Economic Contributions of Atlantic Highly Migratory Species Anglers and Tournaments, 2016

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U.S. Department of Commerce
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Abstract

Highly migratory species (tunas, billfish, swordfish, and sharks), or HMS, draw a dedicated following of specialized marine anglers that spend significant amounts of money in pursuit of these “big game” fish. In 2016, private vessels located along the Atlantic and Gulf of Mexico coastal states (Maine to Texas) were estimated to have made over 87,500 tournament and non-tournament trips (vessel days) in pursuit of tuna, sharks, billfish, and swordfish. In 2016, NOAA Fisheries conducted two studies to collect data on expenditures associated with HMS recreational fisheries: 1) a survey of Atlantic Highly Migratory Species (HMS) Angling permit holders, and 2) a survey of HMS tournament operators and participants to collect data on expenditures associated with HMS tournaments. Atlantic HMS Angling permit holders were surveyed about expenditures associated with their most recent HMS fishing trip with surveys going out in bimonthly waves to collect data on trips conducted throughout the year. Operators of registered HMS tournaments were surveyed about the costs and earnings associated with the tournaments they operated, and participating teams were surveyed about their expenditures associated with a selected tournament. Non-tournament HMS recreational fishing trips were estimated to generated over $46.7 million in total annual expenditures, while tournament trips generated an additional $37.5 million before tournament registration fees. Tournament operators were estimated to have brought in approximately $38.4 million in revenue against total costs of $32.4 million plus $2.5 million in charitable donations. Combined, these expenditures are estimated to have contributed over $232 million in total economic output to the United States economy, including $72 million in household income, and supported 1,404 jobs. When combined with recent assessments of the HMS for-hire recreational fishing sector, and durable goods purchases by HMS recreational anglers for HMS fishing, the total annual economic contribution of HMS recreational fishing to the U.S. economy is estimated to be over $510 million.

I. INTRODUCTION

Atlantic Highly Migratory Species (HMS) are defined as federally regulated sharks, blue and white marlin, sailfish, roundscale spearfish, swordfish, and federally regulated tunas including bluefin, yellowfin, bigeye, skipjack, and albacore in the Atlantic, Gulf of Mexico, and Caribbean (NMFS, 2019). In 2016, NOAA Fisheries conducted two studies to assess the expenditures and economic impacts associated with tournament and private non-tournament recreational fishing for Atlantic HMS from Maine to Texas. The first of these studies, the 2016 Atlantic HMS Tournament Economic Survey (TES), surveyed tournament operators and participants associated with registered Atlantic HMS fishing tournaments. The TES was composed of two surveys, one that surveyed tournament operators about their costs and earnings associated with hosting and organizing tournament events, and a second survey of angling teams about their expenditures associated with participating in a selected HMS fishing tournament. The second study, the National Marine Recreational Fishing Expenditure Survey (NES), surveyed recreational anglers possessing Atlantic HMS Angling permits about their expenditures associated with private boat fishing trips targeting HMS. The TES represents the first attempt by NOAA Fisheries to make a comprehensive assessment of the costs and earnings of HMS tournaments, while the NES sought to update and expand on trip expenditure data collected by NOAA Fisheries in the Northeast Region in 2011 (Hutt et al., 2014).

As top predators that remain farther off shore than most fisheries, HMS support recreational fisheries with comparatively fewer participants that are are generally under-represented in larger national surveys of marine anglers due to their smaller population size (N = 20,020 HMS Angling permit holders in 2016), relatively fewer trips, and infrequent landings. However, anglers that pursue HMS tend to be far more specialized than the average marine angler, and often spend significantly more on individual fishing trips than other anglers (Bohnsack et al., 2002; Ditton and Stoll, 2003; Hutt et al., 2014). In particular, anglers participating in high-end HMS tournaments may spend thousands of dollars just on registration fees alone. As such, HMS recreational fisheries and tournaments can provide significant contributions to local economies.

The objective of surveying Atlantic HMS anglers and tournament operators was to gather data on the expenditures associated with fishing trips and tournaments targeting Atlantic HMS. Regional economic input-output models were then created to estimate the economic contributions of Atlantic HMS angling and tournament expenditures to the economies of the New England, Mid-Atlantic, South Atlantic, and Gulf of Mexico regions, in addition to a national model for the United States. To help the reader better understand the different surveys and associated analyses, this report is broken up into five main sections: 1) introduction; 2) Atlantic HMS NES, covering survey methods and trip expenditure estimates; 3) Atlantic HMS TES, covering survey methods for the participant and operator surveys and tournament expenditure and cost-earnings estimates, respectively; 4) the economic contribution analysis of the expenditure estimates generated by both studies; and 5) discussion and conclusions.

II. ATLANTIC HMS ANGLING EXPENDITURE SURVEY (NES)

Methods

Sample Frame and Procedures

The sample frame for the 2016 NES sub-sample of Atlantic HMS anglers consists of individuals that purchased Atlantic HMS Angling permits during calendar year 2016, and resided within a coastal state located between Maine and Texas (N = 18,455). Atlantic HMS Angling permits are issued to a vessel, and authorize anyone fishing from that vessel to fish for, retain, or possess any federally regulated HMS (NMFS, 2019). Because the available sampling frame is defined at the vessel-permit level, the frame can only be considered representative of the permit holders themselves (who are likely the vessel owners in most cases), but not all of the individuals fishing with them. Also, because the HMS Angling permit is not a valid permit for for-hire vessels, like charter and head boats, the expenditure and economic impact estimates generated by this study do not include trip expenditures generated by Atlantic HMS recreational fishing that occurs by non-permit holding passengers aboard HMS permitted vessels and anglers on for-hire vessels. For both these reasons, the results presented in this report should only be interpreted as representing the expenditures and economic contributions of Atlantic HMS Angling permit holders, and not all Atlantic HMS anglers. Additionally, HMS Angling permit holders from Puerto Rico and the U.S. Virgin Islands were excluded from the survey due to a lack of updated economic impact models for the islands.

A mixed-mode design was used in which surveys were emailed or mailed to 4,847 Atlantic HMS Angling Permit holders. This sample size was determined based on final desired sample size targets, and response rates obtained from previous expenditure surveys of HMS Angling permit holders (Hutt et al., 2014; Lovell et al., 2016). Permit holders were stratified by state of residence and the final sample was allocated proportionally by state (Table 1). Permit holders were sampled in two-month waves from March through December in order to collect trip expenditure data from trips conducted throughout the year. Sampling did not begin until May in the New England and Mid-Atlantic regions and finished in October due to the abbreviated fishing season in these regions. The sampling protocol followed a modified Dillman method (Dillman, 2009). If an email address was available for a respondent, which was the case for approximately 85 percent of HMS permit holders, then the respondent was first sent an email invitation to access a web based version of the survey using a unique user identification code and password. Respondents were asked to complete the web survey within 1 week of receiving the email. Three days after the initial email they received a reminder email followed by a second email reminder 6 days after the initial email. Individuals who did not complete the survey online within one week (n = 1,723) were then routed into the postal mail group during sampling Waves 1 through 3 (January through June). Due to high response rates via email by HMS permit holders that were exceeding sample size targets, it was decided that the HMS portion of the NES could rely exclusively on email reminders after Wave 3 while still meeting the final sample size targets.

However, mail surveys were still sent to HMS permit holders that did not have email addresses when they were selected in subsequent waves. By discontinuing mail reminders to HMS permit holders with email addresses, the contractor was able to shift resources to increase survey mailings for the general NES in states that were receiving lower than expected response rates to the mail survey, thus better achieving the overall study's sample size targets.

Anglers in the postal mail group were first sent a cover letter describing the purpose of the survey, a questionnaire booklet, and a business reply envelope. One week later, all anglers were sent a postcard that thanked the angler for participating in the survey and included a reminder to return the survey. Three weeks after the first mailing, anglers whose surveys had not yet been received were sent a modified cover letter, a second copy of the questionnaire, and business reply envelope. The second cover letter offered the option of completing the survey online and provided the web address to access the survey as well as a unique user name and password. The provision of the web address in the second cover letter was based on studies that showed greater overall response rates when an online option was reserved for follow-up contacts by mail versus providing that option in the first mail contact (ICF Macro, Inc., 2017).

Survey Instruments

The HMS Angling Expenditure Survey (Appendix I) asked selected HMS permit holders to provide data on their most recent recreational fishing trip during which they targeted HMS. Respondents were asked to provide both descriptive and expenditure data from the trip. Descriptive data included what state their most recent HMS trip occurred in, what specific species were targeted (top two), the length of the trip in days if it was an overnight trip, how many nights were spent away from their primary residence, how many individuals accompanied them on the trip, how many days were spent fishing, what fishing methods were used, and whether fishing was the primary purpose of the trip or not. Respondents were asked to estimate their total expenditures for the trip for fuel (auto and boat), auto rental, lodging, public transportation, food (groceries and restaurants), bait, ice, fish processing, and gifts or souvenirs. Respondents were instructed to provide data for what they paid for only, and not to estimate expenditures made by other individuals on the trip. Respondents were also asked to estimate the percentage of their costs spent in the state of the fishing trip for each expenditure category. Based on survey responses the recall period for the majority of HMS trips was one month or less. Since the sample frame consisted of vessel permit holders, and thus likely the vessel owners hosting a trip, it is assumed the expenditure data collected accounted for most of the vessel operating and fishing costs, but likely under-estimates the full travel and food costs of all anglers on the trip.

Expenditure Calculations

Mean trip expenditures were calculated for a vessel-trip, defined as one day of fishing for one vessel. On the survey, HMS permit holders were asked to estimate total expenditures for the entire trip away from their permanent residence if the trip involved an overnight stay. Data on the number of nights permit holders spent away from their permanent residence and the number of days spent fishing was collected and used to calculate expenditures per vessel trip.

Respondents were asked to report what they personally spent on either themselves or others. They were asked not to include expenses that others paid on their behalf. If they did not have expenditures in a given category, they were asked to record zero rather than leaving the item blank. Missing values for trip expenditure categories were replaced with zero if a respondent reported a non-zero dollar amount for at least one other trip expenditure category. The trip expenditure questions included an "other" category that allowed for an open-ended response for the expenditure type and the amount. These responses were recoded into one of the other expenditure categories if applicable and separable into discrete amounts. The survey also asked permit holders to estimate the percentage of trip expenditures that were spent in the state of the most recent fishing trip. These percentages were multiplied by each trip expenditure category to calculate the final expenditure per respondent spent in the state of the trip. If a percentage was left blank, it was replaced with either 100 percent in the case of residents, or for non-residents, a region-wide average percentage (based on non-resident records only). For calculating mean and total trip expenditures per expenditure item, trips were divided by region (i.e., New England, Mid-Atlantic, South Atlantic, Gulf of Mexico) in which the trip took place. Mean expenditures were also calculated based on the category of HMS that was the primary target of the trip (i.e., tuna, billfish, or sharks), but these means were not expanded to total expenditures. Sample weights were used to adjust mean trip expenditures for survey stratification, which was done by state to ensure proportional representation of each state in the sample.

Total trip expenditures per region and nationally were estimated by extrapolating mean trip expenditure estimates by estimates of the number of daily HMS vessel trips taken in 2016 (Table 1). Estimates of daily HMS vessel trips per region were taken from the Large Pelagic Survey (LPS) for New England and the Mid-Atlantic region, and the Marine Recreational Information Program (MRIP) for the South Atlantic and Gulf of Mexico region. MRIP trip estimates for the Gulf of Mexico were also supplemented with HMS vessel trip estimates from the states of Louisiana and Texas as those states do not participate in MRIP surveys. MRIP is a data collection program that uses a combination of on-site, mail, and telephone based surveys to estimate recreational fishing effort and catch along the Atlantic and Gulf of Mexico coasts (NMFS, 2018). The LPS is a targeted survey program that estimates recreational fishing effort and catch for HMS and other pelagic species from Maine to Virginia (NMFS, 2018).

The number of daily vessel trips were estimated for each region by estimating the number of trips taken within each region for which an HMS managed species was either the primary or secondary target species. A vessel trip was defined as one day of fishing for HMS by a single vessel regardless of the number of anglers on board. So whether there are three or five anglers aboard a given vessel, it still only counts as one day of fishing[1]. All effort estimates generated by the LPS are for vessel trips. This is different from the MRIP, and the data provided by Louisiana and Texas surveys which estimate daily effort on a per angler basis, such that if three anglers go fishing for a day on the same boat it counts as three trips as opposed to only one. For the South Atlantic and Gulf of Mexico regions (North Carolina to Texas), the number of HMS vessel trips taken was estimated by dividing the number of HMS angler trips estimated by the MRIP, Louisiana, and Texas surveys by average party size. Average party size for each region was calculated using data reported in the NES. For the LPS region, all 2016 trip estimates were for

[1] Assuming the trip was the most recent trip taken by only one vessel permit holder.

the June through October period, which are the only months in which the LPS is conducted, while the estimates for North Carolina to Texas were for the full 2016 calendar year.

Results

Response Rate and Descriptive Statistics

Ultimately, of the 4,847 Atlantic HMS Angling Permit holders sampled, 1,806 returned completed surveys (1,272 via web; 534 via mail) and 482 were ineligible (i.e., did not fish for HMS during the selected sample wave) for a 42.6% response rate (Table 1). HMS anglers were asked to provide expenditure data for their most recent marine fishing trip spent targeting HMS, and 1,379 of the responses received (76%) listed an HMS as either their primary or secondary target species.

Table 1. Final response status of HMS Angling permit holders for the 2016 HMS Angling Expenditure Survey (NES)

Survey	Sample Size	Respondents	Non-deliverable	Ineligible	Refusals	Response Rate (%)
HMS NES	4,847	1,806	106	482	21	42.6%

Table 2. Frequency and percentage of HMS Angling permits and private boat angling trips reported in the HMS Angling Expenditure Survey by state, 2016

State of most recent HMS trip	HMS Angling Permits	Percent Permits	Trip Reports by State	Percent Trip Reports
Alabama	410	2.3	81	5.9
Connecticut	703	4.0	38	2.8
Delaware	551	3.1	32	2.3
Florida	2,882	16.4	225	16.3
Georgia	196	1.1	2	0.1
Louisiana	641	3.7	148	10.7
Maine	300	1.7	22	1.6
Maryland	1,033	5.9	62	4.5
Massachusetts	2,317	13.2	193	14.0
Mississippi	248	1.4	19	1.4
New Hampshire	254	1.4	12	0.9
New Jersey	2,375	13.5	183	13.3
New York	1,904	10.9	110	8.0
North Carolina	1,131	6.4	60	4.4
Rhode Island	375	2.1	41	3.0
South Carolina	506	2.9	17	1.2
Texas	745	4.2	110	8.0
Virginia	975	5.6	24	1.7

Respondents were most likely to report HMS trips in Florida (16.3%), Massachusetts (14.0%), New Jersey (13.3%), and Louisiana (10.7%) (Table 2). Approximately 76% of all reported trips occurred from July through October (Figure 1). Trips that primarily targeted tunas accounted for the majority of reported trips overall (63%), and in all regions excluding the South Atlantic where they only made up the plurality of trips (43%) (Table 3). Billfish (26%) and swordfish (18%) were most likely to be a primary target species in the South Atlantic, while sharks were most likely to be listed as a primary target species in the Mid-Atlantic (20%) (Table 3). Overall, a tuna species (26%) was most likely to be listed as the secondary target species on an HMS trip followed by a non-HMS species (25.8%) or no other species at all (25.8%) (Table 3). Non-HMS species commonly listed as target species on HMS trips included dolphin, wahoo, and striped bass.

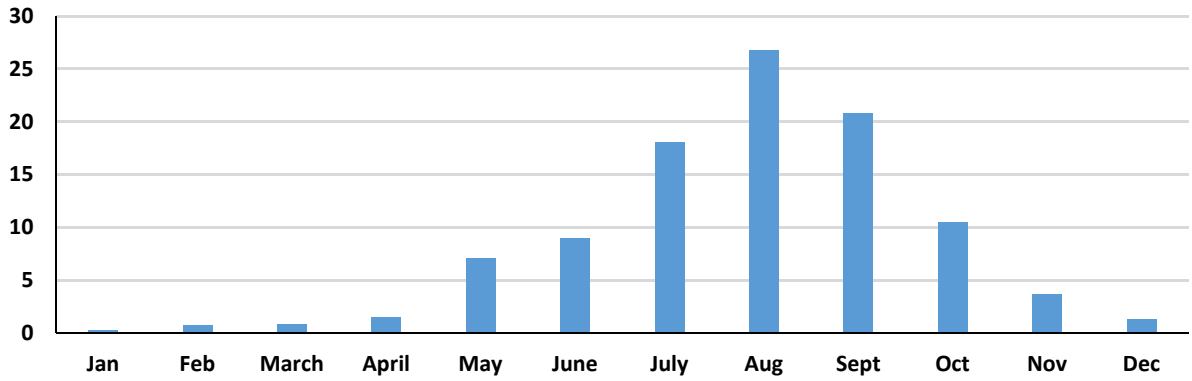

Figure 1. Percentage of HMS private boat angling trips reported in the HMS Angling Expenditure Survey by month, 2016. The New England and Mid-Atlantic regions were only sampled from May to October, while the South Atlantic and Gulf of Mexico regions were sampled year round

Slightly more than a third (38.5%) of HMS angling trips involved spending at least one night away from home, and 30 percent involved two or more days of fishing (Table 4). These percentages varied significantly across regions with over two-thirds (69.5%) of HMS trips in the Gulf of Mexico involving at least one night away from home, and only a fifth (20%) of New England trips involving an overnight stay (Table 4). These regional differences in percentage of overnight trips are likely due to differences in how far vessels must travel offshore to find HMS fishing grounds, which are much farther offshore in the Gulf of Mexico compared to the Atlantic coast. Average party size for HMS angling trips was 3.5 anglers, and ranged from 3 to 4 anglers on average by region (Table 4). Overall, HMS Angling permit holders reported 11 days of HMS fishing per year on average, ranging from a low of 7.6 days per year in New England to a high of 17.6 days per year in the South Atlantic which is consistent with the longer fishing season in southern states (Table 4).

Table 3. Percentage of Atlantic HMS angling trips reported by target species group by region in the Atlantic HMS Angling Expenditure Survey, 2016. A trip was defined as an HMS trip if either the primary or secondary target species was an HMS managed species. Species groups were aggregated as some respondents listed specific species, and other listed generic groups (i.e., tuna). In some cases, the listed primary and secondary target species were from the same species group

Target Species	New England (N = 306)	Mid-Atlantic (N = 411)	South Atlantic (N = 224)	Gulf of Mexico (N = 438)	Overall (N = 1,379)
Primary					
Tuna	83.2	68.6	43.3	55.5	63.3
Billfish	0.3	8.1	26.0	23.6	13.7
Swordfish	0.7	0.2	18.0	7.9	5.9
Sharks	13.9	20.4	0.0	6.4	11.6
Other	1.9	2.7	12.8	6.6	5.6
Secondary					
Tuna	18.0	22.5	30.0	35.6	26.0
Billfish	2.9	11.6	20.9	17.1	13.0
Swordfish	0.3	3.3	2.5	3.7	2.6
Sharks	16.1	8.8	0.5	1.5	7.0
Other	14.8	35.1	24.2	22.0	25.8
None	48.0	18.7	21.9	20.0	25.8

Table 4. HMS vessel trip characteristics and estimates of daily vessel trips targeting HMS, 2016

Trip Characteristics	New England (N = 306)	Mid-Atlantic (N = 411)	South Atlantic (N = 224)	Gulf of Mexico (N = 438)	Overall (N = 1,379)
Party Size	2.9	3.5	3.5	4.0	3.5
Trip Length (days)	1.3	1.4	1.8	2.3	1.7
Percent overnight trips	20.3	32.7	36.4	69.5	38.5
Percent trips fishing two days or more	14.8	23.4	25.4	59.3	30.4

Angling Trip Expenditures

In 2016, nationally HMS Angling permit holders reported spending an average of $682 per daily vessel trip with average trip expenditures ranging from $502/trip in New England to $821/trip in the Gulf of Mexico (Table 5). Trip expenditures by HMS Angling permit holders included purchases of fuel, groceries, lodging, bait, ice, rentals, access fees, and gifts (Table 5). Boat fuel accounted for the majority of aggregate regional average trip expenditures at $388/trip or 57

percent of trip costs. Boat fuel was followed by bait ($76/trip) and groceries ($71/trip) which accounted for either the second or third greatest expenditure item per region. Overall, fuel, bait, and food accounted for 88 percent of total trip costs.

Table 5. Estimated average daily vessel trip expenditures by Atlantic HMS Angling permit holders by region and nationally, 2016

Expenditures	New England	Mid-Atlantic	South Atlantic	Gulf of Mexico	All HMS Trips
Boat Fuel	$298.52	$394.65	$384.92	$447.14	$387.60
Bait	$48.87	$99.63	$70.34	$59.09	$75.60
Groceries	$57.83	$68.19	$68.43	$85.76	$71.37
Restaurants	$26.96	$30.91	$31.31	$54.81	$35.66
Auto Fuel	$23.60	$27.51	$29.46	$46.68	$32.14
Ice	$24.86	$31.93	$24.85	$32.61	$29.22
Lodging	$9.67	$6.95	$35.02	$49.81	$23.39
Parking	$5.86	$7.09	$4.93	$17.39	$8.64
Captain/Charter	$2.13	$3.76	$10.24	$7.53	$5.80
Crew	$1.36	$3.79	$10.57	$8.26	$5.72
Airfare	$0.70	$1.62	$6.34	$6.05	$3.71
Gifts & Souvenirs	$0.84	$0.94	$2.12	$3.77	$1.78
Auto Rental	$0.22	$0.57	$1.00	$1.30	$0.81
Public Transportation	$0.13	$0.10	$0.21	$0.07	$0.13
Fish Processing	$0.03	$0.09	$0.14	$0.27	$0.13
Boat Rental	$0.00	$0.01	$0.01	$0.03	$0.01
Total	**$501.58**	**$677.74**	**$679.89**	**$820.57**	**$681.71**

Average trip expenditures were slightly more variable by primary target species group (Table 6). Shark, tuna, and swordfish trips all had similar average daily expenditures, which ranged between $623 to $637/trip. Shark trips had slightly lower fuel costs, but made up for those costs with the highest bait costs, likely due to extra costs for chum, of any target species at $111/trip. Billfish trips costed significantly more per daily trip as they averaged $1,015/trip (Table 6). This in part explains why average daily trip costs were highest in the South Atlantic and Gulf of Mexico as they had the highest percentage of trips targeting billfish (Table 3).

Overall, HMS Angling permit holders spent an estimated $46.7 million on private, non-tournament boat trips targeting HMS (Table 7). This was calculated by expanding the average HMS trip cost by an estimate of 68,468 private boat, non-tournament trips targeting HMS species (Table 8). The plurality (44%) of these expenditures were spent on trips taken in the South Atlantic region of North and South Carolina, Georgia, and the Atlantic coast of Florida where HMS vessel trips accounted for $20.5 million in total trip expenditures (Table 7). The South Atlantic region saw nearly twice as many trips as any other region at 30,149 non-tournament, HMS vessel trips (Table 8) due to a near year round fishery, and large numbers of HMS Angling permit holders (NMFS, 2017). Furthermore, a larger proportion of billfish trips (26%) would have further added to the higher expenditures for the region as these trips had higher average fuel costs due to the common use of trolling as a fishing method (Table 3). HMS vessel trip-related expenditures were $10.7 million in the Mid-Atlantic, $10.1 million in the Gulf of Mexico, and $5.2 million in New England (Table 7).

Table 6. Estimated average daily vessel trip expenditures by Atlantic HMS Angling permit holders by primary target species group, 2016

Expenditures	Tuna (n = 899)	Billfish (n = 200)	Sharks (n = 136)	Swordfish (n = 61)
Boat Fuel	$366.38	$604.29	$293.69	$371.30
Bait	$67.37	$97.24	$111.12	$64.08
Groceries	$69.09	$90.80	$67.49	$72.59
Restaurants	$32.29	$49.55	$42.74	$26.17
Auto Fuel	$30.08	$40.28	$32.56	$19.76
Ice	$30.16	$29.83	$27.71	$30.50
Lodging	$18.72	$47.64	$9.87	$17.02
Parking	$5.72	$6.94	$26.74	$11.77
Captain/Charter	$4.81	$8.14	$7.56	$8.76
Crew	$3.44	$19.98	$0.00	$7.70
Airfare	$1.83	$14.46	$0.00	$5.25
Gifts & Souvenirs	$1.24	$3.47	$2.33	$1.74
Auto Rental	$0.66	$2.09	$0.52	$0.00
Public Transportation	$0.08	$0.40	$0.05	$0.20
Fish Processing	$0.13	$0.02	$0.23	$0.07
Boat Rental	$0.01	$0.04	$0.00	$0.00
Total	**$632.01**	**$1,015.16**	**$622.60**	**$636.92**

Table 7. Estimated total annual trip expenditures by Atlantic HMS Angling permit holders by region and nationally, 2016. Total trip expenditures were estimated by extrapolating average daily trip expenditures by the number of non-tournament private boat vessel trips targeting HMS as estimated by the Large Pelagic Survey (Maine to Virginia), the Marine Recreational Information Program (North Carolina to Mississippi), the Louisiana Creel Survey, and Texas Parks and Wildlife Department

Expenditures	New England	Mid-Atlantic	South Atlantic	Gulf of Mexico	All HMS Trips
Boat Fuel	$3,078,338	$6,216,921	$11,604,953	$5,479,254	$26,538,197
Bait	$503,947	$1,569,471	$2,120,681	$724,089	$5,176,181
Groceries	$596,343	$1,074,197	$2,063,096	$1,050,903	$4,886,561
Restaurants	$278,012	$486,925	$943,965	$671,642	$2,441,569
Auto Fuel	$243,363	$433,365	$888,190	$572,017	$2,200,562
Ice	$256,356	$502,993	$749,203	$399,603	$2,000,635
Lodging	$99,717	$109,483	$1,055,818	$610,372	$1,601,467
Parking	$60,428	$111,689	$148,635	$213,097	$591,564
Captain/Charter	$21,965	$59,231	$308,726	$92,273	$397,114
Crew	$14,024	$59,704	$318,675	$101,218	$391,637
Airfare	$7,218	$25,520	$191,145	$74,137	$254,016
Gifts & Souvenirs	$8,662	$14,808	$63,916	$46,198	$121,873
Auto Rental	$2,269	$8,979	$30,149	$15,930	$55,459
Public Transportation	$309	$1,418	$4,221	$3,309	$8,901
Fish Processing	$1,341	$1,575	$6,331	$858	$8,901
Boat Rental	$0	$158	$301	$368	$685
Total	**$5,172,293**	**$10,676,438**	**$20,498,004**	**$10,055,265**	**$46,675,320**

Table 8. Estimated number of Atlantic HMS private angling vessel trips (tournament and non-tournament related) and number of registered HMS tournaments by region, 2016. A non-tournament trip was defined as an HMS trip if either the primary or secondary target species was an HMS managed species

Trips (Vessel Days)	New England[1]	Mid-Atlantic[1]	South Atlantic[2]	Gulf of Mexico[2]	Overall
Non-Tournament	10,312	15,753	30,149	12,254	68,468
Tournament[3]	1,261	5,723	8,147	3,935	19,066
Total	11,573	21,476	38,296	16,189	87,534

[1] New England and Mid-Atlantic non-tournament trips were estimated from the Large Pelagic Survey from June through October, 2016.

[2] South Atlantic and Gulf of Mexico non-tournament trips were estimated from general MRIP survey, Louisiana Creel, and Texas Parks and Wildlife data from January to December, 2016.

[3] Tournament trips were estimated from the average number of registered teams reported in the Tournament Operator Survey extrapolated by the number of registered HMS tournaments.

III. HMS TOURNAMENT EXPENDITURE SURVEYS (TES)

Methods

Sample Frame and Procedures

The sample frame for the 2016 HMS Tournament Survey consisted of registered HMS tournaments in the Atlantic, Gulf of Mexico, and Caribbean. All recreational fishing tournaments targeting Atlantic HMS are legally required to register with NOAA Fisheries to facilitate monitoring of HMS landings, particularly billfish landings for which the United States has an annual recreational limit of 250 individual billfish (blue marlin, white marlin, and roundscale spearfish) in the Atlantic HMS region (NMFS, 2017). Some registered tournaments were excluded from the sample frame if they were conducted out of the Bahamas, or if they were longer than 10 days in length. A number of registered HMS tournaments run for several months up to a full year, and anglers submit trophy catches to the tournament director throughout the year. These tournaments were excluded from the study, as they do not reflect the nature of a traditional tournament. Additionally, fishing activity associated with them would be difficult to distinguish from non-tournament fishing trips, which could lead to double counting between the two studies included in this report. Some of these months-long tournaments are also accompanied by a "kick-off" tournament that reflects a more traditional fishing tournament, and these events were included in the study. Finally, each year some events will fail to register with NOAA Fisheries within the required 30-day timeframe. While efforts were made to include these events in the study, this was not always possible. Out of 268 tournaments that registered with NOAA Fisheries in 2016, 49 tournaments were excluded due to the reasons listed above, leaving 219 registered HMS tournaments to constitute the study's sample frame (NMFS, 2017).

All tournaments that met the study's qualification criteria (N = 219) were selected to receive the TES Operator Survey which collected data on the costs and earnings associated with hosting an HMS tournament. Tournament organizers were sent a pre-notification letter informing them of selection for the study at least 14 days in advance of their tournament start date. Pre-notification letters were accompanied by a flier providing information on the purpose of the TES Operator Survey, and instructions on how to access the online survey. Reminder emails were sent to tournament operators four to seven days following the completion of the tournament with a link to the survey, and again approximately three weeks after completion of the tournament. Finally, tournament organizers that had not responded were sent a paper copy of the survey two and six months after the tournament's completion.

A subsample of qualifying tournaments (N = 137) were randomly selected to participate in the TES Participant Survey which collected data on team expenditures associated with participation in an HMS tournament. Tournaments were randomly selected to participate in the TES Participant Survey on a monthly basis, as tournaments are only required to register with HMS at least 30 days in advance of their start date. For those tournaments selected to participate in both

the TES Operator and Participant Surveys, the pre-notification letter was sent 24 days in advance of the tournament start date, with a follow up call at least 17 days prior to the tournament, to insure adequate time to coordinate recruitment of survey participants for the study with the tournament organizer. Tournament organizers that were successfully contacted (N = 94) were asked to assist in recruiting participating teams to complete the survey. To facilitate this, fliers were sent to each tournament organizer explaining the purpose of the study, and providing the link and login information for the online survey. Tournament organizers were asked to distribute at least one copy of the flier to each team registered in the tournament. Tournaments that collected email addresses from tournament participants were also asked to send email reminders to team captains following the tournament with the information provided in the fliers.

Survey Instruments

The TES Operator Survey (Appendix II) asked tournament organizers to provide descriptive data on the tournament, monetary costs associated with hosting an HMS Tournament, and revenues taken in by the tournament. Descriptive data collected on the tournament included its location, dates, number of participating teams, and target species (i.e., species for which tournaments provided award categories). Tournament organizers were asked to provide operational cost data including monetary awards and prizes, trophies and plaques, site fees, licensing and permitting, event-related equipment, marketing and advertising, catering, insurance, electricity and other utilities, merchandise, lodging, entertainment, and security. Tournament operators were also asked to provide data on revenue sources for the tournament including participant registration fees, optional entry fees for specific categories, sponsorships, concession, and merchandise sales.

The TES Participant Survey (Appendix III) including instructions that asked that asked that a single team member, preferably either the team captain or vessel owner, provide descriptive data on their team, and expenditure data on costs associated with traveling to and participating in the tournament. Descriptive data included vessel characteristics, where the vessel launched from to participate in the tournament, days and nights spent fishing in the tournament (many tournaments do not require teams to fish every day of the event), species targeted, number of anglers per vessel, number of nights they were away from home for the tournament, and if the tournament was the primary purpose of their trip. Respondents were asked to provide data on their team's travel expenses including airfare, auto fuel and rentals, lodging, food, and entertainment. They were also asked to provide data on expenditures associated with participating in the tournament including tournament entry fees, parking and site access, boat launch fees, live or dead bait, ice, boat fuel and oil, boat rentals, charter and guide fees, and fishing permits purchased during the trip.

Tournament Expenditure Calculations

Mean tournament operator-related costs and earnings were calculated for completed HMS tournaments held from March 2016 through February 2017. This included operator revenue and

costs incurred in preparation for the event, during the event, or in the immediate aftermath of the event. Net revenue was estimated by taking the difference between total revenues and total costs. Finally, average costs were extrapolated based on the total number of qualifying tournaments (N = 219) that were registered during the study period. Due to the low sample size of available tournaments, all analyses were conducted for the full HMS region as opposed to sub-regions as in the HMS Angling Expenditure Survey. For this reason, there was no need to adjust tournament revenues and costs based on the state in which they were incurred.

Mean tournament participant expenditures were calculated for a vessel tournament trip, defined as all tournament related expenditures incurred by a vessel team while participating in a single registered HMS tournament, including travel expenses. In the TES Participant Survey, the survey instrument asked the responding team member to estimate total expenditures for his or her team's travel and participation in the tournament, including what they and other team participants spent. If their team did not have expenditures in a given category, they were asked to record zero rather than leaving the item blank. Missing values for trip expenditure categories were replaced with zero if an angler reported a non-zero dollar amount for at least one other trip expenditure category. The tournament expenditure questions included an "other" category that allowed for an open-ended response for the expenditure type and the amount. These responses were recoded into one of the other expenditure categories if applicable and separable into discrete amounts. Respondents were also asked to indicate in which state the majority of each expense was made to allow for regional analyses. Expenditure data was assessed for outliers, and windsorized to the 95th percentile. Mean expenditures were estimated across all HMS tournaments as sample sizes were not adequate to allow for region level analyses. Sample weights were applied based on the relative size of the tournament they participated in to adjust for a sample that proved to be biased towards larger tournaments. Larger tournaments tended to be more coordinated, by necessity, and did a better job of recruiting anglers to participate in the study. It is also possible that they were more motivated to demonstrate the positive economic contributions their events made to coastal communities. Total expenditures by participating tournament teams were estimated by extrapolating mean team expenditures by the estimated number of teams participating in all HMS tournaments in 2016. To estimate total tournament teams, we used the average number of teams per tournament reported by tournament operators, and extrapolated that estimate by the total number of HMS tournaments that qualified for inclusion in the study (N = 219). We compared operator reports of the number of participating vessels in the TES to participant data reported with mandatory HMS tournament reporting, and found no significant difference in the two estimates based on overlapping confidence intervals.

Results

Response Rate and Descriptive Statistics

Seventy-three of the 219 tournaments that met the criteria for inclusion in the TES Operator Survey returned completed surveys (Table 9). Three additional tournaments were cancelled due to hazardous weather conditions resulting in a final response rate of 35 percent for the TES Operator Survey. Calculating an exact response rate for the TES Participant Survey was not possible given study's limitation of depending on tournament operators to distribute information about the survey to their participants. In all, 94 tournaments received fliers advertising the TES Participant Survey, which they were asked to distribute to their participants. Prior to each tournament, attempts were made to contact each tournament's operator to explain the purpose of the study, and ascertain how many participants they expected so that they could be sent an adequate number of fliers. Ultimately, 99 participant responses were received from 27 tournaments representing 29 percent of tournaments selected for participant reporting.

Table 9. Final response status of HMS tournament operators for the HMS Tournament Economic Survey (TES), March 2016–February 2017

Survey	Sample Size	Respondents	Non-deliverable	Ineligible	Refusals	Response Rate (%)
TES	219	73	--	3	13	35%

Based on responses from the TES Operator Survey, registered HMS tournaments that lasted less than 10 days averaged 2.8 days in length, 39 participating vessels, and 194 participating anglers (Table 10). However, the number of participating vessels and anglers varied considerably with the number of participating vessels ranging from 4 to 308, and the number of participant anglers ranging from 18 to 2,500. Tournaments were most likely to target billfish species with 61 percent of tournaments targeting blue and white marlin, and 54 percent targeting sailfish (Table 10). Approximately 52 percent of tournaments targeted yellowfin tuna while 26 percent targeted bluefin and bigeye tuna. These percentages exceed 100 percent because most tournaments provided awards for multiple target species. Twenty percent of tournaments reported targeting pelagic sharks, which included shortfin mako, thresher, and blue sharks. Sixty-three percent of registered tournaments and 71 percent of tournaments that responded to the TES Operator Survey took place in the summer months of June through August (Figure 2).

Table 10. Select characteristics of HMS tournaments, March 2016–February 2017. Species targeted adds to greater than 100 percent as most tournaments targeted multiple species

Variable	Estimate	SE	Total
Mean Days Fished	2.8	0.21	621.0
Mean No. of Vessels	39.3	5.29	6,406.6
Mean No. of Anglers	193.7	24.19	42,419.6
Species Targeted (%)			
Blue Marlin	60.9	Pelagic Sharks	20.3
White Marlin	60.9	Albacore	17.4
Sailfish	53.6	Swordfish	15.9
Yellowfin Tuna	52.2	Skipjack Tuna	8.7
Bigeye Tuna	26.1	Coastal Sharks	8.7
Bluefin Tuna	26.1		

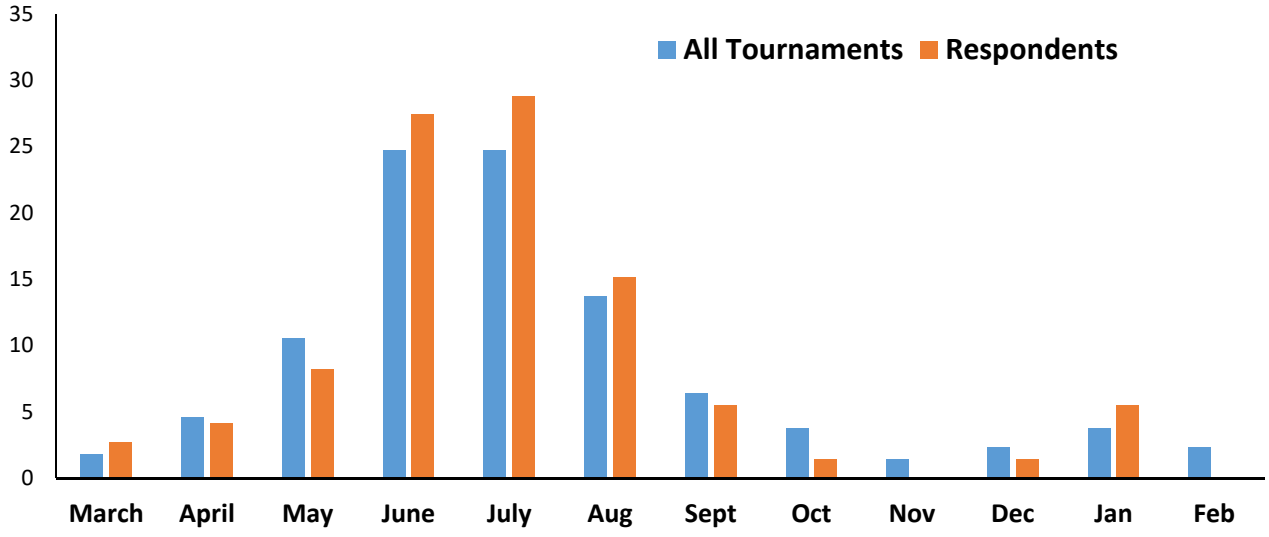

Figure 2. Percent by month of all registered HMS tournaments and tournaments reporting costs and earnings in the HMS Tournament Operator Survey

Tournament Expenditure Calculations

The estimated costs and earnings of HMS tournament operators and participant expenditures were highly variable (Tables 11 and 12). Tournament operations saw an average net return of $16,045, which when extrapolated out to 218 registered tournaments came out to $3.5 million in total net returns (Table 11). The average tournament brought in approximately $175,500 in revenue against $148,000 in expenses plus $11,400 in charitable donations (Table 11). Registration and optional entry fees (not including side bets like calcuttas) accounted for the largest portion of tournament revenues at $144,960 of average tournament revenue, or 83 percent of total revenue (Table 11). Other major sources of revenue including sponsorships ($14,583) and merchandise sales ($11,384). Monetary prizes to the winning teams accounted for over two-thirds (68%) of all tournament costs at $100,991 on average and over $22 million across all tournaments. However, monetary prizes varied considerably across tournaments with a standard error of $57,909 for the average estimate (Table 11). Merchandise accounted for a distant second highest costs at $16,971 per tournament, which exceeded revenues brought in by merchandise sales by $5,587. However, this not unexpected as many tournaments give out merchandise such as t-shirts, hats, and other branded paraphernalia for free to participants to help promote future events. Catering ($7,753), labor ($7,128), and site fees ($3,069) rounded out the top five tournament operating expenses (Table 11). HMS tournaments also average $11,357 per tournament in charitable donations made by the tournament themselves, in addition to $17,626 in additional charitable donations raised from tournament participants and spectators (Table 11). Overall, HMS tournaments were estimated to bring approximately $38.4 million in revenue, and had total estimated costs of $32.4 million plus $2.5 million in charitable donations (Table 11).

Teams participating in HMS tournaments spent $13,361 per team on average with average total expenditures per tournament of $392,661, and over $85.6 million across 218 registered HMS tournaments (Table 12). However, 56 percent of those expenditures, or $48 million, was for registration and optional entry fees, which were also accounted for in tournament operator revenues (Table 11 and 12). These expenses, registration and optional entry fees, were combined in the Participant Survey as we received feedback from participants during the questionnaire design process that most teams would find it difficult to split out these fees after the fact. The estimate of total tournament fees from participating teams is slightly higher than that from tournament operators, but based on overlapping error estimates that difference is not statistically significant. Minus what they spent on tournament registration and optional entry fees, teams spent $5,860 per tournament and $37.5 million across all tournaments. Other top expenditure items for participating teams were boat fuel ($2,079), lodging ($998), food ($993 combined for restaurants and groceries), and bait ($367) (Table 12). While the estimate of boat fuel may seem high, it should be noted tournaments lasted about 3 days on average and the majority of them involved targeting blue and white marlin, which typically require longer trips offshore and often use trolling as the primary fishing method.

Table 11. Estimated average revenues and expenses per registered Atlantic HMS tournament, March 2016 – February 2017. Total revenues and expenses were estimated by extrapolating average tournament operator expenditures (n = 73) by the number of registered Atlantic HMS tournaments in 2016 that qualified for the study (N = 218). Registered tournaments were excluded from the study if they lasted longer than 10 days, were internet-based tournaments with dispersed geographic participation, or if they were conducted outside United States waters (i.e., Bermuda).

Item	Mean	SE	Total Expenditure
Revenues			
Team registrations	$41,454.00	$9,501.88	$9,078,426
Optional fees	$103,506.00	$61,382.00	$22,667,814
Sponsorships	$14,583.00	$2,791.98	$3,193,677
Concessions	$1,737.50	$748.54	$380,513
Merchandise	$11,384.00	$9,284.61	$2,493,096
Other revenue	$2,803.09	$1,065.67	$613,876
Total Revenue	**$175,467.59**		**$38,427,402**
Expenses			
Monetary prizes	$100,991.00	$57,909.00	$22,117,029
Trophies	$2,265.97	$433.11	$496,247
Site fees	$3,068.86	$1,018.54	$672,080
Licensing	$56.41	$16.06	$12,354
Audio-visual rental	$853.01	$414.96	$186,810
Equipment rental	$2,139.93	$616.78	$468,645
Marketing	$2,280.35	$722.18	$499,397
Catering	$7,752.55	$2,366.63	$1,697,808
Insurance	$1,081.62	$346.53	$236,874
Electricity	$223.24	$153.26	$48,889
Merchandise costs	$16,971.00	$7,772.83	$3,716,649
Lodging	$2,433.65	$1,513.99	$532,969
Entertainment	$497.43	$240.99	$108,936
Security	$322.21	$154.66	$70,563
Labor expenses	$7,127.87	$6,437.18	$1,561,003
Total Expenses	**$148,065.10**		**$32,426,253**
Charitable donations			
Tournament donations	$11,357.00	$3,948.81	$2,487,183
Participant donations	$17,626.00	$13,186.00	$3,860,094
Net Return (Revenue minus Expenses and Donations)	**$16,045.50**	----	**$3,513,965**

Table 12. Estimated average (n = 104) and total expenditures for teams participating in Atlantic HMS Tournaments, March 2016 – February 2017. Average expenditures were estimated per team for tournament participants. Total participant expenditures were estimated by extrapolating by the number of teams (n = 6,407) estimated to have participated in the 219 registered Atlantic HMS tournaments that qualified for the study.

Expenditure Item	Mean	SE	Total Expenditure
Travel Expenses			
Airfare	$187.76	$57.67	$1,202,890
Public transportation	$14.80	$4.37	$94,845
Auto fuel	$230.56	$45.20	$1,477,129
Vehicle rental	$18.29	$6.21	$117,154
Lodging	$997.51	$186.00	$6,390,634
Groceries	$419.53	$41.07	$2,687,722
Restaurants	$573.24	$65.82	$3,672,513
Entertainment	$158.48	$34.91	$1,015,320
Fishing Expenses			
Tournament fees	$7,500.93	$887.70	$48,055,223
Access fees	$236.21	$62.27	$1,513,312
Bait	$367.08	$51.49	$2,351,710
Ice	$83.12	$9.90	$532,545
Boat fuel	$2,079.42	$207.73	$13,321,973
Boat rental	$44.74	$22.11	$286,619
Charter fees	$315.40	$99.23	$2,020,662
Permits	$31.85	$7.89	$204,069
Other expenses	$102.37	$27.01	$655,814
Total	$13,361.29	$1,816.58	$85,600,133

IV. ECONOMIC CONTRIBUTION ANALYSIS

Methods

The input-output models used in this report generate four different metrics, referred to as impacts, for assessing the contributions to a region's economy from expenditures on marine recreational fishing. The different measures of impacts are:

- **Output** is the gross value of sales by businesses within the economic region affected by an activity. In the rest of the document, the terms "sales impacts" and "output impacts" are used interchangeably.
- **Labor income** includes personal income (wages and salaries) and proprietors' income (income from self-employment).
- **Value Added** is the contribution made to the gross domestic product in a region from marine recreational fishing.
- **Employment** is specified on the basis of full-time and part-time jobs. There is significant part-time and seasonal employment in commercial and recreational fishing and many other industries.

The first three types of impacts are measured in terms of dollars, whereas employment impacts are measured in terms of number of jobs. Additionally, the four categories of impacts are not independent and it is important to note that adding them together would result in some double counting of impacts.

The economic input-output model of Atlantic HMS angler contributions to the Unites States economy was created using IMPLAN (Minnesota IMPLAN Group, Inc., 2010), a commercially available software. Input-output models estimate the economic contributions, or impacts, of monetary expenditures by consumers and businesses by tracking a regional economy's ability to absorb and circulate their expenses. Impacts of consumer expenditures accessed by the IMPLAN model include direct, indirect, and induced impacts. Direct impacts are the initial expenditures made by anglers with businesses within the regional economy being examined. Indirect impacts represent expenditures made by businesses within the study region that support and resupply the businesses where anglers spend their money. Finally, induced impacts represent the household spending of individuals within the study region whose jobs are supported by angler expenditures. The IMPLAN model has been regularly used in the fisheries literature to estimate the economic impacts and contribution of angler expenditures in studies from the national level (Steinback and Gentner, 2001; Lovell et al., 2013; Hutt et al., 2015) to studies of individual fisheries (Bohnsack et al., 2002; Hutt et al., 2014; Hutt and Silva, 2015).

Separate IMPLAN models were estimated for the HMS Angling Expenditure Survey at the regional and national level, while national-level models were estimated for the TES Operator and Participant Surveys (Appendix IV). To accomplish this, total expenditures for each category were assigned to the appropriate IMPLAN industrial sectors within the models for the respective aggregated regions of states. Expenditure categories that included more than one IMPLAN sector were not aggregated to avoid biases associated with aggregating. Instead, the expenditure in the category was distributed to individual IMPLAN sectors based on the proportion of final

household demand in the study region. Because the typical grocery or convenience store purchase includes a wide range of products, expenditures at grocery and convenience stores were allocated across sectors based on IMPLAN's Personal Consumption Expenditure (PCE) activity database for grocery store purchases. PCE activity databases are created by the Bureau of Economic Analysis and represent national average expenditure patterns. Similarly, expenditures on fishing licenses, property taxes, and parking /site access fees were allocated across sectors using IMPLAN's *State/Local Government Non-Education Institution Spending Pattern* database. When run, each model would then generate estimates of total output, value added output, labor income, and employment. Further details on how angler expenditure models estimate economic contributions to regional economies can be found in Lovell et al. (2013).

To avoid double counting of expenditures in the TES Operator and Participant models, certain expenditures had to be excluded. Tournament fee expenditures were excluded from the tournament participant model as these formed the primary revenue source for tournament operations, and were thus captured in greater detail in the TES Operator model as this model better captured how those fees were spent in the local economy. Payouts to tournament winners were also excluded from both models as the data collected was insufficient to determine how tournament winners spent their winnings and where. Furthermore, tournament winnings could be classified as transfer payments as they are a redistribution of income from multiple participants entering the tournament to a single individual or team. As such, they would not be considered to represent a new economic impact.

Results

Between tournament and non-tournament private-boat related angling trips in 2016, HMS recreational anglers spent approximately $84 million on HMS fishing and fishing trips (minus tournament registration fees), with tournament operators spending an additional $20 million to organize and host tournament events (minus payouts to winning teams) for total expenditures of approximately $104 million (Table 13). The economic contributions associated with HMS recreational fishing expenditures included total output of $232 million, value added impacts of $127 million, proprietor and labor income of $72 million, and 1,404 jobs supported (Table 13). Non-tournament, recreational HMS fishing trips by HMS Angling permit holders accounted for approximately 44 percent of these impacts with $47 million in expenditures generating $103 million in total output, $55 million in value added impacts, $31 million in proprietor and labor income, and 577 jobs supported.

Tournament related HMS fishing trips generated $37.5 million in expenditures, which generated economic contributions of $84.7 million in total output, $46 million in value added impacts, $30.5 million in income, and 532 jobs (Table 13). Finally, tournament operations generated $38 million in expenditures and net profits that supported economic contributions to the Nation of approximately $44 million in total output, $26 million in value added contributions, $15 million in income, and supported 295 jobs (Table 13). National economic contributions from HMS tournaments and angler trips had an overall multiplier effect of 2.22, or $2.22 of total economic output generated for every dollar of HMS expenditures.

Table 13. Total expenditures and economic contributions generated by non-tournament Atlantic HMS Angling trips, registered HMS tournament operations, and HMS tournament participating teams from Maine to Texas in 2016. Non-tournament trip expenditures are reported by region and nationally, while tournament-related expenditures are only reported nationally

Type and Region	Total Expenditures	Employment (jobs)	Income	Value Added	Total Sales Output
Non-tournament Angling Trips					
New England	$5,172,293	37	$2,061,493	$3,056,170	$4,867,047
Mid-Atlantic	$10,676,438	75	$3,938,758	$6,657,037	$10,891,525
South Atlantic	$20,498,004	187	$6,999,234	$12,675,335	$21,426,876
Gulf of Mexico	$10,055,265	105	$4,942,499	$9,133,841	$16,979,295
United States Total	$46,675,320	577	$30,537,454	$54,816,098	$103,372,357
Tournament Angling[1]	$37,544,910	532	$26,153,290	$46,180,928	$84,671,666
Tournament Operation[2]	$20,170,466	295	$15,120,988	$26,099,884	$43,970,942
Total Impacts	$104,390,696	1,404	$71,811,732	$127,096,910	$232,014,965

[1] Tournament angling expenditures used in the IMPLAN model exclude expenses for tournament fees as they are included in the tournament operation model.

[2] Monetary prizes to tournament winners are excluded from the Tournament Operations IMPLAN model as they represent a transfer payment from many tournament participants to a few, and thus do not represent a new economic contribution to the economy.

In addition to estimating national economic contributions, we also estimated regional contributions of non-tournament HMS angling trips (Table 13). The regional contribution models only included the associated coastal states in each region. These models exhibited much lower multiplier effects than the national models due to greater economic leakages, particularly in the oil and gas industry due to the large percentage of trip expenditures associated with boat fuel. Regional multipliers ranged from 0.94 for New England, indicating that regional expenditures associated with HMS angling actually exceeded regional economic contributions, to a high of 1.69 in the Gulf of Mexico where the United States oil and gas industry has a concentrated presence. The multipliers found in this study are consistent with those found in early assessments of the economic contributions of marine angler expenditures (Sabrina et al., 2013). Compared to the national multiplier of 2.22 found in this study, the smaller regional multipliers illustrate the interconnected nature of the United States economy.

V. DISCUSSION AND CONCLUSIONS

This study, combined with two other assessments conducted in recent years, serves as a near comprehensive assessment of the economic contributions of HMS recreational fishing to the Nation's economy. We estimated the trip expenditures and economic contributions of HMS Angling permit holders outside of HMS tournaments, and expenditures and economic contributions associated with HMS tournaments, which also allow the participation from HMS Charter/Headboat, Atlantic Tunas General, and Swordfish General Commercial permit holders. The economic contributions of HMS for-hire charter/headboat operators were previously assessed in July to November of 2013 (Hutt and Silva, 2015). In 2014, NMFS also assessed the economic contributions of durable goods expenditures made by HMS Angling permit holders (Lovell et al., 2016). Table 14 summarizes the results of these assessments in 2016 U.S. dollars alongside the estimates published for the first time in this report. All of these studies assessed distinctly different expenditures associated with HMS recreational fishing, and can be treated as additive estimates within a given category of impacts. In total, these assessments identified combined HMS recreational expenditures of over $307 million that annually support $510 million in total sales output to the Unites States economy and support 4,528 jobs and $192 million in income (Table 14). Durable goods purchased supported the largest portion of economic contributions in the form of total sales at 46 percent, followed by non-tournament HMS private vessel trip expenditures (20%), tournament angling trips (17%), HMS charter/headboat operations (10%), and tournament operations (9%) (Table 14).

Table 14. Summary of expenditures and economic contributions by the HMS recreational fishing sectors estimated through a series of studies conducted from 2013 through 2016. All estimates of expenditures and economic contributions are reported in 2016 US dollars

HMS Sector	Study Year	Total Expenditures	Employment (jobs)	Income	Total Sales Output
HMS Charter/Headboat[1]	2013	$19,919,600	1,131	$13,718,314	$53,468,400
HMS Angling Durable Goods[2]	2014	$174,424,900	2,028	$109,106,387	$232,222,500
Non-Tournament Trip Expenditures	2016	$46,675,320	577	$30,537,454	$103,372,357
Tournament Angling	2016	$37,544,910	532	$26,153,290	$84,671,666
Tournament Operation	2016	$20,170,466	295	$15,120,988	$43,970,942
Total Impacts		**$307,344,500**	**4,528**	**$191,663,701**	**$510,190,900**

[1] Hutt and Silva (2015) estimated costs, earnings, and the economic contributions of the HMS charter/headboat fleet from July through November of 2013.

[2] Lovell et al. (2016) collected data on durable good (i.e., boats, rods and reels, tackle, etc.) expenditures made by marine anglers in all U.S coastal states in 2014, and included a sub-sample of HMS Angling permit holders.

The economic contribution estimates associated with durable goods expenditures was a conservative estimate as the economic contribution analysis only included coastal states within the Atlantic HMS region, and not the entire United States (Lovell et al., 2016). The HMS Charter/Headboat assessment was also slightly conservative as it only encompassed the months of July through November (Hutt and Silva, 2015). However, these months constitute the bulk of the HMS recreational fishery, as 80 percent of trips reported in the 2016 HMS Angling Expenditure Survey took place from July to November. One component of the economic contributions HMS for-hire fishery that was clearly not captured in the HMS Charter/Headboat Cost-Earnings Study were the trip expenditures of the clients taken out on HMS for-hire trips. For-hire trips account for approximately 17-20 percent of annual HMS recreational fishing vessel trips reported in the Large Pelagic Survey, and generally involve a slightly larger average party size. As such, the trip expenditures of HMS for-hire clients should make a significant economic contribution. Unfortunately, NOAA Fisheries currently does not have a sample frame of these anglers, as they are not required to possess an HMS Angling permit as the vessel permit held by the for-hire captain covers them. Furthermore, as all HMS permits are vessel based, these assessments can only be assumed to have captured the full expenditures of the vessel owners. While the HMS Tournament Participant Survey asked for all team expenditures, the other surveys were targeted more specifically to the expenditures of the permit holders. While it can be assumed that the permit holders would be responsible for the vast majority of durable good expenditures, and most expenditures associated with operator their vessel such a fuel costs, anglers joining them for recreational trips would have had their own trip-related expenditures. These later expenditures would not have been captured in this study, as we specifically instructed permit holders to report expenditures only on those items they paid for themselves.

NMFS has previously estimated HMS angling trip expenditures. In 2011, HMS Angling permit holders were estimated to have spent approximately $23 million on HMS angling trips taken in New England and the Mid-Atlantic (Hutt et al., 2014). In comparison, this study only found HMS Angling permit holders to have spent $15.8 million in those regions in 2016. In part, this may be due to the removal of tournament trips from the current assessment, but it is more likely driven by the fact the total number of private-boat HMS trips estimated to be taken in the region by the LPS has declined by approximately 22 percent between 2011 and 2016 (Figure 3). This decline is mirrored by a decline in HMS Angling permitted vessels, which fell from 23,138 to 20,020 in the same period (NMFS, 2017). Additionally, there was a significant reduction in gas prices which averaged $3.58/gallon in 2011, and fell to $2.25 /gallon in 2016, the lowest price since 2004 (USEIA, 2019). This reduction in fuel prices could result in a significant reduction in overall trip expenditures as fuel accounts for over half of average trip costs. However, average trip costs do not appear to have declined by as much as would be expected from such a large reduction in fuel costs. In fact, the 2011 assessment found that trips targeting billfish spent $658/trip on average, which only declined to $604/trip in this assessment despite average gasoline prices declining by about a third. Many billfish trips involve spending hours trolling baited lure behind the boat to cover the maximum amount of water, which is a very fuel intensive technique. Lower fuel prices may have resulted in more billfish anglers choosing this method over less fuel intensive fishing methods.

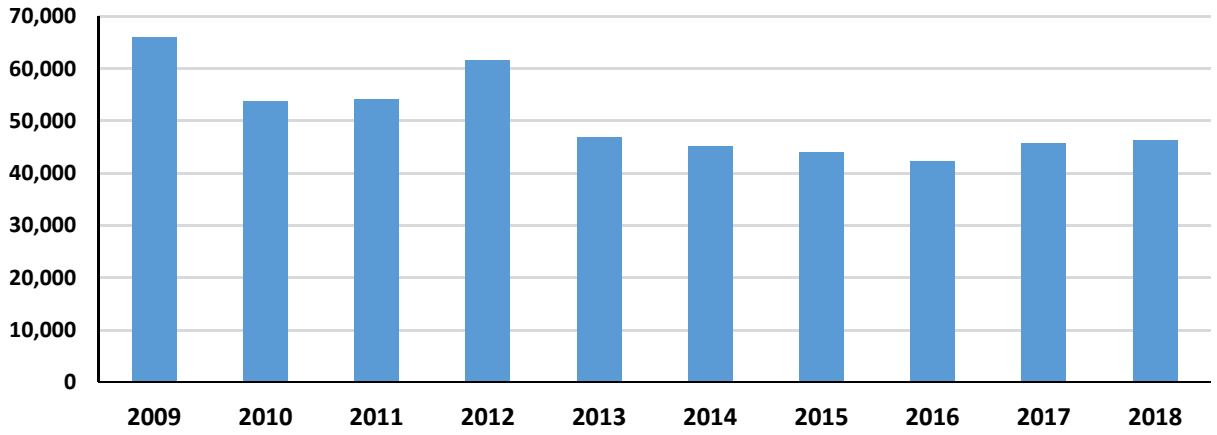

Figure 3. Estimates of the number of private boat vessel trip taken per year from the Large Pelagic Survey, 2009–2018

In total, HMS recreational anglers account for a relatively small portion of total national marine recreational fishing expenditures and impacts. In 2011, a national NMFS assessment found recreational anglers spent $23 billion on recreational fishing trips and durable goods (Lovell et al., 2013). Total Atlantic HMS-related expenditures in 2016, including tournament related expenditures, would only be equal to 1.3% of this estimate. However, HMS anglers tend to have outwardly greater expenditures on a per capita basis than other marine anglers. In 2011, approximately 9.8 million marine recreational anglers were estimated to have averaged $453 in annual fishing trip expenditures (Lovell et al., 2013). Conversely, this study estimated that 20,020 HMS Angling permit holders in 2016 averaged $4,207 per person in annual HMS trip expenditures, or nearly 10 times as much as the average marine angler. In conclusion, HMS angling makes an out-sized economic contribution on a per trip basis, and continues to provide a premier recreational fishing experience to United States anglers, with the potential to be very important contributor to the marine recreational economy of select coastal communities.

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APPENDIX I

HMS Angler Trip Expenditure Survey

OMB Control No. 0648-0693. Expiration Date: 04/30/2017.

2016 Marine Recreational Fishing Expenditure Survey
Highly Migratory Species

We would like to know about your most recent day of marine recreational fishing for highly migratory species.

- **"Marine"** means SALTWATER or any portion of a bay, sound, or river that is saltwater or brackish water.
- A **day of HMS fishing** is *any portion of a day* spent fishing for **highly migratory species** (HMS).
- **HMS species include TUNA, SWORDFISH, SHARKS, MARLIN, SAILFISH, or SPEARFISH.**
- Except when asked, please do not include any information for other household members or other fishing party members.

1. In 2016, in what month was your most recent day of HMS fishing ? Month _____

2. During your most recent day of HMS fishing **in 2016**, did you primarily fish from a:
(*please indicate your primary trip type by making an "X" in **one** box only*)

☐ Party or charter boat ☐ Private boat ☐ Shore, pier, or jetty

3. On this day, what city or town was closest to the place where you launched a boat, cast a line from shore, or boarded a party or charter boat? City or town: _____ State _____

4. What were the primary and secondary species of HMS you were targeting on this trip?

_____ _____ ☐ Whatever I can catch

Primary Secondary

5. Including yourself, how many people traveled with you to your most recent day of marine fishing ?

☐☐☐ Number of people, including yourself

6. Of the people who traveled with you, how many people were fishing **including yourself**?

☐☐☐ Number of people, including yourself

7a. On your most recent day of HMS fishing, did you spend one or more nights away from your permanent or seasonal residence?

☐ Yes **(GO TO QUESTION 7b)** ☐ No **(SKIP TO QUESTION 8)**

7b. How many nights did you spend away from home? ☐☐ Number of nights

7c. How many days on this trip did you go fishing? ☐☐ Number of days

7d. What was the **primary** purpose of this entire trip away from home? *(mark one box)*

☐ Fishing ☐ Vacation or personal reasons ☐ Business

8. During the past **12 months**, how many total days did you go fishing for **HMS**?
(*enter zero if you had no HMS trips)*

☐☐☐ Number of days

9. On your most recent day of **HMS** fishing, how much did you **PERSONALLY** spend for the following items? If your most recent day was part of a longer trip away from home, please provide your expenses for the entire trip. Include expenses that you paid for others, but do not include any expenses paid by others for you. For each item, indicate the percentage of your expense that was spent in the state where you were fishing. **If you spent nothing, please write "0" for that item.**

(A) **Type of Expense**	**(B)** **Your Personal Expense** (Round to the nearest dollar)	**(C)** **% Spent in the State of Your Most Recent Day of HMS Fishing (0-100%)**
Food and drink from grocery or convenience stores	$ _____.00	_____%
Food and drink from restaurants and bars	$ _____.00	_____%
Parking, site access fees, and tolls	$ _____.00	_____%
Auto, truck, or RV fuel	$ _____.00	_____%
Auto, truck, or RV rental	$ _____.00	_____%
Bait	$ _____.00	_____%
Ice	$ _____.00	_____%
Boat fuel and oil	$ _____.00	_____%
Boat rental	$ _____.00	_____%
Party, charter, or guide tickets and surcharges	$ _____.00	_____%
Galley tab & souvenirs bought on charter/party boat	$ _____.00	_____%
Fish filleting fee and/or Tips paid to charter crew	$ _____.00	_____%
Lodging (hotels, motels, campgrounds, etc.)	$ _____.00	_____%
Public transportation (bus, train, taxi, ferry, etc.)	$ _____.00	_____%
Airfare	$ _____.00	_____%
Gifts or souvenirs	$ _____.00	_____%
Processing, freezing, or shipping fee paid to fish processing company	$ _____.00	_____%

If you had none of the above expenses, check here: ☐

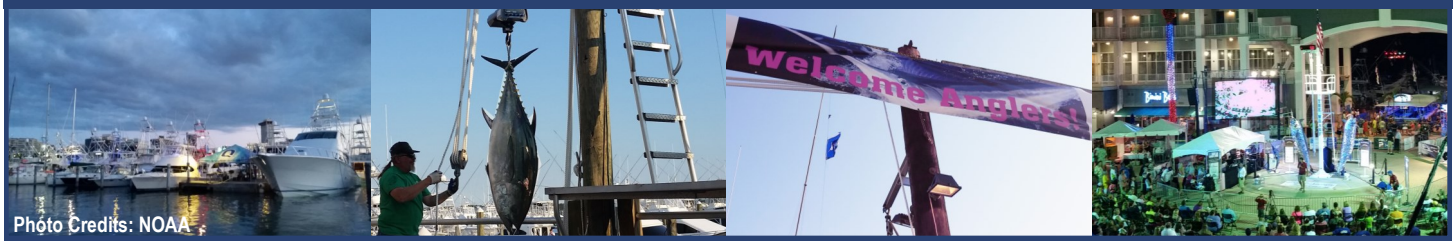
APPENDIX II

HMS Tournament Operator Survey

NOAA FISHERIES

2016 Atlantic HMS Tournaments Survey

Operator Expenses



Your response is important!

About this survey:

Recreational fisheries are important to the national economy, with saltwater angler expenditures contributing up to $56 billion in total economic output annually. This survey represents the first effort by NOAA Fisheries to conduct a comprehensive economic assessment of Atlantic highly migratory species (HMS) tournaments. Your information, when combined with that of other tournament operators and participants nationwide, will allow us to construct a baseline assessment of the economic importance of Atlantic HMS fishing tournaments to coastal communities and businesses. The information gained from this survey can help to minimize impacts on coastal communities from changes in fishery regulations and also help NOAA Fisheries to better understand the effects of natural phenomena, species abundance, and economic change on coastal communities.

Please take a moment to complete this survey. Thank you for helping NOAA sustainably manage our nation's marine resources.

Questions?

George.Silva@noaa.gov or Cliff.Hutt@noaa.gov

OMB Control No. 0648-0725. Expiration Date: 01/31/2019.

Section A: General Tournament Operations

We would like to know about your highly migratory species (HMS) tournament.

- **HMS** are tunas, swordfish, sharks, marlins, sailfish, and spearfishes.
- This is a **voluntary** survey. Responses to financial questions will be protected under the Trade Secrets Act.
- This survey should be completed by the **tournament operator** or **designated staff member** for **one tournament only**.

1. About the Tournament:

   Name:_____ City/town:_____ State:_____

   Month/Day: [#][#]/[#][#] to [#][#]/[#][#] Year: [#][#][#][#]

   Weigh-in date(s):_____

   Weigh-in location(s):_____

   Number of years this tournament been held (including this year): [#][#] First year: [#][#][#][#]

2. Tournament Director name(s):_____

   Your Name:_____ Phone Number: [#][#][#] - [#][#][#] - [#][#][#][#]

3. Number of boats: Fishing in this tournament: [#][#][#]

   Fishing for HMS in this tournament: [#][#][#]

4. Total number of participants (anglers, crew, and captains): [#][#][#][#] → [X] Estimated [X] Actual

5. Did you estimate the number of spectators? [X] Yes [X] No (skip to question 6)

   5a. Estimated total number of spectators at the weigh-ins: [#][#][#][#]

   5b. Description of method used to estimate number of spectators:_____

6. Check the boxes next to the species for which points or prizes were awarded:

[X] Bigeye tuna	[X] Blue Marlin	[X] Swordfish
[X] Albacore tuna	[X] White Marlin	[X] Pelagic sharks
[X] Skipjack tuna	[X] Sailfish	[X] Coastal sharks
[X] Yellowfin tuna	[X] Bluefin tuna	[X] Other species: _____

7. Was there a prize category or points for catch and release of any species? [X] Yes [X] No (skip to the next page)

   7a. Please describe the catch & release point/awards system:

   _____

   _____

Section B: Funding Sources

Please tell us about the various revenue sources associated with your tournament operation.

Source	Total Amount for This Tournament
Total registration fees collected	$_____
Optional entry fees/Jackpot/Derby entry (optional)	$_____
Sponsors (Fees for marketing associated with the event)	$_____
Concessions (Space rental for 3rd party vendors - example: booth or tent for food and drink vendors)	$_____
Sale of merchandise (Hats, t-shirts, souvenirs, etc.)	$_____
Other:_____	$_____

Section C: Tournament Expenses

Please tell us about the various expenses associated with operating your tournament.

1. Number of people employed to work on this event: [#][#][#]
2. Number of volunteers for this event: [#][#][#]
3. Did this tournament benefit any charities? [X] Yes [X] No (skip to question 4)

   3a. Donations made by the tournament:
   $ _____.00

   3b. Donations made directly by the participants to the charities:
   $ _____.00

   3c. Please list the charities:_____
   _____

4. Did this tournament contribute money to items other than charities (example: educational scholarships)? [X] Yes [X] No (skip to the next page)

   4a. Other contributions made by the tournament:
   $ _____.00

   4b. Please list the other beneficiaries:_____
   _____

Section C: Tournament Event Expenses

Please tell us about the costs associated with operating your tournament, rounding to the nearest dollar.

Type of Expense	Total Amount for This Tournament
Monetary awards and prizes	$ _____.00
Trophies and plaques, etc.	$ _____.00
Site fee / Cost of location Recipient (marina, government, resort, etc.): _____	$ _____.00
Local licensing and permitting	$ _____.00
Audio and visual equipment (video monitors, speakers, special effects, etc.)	$ _____.00
Event equipment (chairs, tables, tents, etc).	$ _____.00
Event marketing/advertising (TV, internet, print, social media, etc.)	$ _____.00
Catering	$ _____.00
Insurance	$ _____.00
Electricity	$ _____.00
Other utilities:_____	$ _____.00
Cost of merchandise	$ _____.00
Lodging	$ _____.00
Entertainment	$ _____.00
Security	$ _____.00
Other labor costs:_____	$ _____.00
Other _____	$ _____.00

If you had none of the above expenses, X here: [X]

Thank You for Completing This Survey!

APPENDIX III

HMS Tournament Participant Survey

NOAA FISHERIES

2016 Atlantic HMS Tournaments Survey

Angling Team Expenses

Your response is important!

About this survey:

Recreational fisheries are important to the national economy, with saltwater angler expenditures contributing up to $56 billion in total economic output annually. This survey represents the first effort by NOAA Fisheries to conduct a comprehensive economic assessment of Atlantic highly migratory species (HMS) tournaments. Your information, when combined with that of other tournament operators and participants nationwide, will allow us to construct a baseline assessment of the economic importance of Atlantic HMS fishing tournaments to coastal communities and businesses. The information gained from this survey can help to minimize impacts on coastal communities from changes in fishery regulations and also help NOAA Fisheries to better understand the effects of natural phenomena, species abundance, and economic change on coastal communities.

Please take a moment to complete this survey. Thank you for helping NOAA sustainably manage our nation's marine resources.

Questions?

George.Silva@noaa.gov or Cliff.Hutt@noaa.gov

OMB Control No. 0648-0725. Expiration Date: 01/31/2019.

Section A: Your Most Recent HMS Fishing Tournament

Highly migratory species (HMS) are sharks, tunas, swordfish, and billfishes. Please tell us about your most recent highly migratory species fishing tournament.

- This is a **voluntary** survey. You responses will be protected. Results of this survey will only be released for public use in aggregate statistical form.
- This survey should be completed by the **team captain** or **vessel owner** for **one tournament only**.
- If you participated in another tournament, please complete a separate survey for that event.
- Note: A **day of tournament fishing** is any portion of a day spent fishing in an HMS tournament.

1. Tournament Name:_____ Month: [#][#] Year: [#][#][#][#]

2. From which type of vessel did you fish?
(*If you used more than one vessel, please select the type you used the most*)

[X] Charter boat
Length: _____
HP: _____

[X] Private boat
Length: _____
HP: _____

[X] Other: _____

3. From **where** did you launch or board the vessel to fish in the tournament?
City or town:_____ State: _____

4. How **many** days and nights did you spend tournament fishing? Days: [#][#] Nights: [#][#]

5. Which **highly migratory species** did you target in this tournament? (*Select all that apply*)

[X] Bigeye tuna
[X] Albacore tuna
[X] Skipjack tuna
[X] Yellowfin tuna
[X] Marlins
[X] Sailfish
[X] Swordfish
[X] Bluefin tuna
[X] Pelagic sharks
[X] Coastal sharks
[X] Other species: _____
_____

6. How many members of your fishing team took **time off** from work **without pay** to participate in this tournament? [#][#]

7. Including yourself, **how many** people...
Traveled with you to the tournament (**family/friends**): [#][#]
Were on your **fishing team**: [#][#]

8. Was this tournament participation part of a longer trip in which you spent at least one night away from your permanent or seasonal residence? [X] **Yes** [X] **No** (skip to Section B)

Number of nights (**total**) you were **away from your residence** on this trip: [#][#]
Number of non-tournament **days** you went fishing: [#][#] (*Count partial days as full days*)
Number of non-tournament **overnight** fishing trips you took: [#][#] (*Total number of nights*)

8a. What was the primary **purpose of this trip** away from home? *(Please select only one*)

[X] Fishing in this tournament [X] Vacation or other personal reasons [X] Business

Section B: Tournament Trip Expenses

For this tournament, how much did your **team** spend for the following items?

*If you answered "yes" to question 8, please provide your expenses for the **entire trip**.*

Team Expense: Please round to the nearest dollar.

State: The U.S. state where the majority of the money was spent.

Type of Expense	Team Expense	State
TRAVEL EXPENSES		
Airfare	$ _____.00	_____
Public transportation	$ _____.00	_____
Auto, truck, or RV fuel	$ _____.00	_____
Auto, truck, or RV rental	$ _____.00	_____
Lodging (hotels, motels, campgrounds, etc.)	$ _____.00	_____
Grocery or convenience stores (food & drink)	$ _____.00	_____
Restaurants and bars (food & drink)	$ _____.00	_____
Entertainment	$ _____.00	_____
TOURNAMENT EXPENSES		
Fees: tournament, jackpot, or derby entry	$ _____.00	_____
Parking, site access, boat launch fees	$ _____.00	_____
Bait (live or dead, not artificial)	$ _____.00	_____
Ice	$ _____.00	_____
Boat fuel and oil	$ _____.00	_____
Boat rental	$ _____.00	_____
Charter or guide fees	$ _____.00	_____
Fishing permits bought during tournament trip	$ _____.00	_____
Other _____	$ _____.00	_____

If you had none of the above expenses, X here: [X]

Section C: Tackle and Durable Equipment Expenses

For this tournament, how much did your **team** spend for the following items?

Team Expense: Please round to the nearest dollar, and put "0" if there was no expense.

Percent Spent In-State: The percent of your team expense spent in the state in which the tournament was held (0-100%).

Type of Expense	Team Expense	Percent Spent In State
Rods, reels, and components for rod-making	$_____.00	_____%
Tackle and gear (lures, teasers, hooks, leaders, sinkers, fishing line, tackle boxes, nets, knives, gaffs, etc.)	$_____.00	_____%
Electronics (video cameras, GPS, radars, radios, satellite communications, vessel instruments, depth-finders, EPIRBs/PLBs, etc.)	$ _____.00	_____%

If you had none of the above expenses, X here: [X]

Section D: About You

Different anglers may have different spending patterns. The following questions will help us to ensure that we have a representative sample of anglers, and to see how expenditure patterns may vary. Your answers are strictly confidential.

1. About **you**:

   [X] Male [X] Female Birth Year: [#][#][#][#]

   Number of **years** you've been saltwater **fishing**: [#][#]

   Number of **years** you've participated in saltwater fishing **tournaments**: [#][#]

2. During the past **12 months**...

   Number of **HMS tournaments** you have participated in: [#][#]

   Number of **days** you went fishing for **HMS**: [#][#][#]

   Number of **days** you went fishing for **any** species: [#][#][#]

Thank You for Completing This Survey!

APPENDIX IV

IMPLAN Model Tables

Table A1. Inputs for HMS Angling trip expenditure IMPLAN models.

Expenditure Category	IMPLAN 536 Sector(s)	Basis
Airfare	408	Industry
Auto Fuel	3115	Retail
Auto Rental	362	Industry
Bait	3017	Retail
Boat Fuel	3115	Retail
Boat Rental	363	Industry
Captain/Charter Crew	338	Industry
Crew	338	Industry
Fish Processing	93	Industry
Food – Grocery Store		Household PCE Vector
Food - Restaurant	501, 502, 503	Industry
Gifts & Souvenirs	405	Industry
Ice	3107	Retail
Lodging	499, 500	Industry
Parking and Access Fees		State/Local Gov't NISP
Public Transportation	412	Industry

Table A2. Inputs for HMS tournament operator cost-earnings IMPLAN model.

Expenditure Category	IMPLAN 536 Sector(s)	Basis
Electricity	49	Industry
Merchandise	395	Industry
Insurance	437	Industry
Equipment rental	443	Industry
Audio-visual rental	445	Industry
Marketing/Advertisements	457	Industry
Security services	467	Industry
Entertainment	488	Industry
Marina site fees	496	Industry
Lodging	499	Industry
Catering services	503	Industry
Charitable donations	514	Industry
Trophies and plagues	3406	Commodity
Labor Compensation	5001	Labor Income Change
Operator Net Revenue	6001	Labor Income Change

Table A3. Inputs for HMS tournament participant expenditure IMPLAN model.

Expenditure Category	IMPLAN 536 Sector(s)	Basis
Airfare	408	Industry
Auto Fuel	3115	Retail
Auto Rental	362	Industry
Bait	3017	Retail
Boat Fuel	3115	Retail
Boat Rental	363	Industry
Captain/Charter/Crew	338	Industry
Entertainment	495	Industry
Food – Grocery Store		Household PCE Vector
Food - Restaurant	501, 502, 503	Industry
Gifts & Souvenirs	405	Industry
Ice	3107	Retail
Lodging	499, 500	Industry
Parking and Access Fees		State/Local Gov't NISP
Public Transportation	412	Industry