Atlantic Highly Migratory Species

Marine Recreational Information Program Implementation Plan

Image credit Dr. John Graves, VIMS

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LIST OF COMMONLY USED ACRONYMS

APAIS	Access-Point Angler Intercept Survey
ATCA	Atlantic Tunas Convention Act
ALRS	Automated Landings Reporting System
BFT	Bluefin Tuna
CPUE	Catch Per Unit Effort
CHTS	Coastal Household Telephone Survey
FMP	Fishery Management Plan
FES	Fishing Effort Survey
FHS	For-Hire Survey
HMS	Highly Migratory Species
ICCAT	International Commission for the Conservation of Atlantic Tunas
LPS	Large Pelagic Survey
LPBS	Large Pelagics Biological Survey
LPIS	Large Pelagics Intercept Survey
LPTS	Large Pelagics Telephone Survey
MRIP	Marine Recreational Information Program
PSE	Percent Standard Errors
RBS	Recreational Billfish Survey
SRHS	Southeast Regional Headboat Survey
TFL	Total Fork Length
VTR	Vessel Trip Reports

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Atlantic Highly Migratory Species MRIP Implementation Plan

Atlantic highly migratory species (HMS) are managed under the dual authority of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (Magnuson-Stevens Act) and the Atlantic Tunas Convention Act (ATCA). Under the Magnuson-Stevens Act, NOAA Fisheries must manage fisheries to prevent overfishing while achieving, on a continuing basis, the optimum yield for each fishery. Under ATCA, NOAA Fisheries is authorized to promulgate regulations, as may be necessary and appropriate, to implement the recommendations from the International Commission for the Conservation of Atlantic Tunas (ICCAT). Currently, Atlantic sharks, tunas, swordfish, and billfish are managed under the 2006 Consolidated Atlantic HMS Fishery Management Plan (FMP), and its amendments. The Atlantic HMS Management Division oversees the domestic management of these fisheries in the Atlantic, Gulf of Mexico, and Caribbean with the support of various NOAA Fisheries partners including the Office of Science and Technology, regional offices, and science centers.

Significant recreational fisheries exist for most Atlantic HMS. In 2016, nearly 24,000 vessel permits (20,020 HMS Angling and 3,594 HMS Charter/Headboat) were issued for the recreational pursuit of Atlantic tunas, billfish, swordfish, and sharks in the Atlantic, Gulf of Mexico, and the Caribbean. Additionally, 262 tournaments pursuing HMS registered with NOAA Fisheries in 2016. The collection of precise and timely catch and effort data is essential to the effective management of these fisheries, and a multitude of data collection methods are currently employed. Many of these data collections fall under the umbrella of the Marine Recreational Information Program (MRIP) including the Large Pelagic Survey (LPS).

The purpose of the Atlantic HMS MRIP Implementation Plan is to summarize the data needs associated with Atlantic HMS science and management, evaluate the existing recreational data collections, set priorities for their improvement and expansion, and identify the steps and funding needed to accomplish those improvements. Concurrent regional plans are also under development for the Atlantic, Gulf of Mexico, and Caribbean to address these needs for their respective regional fisheries. The Atlantic HMS Management Division is also participating in development of the Caribbean regional plan.

Section 1: Atlantic Highly Migratory Species Data Needs

This section of the Atlantic HMS MRIP Implementation Plan examines recreational fishing effort and catch data needs for continued scientific understanding and management of HMS fisheries in the U.S. waters of the Atlantic, Gulf of Mexico, and Caribbean. NOAA Fisheries' Atlantic HMS Management Division manages these species in this region, and recreational data collection programs are supported by a variety of organizations both within NOAA Fisheries and its external partners (Section 2). This section of the Atlantic HMS MRIP Implementation Plan is divided into two parts: 1) scientific data needs for supporting stock assessments of Atlantic HMS, and 2) management data needs for supporting quota monitoring and other management needs for Atlantic HMS fisheries.

Scientific Data Needs

Catch & Effort Data Needs for Stock Assessments

Catch data for landed HMS and all discards, both dead and alive, is essential for stock assessments and management.

Coverage: Currently, the Large Pelagic Survey (LPS) provides good coverage on bluefin tuna and other HMS catch and effort data from Maine to Virginia during the June to October period that corresponds to the recreational fishing season in the northeast. However, greater coverage is needed throughout the southeast region (North Carolina through Texas); such coverage would need to include additional months since recreational fishing for HMS is not season-limited in the southern areas. Currently, MRIP surveys such as the Access Point Angler Intercept Survey (APAIS) and the Fishing Effort Survey (FES) provide estimates of HMS catch and effort in the South Atlantic and Gulf of Mexico regions, but these surveys produce low precision estimates as they do not target offshore access sites like the LPS does. To improve coverage in the southeast, it will be necessary to stratify sampling time and location to ensure adequate and representative observations of HMS directed trips. Trip selection should also be unbiased (e.g., no tendency to select trips with greater or lesser catch).

Resolution: Area stratification minimally needed to assign HMS catch and effort to ICCAT statistical areas, which vary by species (35 degree N is relevant dividing line for the United States for bluefin tuna), is needed to support ICCAT stock assessments, but finer resolution is desirable when possible. Estimates of total effort, using an appropriate unit of effort (hours, hook-hours, days), at 1X1 or 5X5 degree resolution (spatial: latitude/longitude) is desirable for ICCAT reporting, but not presently available. Time stratification of effort and catch data should be by quarter at least, but by month is preferable.

Precision: Percent standard errors (PSE) are a measure of precision, or the level of variability, presented with all MRIP and LPS estimates. Highly precise estimates (PSE < 10) are desired for annual estimates by species for all HMS, and by size class for bluefin tuna to support stock assessments. However,

accomplishing this level of precision is challenging for all HMS as many are rare event species in the MRIP surveys including even the LPS.

Timeliness: Updated cumulative estimates by month are desired for all HMS.

CPUE: Fishing effort related data enabling the standardization of catch per unit effort (CPUE) estimates is essential to supporting HMS stock assessments. Specific data desired per observation for these calculations include:

1. Vessel type (e.g. charter, private, party)
2. Units of effort – anglers, lines, hooks, hours fished
3. Target species, regardless of whether the species is successfully caught on a given trip (effort assigned to target, if possible, if multiple on a trip)
    a. Gear/Fishing strategy (troll, chunking/chumming, deep-drop etc.
    b. Bait (type, live/dead, artificial)
    c. Other techniques that may affect catch rates (kites, etc.)
4. Location of fishing (latitude/longitude [preferred], fishing spot [“Mud Hole”, “Cigars”], or as small an area assignment as possible), plus distance from shore
5. Date of fishing

Biological Data Needs for Stock Assessments

Hard part collection (otoliths, spines, etc.) - Ongoing, representative sampling is desirable, but at the very least the capacity for periodic sampling to meet specific research needs should be implemented throughout the full HMS region. Other sampling needs include soft tissue for genetics analysis (e.g., fin clips), and reproductive organs for assessment of maturity and spawning condition. These efforts may be ongoing or to support a specific research study.

Straight fork length – or other measurement appropriate to species, such as lower jaw fork length for billfish – is preferred to support stock assessments. Curved fork length may be acceptable, but measurement type must be specified. Weight can be collected in addition to length. Sampling should be representative, and with adequate sample sizes to support stock assessment analyses (historical sample sizes have generally been low).

Management Data Needs by Species Groups

Bluefin Tuna

For quota monitoring purposes, landings data for bluefin tuna are needed to monitor 3 size category quotas: School (27" to less than 47"), Large School or Small Medium (47" to less than 73"), and Large Medium or Giant (73" or greater). Anglers are required to report all bluefin tuna landings either directly to NOAA Fisheries via the Automated Landings Reporting System (ALRS) or through the North Carolina or Maryland catch card programs. However, reporting is not required for bluefin tuna released alive, nor do they capture comprehensive data on bluefin tuna fishing effort as reporting is only required for trips that land bluefin tuna.

Coverage: Currently, the LPS provides good coverage on bluefin tuna catch and fishing effort data from Maine to Virginia during the June to October period that corresponds to the recreational fishing season in the northeast. However, greater coverage is needed in North Carolina where a significant winter fishery has developed for trophy bluefin tuna.

Resolution: Estimates are primarily needed at the regional level - North Atlantic (Maine to Virginia), South Atlantic (North Carolina to Florida), and Gulf of Mexico (Florida to Texas) - as the Trophy quota is split between these areas.

Precision: High precision estimates are needed to support international and domestic reporting requirements for bluefin tuna. Mandatory landings reports should be exact, but LPS/MRIP estimates used to validate them and estimate under reporting should target the 10% PSE level at most for annual estimates of total catch.

Timeliness: Anglers are currently required to report all bluefin tuna landings and dead discards within 24 hours by phone or online, or through the North Carolina or Maryland catch card programs. Preliminary LPS/MRIP estimates within 2 months of the end of a sampling wave should suffice for other purposes.

BAYS (Bigeye, Albacore, Yellowfin, Skipjack) Tuna

At this time, NOAA Fisheries has not implemented recreational quotas for BAYS tuna; however, an accurate time series of effort and catch data is needed for assessing future management actions and for stock assessment purposes.

Coverage: Currently, the LPS provides good coverage on BAYS tuna catch and effort data from Maine to Virginia during the June to October period that corresponds to the recreational fishing season in the northeast. MRIP surveys provide estimates of BAYS catch and effort in the South Atlantic and Gulf of Mexico regions, but these surveys produce high PSE estimates as they do not target offshore access sites like the LPS does.

Resolution: Estimates are primarily needed at the regional level (New England, Mid-Atlantic, South Atlantic, Gulf of Mexico) as the BAYS fishery has regionally specific fishing seasons. For example, the yellowfin tuna season in the mid-Atlantic is primarily concentrated in the summer months.

Precision: PSEs for annual catch estimates by species should ideally approach 10% or less, and be no higher than 20% for monthly or wave estimates.

Timeliness: Preliminary LPS and MRIP estimates should be available within 2 months of the end of each sampling wave.

Billfish (Blue Marlin, White Marlin, Sailfish, Roundscale Spearfish)

NOAA Fisheries maintains an annual landings limit of 250 billfish (blue and white marlin and roundscale spearfish) in the Atlantic and Gulf of Mexico under a Recommendation from ICCAT. Anglers or tournament organizers are required to report all billfish landings either directly to NOAA Fisheries or through the North Carolina or Maryland catch card programs. However, reporting is not required for billfish released alive, nor do they capture comprehensive data on billfish fishing effort.

Coverage: Currently, the LPS provides good coverage on billfish catch and effort data from Maine to Virginia during the June to October period that corresponds to the recreational fishing season in the northeast. MRIP surveys provide estimates of billfish catch and effort in the South Atlantic and Gulf of Mexico, but these surveys produce high PSEs as they do not target offshore access sites like the LPS does.

Resolution: Estimates are primarily needed at the regional level (New England, Mid-Atlantic, South Atlantic, Gulf of Mexico) as the billfish fishery has regionally specific seasons. For example, the sailfish season in Florida is primarily concentrated in the winter months.

Precision: PSEs for annual catch estimates should be no higher than 20%, but this can be challenging given the rare event nature of billfish catches. The need for highly precise MRIP estimates for billfish is mitigated by the fact that anglers are required to report all billfish landings through the RBS.

Timeliness: Anglers are currently required to report all billfish landings within 24 hours by phone or online, or through the North Carolina or Maryland catch card programs. Preliminary LPS/MRIP estimates within 2 months of the end of a sampling wave should suffice for other purposes.

Swordfish

For quota monitoring purposes, NOAA Fisheries counts both recreationally landed swordfish and commercial incidental landings against the same sub-quota. Anglers and tournament organizers are

required to report all swordfish landings either directly to NOAA Fisheries or through the NC or MD catch card programs. However, mandatory reporting is not required for swordfish released alive, nor does mandatory reporting capture data necessary to estimate swordfish fishing effort.

Coverage: Currently, the LPS provides good coverage on swordfish catch and effort data from Maine to Virginia during the June to October period that corresponds to the recreational fishing season in the northeast. MRIP surveys provide estimates of swordfish catch and effort in the South Atlantic and Gulf of Mexico throughout the year when trips landing or targeting swordfish are intercepted, but these surveys produce high PSEs as they do not target offshore access sites as the LPS does. Swordfish are also commonly targeted at night, and many of these trips may be missed by the current intercept surveys which only conduct surveys during the day.

Resolution: Estimates are primarily needed at the regional level (New England, Mid-Atlantic, South Atlantic, and Gulf of Mexico) as the swordfish fishery has regionally specific seasons. For example, the swordfish season in the Gulf of Mexico peaks in the early spring, while it in the northeast it peaks in the late summer.

Precision: PSEs for annual catch estimates should approach 10%, and be no higher than 20%. This can be challenging given the rare event nature of swordfish catches.

Timeliness: Anglers are currently required to report all swordfish landings within 24 hours by phone or online, or through the North Carolina or Maryland catch card programs. Preliminary LPS/MRIP estimates within 2 months of the end of a sampling wave should suffice for other purposes.

Sharks (Pelagic and Coastal Species)

NOAA Fisheries monitors recreational interactions and landings for 19 species of sharks that recreational anglers are authorized to retain, and 21 species of sharks for which retention is prohibited. Lists of these species by management group can be found in the HMS Recreational Compliance Guide (http://www.nmfs.noaa.gov/sfa/hms/compliance/guides/documents/rec_sharks.pdf). While NOAA Fisheries does not monitor recreational quotas in real time for sharks (as is done for commercial quotas), recreational shark landings are monitored on an annual basis, and the estimated landings count towards overall annual catch limits (ACL) for all shark species or management groups. Accurate time series of effort and catch data are needed for assessing future management actions and to ensure shark ACLs and overfishing limits (OFL) are not exceeded. Anglers in Maryland and North Carolina are required to report shark catches through the state catch card programs.

Coverage: Currently, the LPS provides some coverage of pelagic, large coastal, and some prohibited shark catch and effort data from Maine to Virginia during the June to October period that corresponds to the recreational fishing season in the northeast. MRIP surveys provide estimates of shark catch and effort in mid- and North Atlantic along with the south Atlantic and Gulf of Mexico. Both surveys produce

high PSEs depending on the species as many are rare event species. Frequently caught coastal sharks such as blacktip or Atlantic sharpnose sharks tend to have better PSEs as trips landing them are intercepted more frequently.

Resolution: Estimates are primarily needed at the regional level (New England, Mid-Atlantic, South Atlantic, Gulf of Mexico) as the predominate shark fisheries vary by region. Splits between the Gulf of Mexico and Atlantic regions are needed because many shark species, particularly small coastal sharks, have two genetically differentiated stocks between those regions. For sharks, the boundary between the Gulf of Mexico region and the Atlantic region is defined as a line beginning on the east coast of Florida at the mainland at 25°20.4' N. lat. (around Miami), proceeding due east. Any water and land to the south and west of that boundary is considered, for the purposes of quota monitoring and setting of quotas, to be within the Gulf of Mexico region. Any water and land to the north and east of that boundary, for the purposes of quota monitoring and setting of quotas, is considered to be within the Atlantic region.

Precision: PSEs for annual estimates of catch for commonly-targeted shark species (e.g., shortfin mako, common thresher, blacktip sharks) should ideally be approaching or below 10%, and no higher than 20%. PSEs for annual estimates for all other shark species would ideally approach 20%. It has proven to be extremely difficult to collect precise estimates of catch and harvest for most recreational shark fisheries. This is due to several factors including 1) the rare event nature of shark fishing trips in MRIP surveys, 2) the fact that many anglers that incidentally catch sharks are not able to reliably identify them to species, and 3) the fact that many shark fishing trips occur at night when MRIP intercept surveys are not being conducted.

Timeliness: Preliminary LPS and MRIP estimates should be available within 2 months of the end of each sampling wave.

Section 2: Current Atlantic HMS Recreational Data Collections

This section includes a list of current, ongoing Atlantic HMS recreational fishery data collections of fishing effort, catch, and biological samples. For each data collection program the plan identifies:

1. The organization responsible for overseeing the effort,
2. Whether the data collection involves survey sampling or a census,
3. A description of the data sampling effort,
4. The area and time over which it is conducted,
5. The sample frame used in the data collection, and
6. Pros and cons of how each data collection is currently conducted.

Current Data Collections	Description	Geography/ Time / Sample frame	Pros/Cons
Large Pelagics Intercept Survey (LPIS) NOAA S&T Survey	Dockside interviews with captains of private and for-hire vessels returning from fishing trips targeting large pelagics. Locations are selected from a registry of LPS sites and tournaments. Measures average catch per trip, average size of kept fish, and number of fish released alive.	Maine – Virginia June – October List of access sites to which boats return from HMS trips	Pros: Targets known access sites used by offshore anglers to get more HMS data Cons: Limited to Maine to Virginia; expanding geography would require expanding time frame; designed to focus on bluefin tuna which is a potential con for other HMS such as coastal sharks
Large Pelagics Telephone Survey (LPTS) NOAA S&T Survey	Telephone interviews with randomly selected recreational anglers and for-hire captains who hold HMS permits. Used to determine fishing effort and trips for HMS.	Maine – Virginia June – October HMS Angling and CHB permit holders	Pros: Uses a known permit universe for its sample frame so no need for random household dialing Cons: Limited to Greater Atlantic Region; expanding geography would require expanding timeframe; designed to focus on BFT which is a potential con for other HMS such as coastal sharks
Large Pelagics Biological Survey (LPBS) NOAA S&T	Supplemental dockside survey used to collect biological samples and data on HMS, particularly bluefin tuna. Data supports stock assessments.	Maine – Virginia June – October List of access sites to which	Pros: Targets known access sites used by offshore anglers to get more HMS data Cons: Limited to Greater Atlantic Region; expanding

Current Data Collections	Description	Geography/ Time / Sample frame	Pros/Cons
Survey		boats return from HMS trips	geography would require expanding timeframe; designed to focus on BFT which is a potential con for other HMS such as coastal sharks
Access-Point Angler Intercept Survey (APAIS) ***(MRIP Certified)*** NOAA S&T Survey	Conducted at public marine fishing access points (boat ramps, piers, beaches, jetties, bridges, marinas, etc.) to collect individual catch data and information including: 1) species identification, 2) total number of each species caught. 3) length and weight measurements of individual fishes, 4) angler-specific fishing trip information, and 5) angler-specific fishing behavior. (Source of HMS data for NC – MS and Puerto Rico). Atlantic headboats (ME-GA) are sampled at sea as part of the APAIS design.	ME/NH: May-October MA-GA: March – December NC, FL-MS and Puerto Rico: Year round Site Register database of access sites along the Atlantic and Gulf coasts	Pros: Offers wider geographic coverage and has been redesigned based on NAS recommendations Cons: Does not target known HMS access sites thus HMS trip intercepts are less common and estimates are more variable; does not sample private access points; catch information is limited to angling that occurred on last waking day.
Coastal Household Telephone Survey (CHTS) and Fishing Effort Survey (FES) ***(FES is MRIP Certified; CHTS is being phased out and replaced by the FES)*** NOAA S&T Survey	Collects fishing effort data from shore and private boat anglers. Since the majority of shore and private boat fishing trips are taken by individuals who live in coastal areas, the CHTS is limited to households located in coastal counties. Correction factors derived from the catch survey (APAIS) are used to account for trips taken by non-coastal resident and out-of-state anglers, as well as anglers who live in households without telephones. (Source of HMS data for SC – MS)	ME/NH: May-October MA-GA: March – December NC, FL-MS and Puerto Rico: Year round (no FES in Puerto Rico) Saltwater angler registry plus random digit dialing	Pros: Offers wider geographic coverage and has been redesigned based on NAS recommendations Cons: Does not target HMS permit holders so surveys of these individuals are less common and estimates are thus more variable

Current Data Collections	Description	Geography/ Time / Sample frame	Pros/Cons
For-Hire Survey (FHS) NOAA S&T Survey	Developed to resolve under-coverage of charter and party boat angler effort by the Coastal Household Telephone Survey (CHTS), which was traditionally used to measure effort. The FHS was implemented for Gulf Coast states in 2000 (charter boat only), and all Atlantic Coast states from Maine through Georgia in January 2005. It overlaps other charter and headboat monitoring programs, including the Northeast (Maine-Virginia) Vessel Trip Reporting Program (VTR), the Southeast Regional Headboat Survey (SRHS), various state logbook programs, and the ongoing CHTS/FES. (Source of for-hire HMS data for NC – GA)	ME: May-Oct NH: March-Oct MA-GA: March – December Comprehensive directory of for-hire vessels from Maine to Georgia	Pros: Uses a comprehensive directory of for-hire vessels and covers a wide geographical area Cons: Does not target HMS permit holders so surveys of these individuals are less common and estimates are more variable
Vessel Trip Reports (VTR) (Northeast Region) GARFO Logbook Census	Data reported in the VTRs for NOAA Fisheries-permitted vessels are obtained from Northeast Fisheries Science Center. For all federally-permitted charter boats and headboats, the total trips reported in the VTRs are used to produce an unadjusted number of angler trips. These boats are treated as a separate "VTR boats" stratum within each for-hire boat mode. All FHS data obtained for those vessels are removed, and FHS estimates of the numbers of angler trips on non-VTR boats are re-run for each wave using the remaining FHS data. The resulting FHS estimates represent a second "non-VTR boats" stratum for each mode.	Maine – Virginia Year round All NOAA Fisheries permitted vessels in the Greater Atlantic Region	Pros: Mandatory logbook for for-hire and commercial vessels in the northeast Cons: Somewhat redundant with the FHS; does not cover all for-hire vessels in the region

Current Data Collections	Description	Geography/ Time / Sample frame	Pros/Cons
Southeast Regional Headboat Survey (SRHS) SEFSC Census – Mandatory Logbook	Collects logbook data on headboat effort and catch in the Gulf of Mexico.	North Carolina to Texas Year round Headboats with federal permits issued by the Southeast Regional Permits Office (some of which are dual permitted in the HMS Charter/ Head-boat fishery)	Pros: Only NOAA Fisheries recreational data collection on catch/effort in Texas. Cons: Does not collect data on targeted species.
Mandatory reporting of non-tournament swordfish, billfish, and BFT landings HMS Mgmt. Division Census – Mandatory	Atlantic HMS permitted private boat and for-hire vessels are all required to report all landings of swordfish, billfish, and landings and dead discards of bluefin tuna by phone or online (hmspermits.noaa.gov/catchreports) with the exception of landings in Maryland and North Carolina where they have mandatory catch card reporting.	Maine – Texas plus Caribbean Year round All HMS Angling and CHB permit holders	Pros: Mandatory reporting, collects better data on rare event species Cons: 100% reporting unlikely thus undermining census, cannot estimate confidence intervals
Mandatory reporting of tournament landings for selected tournaments (a.k.a. Recreational Billfish Survey) SEFSC Census – Mandatory	If selected for reporting, the operator of an Atlantic HMS tournament must report all HMS landings in a tournament to NOAA Fisheries. Reports are made to the SEFSC. All billfish and swordfish tournament are selected for reporting.	Maine – Texas plus U.S. Caribbean; year round Operators of registered HMS tournaments	Pros: Mandatory reporting, collects better data on rare event species, tournaments usually record accurate weights/lengths; long-term involvement of SEFSC has built relationships with many tournaments and facilitates reporting Cons: Currently, only billfish and swordfish tournaments are selected for reporting

Current Data Collections	Description	Geography/ Time / Sample frame	Pros/Cons
			leaving a large gap in reporting for other HMS
Florida At-Sea Observer Program **(FWC)**	Headboats randomly selected for at-sea sampling, catch identified to species, sizes obtained for harvest and released catch components	Atlantic Coast of Florida Observed anglers on randomly selected headboat trips	Pros: Size information on discards obtained. Cons: Limited to headboat fleet, limited encounter rate for HMS/LPS Limited sample size (<130 trips annually)
Catch Cards (MD and NC) NOAA S&T; NC and MD Census – Mandatory	Maryland and North Carolina require all bluefin tuna, billfish, swordfish, and coastal sharks to be reported via catch cards at state-operated reporting stations. MD requires all reported fish to be tagged, and trailered boats cannot be pulled from the water until the fish is tagged.	Maryland and North Carolina Year round All anglers landing the species in question in those states	Pros: Mandatory reporting, may collect more data on rare event species Cons: 100% reporting unlikely thus undermining census, cannot estimate confidence intervals
Atlantic HMS Angler Expenditure Survey NOAA S&T Survey	Data on durable goods purchases was collected in 2015, and trip expenditure data is being collected for 2016. This survey is repeated approximately every 4-5 years. The last collection of HMS angler expenditure data was conducted in 2011, and covered Maine to North Carolina.	ME – VA: June to October NC – TX and U.S. Caribbean: Year round Every few years HMS Angling permit holders	Pros: Only HMS targeted recreational survey that samples full HMS region Cons: Not annual, does not collect catch and effort data
Texas and Louisiana Angler Surveys TX and LA Survey	TX and LA have opted out of participating in MRIP, and are collecting their own marine angler catch and effort data. This would include HMS trips, but coverage levels are unknown.	Texas and Louisiana Year round Access sites, possibly permit frames	Pros: Source of data in these states Cons: Lack of NOAA Fisheries oversight, lack of raw data sharing (LA Creel raw data will possibly be available through GulfFIN in the future)

Section 3: Atlantic HMS Priority Rankings

The members of the HMS MRIP Working Group rated the priority (1 = lowest, 5 = highest) of the eleven goals identified in the HMS MRIP Wishlist (Appendix I). The following is a list of those goals based on their average descending rankings with comments justifying their placement on the list. Initially the LPS re-estimation ranked lower than the LPS re-design, but completion of these two goals were combined at the top of the list as the re-estimation is an important first step that will assist in guiding the LPS re-design.

Wishlist Items - HMS MRIP Implementation Plan	**Average Score**
Completion of the Large Pelagic Survey re-design that incorporates appropriate proportional sampling statistical methods, and re-estimation of historical effort and catch estimates using the new statistical design.	*Score: 4.6*
Justification: Complete a re-design of the existing LPS (Maine to Virginia) that incorporates non-response weights, improves data collection on trips originating from private access sites, corrects for tournament vs. non-tournament biases, and optimizes sample sizes to improve PSEs on rare event species. The next step will be conducting the LPS re-estimation, which will involve the re-estimation of historic effort and catch estimates using new survey weights developed to appropriately account for the survey's multi-stage clustering sampling design, non-response bias, and bias associated with over sampling fishing tournaments.	
Expand Atlantic HMS recreational fishery data collections through the rest of the Atlantic HMS region (NC-TX)	*Score: 4.2*
Justification: The Atlantic HMS Management Division is responsible for the management of HMS fisheries from Maine to Texas, yet the LPS only extends from Maine to Virginia as its primary purpose is to quantify recreational landings of bluefin tuna. Data on recreational effort and landings of HMS in the southeast are currently collected via other MRIP surveys like the APAIS and FES. However, most HMS are rare event species in these surveys leading to high PSEs, plus the use of different survey methods from the LPS make it difficult to compare estimates. Expanding the LPS throughout the HMS region, or adding an offshore stratum to the existing MRIP surveys will greatly improve collection of HMS recreational data collection throughout a region with a substantial population of HMS anglers.	
Inclusion of Atlantic HMS charter/headboats in federal for-hire electronic logbook data collections.	*Score: 3.8*
Justification: Many HMS charter/headboat operators in the northeast currently report landings through the VTR logbook system. Currently, the South Atlantic Fisheries Management Council and the Gulf of Mexico Fisheries Management Council are developing rules that will require for-hire vessel	

Wishlist Items - HMS MRIP Implementation Plan	Average Score
operators federally permitted to pursue council managed species to report via electronic logbooks. The HMS Management Division is working to ensure that these logbooks include data collection on HMS trips as most HMS for-hire vessels in these regions are also permitted to pursue council managed fisheries.	
Identify ways to reduce reporting burden on HMS / LPS fishery participants.	*Score: 3.6*
Justification: Reducing reporting burden placed on anglers is, and has always been, a goal of NOAA FISHERIES. Examples of steps that NOAA FISHERIES has already taken to reduce reporting burden on HMS anglers and for-hire captains include relieving those that report HMS landings via state catch card programs from mandatory HMS Catch Reports, and surveying HMS charter/headboat captains through the FHS instead of also including them in the LPS. Currently, the HMS Management Division is working with the South Atlantic and Gulf of Mexico Fisheries Management Councils to ensure their planned for-hire electronic logbooks collect adequate data on HMS trips so that a separate HMS logbook will not be required in the future.	
Develop integrated estimates of effort and catch for species encountered by multiple surveys	*Score: 3.6*
Justification: Anglers can report trips targeting HMS through numerous surveys and logbooks. This is particularly the case in the northeast (Maine to Virginia) where the LPS, MRIP, and the Northeast VTR all overlap. Currently, separate estimates of catch and effort are generated by the LPS and MRIP for HMS caught in the northeast, while VTR data is used to validate reporting in these surveys. HMS catch and effort estimates from the APAIS/FES surveys are generally much less precise than LPS estimates as HMS trip intercepts are rare events in the APAIS/FES surveys. This can result in convergent estimates for the same species, which can lead to confusion over which estimates are the most appropriate to use. Developing a means of combining data from multiple sources to generate a single unified estimate will lead to greater clarity of management.	
Evaluate the combination and expansion of catch card harvest reports and tournament landings reports	*Score: 3.3*
Justification: Currently tournament landings reports are only required for billfish tournaments to track the 250 billfish annual quota. There is increasing interest to expand the tournament landings reports to all HMS tournaments and all species to reduce confusion regarding whose responsibility it is to report landings and when. Currently, the landings reporting requirement for billfish tournaments falls on the tournament operator, while it falls to the permitted anglers in other tournaments. Requiring the tournament operator to report landings for all tournaments should streamline the reporting process and reduce overall confusion.	

Wishlist Items - HMS MRIP Implementation Plan	Average Score
Catch card reporting is only implemented in North Carolina and Maryland, and expanding this to other states would require an investment from each state to implement the program. However, in North Carolina and Maryland, there is interest in combining the catch card program with the tournament landings reports to eliminate duplicate reporting.	
Improve and expand data collection on recreational shark fisheries	*Score: 3.0*
Justification: It has proven to be extremely difficult to collect precise estimates of catch and harvest for most recreational shark fisheries. This is due to several factors including 1) the rare event nature of shark fishing trips in MRIP surveys, 2) the fact that many anglers that incidentally catch sharks are not able to reliably identify them to species, and 3) the fact that many shark fishing trips occur at night when MRIP intercept surveys are not being conducted. This has created challenges for management efforts designed to end overfishing of certain shark species like the dusky shark as good recreational catch data has not been available for stock assessments. For this reason, NOAA Fisheries is exploring ways to generate more precise estimates of recreational shark landings and catch. Starting in 2018, shark anglers fishing in federal waters will be required to get a shark endorsement on their HMS permits. Depending on how many HMS anglers get the endorsement, this may provide a more targeted sampling frame for data collection on recreational shark fishing trips. NOAA Fisheries will evaluate this potential in the years following the endorsement implementation, and pursue a pilot project if warranted. Expansion of state catch card programs and tournament landings reports may provide improved data on recreational landings of sharks.	
Revise the HMS charter/headboat permit category to distinguish for-hire vessels that are authorized to fish both commercially and recreationally and those that are only authorized to fish recreationally	*Score: 2.9*
Justification: It has become apparent that not all HMS charter/headboat permit holders use their permitted vessels for taking out for-hire trips for HMS. In some cases, these for-hire vessels typically pursue other species, and get the HMS permit so their clients can retain an HMS if one is caught incidentally. In other cases, these vessels do not take any for-hire trips at all. One motivation for this later group to have a HMS for-hire permit is that it allows them to sell select HMS (tuna and swordfish) commercially. It also allows for recreational retention of other HMS that are not authorized under similar HMS permits like the Atlantic Tunas General Category permit which does not authorize retention of sharks, billfish, swordfish, and bluefin tuna under 73 inches total fork length (TFL). This situation represents a complication for recreational angling surveys. Primarily, it complicates the sampling frame for the For-Hire Survey because the HMS CHB permit list is used as a sampling frame for the survey. It also creates some confusion on whether trips should be classified as recreational or commercial trips if anglers are taken out on a charter, but the fish caught are sold.	

Wishlist Items - HMS MRIP Implementation Plan	Average Score
The Atlantic HMS Management Division is considering multiple options for revising this permit, and is currently focusing on establishing a commercial sale endorsement that authorizes permit holders to sell their authorized catch. This will allow the LPS and MRIP surveys to distinguish between those that acquire the permit for strictly recreational purposed versus those that acquire it for both recreational and commercial use. While this is not a perfect solution for identifying permit holders that take for-hire trips, it will be much easier to implement than requiring proof of for-hire operations to acquire the permit. The later would greatly complicate the administration of a permit that is currently administered as an open-access permit with no required application review.	
Evaluate opportunities to revise Large Pelagic Biological Survey (LPBS) to allow collection of biological samples from all HMS species	*Score: 2.9*
Justification: Currently, the LPBS primarily collects biological data on tuna to support stock assessments at ICCAT. There is interest in expanding sampling to all HMS to support additional stock assessments. If the LPS is expanded through the South Atlantic and Gulf of Mexico regions, there may be opportunities to expand the LPBS as well. The Apex Predators Program at the Northeast Fishery Science Center already collects biological samples of sharks through some shark fishing tournaments, and the Southeast Fishery Science Center collects samples from commercial landings via the observer program.	
Improve HMS recreational data collections in the Caribbean region.	*Score: 2.5*
Justification: MRIP data collection efforts in the Caribbean region have been minimal compared to the continental United States. However, these data collection efforts are growing, and the region is developing its own MRIP Implementation Plan. The Atlantic HMS Management Division has representation on that team, and will continue to support its efforts.	

Section 4: Recommended Studies and Considerations for Improvement, Integration, and Optimization

The priorities of the HMS MRIP Implementation Plan provided in Section 3 could be grouped into three larger categories depending upon whether each priority requires: 1) improvement in current LPS design and estimation (i.e., LPS redesign), 2) integration of the existing data and statistics from current survey programs (e.g., LPIS, APAIS, Catch Card), and 3) optimization of future survey programs in order to enhance data/estimates quality while reducing the reporting burden. All of the priorities may require pilot studies, feasibility studies, or formal discussion forums with essential constituents (science, management, stakeholders, etc.). Thus, the main purpose of this section is to provide a list of potential pilot studies and needed discussions and considerations that required to obtain the critical information for the decision-making process.

It should be noted that all the priorities share one common goal: to improve the accuracy of catch estimates while optimizing the efficiency of survey/sampling efforts. Some studies may require side-by-side field surveys for multiple years in multiple states for evaluation and verification, which are in general very expensive. Below is the list of potential studies and considerations that would be desired for each category.

Improvements in current LPS design and estimation (LPS redesign)

The "LPS redesign" was top ranked by the working group among other priorities (see Section 3). Improvement of the existing LPS has been highly desired to address the known deficiencies and weaknesses in terms of potential bias and lower precision due to a less strict probability-based sampling design in the intercept survey. There are two competing ideas for the LPS redesign. One idea is the modification of the current LPS sampling design to make the sampling more statistically rigorous, robust, and valid, while maintaining it as a stand-alone independent survey program. The other idea is adding an off-shore stratum to the current APAIS program (hereinafter referred to as APAIS add-on), so that data integration and the expansion of HMS catch estimation to other states in the southeast region (SER) would become simpler, easier, and possibly more cost-effective. However, the idea of APAIS add-on would be only applicable to those states that currently have APAIS in place. A study is needed about how this idea of APIAS add-on could be utilized to the states in SER that do not have APAIS (i.e., LA and TX). It is desired to expand the new LPS to the SER regardless whichever redesign idea is adopted for the renovation of LPS program.

Each idea has its own potential advantages and disadvantages. Various pilot studies and analyses are required to evaluate whether those modified survey designs would produce statistically valid catch estimates. Comparative studies are also needed to determine which

survey program would be more practical and sustainable over time with considerations of wider spatial and temporal coverages if expanded to other states in the SER.

The pilot studies and considerations needed for each approach are listed below. The list is not intended to be exhaustive, but rather it should be used as an initial guideline that can be updated over time based on how the redesign and evaluation progresses.

1. **Modification of the current LPS design as a stand-alone program:**
   A. Review available descriptive analyses of historical LPS data that have been collected under the current LPS program to better understand the characteristics of data and to evaluate the degree of violations to the major statistical assumptions. Perform further descriptive analyses as necessary.
   B. Evaluate the effects of under-coverage of night and early morning trips and develop a method to address this in the new sampling design and estimation procedure.
   C. Review evaluation of the effects of under-coverage of private access trips and develop a method to address this in the new sampling design and estimation procedure.
   D. Estimate an empirical time slice distribution of LPS returned trips in different access site types (i.e., sites on the Master Site Register (on-frame) vs. sites not on the Master Site Register (off-frame)), and find a way to incorporate the new sampling design and estimation procedure
   E. Review and perform an assessment of the potential bias from tournament-targeted oversampling for certain species, and find a way to incorporate the new sampling design and estimation procedure if any bias is detected.
   F. Propose and develop a new survey design that incorporates formal probability-based sampling.
   G. Match the probability-based sampling and the estimation method by including the proper sampling weights in the estimation procedure.
   H. Evaluate and develop an optimal level of geographic stratification (i.e., combining or splitting the state lines) for the new sampling design, considering sampling efficiency and accuracy of estimates as well as the main needs of data users (e.g., managers, stock assessment, ICCAT, etc.).
   I. Study how to best deal with the estimation of rare-event species. The first step should be to find an agreed-upon definition of “rare-event species,” because each constituent may have a different way of defining “rare-event species.” Species encountered in the HMS fishery could be rare because population abundance is actually low in nature, because those species are not primarily targeted, or because species distributions do not overlap with the primary HMS fishing grounds. Rare species tend to have lower

precision in the estimates. If some rare species encountered in the HMS fishery are of high conservation/management concern (e.g., dusky shark, porbeagle shark), then more efforts should be put into addressing those rare species when developing the new probability-based sampling design. It should be noted, however, that other types of survey programs may be more efficient or cost-effective in dealing with the species that are extremely rare but of high conservation/management concern (e.g., catch card programs, tagging programs, or electronic logbooks) for more precise estimates. Thus, for rare-event species, other alternative survey methods or estimation methods (e.g., model-based estimates for zero-inflated data) should be carefully examined as well.

2. **Adding an off-shore stratum to APAIS (APAIS add-on):**

   A. Clearly identify and assess differences between the LPIS and APAIS with regard to survey designs and data elements, as well as the information needed to bridge the differences, such as vessel-trip-based vs. angler-trip-based, mandatory reporting vs. voluntary reporting upon intercept, and cost savings vs. cost increases.
   B. Conduct descriptive analyses of APAIS data to understand the patterns of HMS catches from the survey and to check whether adding such a stratum would be plausible and sufficient for high priority HMS species that are of conservation/management concern.
   C. Assess how well the APAIS add-on design would handle the rare-event species. If improving the precision in rare-event species is a high priority, then it should be evaluated whether the add-on approach would produce comparable estimates to the independent LPS program.
   D. Determine if it is possible to integrate effort estimation using different survey data sources if the LPIS is added to APAIS as an additional stratum. MRIP will be transitioning from the CHTS, a random digit dialing telephone survey, to the FES mail survey for private boat mode fishing effort estimation, and LPTS and FHS currently rely on a telephone survey with a fixed sampling frame with the list of known permit holders. If integration is not feasible for effort estimation, it would still be possible to define separate effort estimation domains for use with the APAIS add-on design. Accuracy of effort estimation with this approach still needs to be investigated.
   E. Discuss how to apply APAIS add-on survey design to those states that are not participating in APAIS.

Integration of existing data and statistics

Integration of data and statistics should occur in two parts. The first part is to calibrate the data or statistics between the previous survey and new survey programs over time for the consistent time series of the estimates, and the second is to find a way to combine the data or statistics from the parallel independent surveys (e.g., LPS, APAIS, Catch Card, ALRS, and RBS) that are being conducted concurrently.

1. **Calibration of catch statistics (point estimate and variance):** calibration is needed to match the previous estimates to new estimates if the new survey program is determined to replace the previous survey, so that the time series of estimates will be consistent over time. Having such a consistent time series of accurate catch estimates is critical for management and stock assessment purposes.
   A. Assess the pros and cons of different calibration methods (e.g., simpler ratio-based methods and more complex model-based approaches), considering the type of data and statistics obtained from the surveys: previous LPS survey vs. new LPS survey vs. APAIS add-on.
   B. After assessments of the various available calibration methods, develop the most suitable calibration method for the new survey program to be adopted and implemented. To develop a calibration method or model, both the new and old survey designs must be conducted side-by-side during the same time frame to obtain input data for the calibration model. The temporal and spatial coverage scope for these pilot studies needs to be determined with consideration of available funding.
   C. Assess whether one universal calibration method could be developed that is applicable across all HMS species, or whether calibrations should be done at the species-specific level.

2. **Combining catch data or statistics from different survey programs**
   A. It is generally believed that combining data or estimates from multiple sources could reduce the variance and increase the precision of the estimates. It should be carefully assessed and evaluated whether this would be true and applicable to currently available data or catch statistics from various HMS-related survey programs (e.g., LPS, APAIS, Catch Card, ALRS, and RBS). It should be noted that combining data or statistics to improve the accuracy of the estimates could make sense for some species but not all species. It could actually lower the accuracy or precision in some cases.
   B. The first step should be assessing and comparing the relative bias and level of precision of different catch statistics from various currently implemented survey programs (e.g., LPS vs. MRIP).

C. Different methods of combining statistics (e.g., ensemble models and small area estimations) should be assessed to check whether any of the methods would be applicable and plausible to produce presumably the best composite estimates of HMS catch statistics.
D. For the chosen composite catch statistics estimated from multiple sources, a calibration method should be developed while considering the characteristics of each source survey program and statistics.
E. Need to determine what the "base catch estimates" should be for the calibration if a composite statistic is going to be adopted as representative of HMS catch estimates for certain species in consideration of the LPS redesign.

Optimization of survey programs for the future

The objectives of most priorities in Section 3 can be regarded as "optimization" of the survey programs for the future. These priorities suggest that the optimization should occur in two directions: enhance the data quality/coverage while reducing the reporting burden. One major issue is that these priorities could be seen as somewhat contradictory to each other. Specifically, data quality/coverage enhancement often means the expansion of certain survey programs, while a reduction in reporting burden generally indicates the necessity of downsizing, combining, or eliminating current survey programs.

It should be noted that although the priority "Identify ways to reduce reporting burden on HMS/LPS fishery participants" is ranked highly (fourth place) in Section 3, most other priorities are directly or indirectly related to advocating the expansion of survey programs to enhance the data quality/coverage. The following priorities, with rankings in the parentheses, are those advocating the expansion of survey programs out of ten total priorities in Section 3.

- Expand Atlantic HMS recreational fishery data collection through the rest of the Atlantic HMS region (NC-TX) (2nd rank)
- Evaluate the combination and expansion of catch card harvest reports and tournament landings reports (6th rank)
- Improve and expand data collection on recreational shark fisheries (7th rank)
- Evaluate opportunities to revise the Large Pelagic Biological Survey (LPBS) to allow collection of biological samples from all HMS species (9th rank)
- Improve HMS recreational data collection in the Caribbean region (10th rank)

The above priority list suggests that the working group sees that the expansion and enhancement of the current survey programs to produce more accurate or more complete catch statistics is the most important objective in the future survey optimization. The ultimate goal of every survey program is to produce the most accurate estimates. The question is how to fold the priority of "reduction in reporting burden" into the priorities potentially leading to expansion of the survey programs.

As described in Section 1, different survey programs were created for the different needs of data and catch statistics (e.g., scientific needs vs. management needs). One particular survey program cannot be used as "one-size-fits-all" type of sampling tool. For example, the LPS can collect information on the released catch of various species encountered in the recreational HMS fishery and the biological samples, while the catch card survey program only collects landings information on certain limited species. Thus, before starting to address the HMS priorities (wish list) at an individual level, fishery managers and scientists must discuss and decide on the main goals and objectives of the survey programs with a holistic view regarding what are the most critical data and statistics to be collected and what survey programs could be combined/reduced/eliminated. This will ensure that pursuing certain priorities will not cause any major negative effects on the other priorities.

To achieve the priorities having goals with opposite directions (i.e., expansion vs. reduction), the working group should take a creative "think outside the box" type of approach. Below is the list of considerations, studies, and ideas to provide some context for future optimization of the survey programs. The list is not intended to be exhaustive.

A. Are all existing data collection programs necessary? Could existing surveys and data collection programs be modified so that they are complementary to each other, instead of overlapping, or integrated/consolidated in some way to address all needs more efficiently? A study of the degrees of overlap and relative efficiencies among different surveys could lead to a more streamlined survey program(s) with the potential to reduce overall reporting burden.
B. What would be an optimal survey method if the data collection on the HMS recreational fishery is expanded through the rest of the Atlantic HMS region (NC-TX) and the Caribbean? Which survey program is most plausible for geographical expansion in terms of data quality and budget: LPS, APAIS add-on, Catch Card, or some combination?
C. One of the major considerations that should be included in the survey expansion to other Atlantic states in the SER is the temporal coverage of the fishery. Currently, the LPS is run for the months of June – October, which matches the HMS recreational

fishery season in the NER. In the SER, however, the HMS fishery season is nearly year-round. This might be more of a consideration for survey cost and budget.

D. Enhance electronic logbook data collection programs. One imminent desire is to find a way to include Atlantic HMS charter/headboats in federal for-hire electronic logbook data collection. What are the pros and cons of electronic logbooks? Would any HMS charter/headboat permit holders be opposed to electronic logbooks?

E. Improvement of current catch card programs as census survey. As the priority list suggests, the working group would like to see an improvement in current catch card programs, and potentially expand the species list or expand the program to other states in the region as a reliable monitoring tool for precise and timely tracking of landings. There are number of questions that need to be addressed such as the following: Do we know all the issues with current catch card estimates (e.g., non-response and compliance issues)? Do we have good ideas about how to resolve those issues? How much more would it cost if we try to remove those issues from the current catch card survey?

F. Integration and modification of catch card program. This project could be termed as "Catch Card Redesign Project." The catch card program does not have to be maintained as a catch census survey, but rather it could be modified to estimate catch rates and fishing effort, as is done in the Pacific salmon catch card program. In addition, development of an incentive program could be considered to further increase the anglers' awareness and participation in the catch card survey and monitoring programs. One example of an incentive program would be providing a discount on the permit fee in the following year for those anglers who fill out catch cards or report their catch records online upon completion of fishing trips. Communication and coordination with the states in the region is critical for the development and successful implementation of new catch card programs in each state. Thus, a pilot project for new catch card programs could be developed and tested in the selected state(s) after in-depth discussions with the states in the region in terms of the feasibility of implementation across other states, because a catch card system that is applicable in one particular state may not be so in other states.

Section 5: Estimated costs, overall and for individual HMS data collections

A discussion of current costs of HMS related data collections relevant to each wishlist item is included below to provide context for the cost estimates of relevant proposed studies from Section 4. Continued evaluation of existing HMS recreational data collections and development of improvements to existing programs is required to identify potential efficiencies and achieve more precise cost estimates for individual survey components. Preliminary estimates of the cost of developing improvements as well as implementation of the improvement/expansion are provided for general planning purposes. These preliminary estimates might include the costs of labor to further develop, oversee, or administer the items in this plan. More accurate cost estimation will be possible when all specific work requirements are defined. Costs for overall and individual data collection components will be contingent on a variety of factors. The factors that will determine the actual costs include, but are not limited to, the mix of direct and indirect costs; which studies are undertaken; and which improvements, integrations or optimizations are implemented as a result of such studies.

Wishlist Items - HMS MRIP Implementation Plan	**Estimated Cost**
Completion of the LPS effort and catch re-estimation, and the re-design of the existing LPS that incorporates statistical methods developed in the LPS re-estimation.	$30,000-$60,000 per Pilot Study; ~$300,000 overall
The cost of the initial phase of the LPS effort and catch re-estimation was approximately $30,000. The cost of each pilot study to inform the LPS re-design process is estimated to range in cost from $30,000 to $60,000. There are several potential pilot studies and the list is not exhaustive. For example, short duration pilot projects with narrow scope such as a project to evaluate the effects of under-coverage of night and early morning trips and develop a method to address this in the new sampling design and estimation procedure (Section 4.1.B) should cost approximately $30,000. A project to clearly identify and assess differences between the LPIS and APAIS in regard to survey designs and data elements, as well as the information needed to bridge the differences, such as vessel-trip-based vs. angler-trip-based, mandatory reporting vs. voluntary reporting upon intercept, and cost savings vs. cost increases (Section 4.2.A) is estimated to cost $45,000. Large scope pilot projects such as a project to propose and develop a new survey design that incorporates formal probability-based sampling (Section 4.1.F) will cost the approximately $60,000.	

Wishlist Items - HMS MRIP Implementation Plan	Estimated Cost
The LPS re-design cost is dependent upon which studies will be implemented. The cost of completing the LPS effort and catch re-estimation following the re-design is approximately $60,000. The overall budget for studies of either integration of the LPIS with the APAIS or LPIS improvement and implementation separate from the APAIS is approximately $300,000. This budget is consistent with the cost of the APAIS re-design pilot study.	
Expand Atlantic HMS recreational fishery data collections through the rest of the Atlantic HMS region (NC-TX)	$2,500,000
The approximate annual cost of the LPIS conducted in ME-VA is $675,000. The LPTS costs approximately $225,000/year. About $100,000/year is spent on the LPBS. The start-up cost of data collection expansion to the rest of the Atlantic HMS region (NC-TX) is dependent on the costs for potential studies to determine optimal sample sizes and appropriate geographic and temporal coverage. Additional costs for coordinating state agency/contractor conduct and staff training also contribute to start-up costs. Preliminary estimates for expanding the surveys to the rest of the Atlantic HMS region assume the improved LPIS, LPTS, and LPBS will be continued seasonally in the current LPS survey area and implemented year-round from NC-TX. The estimated cost for conducting the LPIS from NC-TX is $1,000,000. The estimated cost of the NC-TX LPTS (Add-on and Private) is $300,000. The estimated cost of conducting the LPBS from NC-TX is $100,000. Therefore, the overall estimated cost for the conduct of the expanded LPIS, LPTS, and LPBS is $2,400,000. This estimate assumes current costs are adequate for the re-designed LPS. It is possible that re-design requirements will increase or decrease the overall cost of the expanded, improved surveys. In case of an increase, $3,000,000 is the approximate overall cost. The HMS permitting system, ALRS, and RBS are already implemented coast-wide from ME to TX. The cost of the HMS permitting system and ALRS including the maintenance of the call-in and online systems and mobile application is approximately $1,321,280. The cost of the RBS is ~$180,000 per year.	
Inclusion of Atlantic HMS charter/headboats in federal for-hire electronic logbook data collections.	To Be Determined

Wishlist Items - HMS MRIP Implementation Plan	Estimated Cost
The eVTR system is already implemented in the Northeast but HMS permit holders of Charter/Headboat category permitted vessels are not currently required to submit eVTRs as a condition of their HMS permit. According to a July 19, 2017 analysis there were 5,246 vessels in the 2016 GARFO VTR program. Of these 5,246 vessels, 984 (19%) were HMS permitted in 2016 or 2017. 49% of the 984 vessels had a Charter/Headboat Category HMS permit, 30% have a General category permit, 18% have a General category and Swordfish permit, and 3% have an Angling category permit. Almost 70% of the vessels have principal ports in either ME, MA, NY, or NJ. Extra costs associated with requiring submission of eVTRs for all HMS Charter/Headboat category permitted vessels include program support and enforcement costs. Both the South Atlantic (SA) and Gulf of Mexico (GOM) Fishery Management Councils are considering rulemakings to require electronic reporting for federally permitted for-hire vessels. While these rulemakings do not explicitly include HMS Charter/Headboat category permitted vessels, it is estimated that over half of these vessels possess the federal permits that are proposed to require electronic reporting. Recent reports suggest that roughly 2,200 SA vessels and 1,400 GOM vessels would be required to submit vessel trip reports for the Southeast Region Headboat Survey assuming the proposed rules requiring electronic logbook reporting are implemented (GMFMC 2017, SAFMC 2017). Notably, some commercial fishing vessels may also be submitting vessel trip reports for other SERO projects and have HMS permits. Other SERO vessel trip reporting projects include those for Pelagic Fisheries Vessels for Atlantic HMS, Coastal Fisheries Vessels fishing for South Atlantic Snapper-Grouper, Gulf of Mexico Reef Fish, Shark, King Mackerel, Spanish Mackerel, Atlantic Dolphin/Wahoo, and Wreckfish Fisheries Vessels. The complexities of requiring HMS permitted vessels to report by eVTR (or another established trip reporting system) suggest further analysis is needed to determine the cost of a unified system for HMS trip level reporting.	
Identify ways to reduce reporting burden on HMS / LPS fishery participants.	*$60,000*
There is no current project underway to identify ways to reduce reporting burden on HMS/LPS fishery participants. Approximately $10,000 could be spent on meetings to discuss HMS management data needs and compare the estimated reporting burden to the actual experience of HMS/LPS fishery participants. A program evaluation study to assess ways to reduce reporting burden would cost approximately $50,000.	

Wishlist Items - HMS MRIP Implementation Plan	Estimated Cost
Develop integrated estimates of effort and catch for species encountered by multiple surveys	$30,000-$60,000 per Study
This work is not currently conducted. Overall, projects to integrate estimates from the MRIP surveys (LPIS/LPTS and APAIS/FES) with other data collections such as the CCC program and VTR program could be developed for approximately $30,000-$60,000. The cost of such studies is dependent upon the scope and programs involved. In the past, data from the CCC program was compared to LPIS data to estimate reporting compliance where the data collections overlap (i.e. in MD). The MD compliance estimation was preliminary. An in-depth CCC compliance study for all areas where CCC overlap would occur would cost approximately $30,000.	
Evaluate the combination and expansion of catch card harvest reports and tournament landings reports	*$1,000,000*
Current costs for the CCC programs in MD and NC are approximately $100,000 ($50,000 each). Start-up costs for implementing CCC programs in the 16 states without existing programs (ME, NH, MA, RI, CT, NY, NJ, DE, VA, SC, GA, FL, AB, MS, LA, and TX) will be higher, overall, in the first year. The estimated cost of the first year for all 16 states combined is $1,000,000. In subsequent years, approximately $900,000 would be needed to maintain the expanded CCC program including the expansion and current program states. Expansion of the RBS to include all tournaments targeting HMS (not just billfish tournaments) is currently underway. The expected annual cost of the RBS extended to include all HMS is $190,000 per year, representing an increase in costs of only $10,000.	
Improve and expand data collection on recreational shark fisheries	*$100,000*

Wishlist Items - HMS MRIP Implementation Plan	Estimated Cost
In 2018, HMS Angling Category permit holders fishing for sharks recreationally will be required to obtain a shark endorsement, which requires completion of an online shark identification and fishing regulation training course. Improvements to the LPTS to systematically sample shark endorsement holders may improve data collection for recreational shark fisheries. It may be possible to add questions pertaining to the shark endorsement to the LPTS at no cost. Some improvements, such as increased sample sizes for the LPTS, would require a contract modification. Doubling the sample size for the LPTS should cost approximately $100,000.	
Revise the HMS charter/headboat permit category to distinguish for-hire vessels that are authorized to fish both commercially and recreationally and those that are only authorized to fish recreationally	To Be Determined
The cost for the HMS permit system is $1,321,280 per year. There are administrative and enforcement related costs related to changing the permit requirements. The cost to modify the permit system has yet to be determined.	
Evaluate opportunities to revise Large Pelagic Biological Survey (LPBS) to allow collection of biological samples from all HMS species	*$100,000*
Biological samples from sharks, dolphin, wahoo, little tunny, and Atlantic bonito are not currently collected on the LPBS. Nearly 100% of the LPBS assignments are opportunistic. When a bluefin tuna is available for sampling, an opportunistic assignment is triggered. Additional species, including but not limited to sharks, could be designated to trigger opportunistic assignments. Approximately 150 LPBS assignments can be funded for $100,000.	
Improve HMS recreational data collections in the Caribbean region	*$400,000*
The cost to implement the LPIS in the Caribbean (PR and the USVI) is estimated to cost $150,000. The cost to implement the LPTS in the Caribbean is $100,000.The cost to implement the LPBS in the Caribbean is $50,000. CCC programs can be implemented for approximately $150,000.	

References

GMFMC. 2017. Modifications to Charter Vessel and Headboat Reporting Requirements: Final Generic Amendment to the Fishery Management Plans for the Reef Fish Resources of the Gulf of Mexico and Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region. USDOC, NOAA, GMFMC, p. 182.

SAFMC. 2017. Modifications to Charter Vessel and Headboat Reporting Requirements: Amendment 39 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region, Amendment 9 to the Fishery Management Plan for the Dolphin and Wahoo Fishery of the Atlantic, Amendment 27 to the Fishery Management Plan for the Coastal Migratory Pelagics Fishery of the Gulf of Mexico and Atlantic Region. USDOC, NOAA, SAFMC, p. 221.

Appendix I. Atlantic HMS Wish List: Goals and Objectives for Recreational Data Collections

The following is a "wish list" of goals and objectives developed cooperatively by the HMS MRIP Working Group to help guide the development of the HMS plan, and set priorities for HMS recreational data collections. It is provided here for reference purposes, but the order of items in the list are not necessarily reflective of the final order of priorities determined by the Working Group. The final list of priorities, and their rankings, can be found in Section 3 of this Plan.

1. Complete the Large Pelagic Survey (LPS) re-estimation for Maine through Virginia to identify any biases in estimation that will need to be corrected in the LPS redesign by:
    a. developing a weighted estimation method that appropriately accounts for the multi-stage cluster sampling design of the Large Pelagic Intercept Survey (LPIS).
    b. applying the new estimation method to produce more accurate estimates of catch in current and prior years.
    c. evaluating differences between unweighted and weighted estimates to assess direction, magnitude and potential impacts of the biases in prior year LPS catch estimates on a species by species basis (and across size categories of Atlantic bluefin tuna).
2. Complete a re-design of the existing LPS (Maine to Virginia) that incorporates non-response weights, improves data collection on trips originating from private access sites, corrects for tournament versus non-tournament biases, and optimizes sample sizes to improve proportional standard errors (PSEs) on rare event species. Decisions made in regard to this wishlist item will also affect Item #3 – Expanding HMS data collections throughout the South Atlantic and Gulf of Mexico regions.
    a. First step is to choose between the following approaches:
        i. Develop an improved sampling design for the existing specialized intercept survey (LPIS), or
        ii. Modify the new MRIP Access-Point Angler Intercept Survey (APAIS), which has already been re-designed, to collect data needed to improve the estimation of recreational HMS catch rates
    b. If continuing the specialized LPIS is preferred, then a more formalized probability sampling design with stricter protocols for selecting sampling sites for intercept surveys needs to be developed.
        i. Integrate for-hire Large Pelagic Telephone Survey (LPTS) with the For-Hire Survey (FHS) as is currently done in VA-ME
        ii. Conduct separate private boat LPTS as is currently done in VA-ME
    c. If modifying the APAIS is the preferred option, then the requirements for the creation of an offshore site stratum with each of the existing APAIS boat site strata (predominantly charter boat sites and predominantly private boat sites) need to be developed. The requirements should include evaluation of mixed mode sampling approach, and the evaluation of the utility of possible LPS tournament strata.

d. A major consideration to consider when choosing between continuing the LPIS or adding an offshore strata to APAIS is that the LPIS estimates effort as vessel trips while APAIS estimates angler trips. If a modified APAIS is the preferred option, the inconsistency in the designs of the two studies, and how switching to a modified APAIS will affect the LPS time series, will have to be addressed. These will also be major considerations for Wishlist Item #3 – Expanding HMS data collections throughout the South Atlantic and Gulf of Mexico regions.

3. Expand Atlantic HMS recreational fishery data collection through the rest of the Atlantic HMS region (NC-TX) either through an expanded LPS or addition of an offshore stratum to APAIS.
    a. Expand re-designed LPIS or add offshore site strata to the MRIP APAIS in NC-MS
        i. Re-designed LPIS would be separate from the MRIP APAIS and would have some overlap with that survey.
        ii. Offshore site strata added to the APAIS:
            1. An offshore site stratum could be created for both the predominantly charter boat sites and the predominantly private boat sites.
            2. Higher levels of sampling could then be allocated to the offshore site strata to ensure adequate effective sampling of trips targeting HMS.
            3. Evaluate the need for an LPIS Tournament strata
    b. The states of Louisiana and Texas do not currently participate in MRIP, and as such, expanding intercept surveys of HMS anglers into these states is likely not an option.
4. Consider the inclusion of all Atlantic HMS charter/headboats in for-hire electronic logbook data collections. Currently, only HMS charter/headboats that also have southeast (North Carolina to Texas) or northeast (Maine to Virginia) regional for-hire permits are reporting via electronic logbooks and are doing so under the regional permit requirements.
5. Consider revising the HMS charter/headboat permit category to include only boats that have evidence of taking trips with paying passengers, or develop survey/reporting protocols to identify non-hire trips. This change would facilitate integration with either the For-Hire Survey or mandatory electronic reporting programs for for-hire boats. **(NOTE: The Atlantic HMS Management Division is pursuing rulemaking to split the HMS Charter/Headboat permit into two permits, one authorizing both recreational fishing for HMS and commercial sale of approved HMS, and one only authorizing recreational fishing for HMS.)**
6. Improve recreational fishery data collections in the Caribbean region. This is being addressed in greater detail by the Caribbean MRIP Working Group and in their Implementation Plan.
7. Improve data collection on recreational shark fisheries. LPIS is designed to focus on access points used most heavily by offshore anglers, but many coastal sharks are caught in inshore waters.
8. Evaluate combining and expanding the catch card harvest reports and tournament landings reports to all Atlantic HMS species tournaments (billfish, tuna, swordfish, sharks) and non-tournament harvest cards from ME-TX, year round.
    a. Consider expanding tournament landings reports from Atlantic billfish tournaments only to all Atlantic HMS tournaments.

b. Consider expanding catch card data collections to additional states (currently required in Maryland and North Carolina) as an alternative to mandatory call in reporting for bluefin tuna, billfish, and swordfish landings. Consider expanding catch card data collections to additional states (currently required in Maryland and North Carolina) as means of improving data collection on recreational shark fisheries.

9. Evaluate how to reduce the reporting burden on HMS / LPS fishery participants.
10. Evaluate opportunities to revise the Large Pelagic Biological Survey (LPBS) to include it in a revised LPIS tournament strata to allow collection of biological samples from all HMS species (within current priority list). Possibly as 2nd field sampler alongside Interviewer.
11. Develop integrated estimates of fishing effort and catch for species encountered by multiple surveys (HMS Catch cards, LPS surveys, Logbooks, and CHTS/APAIS). Currently, independent estimates of catch are generated and reported by for HMS in the northeast region by both the APAIS and LPS.