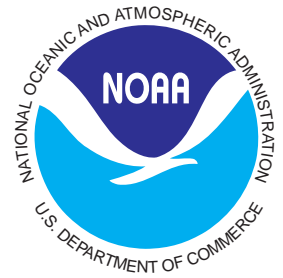


# *The Southwest Fisheries Science Center's*



## *2010 Billfish Newsletter*

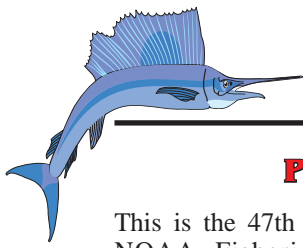
 *2008 and 2009 Surveys: Trends in Angler  
Catch Rates*

 *2008 and 2009 Billfish Tagging and Recoveries*

 *Top Anglers and Captains Acknowledged*

 *Successful Catch and Release*

 *Highlight on North Pacific Swordfish*



## PROLOGUE

This is the 47th issue of the *Billfish Newsletter*. NOAA Fisheries and the billfish angling community have combined efforts to measure angler success for billfishing, creating one of the longest time series available for recreational billfishing, charting trends in relative abundance for key species. This time series, among others, is key to assessing the health of the stocks. The Southwest Fisheries Science Center remains committed to monitoring recreational billfishing success.

Dr. Francisco Werner Director, Southwest  
Fisheries Science Center

## INTRODUCTION

The 2010 Billfish Newsletter describes ongoing billfish research projects conducted at the NOAA Fisheries Southwest Fisheries Center (SWFSC). Emphasis is on billfish angling in the Pacific Ocean. The results of the 2008 and 2009 International Billfish Angler Survey and the Cooperative Billfish Tagging Program for the Pacific are described in this issue. The data presented are the result of cooperation with billfish anglers, sportfishing clubs, commercial fishers, and agencies affiliated with the SWFSC. We express our sincere gratitude to all anglers completing the Angler Survey forms and to all those who tag and release billfish and report recaptures of tagged billfish. Your efforts are helping to monitor and conserve these magnificent fish. We welcome comments concerning both the Survey and Tagging programs as well as the contents of this Newsletter.

## THE INTERNATIONAL BILLFISH ANGLER SURVEY

The Billfish Angler Survey provides the only estimates of recreational billfish angling activities for the Pacific and Indian Oceans. This collection of recreational billfish catch and effort data began in 1969 and now provides a 41-year index of fishing success in many areas of the Pacific. Catch-per-unit-effort (CPUE) is measured in number of billfish caught per angler fishing day. The time series of angler success provides a measure of relative abundance and is the only survey independent of commercial fisheries in the Pacific. Trends in CPUE tracked over time may indicate changes in the health and size of billfish stocks. These indices of relative abundance are important to scientists because the information is used for analyses of stock condition, developing management options, and monitoring fishery interactions.

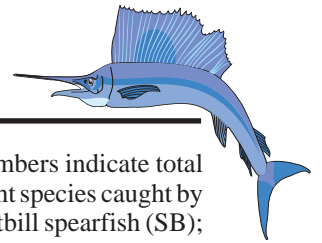
In order to improve the reliability of the catch and effort statistics, we encourage more anglers to submit Survey cards. We mail forms to anglers who have submitted a completed Survey or Billfish Tagging card in the last three years. If you or someone you know does not currently receive the Angler Survey or would like additional forms, please do not hesitate to contact us. Alternatively, the form can be downloaded from the SWFSC website and mailed to our office: <http://swfsc.noaa.gov/FRD-Billfish/>.

The Angler Survey results presented here are primarily for the Pacific areas, although anglers also reported some fishing activity in the Indian and Atlantic Oceans. In 2008, throughout all areas, anglers reported catching 2,847 billfish during 4,176 fishing days (0.68 CPUE); in 2009, 2,175 billfish were caught during 4,756 fishing days (0.46 CPUE). Fishing effort, in angler fishing days, and CPUE, in billfish catch per fishing day are shown by location in **Table 1** for all billfish reported caught in these two years.

In each reporting year, interesting catch and effort trends were revealed. Higher fuel prices and an economic downturn in 2008 may have had some negative effect on our survey respondents' fishing efforts. The number of fishing days reported in 2008 was the lowest in over 20 years. Over 14,000 fishing days were reported in the Pacific in 1986, compared to 4,137 in 2008 - a reduction of over 70 percent. The good news was that anglers reported higher catch rates per fishing day. In 2008, mean CPUE was 0.68 in the Pacific; in 1986, respondents averaged 0.51 billfish per fishing day in the Pacific. Anglers reported spending more time on the water in 2009, but the billfish catch total was down from the previous year, which resulted in a relatively low catch per fishing day (0.46 CPUE). In both of our highest reporting areas, Hawaii and Baja California, there was a drop in mean billfish catch rates in 2009; Hawaii CPUE dropped from 0.47 in 2008 to 0.38 and Baja CPUE dropped from 1.59 to 0.71.

## PACIFIC BLUE MARLIN

Blue marlin are tropical and sub-tropical in distribution and continue to be the most common species encountered by billfish anglers in Hawaii and the central and western Pacific island nations. In 2008, anglers reported the highest blue marlin catch per fishing day (0.29 CPUE) off Hawaii in over thirty years. A total of 447 blue marlin were reported caught, which was down from recent years; however, the number of fishing days reported was the lowest since 1988. In 2009, catch per fishing effort off Hawaii was also relatively high (0.27). Anglers spent more time on the water off Hawaii in 2009 than 2008 and also caught more blue marlin (646). Conversely, blue marlin CPUE off Baja California, Mexico during the two reporting years was low. In 2008, blue marlin catch per fishing day was 0.04, which was the lowest reported CPUE from this area since 1981. Baja California was one of the few locations where fishing effort increased in 2008 from the previous year; however, the number of blue marlin reported caught decreased from 72 in 2007 to 32 in 2008. In 2009, the blue marlin catch per fishing effort was 0.05. The number of blue marlin reported caught (35) was similar to 2008, as was the number of fishing days (700). In the western Pacific, a relatively high blue marlin CPUE of 0.55 was reported from Japan in



**Table 1.** Catch and effort reported for the 2008 and 2009 International Billfish Angler Surveys. Numbers indicate total days fished by location, number of billfish caught, and the catch-per-fishing day. The most predominant species caught by area is also listed: striped marlin (SM), blue marlin (BL), black marlin (BLK), swordfish (SWF), shortbill spearfish (SB); and sailfish (SF).

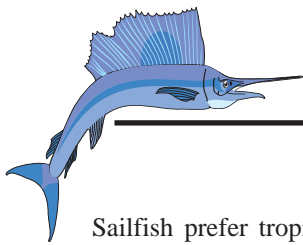
LOCATION	YEAR	ANGLER FISHING DAYS	NUMBER OF BILLFISH	BILLFISH PER FISHING DAY (CPUE)	MAJOR SPECIES
<b>PACIFIC OCEAN</b>					
Acapulco, Ixtapa, Zihuatanejo	2008 2009	74 236	126 167	1.70 0.71	SF SF
Australia	2008 2009	101 77	44 50	0.44 0.65	BLK BLK
Baja California	2008 2009	760 700	1,238 502	1.63 0.72	SM SM
Costa Rica	2008 2009	89 38	184 66	2.07 1.74	SF SF
Fiji	2008	16	2	0.13	SF
Guam	2008 2009	2 2	2 1	1.00 0.50	BL BL
Guatemala	2009	12	139	11.58	SF
Guaymas/Sonora	2008 2009	18 4	1 0	0.06 0.00	SF
Hawaii	2008 2009	1,544 2,399	724 910	0.47 0.38	BL BL
Japan	2008 2009	38 15	23 5	0.61 0.33	BL SF
Malaysia	2008	4	27	6.75	SF
Manzanillo/Colima	2008 2009	71 57	56 17	0.79 0.30	SF SF
Marshall Islands	2008	5	3	0.60	BL
Mazatlan/Sinaloa	2008 2009	41 10	49 11	1.20 1.10	SF SF
New Guinea	2008	10	4	0.40	BL
New Zealand	2008 2009	23 29	21 6	0.91 0.21	SM SM
Panama	2008 2009	51 74	50 68	0.98 0.92	SF BLK
Puerto Vallarta	2008 2009	69 101	24 41	0.35 0.41	BL/SF SF
Solomon Is./New Caledonia/Vanuatu	2008	7	2	0.29	SF
Southern California	2008 2009	1,079 920	184 152	0.17 0.17	SM SM
Tahiti	2008 2009	94 41	33 12	0.35 0.29	BL BL

2008. Thirty eight fishing days were reported, which was the mean number of fishing days of effort reported from this area over the past 10 years, and 21 blue marlin were caught by those respondents. In 2009, blue marlin CPUE off Japan was 0.13. Both effort (15 fishing days) and blue marlin catch (2) decreased from the previous year. Blue marlin catch was also reported off central and southern Mexico, Costa Rica, Dominican Republic, Panama, Australia, New Zealand, Brazil, St. Thomas, and Madeira Islands. Trends in mean angler catch rates for blue marlin in areas with high reporting rates are shown graphically in [Figure 1a](#).

LOCATION	YEAR	ANGLER FISHING DAYS	NUMBER OF BILLFISH	BILLFISH PER FISHING DAY (CPUE)	MAJOR SPECIES
<b>ATLANTIC OCEAN</b>					
Brazil	2008 2009	7 14	2 10	0.29 0.71	BL BL
British/U.S. Virgin Islands	2008	7	2	0.29	BL
Cancun/ Isla Mujeres/ Yucatan	2008 2009	5 1	8 0	1.60 0.00	SF
Dominican Republic	2008	7	9	1.29	BL
Florida	2008 2009	43 16	27 5	0.63 0.31	SF SF
Madeira Islands	2008	10	2	0.20	BL/SB
Miami or Keys	2009	2	7	3.50	SF
St. Thomas	2009	8	6	0.75	BL
<b>INDIAN OCEAN</b>					
Mauritius Island	2008	1	0	0	
<b>Totals</b>	<b>2008 2009</b>	<b>4,176 4,756</b>	<b>2,847 2,175</b>	<b>0.68 0.46</b>	<b>SM BL</b>

### STRIPED MARLIN

Striped marlin is the most common billfish species encountered by anglers off southern California and northern Mexico, and also off New Zealand. The 2008 striped marlin catch per fishing day from all reporting areas in Mexico was 1.14, which was the second highest on record ([Figure 1b](#)). The 2009 CPUE (0.38) was closer to average after fishing effort increased from the previous year to over 1,100 fishing days and total striped marlin catch dropped to 424. Within Mexico, Baja California is an angling hotspot for striped marlin according to our survey results. The 2008 striped marlin catch per fishing day off Baja California was high (1.52) as more striped marlin were reported caught in this area (1,158) than any other despite a relatively small effort (760 fishing days) compared to previous years. Anglers off southern California also indicated relatively good striped marlin CPUE in 2008 and 2009. Respondents reported 0.17 marlin per fishing day off this area in 2008; 179 striped marlin were caught in 1,079 angler days. Similarly, striped marlin CPUE off southern California in 2009 was 0.16; anglers reported catching 147 striped marlin in 920 fishing days. In the southwest Pacific, respondents also had relatively good results during 2008 catching 15 stripers in 23 fishing days (0.65 CPUE) off New Zealand. Striped marlin catch was also reported from other Pacific locations including Hawaii, Australia, Costa Rica, Japan, and Tahiti. The data shown for Mexico is an average for all areas in the country where survey respondents fished.



**SAILFISH**

Sailfish prefer tropical habitat and are abundant in eastern Pacific coastal and offshore waters from Mexico to Ecuador. The highest sailfish CPUE reported through the International Billfish Angler Survey is typically from southern Mexico and Central America, and 2008 and 2009 were no exception. The sailfish catch per effort from all of Mexico was 0.24 in 2008 and 0.20 in 2009, which is consistent with catch rates reported over the past decade. However, hidden in the country's sailfish CPUE is a dichotomy between fishing locations north and south of Cabo San Lucas, Baja California, Mexico. Over the two reporting years, respondents reported catching an average of one sailfish for every 16 days of fishing (0.06 CPUE) north of the tip of Baja. In contrast, fishing success for sailfish at locations south of the tip of Baja was far greater; more than one sailfish was caught every fishing day (1.73 CPUE). Sailfish CPUE off Central America was down in 2008 and 2009 in comparison to recent years. Survey responses indicated a mean catch rate of greater than two sailfish per fishing day off Costa Rica in all but one year since 2000; however, sailfish catch per fishing day off Costa Rica in 2008 and 2009 were below two at 1.83 and 1.58, respectively. Anglers in Panama reported catching 0.41 sailfish for every day fishing in 2008 (22 sailfish in 51 days), which was the fourth lowest CPUE reported from this area since 1975. The lowest CPUE reported from Panama was in 2009 when 25 sailfish were caught during 74 fishing days (0.34 CPUE). Unfortunately, after 20 years of data from Guatemala, there were no reports of fishing from this area in 2008. However, respondents did report from Guatemala in 2009 and the results indicated a very good year. Sailfish CPUE off Guatemala in 2009 was 11.58; 139 sailfish were caught in 12 fishing days! Sailfish catch was reported from other areas including Florida, Hawaii, Fiji, Solomon Islands, Japan, Tahiti, St. Thomas, Brazil, Guam, Australia, and New Guinea. **Figure 1c** shows the trend in catch rates over time for Central America countries with high reporting rates and all of Mexico combined.

**SHORTBILL SPEARFISH**

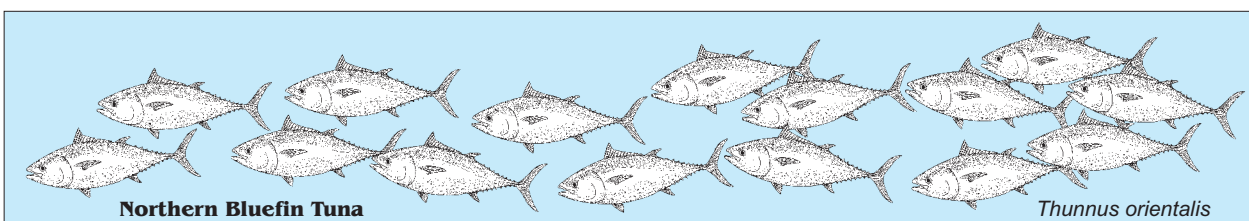
The shortbill spearfish is an oceanic species with limited abundance near the west coasts of the U.S., Mexico, and Central America. Most reports of shortbill spearfish catch by Survey anglers occur off Hawaii. In 2008, anglers reported catching 0.11 shortbill spearfish per fishing day off Hawaii; 167 shortbills were caught in 1,544 fishing days. Shortbill spearfish CPUE off Hawaii was down slightly in 2009 (0.07). A similar number of spearfish were caught (163) in a greater number of fishing days (2,398). Only 5 other shortbill spearfish were reported caught during the two reporting years in three locations: Tahiti (3), Brazil (1), and Madeira Island (1).

**BLACK MARLIN**

Black marlin are typically found in tropical and subtropical waters and occasionally frequent temperate areas. They are the most common species encountered by billfish anglers in Australia. In Australia's waters, survey respondents reported 0.37 CPUE in 2008; 37 black marlin were caught in 101 fishing days. A similar black marlin catch per effort (0.31) was reported in 2009 when 24 black marlin were caught within 77 angler days. Comparatively, these catch rates for this species off Australia are low, but large fluctuations in Australia's black marlin CPUE have been recorded throughout the survey (**Figure 1d**). Hopefully 2010 will be much better! Black marlin CPUE off Panama has been trending upward since 2004. Anglers in Panama reported a black marlin CPUE of 0.39 in 2008 when 21 black marlin were caught in 54 fishing days. In 2009, the success rate improved as the black marlin CPUE increased to 0.46 (34 black marlin in 74 fishing days). 2008 and 2009 had the fourth and second highest black marlin CPUE respectively, in this area in over 30 years. In fact, half of the black marlin captures reported in 2009 occurred off Panama. Moreover, 2009 was one of the few years when anglers reported capturing a greater number of black marlin than sailfish off Panama. Black marlin are often caught off Puerto Vallarta and around the tip of Baja California, Mexico, but their distribution rarely extends into southern California waters. However, in 2009 four black marlin captures were reported from southern California. Black marlin captures were also reported from several Mexico locations during both reporting years. Off Baja California, four black marlin were reported taken in 2008 and seven were captured in 2009. Off Puerto Vallarta, four and six black marlin were caught by Survey anglers in 2008 and 2009, respectively. Black marlin catch was also reported from Costa Rica and Hawaii.

**BROADBILL SWORDFISH**

Fishing for swordfish differs from other billfishing in that the fish are generally targeted at night. Swordfish are a commercially important fish but have historically not been taken in high numbers by recreational anglers in the Pacific. Even so, a few recreational anglers responded to the International Billfish Angler Survey with positive swordfish catch off Southern California (4), and New Zealand (3) in 2008; and off Hawaii (1), New Zealand (2), and Florida (1) in 2009.



Northern Bluefin Tuna

*Thunnus orientalis*

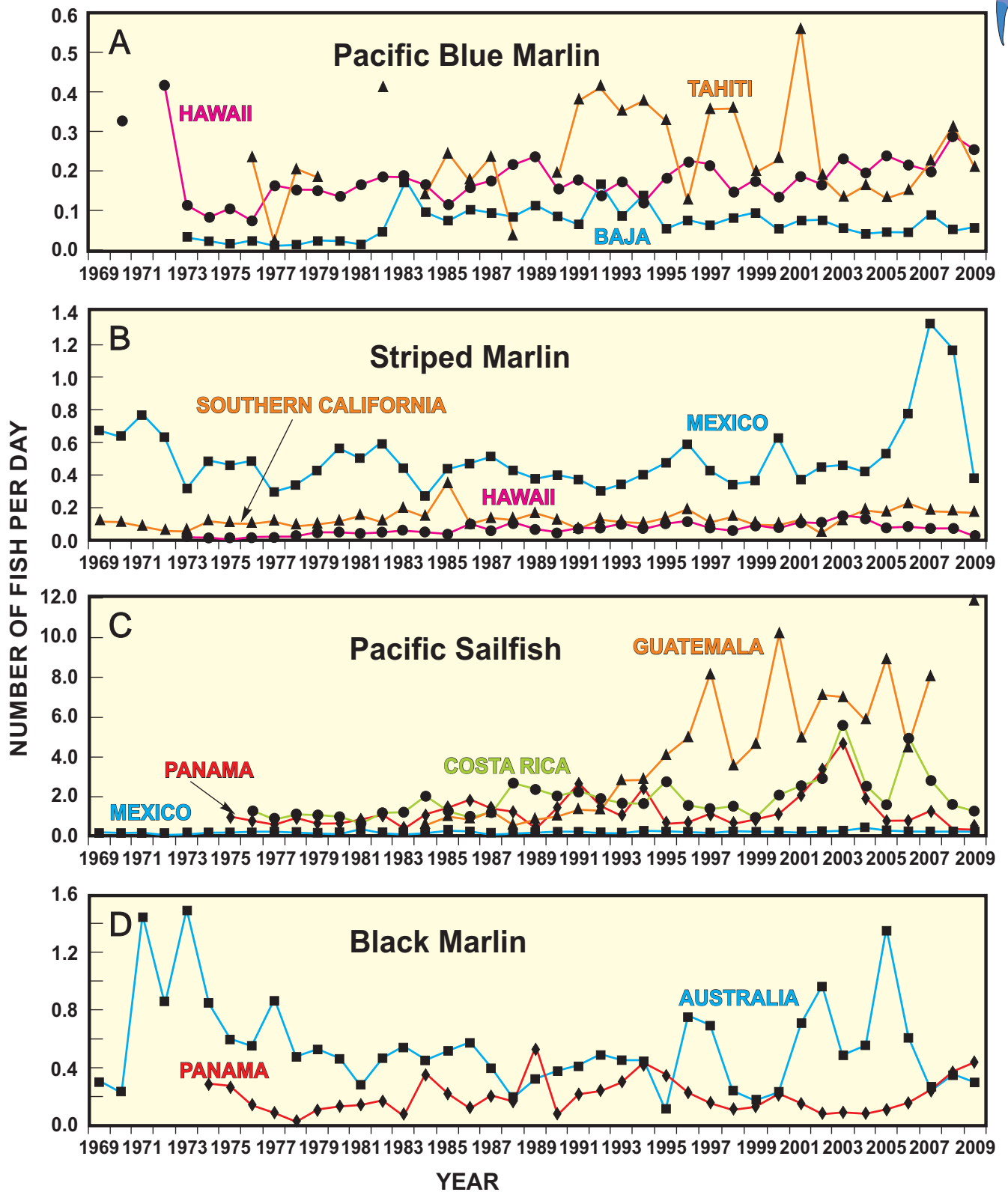
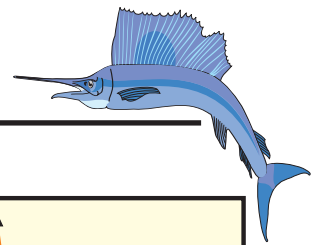
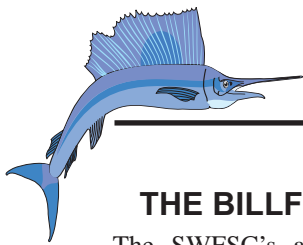


Figure 1. Catch-per-unit-effort (CPUE) in number of fish per angler day reported by region from 1969 to 2009 for blue marlin (A), striped marlin (B), Pacific sailfish (C), and black marlin (D).



### THE BILLFISH TAGGING PROGRAM

The SWFSC's angler-based Billfish Tagging Program began in 1963 and has provided tagging supplies to billfish anglers for 48 continuous years. Tag release and recapture data are used to determine movement and migration patterns, species distribution, and growth. This volunteer tagging program depends on the participation and cooperation of recreational captains and anglers, sportfishing organizations, and commercial fishers. Since it's inception, over 60,000 fish have been tagged and released (Table 2). Our emphasis continues to focus on the skillful tagging of all billfish in the Pacific and Indian Oceans. Other species tagged over the years through other collaborations and independent research efforts are reported here as general interest and also so that anglers will know to look out for tags on a number of different species. While we consider tag-and-release vital for conservation, we do not encourage the use of our billfish tags for non- billfish. **We encourage all anglers to tag and release live billfish, so if you want to tag as part of our program, please let us know and we will send you tags!**

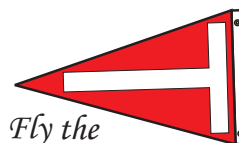
The annual number of billfish tag releases has increased since 2007! The number of tags released on billfish went up from 840 in 2007 to 866 in 2008, followed by another increase to 871 in 2009 (Table 2). In 2008, more tags were released on all but two species, striped marlin and black marlin, than the previous year. There was a jump of over 250 percent in the number of sailfish tagged between 2007 and 2008. Conversely, in 2009, there was a decrease from 2008 in the number of tags released on most billfish species. The exception was blue marlin, which anglers have been tagging in increasing numbers in recent years. The successful blue marlin tagging effort is largely a result of billfish tournament operators and fishing charter captains around Hawaii who strongly support the tagging program. In addition to billfish, several species were tagged by SWFSC researchers during research trips in 2008 and 2009.

Table 2. Summary of all fish tagged in 2008 and 2009 with releases and recoveries for the period 1963-2009.

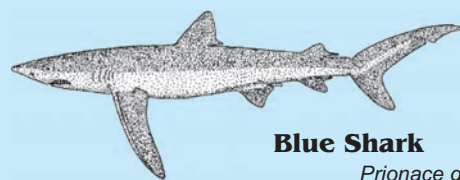
Species Name	Release 2008	Release 2009	Release Total	Return Total	Rate %
Striped Marlin	177	72	22,890	343	1.50
Pacific Blue Marlin	504	660	10,444	89	0.85
Sailfish	75	58	9,179	49	0.53
Billfish, unid.	9	16	4,377	6	0.14
Black Marlin	1	1	3,385	69	2.04
Shortfin Mako Shark	55	206	2,247	95	4.23
Shortbill Spearfish	100	64	2,111	2	0.09
Blue Shark	268	140	1,030	69	6.70
Common Thresher	283	203	1,056	53	5.02
Broadbill Swordfish	0	0	521	17	3.26
Yellowfin Tuna	0	0	348	25	7.18
Skipjack Tuna	1	0	100	2	2.00
Albacore Tuna	43	41	717	29	4.04
Bigeye Tuna	0	0	79	2	2.53
Bluefin Tuna	0	0	58	8	13.79
Bronze Whaler Shark	0	0	51	1	1.96
Hammerhead Shark	0	1	51	1	1.96
Atlantic Blue Marlin	0	0	43	0	0.00
Salmon Shark	0	0	33	1	3.03
Silky Shark	0	0	21	0	0.00
White Marlin	0	0	13	1	7.69
Basking Shark	0	0	7	0	0.00
Longbill Spearfish	0	0	3	0	0.00
Other Tunas	0	0	21	1	4.76
All Others	6	3	2,652	98	3.70
<b>TOTAL</b>	<b>1,522</b>	<b>1,401</b>	<b>61,437</b>	<b>961</b>	<b>1.56</b>

### SHARK RESEARCH PROGRAM

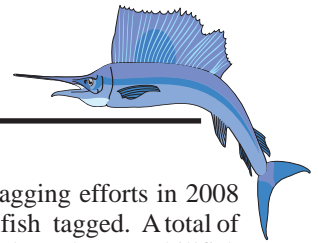
The SWFSC's Large Pelagics group has a significant shark research program. Tagged and recaptured sharks in that program are mentioned here as general interest and because we need your support to look for bright yellow and/or white tags on the dorsal fin of shortfin mako, blue, and thresher sharks. These specially tagged sharks are part of our age and growth studies and are very important. These sharks were tagged with oxytetracycline which leaves a growth mark on the shark's vertebrae. We offer a US\$100.00 reward for the return of the tag with a four inch section of the vertebrae. Please notify this office as soon as possible if you catch one of these tagged sharks.



*Fly the Tagging Flag!*



**Blue Shark**  
*Prionace glauca*



**Table 3.** Summary of billfish tagged during 2008 and 2009, by region.

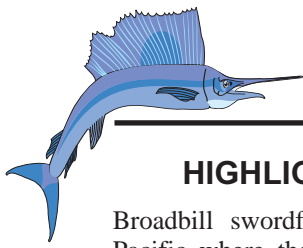
AREA	SPECIES	TOTAL
<b>PACIFIC OCEAN</b>		
Hawaii, U.S.A.	Pacific Blue Marlin	1,133
	Shortbill Spearfish	164
	Striped Marlin	75
	Marlin, unidentified	8
	Sailfish	3
	Black Marlin	1
Baja California	Striped Marlin	116
Baja California Sur	Sailfish	17
	Marlin, unidentified	3
Acapulco / Ixtapa / Zihuatanejo, Guerrero	Pacific Blue Marlin	2
	Sailfish	73
	Striped Marlin	4
Southern California	Pacific Blue Marlin	1
	Striped Marlin	55
	Marlin, unidentified	14
Huatulco, Oaxaca	Pacific Blue Marlin	5
	Sailfish	21
Puerto Vallarta, Jalisco	Pacific Blue Marlin	3
	Sailfish	7
	Striped Marlin	4
Fiji	Striped Marlin	2
	Sailfish	6
Manzanillo, Colima	Pacific Blue Marlin	1
	Striped Marlin	3
	Sailfish	2
Samoa	Pacific Blue Marlin	3
Tahiti	Pacific Blue Marlin	3
Guaymas, Sonora	Sailfish	2
French Polynesia	Pacific Blue Marlin	1
Marshall Islands	Billfish, unidentified	1
Mazatlan, Sinaloa	Sailfish	1
Panama	Striped Marlin	1
<b>INDIAN OCEAN</b>		
Mauritius Island	Pacific Blue Marlin	1
<b>UNKNOWN LOCATION</b>		
	Pacific Blue Marlin	1
	Shortbill Spearfish	1
<b>TOTAL</b>		<b>1,737</b>

**Table 3** shows the cumulative tagging efforts in 2008 and 2009, by area, for all billfish tagged. A total of 1,737 billfish were tagged and released. Most billfish were tagged and released in U.S. or Mexican waters. Additionally, billfish were tagged and released by anglers across the Pacific in locations including Fiji, Samoa, Tahiti, Polynesia, Marshall Islands, and Panama. In the Indian Ocean, one blue marlin was tagged off Mauritius. A total of 1,384 tags were deployed on billfish off Hawaii, representing nearly 80 percent of the tagging effort. According to Survey respondents, which also include many of our taggers, anglers averaged less time fishing off Hawaii during 2008 and 2009 than the previous two years (2006-2007). Nevertheless, a greater number of tags were released, which may represent the focused tagging efforts that occur during tournaments. Anglers off Mexico were also very active taggers. During 2008 and 2009, a total of 262 billfish were tagged off Mexico. Most of the tagging effort off Mexico was concentrated off Baja California, where the majority of striped marlin were tagged and released. The tip of Baja, including the fishing towns of Cabo San Lucas, Los Cabos, and La Paz, has historically been considered a “Billfishing Capital of the World”. Elsewhere in Mexico, a high number of sailfish were tagged off Acapulco (73) and Huatulco (21). Thanks to everyone involved!

**PAPER REDUCTION ACT NOTIFICATION**

NOAA Fisheries needs the information reported on Billfish Tagging Cards and the International Billfish Angler Survey for the conservation and management of fishery resources. The information will be used for billfish research. Public reporting burden for both the International Angler Survey and the Billfish Tagging Card are estimated to average five minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate to the SWFSC, 8604 La Jolla Shores Drive, La Jolla, CA 92037. The information submitted will become a public record. Notwithstanding any other provision of the law, no person is required to, nor shall any person be subject to a penalty for failure to comply with collection of information subject to the requirements of the Paperwork Reduction Act, unless that collection of information displays a currently valid OMB Control Number.





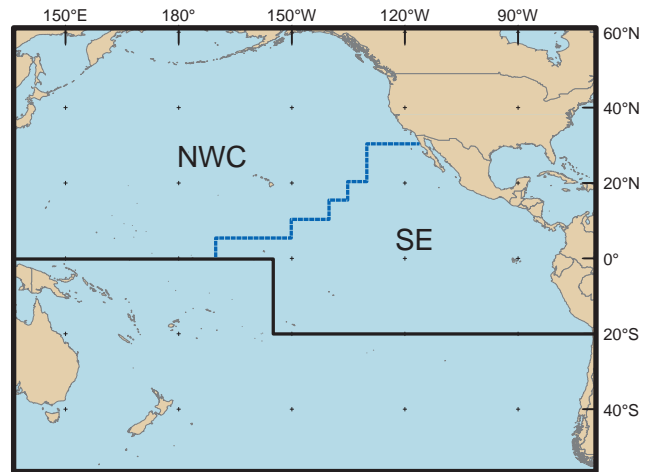
### HIGHLIGHT ON NORTH PACIFIC SWORDFISH AND STOCK STATUS UPDATE

Broadbill swordfish are widely distributed across the Pacific where they are typically encountered in coastal boundary currents or in the high seas transition zones. Consequently, commercial fisheries targeting swordfish are typically concentrated in these areas. In the North Pacific, the average annual commercial swordfish harvest from 1999-2008 was 13,576 mt ( $\pm 2,951$  SD). Swordfish fisheries in the North Pacific are managed by the Inter-American Tropical Tuna Commission (IATTC) and the Western and Central Pacific Fisheries Commission (WCPFC). The IATTC manages fishery resources distributed east of 150°W while the WCPFC manages resources west of 150°W. These lines do not correspond to the currently accepted stock boundaries and thus assessments are coordinated between these organizations.

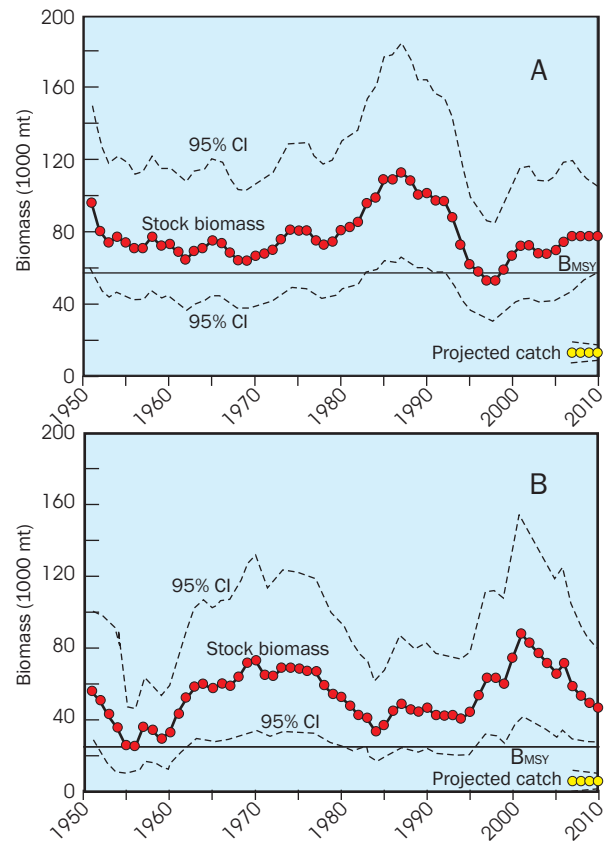
While work on stock structure in the North Pacific is ongoing, genetics and patterns in catch data suggest that the swordfish population is comprised of two stocks; one in the northwest and central North Pacific (NWC) and one in the southeastern North Pacific (SE) (Figure 2). Two genetic studies conducted by researchers from Stanford and Texas A & M Universities showed that swordfish from these two regions have significantly different gene frequencies. In addition, detailed analyses conducted by scientists at the Japanese National Research Institute of Far Seas Fisheries and the National Marine Fisheries Service, Pacific Islands Fisheries Science Center (NMFS, PIFSC) of spatial patterns in Japanese longline catch data revealed differences in CPUE between areas. Interestingly, the swordfish stock boundary coincides with the interface of three major currents in the northeastern Pacific: the California Current, the North Pacific Equatorial Countercurrent, and the North Pacific Tropical Gyre. This suggests that oceanography may act to create physical barriers to spawning locations.

While two North Pacific stocks are currently recognized, there is some suggestion these two stocks are utilizing a common foraging ground off the U.S. West Coast in the California Current. Largely anecdotal data suggests the existence of differences in both morphology and parasite load between fish arriving to this area off California from the south and west. Research is ongoing at the SWFSC and PIFSC to further explore the stock structure in the North Pacific and determine if mixing is occurring off the U.S. West Coast and if so, the extent of temporal and spatial patterns in mixing. This includes conventional and electronic tagging studies, genetic analysis, and otolith microchemistry. It is hoped that these efforts will yield further insights into swordfish movements, biology, and stock structure.

The Billfish Working Group of the International Scientific Committee on Tuna and Tuna-like Species (ISC) conducts stock assessments of North Pacific swordfish. The latest full stock assessment was conducted in 2009 with an update in 2010 that incorporated missing catch data for the SE region only. Estimates of exploitable swordfish biomass

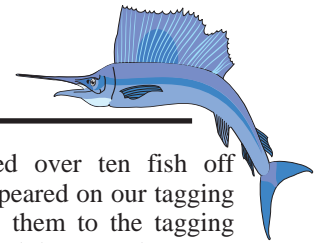


**Figure 2.** Geographic regions corresponding to the two North Pacific swordfish stocks: the northwest and central North Pacific (NWC) stock and southeastern North Pacific (SE) stock. The NWC swordfish stock was assessed as part of a North Pacific-wide assessment in 2009. In 2010, the assessment of the SE stock was updated.



**Figure 3.** Time series of estimated swordfish biomass in the A) northwest and central North Pacific and B) southeastern North Pacific from 1951-2006, with 95% confidence intervals, along with projected biomass in 2007-2010 at constant fishing effort. Also shown are the estimated levels of biomass at the maximum sustainable yield (BMSY).





(ages 2 and older) and harvest rate (fraction of exploitable biomass harvested per year) were derived from fishery catch and standardized CPUE data along with swordfish life history information. Throughout most of the time period, between 1951 through 2006, the exploitable biomass of the NWC swordfish stock was at or above the biomass that would maximize yield (Figure 3), while exploitation rates were at or below the harvest rates that would maximize yield. A similar result was found for the SE stock. For both stocks, projections of swordfish yield and biomass through 2010 suggested that exploitable biomass should be sufficient to sustain current levels of catch. Overall, the assessment results indicated that the two swordfish stocks are relatively healthy and overfishing is not occurring. The ISC Billfish Working Group plans to complete another assessment of North Pacific swordfish in 2013.

### CAPTAIN AND ANGLER ACKNOWLEDGMENTS

We are proud to recognize the cooperating anglers and captains who tag and release billfish. Over 1,100 anglers reported a billfish tag release during 2008 and 2009. Individual recognition of 84 anglers who reported tagging three or more billfish is presented in Table 4. Morten Kristensen put out more tags than any of our recreational anglers over the two years. Morten tagged a total of 20 billfish off Mexico. Herluf Kristensen and Coehen

Ludouico also successfully tagged over ten fish off Mexico. These anglers had not appeared on our tagging list before 2008 and we welcome them to the tagging program. Suzanne Gustavson tagged the second greatest number of fish with sixteen. Other notables that released tags on billfish off Hawaii include Steve Spina, Mike Jacobsen, and James Karamouzis. Don Anderson and Tracy Reitenauer led the recreational tagging effort off Baja with five or more tag releases. John VanDellan tagged seven billfish near Huatulco, Mexico, Clarke Smith tagged ten fish off Puerto Vallarta, and Stan Ecklund Sr. tagged seven billfish off southern California.

Charter and private boat captains who support billfish tag and release (and catch and release) play an important role by supporting ethical angling and conservation stewardship of the marine environment. They set an example by demonstrating skillful release of their billfish catch. During 2008 and 2009, 175 captains reported tagging billfish with their anglers and clients. We gratefully acknowledge those 94 captains who assisted with three or more billfish in specific regions (Table 5). Forty-two captains helped tag 10 or more billfish during the two year period. Captains Chuck Wigzell, John Bagwell, and Mike Shrosbree all deserve recognition for skippering vessels during 75 or more tag and releases within the two-year period. Chuck Wigzell and John Bagwell both skipper off Hawaii.

Table 4. Names of anglers tagging three or more billfish during 2008 and 2009, by area.

ANGLER NAME	BILLFISH TAGGED	ANGLER NAME	BILLFISH TAGGED	ANGLER NAME	BILLFISH TAGGED
<b>ACAPULCO-IXTAPA-ZIHUATANEJO, GUERRERO</b>		<b>HAWAII</b>		<b>HAWAII</b>	
Morten Kristensen	20	John Gamrot	5	Tim Rego	3
Herluf Kristensen	13	Mike Jacobsen	5	Robert Joiner	3
Coehen Ludouico	12	Gary Carruthers	5	Robert Clunes	3
Scott Doman	4	Daron Castoro	5	Robert Brauns	3
Anthony Hill	3	John Patterson	5	Rick Fitts	3
Norman Smith	3	Jim Robinson	5	Randy Wright	3
		Mark Yang	5	Eric Smith	3
		Kevin Casey	5	Ralph Lane Falls III	3
		Uwe Schulz	5	Haruo Kaneko	3
<b>BAJA CALIFORNIA, BAJA CA SUR</b>				Mike Farber	3
Don Anderson	8	Janet B. Martic	4	Laurie Williams	3
Tracy Reitenauer	5	John Bowers	4	Carol Ann Griss	3
Don Bear	4	David Sullivan	4	Stephen Gunther	3
Steve Blackburn	4	Carl Bland	4	<b>HUATULCO, OAXACA</b>	
Brad Allin	3	Brooke Smith	4	John VanDellan	7
Jason J. Shephard	3	Brad Damasco	4	Chris Kaman	4
		Bob Hoffman	4	<b>PUERTO VALLARTA, JALISCO</b>	
		Bob Chung Gon	4	Clarke Smith	10
		Chris Gamrot	4	<b>SOUTHERN CALIFORNIA</b>	
		Randy Wein	4	Stan Ecklund, Sr.	7
<b>HAWAII</b>				Reed Miller	5
Suzanne Gustavson	16	Kihachirou Suzuki	4	Lynn Jasper	4
Steve Spina	14	Michael C. Corbino	4	Shane Melton	4
Mike Jacobsen	14	Kenneth R. Corday	4	William H. MacCorkell	4
James Karamouzis	12	Buzz Colton	3	Dell Primrose	3
Charles Helscel	9	Sally L. Kurz	3	Don Orr	3
Kevin Capps	8	Scott Crampton	3	Gerald A. Garrett	3
Rick Chaponot	7	Keith G. Hollingworth	3	Kathy Ecklund	3
Masaharu Matsushita	6	Roger D. Pearson	3		
Paul Winter	6	Bill Ingram	3		
Duane Bunch	6	Bridget Hurlbut	3		
Al Sullivan	6	Bill Henson	3		
David Pilgrim	6	Andrew McLeod	3		
Parke Berolzheimer	6	Todd Barrett	3		
Hidemi Hayaishi	5	Tom Sondag	3		

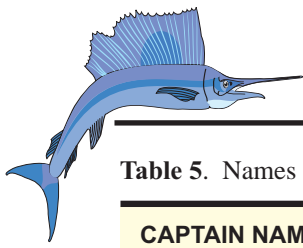


Table 5. Names of captains tagging 3 or more billfish during 2008 and 2009, by area.

CAPTAIN NAME	BILLFISH TAGGED
<b>ACAPULCO-IXTAPA-ZIHUATANEJO, GUERRERO</b>	
Martin G. Cortez	51
Richard Hamilton	20
Julio Bustos	3
<b>BAJA CALIFORNIA, BAJA CA. SUR</b>	
Mike Shrosbree	75
Richard Hamilton	18
Harold Schram	10
Tom Patierno	8
Paulino Martinez (Castro)	7
Martin Collins	4
Martin Ochea	3
<b>FIJI</b>	
Solo Ratu	3
<b>HAWAII</b>	
Chuck Wigzell	79
John Bagwell	76
Guy Terwilliger	63
Teddy Hoogs	60
McGrew Rice	52
Wayne Knight	52
Marlin Parker	49
Steve Epstein	45
Dennis Cintas	42
Tim Hicks	36
Chuck Wilson	35
James Dean	33
Peter Hoogs	32
Jeffrey Fay	31
Kevin Hibbard	31
William Dorr	30
Bill Crawford	27
Ken Fogarty	26
Bill Casey	25
Chris Kam	24
Robert C. Sylva, Jr.	24

CAPTAIN NAME	BILLFISH TAGGED
<b>HAWAII</b>	
Rob Ellyn	24
Al Gustavson	23
Tom Casey	23
Kerwin Masunaga	20
Neal Isaacs	19
William Lazenby	19
Robert Hudson	17
Allan Ayano	13
Scott Crampton	13
Steven D. Kaiser	11
Jason Holtz	11
Lance Gelman	11
Bruce Herren	10
Brian Wargo	9
Scott M. Fuller	9
Jerry Allen	9
Mike Derego	9
Jeff Metzler	9
Ray Kalman	9
Dave (David) Bertuleit	8
Dave Bensko	8
Steve Carroll	8
Kevin M. Hogan	8
Alan Armstrong	7
Alex Schulz	7
Bill Benbow	7
Bomboy Llanes	6
Doug Lanterman	6
Charles Hauptert	6
Chip Fischer	6
Al Gustavson	5
Mike Holtz	5
Brian (Chip) Van Mols	5
Bruce Evans	5
Mark Shultz	5
Jeff Kahl	5
Terry Adams	5
Loyd Potter	4
Steve Tarbill	4

CAPTAIN NAME	BILLFISH TAGGED
<b>HAWAII</b>	
Dale Leverone	4
David Itano	4
Steven R. Fassbender	4
Nate Cary	3
Hector P. Ubaldo	3
Alan Bakke	3
Rick Reger	3
Ryan Fiedorowicz	3
Robert McGuckin	3
Kim Holland	3
Randy Llanes	3
<b>HUATULCO, OAXACA</b>	
Michael Arujo	24
<b>MANZANILLO, COLIMA</b>	
Howard Bond	4
<b>PUERTO VALLARTA, JALISCO</b>	
Manuel Ocaranza	11
<b>SAMOA</b>	
Clyde Fraser	3
<b>SOUTHERN CALIFORNIA</b>	
Ron Johnson	13
Danny Lee Jones	8
Kathy Ecklund	7
Thomas A. Shanahan	7
Stan Ecklund, Sr.	5
William H. MacCorkell	4
George A. Garrett	3
<b>TAHITI</b>	
Joel Allain	3

Mike Shrosbree skippers off Baja California, Mexico. Five other captains helped tag and release over 50 billfish: Martin Cortez (Acapulco), Guy Terwilliger (Hawaii), Teddy Hoogs (Hawaii), Rice McGrew (Hawaii), and Wayne Knight (Hawaii). Also, special thanks goes out to our captains supporting the tagging program from the far reaches of the western Pacific, namely Joel Allain in Tahiti, Clyde Fraser in Samoa, and Solo Ratu in Fiji. Continued interest and cooperation by all captains has greatly enhanced the Billfish Tagging Program, and your efforts and conservation ethic are truly appreciated. These efforts are a critical component of sustainable billfish angling.

It is important that all Billfish Tagging Program report cards be sent in as soon after tagging as possible. **Please ensure that all fields are filled out when returning tag cards.** This would be a great time to check your tackle boxes and make sure that all Billfish Tagging Program report cards have been sent to our office.



Pacific Sailfish

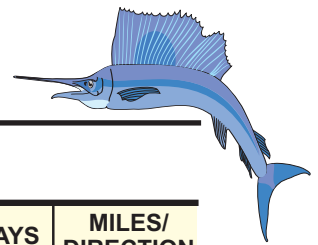


Table 6. Tag recovery information for 2008 and 2009.

TAGGER/CAPTAIN	RELEASE DATE	RELEASE LOCATION	RECOVERY DATE/ ANGLER	RECOVERY LOCATION	DAYS FREE	MILES/ DIRECTION TRAVELED
<b>Pacific Blue Marlin</b>						
Neil Roser Ken Fogarty	01/30/2008	19°30'N 156°W Hawaii	01/31/2008 Tim Hicks	19°30'N 156°W Hawaii	1	0
Victor Cann Gus Sellers	08/02/2005	19°30'N 156°W Hawaii	02/19/2008 Budi Santos	Hawaii	931	N/A
Haruo Kaneko Guy Terwilliger	07/31/2008	19°23'N 156°02'W Hawaii	12/12/2008 Shirahama	12°10'N 177°56'E Marshall Islands	134	1,562 - SE
Mike Jacobsen James Dean	01/23/2009	19°N 156°W Hawaii	01/29/2009 Tom Dunagan	19°01'N 155°09'W Hawaii	6	6 - NE
No Release Card	N/A	N/A	05/10/2009 Michael Marsik	11°48'N 165°52'W High Seas	N/A	N/A
Limited Release Information	N/A	Hawaii	07/23/2009 Hoshina	19°22'N 155°59'W Hawaii	N/A	N/A
John Bowers Brian Wargo	07/11/2009	Hawaii	07/31/2009 Richard Thompson	19°44'N 156°04'W Hawaii	20	N/A
<b>Striped Marlin</b>						
Mitsuru Sato Chip Fischer	08/06/1998	19°36'N 156°02'W Hawaii	04/06/2008 Wawan Sugiawan	12°26'N 179°08'E Marshall Islands	3,531	1,497 - SE
Will A. Courtney Mike Shrosbree	10/04/2008	23°03'N 110°16'W Baja California	10/19/2008 Carmen Piucci	23°N 109°27'W Baja California	15	45 - E
Tom Parker Billy Dorr	01/12/2009	19°40'N 156°05'W Hawaii	10/12/2009 Michael Marsik	26°09'N 146°00'W Hawaii	273	705 -NE

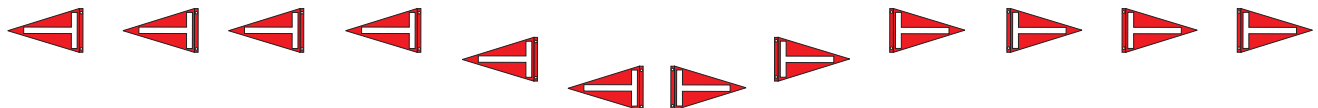


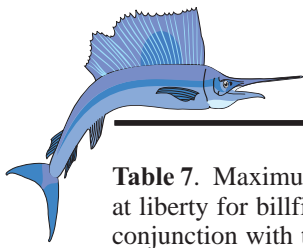
**TAG RECOVERIES IN 2008 AND 2009**



Tag recoveries are a vital part of the Tagging Program because they allow us to track movements of highly migratory billfish species and monitor growth and mortality rates. In past years, as many as 27 recoveries have been recorded in a single year; however, in recent years those numbers have significantly dropped. We encourage all anglers to report tag recoveries, including those that are re-released with or without new tags. Five recoveries were reported in each 2008 and 2009. The majority of recoveries during these two years were Pacific blue marlin (Table 6). Three blue marlin were recaptured in 2008, all during the winter months of December, January, and February. One blue marlin was recaptured only one day after it had been released with a tag. Tim Hicks, a regular participant in the Billfish Tagging Program, recognized the tag on the fish and gathered the information to report a recovery and re-release. The second blue marlin recapture occurred after the fish had spent over two years at liberty, ending up very close to where it had been released. The exact location of the recapture was not provided but we were informed the fish was caught near Hawaii. The third blue marlin that was

recaptured in 2008 traveled over 1,500 nautical miles from Hawaii to the Marshall Islands in only 134 days. In 2009, four blue marlin were recaptured, but only one recapture occurred during the winter, in January. Two of the blue marlin recaptures in 2009, including the fish caught in January, were very short deployments, each lasting less than thirty days. Unfortunately, the other two blue marlin recaptures in 2009 were missing deployment information and we were unable to determine the exact length of time and distance each fish traveled. Two striped marlin tags were recovered in 2008, including one recapture that marked the longest billfish tag deployment in the history of the program (Table 7)! The fish was tagged in 1998 around the Hawaiian Islands and after nearly 10 years (3,531 days) was recaptured near the Marshall Islands. During its time at liberty, the striper nearly doubled in length to over 6 feet and migrated almost 1,500 nautical miles to the south-east. The other striped marlin recaptured in 2008 was tagged off Baja California and was caught only fifteen days later. Finally, one striped marlin was recaptured after 273 days at liberty by Michael Marsik in 2009.





**Table 7.** Maximum net distance traveled and longest time at liberty for billfish, tunas, and pelagic sharks tagged in conjunction with the Billfish Tagging Program and other SWFSC research programs during, 1963-2009.

SPECIES	MAXIMUM DAYS AT LIBERTY	MAXIMUM NET MOVEMENT (nmi)
Sailfish	1,717	932
Broadbill Swordfish	1,681	2,573
Striped Marlin	3,531	3,693
Pacific Blue Marlin	1,503	4,450
Black Marlin	1,454	5,763
Shortbill Spearfish	34	173
Albacore Tuna	751	3,085
Bluefin Tuna	1,829	5,116
Yellowfin Tuna	324	850
Skipjack Tuna	290	575
Shortfin Mako Shark	1,938	3,597
Salmon Shark	1,547	285
Blue Shark	888	2,474
Common Thresher Shark	961	426
Silky Shark	175	447

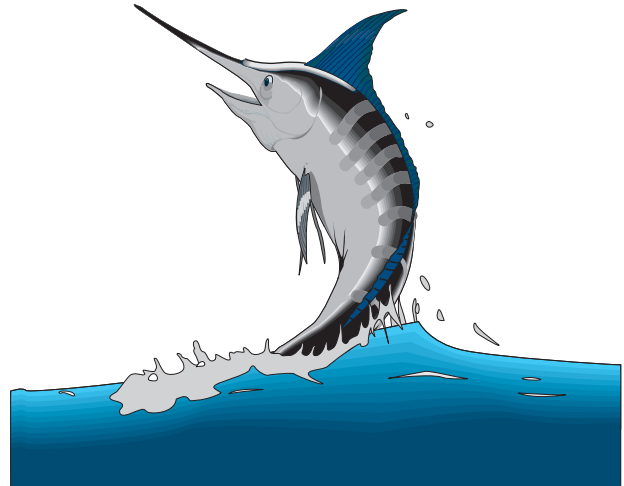
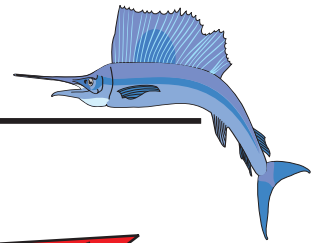


Photo taken by Pat Woodard onboard the *Christina Lynn*, skippered by Bob Wordard. The black marlin in the photo was caught by Bob Woodard Jr. off Montuosa Island, Panama.



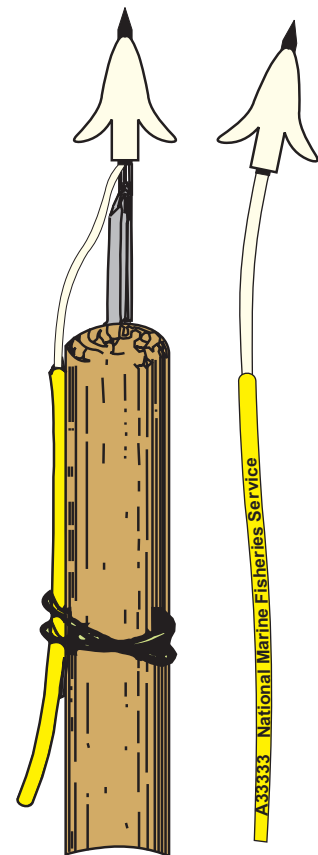
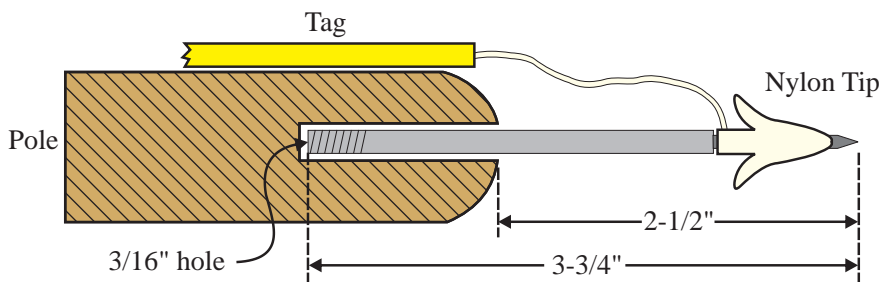
Blue marlin caught on a live Blue Runner on top of the Hannibal Bank, Panama. Photo taken by Pat Woodard onboard the Christina Lynn. Bob Woodard Jr. caught the fish.

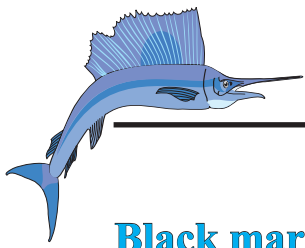


### CONSTRUCTING THE TAGGING POLE

It is important that the billfish tag be applied properly. Tag location, angle, and depth are critical to successful tagging. For striped marlin of 100 to 200 lbs, the tag should be inserted about 2.5 inches deep just below the tallest part of the dorsal fin. For larger fish, such as blue and black marlin, the tagging applicator pin may be 3.5 inches. Conversely, if you are tagging small, narrow fish like sailfish and shortbill spearfish, then it would be better to shorten the pin. Manufactured tagging poles are available at most retail sportfishing stores. It is important to check the length of the applicator pin installed on these poles to ensure the length of the tip matches the fish you are seeking. Some manufacturers produce tagging poles that have pin lengths that are adjustable by moving the stopper.

If you construct your own tagging pole, an old wooden broom or mop handle about five feet long works very well. A hole should be drilled with a 3/16 inch or No. 16 drill bit to a depth of 1.25 inches for the applicator tip (see diagram below). Use a good grade epoxy to secure the applicator pin and seal out saltwater. Please contact our office if you need an applicator tip.

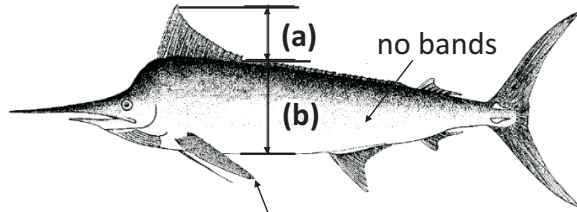




# Identification Guide

## Black marlin

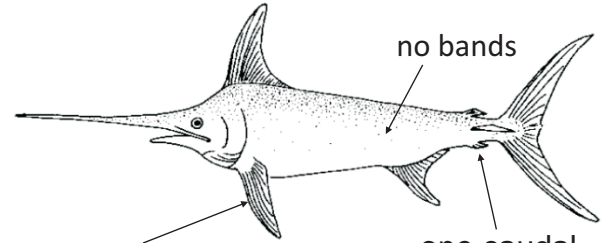
dorsal fin height (a) about half body height (b)



pectoral fins rigid cannot flatten against body

## Swordfish

sword-like bill with smooth surface



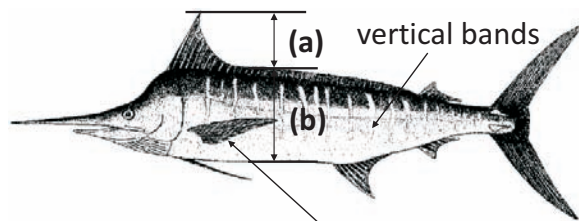
pectoral fins rigid

one caudal keel per side

\* no pelvic fins present

## Blue marlin

dorsal fin height (a) half to three quarters body height (b)



pectoral fins not rigid can flatten against body

\* body more stout than striped marlin

## Shortbill spearfish

short bill

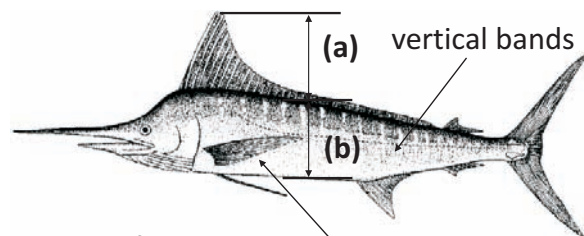


short pectoral fins not rigid

two caudal keels per side

## Striped marlin

dorsal fin height (a) greater than body height (b)

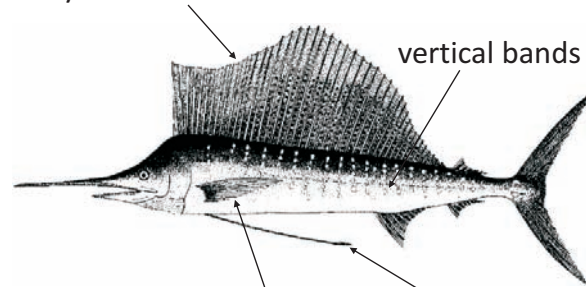


pectoral fins not rigid can flatten against body

\* body more compressed than blue marlin

## Sailfish

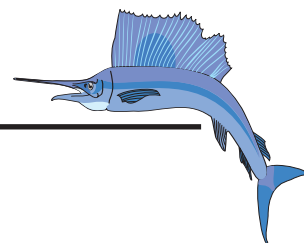
very tall dorsal fin



pectoral fins not rigid can flatten against body

long pelvic fins

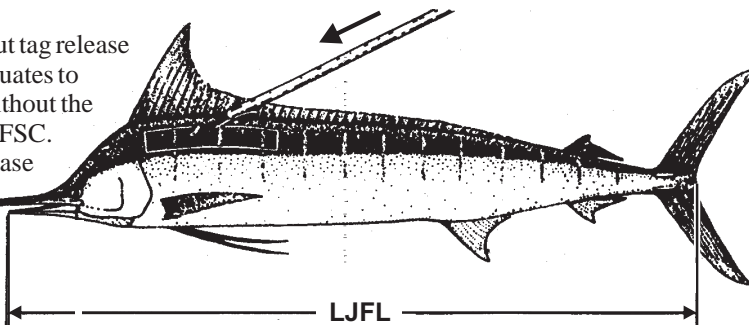




# Tagging Guide

- ▶ **1. BEFORE YOU CATCH YOUR FISH:**  
First decide if you plan to tag and release any fish caught. If so, use a circle hook which reduces deep or foul hooking when bait fishing or a single circle or single 'J' hook if trolling. Do not use double rigged 'J' hooks when releasing your catch.
- ▶ **2. WHILE FISHING:**  
Never attempt to tag a fish while it is jumping or thrashing about. Bring your fish to leader as quickly as possible but wait until the fish is calm and swimming beside the boat before tagging.
- ▶ **3. TAGGING:**  
Tag the fish as it is being towed alongside the boat by inserting the tag in the back muscle below the tallest part of the dorsal fin. Avoid the gills, head, and stomach. Take care not to allow your fish to injure itself on the vessel's transom or hull.
- ▶ **4. RELEASING:**  
Revive all fish by slowly towing it through the water, allowing water to flow over the gills until its normal color returns and it begins to swim on its own. Remove the hook with a good pair of pliers, or if deeply hooked in the throat or stomach, release it by cutting the leader as close to the hook as possible.
- ▶ **5. COMPLETE THE BILLFISH TAGGING REPORT CARD:**  
Fill out the yellow Billfish Tagging Report card completely and as accurately as possible indicating latitude and longitude, date of release, estimated length (lower jaw-to-fork length; LJFL) and estimated weight of the fish. Include name and mailing address of the angler and boat captain and other remarks as appropriate. Return cards promptly to the Southwest Fisheries Science Center.

**PLEASE NOTE:** Billfish recaptures without tag release information now stand at 12 percent. This equates to nearly 7,000 billfish that have been tagged without the release information being returned to the SWFSC. Make your tagging effort count. Tag and release your fish skillfully and return the yellow BILLFISH TAGGING REPORT promptly. Though easily forgotten in the heat of battle and glow of success, returning the card is the most critical and final step in tagging your fish.



## COMPLETING THE BILLFISH TAGGING REPORT CARD

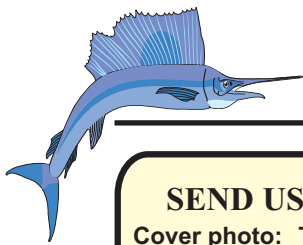
- Fill out the card completely and as accurately as possible.
- Indicate latitude, longitude and locally known fishing area.
- Estimate the length of the fish as "tip of lower jaw-to-fork" length (LJFL).
- Estimate weight of the fish.
- Include any remarks, club name and complete address of the angler and the boat captain.
- Return cards promptly to the Southwest Fisheries Science Center. Tagging is of no value unless this Billfish Tagging Report card is returned. Postage is paid if mailed in the U.S.A.

NOAA, National Marine Fisheries Service If mailing outside USA, postage must be affixed  
**BILLFISH TAGGING REPORT** Please return card. Otherwise tagging is of no value  
 PLEASE FILL IN DETAILS AND MAIL TODAY. TAG #: **A33333**

---

Latitude: 33° 14' N Longitude: 118°14' W  
 Locality: East End Catalina Is. CA  
 Species: Striped Marlin Date: 6/10/98  
 Estimate length (tip of jaw to fork of tail): 72 inches. Weight: 140 lbs.  
 Fish Condition: Good Bait type: Plastic Lure  
 Angler: Bill Fish Fight time (minutes): 23  
 Address: P.O. Box 271 La Jolla, CA Zip: 92038  
 Club: Anglers Club  
 Captain: Capt. Joe Dew Boat name: Good Grief  
 Address: P.O. Box 271 La Jolla, CA Zip: 92038

Response to this form is voluntary.  
 OMB 0648-0009, expiration date 08/31/2001  
 NOAA 88-162, 2/99



**SEND US YOUR PHOTOGRAPHS**

Cover photo: Terry Hastings admires his catch, a beautiful striped marlin captured off the east end of Catalina. Terry and photographer, Ben Babbitt, were fishing off Ben's 19ft skiff when they came across the marlin working a bait ball. Terry caught the fish using mackerel.

We are looking for good photographs of billfish for the cover of the next *Billfish Newsletter*. Color or black-and-white photos of billfish and/or fishing activities are appropriate. Digital photos are preferred, but we also accept hard copy. We would appreciate you sharing your photos and will give you full credit in the 2011 issue.

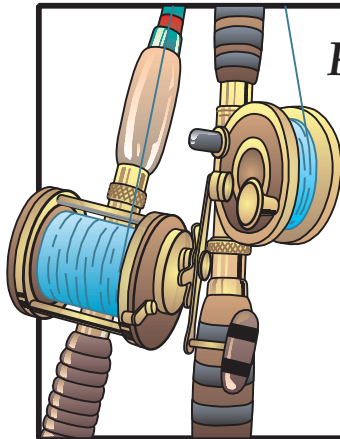
A billfish T-shirt and plaque will be awarded to the winning photographer.

**SURVEY RESPONSE**

**BILLFISH ANGLER SURVEY** cards for fishing in the 2010 calendar year were mailed in early 2011. If you have not already completed the survey, please fill it out and return the post-paid form as soon as possible. Additional 2010 Angler Survey forms are available to all billfish anglers by contacting this office or they can be downloaded from our website. See <http://swfsc.noaa.gov/FRD-Billfish/>. We update our mailing list each year, so if you wish to continue to receive the *Billfish Newsletter* but did not fish, please indicate "NO FISHING" on the Billfish Angler Survey form and return it to the SWFSC and your name will be retained on our mailing list. Your continued response to the Billfish Angler Survey is appreciated and is critical to monitoring changes in abundance of billfish stocks important to recreational and commercial fisheries.

**ACKNOWLEDGEMENTS**

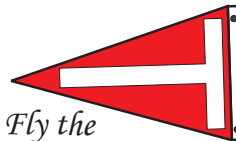
The information reported here would not be possible without the cooperation of thousands of anglers and volunteers who support these investigations. Their efforts and assistance are greatly appreciated. We also thank Roy Allen who designed the Newsletter and Jon Brodziak and Heidi Dewar for contributing to the Swordfish Stock Status Update article included in this year's Newsletter. This and past *Billfish Newsletters*, and the 2010 Angler Survey form, can also be accessed through the SWFSC's webpage at <http://swfsc.noaa.gov/FRD-Billfish/>. We welcome reader comments and suggestions concerning the content of the *Billfish Newsletter*.



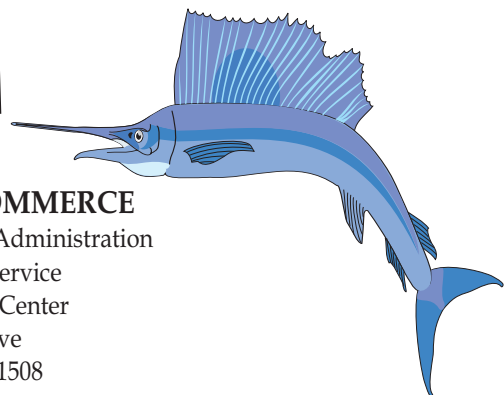
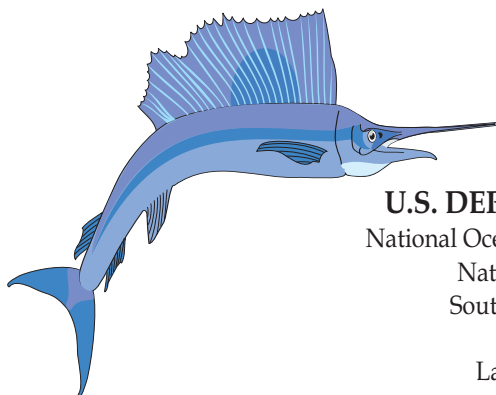
*Fine fishing for now and forever!*

*James Wraith and Suzanne Kohin,  
Fishery Biologists*

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