Cooperative design of a logbook reporting program for the Gulf of Mexico

FY 2009 Proposal

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1. Overview

1.1. Sponsor

1.2. Focus Group

Survey Design and Evaluation

1.3. Background

A recent study of marine angler expenditures nationwide demonstrates the economic importance of recreational fishing to the Gulf of Mexico region, with Florida ranked first ($16.7 billion), Texas ranked second ($3.2 billion), and Louisiana ranked fourth ($2.9 billion) in the nation for annual expenditures (Gentner and Steinback, 2008). The Gulf of Mexico supports large recreational fisheries, and significant portions of total recreational landings are attributed to the for-hire sector (Table 1). Two important species complexes, reef fish and pelagic fish, are highly sought by recreational anglers. These species are assessed and managed as unit stocks throughout the region, and many of these stocks are either overfished or recovering from overfishing. Recreational fisheries for these species are tightly regulated with seasons, size limits, daily harvest limits, and gear specifications. There is a critical need in this region to improve the timeliness and accuracy of recreational fishing statistics. In recent years, the length of the recreational season has been adjusted in response to unanticipated recreational harvest levels that exceeded management targets. The recreational fishing season for red snapper was open six months in federal waters until as late as 2006, reduced to four months in 2007, and reduced again to two months in 2008. Fishery managers still await final statistics for 2008 to determine the length of the season for 2009. For for-hire fisheries that rely on fixed seasons to plan their business and book trips in advance, this type of fisheries management has devastating economic impacts.

In 2006, the National Research Council conducted an independent review of recreational fisheries survey methods (NRC 2006). The NRC review recognized that in regions such as Alaska and the Gulf of Mexico, the magnitude of the for-hire sector and the potential scale for fishery removals warrants the use of mandatory logbooks as the source of catch and effort data for the for-hire sector. The NRC recommended essential elements for this type of reporting system to meet acceptable standards for data collection. First, reporting should be mandatory for continued operation in the fishery, and they highly favored reporting requirements that are tied to permit renewal for continued participation in the fishery. This census-style reporting system is expected to minimize the need for under-coverage adjustments in catch and effort statistics. Second, the reviewers recognized that data collected through logbook programs will be reliable only if there are strict verification and enforcement components of the program. They recommended that self-reported information collected on both CPUE and effort be verifiable. Thirdly, the reviewers recommended that information collected in a logbook program should be made available in a timely manner.

In 2009, a more detailed review of for-hire data collection methods in the United States supported the NRC recommendations (MRIP in progress). In addition, the reviewers provided a list of best practice recommendations for collecting and verifying self-reported logbook data (see Appendix A attached). In the Gulf of Mexico, the reviewers recommended that complete logbook coverage for for-hire data collection be phased in as soon as possible, and that all applicable best practice recommendations should be applied in the region.

In the Gulf of Mexico, for-hire vessels must have federal permits to fish for reef fish and pelagic fish in the EEZ, and they are required to participate in at least one approved regional data collection program as a condition for permit renewal. There is currently a moratorium on the issuance of new federal permits, and the loss of privilege is strong incentive to comply with reporting requirements. Vessels without federal permits may legally fish for these species in state territorial seas; however, in states where territorial seas extend 3 nautical miles (AL, MS, LA), federal permits are essential to participate in these fisheries. In Texas and Florida, state territorial seas extend 9 nautical miles from shore and it is plausible that for-hire vessels may fish for reef fish and pelagic species in state waters, with or without federal permits.

Vessels with federal permits must participate in one subsequently approved appropriate data collection system*. Currently, there are three approved regional programs in the Gulf of Mexico that collect data from for-hire fisheries:

1. The Southeast Headboat Survey, which includes large capacity headboats operating in the Gulf of Mexico from Texas through Florida. Vessels included in this survey are required to report catch and effort on paper logsheets for each trip and submit trip level data monthly to National Marine Fisheries Service.

2. The For-Hire Survey, which includes all for-hire vessels operating in the Gulf of Mexico from Louisiana through Florida that are not already reporting in the Southeast Headboat Survey. These vessels are required to report all trips taken during selected weeks (effort only) whenever they are randomly selected to participate in the survey. Vessel operators are contacted by telephone to collect this data. Catch data are collected in a separate dockside intercept survey, and there is no requirement for these vessels to participate in that portion of the survey.

3. The Texas Parks and Wildlife Survey, which is a field-intercept survey of boat-based fishing, including for-hire vessels. This survey estimates fishing effort and catch (harvest only) on a seasonal basis.

While the requirement for federally permitted vessels to report in one of the approved data collection methods carries potentially severe consequences for non-compliance, not all of these data collection systems were initially designed to support mandatory reporting requirements. In the Southeast Headboat Survey, all large capacity headboats are selected to participate and vessel operators are required to report 100% of their vessel trips. This data collection method places responsibility for submitting required information directly on the permit holder, and compliance is monitored and enforced. The obligation to report is periodically reinforced via certified letter to each permit holder. In contrast, the For-Hire Telephone Survey was designed to be a voluntary survey and the agent conducting the telephone interviews is responsible for collecting trip information from vessel operators. To enforce the mandatory reporting requirement in the For-Hire Telephone Survey, permit holders who refuse the survey over the phone are notified by letter of their obligation to report as a condition for permit renewal. However, it is impossible to identify permit-holders who are evading the survey by refusing to answer the phone. Contact rates in the For-Hire Telephone Survey vary by wave (2 month sample period) and by state and region, and the percent of selected vessels that are unable to be contacted by phone is quite high in some strata. For example, during wave 3, 2007, 32% of vessels selected in the Florida Keys and 27% of vessels selected in the western peninsula region of Florida could not be contacted in the telephone survey (GSMFC 2007).

1.4. Project Description

The For-Hire Telephone Survey estimates close to half of all for-hire angler trips in the Gulf of Mexico spend the majority of fishing time in the EEZ. Because for-hire effort estimates are generated by area fished (inland, state waters, and EEZ), achieving 100% reporting compliance for federally permitted vessels would increase precision and reduce potential non-response bias in effort estimates for the EEZ. However, improving survey response rates for vessels that take more fishing trips in the EEZ, but not making the same improvements in the survey response rates for vessels that take more trips in inland waters and state territorial seas, could result in a higher proportion of survey respondents reporting trips in the EEZ. Since these proportions are used to expand estimates for all vessels in the survey frame, this would result in an overestimate of the proportion of trips taken in the EEZ. Therefore, it is important to implement some form of follow up with non-respondents who participate voluntarily in the survey to identify and account for this potential bias.

The Texas Parks and Wildlife Survey samples vessels fishing in inland, state, and federal waters. In 1991 Texas increased sampling for vessels fishing in the Gulf of Mexico and there are plans to increase state sampling efforts in the future for vessels operating in federal waters (P. Campbell, pers. comm.). Estimates from this survey are not directly comparable with the For-Hire Survey. The Texas survey estimates harvest for two sample periods, “high use” and “low use” fishing seasons, which are not easily converted to monthly or calendar year estimates. Because the Texas survey does not collect data on numbers of fish discarded, discarded fish for regional stock assessments must be estimated for Texas using proportions from data collected by the For-Hire Survey in other states.

Industry support for a universal logbook reporting method in the Gulf of Mexico has been building throughout the region in recent years, particularly from vessels that participate in federally managed fisheries. The increasing public testimony supporting a change to logbook reporting has spurred recent actions at state and regional levels. At the request of the for-hire industry, the Louisiana Department of Wildlife and Fisheries was mandated by legislation to develop and implement a voluntary electronic logbook reporting system in 2009. The state reporting system will be in addition to existing regional data collection programs that federally permitted vessels are required to participate in, and currently there are no means for validation of self-reported effort and catch data in the state logbook. Potential differences in catch and effort numbers from the alternative data collection programs may not be readily explainable to industry participants and could erode confidence in the existing regional data collection programs. In addition, the Gulf of Mexico Fishery Management Council has been presented with multiple industry-supported logbook data collection proposals over the past year, and these groups are urging the Council to implement a regional logbook reporting system specifically for red snapper before the opening of the recreational season in July, 2009. One of those proposals is funded by the non-profit group, the Environmental Defense Fund, and includes the development of licensed computer software for real-time electronic reporting with a vessel monitoring system (VMS) to track vessel activity and fishing locations. Some for-hire industry groups are opposed to mandatory use of VMS, citing the high cost and limited utility for validation of fishing activity, and have offered alternative proposals for the Council to consider. Among the supporters for each plan, there is general agreement that self-reported logbook data must be validated; however, there is no consensus for how to accomplish this. In response, the Gulf Council made a motion at their January, 2009, meeting to request guidance from the NMFS Southeast Fisheries Science Center and the Marine Recreational Information Program (MRIP) on protocols for validation of self-reported recreational data, and recommended that MRIP establish pilot projects to evaluate and ground truth these protocols. Furthermore, they requested a review of industry-supported proposals in the Gulf of Mexico as they relate to validation of self-reported data.

Given the high non-response rates that are unaccounted for in the current survey method, mandatory reporting requirements that are often unenforceable, the need for more complete fishing information and compatible estimates for regional stock assessments, and the urgent need for more timely data for fisheries management, there is strong justification for moving to a new system for for-hire data collection in the Gulf of Mexico. This is reinforced by two recent independent reviews of recreational fisheries data collection methods and the growing support within the for-hire industry in this region.

1.5. Public Description

1.6. Objectives

1.7. References

*Participation means being identified in an active survey frame (i.e., universe of captains or vessels from which persons are randomly selected report) and, if chosen, providing the requested information (GMFMC, 2003). GMFMC (Gulf of Mexico Fishery Management Council), 2003. Corrected Amendment for a Charter Vessel/Headboat Permit Moratorium Amending the FMPs for: Reef Fish (Amendment 20) and Coastal Migratory Pelagics (Amendment 14). Gentner, B. and S. Steinback, 2008. The Economic Contribution of Marine Angler Expenditures in the United States, 2006. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-F/SPO-94, 301p. MRIP (Marine Recreational Information Program), In Review. Review of For-Hire Recreational Fisheries Data Collections in the United States. Report to the For-Hire Workgroup. NRC (National Research Council), 2006. Review of Recreational Fisheries Survey Methods. National Acadamies Press, Washington, D.C. 187 pp.

2. Methodology

2.1. Methodology

This proposal for MRIP funding addresses the current need to develop protocols and assess feasibility of implementing a universal logbook reporting program for for-hire data collection needs in the Gulf of Mexico. Specifically, the For-Hire Workgroup will work in collaboration with for-hire industry groups, representatives from state resource management agencies, Gulf States Marine Fisheries Commission, and federal fisheries managers and stock assessment scientists to identify the required data elements and reporting needs; evaluate the cost, benefits and practicality of alternative reporting methods; and identify existing data collection programs that may be integrated into a logbook reporting program for validation of self-reported data and compliance tracking. Contract support is requested to assist with evaluating the usefulness of existing data collection programs for validating self-reported catch and effort data, developing protocols, and recommending modifications to existing data collection or new data collection programs for future use in validation and compliance tracking.

The objectives of this project are to:
• Fund the research and design of a logbook reporting system for federally permitted vessels for region-wide implementation in the Gulf of Mexico. Components of this reporting system will include:
o Trip-level reporting for effort, catch (harvest and discards), and area fished
o Mandatory and enforceable
o Verifiable
o Timely for fisheries management
o Practical and supported by industry
o Cost efficient
o Estimates that are complementary throughout the region
o Satisfies reporting requirements and data needs of multiple data users
o Employs sound statistical methods
o Produces reasonably precise estimates at state and regional (within state) levels for stock assessment and fisheries management
o Complete registry of all federally permitted for-hire vessels with regular updates

• For vessels that currently participate in regional data collection systems on a voluntary basis, explore state-level support for including them in the proposed universal logbook reporting system. Components of this reporting system will match the system for federally permitted vessels, with the exception that participation would be voluntary, and will also include:
o Follow-up for non-response
o Measurement of non-response bias
o Estimates of catch and effort that account for non-response
o Complete registry of all state-permitted for-hire vessels with regular updates

• Explore potential state-level support for a mandatory reporting system.

• Develop procedures to validate self-reported catch and effort data, including:
o address concerns with current intercept survey methods identified by NRC and MRIP reviews
o collect additional data elements necessary for validation of catch and effort data
o adjust raw logbook data and account for misreporting using statistically sound methods

• Produce a follow-up proposal for MRIP Funding to include:
o Outreach to for-hire industry
o Pilot testing
o Benchmarking with existing data collection programs

Components of this study will include:

First, convene up to two workshops (up to two days) to meet with for-hire industry groups; representatives from state resource management agencies; Gulf States Marine Fisheries Commission; and representatives from National Marine Fisheries Service, including the Southeast Regional Office, Southeast Fisheries Science Center, and Science and Technology to:
• identify minimum data elements for a proposed logbook reporting system,
• determine the necessary reporting frequency,
• evaluate, with input from industry, the practicality of reporting methods and requirements,
• determine state-level participation (would states keep participation voluntary or match federal requirements; identify overlapping state reporting programs),
• evaluate the cost and benefits of various reporting options,
• identify existing data sources for potential validation of self-reported data,
• identify methods for tracking non-response/non-compliance,
• develop recommendations and preferred alternatives for a proposed logbook reporting system

Second, using recommendations developed from the workshops, the For-Hire Workgroup will work with MRIP contract support to develop protocols to validate self-reported data and account for non-response/non-compliance, including:
• evaluate usefulness of existing data sources identified by the For-Hire Workgroup, recommend improvements to existing data sources to meet short-term data needs (e.g., increase sample sizes, sample distribution, additional data elements),
• Review self-reported data collected from Louisiana state logbook reporting system and existing headboat program to evaluate methods for using existing data sources for validation,
• recommend new designs and procedures for future MRIP funding consideration (e.g. video monitoring, at-sea observer coverage, or other methods for additional data collection, validation, and non-response/non-compliance tracking),
• develop methods for adjusting raw logbook data for misreporting and under-reporting.

Third, the For-Hire Workgroup will develop a proposal for MRIP funding to begin outreach to industry and testing implementation of a logbook reporting system in the Gulf of Mexico. This proposal would be developed in August for funding approval in 2009. The scale of the initial testing will be determined after the proposed methods are developed from this project.

Project Closure:
The final product will be the project proposal to the Operations Team, described in the Scope section, to implement a pilot logbook reporting system in the Gulf of Mexico, including protocols for validation of self-reported data, tracking compliance, follow-up for non-response, and adjustment of raw logbook data for misreporting and non-response/non-compliance. The proposal will include funding requests to:
• Hire a contractor to build the reporting system;
• Implement pilot testing and benchmark with existing data collection methods;
• Work with Gulf States Marine Fisheries Commission and National Marine Fisheries Service to establish infrastructure for handling data from multiple states and delivery to multiple users;
• Conduct analysis with NMFS Science and Technology to compare estimates between two methods, evaluate non-response bias in each method, look at rare event species in logbook reports (such as highly migratory species, localized and pulse fisheries), evaluate field intercept sample distribution (are the field intercept samples representative of regional catch rates, species compositions, etc.)

2.2. Region
Gulf of Mexico

2.3. Geographic Coverage

2.4. Temporal Coverage

2.5. Frequency

2.6. Unit of Analysis

2.7. Collection Mode

3. Communication

3.1. Internal Communication
For-Hire Workgroup chair will provide monthly updates to Operations Team Chair during regular conference calls. Results and recommendations from workshops will be documented and provided to the Operations Team Chair upon conclusion. Results of meetings and work conducted by contract support will be documented and provided to the Operations Team Chair prior to submission of a project proposal for FY2010.

3.2. External Communication
test

4. Assumptions/Constraints

4.1. New Data Collection

4.2. Is funding needed for this project?

4.3. Funding Vehicle
Gulf FIN Grant

4.4. Data Resources
test

4.5. Other Resources
• assumes participation at industry, state, regional, and federal levels • assumes Southeast Fisheries Science Center Director will require participation for federally permitted vessels • mandatory reporting and frequency of reporting may require changes to existing state and/or federal legislation and/or regulations

4.6. Regulations

4.7. Other
restre

5. Final Deliverables

5.1. Additional Reports

5.2. New Data Set(s)

5.3. New System(s)

6. Project Leadership

6.1. Project Leader and Members

First Name	Last Name	Title	Role	Organization	Email	Phone 1	Phone 2
Gregg	Bray		Team Member	GSMFC			
Michael	Burton		Team Member	NMFS/SEFSC			
Page	Campbell		Team Member	TX Parks and Wildlife			
Dave	Donaldson		Team Member	GSMFC			
Michelle	Kasprzak		Team Member	LA Department of Marine Resources			
Beverly	Sauls		Team Leader	Florida Fish and Wildlife Conservation Commission			

First Name	Last Name	Title	Role	Organization	Email	Phone 1	Phone 2
Andy	Strelcheck		Team Member	NMFS/SERO			
Bob	Zales		Team Member	National Association of Charter Operators			

7. Project Estimates

7.1. Project Schedule

Task #	Schedule Description	Prerequisite	Schedule Start Date	Schedule Finish Date	Milestone
3	Secure contract support		05/01/2009	07/31/2009	
1	Workshops		04/01/2009	04/30/2009	
2	Develop recommendations		04/01/2009	04/30/2009	
5	Develop proposal for MRIP		08/01/2009	08/31/2009	
4	Design proposed logbook		05/01/2009	07/31/2009	

7.2. Cost Estimates

Cost Name	Cost Description	Cost Amount	Date Needed
Workshop	Workshops with industry and state/federal/regional agencies to develop recommendations	$48000.00	04/01/2009
Contract Support	Statistical design of new reporting system	$20000.00	04/01/2009
Meetings with contractors	Travel for workgroup members to meet with contract support to develop design of new reporting system	$10000.00	04/01/2009
TOTAL COST		$78000.00	

8. Risk

8.1. Project Risk

Risk Description	Risk Impact	Risk Probability	Risk Mitigation Approach

9. Supporting Documents

"Appendix A", page 1

Best Practice Methods

Recommendation 1: Complete list of for-hire vessels

Maintain and periodically update a list of for-hire vessels in each fishery.

Recommendation 1.1 Sampling frame: The master list of for-hire vessels serves as the sampling frame for obtaining vessel-trip data from logbooks. It becomes the basis for identifying nonrespondents and selecting samples of nonrespondents.

Recommendation 1.2 Landing site data: A periodic survey of the master list to obtain usual landing site data, usual periods of operation, and other general data would be useful for making reasonable assumptions about unresolved nonrespondents and for developing the sampling frame of landing sites for the intercept survey. This additional information should become part of the master list.

Recommendation 2: Logbooks

In concurrence with the NRC report, we recommend the universal use of logbooks by the for-hire survey[4]

Recommendation 2.1 Data: For each recreational fishing trip, logbook entries should include data on effort (number of anglers), total catch, catch by species, count of fish released by species, type of trip (whole day, half-day, night trip, etc.), and other data required by local fisheries management (e.g., area fished, target species, etc.)

Recommendation 2.2 Frequency of reporting: Logbook data should be submitted no less frequently than one time per week in all weeks when fishing trips occur. If the vessel is not operating during a specified week, a report so indicating should also be submitted. For longer periods of nonfishing, advance reports can be submitted for periods when the vessel will definitely not be operating in a for-hire mode.

Recommendation 2.3 Mode of reporting: The preferred method of reporting should be based on a convenient web application which would allow reporting on a vessel-trip basis. Back up modes should be developed for vessel operators who do not have access to on-line computers. Fax transmission of paper reports should be the first alternative. Reporting by telephone should be the last alternative. If telephone is used, there are automated systems used by major companies that can interact with the caller and record data, without a live person being needed (e.g., Fedex). Reporting by mail will not provide the timely data required for many fisheries and should not be used.

Recommendation 2.4 Unit nonresponse: Telephone followup of all nonresponding vessels is recommended. Launching site observations or unstructured interviews can

[4] This report focuses only on the surveys used to obtain estimates about the for-hire component of marine fisheries. Some of the comments and recommendations may apply to other components, but the authors restricted their review and recommendations to the for-hire component.

also be used to check or verify periods when no fishing occurred. For smaller vessels when unit nonresponse is large, a probability sample-based followup should be used.

Recommendation 2.5 Missing, incomplete, or inconsistent data: Procedures to quickly scan and identify missing and inconsistent data should be developed. Telephone followup of these cases should be implemented to resolve these issues.

Recommendation 2.6 Estimation: Initial estimates (effort and catch) should be developed based on logbook data alone. Final estimates would be adjusted based on the intercept data and at-sea observation data. Estimates should be based on weighted data where weights take into account the probability of selection (e.g., for sample followup) and adjustments for unit nonresponse. With perfect 100% response all weights would be equal. For vessel trips with missing or inconsistent data, imputation procedures should be developed to produce complete data records. We assume that the estimation team will be addressing these issues more specifically.

Recommendation 3: Landing site frame for the for-hire intercept survey

Develop a complete list of known and potential landing sites used by for-hire vessels to be used as a sampling frame for for-hire intercept surveys.

Recommendation 3.1 Sources of data: While most sites will be known, additional potential sites should be added based on the data obtained from the periodic survey of for-hire vessels (see Recommendation 1.2).

Recommendation 3.2 Pressure by time period: Data are already being obtained on fishing pressure by landing site. These data can be interpreted as a judgmental estimate which should be proportional to the expected for-hire catch to be landed at the site and as such should be useful as a size measure for PPS (probability proportional to size) sampling. Separate advance measures should be obtained for each relevant time period and time of day category (based on fishing practices at the site). The size measure should be refined to reflect expected landings by time of day (e.g., morning, afternoon, and night landings) for each site.

Recommendation 3.3 Sampling units: Sampling units should be defined to cover both spatial and temporal dimensions of for-hire landing events. The sampling units should be specified by site, day (or type of day), and time of day and each unit should have a size measure based on expected catch landed at the site by time of day definition of the sampling unit. The time definition of the sampling unit should correspond to a reasonable time to expect data collectors to remain at the site to select vessel trips at the next stage of sampling. Selection of sites and time periods is the first stage of sampling, so the sampling units can be described as first-stage or primary sampling units (PSU's).

Recommendation 3.4 Stratification: Stratification should also be two-dimensional, classifying PSU's by both time period and location.

Recommendation 3.5 PPS sample selection: Probability proportional to size (PPS) sampling should be used select the sample of sites and time periods. The sample size should be sufficient to make allowances for low yield of terminating vessel trips for some sites and time periods.

Recommendation 3.6 Headboats or other vessels with capacity to carry large numbers of anglers may be treated as a separate population with a separate survey with its own PSU definitions, stratification schemes, and PPS selection methods designed to allow time to select the samples of anglers and fish for headboat intercepts or to allow selection of headboats and time periods for at-sea data collection. For example, sampling of headboats for at-sea data collection would require definitions of PSU in terms of specific vessels and times of trip departure (as opposed to trip termination).

Note: Recommendations 4 through 8 assume headboats or other large capacity for-hire boats are treated separately.

Recommendation 4: Vessel trip selection

Probability sampling should be used to select a sample of terminating for-hire vessel trips at each selected PSU (site and time period). The terminating vessel trips at the selected PSU become second-stage or secondary sampling units (SSU's).

Recommendation 4.1 Sampling parameters: Based on advance information on fishing pressure, a preliminary sampling rate (e.g., take all, 1 out 2,…, 1 out of *K*, etc.) and a random start, *S* between 1 and *K*, should be provided to the data collectors.

Recommendation 4.2 Secondary sampling frame: Data collectors should remain at the PSU for the entire period and compile a list of potentially eligible "for-hire" vessels returning to the landing site. This list becomes the sampling frame for second stage sample selection. If a vessel's "for-hire" eligibility is not known with certainty, the vessel should be included on the list. The list of arriving vessels should be retained for procedural audit purposes.

Recommendation 4.3 Vessel selection: Using the predetermined sampling parameters, the K-th, (K+S)-th, (K+2S)-th,.., etc. arriving vessels should be included in the sample. Note that *K* and *S* are defined under recommendation 4.1

Recommendation 4.4 Eligibility verification and collection of logbook data: For each selected vessel, data collectors should first confirm eligibility and then collect the vessel-trip logbook data from the vessel captain. If data collectors have access to computers (laptop or handheld), they may be able to quickly confirm vessel eligibility for cross checking with the master list (see Recommendation 1). A vessel-trip may still be ineligible if the purpose of the trip did not involve "for-hire" fishing (whale watching, sightseeing, or other not-fishing-for-hire trips). Vessel-trip ineligibility for selected vessel-trips should be recorded and become part of the analysis file for estimation purposes. Newly identified for-hire vessels (not previously on the master

list) may also be identified during this process either at the site or based on comparisons of the list developed at the site with the master list conducted later.[5]

Recommendation 4.5 Scheduling problems: If the next selected vessel-trip arrives before completion of the angler and fish data collection at the previously-selected vessel-trip (SSU), skip detailed data collection at that unit and record the outcome as nonresponse. Attempt to get the vessel-trip logbook data from the captain at a minimum. With appropriate selection of the sampling interval, *K*, this should not happen often. If the vessel captain has dropped off the angler party before returning to his normal berth at a selected site, data collectors should still collect the logbook data for the vessel-trip as it terminates (without anglers) at the selected site.

Recommendation 5: Angler selection

For the smaller boats (excluding headboats), it should usually be possible to include all anglers in the sample. See recommendation 9.1.3 below for methods to be used to select anglers from larger vessels. Anglers are the third-stage or tertiary sampling units. For the purposes of collecting catch and release data, they are ultimate sampling unit.

Recommendation 6: Fish selection

Whenever feasible, all fish landed by a sampled angler will observed with required data obtained and recorded. If intensive effort is required to obtain measurements or biological samples, it may be necessary to subsample an angler's catch. Separate sampling rates may be specified based on size or species. Stratification by size or species may be implemented along with sampling using simple random sampling without replacement or systematic sampling start may be employed. Preprinted specifications or computer programs should be provided for selecting the sample. The sample specifications or computer logs should be maintained for procedural audit purposes and for determination of the selection probabilities associated with each fish's data.[6]

Recommendation 7: Nonresponse and missing data[7]

[5] Collecting comparable data from logbooks for each terminating vessel trip sampled in the intercept survey will provide the necessary vessel-trip level comparisons between logbook data and intercept data needed to adjust the logbook-based estimates of catch and catch characteristics (e.g., correcting for accurate species identification, adding biological measurements, etc.). This report does not address all the details of estimation, since a separate study team is addressing this issue. It could be the subject of a future report based on collaboration between the for-hire review team and the general estimation review team. The focus of the intercept survey should still be primarily on obtaining objective data from all or a sample of anglers.

[6] No distinction is recommended in the sampling scheme for estimating catch or for biological characteristics since it was the review panel's understanding that both types of data can be collected for the same sample of fish caught. Note that stratification of an angler's catch so that a targeted sample by size or species can be selected for more intensive data collection already involves documentation of the count of the angler's total catch by stratum and this information about the sampling process is to be maintained as part of the data record.

[7] The related recommendation 2.4 pertains to efforts to obtain an acceptable response rate for vessels in the logbook survey with emphasis on long-term improvement. Recommendation 7 pertains to postsurvey estimation methods for dealing with the nonresponse problems at all stages of sampling: vessels, vessel-trips, anglers, and fish.

All surveys suffer from some level of unit nonresponse and missing or inconsistent data problems. Reasonable procedures for nonresponse adjustment and missing data imputation are likely to be required. These procedures are well developed for surveys, in general, and will be applicable to fishery data as well. The estimation team may have more specific recommendations in this area.

Recommendation 8: Estimation

The logbook data and the intercept data complement each. The logbook data are based on a much larger sample (ideally, a census of all vessel trips). The intercept data provide more accurate and detailed information on catch but on a much smaller sample of vessel trips. The opportunity exists to develop improved estimates based on double sampling and the associated estimation methods as recommended by the NRC. We expect this topic to be addressed in more detail by the estimation team[8].

Recommendation 9: Special procedures for headboats[9]

Logbook recommendations remain unchanged. Depending on the fishery, more detailed data about headboat-trips may be obtained by intercept surveys, at-sea surveys, or both.

Recommendation 9.1 Headboat intercept surveys: Most procedures described in recommendations 4-8 can be adapted to headboat intercept surveys. Exceptions are discussed below.

Recommendation 9.1.1 PSU definition: Since the identity of headboats is usually well-known, the number of landing sites will be smaller reducing the number primary sampling units (PSU's). More reliable information may also be available about hours and seasons of operation to further limit the primary sampling frame.

Recommendation 9.1.2 SSU sampling frame: Since headboats usually have assigned berths, data collectors should be able to construct the secondary sampling frame of headboat vessel-trips based on vacated berths. The angler capacity of headboats is also known, so it should be possible to select a PPS sample of headboat-trips. If a sample size of more than one specified, then systematic PPS sampling would provide the best opportunity to avoid having to collect data at two vessels at the same time. Since many data collectors already

[8] Several estimation procedures are available for combining data from a large sample of less accurate data and a subsample of more nearly accurate data. Examples include methods to adjust the overall estimate based on the less accurate data by using differences, ratios, or regression estimators relating the data from both sources in the small sample to adjust the full sample estimates. These procedures can take advantage of the larger overall sample (logbook data) and the improved accuracy of the intercept data. The general procedures can be applied to effort, catch, and any other statistics.

[9] The procedures presented here for headboat surveys can be applied to larger capacity boats in general where sampling of anglers may be necessary in order to control the data collectors' workloads. The term "headboat" is used in the SE Headboat Survey in the Atlantic and Gulf Coasts, but similar types of for-hire fishing vessels operate in other fisheries. More uniform and consistent terminology for distinguishing charter boats, party boats, and headboats in different fisheries would have enhanced the review team's ability to discuss these issues more clearly.

carry laptop or handheld computers, assistance with the vessel selection procedures could be provided with the computers.

Recommendation 9.1.3 Angler selection: Subsampling of anglers will almost always be required for headboat-trips. Methods of probability sampling will need to be developed and tested in practice. Stratified probability sampling could be employed to insure adequate representation of pelagic closely monitored species and/or large fish. This is a particular challenge, since anglers may start departing the vessel soon after docking. A team of data collectors should be able to implement a procedure where departing anglers are quickly classified into sampling strata based on their catch characteristics including "no catch". Counts of each category should be maintained and samples selected based on specified sampling intervals and starting point. As an example, all anglers with rare or target species might be sampled with a skip interval of *K=1*, anglers with very small or no catch could be sampled with a skip interval of *K=10*, and others could be sampled with a skip interval of *K=5*. Counts in each stratum would need to be maintained.

Recommendation 9.1.4 Fish selection: Fish sampling rates need to be coordinated with angler fishing rates to maintain a reasonable data collector workload and to limit angler waiting time. Recommendation 6 still applies, but lighter sampling rates are likely to be required to control workload. Selecting more anglers and fewer fish allows more data to be collected on released fish, but provides less information on fish characteristics. By retaining data on the process for future procedural adjustments, it should be possible to strike a compromise approach that meets multiple fishery data requirements at a reasonable cost.

Recommendation 9.2 Headboat at-sea surveys: At-sea surveys obtain objective data on both retained and released catch. Since data collectors must board the vessel at departure rather than at returns, several recommendations are modified below.

Recommendation 9.2.1 PSU definition: PSU definitions are similar to those discussed in recommendation 9.1.1, but the time frame is defined in terms of times of departure.

Recommendation 9.2.2 SSU definitions and selection: Information on planned departures needs to be obtained in advance to increase the efficiency of sampling. Random ordering of the planned departures can be used to select a probability sample of 1 departing headboat by pre-specifying the second and third choice, so that a probability sample of those actually departing can be obtained. The total number of headboats departing in the specified period needs to be recorded and maintained in the data to allow computation of the selection probability.

Recommendation 9.2.3 Retained and released catch: Objective measurement of retained and released catch requires observation by data collectors. This suggests defining sampling units in terms of areas along the rail and fishing periods.

Picking a random starting area and moving around the vessel for each successive period would make sense. Separate periods may be designated for observing bottom fishing vs. fishing for pelagic species when applicable.

Recommendation 9.2.4 Angler and fish selection: Since anglers can be interviewed and their catch examined on the return trip, more time can be devoted to collecting data on reported catch and reported release and to obtaining biological measurements on the fish landed. Anglers could be sampled from a list provided by the crew or such a list could just be used to check off anglers when interviewed to insure complete coverage when all are sampled. If necessary to conserve time, some sampling of anglers could be employed based on the angler list. More time could be devoted to species identification, weight, and other biological data, so a larger sample of fish could be selected and observed; otherwise, procedures outlined above would apply.

Recommendation 9.2.5 Onboard video monitoring: We recommend that onboard video monitoring be trialed as a method for at-sea collection of catch and discard data. The review panel was not provided with sufficient information for us to be able to recommend this as the best method, but provided coverage is 100%, it appears to have the potential to be an effective and cost efficient alternative to observer monitoring.

Some Comments on Current Procedures and Essential Changes

Strict Application of Probability Sampling Procedures: Currently, probability sampling is not applied at every stage of sampling. Current procedures call for data collector judgment to select a “random” sample of anglers or a “random” sample of fish caught. It appears that intercept data collection stops when data collectors have achieved their quotas, often resulting in samples of convenience. Not only must the arbitrary judgment be eliminated, but steps in the process must be documented so that adherence to procedures can be audited and probabilities of selection can be determined.

Positive Probabilities of Selection: The goal should be for all eligible vessel-trips and time periods must have positive probabilities of selection. This would cover night fishing and perhaps some new landing sites. Failure to meet this goal leads to undercoverage. Logbook data if submitted as requested would help quantify the undercoverage.

Estimation Based on Probabilities of Selection: We did not identify much evidence of weighting in developing estimates of effort or catch. Design-based at all stages of sample selection and adjustments for nonresponse at all those stages is a necessary first step in developing that represent the for-hire sector and should eliminate much of the need for further adjustment of estimates.

Coverage Adjustment: Current practices apply adjustment factors to many estimates.[10] Some adjustment for undercoverage may still be necessary, but it should be based on objective data and should be well documented so it can be defended to fisheries management and to the for-hire industry.

[10] For example, a K-factor is applied in the Southeast Headboat Survey to adjust for effort based on effort worksheets compiled by port agents (Sauls *et al*, p. 108). Other adjustments are made in other surveys to adjust for nonsampling of night vessel trips or undercoverage of lightly used landing sites.

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1. Overview

1.1 Purpose

A recent study of marine angler expenditures nationwide demonstrates the economic importance of recreational fishing to the Gulf of Mexico region, with Florida ranked first ($16.7 billion), Texas ranked second ($3.2 billion), and Louisiana ranked fourth ($2.9 billion) in the nation for annual expenditures (Gentner and Steinback, 2008). The Gulf of Mexico supports large recreational fisheries, and significant portions of total recreational landings are attributed to the for-hire sector (Table 1). Two important species complexes, reef fish and pelagic fish, are highly sought by recreational anglers. These species are assessed and managed as unit stocks throughout the region, and many of these stocks are either overfished or recovering from overfishing. Recreational fisheries for these species are tightly regulated with seasons, size limits, daily harvest limits, and gear specifications. There is a critical need in this region to improve the timeliness and accuracy of recreational fishing statistics. In recent years, the length of the recreational season has been adjusted in response to unanticipated recreational harvest levels that exceeded management targets. The recreational fishing season for red snapper was open six months in federal waters until as late as 2006, reduced to four months in 2007, and reduced again to two months in 2008. Fishery managers still await final statistics for 2008 to determine the length of the season for 2009. For for-hire fisheries that rely on fixed seasons to plan their business and book trips in advance, this type of fisheries management has devastating economic impacts.

Table 1. Estimated numbers of fish landed by headboats, charterboats, and private recreational anglers, and percent of total recreational harvest landed by for-hire anglers in 2007.

	For-Hire Headboats (FL to TX)	**For-Hire Charter/Guide (FL to LA)**	**For-Hire Charter/ Guide (TX)***	**Private Anglers (FL to LA)**	**Private Anglers (TX)***	**% of total recreational landings caught by for-hire**
Red Snapper	174,262	502,275	8,600	615,093	47,600	**50.8%**
Vermilion Snapper	223,925	123,940	300	139,358	1,600	**71.2%**
Gag Grouper	11,979	49,026		259,685		**19.0%**
Red Grouper	6,174	26,294		121,557		**21.1%**
Gray Triggerfish	34,278	66,751	300	119,108	5,200	**44.9%**

*May 15, 2006, through November 20, 2007

In 2006, the National Research Council conducted an independent review of recreational fisheries survey methods (NRC 2006). The NRC review recognized that in regions such as Alaska and the Gulf of Mexico, the magnitude of the for-hire sector and the potential scale for fishery removals warrants the use of mandatory logbooks as the source of catch and effort data for the for-hire sector. The NRC recommended essential elements for this type of reporting system to meet acceptable standards for data collection. First, reporting should be mandatory for continued operation in the fishery, and they highly favored reporting requirements that are tied to permit renewal for continued participation in the fishery. This census-style reporting system is expected to minimize the need for under-coverage adjustments in catch and effort statistics. Second, the reviewers recognized that