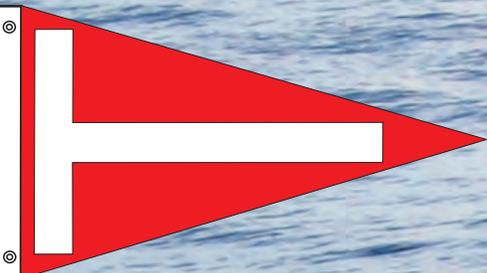
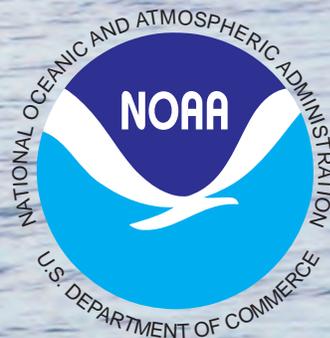


The Southwest Fisheries Science Center's



*2010 Billfish Tagging
and Recoveries*

*Successful
Catch & Release*

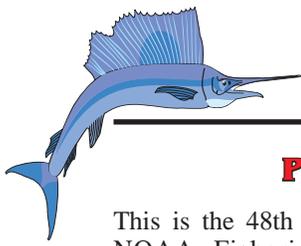
*Top Anglers
and Captains
Acknowledged*

*2010 Survey: Trends
in Angler Catch Rates*



*Striped Marlin
Movements and Behavior:
A Southwestern
Pacific Perspective*

**2011
Billfish
Newsletter**



PROLOGUE

This is the 48th 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 2011 *Billfish Newsletter* describes ongoing billfish research projects conducted at the NOAA Fisheries Southwest Fisheries Science Center. The results of the 2010 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 important to facilitate the monitoring and conservation of these magnificent fish.

INTERNATIONAL BILLFISH ANGLER SURVEY

The Billfish Angler Survey provides comprehensive estimates of recreational billfish angling success for the Pacific Ocean. This collection of recreational billfish catch and effort data began in 1969 and now provides a 42-year index of fishing success in many areas of the Pacific. Catch-per-unit-effort (CPUE), also referred to as catch rate, 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 serve as an indicator of changes in the health 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 anglers to submit Angler Survey cards. The Survey cards are mailed to anglers who have previously submitted a completed International Billfish Angler Survey card

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 to receive additional cards, 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/>.

Fishing effort, in angler fishing days, and CPUE, in billfish catch per angler fishing day, are shown by location in **Table 1** for all billfish reported caught in 2010. The Angler Survey results are primarily from Pacific locations, although anglers also reported fishing activity in the Indian and Atlantic Oceans. Survey results indicated that 2010 was a slow fishing year for many reasons. The overall catch rate reported for most locations was down in 2010. Throughout all locations, anglers reported catching 1,737 billfish during 3,814 angler fishing days (0.46 CPUE). This catch rate is slightly below the average annual catch rate (0.50 CPUE) and well below the most recent 5-year annual average (2005-2009; 0.64 CPUE). The number of respondents was also down. A total of 487 anglers responded in 2010. Only six times since 1984 has the number of respondents dropped below 500. Perhaps anglers are less inclined to respond during years that they have either not caught fish or have not spent time on the water. Indeed, 144 respondents, or 30 percent of the anglers that sent in Survey responses indicated no fishing in 2010, which is the highest percentage of non-fishing respondents in Survey history. As a result, the total number of fishing days reported was the lowest on record. Those respondents that did fish and reported at least one fishing day in 2010 averaged 14.4 days. This was below average (16.6) but is the highest value reported since 2002.

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. The reported blue marlin catch per angler fishing day (CPUE) has trended down in several places in the central Pacific over the last three years, including Hawaii and Tahiti (**Figure 1a**). Nevertheless, the 2010 blue marlin CPUE off Hawaii has remained above average, as Hawaii anglers reported catching 0.22 blue marlin per angler fishing day. Hawaii has a very strong representation of respondents each year and catch rate reports from this area should be an excellent indicator of what's happening around the islands. A little less robust are the data from Tahiti; only seven people reported fishing in this area during 2010. Those seven respondents fished a combined 166 days and caught 0.13 blue marlin per angler fishing day. In the northeastern Pacific, blue marlin CPUE off Baja California, Mexico has increased since a relatively low catch rate was reported in 2008. In 2010, survey respondents reported catching 0.70 blue marlin per angler fishing day off Baja. This catch rate is the median reported rate for this area. Numerous anglers also reported catch and effort from Central America in 2010. Blue marlin CPUE from Panama, Costa Rica, and Guatemala were 0.15, 0.09, and 0.22, respectively. In the northwestern Pacific, the blue marlin catch rate was relatively high compared to previous years. Blue marlin CPUE off Japan was 0.25, which is the fourth highest since 1984 and well above average (0.09). Blue marlin CPUE was also reported from New Zealand, central and southern Mexico, U.S. Virgin Islands, Tonga, Ascension Island, Columbia, Fiji, and Bermuda.

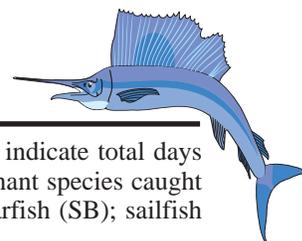


Table 1. Catch and effort reported for the 2010 International Billfish Angler Survey. Numbers indicate total days fished by location, number of billfish caught, and the catch-per-fishing day. The most predominant species caught by area is also listed: striped marlin (SM); blue marlin (BM); black marlin (BK); shortbill spearfish (SB); sailfish (SF); longbill spearfish (LB); and white marlin (WM).

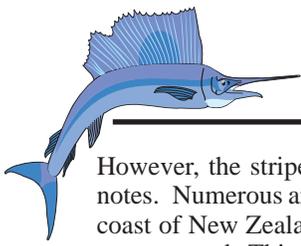
LOCATION	ANGLER FISHING DAYS	NUMBER OF BILLFISH	BILLFISH PER FISHING DAY (CPUE)	MAJOR SPECIES
PACIFIC OCEAN				
Acapulco/Ixtapa/Zihuatanejo, Guerrero	101	110	1.09	SF
Australia	71	37	0.52	BK
Baja California/Baja California Sur	634	377	0.59	SM
Colombia	6	6	1.00	BK
Costa Rica	59	114	1.93	SF
Fiji	15	4	0.27	SF
Galapagos Islands	7	11	1.57	SM
Guam	2	0	0.00	
Guatemala	18	194	10.78	SF
Guaymas, Sonora	2	1	0.50	SM
Hawaii	1,685	561	0.33	BM
Huatulco, Oaxaca	2	1	0.50	SF
Japan	65	19	0.29	BM
Malaysia	8	25	3.13	SF
Manzanillo, Colima	44	11	0.25	SF
Mazatlan, Sinaloa	23	17	0.74	SF
New Zealand	87	41	0.47	SM
Northern Mariana Is.	3	0	0.00	
Panama	60	31	0.52	SF
Puerto Vallarta, Jalisco	20	10	0.50	SF
Samoa	20	1	0.05	SF
Solomon Is./New Caledonia/Vanuatu	10	1	0.10	BK
Southern California	540	19	0.04	SM
Tahiti	166	25	0.15	BM
Tonga	11	4	0.36	BM

STRIPED MARLIN

Striped marlin is the most common billfish species encountered by anglers off southern California and northern Mexico, and off New Zealand. Striped marlin catch was reported from 15 separate locations in 2010 and results varied by region. According to Survey respondents, 2010 was not a good year for catching striped marlin off the coast of southern California where the reported CPUE was

LOCATION	ANGLER FISHING DAYS	NUMBER OF BILLFISH	BILLFISH PER FISHING DAY (CPUE)	MAJOR SPECIES
ATLANTIC OCEAN				
Ascension Island	14	4	0.29	BM/LB
Bahamas	11	2	0.18	BM
Bermuda	1	1	1.00	BM
British or U.S. Virgin Islands	19	21	1.11	BM
Cancun/Isla Mujeres/Yucatan	4	14	3.50	SF
Caribbean	20	11	0.55	BM
Florida	22	14	0.64	SF
Gulf of Mexico	9	1	0.00	WM
Honduras	2	0	0.00	
Maryland	3	4	0.00	WM
Miami or Keys	1	0	0.00	
INDIAN OCEAN				
Kenya	3	7	2.33	SF
Mauritius	8	0	0.00	
Total	3,814	1,737	0.46	

0.03. This was equal to the lowest value reported from this area in Survey history. Reporting years 1973 and 2002 were the only other times the striped marlin CPUE has been this low (**Figure 1b**). For many anglers this may not come as a complete surprise. Water temperatures in the northeast Pacific were well below average during the peak season, from July through October, as La Niña conditions moved into the area. In fact, the unusually low water temperatures seemed to have a negative effect on much of the large pelagic catch off southern California according to reports from local anglers. South of the border, respondents reported 0.39 striped marlin CPUE throughout all of Mexico. This was a slight increase to what was reported in 2009 (0.38). Delving into different parts of Mexico, we see a different trend from the northwestern peninsula of Mexico, Baja California. Baja has traditionally been a popular destination for striped marlin according to our survey respondents. The average CPUE reported from Baja California since 1984 is 0.60, and as recently as 2007 the reported striped marlin CPUE has been as high as 1.7. However, since 2007 the striped marlin CPUE has decreased each year. The striped marlin CPUE dropped from 0.55 in 2009 to 0.45 in 2010. A downward trend in striped marlin CPUE has also occurred off Hawaii since a record high year in 2003. In fact, the 2010 CPUE (0.02) was the lowest in over 25 years.



However, the striped marlin story does have some positive notes. Numerous anglers reported their fishing efforts off the coast of New Zealand where a striped marlin CPUE of 0.36 was reported. This was the fourth highest striped marlin catch rate reported from a Pacific location in 2010. The location with the highest CPUE was Galapagos Islands where anglers caught 1.57 striped marlin per angler fishing day. Striped marlin CPUE was also reported from Guatemala, Fiji, Costa Rica, Japan, and Tahiti. A few anglers in the Atlantic also reported catching 5 closely related white marlin.

SAILFISH

Sailfish prefer tropical habitat and are abundant in eastern Pacific coastal and offshore waters from Mexico to Ecuador. In many of the popular sailfish destinations in the eastern Pacific, sailfish catch was down in 2010 compared to recent years. Throughout Mexico, anglers reported catching 0.18 sailfish per day, the lowest catch rate there in over a decade. Within Mexico, anglers reported higher catch rates south of the tip of Baja California. The sailfish CPUE from central and southern Mexico was 0.67, which was relatively low for this region, but greater than what respondents reported in 2009. This number includes reports from Mazatlan, Puerto Vallarta, Manzanillo, Zihuatanejo, Acapulco, and Huatulco. In contrast, 0.04 sailfish were caught per angler fishing day off Baja California, Mexico. Further south, survey respondents reported catching sailfish off many Central American countries. Once again, Guatemala was a highlight where anglers caught over ten sailfish per angler fishing day (10.44). This catch rate was slightly down from 2009 but is the second highest sailfish catch rate reported from this country and is the highest sailfish catch rate reported from any location in 2010. Numerous respondents reported fishing off Costa Rica and all of them had success catching sailfish. The overall catch rate from this location was 1.78 sailfish per day, which was a slight increase from the previous year. Off Panama, anglers indicated a lower sailfish catch rate compared to other locations in Central America; CPUE was 0.30. Anglers also reported sailfish CPUE from other parts of the world. From the central and western Pacific survey respondents reported sailfish CPUE from Hawaii, Samoa, Tahiti, Fiji and Malaysia. In fact, respondents caught over 3 sailfish per angler fishing day off the coast of Malaysia. In the Atlantic Ocean, respondents reported sailfish CPUE off the coast of Florida (0.50). In the Gulf of Mexico, 2.25 sailfish were caught per angler fishing day off the Yucatan Peninsula, Mexico. And, in the Indian Ocean anglers reported 1.33 sailfish per angler fishing day off the coast of Kenya. **Figure 1c** shows the trend in catch rates over time for Central America countries with historically high reporting rates and all of Mexico combined.

BLACK MARLIN

Black marlin are typically found in tropical and subtropical waters and occasionally frequent temperate areas. According to Survey respondents, at many locations where black marlin are encountered by anglers they are caught in fewer numbers than other billfish species also found in those areas. However, in Australia, black marlin are the most common species encountered by billfish anglers. Moreover,

the black marlin catch rate reported off Australia is usually higher than other locations. In 2010, this was also the case. Survey respondents reported catching 0.52 black marlin per angler fishing day off Australia (**Figure 1d**). Relative to previous years, this is slightly lower than Australia's average black marlin CPUE but slightly higher than what was reported in 2009. Conversely, the black marlin catch rate reported off the coast of Panama plummeted in comparison to the previous year. Black marlin catch rate off Panama was 0.07 in 2010, which was the third lowest CPUE reported from this location. Many anglers will argue that Panama is a premier spot in the eastern Pacific for black marlin, so hopefully the coming years will bring better numbers. Off the coast of neighboring Costa Rica, survey respondents reported capturing 0.03 black marlin per angler fishing day. Looking further up the coast, anglers reported catching only a few black marlin from two locations off Mexico. There were two black marlin reported captured from each location: Puerto Vallarta and Baja California. In previous years, as recently as 2009, black marlin captures have been reported as far north as southern California. However, in 2010 Survey respondents did not catch any black marlin north of Mexico. Black marlin CPUE was reported from several other locations, including Columbia, Solomon Islands, Japan, and Hawaii.

SHORTBILL SPEARFISH

The shortbill spearfish is an oceanic species with a distribution across tropical and temperate Pacific Ocean waters with limited abundance near Hawaii, Mexico, Central America, and the west coasts of the U.S. Shortbills are also infrequently encountered in the Atlantic Ocean, but it is thought that the primary populations and spawning grounds are within the Pacific and Indian Oceans. Most reports of shortbill spearfish catch by Survey anglers occurred off Hawaii. In 2010, anglers fishing off the coast of Hawaii reported catching 0.09 shortbill spearfish per angler fishing day, which is consistent with most previous years. Survey respondents have averaged approximately 2000 fishing days off Hawaii over the last three years and close to 160 spearfish are captured each year. The 2010 shortbill CPUE off Hawaii is a result 149 captures during a total of 1,685 anglers fishing days. Only 2 other shortbill spearfish were reported caught during 2010 in Tahiti (1) and the Caribbean (1). Also, at Ascension Island two longbill spearfish were caught.

BROADBILL SWORDFISH

Fishing for swordfish differs from other billfishing in that the fish are generally targeted at night. Broadbill 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 New Zealand (6), Florida (3), Kenya (3), southern California (2), and Hawaii (1).

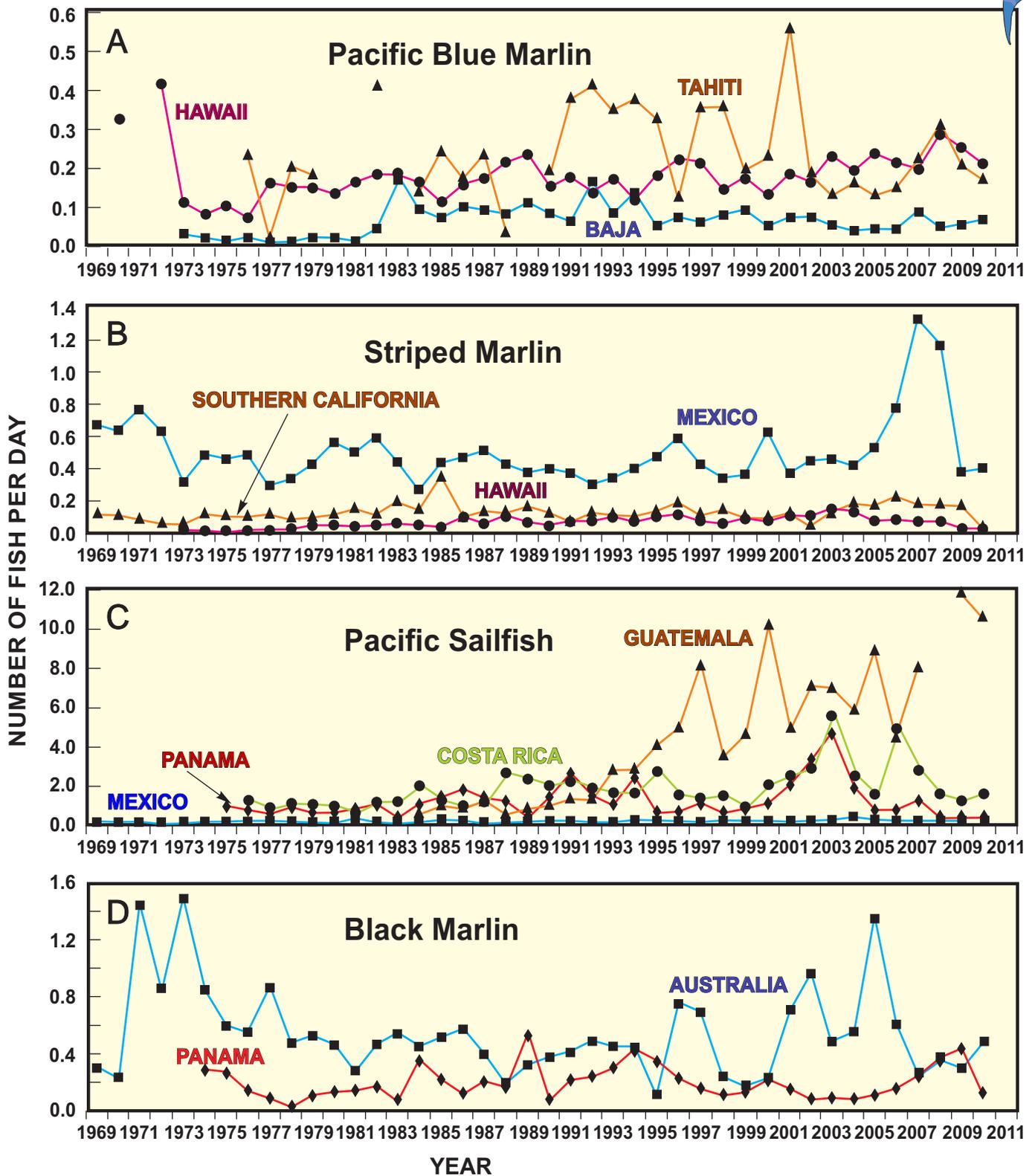
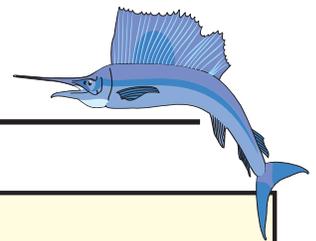
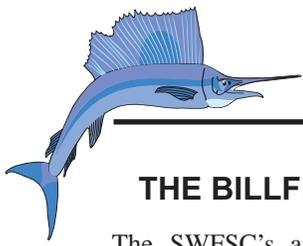


Figure 1. Catch-per-unit-effort (CPUE) in number of fish per angler fishing day reported by region from 1969 to 2010 for Pacific blue marlin (A), striped marlin (B), Pacific sailfish (C), and black marlin (D).



THE BILLFISH TAGGING PROGRAM

The SWFSC’s angler-based Billfish Tagging Program began in 1963 and has provided tagging supplies to billfish anglers for 49 continuous years. Tag release and recapture data are used to determine movement and migration patterns, species distribution, and age and growth. This volunteer tagging program depends on the participation and cooperation of recreational captains and anglers, sportfishing organizations, and commercial fishers. Since its inception, over 62,000 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 would like to participate in our tagging program, please let us know and we will send you tags!**

We send our thanks to everyone who contributed to the tagging effort during the 2010 calendar year and to everyone who continues to support our program. We are pleased to report that several hundred tags were released across the Pacific Ocean. However, the tagging effort had a substantial drop in 2010. A total of 416 tags were released on billfish in 2010, which was a 52 percent reduction from the previous year. In fact, nearly all billfish species were tagged in fewer numbers compared to 2009. The most substantial difference was a decline in sailfish tags, a reduction of 62 percent. This followed a 23 percent drop in sailfish tag releases from 2008 to 2009. Blue marlin tag releases also fell to less than half the number released the previous year. Additionally, shortbill spearfish were tagged in fewer numbers. Thirty-three shortbill spearfish were tagged and released in 2010, which was a 48 percent reduction from the previous year. Lastly, striped marlin tag releases dropped from 72 in 2009 to 43 in 2010, a 40 percent reduction. It is difficult to know with certainty what happened in 2010, but this could be related to the relatively low effort and catch rates reported from many locations in the 2010 Billfish Angler Survey.

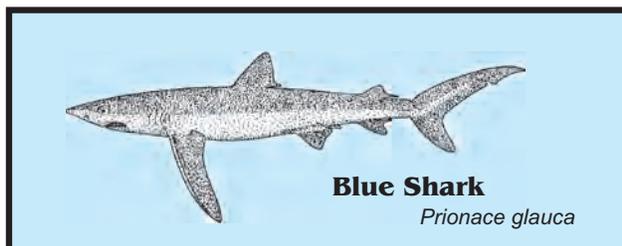


Table 2. Summary of all fish tagged in 2010 with releases and recoveries for the period 1963-2010. The pelagic sharks and albacore were tagged during NOAA SWFSC research operations.

Species Name	Release 2010	Release Total	Return Total	Return Rate %
Striped Marlin	43	22,934	345	1.50
Pacific Blue Marlin	307	10,765	90	0.84
Sailfish	22	9,201	49	0.53
Billfish, unid.	9	4,386	6	0.14
Black Marlin	2	3,387	69	2.04
Shortfin Mako Shark	56	2,303	217	9.42
Shortbill Spearfish	33	2,145	2	0.09
Common Thresher	274	1,330	78	5.86
Blue Shark	196	1,226	126	10.28
Albacore Tuna	33	749	29	3.87
Broadbill Swordfish	0	521	17	3.26
Yellowfin Tuna	0	349	25	7.16
Skipjack Tuna	0	100	2	2.00
Bigeye Tuna	0	79	2	2.53
Bluefin Tuna	0	58	8	13.79
Hammerhead Shark	0	55	2	3.64
Bronze Whaler Shark	0	51	3	5.88
Leopard Shark	0	45	8	17.78
Whitetip Shark	0	44	1	2.27
Atlantic Blue Marlin	0	43	0	0.00
Soupin Shark	0	33	1	3.03
Salmon Shark	0	33	3	9.09
Silky Shark	0	21	0	0.00
White Marlin	0	13	1	7.69
Basking Shark	0	7	0	0.00
Longbill Spearfish	0	3	0	0.00
Other Tunas	0	21	1	4.76
All Others	3	2,538	114	4.49
Total	978	62,440	1,199	1.92

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 for 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.

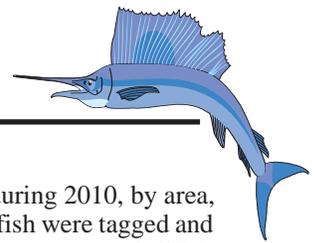
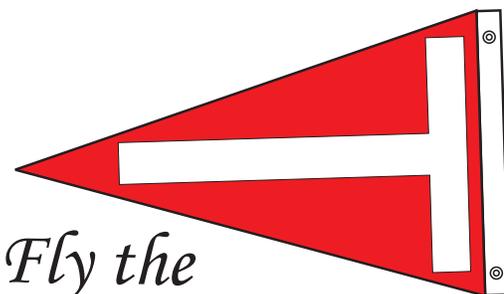
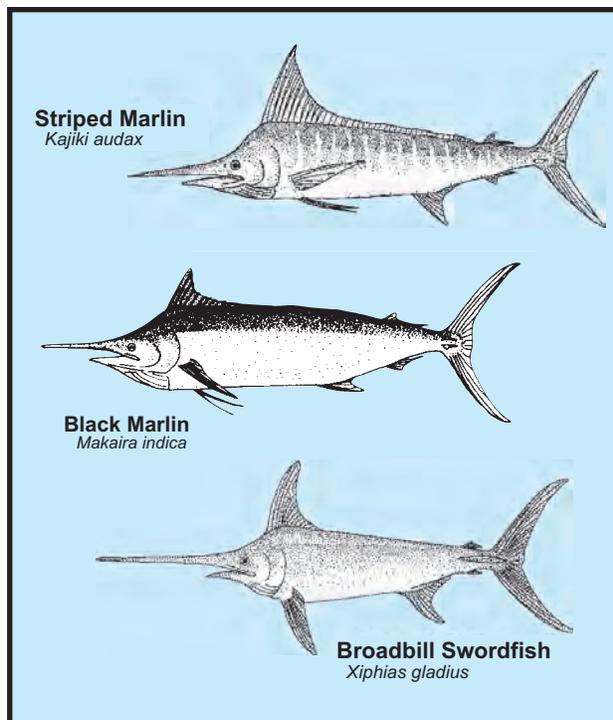


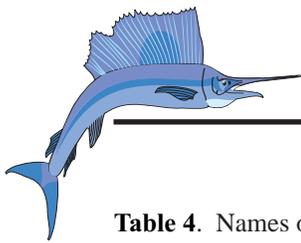
Table 3. Summary of billfish tagged during 2010, by region.

AREA	SPECIES	TOTAL
PACIFIC OCEAN		
Hawaii	Pacific Blue Marlin	297
	Shortbill Spearfish	33
	Striped Marlin	8
	Marlin, unidentified	1
Baja California/ Baja California Sur	Striped Marlin	24
	Sailfish	2
	Marlin, unidentified	8
Acapulco / Ixtapa / Zihuatanejo, Guerrero	Sailfish	13
	Striped Marlin	1
Puerto Vallarta, Jalisco	Striped Marlin	3
	Pacific Blue Marlin	3
	Black Marlin	2
	Sailfish	2
Fiji	Pacific Blue Marlin	3
	Striped Marlin	2
	Sailfish	2
Manzanillo, Colima	Striped Marlin	3
	Sailfish	2
	Pacific Blue Marlin	1
Marshall Islands	Pacific Blue Marlin	2
Southern California	Striped Marlin	1
Tahiti	Pacific Blue Marlin	1
Samoa	Striped Marlin	1
ATLANTIC OCEAN		
Florida	Sailfish	1
Total		416

Table 3 shows the tagging effort during 2010, by area, for all billfish tagged. Most billfish were tagged and released in U.S. or Mexican waters; however, billfish were also tagged and released by anglers in many locations across the Pacific, including Fiji, Samoa, Tahiti, and the Marshall islands. In the Atlantic Ocean, one sailfish was tagged off Florida. A total of 339 tags were deployed on billfish off Hawaii, representing over 80 percent of the tagging effort. Relative to other locations, we have had tremendous tagging success out of Hawaii in recent years. The majority of tags released off Hawaii in 2010 were on blue marlin, a total of 297. This was down from 2009 when 651 blues were tagged in this area. The Angler Survey indicated a slight drop in the blue marlin catch rate off Hawaii, potentially contributing to the drop in released tags. We saw a similar trend in southern California, where striped marlin are commonly tagged by our faithful taggers. Only 1 tag was released off southern California in 2010, but as mentioned earlier, contributing factors led to a slow billfish season in this area and the reported striped marlin catch rate for 2010 was the lowest on record. To the south, tagging anglers fishing off Mexico remained active. The tip of Baja, including the fishing towns of Cabo San Lucas, Los Cabos, and La Paz, has historically been considered a hot spot for catching several billfish species, and in 2010 most of the Mexico tagging effort was concentrated in this area. The majority of tags released off Baja were on striped marlin. In fact, more striped marlin were tagged off Baja in 2010 than the previous year, which is extremely encouraging after Survey respondents indicated 2010 was a slow year for catching striped marlin in this area. Several species including blue marlin, sailfish, black marlin, and striped marlin were also tagged elsewhere in Mexico including Puerto Vallarta, Manzanillo, Zihuatanejo, and Acapulco. From this list of locations anglers in Guerrero including the ports of Zihuatanejo and Acapulco led the sailfish tagging charge with 13 releases. This part of Mexico has traditionally been popular among taggers and we hope to see efforts continue to thrive. Thanks to everyone, in particular our far reaching anglers tagging from the many Pacific islands.



*Fly the
Tagging Flag!*



TOP ANGLERS AND CAPTAINS ACKNOWLEDGEMENTS

Table 4. Names of anglers tagging two or more billfish during 2010, by area.

ANGLER NAME	BILLFISH TAGGED
BAJA CALIFORNIA, BAJA CA SUR	
Neal Shaver	6
Sean Pavlich	4
John Shaver	2
Steven Shaver	2
Dean McDavid	2
Don Anderson	2
Steve Maldonado	2
Peter Libkind	2
PUERTO VALLARTA, JALISCO	
Clarke Smith	7
MANZANILLO, COLIMA	
Howard Bond	4
ACAPULCO/IXTAPA/ - ZIHUATANEJO, GUERRERO	
Gary Paxton	4
Paul Marchant	2
Shebly Cuellar	2
Alan Harber	2
HAWAII	
Steve Spina	8
Bridget Hurlbut	6
Janet B. Martic	6
Barry Alty	5
Randy Weih	4
John C. Hurlbut	4
Paulette Pama	3
Ron Gilson	3
Carmen McIntyre	3
Chris Gamrot	3
Rob McCarthy	3
Hideyo Hoshino	3

We appreciate the cooperation of anglers and captains who tag and release billfish. Over 300 anglers reported a billfish tag release during 2010. Individual recognition of the 56 anglers who reported two or more billfish tag releases is presented in **Table 4**. Steve Spina released more tags than any other angler during 2010. Steve released 8 tags off Hawaii. He is often one of our best contributors and we appreciate his efforts. Bridget Hurlbut and Janet Martic also deserve recognition for each tagging six billfish off the coast of Hawaii. Other notables that released more than three tags on billfish off Hawaii include Barry Alty, Randy Weih, and John Hurlbut. Anglers were also very active taggers off the coast of Mexico. Clarke Smith released the second highest number of tags out of all of our contributing recreational anglers. Clarke released seven tags near Puerto Vallarta, Mexico. Neal Shaver led the angler tagging effort off of Baja

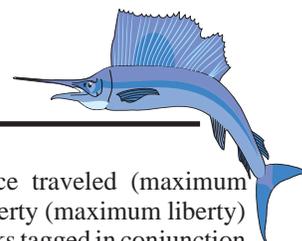
ANGLER NAME	BILLFISH TAGGED
HAWAII cont.	
Debbi David	2
Andrew Kyle Albenesius	2
Angelo J. Rossi	2
Allen McGee	2
Christopher Bolin	2
Dana Fennell	2
Brad Bobbermien	2
Matt Guzik	2
Walter Parish	2
Todd Kole	2
Scott Thompson	2
Sally L. Kurz	2
Saeid Hoorazar	2
Peter T. Cohen	2
Kevin Jennier	2
Daron Castoro	2
Michael Lavecchia	2
Donald Brandt	2
Masaharu Matsushita	2
Lynn J. Moorhouse	2
Lou Groebner	2
Kirby Carter	2
Ken Onion	2
Keiji Matsuba	2
Justin Bernal	2
Jim Robinson	2
James Hutton	2
Neil Williamson	2
MARSHALL ISLANDS	
Karness Kusto	2
FIJI	
Geoff Eden	2

California, Mexico with 6 tag releases. Several other members of the Shaver clan also contributed to the tagging effort in this region. Sean Pavlich (4 releases) also made a significant tagging contribution off Baja in 2010. Gary Paxton and Howard Bond were the top taggers off the Mexican states of Guerrero and Colima, respectively. Finally, special thanks to Geoff Eden (Fiji) and Karness Kusto (Marshall Islands) for their tagging efforts in the western Pacific.

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 2010, 95 captains reported tagging billfish with their anglers and clients. We gratefully acknowledge those 57 captains who assisted with tagging two or more billfish in specific regions (**Table 5**). Eighteen captains helped

Table 5. Names of captains tagging two or more billfish during 2010, by area.

CAPTAIN NAME	BILLFISH TAGGED
BAJA CALIFORNIA/BAJA CA. SUR	
Tom Shaver	10
Mike Shrosbree	6
Harold Schram	3
Martin Collins	2
Luis Abaroa	2
Richard Hamilton	2
PUERTO VALLARTA, JALISCO	
Manny Ocaranza	7
Mike Shrosbree	3
MANZANILLO, COLIMA	
Howard Bond	6
ACAPULCO/IXTAPA/ ZIHUATANEJO, GUERRERO	
Julio Bustos	14
HAWAII	
Teddy Hoogs	27
Chuck Wigzell	26
Steve Epstein	15
Dennis Cintas	14
Matt Losasso	13
James Dean	13
Marlin Parker	13
Ken Fogarty	12
Chuck Wilson	12
John Bagwell	12
McGrew Rice	11
Jeffrey Fay	10
Kevin Hibbard	10
Rob Ellyn	10
Guy Terwilliger	10
Kerwin Masunaga	10
Bill Crawford	7
Brian (Chip) Van Mols	5
Kent Mongreig	5
Neal Isaacs	5
Tio Kearney	5
Scott Crampton	4
Jeff Kahl	4
Mike Derego	4
William Lazenby	4
Kevin M. Hogan	4
Lance Gelman	4
Larry Henry	4
Mark Shultz	4
William Dorr	3
Scott M. Fuller	3
Doug Pattengill	3
Don Stutheit	3
Robert C. Sylva, Jr.	3
Jason Holtz	3
Steven R. Fassbender	2
Steven D. Kaiser	2
Wassy Torossi	2
Allan Ayano	2
Bill Casey	2
Paul Warren	2
Jeff Metzler	2
Randy Llanes	2
Bruce Herren	2
Chris Kam	2
MARSHALL ISLANDS	
Ben Reimers	2
FIJI	
Justin Smith	3
Anil Kumar	2



tag 10 or more billfish during 2010. Captains Teddy Hoogs and Chuck Wigzell deserve special recognition for skippering vessels during 25 or more tag releases within a one-year period. Both captains skipper vessels off Hawaii. The two top captains from locations off Mexico were Julio Bustos and Tom Shaver. These captains each assisted with the tagging of ten or more billfish. Julio was actively tagging off the state of Guerrero and Tom Shaver off Baja California Sur. Other notable captains flying the tagging flag off the coast of Mexico include Mike Shrosbree (9 releases), Manny Ocaranza (7 releases), and Howard Bond (6 releases). Also, special thanks goes out to our captains supporting the tagging program from the far reaches of the western Pacific, namely Justin Smith and Anil Kumar who skippered during tag releases off Fiji, and Ben Reimers off the Marshall Islands. 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.

TAG RECOVERIES

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.** Two recoveries were reported in 2010 (Table 6). These recaptures are very interesting because both fish were at liberty for greater than one year and both were recaptured very close to the location where they were tagged. The first recovery of 2010 was reported by Tom Wanzer. Tom caught a tagged Pacific blue marlin on June 28, 2010 while fishing off the coast of Hawaii.

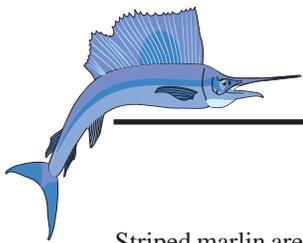
Table 6. Tag recovery information for 2010.

TAGGER/CAPTAIN	RELEASE DATE	RELEASE LOCATION	RECOVERY DATE/ ANGLER	RECOVERY LOCATION	DAYS FREE	MILES/ DIRECTION TRAVELED
Pacific Blue Marlin						
Chad Davis Jerry Allen	05/31/2009	19°30'N 156°W Hawaii	06/28/2010 Tom Wanzer	19°49'N 154°56'W Hawaii	394	63 -NE
Striped Marlin						
Danny Lee Jones Phyllis Jones	08/24/2008	33°23'N 118°59'W Southern California	09/18/2010 Sonny Do	32°28'N 117°58'W Southern California	756	75 - SE

Table 7. Maximum net distance traveled (maximum movement) and longest time at liberty (maximum liberty) for billfish, tunas, and pelagic sharks tagged in conjunction with the Billfish Tagging Program and other NOAA SWFSC research programs, 1963-2010.

SPECIES	MAXIMUM LIBERTY (Days)	MAXIMUM MOVEMENT (nmi)
Black Marlin	1,454	5,763
Bluefin Tuna	1,829	5,116
Pacific Blue Marlin	1,503	4,450
Striped Marlin	3,531	3,693
Shortfin Mako Shark	1,938	3,597
Albacore Tuna	751	3,085
Broadbill Swordfish	1,681	2,573
Blue Shark	888	2,474
Sailfish	1,717	932
Yellowfin Tuna	324	850
Skipjack Tuna	290	575
Silky Shark	175	447
Common Thresher Shark	1,389	426
Salmon Shark	1,547	285
Shortbill Spearfish	34	173

The fish was released 13 months prior by Chad Davis and Jerry Allen, only 63 nautical miles from the location where Tom recaptured it. The second recovery reported in 2010 was a striped marlin caught by Sonny Do, also in Hawaii. The fish was tagged in August of 2008 by Danny Lee Jones and Phyllis Jones. It was at liberty for over two years before Sonny recaptured it only 75 nautical miles from the release location. These recaptures may represent resident behavior of fish remaining near the Hawaiian Islands, or they may represent a seasonal return to Hawaii after migrations to locations elsewhere in the Pacific in the intervening months. Indeed, many tagged fish travel thousands of miles before they are recaptured. Table 7 provides the maximum distance traveled and maximum time at liberty for billfish and some of the other common large pelagic species tagged in previous years. However, it is important to realize that similar to the recoveries reported in 2010, many of the tag recoveries that have been reported throughout the history of the tagging program have been over short distances even after a considerable amount of time at liberty.



STRIPED MARLIN MOVEMENTS AND BEHAVIOR: A SOUTHWESTERN PACIFIC PERSPECTIVE

Striped marlin are the most widely distributed marlin species and also the most economically valuable in both recreational and commercial fisheries. North American game fishers have long sought striped marlin off Baja and other destinations in Mexico. Those seeking the thrill of larger fish are drawn to the summer and autumn waters of New Zealand where most of the various International Game Fish Association (IGFA) line class world records are held for this species. The advent of satellite telemetry technologies over the last decade has brought some fascinating new insights into their movements and behaviors. Pop-up satellite archival tag (PSAT) studies provide a broad overview of their Pacific movement patterns, showing that those of the eastern Pacific generally don't move outside of the region while those from New Zealand often show greater migratory potential¹ (Figure 2).

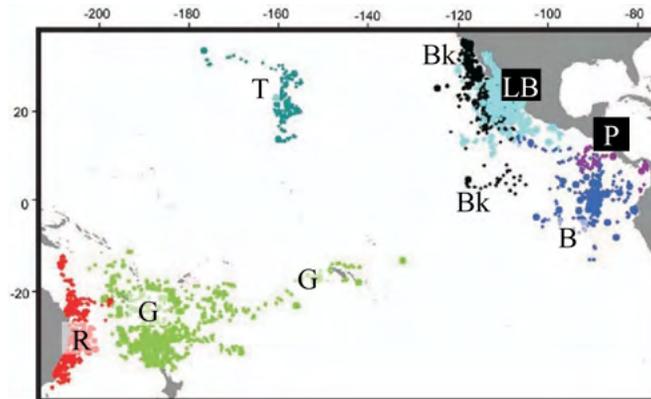
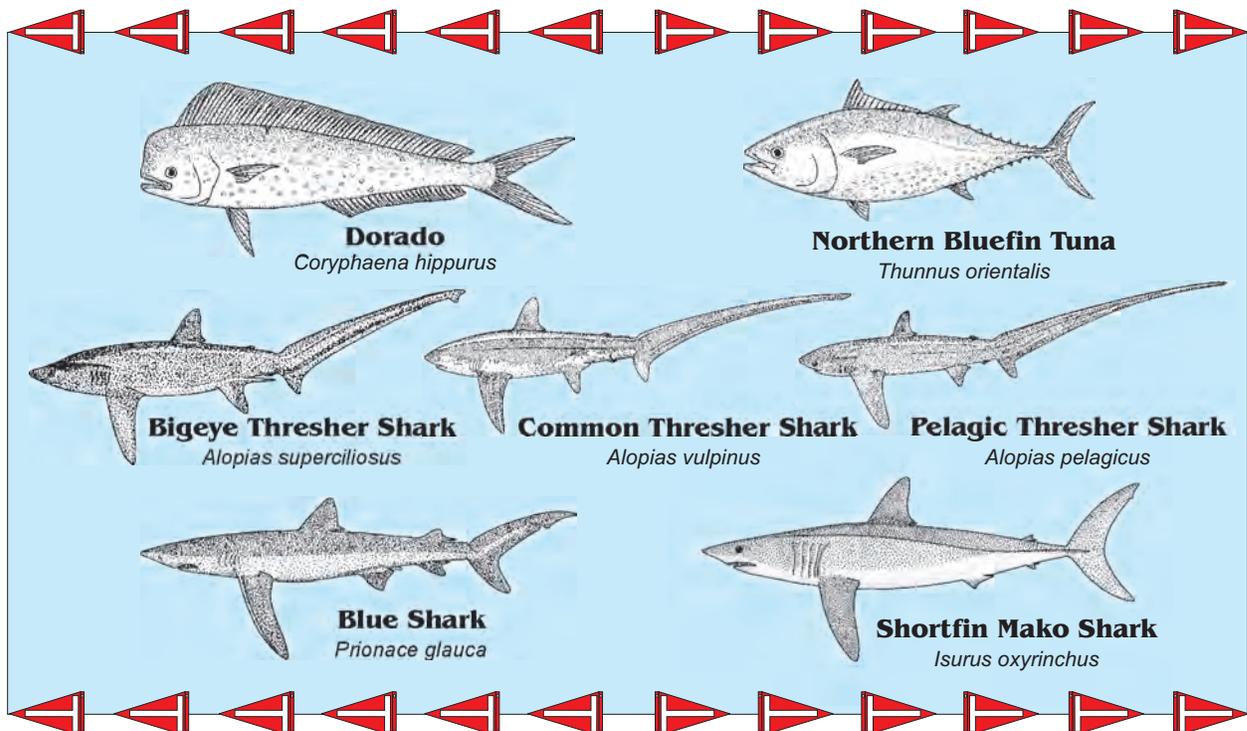
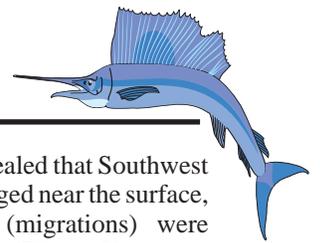


Figure 2. Satellite tag position estimates for striped marlin in the Pacific Ocean. Colors represent original tagging region [red(R)=Australia, green(G)=New Zealand, teal(T)=Hawaii, black(Bk)=California, light blue(LB)=Mexico, blue(B)=Ecuador, purple(P)=Costa Rica and Panama; from Domeier, 2006].

¹Domeier, M.L., *Bulletin of Marine Science* 79, 811-825 (2006).





A more in-depth investigation of movements and inferred behaviors of those tagged off of New Zealand and in the Tasman Sea revealed how foraging and transiting behaviors were related to diving patterns and changed through time and space.

A behavior classification model revealed that Southwest Pacific striped marlin generally foraged near the surface, but their transitory movements (migrations) were associated with a wider vertical range (**Figure 3**).

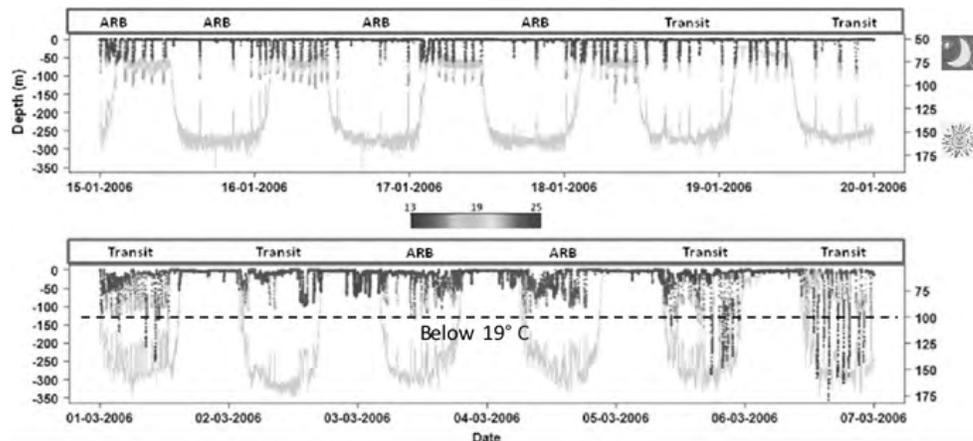
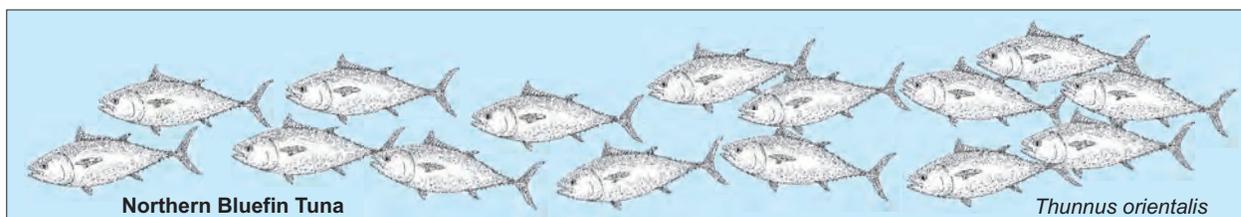
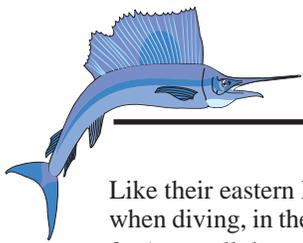


Figure 3. Water column occupancy by a satellite tagged striped marlin during two representative periods of January and March 2006 in the southwest Pacific Ocean. Darkness of lines represents water temperature (°C), depth along the left axis, and light intensity in grey lines scaled on the right axis (no measurement units). Labels ‘ARB’ and ‘Transit’ refer to ‘foraging’ and ‘migration’ phases, respectively (Sippel et al. 2011).



Leader man Tripp Davis works with Captain Marlin Parker to tag and release a lively blue marlin. The fish was caught off the Kona coast using a Marlin Magic Red Eye Rukus lure. Photo was taken by Carol Lynn onboard *Marlin Magic II*.





Like their eastern Pacific counterparts, New Zealand striped marlin spent most of their time near the surface. However, when diving, in the southwest Pacific they descended deeper (> 1,000 feet) and spent more time below the surface (> 100 feet) overall than their eastern Pacific counterparts^{2,3}. This may demonstrate a physiological effect related to the higher concentrations of oxygen at depth in the Southwest Pacific enabling deeper, longer dives than in the more oxygen depleted eastern Pacific. Southwest Pacific fish also spent more time at depth (deeper than 30 feet) during the day than at night (Figure 4).

Surely the intrepid game fisherman, Zane Grey, would have valued this information early in the 20th century when he traveled the world in search of Earth's ultimate fishing experiences. Perhaps there would have been a few different twists to the stories in his famous book *Tales of the Angler's Eldorado, New Zealand*.

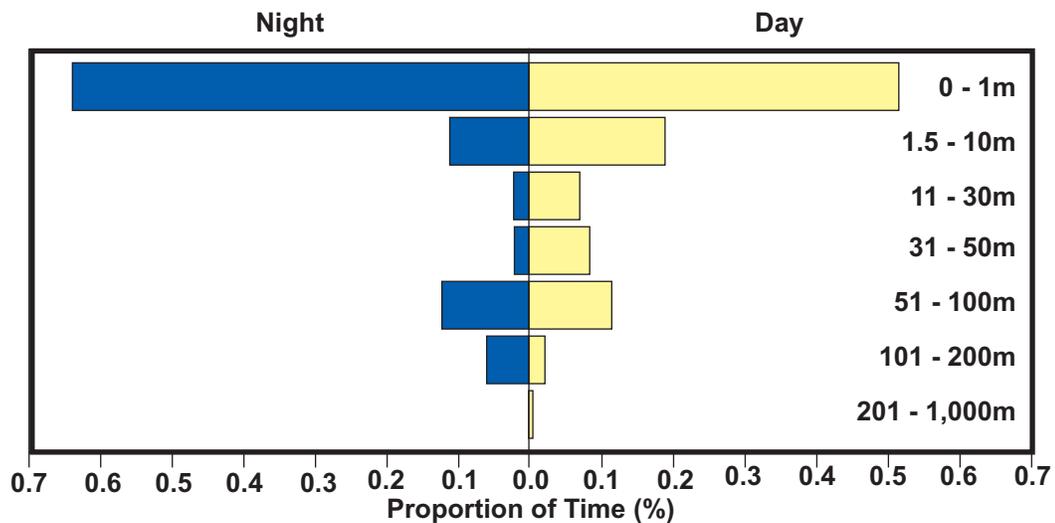
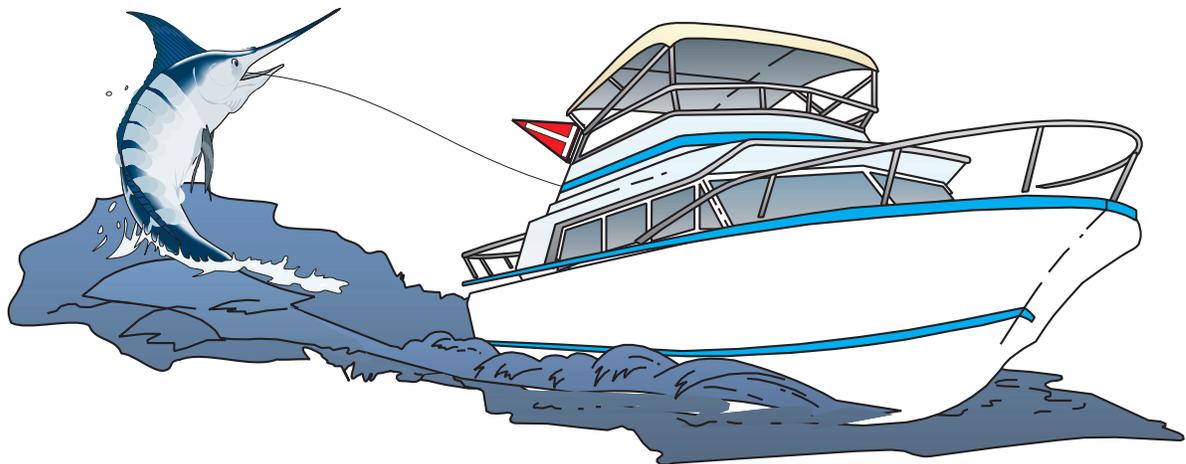
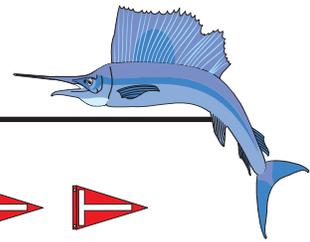


Figure 4. Proportion of time spent at depth by striped marlin tagged in the southwest Pacific Ocean (from Sippel et al. 2011).

²Sippel, T., Holdsworth, J., Dennis, T. & Montgomery, J. *PLoS ONE* 6, e21087 (2011).

³Domeier, M.L., Dewar, H. & Nasby-Lucas, N. *Marine and Freshwater Research* 54, 435-446 (2003).

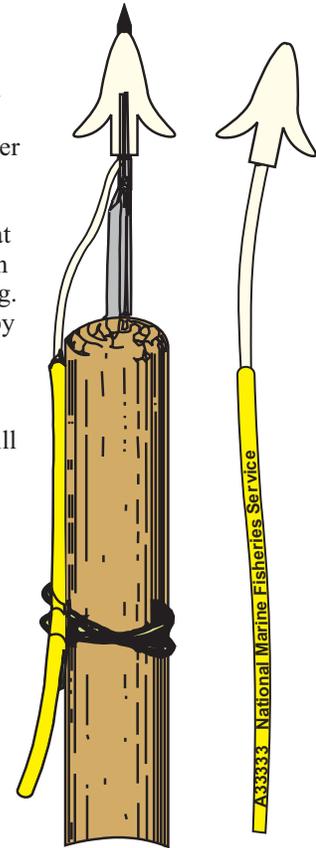
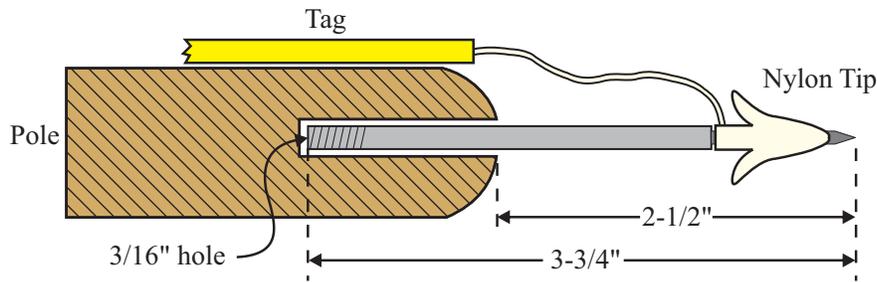




CONSTRUCTING THE TAGGING POLE

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.**



PAPERWORK REDUCTION ACT NOTIFICATION

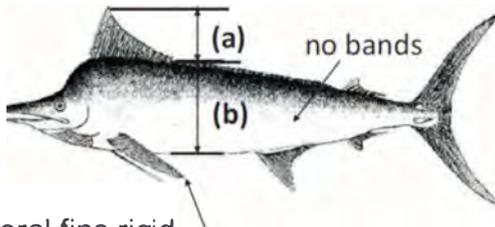
NOAA Fisheries needs the information reported on Billfish Tagging Cards and the International Billfish Angler Survey for the conservation and management of fishery resources. The information will be used for billfish research. Public reporting time and effort for the Billfish Angler Survey card is estimated 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. You can send comments regarding this burden estimate to the SWFSC, 8901 La Jolla Shores Drive, La Jolla, CA 92037. The information submitted will become 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.

BILLFISH ANGLER SURVEY cards for fishing in **last** calendar year were mailed early this calendar year. If you have not already completed the survey, please fill it out and return the post-paid form as soon as possible. Additional 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.

Identification Guide

Black marlin

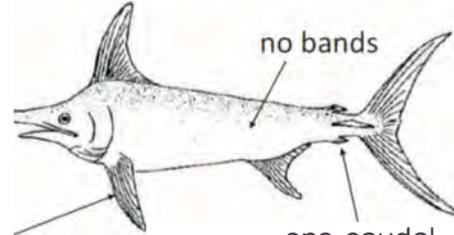
dorsal fin height (a) about half body height (b)



pectoral fins rigid
cannot flatten against body

Swordfish

sword-like bill with smooth surface



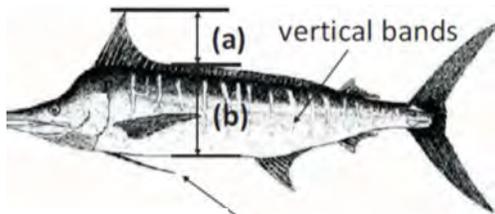
pectoral fins rigid

one caudal keel per side

* no pelvic fins present

Blue marlin

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



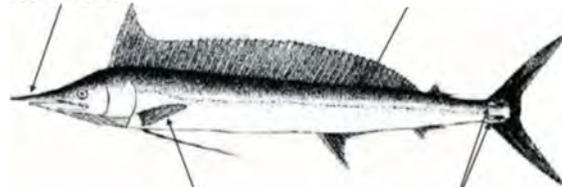
pectoral fins not rigid
can flatten against body

* body more stout than striped marlin

Shortbill spearfish

short bill

no bands

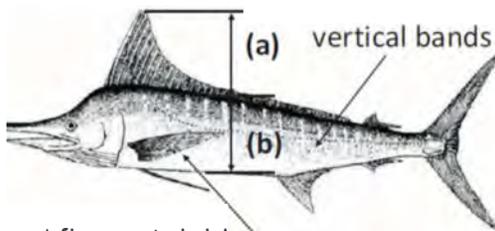


short pectoral fins
not rigid

two caudal keels per side

Striped marlin

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

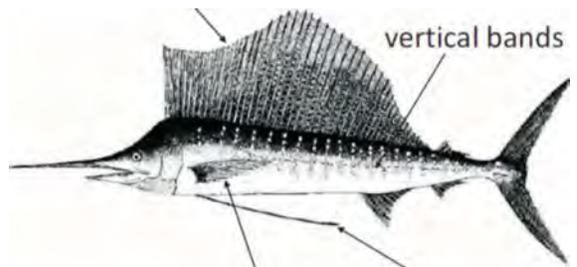


pectoral fins not rigid
can flatten against body

* body more compressed than blue marlin

Sailfish

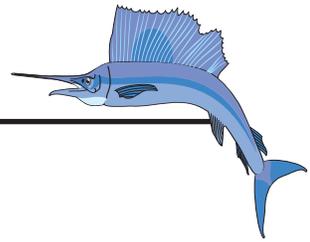
very tall dorsal fin



pectoral fins not rigid

long pelvic fins
can flatten against body





Tagging Guide

▶ **1. BEFORE YOU CATCH YOUR FISH:**

First decide if you plan to tag and release any fish caught. If so, circle hooks are preferred because they reduce deep or foul hooking when bait fishing. We recommend that you do not use double rigged J hooks if you plan to release 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. **Check for previous tags!**

▶ **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.

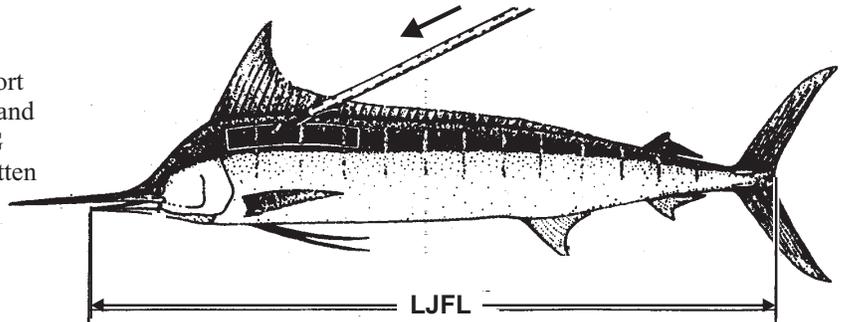
▶ **4. RELEASING:**

Revive the 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 us at the Southwest Fisheries Science Center.

PLEASE NOTE: Make your tagging effort count. Tag and release your fish skilfully 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 0648-0002, expiration date 09/31/2001
 NOAA 88-162, 2/99

SEND US YOUR PHOTOGRAPHS

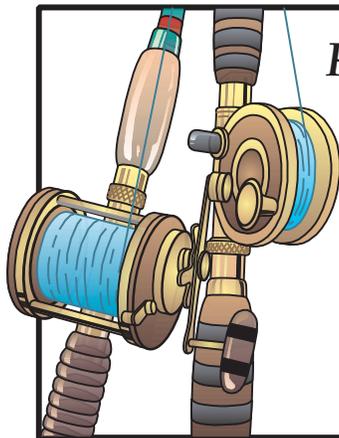
Cover photo: The winning cover photo was taken by Bob Hoose. Black marlin caught while live-baiting the Gordo Banks off Cabo San Lucas, Mexico. Brian Collins was the angler onboard Sea Jewel, skippered by Captain Mike Arujo.

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 2012 issue.

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

ACKNOWLEDGMENTS

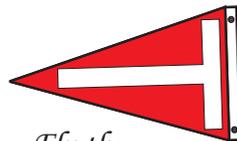
The information reported here would not be possible without the cooperation of thousands of anglers and volunteers who support these investigations. Their efforts and assistance are greatly appreciated. This and past *Billfish Newsletters* and the Angler Survey form can also be accessed through the SWFSC's webpage at <http://swfsc.noaa.gov/FRD-Billfish/>. We welcome reader comments and suggestions concerning the content of the *Billfish Newsletter*.



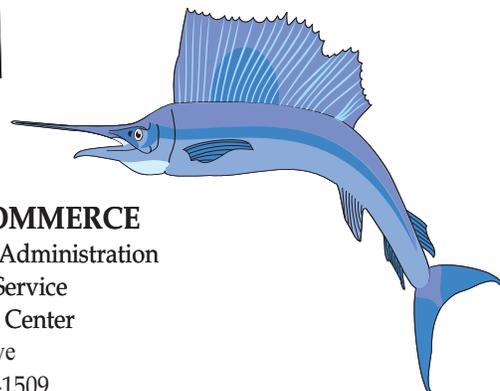
Fine fishing for now and forever!

*James Wraith and Suzanne Kohin,
Fishery Biologists*

Southwest Fisheries Science Center
8004 La Jolla Shores Drive
La Jolla, CA 92037-1509
Phone - (858) 546-7000
FAX - (858) 546-7003
email: james.wraith@noaa.gov
suzanne.kohin@noaa.gov



*Fly the
Tagging Flag!*



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Fisheries Science Center
8901 La Jolla Shores Drive
La Jolla, California 92037-1509