



Puerto Rico Highly Migratory Species Telephone Survey Pilot Study

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Executive Summary

Recreational catch estimates for billfish derived from general fisheries surveys are typically imprecise due to the rare event nature of these fisheries, and may also be susceptible to bias due to survey design and estimation issues. As a result, the utility and reliability of these estimates for fisheries management and assessment purposes is sometimes compromised. Through the Marine Recreational Fisheries Information Program (MRIP), efforts are underway to improve the quality of recreational billfish fishery information through new and expanded data collection designs. For this study, a pilot survey of Highly Migratory Species (HMS) permit holders in Puerto Rico was implemented by the University of Puerto Rico Sea Grant College Program (UPRSG) with technical assistance and oversight from NOAA Fisheries Office of Science and Technology. The focus of this report is on the socially and economically important recreational blue marlin fishery in Puerto Rico.

The survey period was divided into 24 bi-weekly sampling periods or strata covering fishing activity from January 31, 2011 through January 1, 2012. Sampling frames consisted of HMS permit holders in the Angling (private frame) and Charter/headboat (charter frame) categories in Puerto Rico. Sampling rates ranged (by period) from 14%-20% for the Angling frame and 30%-40% for Charter/headboat frame. Respondents were provided with the option to report either by telephone or Internet. The Internet option was eventually dropped two months into the study due to lack of use. Telephone interviews were conducted using computer assisted telephone interviewing (CATI) software. The survey instrument was designed to collect detailed catch and effort information on trips targeting tunas, sharks, billfish, swordfish, dolphin, wahoo, or amberjack. For all billfish releases, information was collected on the post-release condition of the fish (e.g., hook type, hook location, bleeding) as a possible gauge of post-release mortality rate in the recreational fishery. Base sampling weights were computed for each bi-weekly sampling period and were used for analyses that involved pooling data across strata. Expanded estimates and associated variances were produced for blue marlin catch, directed billfish effort, and blue marlin tournament catch and effort.

A total of 2,076 Angling category and 142 Charter/headboat category interviews were completed during the 24 bi-weekly periods. Average response rates were relatively high for a telephone survey (Angling 81.7%, Charter 72.4%). Puerto Rico HMS permitted vessels are highly specialized with the large majority of their fishing trips directed at large pelagics, primarily billfish, dolphin, tuna, or wahoo. Return times on billfish targeted trips differed by fishing mode: private boats typically returned in late afternoon or early evening (2:30PM – 5:30PM); charters typically returned around mid-day (11:00AM-2:00PM). Private boats accounted for about 75% of the blue marlin caught in Puerto Rico and charter boats for about 25%. Nearly one out of every three private boat trips targeting billfish in Puerto Rico was participating in a blue marlin tournament. About one-half of the reported blue marlin released alive were caught using

a non-circle/J-hook. An analysis of reported blue marlin landings in the telephone pilot survey suggests that the compliance rate with the NOAA Fisheries mandatory reporting requirement is very low in Puerto Rico. Willingness to report blue marlin landings through random telephone interviews, but not through the mandatory reporting system, suggests that non-compliance may be largely unintentional, due to either not knowing the rule or forgetting to report. The pilot study resulted in very precise annual estimates of recreational HMS vessels trips and of vessel trips targeting billfish in Puerto Rico (PSEs < 10%). Reasonably precise estimates were also produced for HMS tournament effort, blue marlin targeted tournament effort, and blue marlin released alive (PSEs < 20%). Precision on blue marlin catch estimates from the pilot telephone survey was much higher than precision on blue marlin estimates derived from the Marine Recreational Fisheries Statistics Survey (MRFSS).

To minimize both recall bias and species identification errors, fisheries catch data are typically collected on-site by trained interviewers. However, these potential biases should be less of a factor when estimating catch of a very large, rarely caught, and easily identified species such as blue marlin. Blue marlin catch rates (i.e., number released alive per vessel trip) from the telephone survey pilot were compared with catch rates derived from the Puerto Rico Department of Natural and Environmental Resources (DNER) tournament census program. Average catch rates were nearly identical between the pilot telephone survey (tournament trips only) and the DNER tournament census program. These results support the notion that catch data collected through a telephone survey (with a 1 to 3 week recall period) may be reasonably accurate for a large, rare event, and salient species such as blue marlin.

Collection of catch data through a telephone survey could result in significant cost savings compared to dockside sampling, and should, therefore, be considered for species such as blue marlin where catch data are more likely to be accurate. For species where accurate catch data can be collected by telephone, such data would likely supplement (rather than replace) dockside sampling data. Dockside sampling for catch would still be needed for the large majority of species for which telephone survey recall bias is likely a factor. For blue marlin data, some level of dockside sampling would also be important to collect biological data, to validate catch (and other) data collected by phone, and to develop ratio estimators to account for the off-frame component not covered in a permit list frame phone survey design. A more thorough evaluation, comparing the relative costs-benefits of enhancing and modifying the MRIP access point intercept survey versus conducting a specialized HMS phone survey, should be undertaken to determine the best approach for improving blue marlin estimates. A hybrid design that combines information from the general access point intercept survey, a specialized HMS “off-site” survey, and (possibly) the DNER tournament census program should also be considered for estimating blue marlin catch and effort in Puerto Rico.

Background

Recreational catch estimates for billfish derived from general fisheries surveys, such as the MRFSS, are often imprecise due to the “rare event” nature of these fisheries. These estimates may also be susceptible to bias due to survey design and estimation issues identified in the National Research Council report¹. As a result, the utility and reliability of these estimates for fisheries management and assessment purposes is sometimes compromised. Through MRIP, efforts are underway to improve the quality of recreational billfish, and other highly migratory species, information through new and expanded data collection designs.

Billfish are widely targeted by recreational anglers and charter boat captains in Puerto Rico. In particular, the Puerto Rico blue marlin fishery is both socially and economically important to the island, and attracts visitors from all over the world. The need to improve Puerto Rico recreational billfish data has been identified by the MRIP Rare Event Species Working Group and the Highly Migratory Species (HMS) Advisory Panel. HMS management and assessments would likely benefit from more accurate and precise billfish landings and release estimates, as well as the collection of detailed information about billfish release events (e.g., hook types, hook location, bleeding) for estimating post-release mortality. Since the large majority of billfish caught recreationally are released alive, post-release mortality may be an important source of mortality in this fishery². It is anticipated that HMS stock assessment and management, both domestic and international, will focus more on this source of mortality in the future as competition for limited fisheries resources increases.

Phase I of this study characterized the HMS recreational fishery in Puerto Rico. The final report from this initial phase recommended pilot testing specialized HMS data collection approaches in Puerto Rico³. Phase Two of this project involved two pilot tests: 1) Billfish/swordfish catch card and landings tag program to replace the existing telephone/Internet reporting system, and 2) Specialized telephone/Internet survey of HMS Angling and Charter/headboat permit holders. Results from the HMS catch card pilot are discussed in a previously released MRIP report⁴. This report describes the results of the HMS telephone/Internet survey pilot in Puerto Rico conducted during the 2011 fishing season. In particular, the focus of this report is on the Puerto Rico recreational fishery for blue marlin.

¹ National Research Council of the National Academies. 2006. Review of Recreational Fisheries Survey Methods. The National Academies Press, Washington, D.C.

² Domeier, M. L., H. Dewar, and N. Nasby-Lucas. 2003. Mortality rate of striped marlin (*Tetrapturus audax*) caught with recreational tackle. *Marine and Freshwater Research* 54:435-445.

³ MRIP Highly Migratory Species Work Group. 2009. Non-tournament Highly Migratory Species Recreational Landings Reporting for Private Boats in Puerto Rico – Phase One: Fishery Characterization and Outreach. Marine Recreational Information Program technical report.

⁴ Del Pozo, Miguel, Ruperto Chapparo, Michelle T. Schärer Umpierre, and Ronald Salz. 2012. Highly Migratory Species Recreational Fisheries Catch Card Pilot Program in Puerto Rico. Marine Recreational Information Program technical report.

Sampling Methods

Survey Sample Frames and Allocation

The survey period was divided into 24 bi-weekly sampling strata covering fishing activity from January 31, 2011 through January 1, 2012. Attempts were made to contact vessel representatives during a one week dialing period from Monday through Sunday. Selected permit holders were asked to report on their fishing activity for the prior two week period. Two sample frames were used for the Puerto Rico HMS Survey: 1) Private boat frame based on the HMS Angling category permit list, and 2) Charter boat frame based on the HMS Charter/headboat permit list. Only vessels whose principle port state was listed as Puerto Rico on the permit application were included in this study. NOAA Fisheries sent updated HMS permit lists to the University of Puerto Rico Sea Grant (UPRSG) project manager. UPRSG staff reviewed and edited the frames as needed in an effort increase response rates. This included removing duplicate vessels, updating contact information, and tracking down missing information through reverse look-up techniques and state and federal vessel registration databases. To be included in the sample frame, a vessel must have had complete contact information, including a telephone number, the name of a vessel representative, and a vessel identifier (vessel name or number).

To increase frame robustness, for sampling Periods 1-7 (January 31-May 8) the frame included all permit holders from the previous year (2010) plus newly issued 2011 permits. Starting in Period 8 only 2011 permit lists were used. Sample frame sizes and sampling rates are shown by sampling period and permit type strata in Table 1.

Table 1. Sampling frame sizes and sampling rates by sampling period and permit type.

Bi-weekly Sampling Periods	HMS Angling Category (Private Boat)			HMS Charter/Headboat Category		
	Sample Frame Size	Vessels Selected	Sampling Rate	Sample Frame Size	Vessel Selected	Sampling Rate
1 through 3	831	120	13.7%	27	11	40.7%
4 through 7	873	120	13.7%	27	11	40.7%
8 through 24	505	100	19.8%	23	7	30.4%

Ideally, the sampling frames should have been periodically updated (e.g. every month or wave) to account for newly purchased permits throughout the year. However, due to a programmatic oversight the same frames were used for Periods 8 through 24 (May 9 – December 31). While the majority of 2011 permits were on the Period 8 frame, permits purchased after May 9 were not included in sampling of subsequent periods. Thus, the percent of 2011 permitted vessels covered by the sampling frame decreased each period after Period 8 (Table 2).

Table 2. Proportion of 2011 HMS permitted vessels on sampling frame for Periods 8 through 24, by permit category.

Bi-weekly Sampling Period	HMS Angling Category (Private Boat)			HMS Charter/Headboat Category		
	Vessels on sampling frame	Permitted vessels at start of period	Percent Covered	Vessels on sampling frame	Permitted vessels at start of period	Percent Covered
8 (May 9-May 22)	505	505	100.0	23	23	100.0
9 (May 23-Jun 5)	505	524	96.4	23	23	100.0
10 (Jun 6-Jun 19)	505	542	93.2	23	23	100.0
11 (Jun 20-Jul 3)	505	550	91.8	23	23	100.0
12 (Jul 4-Jul 17)	505	558	90.5	23	23	100.0
13 (Jul 18-Jul 31)	505	577	87.5	23	24	95.8
14 (Aug 1-Aug 14)	505	612	82.5	23	24	95.8
15 (Aug 15-Aug 28)	505	631	80.0	23	25	92.0
16 (Aug 29-Sep 11)	505	638	79.2	23	26	88.5
17 (Sep 12-Sep 25)	505	650	77.7	23	28	82.1
18 (Sep 26-Oct 9)	505	658	76.7	23	28	82.1
19 (Oct 10-Oct 23)	505	682	74.0	23	28	82.1
20 (Oct 24-Nov 6)	505	694	72.8	23	28	82.1
21 (Nov 7-Nov 20)	505	711	71.0	23	28	82.1
22 (Nov 21-Dec 4)	505	718	70.3	23	28	82.1
23 (Dec 5-Dec 18)	505	718	70.3	23	28	82.1
24 (Dec 19-Jan 1)	505	718	70.3	23	28	82.1

Permit Holder Pre-notification

Notification letters were mailed to representatives of selected vessels. The letter included options for reporting (i.e. Internet or telephone), the dates for which the vessel was selected to report, as well as the dialing dates. The notification package also included a logsheet that the respondent could use to record the selected vessel’s fishing activity. Notification letters were sent via Email to permit holders who both provided a working Email address during the 2009 characterization study and indicated a preference for Email notifications. Permit holders for whom no Email address was available were asked during their first telephone interview if they wanted to be notified through Email and/or report via Internet if selected in future sampling periods.

Data Collection Procedures

Each dialing period lasted 7 days, starting on a Monday and ending on a Sunday. In an attempt to increase response rates and reduce reporting burden, respondents were provided with two reporting method options: telephone interview or Internet tool. On the last day of each two-week reporting period (i.e., second Sunday) permit holders who indicated Internet tool as their reporting preference were sent an Email reminder with a link to the secure Internet site and a unique PIN for accessing the site. Emailed permit holders were given the first three days of the

dialing period to report online. If a complete online report was not received by Wednesday, the UPRSG staff attempted to contact the permit holder by telephone starting on Thursday.

Telephone interviews were conducted using Qualtrics Computer Assisted Interview (CAI) software. Dialing began on day 1 (Monday) of the 7-day dialing period for all selected permit holders, except for those who indicated they prefer to report online. A minimum of 5 call attempts were made to contact each sampled vessel's representative. Telephone calls were made during the time of day that maximized the potential to contact vessel operators. Interviewers made use of both day and evening phone numbers, if provided by permit holders in the database. No calls were made between 9:00 PM and 9:00 AM. Once a vessel representative was contacted, future calls to that individual were made on an appointment basis if the interview could not be completed at the time of initial contact. Respondents were questioned as to the best time and number to call back in order to complete the interview.

Interviewers continued to attempt to contact vessel representatives until they conducted an interview, received a fishing report through the Internet tool, determined that the boat was no longer operating, or made the minimum of five attempts. After five call attempts had been made the interviewer left a brief message on voice mail or an answering machine. The message included a toll-free call-back number and available times to conduct the interview. UPRSG staff recorded the results of each attempt for each sampled vessel.

Survey Instrument

The project team developed and tested the survey instrument (see Appendix) with input from Puerto Rico fishing industry participants, fisheries biologists, and HMS Advisory Panel members. Questions were designed to collect detailed catch and effort information related to recreational HMS fishing activity during the designated two-week period. For purposes of the survey, HMS activity was defined as any trip targeting tunas, sharks, billfish, swordfish, dolphin, wahoo, or amberjack.

Data Analyses Methods

Unit response rate was defined as the ratio of the number of completed telephone interviews (or sufficient partials) to the number of in-scope sample cases. In-scope sample cases was calculated as: completed interviews + partial interviews with key minimum data elements + refusals + non-response due to any other reason (e.g., language barrier, illness) + non-contacts.⁵

Summary statistics were computed by sampling period and mode for HMS trip prevalence rates, mean HMS trip avidity per vessel, and mean billfish directed trip avidity. Trips return times (HMS and billfish directed) reported by respondents to the nearest half-hour were pooled into five time intervals for analysis by mode. Hook type used (i.e., J-hook versus Circle hook) for blue marlin releases were analyzed by mode and tournament status. Sampling weights were computed for each bi-weekly sampling period and mode stratum as the sample frame divided by

⁵ Office of Management and Budget. 2006. Standards and Guidelines for Statistical Surveys.

the number of completed interviews. Sample weights were used, where indicated, for most analyses that involved combining strata.

Catch and effort estimates were produced using the SAS V9.3 SURVEYMEANS Procedure for stratified random sampling (stratum= bi-weekly sampling period). For combined mode estimates strata including both sampling period and mode. Trips that returned to ports outside of Puerto Rico were not included in these estimates. Estimates of mean trip and catch rates per vessel and associated variance estimates were produced for the following:

- HMS trips
- Directed billfish trips (defined as caught or targeted a billfish)
- HMS tournament trips
- HMS tournaments trips targeting blue marlin
- Blue marlin released alive
- Blue marlin released alive in tournaments
- Blue marlin tagged and released

Mean trip and catch rates per vessel were expanded by the total frame size across all strata (i.e. sum of weights) to arrive at estimates of total effort and catch. Variances of expanded estimates were calculated as the variance of the mean multiplied by the sum of weights squared. Percent standard error (PSE) and estimated 95% upper and lower confidence limits were calculated using standard statistical formulas.

Results

Sampling Results

About 15% of permit holders sampled were initially placed in the “Internet” group based on their stated reporting mode preference either during the 2009 HMS characterization study or during initial contact for this survey. However, due to extremely low Internet reporting rates during the first few sampling periods, the large majority of these permit holders still had to be contacted by phone if selected. The Internet survey mode was eventually dropped after Sampling Period 4 since the small number of interviews obtained did not justify the additional administrative and data management costs of maintaining this option.

A total of 2,076 Angling category and 142 Charter/headboat category interviews were completed during the 24 bi-weekly periods, yielding overall response rates of 81.7% and 72.4% for Angling and Charter, respectively (Table 3). Non-contacts were the primary reason for not completing interviews as refusal rates were typically very low for both categories (i.e. < 3%).

Table 3. Completed interviews and response rates by sampling period and category.

Bi-weekly Sampling Period	HMS Angling Category (Private Boat)		HMS Charter/Headboat Category	
	Completed Interviews	Response rate	Completed Interviews	Response rate
1 (Jan 31-Feb 13)	100	83.3	7	63.6
2 (Feb 14-Feb 27)	105	87.5	9	81.8
3 (Feb 28-Mar 13)	109	90.8	8	72.7
4 (Mar 14-Mar 27)	106	88.3	9	81.8
5 (Mar 28-Apr 10)	92	76.7	7	63.6
6 (Apr 11-Apr 24)	99	82.5	8	72.7
7 (Apr 25-May 8)	80	66.7	9	81.8
8 (May 9-May 22)	87	87.0	2	28.6
9 (May 23-Jun 5)	83	83.0	3	42.9
10 (Jun 6-Jun 19)	73	73.0	3	42.9
11 (Jun 20-Jul 3)	65	65.0	4	57.1
12 (Jul 4-Jul 17)	82	82.0	7	100.0
13 (Jul 18-Jul 31)	62	62.0	6	85.7
14 (Aug 1-Aug 14)	79	79.0	5	71.4
15 (Aug 15-Aug 28)	82	82.0	5	71.4
16 (Aug 29-Sep 11)	69	69.0	6	85.7
17 (Sep 12-Sep 25)	72	72.0	4	57.1
18 (Sep 26-Oct 9)	89	89.0	4	57.1
19 (Oct 10-Oct 23)	86	86.0	7	100.0
20 (Oct 24-Nov 6)	91	91.0	6	85.7
21 (Nov 7-Nov 20)	90	90.0	6	85.7
22 (Nov 21-Dec 4)	92	92.0	6	85.7
23 (Dec 5-Dec 18)	94	94.0	5	71.4
24 (Dec 19-Jan 1)	89	89.0	6	85.7
All Periods	2,076	81.7	142	72.4

HMS Fishing Effort Results

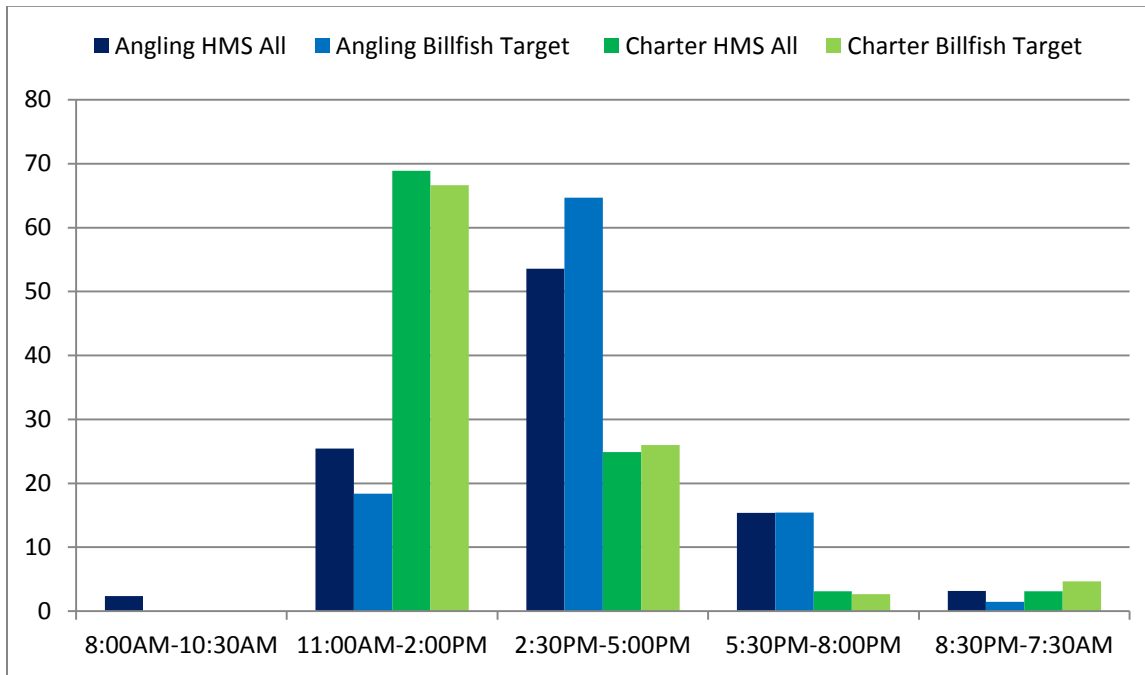
Across all sampling periods, data were obtained for 385 Angling and 232 Charter/headboat reported recreational fishing trips in Puerto Rico targeting a highly migratory species (i.e. tuna, shark, billfish, swordfish, dolphin, wahoo, or amberjack). Angling category respondents also reported using their vessel for 21 HMS trips that returned to ports outside Puerto Rico (e.g. USVI, Dominican Republic). Trips targeting HMS accounted for 92% of all Angling category vessel fishing activity and 83% of Charter/headboat vessel fishing activity. HMS fishing prevalence rates and reporting rates are shown by sampling period and permit category (Table 4).

Table 4. HMS fishing prevalence rates and reporting rates by sampling period and mode.

Bi-weekly Sampling Period	HMS Angling Category (Private Boat)			HMS Charter/Headboat Category		
	Proportion of vessels that took an HMS trip in PR	Mean HMS PR trips reported per vessel	Mean Billfish PR trips reported per vessel	Proportion of vessels that took an HMS trip in PR	Mean HMS PR trips reported per vessel	Mean Billfish PR trips reported per vessel
1 (Jan 31-Feb 13)	0.16	0.38	0.07	0.57	2.57	1.71
2 (Feb 14-Feb 27)	0.08	0.11	0.01	0.33	1.67	1.56
3 (Feb 28-Mar 13)	0.17	0.31	0.07	0.63	1.88	1.13
4 (Mar 14-Mar 27)	0.15	0.23	0.08	0.67	3.44	2.67
5 (Mar 28-Apr 10)	0.22	0.33	0.05	0.29	2.14	1.29
6 (Apr 11-Apr 24)	0.11	0.14	0.05	0.38	2.25	2.25
7 (Apr 25-May 8)	0.06	0.09	0.06	0.44	2.11	1.67
8 (May 9-May 22)	0.18	0.31	0.22	0.00	0.00	0.00
9 (May 23-Jun 5)	0.13	0.23	0.08	0.33	0.33	0.33
10 (Jun 6-Jun 19)	0.08	0.16	0.08	1.00	4.67	4.00
11 (Jun 20-Jul 3)	0.11	0.14	0.09	0.25	0.50	0.00
12 (Jul 4-Jul 17)	0.07	0.15	0.13	0.57	2.14	1.14
13 (Jul 18-Jul 31)	0.21	0.31	0.15	0.67	1.83	0.17
14 (Aug 1-Aug 14)	0.10	0.23	0.22	0.60	1.80	1.40
15 (Aug 15-Aug 28)	0.07	0.07	0.04	0.40	1.60	1.60
16 (Aug 29-Sep 11)	0.14	0.20	0.13	0.33	0.83	0.33
17 (Sep 12-Sep 25)	0.11	0.17	0.06	0.50	0.75	0.50
18 (Sep 26-Oct 9)	0.19	0.25	0.07	0.50	2.50	1.25
19 (Oct 10-Oct 23)	0.15	0.16	0.01	0.43	0.86	0.00
20 (Oct 24-Nov 6)	0.05	0.07	0.00	0.50	1.00	0.50
21 (Nov 7-Nov 20)	0.09	0.09	0.03	0.00	0.00	0.00
22 (Nov 21-Dec 4)	0.12	0.16	0.00	0.33	0.33	0.17
23 (Dec 5-Dec 18)	0.03	0.04	0.01	0.00	0.00	0.00
24 (Dec 19-Jan 1)	0.04	0.10	0.02	0.33	1.50	0.00
All Periods (weighted mean)		0.18	0.07		1.41	0.92

The majority of private boat (Angling) trips targeting HMS, and nearly two-thirds of billfish directed trips, returned to the dock between 2:30 PM and 5:00 PM (Figure 1). Only about 5% of private boat HMS trips returned between 8:30 PM and 10:30 AM. By comparison, nearly 70% of charter boat trips targeting HMS, and two-thirds of billfish trips, returned to the dock between 11:30 AM and 2:00 PM. Only about 6% of charter boat HMS trips returned between 5:00 PM and 10:30 AM.

Figure 1. Frequency distribution of reported trip return time interval for 2011 Puerto Rico trips targeting HMS and targeting billfish specifically, by fishing mode.



Expanded effort estimates were computed from survey data for the sampled period from January 31, 2011 through January 1, 2012 (Table 5). During this period an estimated 4,083 vessel trips targeted HMS (i.e., tunas, sharks, billfish, swordfish, dolphin, wahoo or amberjack) in Puerto Rico. HMS Angling category (private) vessels accounted for 76% of these trips and charter vessels accounted for 24%. Permitted charter boats took an estimated 34.3 HMS trips annually per vessel, compared to only 4.4 HMS trips annually per permitted private (Angling) vessel in Puerto Rico. When fishing for HMS, charter boats captains were more likely to target billfish (64% of HMS trips) than were private boat operators (37% of HMS trips) who reported more trips targeting dolphin than billfish. Of the estimated 1,144 private boat billfish trips in Puerto Rico, about one-third were associated with a blue marlin fishing tournament. By comparison, less than 10% of the estimated charter boat trips targeting billfish (57 out of 616) were associated with a tournament.

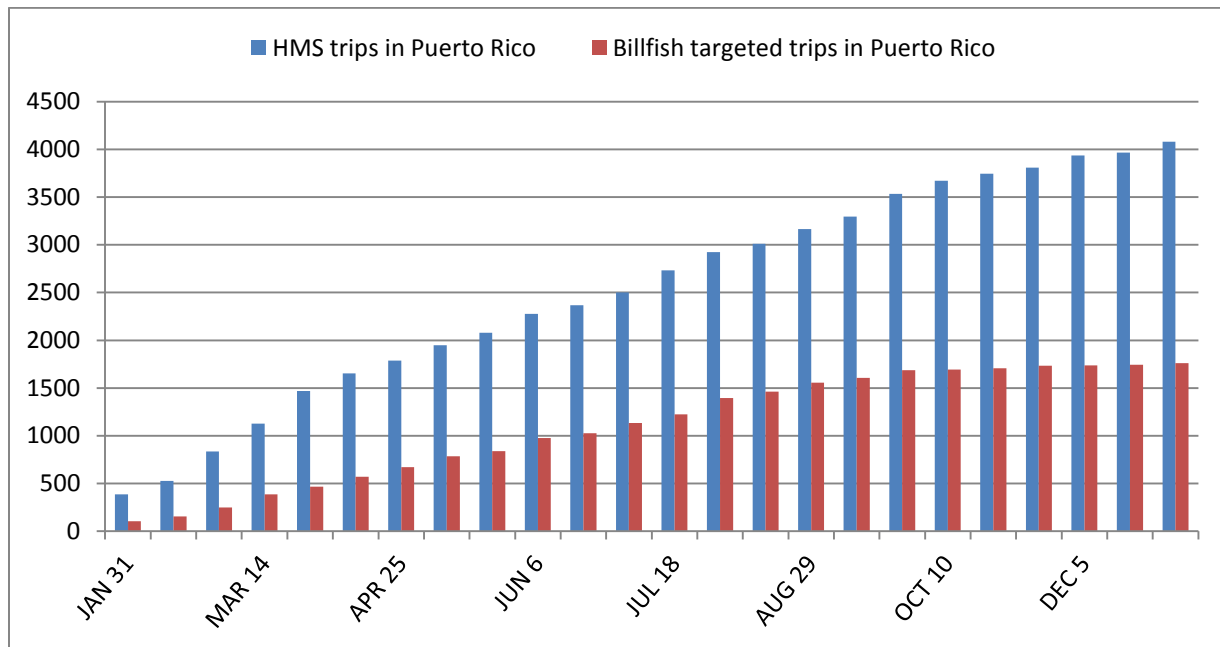
HMS recreational fishing activity was reported during all sampling periods covered by the survey (Figure 2). Billfish were also targeted in all months covered with a concentration from

about mid-March through September. Cumulative effort estimates across sampling periods are shown for HMS tournament trips and blue marlin tournament trips in Figure 3.

Table 5. Expanded estimates of fishing effort (vessel trips) for HMS in Puerto Rico by mode.

Puerto Rico Effort Estimate (Vessel Trips)	HMS Angling (Private Boat)		HMS Charter/Headboat (Charter)		Total (modes combined)	
	Estimate	PSE	Estimate	PSE	Estimate	PSE
HMS trips	3,123	6.8%	960	11.4%	4,083	5.8%
Billfish targeted trips	1,144	10.7%	616	15.1%	1,760	8.8%
HMS tournament trips	543	17.0%	57	55.6%	600	16.3%
Blue marlin tournament trips	384	20.4%	57	55.6%	441	19.1%

Figure 2. Cumulative HMS vessel trip estimates and billfish directed trip estimates in Puerto Rico across bi-weekly sampling periods.



HMS Catch Results

In addition to fishing effort, respondents were asked to report the number of blue marlin caught, and the disposition of each fish caught, over the previous 2-week sampling period. Table 6 shows the unexpanded reported number (raw counts) of directed billfish trips, blue marlin released alive, kept/released dead, and tagged/released on those trips, by quarter and mode. None of the 100 blue marlin reported as caught had a previously placed tag on it.

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Figure 3. Cumulative HMS tournament trip estimates and blue marlin tournament trip estimates in Puerto Rico across bi-weekly sampling periods.

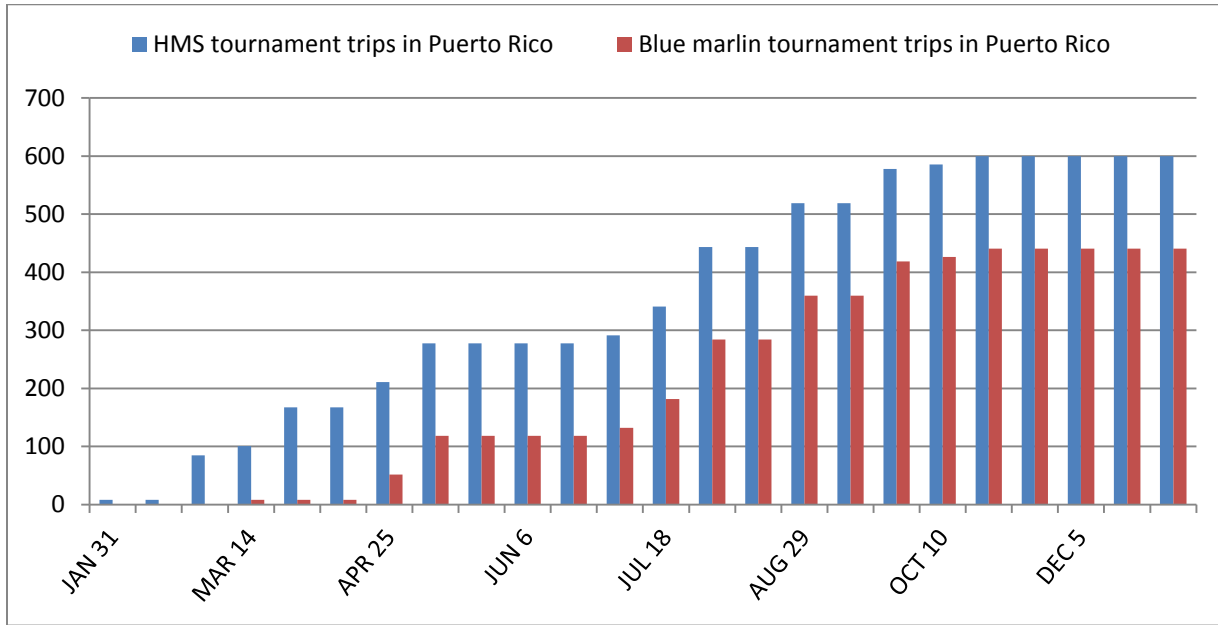


Table 6. Unexpanded (raw) number of reported directed billfish trips, blue marlin kept/released dead, released alive, and tagged/released in Puerto Rico by quarter and mode.

Quarterly Period	Angling				Charter			
	Billfish Trips	Kept or Released Dead	Released Alive	Released Alive and Tagged	Billfish Trips	Kept or Released Dead	Released Alive	Released Alive and Tagged
Jan 31-Apr 24	34	0	15	2	86	0	6	1
Apr 25 – Jul 17	54	6	13	8	36	0	7	2
Jul 18 – Oct 9	48	6	29	6	25	1	15	7
Oct 10 – Jan 1	7	0	2	1	4	0	0	0
All Periods	143	12	59	17	151	1	28	10

Additional questions were asked about the blue marlin reported as released alive to gather information about fish condition upon release that could possibly assist in estimating post-release mortality rates. Overall, about one-half of the blue marlin released alive were reported as caught with a circle hook and one-half were caught with a non-circle or J-hook (Table 7). Charter boat captains reported a higher rate of circle hook use (60%) on blue marlin releases than did private boat operators (40%). Both hook types were reported for blue marlin released alive in tournaments (11 circle hook, 10 non-circle/J-hook). Of the blue marlin released alive in

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tournaments with non-circle/J-hooks, 2 were caught using “dead bait” and 4 using “artificial” lures (bait type was not reported for the other four fish).

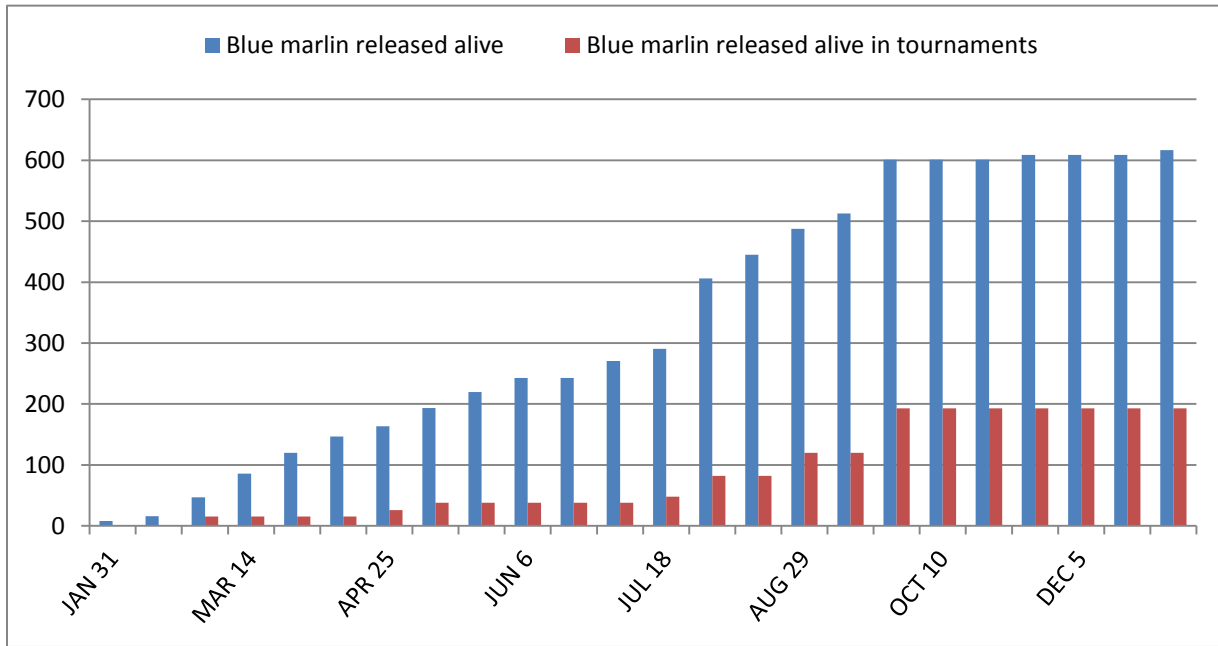
Only 4% of the blue marlin released alive in Puerto Rico were reported to be bleeding (3 out of 76), and all three bleeding fish were caught using a J-hook. About 12% were reported as hooked in a location other than the mouth (five fish were foul hooked, two hooked in the bill, and one in the gill cavity). The one blue marlin recorded as released dead was reported to be caught with a J-hook, hooked in the mouth and not bleeding.

Table 7. Hook type reported for blue marlin released alive by category and tournament status (raw data).

Hook Type	Angling			Charter		
	Non-tournament	Tournament	All	Non-tournament	Tournament	All
Circle	8	6	14	10	5	15
Non-circle / J-Hook	13	8	21	8	2	10

An estimated 617 blue marlin (PSE 15.2%) were released alive by HMS permit holders in Puerto Rico during the survey period from January 31, 2011 through January 1, 2012. Charter boats accounted for an estimated 24% of blue marlin releases and private boats for an estimated 76%. Survey results indicated that an estimated 30% of the blue marlin released alive were tagged by the angler or captain. Tournament fishing accounted for an estimated 31% of the blue marlin released in Puerto Rico. Seasonally, the months from March through October accounted for approximately 95% of all blue marlin released alive (Figure 4).

Figure 4. Cumulative estimates of total blue marlin released alive (in blue) and the subset released alive in tournaments (in red) in Puerto Rico across bi-weekly sampling periods.



Comparisons with Other Data Sources

Pilot survey estimates were compared to other sources of Puerto Rico recreational blue marlin data collected in 2011. It should be noted that the pilot survey estimates only reflect fishing activity by HMS permitted vessels (Angling and Charter/headboat) who indicated Puerto Rico as their principle port state (i.e. “on-frame” vessels). The programs used for comparison (below) may also include blue marlin catch and effort in Puerto Rico by “off-frame” vessels either fishing without an HMS permit, from a different principle port state, or foreign vessels.

1. Puerto Rico DNER Assessment of Marine Recreational Tournament Fishery

DNER biologists collected catch and effort data from all blue marlin tournaments held in Puerto Rico in 2011. Results from this attempted tournament census program were compared to the pilot survey for tournament trips targeting blue marlin. Blue marlin tournament data from both programs came from trips taken between April 30th and October 17th.

Information obtained by the DNER from tournament organizers indicated that 347 vessels participated in the 10 blue marlin tournaments⁶. Based on pilot survey data, the average number of days fished per vessel in 2011 blue marlin tournaments was estimated to be 2.0 (n=29 respondents fished in blue marlin tournaments). Combining these results (347 vessels X 2 trips

⁶ Ferrer, Grisel Rodriguez and Yamitza Rodriguez Ferrer. 2011. Puerto Rico Marine Recreational Fisheries Statistics Program Annual Report. Puerto Rico Department of Natural and Environmental Resources, Fish and Wildlife Bureau, Marine Resources Division.

per vessel) yields an estimated blue marlin tournament effort of 694 vessel trips. By comparison the pilot survey estimate for blue marlin tournament vessel trips was 440.5 with a PSE of 19.1%.

The DNER tournament program reported 315 blue marlin released alive during 2011 tournaments. By comparison, the pilot survey estimate for blue marlin released alive in tournaments was 193 with a PSE of 29.3%. While the census program reported more trips and blue marlin released alive than the survey estimated, catch rates (i.e. number released alive / vessel trips) were nearly identical between the two programs: DNER census 0.44 blue marlin per vessel trip; pilot telephone survey 0.45 blue marlin per vessel trip.

2. NOAA Fisheries Marine Recreational Fisheries Statistics Survey

The MRFSS 2011 estimate for blue marlin released alive in Puerto Rico was 2,037 with a PSE of 77.7%⁷. It should be noted that the MRFSS access point angler intercept survey used in Puerto Rico in 2011 did not allow sampling at official tournament sites. Although the MRFSS was conducted year-round, blue marlin releases were estimated for only three waves: March/April (1,551), July/August (152), and September/October (334). The pilot survey estimate for blue marlin released alive in Puerto Rico was 616.8 with a PSE of 15.2%. Blue marlin releases were reported in the pilot survey during all months sampled (February through December) with nearly one-half of the estimate from August through mid-October.

3. MRIP HMS Recreational Fisheries Catch Card Pilot Program in Puerto Rico

An HMS Catch Card census program was pilot tested in 2011 in an effort to improve the blue marlin landings estimate for Puerto Rico. Although the telephone survey pilot was not designed to produce a precise blue marlin landings estimate, reported blue marlin landings (raw data) were compared with the census program in an effort to estimate catch card reporting rates. Only four blue marlin landings were reported through the 2011 HMS Catch Card pilot program, three of which were landed in tournaments.⁸ Of the 12 blue marlin landings reported during the phone survey pilot, only one was positively matched to a Catch Card pilot program reported fish.

⁷ Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division February 24, 2014.

⁸ Del Pozo, Miguel, Ruperto Chapparo, Michelle T. Schärer Umpierre, and Ronald Salz. 2012. Highly Migratory Species Recreational Fisheries Catch Card Pilot Program in Puerto Rico. Marine Recreational Information Program Technical Report.

Discussion

The Puerto Rico HMS pilot was successful at achieving relatively high response rates for a telephone survey. The average Angling category response rate across all sampling periods (81.7%) exceeded the 80% threshold for OMB guidelines regarding when to conduct a non-response analysis⁹. The telephone pilot response rate also exceeded those typically obtained for the NOAA Fisheries Large Pelagics Telephone Survey (LPTS). The LPTS is a bi-weekly survey of HMS Angling and Atlantic Tunas General category permit holders conducted from June through October from Maine through Virginia. From 2011-2013 the average annual LPTS private boat response rate ranged from 71% to 73%. It is also worth noting that the pilot achieved higher response rates despite a heavier response burden placed on permit holders. Private boat sampling rates for the Puerto Rico pilot, which ranged from 14% to 20% (depending on the sampling period), were considerably higher than LPTS private sampling rates, which typically range by state from 2% to 8%. In addition, the pilot was conducted for 24 continuous bi-weekly sampling periods (February through December), whereas the LPTS is only conducted for 11 bi-weekly sampling periods (June through October).

The Charter/headboat sampling frame average response rate (72.4%), while lower than the Angling category, was still relatively high for a telephone survey. The lower response rate (compared to private boats) may partially be explained by the fact that charter boats were sampled at a higher rate (between 30%-40%) resulting in a greater response burden across all sampling periods. In spite of this high sampling rate, the overall response rate for the charter boat mode still exceeded typical response rates from the HMS Charter/headboat component of the LPTS. The LPTS charter boat component is conducted as an add-on to the For-Hire Survey which is conducted weekly at a 10% sampling rate. From 2011-2013 the average annual LPTS charter boat response rate ranged from 62% to 64%.

The pilot study tested a mixed-mode sampling design that could be viewed as a hybrid of both concurrent and sequential mixed-mode designs. Similar to concurrent designs, respondents were initially offered a choice between completing the survey via the Internet web tool or by telephone. However, the pilot study resembled sequential mixed-mode designs in that permit holders who indicated Internet as their reporting preference were given three days of the dialing period to report on-line. Those who did not report via Internet after three days were called (starting on the 4th day of the 7-day dialing period) in an attempt to initiate a phone interview. Internet reporting rates were extremely low and the large majority of “Internet preferred” respondents still had to be contacted by phone. Providing the Internet reporting option may have negatively impacted overall response rates because it effectively shortened the dialing period for

⁹ Office of Management and Budget. 2006. Standards and Guidelines for Statistical Surveys. http://www.whitehouse.gov/sites/default/files/omb/assets/omb/inforeg/statpolicy/standards_stat_surveys.pdf

contacting “Internet preferred” permit holders (from 7 to 4 days). The Internet option was eventually dropped after the first two months of the pilot study.

The extremely low rate of Internet reporting was somewhat unexpected, considering prior results from questions about reporting mode preference in the Puerto Rico Angling category characterization study¹⁰. Nearly three-fourths of characterization study respondents indicated they were willing to participate in future Internet fisheries surveys, and nearly two-thirds stated the Internet was their preferred mode for reporting billfish catches. A possible explanation for the lack of Internet reporting in the pilot is that Internet reporting is an “active” self-reporting mode in that it requires at least some initiative or motivation on the part of the respondent. By comparison, the respondent’s initial role with the telephone survey interview is “passive” since they wait for the interviewer to call them to initiate the interview. This could be an important distinction particularly since on average, only about 12% of Angling permit holders contacted indicated they had fished during the bi-weekly sampling period. Permit holders who were inactive during the selected two-week period may have felt less compelled to report, lacked the initiative, or incorrectly assumed they didn’t need to respond because they did not take any fishing trips. Another possible explanation is that the three-day window to respond online was too short. If given more time and more Email reminders emphasizing the need to respond, even if they did not fish, Internet reporting rates may have been higher than those obtained in the pilot. Further research is needed to determine ways to encourage selected anglers and captains to report via the Internet as this could be less costly than contacting them by phone. However, as this study showed, a telephone survey using a fishing permit list frame can result in relatively high response rates which may be difficult to improve upon with a mixed-mode design.

The pilot study resulted in very precise annual estimates of recreational HMS vessels trips and billfish targeted vessel trips in Puerto Rico (PSEs both less than 10%). Reasonably precise estimates were also produced for HMS tournament effort, blue marlin targeted tournament effort, and blue marlin released alive (PSEs all less than 20%). If implemented in the future, it is anticipated that similar precision on blue marlin estimates can be obtained at a reduced sampling rate and overall cost (compared to the pilot) through optimal sample allocation. For example, sampling effort could focus more on peak activity blue marlin months (e.g. March through mid-October) and greatly reduced (or eliminated) during other periods. Bi-weekly periods with major blue marlin tournaments could also be sampled at a higher rate than periods without tournaments. A short form questionnaire, focused on blue marlin, could also be used to reduce the cost of administering the survey and potentially increase response rates.

The pilot survey sample frame was limited to HMS Angling and Charter/headboat permit holders who listed Puerto Rico as their principle port state. However, to fully account for catch and effort in the Puerto Rico blue marlin fishery, other “off-frame” vessels would need to be included

¹⁰ MRIP Highly Migratory Species Work Group. 2009. Non-tournament Highly Migratory Species Recreational Landings Reporting for Private Boats in Puerto Rico – Phase One: Fishery Characterization and Outreach. Marine Recreational Information Program technical report.

in the survey design and estimation method. This “off-frame” component includes vessels fishing in Puerto Rico without an HMS permit, vessels with a different principle port state listed on their permit, and foreign vessels. One approach to estimating the off-frame component would be to add an HMS permit question to the MRIP general access point intercept survey to determine ratio factors for expansion of “on-frame” estimates. The telephone sampling frame used in the pilot could also be expanded to include vessels that are likely to fish for marlin in Puerto Rico. This might include HMS permits with nearby principle port states (e.g. USVI) or with Puerto Rico not listed as “principle port” state but listed as either “home port” or “bill to” state on the permit application. Atlantic Tunas General category vessels in Puerto Rico can also be added to the sampling frame, since this permit designation allows captains to target marlin in recreational fishing tournaments.

While this “off-frame” component was not included in the pilot telephone survey, it was accounted for in the Puerto Rico DNER tournament census program. This coverage difference likely explains, at least in part, the lower estimates of blue marlin tournament trips and blue marlin tournament releases in the pilot compared to the tournament estimates derived from the DNER census program. Blue marlin tournaments held in Puerto Rico attract vessels from other U.S. territories and nations throughout the Caribbean including the U.S. Virgin Islands, Dominican Republic, and Bermuda. For example, at the 2011 San Juan International Billfish tournament 12 different countries were represented by the 51 registered boats.

The incomplete pilot sampling frames, which did not include permits purchased after early May, may have also been a contributing factor to the lower pilot tournament estimates compared to the DNER program estimates. During the sampling periods when blue marlin tournaments occurred (i.e. April through mid-October) the pilot undercoverage rate ranged from 0% – 26%. If captains who purchased their HMS permit after May (i.e. not sampled) were more likely to participate in blue marlin tournaments than those who had purchased their permit earlier in the year, this undercoverage could have resulted in blue marlin tournament effort and catch estimates biased low. If implemented in the future, it is recommended that the most current permit list frame available be used for each bi-weekly sampling period to minimize potential bias due to undercoverage.

To minimize both recall bias and species identification errors, fisheries catch data are typically collected on-site by trained interviewers. However, these potential biases should be less of a factor when estimating catch of a very large, rarely caught, and easily identified species such as blue marlin. The presumption here is that catching a blue marlin is an extremely memorable event, even for seasoned captains, and catches reported over the phone should be reasonably accurate even with a 2-week recall period. Blue marlin catch rates (i.e., number released alive per vessel trip) from the telephone survey pilot were compared with catch rates derived from the Puerto Rico DNER tournament census program. Average catch rates were nearly identical between the pilot telephone survey (tournament trips only) and the DNER tournament program.

These results support the notion that recall bias may not be a factor for blue marlin catch data collected through a telephone survey with a 2-3 week recall period.

Collection of catch data through a telephone survey could result in significant cost savings compared to dockside sampling, and should be considered for species, such as blue marlin, where catch data are more likely to be accurate. For species where accurate catch data can be collected by telephone, such data would likely supplement, rather than replace, data from dockside sampling. Dockside sampling would still be needed for the large majority of species for which accurate catch data cannot be collected using off-site methods due to recall bias or species identification errors. For blue marlin data, dockside sampling would also be needed to collect biological data, to validate catch (and other) data collected by phone, and to develop ratio estimators to account for the off-frame component not covered in a permit list frame phone survey design.

Precision on annual estimates of Puerto Rico blue marlin released alive from the general MRIP survey (formerly MRFSS) is extremely poor (PSEs typically range from 40%-80%) due to the rare event nature of catching this fish. As a result, the utility and reliability of these estimates for fisheries management and assessment purposes is somewhat compromised. It should be noted that starting in 2014 the improved MRIP design and estimation methods will replace the MRFSS intercept design in Puerto Rico. These changes, which include sampling at tournament sites (previously prohibited under MRFSS), expanded coverage of trip return times, site clustering, and matching sample design to estimation, are aimed at reducing bias in catch estimates. Additional changes may be needed to significantly improve on the precision of rare event species such as blue marlin. Precision on MRIP blue marlin catch estimates can be improved by enhancing intercept survey sample sizes and shifting sample to site/day combinations with higher blue marlin catch rates. However, as shown in the pilot survey, a phone survey of HMS permitted vessels can also result in a relatively precise blue marlin catch estimate (PSE 15%). A more thorough evaluation, comparing the relative costs-benefits of enhancing and modifying the MRIP access point intercept survey versus conducting a specialized HMS phone survey, would need to be undertaken to determine the best approach for improving blue marlin estimates. A hybrid design that combines information from the general access point intercept survey, a specialized HMS “off-site” survey, and (possibly) the DNER tournament census program should also be considered for estimating blue marlin catch and effort in Puerto Rico.

Recreational landings of blue marlin are extremely rare and therefore are difficult to estimate with adequate precision using a standard survey design. In 2011, in addition to the pilot phone survey, an HMS catch card pilot was conducted in Puerto Rico in an attempt to improve marlin landings reporting rates. An analysis of reported blue marlin landings in the phone survey suggested an extremely low reporting rate with both the catch card pilot and the NOAA Fisheries mandatory phone/Internet reporting system. It is interesting that anglers who willingly report blue marlin landings during a random phone survey interview are, for the most part, not reporting these fish through the mandatory system. This finding was similar to that found in the

2008 Puerto Rico HMS characterization study which asked anglers to recall the number of blue marlin landed in the previous 12 months. This suggests that at least some portion of the non-compliance may be unintentional on the part of the angler. In an anonymous Internet survey Massachusetts HMS permit holders cited lack of knowledge of the reporting requirement and forgetting to report as the biggest reasons for not reporting landed recreational bluefin tuna¹¹. MRIP pilot study results suggest the same may be true for many anglers and captains who land blue marlin in Puerto Rico.

In addition to blue marlin catch data, phone pilot respondents were asked to recall details (e.g., hook type use, hook location, and bleeding) for each marlin they released alive as an indicator of post-release mortality rate. About the same number of blue marlin were reported as released alive using a circle hook as were reported released alive using a J-hook. Similarly, about one-half of the reported tournament releases were caught using a J-hook, indicating a possible violation of the NOAA Fisheries rule prohibiting the use of J-hooks with natural baits in Atlantic billfish tournaments. Although sample sizes were very small, the pilot study results regarding condition of blue marlin releases were consistent with Graves and Horodysky's (2010) finding that "blue marlin derive substantial conservation benefits from the use of circle hooks." All three blue marlin releases reported as "bleeding" were caught using a J-hook, and the only fish reported as "released dead" was also caught on a J-hook. The potential for recall bias was likely greater for these catch-related details compared to the accuracy of the reported number of blue marlin caught. As such, it would be important to validate detailed catch-specific data collected by phone, either with dockside intercepts or other sources as available (e.g. tournament data), if such information is to be used by management for estimating post-release mortality in the recreational blue marlin fishery.

Summary of Key Findings

- Puerto Rico HMS permitted vessels are highly specialized with the large majority of their recreational fishing trips directed at large pelagics, primarily billfish, dolphin, tuna and wahoo.
- Return times on billfish targeted trips in Puerto Rico were notably different between private and charter boats: Private boats typically return to the dock in the late afternoon or early evening (2:30PM – 5:30PM); Charters typically return closer to mid-day (11:00AM-2:00PM).
- Nearly one out of every three private boat trips targeting billfish in Puerto Rico was participating in a blue marlin tournament.
- Charter boats account for nearly one out of every four blue marlin caught in Puerto Rico.
- Compliance rates with the NOAA Fisheries mandatory reporting requirement for blue marlin landings are likely very low in Puerto Rico.

¹¹ MRIP Technical Report. 2013. Massachusetts Recreational Bluefin Tuna Landings Census Pilot.

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- Willingness to report blue marlin landings through random telephone interviews, but not through the mandatory reporting system, suggests that non-compliance may be largely unintentional, due to either not knowing the rule or forgetting to report.
- Respondents reported using non-circle/J-hooks and circle hooks on about the same number of blue marlin caught and released.
- Precision on blue marlin catch estimates from the pilot telephone survey was much higher than precision on the MRFSS blue marlin catch estimates.
- Telephone survey interviews represent a cost effective sampling mode with high response rates and low refusal rates for the population of Puerto Rico HMS permit holders.
- Additional research is needed to determine the optimal design and potential benefits of a mixed-mode survey (i.e., telephone/Internet) of this population.
- Blue marlin catch rates were nearly identical between the pilot telephone survey (tournament trips only) and the Puerto Rico DNER tournament census program.
- “Off-site” sampling modes (telephone/ Internet) should be considered, to supplement “on-site” intercept sampling, for collecting catch and detailed trip information on very rare and memorable species such as blue marlin.
- A hybrid design that combines information from a general access point intercept survey, a specialized HMS “off-site” survey, and possibly a tournament census program should also be considered for estimating blue marlin catch and effort in Puerto Rico.

Appendix. Puerto Rico HMS Telephone Survey Pilot Questionnaire

Q1.2 Hello, my name is [INTERVIEWER NAME] and I'm calling from the University of Puerto Rico at Mayaguez Sea Grant Program. We are interviewing marine fishermen for a study sponsored by the National Marine Fisheries Service of the U.S. Department of Commerce. Our records show that the [VESSEL NAME] has an HMS permit and is owned or operated by [RESPONDENT NAME]. May I please speak with [RESPONDENT NAME]? IF RESPONDENT NOT AVAILABLE AND AFTER WEDNESDAY, ASK: Would you or someone else who could talk with us today know about whether the boat was used to fish for large fish such as tunas, sharks, billfish, dolphin, amberjack or wahoo.

If Respondent is available Is Selected, Then Skip To We are calling people with HMS permit...If Proxy is available (after W... Is Selected, Then Skip To Perhaps you can help me. We are survey...If Respondent/Proxy NOT available Is Selected, Then Skip To What day would be the best to call back...If Respondent deceased/disabled Is Selected, Then Skip To Do you know the name of the owner or ...

Q1.3 Hi, we are calling you from the Sea Grant Program at the University of Puerto Rico at Mayagüez are calling you as part of a survey of HMS permit holders to ask them a few questions about fishing trips between [START DATE] and [END DATE]. This survey is conducted on behalf of the National Marine Fisheries Service under the authority of the Atlantic Tunas Convention Act. Your answers will be kept confidential, and data from this survey may only be released in accordance with the Privacy Act of 1974. The information you provide us will help to improve the management of this fishery and to improve future fishing opportunities. Will you participate in our survey?

If Yes Is Selected, Then Skip To SCREENER QUESTION 1. CONFIRM THE CAPT...If No Is Selected, Then Skip To End of Survey

Q1.4 What day would be the best to call back?

If What day would be the best ... Is Empty, Then Skip To End of Survey

Q1.5 Who should I ask for when I call back?

If Who should I ask for when I... Is Empty, Then Skip To End of Survey. If Who should I ask for when I... Is Displayed, Then Skip To End of Survey

Q1.6 PROXY INTRODUCTION (NOT AVAILABLE ON MONDAYS AND TUESDAYS) Perhaps you can help me. We are surveying all people with HMS permits to ask a few questions about their fishing trips targeting large fish such as tunas, sharks, billfish, dolphin, amberjack or wahoo. This study is being conducted under the authority of the Atlantic Tunas Convention Act. Your answers will be kept confidential, and data from this survey may only be released in accordance with the Privacy Act of 1974. Do you know if the boat was used in the last two weeks to fish for any of these species?

If Yes (PROXY SAYS BOAT TOOK T... Is Selected, Then Skip To SCREENER QUESTION 1, PROXY VERSION. C...If No (PROXY SAYS BOAT TOOK NO... Is Selected, Then Skip To End of Survey. If Boat is Inactive is selected, Then ask "When will boat be active again?"

Q1.7 CALLBACK PROXY DOES NOT KNOW ABOUT BOAT TRIPS What day would be the best to call back? Q1.8 CALLBACK PROXY DOES NOT KNOW ABOUT BOAT TRIPS. Who should I ask for when I call back?

If Q1.8 CALLBACK PROXY DOES NOT ... Is Displayed, Then Skip To End of Survey

Q1.9 Can you answer questions about fishing trips taken during the last two weeks, that is Mon.-Sun., [RECALL DATES], by the [VESSEL NAME]?

If Yes Is Selected, Then Skip To SCREENER QUESTION 1. CONFIRM THE CAPT...If Yes Is Selected, Then Skip To CALLBACK. What day would be the best...

Q1.10 CALLBACK What day would be the best to call back? (RECORD DAY)Who should I ask for when I call back? (RECORD RESPONDENT)

Screener Questions

Q1.11 CONFIRM THE CAPTAIN'S NAME AND OWNERSHIP STATUS.IF RESPONDENT: Are you the captain or owner of the [VESSEL NAME]?

If Yes Is Selected, Then Skip To SCREENER QUESTION 4. PERMIT CATEGORYO...If No Is Selected, Then Skip To SCREENER QUESTION 2. NEW OWNER NAME.D...If Boat sold Is Selected, Then Skip To SCREENER QUESTION 2. NEW OWNER NAME.D...

Q1.12 PROXY VERSION. CONFIRM THE CAPTAIN'S NAME AND OWNERSHIP STATUS. Is [RESPONDENT] still the captain or owner of the [VESSEL NAME]?

If Yes Is Selected, Then Skip To SCREENER QUESTION 4. PERMIT CATEGORYO...If No Is Selected, Then Skip To SCREENER QUESTION 2. NEW OWNER NAME.D...

Q1.13 NEW OWNER NAME. Do you know the name of the owner or captain of the [VESSEL NAME]?

If No, THANK RESPONDENT AND TE... Is Selected, Then Skip To End of Survey. If Yes, RECORD NEW OWNER/CAPTA... Is Selected, Then Skip To SCREENER QUESTION 3. NEW OWNER PHONE ...

Q1.14 NEW OWNER PHONE NUMBER. Do you know the telephone number of the owner or captain?

If No, THANK RESPONDENT AND TE... Is Selected, Then Skip To End of Survey. If Yes, RECORD NEW OWNER/CAPTA... Is Selected, Then Skip To End of Survey

Q1.15 PERMIT CATEGORY: Our records show that the [VESSEL NAME] has an [PERMIT CATEGORY] HMS permit. Is that correct?

If No Is Selected, Then Skip To SCREENER QUESTION 4A. PERMIT CATEGORY...If Yes Is Selected, Then Skip To SCREENER QUESTION 6. STATE OF PRINCIP...If Don't know/ Refused Is Selected, Then Skip To SCREENER QUESTION 6. STATE OF PRINCIP...

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Q1.16 PERMIT CATEGORY: What category HMS permit does the vessel have?

Q1.17 STATE OF PRINCIPLE PORT: Do you/the captain usually dock or launch this vessel in Puerto Rico?

If Yes Is Selected, Then Skip To SCREENER QUESTION 7. LPS FISHINGIs [V...If No Is Selected, Then Skip To End of Survey

Q1.18 OTHER STATE OF PRINCIPAL PORT: In what state do you usually dock or launch this vessel?

Q1.19 LPS FISHINGIs [VESSEL NAME] ever used to fish with rod and reel or handlines for tunas, sharks, billfish, dolphin, amberjack or wahoo?

If No Is Selected, Then Skip To End of Survey

Fishing Effort and Trip Details

Q1.20 TRIPS - RECREATIONAL FISHING TOTAL: During the weeks of [RECALL DATES] how many saltwater fishing trips targeting finfish did the [VESSEL NAME] take?

If None Is Selected, Then Skip To End of Survey. If 1 - 14 Is Selected, Then Skip To: Did you target a large pelagic specie...

Q1.21 TARGET SPECIES How many of these trips targeted a large pelagic species such as tunas, sharks, billfish, dolphin, wahoo, amberjack, or similar offshore species on this trip?

If None Is Selected, Then Skip To End of Survey. If Refused Is Selected, Then Skip To End of Survey

Q1.22 In our previous question you indicated that during the period of interest you went on (insert trip number) trips targeting large pelagic species On what dates did your boat leave port to begin each of these trips?

Q2.1 Thinking about the trip you took on \${lm://Field/1}Did this trip target offshore large pelagic fishes such as tuna, sharks, billfish, dolphin, amberjack or wahoo?

If No - CONTINUE BACKWARD THRO... Is Selected, Then Skip To End of Block

Q2.2 How many people were actively fishing? [RECORD THE NUMBER OF PEOPLE ACTIVELY FISHING, OR RECORD DON'T KNOW / REFUSED IF THEY DON'T KNOW, OR REFUSED THE QUESTION]

Q2.3 Did this trip return to a Puerto Rico marina, dock, or launch ramp?

If No Is Selected, Then Skip To what state did your boat return from...If Yes Is Selected, Then Skip To Q2.5?

Q2.4 To what state did your boat return from this trip?[RECORD STATE <PULL DOWN LIST> IF NOT ON LIST GO TO NEXT TRIP

If Puerto Rico Is Not Selected, Then Skip To Q14. Did this trip cover more than on...

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Q2.5 To what county did this trip return?[RECORD COUNTY <PULL DOWN LIST>]

Q2.6 Did this trip return to a marina/dock/launch ramp to which the public normally has access? If so, to what particular marina/dock/launch ramp did this trip return?[RECORD DOCK PULL DOWN LIST]

Q2.7 Did this trip cover more than one day of fishing?

If Yes Selected, Then Skip To Q14A..If No Selected, Then Skip To Q15.At what time, to the nearest half...

Q2.8 How many days of fishing occurred on this trip?[RECORD NUMBER OF DAYS]

Q2.9 At what time, to the nearest half-hour, did your boat leave the dock for that trip?

Q2.10 At what time, to the nearest half-hour, did your boat return from that trip?

Q2.11 To the nearest half-hour, how much time was spent actively fishing with gear in the water?

Q2.12 What fishing method or methods were used on that trip? Please tell us which were the one or two most prominent methods you used. CHECK PROMINENT ONE/TWO METHOD(S):

Q2.13 What species were targeted on that trip? That is, when you left the dock, what species were you planning on fishing for? [SELECT SPECIES FROM DROP DOWN LIST – IF ANY OF THE FOLLOWING ARE SELECTED...]

- Sharks (1)
- Tuna (2)
- Billfish/Swordfish (3)
- Other large pelagic (4)

Answer If Q19. What species were targeted on that trip? That is, w... Sharks Is Selected

Q2.14 Which type of shark were you fishing for?

Answer If Q19. What species were targeted on that trip? That is, w... Tuna Is Selected

Q2.15 Which type of tuna were you fishing for?

Answer If Q19. What species were targeted on that trip? That is, w... Billfish/Swordfish Is Selected

Q2.16 Which type of Billfish were you fishing for?

Answer If Q19. What species were targeted on that trip? That is, w... Other large pelagic Is Selected

Q2.17 Please specify which “other” large pelagic species.

Q2.18 Were you participating in a tournament on that day?

If Yes Is Not Selected, Then Skip To Q20. How many lines were used on...

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Q2.19 What was the name of the tournament? [RECORD NAME FROM DROP DOWN LIST]

Q2.20 How many lines were used on that trip? [RECORD NUMBER]

Q2.21 What type of bait was used during that trip?

- Live (1)
- Dead (2)
- Artificial (3)

Q2.22 What was the name of the fishing grounds on which you did most of your fishing? [RECORD RESPONSE <DROP DOWN LIST>]

Q2.23 How many miles was the fishing grounds from the nearest shoreline? IF R DOES NOT KNOW OR REFUSES LEAVE FIELD EMPTY. [RECORD RESPONSE]

Catch Questions

Q2.24 Now I'd like to ask you a few questions about the fish you caught on this trip; did you catch any fish?

If No [Go to Next Trip] is Selected, Then Skip to End of Block

Q2.25 What kinds of fish did you catch? Please check all that apply.

- Sharks (1)
- Tuna (2)
- Billfish/Swordfish (3)
- Other large pelagic (4)
- Other fish (not large pelagic fish) (5)

Q2.26 Which species of sharks did you catch? Please check all that apply

Q2.27 through Q2.44 For each species of shark caught ask the following:

Out of the (insert species name) caught, how many did you release alive?

Out of the (insert species name) caught, how many did you release dead?

Out of the (insert species name) caught, how many did you keep?

Q2.45 Which species of tuna did you catch? Please check all that apply and tell us how many of each you caught.

Q2.46 through Q2.63 For each species of tuna caught ask the following:

Out of the (insert species name) caught, how many did you release alive?

Out of the (insert species name) caught, how many did you release dead?

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Out of the (insert species name) caught, how many did you keep?

Q2.64 Which of the following other large pelagic species did you catch? Please check all that apply and tell us how many of each you caught.

- Dolphin (1) _____
- Amberjack (2) _____
- Wahoo (3) _____
- Not identified,/ Don't know (4) _____

Q2.65 through Q2.76 For each other large pelagic species caught ask the following:

Out of the (insert species name) caught, how many did you release alive?

Out of the (insert species name) caught, how many did you release dead?

Out of the (insert species name) caught, how many did you keep?

Billfish Catch Questions

Q2.77 Which of the following species of billfish did you catch? (check all that apply)

- blue marlin (*M. negricans*) (1) _____
- sailfish (*I. platypterus*) (2) _____
- swordfish (*X. gladius*) (3) _____
- white marlin (*T. albidus*) (4) _____
- longbill spearfish (5) _____

For each species of billfish caught ask the following:

Q2.78 Out of the (insert species name) caught, how many had a previously placed tag on them?

Q2.79 Of the tagged (insert billfish species) that you caught, how many tags did you report?

Q2.80 Out of the (insert species name) caught, how many did you keep?

Q2.81 Out of the (insert species name) caught, how many did you release, either alive or dead?

Q2.82 Out of the (insert species name) caught, how many did you release alive?

Q2.83 Out of the (insert species name) released alive, how many did you tag?

Q2.84 Out of the (insert species name) caught, how many did you release dead? For each individual billfish released ask the following:

Q2.85 Was this fish released dead or alive?

Q2.86 What type of hook was used on this fish?

Q2.87 Was the fish bleeding? If No Selected, Then Skip To Q2.89

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Q2.88 Bleeding location?

Q2.89 What was the hook location?

Q2.90 What was the drop back time in seconds for this fish.

Q2.91 What was the fight time? RECORD TO THE NEAREST HALF HOUR

Q2.92 What was the fish length? [RECORD IN INCHES TO THE NEAREST INCH, 9997=DK, 9999=REFUSE]

Q2.93 What was the fish weight?[RECORD IN POUNDS TO NEAREST POUND, 9997=DK, 9999=REFUSE]

Q2.94 INTERVIEWER CHECK POINT: HAVE ALL BILLFISH CAUGHT BEEN COVERED?

If Yes Is Selected, Then Skip To END; If No loop back through Q2.78...Q2.94

END “Those are all of the question that I have for you, thank you for your time and cooperation.”