Circle Hooks, J Hooks, and Blue Marlin

On January 1st of this year the National Marine Fisheries Service (NMFS) implemented a rule requiring the use of circle hooks with natural baits in all Atlantic billfish tournaments. The major intent of this rule was to reduce fishing mortality on white marlin, but it was also realized that sailfish and blue marlin would benefit from the management measure. However, many recreational anglers have complained to NMFS that the measure excludes the use of an Ilander lure (Hawaiian Eye) in combination with either a horse ballyhoo or Spanish mackerel and J hook – a rig that is often used for blue marlin in the mid-Atlantic region. The concerned anglers contend that few white marlin are caught on these larger baits, and that most blue marlin taken on the rig are typically hooked externally, in or about the jaw. Unfortunately, there aren't a whole lot of data to evaluate the situation, and that's a void we're trying to fill. With support from NMFS and The Offield Foundation we are using pop-up satellite tags (PSATs) to study the post-release survival and habitat utilization of blue marlin caught on the different gear types.

Over the past several years while studying the post-release survival of white marlin, my colleagues and I have collected a lot of information on where circle hooks and J hooks in naked ballyhoo baits lodge in white marlin, as well as sailfish and blue marlin. Our results suggest that there is a significant difference between the hooking location of J hooks in blue marlin compared to white marlin and sailfish. From the data in Table 1 you can see that more than 40% of all white marlin and sailfish caught on J hooks are hooked internally (within the mouth or deeper), while only 14% of blue marlin caught on J hooks are hooked internally. The proportion of fish bleeding closely follows the hooking location data. Why the difference? Well, it could be that blue marlin are simply more aggressive feeders and that anglers tend to use shorter dropbacks when line is screaming off their reels at 40 miles an hour. In any case, on natural baits with J hooks, fewer blue marlin are hooked deeply than white marlin and sailfish. Will this trend hold for Ilander/natural bait combinations?

In the current study we will deploy 60 PSATs on blue marlin: 30 caught on natural baits with circle hooks and 30 caught on Ilander/natural baits with J hooks. The tags are programmed to collect temperature, depth and light level data every two minutes and release from the fish after 10 days. Following release, the tags float to the surface and transmit the archived data back to us via the Argos satellite system. As of August 1st, we've received data back from nine blue marlin, four caught on circle hooks and five on J hooks. All of the fish survived and we've noted some interesting behavior. Check out the fish in Figure 1 that spent most of its time between the surface and 100 meters, then made a single deep dive to below 350 meters (~1150 feet) into 12°C (54° F) water. We're making a big push to get all of the tags out by the end of the year and we hope to have the complete results for you in next year's newsletter. ***Stay tuned.***

Table 1. Hooking location data (internal, external) and fish condition (bleeding, not bleeding) for observed catches of white marlin, sailfish, and blue marlin caught on naked ballyhoo rigged with circle (C) hooks or J hooks. The frequency of internal hooking locations and bleeding of blue marlin hooked on J hooks is significantly lower than in white marlin or sailfish.

Species	Hook Type	Internal	External	Bleeding	Not Bleeding
White marlin	C	4 (2%)	196 (98%)	2 (1%)	198 (99%)
	J	32 (44%)	40 (56%)	24 (33%)	48 (67%)
Sailfish	C	5 (6%)	76 (94%)	2 (2%)	79 (98%)
	J	21 (41%)	30 (59%)	17 (33%)	34 (67%)
Blue marlin	C	0 (0%)	25 (100%)	0(0%)	25 (100%)
	J	5 (14%)	32 (86%)	4 (11%)	33 (89%)

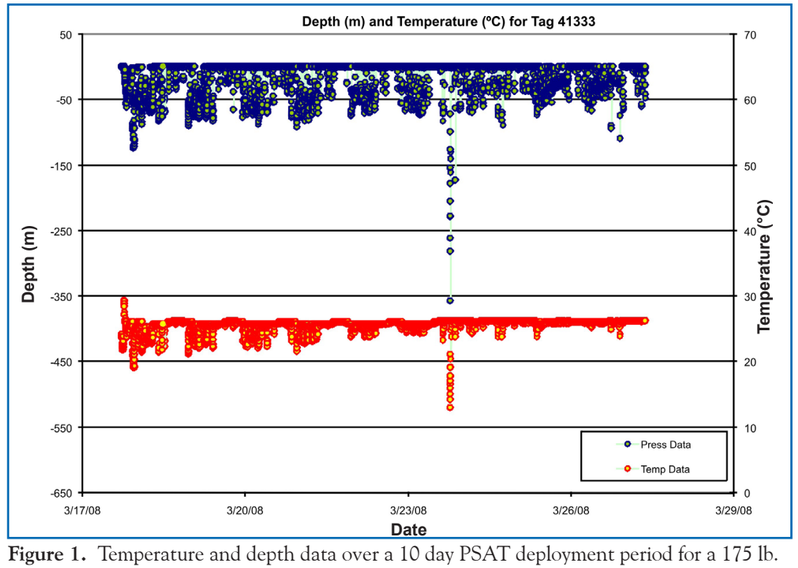
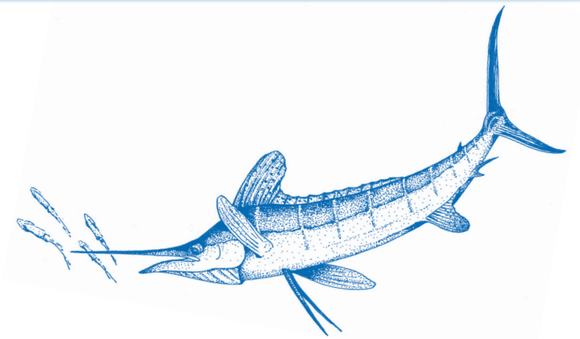


Figure 1. Temperature and depth data over a 10 day PSAT deployment period for a 175 lb. blue marlin caught on an Ilander/ballyhoo/J hook off Venezuela in March of this year. Note the one very deep dive to more than 350 meters (~1150 feet).

Billfish Research and Management News for the Mid-Atlantic $500,000

Summer 2008

John Graves
Virginia Institute of Marine Science
College of William & Mary



Greetings!

Welcome to the 2008 Mid-Atlantic $500,000. There's a lot of billfish research going on in my lab at the Virginia Institute of Marine Science, but as luck would have it we are in the middle of most of the studies so there aren't a lot of data to put in this year's newsletter. To give you an idea of what we're up to, our ongoing billfish projects include the following: (1) *Genetic analysis of the distribution and abundance of the roundscale spearfish.* The recently "rediscovered" roundscale spearfish is very similar in appearance to the white marlin and often confused with that species. Consequently, little is known about the distribution of the roundscale spearfish. We are using genetic techniques to determine the relative abundance of the two species throughout the Atlantic. (2) *Genetic analysis of the stock structure of black marlin.* Black marlin occur throughout the Pacific and Indian oceans, but they are only known to spawn off the Great Barrier Reef in Australia. Do black marlin in the eastern Pacific (Panama and Costa Rica) really swim across the Pacific to spawn? Using rapidly evolving molecular markers we are studying the stock structure of this widely distributed species. (3) *Development of molecular markers to discriminate Atlantic and Indo-Pacific blue marlin.* Blue marlin is a single species throughout the world's oceans. In the United States it is illegal to sell blue marlin from the Atlantic, but there are no restrictions on the sale of the same species from the Pacific or Indian oceans. That sets up a situation where Atlantic blue marlin could be mislabled as Pacific blue marlin for illegal sale. From our previous work on blue marlin stock structure we have one molecular marker that will positively identify about 40% of blue marlin from the Atlantic without misclassifying an Indo-Pacific fish. In our current study we are developing other markers that will increase our ability to assign fish to ocean of origin and provide a better means for enforcement of the no-sale rule. (4) *Post-release survival of blue marlin caught on circle hooks and J hooks.* Little is known about the fate of released blue marlin caught on circle hooks and J hooks in the recreational fishery. We are using pop-up satellite archival tags to study post-release survival of blue marlin caught on the two hook types (see story on the back page).

If you would like to know more about our billfish research, the domestic or international management of billfish, or graduate education in marine science, please drop by to talk. I'll be down at the Canyon Club weigh station in the early evenings and under the tent after that. My colleague and former student Andrij Horodysky will be at the Ocean City weigh station. Andrij will be more than happy to talk about billfish research, his doctoral studies on the sensory physiology of some coastal marine fishes, or fly tying.

John Graves & Andrij Horodysky

Tight lines,

John Graves
Professor of Marine Science
Virginia Institute of Marine Science
College of William and Mary
Gloucester Point, Virginia 23062
email: graves@vims.edu
(804) 684-7352

WILLIAM & MARY VIMS
VIRGINIA INSTITUTE OF MARINE SCIENCE
SCHOOL OF MARINE SCIENCE
http://www.vims.edu

Mid-Atlantic $500,000 — Facts & Figures

Winning Fish (weight in lbs.)

		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
White Marlin	1st	**86**	**69**	**69**	**69**	**77**	**89**	**74**	**78**	**68**	**69**	**75**	**91**	**75**	**75**	**88**	**92**
	2nd	83	68	65	68	69	76	71	67	61	63	61	79	74	68	79	77
	3rd	76	61	65	64	66	72	68	63	---	63	60	79	71	67	77	69
Blue Marlin	1st	**466**	**615**	**586**	**746**	**455**	**748**	**534**	**522**	**566**	**578**	**558**	**433**	**518**	**699**	**722**	**536**
	2nd	384	488	542	660	410	493	468	480	476	421	---	---	---	525	641	524
	3rd	359	435	522	519	407	448	412	464	---	---	---	---	---	418	469	414
Tuna	1st	**109**	**254**	**242**	**205**	**153**	**120**	**221**	**204**	**172**	**114**	**147**	**82**	**182**	**193**	**184**	**212**
	2nd	102	218	213	166	142	103	181	185	153	114	136	72	150	78	123	172
	3rd	95	200	139	108	126	99	105	185	141	112	81	61	132	60	118	168
Dolphin	1st	**36**	**42**	**53**	**33**	**34**	**33**	**33**	**43**	**39**	**29**	**34**	**43**	**44**	**47**	**44**	**39**
Wahoo	1st	**44**	**67**	**73**	**47**	**79**	**69**	**38**	**72**	**86**	**76**	**75**	**95**	**58.5**	**74**	**93**	**77**

Billfish Releases

White Marlin	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Boated	15	20	23	16	18	13	10	14	3	10	10	13	14	14	18	23
Released	84	136	174	177	153	124	231	432	58	220	182	144	313	244	444	274
% Released	85%	87%	88%	92%	89%	91%	96%	97%	95%	96%	95%	92%	96%	95%	96%	92%

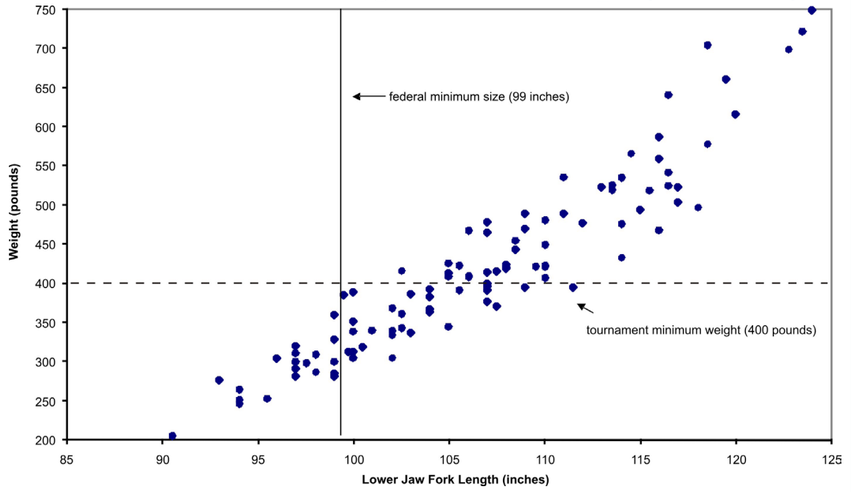
Blue Marlin	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Boated	9	7	11	14	7	15	8	10	2	3	3	4	3	5	6	3
Released	3	8	13	16	11	26	17	29	32	10	18	15	22	25	19	23
% Released	25%	53%	54%	53%	61%	63%	68%	74%	94%	77%	86%	79%	88%	84%	76%	88%

Catch Per Unit Effort (CPUE)

White Marlin	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
# Fish Caught	99	156	197	193	171	137	241	446	62	203	192	157	327	258	462	297
# Boats x # Days	393	408	426	417	435	381	393	411	399	378	393	384	429	507	528	462
CPUE (fish/boat-day)	0.25	0.38	0.46	0.46	0.39	0.34	0.61	1.09	0.15	0.61	0.49	0.41	0.76	0.51	0.87	0.64

Blue Marlin	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
# Fish Caught	12	15	24	30	18	41	25	39	34	13	21	19	25	31	25	26
# Boats x # Days	393	408	426	417	435	381	393	411	399	378	393	384	429	507	528	462
CPUE (fish/boat-day)	0.03	0.04	0.06	0.07	0.04	0.11	0.06	0.09	0.09	0.03	0.05	0.05	0.06	0.06	0.05	0.06
Marlin/Boat-Day	**0.28**	**0.42**	**0.52**	**0.53**	**0.43**	**0.45**	**0.67**	**1.18**	**0.24**	**0.64**	**0.54**	**0.46**	**0.82**	**0.57**	**0.92**	**0.70**

Blue Marlin Length-Weight Relationships (1992-2007)



There is a good relationship between length and weight for blue marlin. Fish need to be about 5 inches over the federal minimum size of 99 inches lower jaw fork length (LJFL) in order to meet the tournament minimum weight of 400 pounds. It's a different story for white marlin. The federal minimum size is 66 inches LJFL, but white marlin landed at the Mid-Atlantic $500,000 with a LJFL of 67 inches have weighed anywhere from 51 to 74 pounds! The best way to tell if a legal white marlin will make the tournament minimum weight is to see if it "carries the weight" all the way to the tail. Long, thin fish won't make weight!

White Marlin Length-Weight Relationships (1992-2007)