

For-Hire Programs: Inventory, Certification, and Integration Planning

FY 2014 Proposal

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Created: 05/13/2015

1. Overview

1.1. Sponsor

Mike Cahall

1.2. Focus Group

Survey Design and Evaluation

1.3. Background

During a recent ACCSP Recreational Technical Committee meeting, several states had questions on the party-charter logbook process and the possibility of coordinating reporting needs. Specifically, North Carolina will be implementing mandatory logbooks for the party-charter fisheries in 2014 and they are requesting a one-stop reporting method. ACCSP suggested an information-gathering discussion of: a) What are the current state and federal reporting requirements for party-charter boats? b) what is the MRIP process of using or referencing party-charter VTR reports? and c) are there opportunities to reduce duplicate reporting / surveying of party-charter vessels and/or captains? The 2009 MRIP Consultants Report on For-Hire Recreational Fisheries Surveys identified overlaps in sampling. MRIP has shown interest in resolving the layered reporting (MA, MD and SC and others have logbooks that potentially overlap with multiple federal programs such as NE-VTR and SE-Headboat). If a state can meet timeliness and availability of logbooks, MRIP has options to include the information as 1) enter logbook data as "samples" or 2) if state logbooks are census then use logbooks instead of MRIP survey for that state, or 3) use logbooks as checkpoint (not validation) for MRIP survey reporting and dockside data. Now is the appropriate time to limit the burden on fishermen while obtaining all the necessary data on the right timeline for the various data collection programs. In commercial fisheries ACCSP was involved in setting standards and helping to coordinate reporting to improve timeliness and availability of data, as well as reduce duplicate reporting of wholesale dealers. While it is noted in the MRIP Consultant's Report that for-hire data collection programs overlap in scope and participants, there remains a need for integration of various for-hire data collection activities. The report also highlights the desire to collect logbook data that could be used as a census. It is recognized that there would need to be program changes to minimize duplicate reporting. However, we expect there are some short term, achievable opportunities to align state agency priorities of reporting compliance with MRIP goals of efficient and timely data collection.

1.4. Project Description

ACCSP proposes to update the Atlantic coast inventory of For-Hire data collection programs, previously compiled by the MRIP For-Hire workgroup. The updated inventory will include clarification of program requirements and data needs to support agency specific objectives. The updated inventory will be summarized and used as a basis for a workshop to identify opportunities to promote data availability, improve data timeliness, and reduce the reporting burden by integrating the various data collection programs. MRIP priorities to be addressed include: further developing MRIP funded reviews of data collection programs, evaluation of ongoing catch-effort surveys, and assessment of data needs (timeliness). The expected outcomes of the workshop include submission of a certification plan (of method or programs) to integrate the data from various for-hire data collection programs into the MRIP catch-effort estimation process. Additional benefits may include reduction of duplicate reporting burden on for-hire operators.

1.5. Public Description

1.6. Objectives

- Update the Atlantic Coast Inventory of For-Hire Data collection programs (report by the MRIP For-Hire workgroup, 2008)
- Evaluate ongoing for-hire data collection programs, including MRIP and other state and federal administered programs.
- Identify opportunities to improve timeliness and reduce reporting burden while meeting the goals of catch estimation and agency reporting compliance.
- Submit a certification plan (of methods or data collection programs) to integrate the data from various programs into the MRIP estimation process.

1.7. References

- Inventory of For-Hire Data Collections in the United States and US Territories (by the MRIP For-Hire workgroup), 2008.
- Consultants Report: For-Hire Recreational Fisheries Surveys, March 2009.
- Minutes, ACCSP Recreational Technical Committee, Sept 2013.

2. Methodology

2.1. Methodology

a. Methodology: ACCSP will construct a steering committee to guide the process, hire a contractor to update the Atlantic coast For-Hire inventory of data collection programs, and convene a workshop for state and federal agency staff b. Geographic Coverage: Maine to Florida.c. Temporal Coverage: May 2014-May 2015d. Frequency: Data Collection program inventory will occur one time, and one workshop shall be convened.e. Unit of Analysis: The project will be done at the level of for-hire data

collection program and state/federal agency requirements. f. Collection Mode: For-hire data collection program staff will be contacted via telephone interviews and web surveys.

2.2. Region

Mid-Atlantic, North Atlantic, South Atlantic

2.3. Geographic Coverage

Maine to East Coast of Florida

2.4. Temporal Coverage

2014

2.5. Frequency

One time

2.6. Unit of Analysis

2.7. Collection Mode

For-Hire

3. Communication

3.1. Internal Communication

Monthly conference calls among the project lead and steering committee.

3.2. External Communication

Monthly progress reports to the MRIP Operations team in MDMS. Submission of updated inventory and documented options to reduce duplicate reporting in for-hire fisheries to the MRIP operations team.

4. Assumptions/Constraints

4.1. New Data Collection

N

4.2. Is funding needed for this project?

Y

4.3. Funding Vehicle

Grant to ACCSP

4.4. Data Resources

4.5. Other Resources

4.6. Regulations

4.7. Other

5. Final Deliverables

5.1. Additional Reports

Inventory ATL. For-Hire programs, Workshop Report, Action/Certification/Integration Plan.

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
Mike	Cahall	ACCSP Director	Team Leader	ACCSP	mike.cahall@accsp.org	7038420781	
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7. Project Estimates

7.1. Project Schedule

Task #	Schedule Description	Prerequisite	Schedule Start Date	Schedule Finish Date	Milestone
1	Convene Steering Committee, define questions and procure contractor to complete inventory update		05/05/2014	06/19/2014	
2	Update For-Hire Program Inventory for Atlantic Coast		06/02/2014	09/30/2014	Y
3	Workshop Preparation		07/21/2014	11/03/2014	
4	Convene Workshop (1-2 days)	1,2	11/03/2014	12/12/2014	Y
5	Complete Workshop report and Certification Plan	3	01/05/2015	02/27/2015	Y

7.2. Cost Estimates

Cost Name	Cost Description	Cost Amount	Date Needed
Staff Support	ASMFC Overhead	\$9000.00	05/01/2014
Contractor Support	Contractor update of Inventory via interview process	\$50000.00	05/01/2014
Travel	Travel for workshop	\$40000.00	10/15/2014
TOTAL COST		\$99000.00	

8. Risk

8.1. Project Risk

Risk Description	Risk Impact	Risk Probability	Risk Mitigation Approach
Non-response of current For-Hire programs to update inventory	incomplete scope of inventory	Low	Allow time for multiple contacts, and invite program leads to workshop to include major for-hire data collection programs in the workshop.

9. Supporting Documents

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CONSULTANTS' REPORT FOR-HIRE RECREATIONAL FISHERIES SURVEYS

**Submitted to the For-Hire Work Group,
National Marine Fisheries Service**

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March 2009

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Statement of Work

The National Marine Fisheries Service of the National Oceanic and Atmospheric Administration (NOAA Fisheries) is required to conduct surveys of marine recreational fishing. For-hire data collection programs specifically gather information on fishing effort (number of angler trips) and catch by marine recreational anglers fishing on for-hire vessels (charter boat and headboats). NOAA Fisheries supports regional programs to collect these statistics. The goal is to build a system of data collections programs that are responsive to regional needs and are coordinated at the national level to provide standard data elements for both regional and national assessments of fish stocks and associated fisheries management.

Recently, NMFS requested the National Research Council (NRC) review its recreational fisheries monitoring program. The report, issued March 2006, included a review of NMFS' supported regional programs, including the For-Hire Survey used on the Atlantic and Gulf of Mexico coasts, a similar Party-Charter Survey on the California coast, the Vessel Trip Report program along the Northeast Atlantic coast, the Southeast Headboat Logbook program along the Southeast Atlantic and Gulf coasts, and several state supported logbook programs that may overlap the federal programs (see chapters 2-4 of the NRC report, "Review of Recreational Fisheries Survey Methods."). Several recommendations of a general nature were provided for improvements or modifications to the existing surveys but specific regional programs were not endorsed or recommended.

Goal for this Review

This review solicited recommendations for specific survey designs, by region, by analyzing the strengths and deficiencies of existing surveys. The specific survey design recommendations could retain current designs, improve current designs, or discard current designs and provide entirely new (and complete) survey designs. It is expected that a narrower-scope survey topic (for-hire fisheries only) and provision of fuller information on this topic to the reviewers, will result in a more detailed review that details any needed changes in a manner that facilitates immediate implementation of those changes. The Goal of this review is to provide the MRIP with the precise actions that must be taken to ensure that the future systems of collecting for-hire data provide accurate (precise and unbiased) data that is most useful for management needs (which specifically includes catch estimation needs and stock assessment needs).

The Review Panel was assembled by NOAA Fisheries, Office of Science and Technology, Division of Fisheries Statistics staff based on recommendations by some of the NRC reviewers. Experts were selected to serve on the Panel based on their experience with survey design, sampling statistics and/or fishery survey conduct. The Panel conducted a thorough examination of the appropriateness of current for-hire recreational fisheries data collections methods used for providing timely, accurate catch and effort statistics, and recommended a suite of regional data collection programs that will meet the needs of fishery managers. Acceptance by stakeholders, minimization to the extent

practicable of reporting burden, and minimization to the extent practicable of overlap/redundancy was also taken into account.

The MRIP (Marine Recreational Information Program) For-Hire Workgroup provided the Panel with detailed documentation of current existing data collection programs. The For-Hire Workgroup met with the Panel for a two-day workshop during 2008 and presented a series of concise presentations of the various programs followed by informal question and answer period to introduce and clarify the existing survey types. During each presentation, the Panel was given the opportunity ask questions at any time. At the end of each presentation, additional time was allotted for questions and discussion. On the second day the panel met to begin the evaluation and review process while the assembled presenters were available for any additional information needs. A draft summary report was be submitted to the For-Hire Workgroup for review and the workgroup was allowed to request clarifications or additional information. The final results of the review were presented to the Workgroup in December, 2008, and the final report was delivered to the workgroup in March, 2009.

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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 survey⁴

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 of 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 be 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 data⁷

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 team⁸.

Recommendation 9: Special procedures for headboats⁹

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.

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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.

1 Context of For-Hire Review

1.1 Review of Concerns from NRC Report

The NRC report (NRC 2006) addresses surveys of recreational marine fisheries as a whole, but several of its recommendations apply to the “for hire” survey.

- *The for-hire sector of marine recreational fisheries should be considered a commercial sector, and survey methods and reporting requirements for that sector therefore should be different from those for private anglers (NRC, p.6).*

The NRC report lists two complementary methods of sampling:

1. On-site: intercepting anglers while fishing or at their access points
2. Off-site: Contacting anglers after they have completed their trips.

The for-hire surveys have aspects of both methods.

Other issues that may apply to the for-hire surveys are:

- *..., the estimation procedure for information gathered onsite does not use the nominal or actual selection probabilities of the sample design and therefore has the potential to produce biased estimates for the parameters of interest and their variances (NRC, p. 6).*
- *..., various physical, financial, and operational constraints often lead to spatial or temporal biases in onsite sampling coverage that are not adequately accounted for in the estimation equations (NRC, p. 6).*
- *The survey fails to provide a valid and reliable method of adequately accounting for fish caught and not brought back to the dock (including fish released alive or dead, as well as fish caught for bait or given away before reaching the dock) (NRC, p. 7)*

Some specific NRC recommendations include:

- *Charter boat, head boat, and other for-hire recreational fishing operations should be required to maintain logbooks of fish landed and kept, as well as fish caught and released. Providing the information should be mandatory for continued operation in this sector, and all the information should be verifiable and made available to the survey program in a timely manner (NRC, p. 8).*
- *The onsite sampling frame...should be redesigned. ...small or private access points that most likely are missed might have different catch rates than larger access points, which would lead to bias in the resulting estimators., the sampling process requires greater quality control (less latitude on the part of the samplers) than it has at present (NRC, p. 9).*

- *Dual frame procedures should be used whenever possible to reduce sample bias* (NRC p. 9).

1.2 General Comments Addressing NRC Critique

Our review shows that the survey protocols applied to for-hire recreational fisheries is quite specialized and different from the protocols employed for other recreational anglers. It is our understanding that any duplication of effort or catch data with other surveys is removed from the estimates of the other surveys; this is one solution to duplication of coverage due to the use of dual sampling frames.

Other NRC issues can be grouped into the following areas:

- Coverage
- Formalization of the sampling procedure, faithful execution at all stages, and compliance with the procedure by data collectors
- Estimation based on the design and actual selection probabilities
- Mandatory log books
- Fish caught and not brought back to the dock

Coverage Issues: Coverage is defined in terms of the relationship between the population and the sampling frames employed to select the sample at each stage. A broader definition of coverage can also include response rates. Population definitions are usually conceptual and sampling frames are operational and involve a finite list of sampling units. The frame provides rules for identifying the population elements associated with each sampling unit. Complete coverage is achieved if the sampling units on the frame are clearly associated with all the elements in the population.

Evaluation of coverage requires definitions of the population which can then be compared with the sampling frame. For marine recreational fisheries, the population is defined in terms of anglers and specified time periods. In the case of the for-hire survey, the time period is related to the trip taken on a for hire vessel for the purpose of catching fin fish in marine waters. The population is also defined temporally in terms of specified seasons or other factors.

Our examination indicated that somewhat different approaches to defining the sampling frame are used in different fisheries. In examining frame construction we will be particularly interested in any arbitrary exclusions and the justification for such exclusions. In the multi-stage designs employed in the for-hire survey, sampling frames may be constructed in terms of landing sites, boats, licenses, or other lists. The temporal aspect is recorded in the questionnaire, but may also be a part of the stratification process when the sampling frame is partitioned into sampling strata. The treatment of vessel trips terminating during night hours will be examined in particular. Sampling frames are also

required for listing anglers associated with each vessel-trip; depending on the number of anglers on the vessel-trip, this may be a simple or a complex issue. Finally, for the purposes of estimating the catch by size or species, a sampling frame may be required to sample an angler's catch for the measurement process

Response rates are based on the ratio of the observed or respondent sample to the selected sample. Response rates can be calculated for each stage of sampling.

Dual or multiple frame procedures are in place in some fisheries. In some cases, the same or similar data may be obtained from more than source. A particular challenge may be to utilize multiple frame approaches to improve estimates or to recognize the duplication of effort and reallocate the survey effort to obtain better data and reduce respondent burden.

Sampling Procedures: The key to formal sampling procedures is to develop procedures to select a probability sample. Then it is necessary to know the probability of selection for each unit (landing site, vessel-trip, angler, or fish) interviewed or observed.

Estimation Based on the Design: A separate team is working on estimation procedures, but we will still be concerned with providing the sampling design information required for unbiased estimation and with obtaining information on coverage, response rates, exclusions, etc. which may be required for estimation purposes and quality assessment.

Log Books: The use of logbooks also varies by fishery and is often dependent on the licenses held. Special log book requirements may be associated with target species and made mandatory for obtaining and retaining licenses. The actual experience will be discussed for each fishery. It should be noted that the laws specifying mandatory logbooks may also set limits on the access to these data.

Fish Caught and Not Brought Back to the Dock: This issue is important because released fish may not survive. Total estimates of count of fish removed including those released dead or not likely to survive release alive. At-sea observation trips are typically used to measure this data component.

1.3 Approach to Critique

As noted in the NRC report (p.3), the goals and objectives of MRFSS have changed since the surveys were first begun in 1979. It also appears that local goals and objectives may vary considerably by fishery making it difficult to focus on a national design, even though a national strategy should be one outcome of the survey redesign process. We have addressed both national and local objectives by preparing a set of Best Practice Methods that should be applied across all fisheries where relevant, and by addressing specific (but often overlapping) local issues on a fishery by fishery basis. The Best Practice Methods are presented at the beginning of this report, while specific discussion

of and recommendations for each fishery appear in Section 2. Specific regional fisheries we examine are:

West Coast:

- California
- Oregon
- Washington
- Alaska

East Coast:

- Atlantic coast including Atlantic side of Florida
- Texas
- The remainder of the Gulf Coast

Due to time constraints, the review panel was unable to undertake a detailed evaluation of Pacific Island and Caribbean fishing areas. However, the Best Practice Methods presented at the beginning of this document apply equally to those areas.

The NRC report urged additional staffing to supplement NMFS statistical expertise. The recommended changes cannot be implemented overnight. A continuous improvement program to develop and monitor probability sampling methods and the associated estimation methods will require the type of staffing recommended by NRC.

1.4 Overview of Methods Currently in Use

This section is intended as a brief overview of the advantages and disadvantages of the main data collection methods used for effort and catch sampling. The reviewers' critiques and specific recommendations for each region follow this overview.

Effort sampling

In each area, data for effort estimation generally comes from at least one of three sources: logbooks, telephone or mail surveys, or direct boat counts. A major recommendation of the NRC report was the use of logbooks for both effort and catch data collection. If logbooks are mandatory and compliance is 100%, they provide an effort census, avoiding both the need for a separate effort sampling program and the issue of non-response bias present in telephone and mail surveys. Verification of a sample of logbooks can be done during portside intercept sampling. Lack of compliance with logbook submission can be a significant issue in some areas, and will likely lead to bias if logbooks are the only source of effort data. Cooperation from anglers and enforcement of logbook completion and submission are therefore important parts of any logbook program. Resistance from vessel operators to the burden of completing multiple logbook requirements for different purposes or agencies can be reduced by minimizing the overlap of data collected on different forms or combining logbook forms where possible.

Telephone and mail surveys draw on lists of for-hire participants, usually operator license frames, to select a random sample to survey. They are subject to non-response biases, and further attempts must be made to contact non-respondents in order to get data for correction of such biases. Depending on the interval between fishing and the survey, they can also be subject to recall errors. The NRC report expressed concern about undercoverage or overcoverage in telephone surveys of recreational fishers. We might expect this to be less of a problem for surveys of for-hire vessels when operators or skippers are sampled, rather than individual anglers, as the smaller sampling frame (list of licenses) should be easier to accurately maintain

In some areas, the principle form of effort sampling is direct daily vessel counts, or daily counting of vacant moorages used by for-hire vessels. This method is only practical in areas where for-hire vessels are concentrated at a very small number of ports such as Oregon and Washington, although even then it is not a complete census due to some catch being landed at smaller, unsampled or undersampled ports. Also, such counts do not provide information on the number of anglers per vessel, which is necessary if angler trips are the desired measure of fishing effort. Angler effort data must come from other components of the monitoring programs, such as intercept surveys.

Catch and Biological sampling

Catch and biological data generally come from intercept surveys, which lead to estimates of total catch and catch per unit effort when combined with effort estimates. Depending on the number of landing sites, the design of such surveys can be complex, sometimes using multiple levels of stratification, and requiring great care in implementation to ensure that the samples obtained are representative of the entire catch of interest. In areas with many and sometimes difficult to access landing sites, gaps in coverage can be significant. Intercept sampling is the only reliable method available for obtaining the biological measurements necessary for estimating catch weight and for use in stock assessments. Tagging programs often rely on intercept sampling for recovery of tagged fish.

Some agencies use logbooks to record catch information. Logbooks used in the Southeast Headboat survey all record catch data, in California and in Alaska all record catch data, with Alaska logbooks recording catch by individual angler. The Northeast VTR form also has spaces to record catch by species. However, logbooks can be an unreliable method for collecting some catch data, because of inaccuracies with species identification by anglers or vessel staff, or when logbooks are difficult to complete accurately because of the large number of anglers on many charter vessels. Any use of logbooks for catch estimation must be accompanied by a verification program to ensure data accuracy and to allow for corrections of estimates due to systematic errors in logbook data.

Discard data currently come from three sources: reporting of discards during intercept surveys; logbook or trip report entries, and direct observation from on-board monitoring. The latter has two clear advantages: on-board monitoring uses trained observers, and so

errors in species identification and counting will be small; and biological data can be recorded prior to discard release. A serious drawback of on-board monitoring is that angler behavior may be different with an observer present, and the data will therefore not be representative of discards from unobserved vessels. However, the self-reporting of discards in an interview or on a logbook with no possibility of verification would seem to hold even greater potential for bias (either through systematic errors or deliberate underreporting). Other methods for on board data collection not currently in use by the charter fleet include video monitoring and real time electronic reporting. Provided there is 100% coverage (both of vessels and all parts of a vessel from which fishing takes place), onboard video monitoring could be an effective method for monitoring numbers of released fish, as well as catch. As with observers, behavioral differences between those being monitored and those not monitored means anything less than complete coverage will likely lead to biased estimation based on video monitoring data.

2. Discussion by Fishery

2.1 California

2.1.1 Logbooks

Description

California licenses commercial passenger fishing vessels (CPFV's). To maintain their licenses, CPFV's must maintain logs on each vessel trip and submit them or a report of no fishing activity by the 10th of the following month. The log entries include number of anglers and other data about each trip. The area fished data could identify those trips associated with fishing in marine waters. The data are reviewed, edited and entered into a central data base.

Critique

Validation for compliance and accuracy is feasible, but does not appear to be done in any organized fashion. The logbook data are not used to estimate effort. They do provide long term comparable data for studying trends in fishing activities. If the quality of the logbook data changes over time, even the trend estimates are likely to be biased. Generally, it is difficult to replicate imperfect surveys as a means of obtaining valid trend measures. Even if general procedures do not change, the reaction of the surveyed population to those procedures may change over time.

If complete, this would be considered a census of effort. This source of data is just beginning to be utilized for the estimation purposes.

Recommendations:

- Add catch and release data to the logbook.
- Verification of log book data should be based on dock side verification methods which are based on probability sampling.
- Log book and dockside sampling can be coordinated using double sampling techniques to adjust the log book estimates based on more accurate data obtained by trained observers in the dockside intercept portion of the study.
- Apply all applicable best practice recommendations.

2.1.2 California Recreational Fisheries Survey (CRFS)

Description

The California procedures manual states the CRFS goal: "to produce, in a timely manner, marine recreational data needed for sustainable management of California's marine resources" (California Department of Fish and Game 2006).

The total catch population includes marine finfish caught by four major modes: private and rental boats, commercial passenger fishing vessels (CPFV's), man-made structures, and beaches and banks. Only those fish caught by anglers fishing from CPFV's are part of the for-hire domain. Guide boats are not specifically mentioned, but are considered CPFV's.

The population for measuring effort for the for-hire survey includes all CPFV's. The temporal population is year-round with estimates produced for each month. Estimates of total catch are derived by multiplying the estimate of fishing effort from the vessel telephone survey by the estimate of catch per unit effort from intercept surveys. Fishing effort estimates are obtained from the Party Charter Phone Survey (PCPS), an implementation of the NMFS For-Hire Telephone Survey.

Catch per unit effort (CPUE) estimates are obtained from two intercept surveys: The CA-PC is a monthly intercept survey to estimate CPUE for party and charter boats. The CA-OSP is a monthly intercept survey of salmon boats and is designed to estimate both effort and CPUE. In addition, the AT-SEA is an add-on to the CA-PC collects data on board CPFV's for CPUE and additional data including interaction with pinnipeds. Samplers also observe the landing sites of CPFV's selected for a particular week's telephone survey and attempt to get an independent estimate of the trips taken. A discussion of the individual program components follows.

2.1.3 Party Charter Phone Survey (PCPS)

Description

The conceptual population of CPFV's includes all vessels that carry recreational anglers for a fee and depart from California ports or landings to engage in salt-water fishing. Temporally, the population includes the entire year. Transient vessels that fish in California waters are included in the state surveys where they land. Mexican boats are not surveyed even though they may fish in California waters.¹¹

The sampling frame is constructed from CPFV licenses which are required by the Department of Fish and Game but may include vessels that fish only in fresh water or only for shellfish. A directory of about 380 eligible vessels is based on about 450 annual license renewals. The directory is updated as new licenses are added and unlicensed CPFV's may be added if they are encountered in the private boat intercept surveys. The

¹¹ Per E-mail correspondence with Tom Sminkey.

spatial sampling frame is stratified into 6 strata covering the coastal areas. The temporal frame is partitioned into 6 periods of two months each for the purpose of handing out sample assignments. In addition CPFV's are stratified by size in terms of angler capacity per trip: 1 to 6, 7 to 30, and 31 or more. No current CPFV's have capacity beyond 150. Because of low numbers of vessels within some strata, the stratification by capacity is achieved implicitly by ordering the vessels by size.

Each CPFV operator in the sample is sent a trip log type of form by mail and asked to record effort data for all trips for the selected vessel during a specified week. Telephone calls are placed the following week to obtain the data; vessel operators may also submit the log data by fax. The calling effort continues for up to 3 weeks. In spite of the extended calling period, only about 50 percent of vessels respond and a large portion of these are refusals. The county from which each trip originated is a key datum required to place the trip into the six coastal strata for estimation of effort and CPUE.

About 80% of vessels are able to be contacted for trip data of which 18% do not cooperate with the survey. The county from which each trip originated is a key datum required to place the trip into the six coastal strata for estimation of effort and CPUE.

Adjustments for nonresponse are made by spatial stratum pooled across weeks in the two-month sample selection period.

In a program of dockside vessel checks, samplers also observe the landing sites of CPFV's selected for a particular week's telephone survey and attempt to get an independent estimate of the trips taken. In addition, they gather information on general fishing activity and identify vessels that can carry an at-sea data collector (CDFG, p 32).

Weekly estimates are provided for each geographic stratum.

Critique

The sample appears to be allocated on percentage of vessels of basis (California Department of Fish and Game 2006, Table 3.2, p 28) across size strata; 10 percent sampling is applied except that a minimum sample size is prescribed by region for each period of study increasing the sampling rate in some cases. The sample allocation should be based on controlling the sampling error at specified levels for key domains of interest. At an aggregate estimate level, larger vessels contribute more to the number of angler trips and generally will make a larger contribution to the variance of the estimate in a stratified sample. Optimum allocation of the sample to control the variance of estimates would likely lead to sampling in proportion to the expected number of angler trips per vessel; vessel capacity might serve as a good proxy variable for sample allocation purposes. This would lead to taking a higher proportion of large vessels and a smaller proportion of small vessels. The actual selection probabilities should be maintained for use in estimation.

A serious effort to improve response rates is in order. Some of the bias caused by nonresponse can be removed with appropriate weight adjustment strategy.

Recommendations:

- Rigorously implement the logbook data collection for all vessel-trips as required by licensing requirements and use telephone procedures only to fill in for late reports.
- Apply all applicable best practice recommendations.

2.1.4 CA-PC

Description

The CA-PC is an intercept survey program for party and charter vessels. The purpose of this survey is to estimate catch per unit effort (CPUE) for the for-hire survey of CPFV's. The target population is the anglers who fish from these vessels. The target measures are counts, classification, and other characteristics of the angler catch (both kept and released at sea).

The sampling frame is coordinated with the sampling frame for private and rental boats. The spatial structure of the frame involves (1) 6 geographic strata that partition the California coastline, (2) landing sites within the geographic strata, (3) CPFV's returning to these landing sites during a sampling period, and (4) anglers riding those CPFV's. The catch landed by the anglers adds a 5th level for estimating characteristics of the catch (weight, species, and other biological measures). The temporal frame is stratified by month and day-type.

The sampling frame of landing sites is limited to 53 public access landing sites. CPFV's that launch from ramps and private marinas are excluded, but are eligible to be sampled as part of the private and rental boat survey. The for-hire sample at the public landing sites covers both day and night landings. The private and rental boat survey is limited to day landings (CDFG, p.4) and uses the estimates from the day landings to estimate CPUE from night landings.¹²

Critique

The selection of CPFV trips is described as a three-step process (1) selection of landing sites, (2) selection of day-type, types of CPFV trips and areas fished, and (3) selection of the CPFV at the landing. To evaluate this process, the frame construction and the probabilities of selection at each stage would be required and were not found in the available documents. The selection of trips at a landing site is described as systematic and in proportion to past effort for day-type, kind of CPFV trips and areas fished; it is not clear how this can be implemented operationally as vessels are returning to the landing site. Some element of probability proportional to size (PPS) sampling appears to be built in but this needs to be formalized in a formal selection algorithm so that the probability of selection could also become part of the estimation process.

¹² This report is limited to critique and recommendations concerning the for-hire segment only.

When the number of anglers per vessel is low, the entire vessel catch can be enumerated as well as the number of anglers associated with the total catch. On large vessels, it may be necessary to sample anglers. This process also needs to be formalized so that the probabilities of selection are positive for all anglers and known for sample anglers.

Similarly, any sampling of an angler's catch for classification and biological measurements should be formalized with the proper recording to total catch, sampled catch, and the probabilities of selection.

Recommendations:

- Continue coverage of night landings.
- Formalize current processes and apply probability sampling at all sampling stages.
- Eliminate data collector discretion from the sample selection process.
- Apply all applicable best practice recommendations.

2.1.5 CA-OSP

Description

The California Ocean Salmon Project (CA-OSP) provides supplementary data targeted at the recreational fishing for salmon. It focuses on private boats and CPFV's and uses a higher sampling rate to obtain a larger sample of vessel trips targeted toward salmon than would be obtained from the CA-PC surveys. The for-hire component only is discussed here.

The target population is limited to vessel trips that specifically target salmon for all or part of the day. Eligible combination trips include trips that target salmon and other species on the same day.

The sampling frame is stratified into 5 statistical port areas. The temporal frame is based on half-month time periods during specified seasons which vary by port area and may include from 121 to 275 days (Palmer-Zwahlen and Grover 2003). The focus appears to be on large sample size in major port areas and is limited to trips ending during daylight hours. The extent of the landing ports included in the frame may vary depending on the extent of salmon fishing during a particular year. The coverage bias may be small but is not well documented.

Effort is obtained by OSP data collectors through visits or phone calls to obtain a census of counts of salmon-targeted trips by day for all port areas and all days in the sampling frame. Trip logs are used postseason to fill in missing data, but are not relied upon for total effort.

CPUE is obtained on a vessel basis rather than an angler basis. The basic sampling unit is landing port-day. Twenty percent of days are selected systematically by day type (weekend/day) and half-month proportional to the number of days possible by day-type and half-month. Samplers are expected to get 100% of the effort and CPUE for the assigned landing port-day. During high volume fishing, they may have to use their own judgment to impute data for missed fishing boats.

Critique

The general approach appears to be to substantially increase the sample size and reduce sampling error. Too little attention is paid to controlling coverage and measurement biases. The procedures for estimating the effort and CPUE for missed boats is not based on probability sampling procedures and leaves too much discretion to the data collectors. The selection of landing port-day sample needs to be documented.

Recommendations:

- Integrate the sampling for OSP with the PC survey to achieve the same goals using stratification and differential sampling rates.
- Also integrate the data collection procedures to the extent possible.
- Apply all applicable best practice recommendations.

2.1.6 AT-SEA

Description

Samplers are assigned to vessels and days in advance. Samplers attempt to board vessels in the CA-PC survey. Vessels that are not boarded are sampled dockside when they return. The program is designed to get supplemental information, particularly on discards. The sampler has personal discretion to board a nearby alternate vessel if the assigned one does not have a trip on the assigned day. The sampler may also reschedule if necessary.

The data are used to collect depths and partition the discard estimates into mortality by depth bins. The data are also used to calculate mean size of discards in all modes of fishing in order to convert estimates of numbers of fish to metric tons of fish. Samplers have considerable discretion in arranging alternate vessel trips. This program has the same lack of selection probabilities as the CA-PC, with the added uncertainty of boarding for direct observations.

Critique

At sea data collection is limited to larger vessels and probability sampling does not appear to be applied in any rigorous fashion. No information on how the data are used improve estimates or how they are combined with other data to obtain improved

estimates was located during the review. Samplers have considerable discretion in arranging alternate vessel trips. It is hard to justify this effort without more specific information.

Recommendations:

- Use probability sampling for vessel selection for at-sea sampling.
- Develop procedures to combine at-sea data with other intercept data to improve estimates, based on a sound theoretical sampling basis. If such procedures already exist, they need to be documented.
- Apply all applicable best practice recommendations.

2.2 Oregon

2.2.1 Effort sampling

Description

A census of charter boats is made by obtaining trip data from office staff. It is rare for information to be refused when requested. Guide boat effort from major ports is determined using morning exit counts (bar crossing counts). Guide boats cannot be distinguished from private boats, but the total effort count is divided based on trip type information from dockside interview sampling. At smaller ports, counts are made of vacated moorage slips and boat trailers, with trips partitioned by type in the same way as for major ports. The guide boat effort sampling is an attempt at a census, but with some gaps due to limited sampling hours. Expansion factors calculated from intercept survey data on trip times are used to account for guide boats that exit outside of the sampling periods, while other expansions are used to account for unsampled days (a minimum of four days a week are sampled).

Some access points are omitted from the sampling. These are believed to account for less than 2% of activity. Sampling is from March through October at the five major ports, accounting for 96% of non-salmon effort. At smaller ports, sampling is done over a shorter season, accounting for 60-90% of activity. Adjustments are made for sampling gaps in estimation, in particular, data from previous years are used when small ports are unsampled in the current year.

Data on anglers per boat come from dockside intercept sampling (see below).

Critique

In theory, the collection of charter boat effort data from offices provides an accurate census of effort in an efficient manner. However, this is self-reported data, and some validation should be undertaken to ensure the information is accurate. There are some small gaps in coverage of guide boat activity that need to be addressed. Currently a complicated mix of counting and expansion factors are used to estimate effort at minor

ports, with the exact method depending on the port. A great effort seems to be made to get as close to an effort census of guide boat activity as possible, resulting in what appears to be a heavy use of resources devoted to counting vessel activity. In some instances, obtaining accurate counts depends on observers' familiarity with local vessel activity, and there seems some room for observer error, particularly in counts of vacant slips. A program of vessel logbooks (with validation) may be a more efficient method of obtaining effort estimates for the guide boat sector.

Recommendations:

- Continue obtaining timely effort data for charter boats directly from company offices, but with independent validation of vessel trip data through portside sampling or with a parallel logbook program.
- Implement a pilot logbook program for collecting effort data from for-hire vessels, and compare results with current effort estimation methods. This recommendation follows our general recommendation for use of logbooks for both effort and catch in all regions.
- Some low-intensity intercept sampling should be undertaken at minor ports throughout the for-hire fishing season. The selection probability can be proportional to expected fishing effort at these ports, so that the chance a minor port is selected is low and the burden of sampling effort is not unreasonable given the likely sparse data outside of major ports.
- Apply all applicable best practice recommendations.

2.2.2 Catch and Biological sampling

Description

Dockside intercept sampling is used for catch and biological data, as well as anglers per boat. A weekly minimum sampling rate of 20% by trip type has been set.

For charter boats, interviews are selected to be representative of activity for different target species. Boat selection depends on port and trip type. Samplers arrange to meet most low frequency types (eg salmon-combo trips). Examples of port differences: At Newport, samplers drive to charter boat return locations, requiring additional planning. Once there, the sampler can interview 2-4 returning boats within an hour. At Winchester Bay, the "next boat" protocol is used, whereby the next available boat is selected for sampling, as all boats moor in the same area. Private/guide boats are also sampled using the "next boat" method – no mention is made of port differences.

For biological sampling, there is a weekly goal of 15 fish per species per sampler per week, except for black rockfish, blue rockfish and lingcod, which have a goal of 15 per trip type per species per sampler per week. For most species, where it is unlikely that many more than 15 will be encountered, the first fish observed are sampled until the weekly goal is met. For other species, a random basket method is used, in which a single

basket is chosen at random from all baskets of fish on a boat, and all fish in that basket are sampled.

Critique

Boat selection for intercept sampling appears somewhat opportunistic at some locations, such as Newport, where samplers select the boats that happen to be there when they show up. The “next boat” method requires modification in order to avoid selection biases (choosing the most appealing vessel when 2 or more arrive at the same time) or biases due to variation in arrival intensity. The Washington method of strict systematic vessel selection is one sensible option.

Weekly sample targets for individual samplers are not acceptable. Such targets can lead to bias if they are met before the end of the week, leading to undersampling of or failure to sample fish landed on later days. Overall sample targets should be based on desired levels of precision in the estimates. Sampling should be conducted in a way that minimizes potential sources of bias, for example, at a fixed fraction of fish (or baskets) on a selected vessel.

Recommendations:

- Some low-intensity intercept sampling should be undertaken at minor ports throughout the for-hire fishing season. The intensity can be proportional to expected fishing effort at these ports, so that the chance a minor port is selected is low and the burden of sampling effort is not unreasonable given the likely sparse data outside of major ports.
- Boat selection for intercept sampling should be modified to ensure the selected boats are a representative sample, drawn with known probabilities. In place of the “next boat” method, a systematic random sampling could be used, with daily sampling fractions chosen in advance based on anticipated activity. At other ports, such as Newport, a randomized sampling schedule could be used, with landing sites sampled in a random order.
- There should be no sample targets for individual samplers. Sampling goals for catch should be chosen to achieve targeted levels of precision in the estimates, and probability sampling should be used to select individual fish or groups of fish.
- Apply all applicable best practice recommendations.

2.2.3 At-sea observer sampling

Description

Oregon has a separate at-sea sampling program modeled after California's AT_SEA program, although no documentation for boat sample selection has been provided. From an email: “We record both released [discarded] and retained catch by species and drift for a set of anglers (and also gather the location and depth). The sampler observes a group of anglers for one or more drifts and then rotates to a different position on the boat

to observe another group of anglers. This is repeated to cover all areas of the boat. Our goal is to observe 100 groundfish targeted boat trips per year from March through October (not much activity in OR during November through February). The at-sea observation program is much like the one operating in California.” Further email correspondence clarifies the boat selection:

[It is left] up to the samplers to arrange trips. Sometimes they arrange it the day before and sometimes they just show up on the docks and ride whatever boat is going out (assuming the captain says ok). We do review the frequency of trips by boat in season compared to the number of trips they take and advise the sampler if a boat(s) is being over or under sampled. In some ports there are so few boats they are the only option. We instruct the crew as to the number of trips to take by month and port. They are based on the recent year temporal average of bottomfish angler effort by month and port. For some of the smaller ports we group them into a cluster.

As noted above, discard information is collected by at-sea observation.

Critique

The at-sea sampling gathers valuable data on catch locations and discards. For this program, vessel selection is, with some guidance, left to the discretion of the samplers: there is no formal sampling design for the at-sea program in Oregon.

Recommendation:

- A formal sampling design should be developed for the at-sea sampling program. At present, vessel selection is somewhat ad-hoc. To avoid potential biases from opportunistic boat selection, a randomized sampling scheme should be used.

2.3 Washington

2.3.1 Effort sampling

Description

Effort is recorded by making daily exit and entrance counts of boats at the four major Washington ports. According to the documentation provided to the review panel, “all boats...are tallied” and thus an attempt is made at an effort census of all for-hire vessels. Gaps in sampling coverage include winter months (Nov-Feb), small ports except during high-effort salmon fisheries, and Puget Sound, where no sampling occurs. Although Washington effort sampling may be close to a census of boat trips, it provides no information on angler effort, which instead comes during dockside interviews for catch and other information.

Critique

The boat exit count method is an effective way of measuring effort in terms of boat trips at major ports, and allows for timely reporting of effort statistics. At minor ports, and in Puget Sound, effort is either undersampled or unsampled.

Recommendations:

- The boat exit and entrance count method should be maintained for effort estimation at major ports.
- A pilot logbook program for collecting effort data from for-hire vessels should be implemented, and results compared with current estimation from the boat count data. This recommendation follows our general recommendation for use of logbooks for both effort and catch in all regions.
- Some low-intensity sampling for effort should be undertaken at minor ports throughout the year. The probability of selection can be proportional to expected effort at these ports, so that the chance a minor port is selected is low and the burden of sampling effort is not unreasonable given the likely sparse data outside of major ports.
- A new Puget Sound survey should be designed and implemented. Given the scattered nature of fishing in the Sound, a telephone or email survey (with follow-up) would be more efficient than an intercept survey. Some validation in the field would need to be done to ensure accuracy of the results of such a survey. (See also 2.3.2.)
- Apply all applicable best practice recommendations.

2.3.2 Intercept sampling

Description

Boats are selected for interview using a daily sampling rate that depends on the number of boats exiting a port. For example, if the rate is 50%, then every second boat is sampled. If exit totals are low, the sampling rate can be 100%. Selection is strictly systematic, even during busy periods of the day. At minor ports and in Puget Sound, catch is either undersampled or unsampled.

Once a boat is selected, all catch is speciated, giving complete species counts for each sampled vessel. Species are treated differently for biological sampling. For halibut, all fish on a sampled vessel are measured for length and checked for PIT tags unless some fish are unavailable (any fish filleted at sea, a missed angler), in which case no biological data is collected. Salmon data collection is also all or none, and when all fish are available, all are speciated and data (clips, tags, DNA for Chinook) are collected on each fish.

Other groundfish are generally sub-sampled for lengths and weights, but all are speciated. Selection of fish for measurement is somewhat opportunistic as samplers must work around processing operations. In two ports, it is not boat specific because catches are mixed prior to sampling.

Discard data come from interviews with skippers and anglers. No onboard sampling is done for discards as in Oregon and California.

Critique

The systematic sampling method is a good approach for vessel selection. Most importantly, strict adherence to daily sampling rates should ensure there is no vessel selection bias. However, the sampling rates are apparently chosen to maximize the number of vessels that are sampled for a given daily level of activity and sampling resources. Ideally, sampling rates will be chosen to give desired levels of precision in estimation. It is possible that good estimates can be obtained with lower daily sampling rates, or conversely that greater sampling effort is needed to achieve precision goals.

Relatively little or no sampling at minor ports and in Puget Sound creates the possibility that there is some bias in the estimates if the characteristics of fish at undersampled locations differ from those landed at major ports or those landed outside of the narrow sampling period at minor ports.

Interview sampling provides more limited and potentially less reliable data on discards than sampling on-board vessels, or even carefully maintained vessel logbooks. It relies on the recollection of those being interviewed and there is no possibility of making measurements of released fish or of bottom depth, which are important for estimating mean weight and discard mortality.

Recommendations:

- Select sampling rates of vessels and fish (for subsampled species) that achieve desired levels of precision in parameter estimates. This may require increases or reductions from current sampling effort.
- Some low-intensity intercept sampling for catch and biological data should be undertaken at minor ports throughout the year. The intensity can be proportional to expected effort at these ports, so that the chance a minor port is selected is low and the burden of sampling effort is not unreasonable given the likely sparse data outside of major ports.
- A new Puget Sound survey should be designed and implemented. Given the scattered nature of fishing in the Sound, a telephone or email survey (with follow-up) would be more efficient than an intercept survey. Some validation in the field would need to be done to ensure accuracy of the results of such a survey.
- Apply all applicable best practice recommendations.

2.4 Alaska

2.4.1 Statewide Harvest Survey

Description

In Alaska, there are three sources of charter boat effort data: the Statewide Harvest Survey (SWHS), which targets individual anglers (clients); the Saltwater Charter Logbooks, which are mandatory for sport fishing guides and businesses; and creel

(interview) survey programs in Southeast and South-central Alaska. The Statewide Harvest Survey (SWHS) targets individual anglers (clients) for the purpose of estimating both effort and catch. The standard SWHS is a voluntary mail survey, with questionnaires sent to a stratified random sample of approximately 23 000 sport fishing households from a master list of such households. The household list is incomplete due to late season acquisition of licenses or incomplete or illegible information, and an expansion is used to account for this in estimation. The stratification is by residency (location of license holder) and license date purchase (early or late); there is a total of eight sampling strata. Up to two reminder letters are sent, and non-response bias is modeled as part of estimation. A supplementary survey is sent to around 24 000 sport fishing households in order to provide information broken down by guided (for-hire) and unguided fishing, something not done for all regions in the standard survey.

Strata sample sizes are chosen in order to achieve specified precision criteria.

Critique

Accounting for non-response bias is important in such surveys, and we are pleased to see this is done for the SWHS. In-season monitoring is not possible with this type of survey. This survey is likely to have greater regional coverage than intercept surveys (see below). Comparison in 2006 of harvest estimates from this survey with logbook estimates show often quite larger differences, with logbook estimates typically higher, raising concerns about bias in the SWHS estimates in particular.

Recommendation:

- Continue ongoing comparisons with other data collection methods to identify sources of differences in estimates. If sources of bias in the SHWS are identified, improve survey design and analysis methods or discontinue the components of this survey for which better data are obtained elsewhere.

2.4.2 Southeast and South-central intercept surveys

Description

Effort and catch (harvest and release) are estimated using creel surveys only for selected ports in Southeast Alaska. At other Southeast sampling locations and at South-central sampling locations, effort and catch data may be collected but are not used to estimate total effort or harvest. Rather, the information is used for other objectives such as estimating CPUE or spatial statistics.

Participation in the Southeast interview survey is voluntary, although all catch must be available for inspection. A stratified random design is used, with period (weekly or biweekly), time of day, and access location being the strata. During a selected sampling occasion, attempts are made to interview all boat parties at each of the selected access locations, or all boat parties within a designated sublocation and subperiod. Creel surveys are conducted in only four ports to estimate effort. Interviews and biological sampling are conducted at eight ports, most of which have several harbors. All these

sampling sites combined account for 66-80% of the harvest (not catch) of major species and 74% of charter trips.

The Southcentral creel survey (interview, biological sampling) is conducted at seven major ports, accounting for over 84-95% of catch of major species and 88% of charter trips. At other ports, implementation of a sampling program is said to be impractical. Sampling is performed according to a randomized work schedule, with interview days being distinct from biological sampling days. Samplers try to interview all charter boats on selected sampling days.

For selected vessels, all catch is sampled unless some fish were cleaned at sea, in which case, no sampling was done. In Southcentral, the focus is on halibut, while salmon is the major species in Southeast, although other species are also measured in both areas. There are sample targets for biological sampling, and the allocation of sampling effort to strata is done in order to meet these targets.

Information on discards comes from the interview surveys. Like Washington, Alaska has no at-sea sampling program for direct sampling of discards.

A comparison of 2006 effort data from logbooks and interview surveys showed both methods gave very similar estimates of angler numbers, but there were some differences between harvest estimates.

Critique

There are significant gaps in geographical coverage of the intercept sampling program. Lack of intercept sampling at minor ports and landing sites could introduce bias into estimates of catch of biological parameters from intercept surveys, particularly in Southeast Alaska, where over 25% of trips land at unsampled locations. The situation is quite different in Alaska than in other states. In Alaska it is often not feasible to drive or fly to minor ports. We recognize that the very large distances covered by coastal Alaska and the inaccessibility of many ports are likely to preclude even infrequent intercept sampling at many landing sites used by for-hire vessels.

Recommendation:

- We understand the practical difficulties of directly sampling at many small, hard to access ports, and we have no strong recommendation at this time for how sampling coverage can be improved without substantial cost. That said, the significant gaps in coverage of the intercept survey program should be addressed. Annual spot checks at a sample of landing sites is one option that could be considered.

2.4.3 Saltwater Charter Logbooks

Description

A mandatory charter vessel logbook program has been in place since 1998 for the purposes of gathering effort and catch data. Currently, weekly logbook reports must be submitted for each vessel trip. Late submission can lead to review of offenders by enforcement agencies. The logbook format has been revised and improved over recent years. Currently harvest is recorded by species, except for rockfish which is recorded by species categories.

Both onsite and offsite verification of logbook catch data is done. Onsite verification is done by intercept survey staff, and involves counting and recording catch of principle species. Offsite verification is primarily in the form of a random mail-out survey sent to charter clients (although catch verification is not the main purpose of this survey).

Critique

Differences between estimates obtained from logbooks, the SWHS and creel surveys are of concern. Continued comparison of logbooks with other data sources is required to determine the cause of discrepancies. Our impression is that logbooks are considered more reliable than at least the SWHS.

Recommendation:

- Continue ongoing review of logbook data, including comparison with other sources of effort and catch information.
- Ensure that vessel selection for verification of logbook data is done on a probability sampling basis.
- Apply all applicable best practice recommendations.

2.5 Gulf Coast Fisheries (Texas to West Coast of Florida)

The Gulf Coast includes West Florida, Alabama, Mississippi, Louisiana, and Texas. In these coastal areas, the For-Hire Survey addresses charter boats and the Southeast Headboat Survey addresses headboats. Separate for-hire surveys are employed in Texas and in the Everglades National Park. The Florida keys are generally included in the Gulf Coast fisheries, but some species may be managed in the Atlantic coast fisheries (Sauls et al 2008, p. 21).

2.5.1 Vessel-Directory Telephone Survey (VDTS)

Description

The purpose of VDTS is to estimate angler effort while fishing from for-hire vessels excluding headboats which are covered by the Southeast Headboat Survey. The

population includes charter boats and guide boats operating from West Florida to the Louisiana coasts.^{13,14} The temporal population is the entire year.

The sampling frame is a vessel directory compiled from a variety of sources including state and federal licensing agencies and intercept survey samplers. The vessel directory includes a number of other descriptors and eligibility indicators. The directory is updated to correct contact information or changes in active status or in cooperation status based on data obtained during the survey process. Temporarily inactive vessels may be included in the sample, but coded as inactive and not contacted during the inactive period.

Adjustments are made for undercoverage of for-hire vessels on the frame and for undercoverage of vessel trips by vessels in the VDTS sample (Sauls et al, p. 84-86).

The ultimate sampling unit for the VDTS is a vessel-week (7 days ending on Sunday). Vessels are stratified by coastal areas defined by state and further partitioned into 3 coastal areas on the west coast of Florida (panhandle, western peninsula, and keys). The sampling frame is updated and stratified samples are selected in advance for each 2-month wave. Some vessels are omitted from the frame due to incomplete contact information; a list of these vessels and a list of ineligible for-hire boats is delivered to NOAA along with the sample (Sauls et al, p 81). The "incomplete contact" lists are considered outside the sampling frame and excluded from the estimation process, but are used to develop coverage adjustment factors. The lists are also used to try to obtain contact information so the vessels may be included in future surveys. Ineligible vessels need not be a coverage concern; typically if they become eligible in the future, these vessels are treated as a new boat (Tom Sminkey e-mail of 11/18/2008).

Vessel operators are notified in advance and received a weekly log to record the angler count and trip characteristic data that will be requested by telephone. They are also given options to respond by toll-free fax or via a secure website (Sauls et al, p. 82)¹⁵.

Telephone data collection is conducted the week following the target week. Response rates are typically 50 to 65 percent in the summer season (May-Oct) and 70 to 75 percent in the winter period overall from Florida to Louisiana. Response rates are fairly variable with higher response rates in Alabama and Mississippi and lower response rates in the Florida Keys (Tom Sminkey e-mail of 11/18/2008).

Critique

The population coverage by the vessel directory is unknown, but the updating procedures appear reasonable.

¹³ Texas for-hire surveys are discussed separately.

¹⁴ Comment from work group review: "The charter survey includes vessels with a charter license, six people max (correct me if I am wrong), while the headboat survey includes vessels with a Gulf reef fish Charter vessel/headboat permit and a capacity of more than six people."

¹⁵ For-hire group comments indicate that the secure web-site option is not available.

The discussion of for-hire vessel frame undercoverage (Sauls, *et al*, pp. 84-85) assumes a random sample of vessel trips and provides a ratio estimate of for-hire angler trips covered in the frame to observed angler trips. This discussion lacks any detail on the sampling frame used to make this adjustment or how a random sample of all vessel trips can be obtained without clustering them by site and time. Keep in mind that this sample is assumed to include vessels not on the vessel directory, so random sampling from the directory is not an option. To critique this procedure, more detail would be needed to clarify how this methodology is actually applied. The idea of adjusting for vessel directory undercoverage is, however, a good one. Any new vessels identified in the process would presumably be added to the vessel directory for subsequent rounds.

A separated discussion of auditing procedures for underreporting of vessel trips is presented on pages 85-86. The discussion is about estimation methodology and does not indicate how the audit is performed. Are night trips included? Do the auditors actually observe during all hours or select a sample of time periods. Are observed absences of vessels from the dock confirmed to be for the purpose of for-hire fishing?

Sample sizes are set by a 10% rule rather than on obtaining an acceptable variance for key estimates (either overall effort or estimates of coverage).

Recommendations:

- The current system collects logbook type data on a sample basis only. Phase in complete logbook coverage as soon as possible.
- The logbook approach requires a high quality frame. An intensive effort is needed to clean up eligibility problems, missing locator information, *etc.*
- Incorporate verification and audit procedures into the sample selected for access-point intercept survey. Take the opportunity to add qualified for-hire vessels to the vessel directory and to update address and locator information when it changes or if it is currently missing. This should be a long term and continuing effort.
- Apply all applicable best practice recommendations.

2.5.2 Access-Point Angler Intercept Survey for Charter Mode

Description

The intercept survey targets all anglers participating in for-hire fishing over the entire year and all fish caught or released by those anglers. The sampling frame is constructed in stages. The first stage is Master Site Register (MSR) of identified access-points. Additional sampling stages for estimating catch per unit effort are for-hire vessels (excluding head boats) and anglers. For the purpose of measuring catch characteristics, the individual fish are the final sampling stage.

The MSR includes trailer launch ramps, public docks, marinas, etc. It excludes private access areas where interviewers are not allowed access, dry docking facilities, or locked marinas. Transient sites where anglers may be dropped off before the vessel returns to a trailer launch site are also excluded.

The temporal frame is defined in terms of days. The ultimate sampling units are site-days. An estimate of the number of angler trips (pressure estimates) during a typical 8-hour data collection period at each site by month and kind of day is used to develop sampling rates for site-days. Site-days with higher estimated angler trips are sampled most heavily. The MSR is also updated for each wave of data collection (2 months).

The selection procedure described (Sauls et al, p. 91) is a form of probability proportional to estimated size (PPS) sampling. It produces unbiased estimates if the data are weighted inversely to the selection probabilities. Software is available for selecting PPS samples and fairly simple analytic software is available for computing weighted estimates and their variances. More precise estimates can be obtained by taking advantage of ordering on auxiliary variables (as opposed to random ordering) within major strata and variance estimates based on analysis strata formed by sample pairs or triples along the ordered list of selected units. Selecting a larger than needed PPS sample and dividing it into waves or releases based on equal probability subsampling preserves the PPS property and is also commonly used to control workload or to achieve sample size targets.

Written information about sampling anglers and fish particular to the Gulf region was not reviewed so the critique and recommendations are based on recall of oral presentations and generic descriptions of these methods.

Critique

Major problems with the temporal frame are the apparent exclusion of night fishing and limitation of data collection to an eight-hour period. The other major problem is the great degree of discretion given to data collectors in switching sites and the emphasis on achieving quotas.

Recommendations:

- Primary sampling units should be defined temporally as well as geographically.
- The time periods (temporal definition) should be short enough to be observed in entirety by the data collector(s) during one visit.
- Apply all applicable best practice recommendations.

2.5.3 At-Sea Angler Observer Survey for Headboat Mode

Based on comments from the For-Hire Survey Group, the NMFS at-sea observer program was limited to Alabama and west Florida and has been discontinued since 2007.

2.5.4 Southeast Headboat Survey

Description

This survey program covers headboats from North Carolina to Texas and is the official method for headboat catch and effort in South Atlantic and Gulf of Mexico. The survey overlaps¹⁶ with the for-Hire Survey on the Atlantic Coast (NC, SC, GA, and East FL) but is unduplicated in the Gulf.

The populations covered include head boats, anglers fishing on head boats, and fish caught on head boat vessel trips. As noted above, the VDTS excludes headboats. The vessel directory for headboats includes a fairly short list of vessels that are well-known in the industry.

Head boats are required to maintain log books on angler effort and catch. The timely submission of logbooks is required in order to keep their charter vessel/headboat reef fish permit that allows them to fish in the for-hire fishery in the Gulf of Mexico. This permit is now a limited entry permit, so that if they lose it because of non-compliance with reporting, they will not be able to get back into the fishery. As always, enforcement is the big issue, there is not enough of it. The sampling frame for head boats is a master list of headboats compiled and maintained by the Beaufort Laboratory headboat survey staff, with input from the field samplers, and consists of all vessels licensed to carry more than six passengers and prosecuting fishing effort on the reef fish stocks of the Gulf of Mexico or adjacent state waters. Port agents are responsible for working with the head boats in each port to collect log books, to sample anglers, and to sample catch. The sampling method is opportunistic.¹⁷

Log book compliance varies by region and appears at best to be about 75 percent in major gulf coastal areas. Catch estimates are generated directly from the log books with an adjustment for undercoverage (K-factor) obtained from effort worksheets compiled by the port agents (Sauls et al, p. 108).

Port agents are advised to systematically sample all vessels in their sampling area, trying to get all vessels sampled once before starting over. They are instructed to not oversample any particular vessel or vessels. Some vessels simply run more than others, though, and sometimes they may occur more frequently in the dataset because the port agents are trying to get hours in for a paycheck. At the dockside when the vessels depassenger, port agents are instructed to select anglers with uncommon species on their stringers. The rationale behind this instruction is that the stringers with uncommon, less frequently occurring fishes, will no doubt have plenty of the common species as well, resulting in a better sample representing the diversity of the species present. Port agents are instructed to sample all fish on a stringer (or in a cooler, whichever it may be) once

¹⁶ In fisheries where they overlap, the survey effort is coordinated to ensure that vessels are not sampled in more than one survey.

¹⁷ Details in this paragraph were supplied by work group comments on draft report.

they have started. Once they reach ten fish of a given species however, they do not have to sample any more of those fish from subsequent stringers, allowing them to obtain measurements from more of the uncommon species. Port agents do not collect data about CPUE, they only collect biological data from a sample of the catch. CPUE comes directly from the logbook reports.¹⁸

Critique

The collection of both effort and catch and logbook confirms the feasibility of the recommended method for this particular population. There does not appear to be any independent verification or confirmation of the catch data based on the intercept data.

The procedures for vessel-trip, angler, and fish selection are an attempt at appropriate representation in the sample, but procedures based on probability sampling could fairly easily implemented and could be defended on theoretical grounds. Stratification to insure representation of both vessels and time periods could be implemented; we should not be concerned if vessels making more trips provide more data; in fact, we should expect this to happen.

Recommendations:

- Continue the logbook program for both effort and catch. Since submission of logbook data is mandatory for licensing of headboat operators, take legally authorized steps to insure compliance.
- Implement probability sampling procedures for catch as recommended in general recommendations.
- Include confirmation of the logbook data as part of the intercept survey.
- Apply all applicable best practice recommendations.

2.5.5 Texas Surveys

Description

For-hire vessels that fish in Gulf of Mexico waters were surveyed in a pilot telephone effort survey (the VDTS). This survey did match the survey for for-hire vessels in the rest of the Gulf of Mexico states (estimates effort by wave and year). One reason for discontinuing this pilot in Texas was the high corrections for off-frame vessels that were not added to the survey frame during the course of the pilot study. This pilot will be discontinued in 2009.

¹⁸ Several clarifications received from the working group review are incorporated in this description. Earlier confusion may have resulted from reviewing descriptions of pilot studies which may have involved some variations in methodology no longer in practice.

For-hire vessels that fish in state and inland waters have historically been surveyed in the Texas Parks and Wildlife survey, which relies on dockside intercepts and direct vessel counts for effort. This survey does not match the rest of the For-Hire Survey in the other Gulf of Mexico states (estimates generated for fishing season, not calendar year; no discard estimates). These vessels continue to be surveyed in this manner.

Critique

The re-establishment of the Texas survey in the Gulf waters provides an opportunity start on a new footing and develop rigorous procedures at all stages of sampling frame development and sample selection.

The decision about continuation of the survey in state and inland waters appears to be a decision for Texas to make. It appears that this survey could be continued and with some re-design and sharing of data. The Texas inland and state waters survey could contribute to both Texas, Gulf coast, and national statistics. The temporal stratification would need to incorporate both Texas seasons and the two-month time stratification currently employed in the remainder of the Gulf. The shared data would need to include variables identifying the temporal strata.

Recommendations:

- Augment the data collected in Texas to include data on discards.
- Expand or supplement the survey into Gulf waters beyond the Texas state waters.
- Since the Pilot Study demonstrated the incompleteness of the directory of for-hire vessels, basic efforts are required to establish a more complete directory and establish rigorous survey procedures including logbook data and probability-sampling based intercept data.
- The procedures developed should comply with all applicable best practice recommendations including those for headboats.

2.5.6 Everglades National Park (ENP) Guide Logbook

Description

This is a local program to monitor catch by species in the ENP based on logbooks completed by licensed guides. A census is attempted, but the totals end up being adjusted for guide undercoverage.

Critique

Because the for-hire intercept survey does not sample access sites in the covered area, there is a potential problem in coverage. The for-hire telephone survey may include some vessels also covered by the ENP logbooks. It is not clear how data are combined or unduplicated.

Recommendations:

- Since this is already a logbook survey, the logbook data just needs to be coordinated (in terms of content, definitions, timely reporting, etc.) with the broader survey effort.
- Implement a sample-based intercept survey to confirm logbook data and provide additional biological data that may be required.
- Eliminate any possible duplicate data collection.
- Apply all applicable best practice recommendations.

2.6 Atlantic Coast Fisheries

There are multiple for-hire data collection programs in place among states along the Atlantic coast, and many of these programs span across multiple management regions. There are 14 states and 3 fishery management councils covering the Atlantic coast fisheries. Some state-specific programs also exist. This is summarized in table 1 at the end of this section, provided to the review team by NOAA¹⁹.

2.6.1 For-Hire Survey (FHS)

Description

For the states of Maine through Virginia, the FHS is structured around two types or “modes” of for-hire fishing: 1) Charter vessels, and 2) Headboats. For the South Atlantic and Gulf areas, “large” party headboats operating in states from North Carolina through Texas participate in a separate survey, the Southeast Headboat Survey. In these states, charter vessels sampled in the FHS include some “larger capacity charter vessels (>6 passengers)” that are not on the Southeast Headboat Survey frame.

The For-Hire Survey is conducted in every state on the Atlantic coast²⁰. The FHS collects information on fishing effort (number of angler trips) and catch by marine recreational anglers fishing on professional for-hire vessels (variously referred to as charter boats, guide boats, party boats, head boats, or multi-passenger fishing vessels). The survey design consists of two independent, yet complementary methods:

- 1) an access-point intercept survey to collect data on catch per-unit of effort, and
- 2) a vessel-directory telephone survey (VDTS) to collect data on fishing effort directly from vessel operators.

Data from the two survey methods are combined to estimate total fishing effort and catch by species.

¹⁹ Methodological summaries of the various surveys on the Atlantic coast are largely summary excerpts from the document “Inventory of For-Hire Data Collections in the United States and U.S. Territories; NOAA, 2008” to provide an overview of methods reviewed by the for-hire review team.

²⁰ and Gulf of Mexico coast, except for TX where it is in pilot phase.

Catch and Biological Sampling (Charter and Headboat Mode)

A coastal waters access-point angler intercept survey for charter mode is conducted at either public or private marine/brackish-water fishing access points to collect catch data from individual anglers fishing from for-hire vessels. Data collected in this portion of the For-Hire Survey (FHS) include species identification, total number of each species harvested and released, and length and weight measurements of harvested fish, as well as some angler-specific information about the fishing trip.

A Master Site Register (MSR) exists which includes identified access-point sites for marine recreational fishing from for-hire vessels in each state (trailer launch ramps, public docks, marinas, etc.). It does not include private access sites where field interviewers are not allowed access, such as dry docking facilities or locked marinas. Also excluded are transient sites where for-hire captains may arrange to drop off clients before taking their vessels back to trailer launch sites. The register is stratified by state²¹, county and expected magnitude of angler trips from each site, ranging from 1 to 80+. In effect, this is a frame representing the population of trip departure –arrival points for for-hire vessels based in public areas. In addition to sites, a temporal component (month and KOD²²) creates the “site-day” sampling element, which is stratified by wave to assure a representative temporal distribution of samples.

Overall, a stratified 3-stage cluster sampling design occurs, with the site-day being the primary sampling unit, randomly selected boat-trips as the secondary sampling unit and anglers on that boat-trip are the tertiary sampling unit. Some alternate site selection occurs to increase interviewer productivity, if there is no for-hire fishing activity at the selected site or if such fishing activity is low, and no boats are likely to return for 4-5 hours; or if at least one for-hire interview per on-site hour cannot be obtained. A nearby (no more than one hour drive) alternate site with for-hire fishing activity (with low to moderate fishing pressure) in the same state and mode can be substituted. Restrictions in selecting alternate sites are designed to avoid “hot spotting” or the repeated selection of highly productive alternate sites.

During the access-point intercept surveys, a sub-sample of inspected angler caught fish are measured and weighed to establish a “mean weight of fish” caught estimate. If 15 or fewer fish of one species are available, the interviewer tries to weigh and measure all of them. If more than 15 fish of one species are available, they randomly select 15 fish to be weighed and measured. Ideally, they line up the fish from largest to smallest, divide the total number by 15, and select every n^{th} fish for length and weight measurement. When systematic random sampling is not possible, they use simple random sampling. Released, filleted or un-inspected fish are not utilized in this estimate.

²¹ East coast of Florida is divided into two regions (being treated as two states for purposes of this survey methodology); a northeast region consisting of six counties from Nassau to Brevard counties and a southeast region consisting of six counties from Indian River to Miami-Dade counties (the Florida Keys (Monroe county) is another region considered as part of the Gulf coast, thus not included in this part of the discussion).

²² kind of day – weekday or weekend/holiday day

Critique

As noted in earlier critiques and overviews of best practice procedures, one key issue is coverage of the population by the sample frame. In this case, the sample frame starts off with a list of interview sites, proceeds to a frame of boat trips and finally, a frame of anglers on selected boats.

The initial sample frame of sites, appears to cover public areas well, but under represents private docks, or drop off points that trailered boats may use. Night fishing vessels also are not intercepted due to lack of inspectors after 4pm.

The inability to access private boat dockage areas is also a weakness in the current sampling methodology's coverage of the population of for-hire vessels. Also there may be some about unlisted sites, such as boats that may meet anglers at a marina or ramp. This raises a sampling coverage concern that was mentioned in the NRC critique.

Once a site is selected but there are no boats available, the alternate sites selection process erodes the random sample process. In addition, the inability to access "hostile sites" erodes the random sample process. These are deviations from strict random sampling protocols. It is unclear to this review team, if the estimation procedures can accurately adjust estimates to adjust for these biases, but we doubt it. The limitations placed on alternative site selection, do appear to minimize biases, but they do not eliminate them.

The pressure category table used to weight and prioritize sites appears reasonable if past and current situations are good predictors of the future.

We were told that the process used to select the angler on the boat is "purposive" where those anglers with "interesting catches" of less common species are targeted for catch inspection. This is acceptable for the bioprofile survey to get biological information, which is not necessarily intended to be representative or extrapolated to the population of anglers as, say an "average catch". Once that angler(s) is selected, it appears that proper sampling strategies are in place to take a random sample of fish for bioprofile measurements.

Recommendations:

- A review process should be initiated (on a state by state basis) to classify charter boats based on where they operate from into either public or private docks or ramps. Since charter boats in most states have a specific license, this state (or federal) license list, can be used as the frame of charter boats, stratified by state. In some cases, such as Florida, where a charter license may be issued to a captain who has multiple vessels, then a modified list will have to be developed, based on some background work, identifying those cases. It seems reasonable that there would be no headboats operating out of private areas. It appears the current MSR captures the population of public sites adequately. Once a sample frame of charter boats is established, field surveyors can be asked to code an operating dock/marina for each boat. Once a residual list exists of "un-sited" boats, efforts

can be made to contact the owner/operators to determine the site they operate from, and add that site to the MSR or create another process for selecting boat trips from private sited boats.

- Regarding the inactive site substitution process, from a pure methodological perspective, such substitution should not occur and additional sampler resources are needed to follow a stricter random sampling procedure without alternative site selection. In addition, if possible some legal mechanism to overcome the issue of "hostile sites" where the dock is unreceptive to interviewers, should be implemented with state participation, as the non-inclusion of data from boats based at such sites introduces another source of non-response bias, which over time, could be systematic and result in extrapolation biases to the population.
- Initiate inspections for a sample of late afternoon, evening and night fishing vessels.
- As noted in the For-Hire preamble discussion above, states from North Carolina through Louisiana participate in two surveys, the For-Hire-Survey and the Southeast Headboat Survey. In these states, charter vessels sampled in the FHS include some "larger capacity charter vessels (>6 passengers)" that are not on the Southeast Headboat Survey frame. They should be included. There should be better communication and consistency between the two surveys in who they sample.

Effort Sampling (Charter and Headboat Modes)

Description

The Vessel Directory Telephone Survey (VDTS) is based on a sample frame that includes a population list of all known for-hire vessels in the 14 state east coast (and 5 state Gulf coast) region. The sample frame is updated regularly with information from multiple state and coastal sources; including coding them as 'ineligible' if they drop out of for-hire mode; 'inactive' for certain waves if the vessel does not fish in certain seasons or is undergoing maintenance that removes them from the fishery for a known period of time; or 'non-cooperative' if the vessel representative refuses to participate in the survey.

Participation is listed as voluntary and detailed information about response rates and inability to contact are available in the wave reports compiled by QuanTech. Upon reviewing the 2007 and 2008 wave reports, the percent of nonresponse in 2006 was about 30% and for 2008 about 28%. Also it was noted that the For-Hire Survey vessel directory had about 10% of the vessels with no phone contact point and about 12% that did not list a county and hence were not in the frame to be selected.

The vessels to be sampled in each wave to participate in the telephone survey (to estimate for-hire fishing effort by state) are selected using a stratified systematic sample, with a random start. Each wave consists of a 10% sample (or minimum of 3 vessels, whichever

is larger) from each state²³. Field personnel visit the dock of vessels based at public marinas, or docked at a permanent storage shed, during the sample week to validate the presence or absence due to a probable for-hire trip, at least once during each sampled week, and multiple validations on different days during the sampled week if feasible.

Data collection consists of up to 10 phone call attempts to reach the selected vessel representative, after being precontacted by letter with a copy of logsheet and questions to be answered and being provided with other options to submit information such as fax, dial-in and web input (options vary by state).

Critique

Assuming all for-hire vessels must register as such, that list should be an accurate representation of the population of vessels. Updating was mentioned and as long as it occurs regularly, this is a good sample frame. Sauls indicates that some vessels are not in the sampling frame due to incomplete contact information and a list of such vessels is provided to NOAA. It is unclear if there is a feedback loop for NOAA to provide information to reinstate these vessels to the sample frame.

The frame undercoverage problem noted in the Gulf section of the VDTS review, due to under/over reporting of self-reported trip activity issue is relevant in the Atlantic VDTS too.

Sample sizes are set by a 10% rule rather than on obtaining a sample based on variance levels for accurate population estimation.

On p. 78 of the summary of procedures (inventory) document, it says "Each for hire fishing boat can only be designated as one type of boat: either a charter or head (party) boat." Yet, on p. 79 it says that "In the [NC-TX] region, charter vessels sampled in the FHS include some "larger capacity charter vessels (>6 passengers)" that are not on the Southeast Headboat Survey frame. These two statements are inconsistent? Are they included in the FHS as "charter boats" or "head boats"? Possibly this difference is due to differences in permit qualifications? It appears this may be a weakness in the Southeast Headboat Survey sample frame that appears to not include some smaller headboats; which seems misclassified as "charter boats" under a one of a kind definition not used elsewhere for headboats?

Upon reviewing the 2007 and 2008 wave reports, the percent of nonresponse in 2006 was about 30% and for 2008 about 28%. This is an acceptable nonresponse rate and is better than many surveys, though most do not have the intense focus of resources that this one does. Efforts to reduce it would be welcomed, but a ~70% completion rate is acceptable, assuming the non-respondents are not all clustered in one state or other systematic bias.

²³ East coast of Florida is divided into two regions (being treated as two states for purposes of this survey methodology); a northeast region consisting of six counties from Nassau to Brevard counties and a southeast region consisting of six counties from Indian River to Miami-Dade counties (the Florida Keys (Monroe county) is another region considered as part of the Gulf coast, thus not included in this part of the discussion).

Vessel presence or absence validation efforts are good for the VDTS. The FHS dockside validation consists of visiting the access site during the week they are selected to report and recording whether the vessel is docked or away. If the vessel is away from the dock, an attempt is made to determine the vessel's activity. Sites are visited at a time of day when it would be likely that the vessel would be away from the dock on a for-hire fishing trip. All sampled vessels that can be validated should be validated at least once during the sample week, and multiple validations per vessel per week are encouraged; however, only one validation per vessel per day is allowed. These procedures could be utilized for other surveys that do not currently validate vessel presence.

Recommendations:

- An overall recommendation regarding the overlap between the multiple surveys and what should be done is listed in the first two recommendations below under the "At Sea Observer Angler Survey" below (though for this case, charter boats can be added to that recommendation). In brief, if the best practice of using log books can be implemented, then the For-Hire VDTS should be phased out. Until then, if the corrective actions are taken to improve this survey as noted below, then the program is appropriate given resource and legal constraints.
- Make sure a process is in place to obtain contact information for all vessels, so that the sample frame accurately reflects boat population. The 2008 For-Hire Survey vessel directory had about 10% of the vessels with no phone contact point and about 12% that did not list a county and hence were not in the frame to be selected. We recommend that resources be mined to update these missing variables. Since these boat businesses market themselves to the public, we would think that marina managers or websites could be checked for phone numbers and that some investigation of the location of the boat would provide the ability to fill in the county code number in the vessel directory. While, the directory will likely not be 100% complete, the current situation of 600-700 boats with no phone number or county code seems high and able to be addressed. Perhaps field workers in each state could be provided a list of boat names to look out for at their sites, during the slow times, to see if they can locate the missing information? Or, perhaps they have key informants at some of their sites they could ask to see if the incomplete information could be filled in and provided back to NOAA to update the vessel directory.
- For boat owners who never or rarely seem to answer the phone to complete the phone survey, and if the field checks indicate they seem to be out fishing regularly; should be contacted by mail seeking alternative methods of contact; and if that is unsuccessful then reported to state licensing officials as non-cooperative with the recommendation that some action be taken restricting future license or permit issuance until they respond.
- The ~70% response rate on the For-Hire Survey is good. However, a nonresponse check is recommended where extra efforts to contact the non-respondents are made, with a brief survey recording number of trips, number of passengers, species targeted and caught to compare with the respondent means on these

variables. After several months of collecting these data, if there are systematic differences between the respondents and non-respondents, then adjustments should be made, or at least the biases acknowledged in the final reports of for-hire activities. Most survey research manuals/books have sections on how to do non-response checks. The non-response issues should be referred to the estimation advisory team for specific adjustments to be made. In the meantime, some of the bias caused by nonresponse can be removed with appropriate weight adjustment strategy.

- The apparent headboat-charter boat definition inconsistency should be addressed, though given the longevity of the SE Headboat survey, comparability of results concerns are an issue also. For comparability across states and other data sets; the '6 or less' and '7 or greater' passenger operational definition should be standardized across all survey methodologies and utilized.

2.6.2 At-Sea Angler Observer Survey (Headboat Mode)

Description

The For-Hire Survey sampled headboats (also called party boats) from Maine through Georgia are treated as a separate fishing mode and generate separate estimates of effort and catch-per-unit-effort for the mode. Florida and Alabama also conducted pilot studies for headboat mode sampling in the south Atlantic and Gulf of Mexico. Intercept samplers have the option for headboats to board the vessel and collect angler interviews at-sea, using the same interview methods as if conducted dockside. The For-Hire Survey overlaps with several other data collection programs for headboats throughout the region.

Critique

The At-Sea Angler Observer Survey is an acceptable procedure, and probably is more effective than the land based on-site angler survey given that there is a captive audience of anglers and additional observations of catch made by the observer. In the South Atlantic, the at-sea observer survey and for-hire telephone survey overlap with the Southeast Headboat Survey, so hopefully anti-duplication procedures to make sure the same boats are not sampled are being followed.

Recommendations:

- As noted in table 1, there are duplications between the For-Hire Survey, Vessel Trip Reports (VTR) (below), the Large Pelagic Survey (below) and the SE Headboat survey (as well as the MD and SC state logbook programs). For headboats, it appears that the VTR's and SE Headboat Survey (logbook portion) are very similar and one should suffice. The review team recommends that a careful review be done to develop a single report form (using the SE Headboat Survey as the starting template) that adds any additional information needed from the VTR survey (probably the spatial component primarily), and that format of logbook be used instead of the VTR logbook report. We understand the different evolutions and requirements that led to this duplicative effort; and that change in

legislation or rules may need to occur to make this happen, but probably language under the federal paperwork reduction act of 1995, could be used to facilitate this. Also, review the best practice logbook procedures earlier in this report for additional details to review in the enactment of this revised logbook program.

2.6.3 Vessel Trip Report Program (VTR)

Description

Fishing Vessel Trip Reports (VTRs) are a paper-based self-reported trip report for catch and effort that are mandatory for vessels licensed to participate in certain federally managed fisheries in the north Atlantic and mid-Atlantic (Maine to Virginia). Vessels from the south Atlantic may also possess these permits, and all permitted vessels are required to submit VTRs for each fishing trip, regardless of area fished (federal or state waters) and species targeted or caught. Data from vessel trip reports are also included in effort estimates from the For-Hire Survey for the states of Maine through Virginia.

Fishing Vessel Trip Reports (VTRs) are the primary source of spatial data, which is imperative in the monitoring of Total Allowable Catch (TAC) programs, quotas, and fishery specific management areas. VTRs are also used for catch per unit effort (CPUE) calculations, and as a source of discard data, which are critical components of stock assessments.

The VTR frame comes from the Vessel Permit System (VPS), which is a comprehensive directory of federally permitted boats. The VTR frame does not distinguish between for-hire vessel types (headboat vs. charter boat).

The VTR program is designed to be a complete census of catch and effort for for-hire vessels participating in the defined fisheries; however, reporting compliance is less than 100%. Inaccurate reporting also exists in this method of data collection, although it is impossible to quantify or qualify. Intentionally or unintentionally, mis-reporting does exist accidentally or in attempt to disguise catch (species or quantities), fishing effort, gear characteristics, location data, etc. VTRs can be cross referenced with other data sources as a means of validation. Other data sources include dealer reports, bio-sampling, observer coverage, etc.

Some overlap and redundancy in reporting exists with other data collection programs. Examples of redundancy include the requirement of some vessel permits to submit catch reports through their VMS units. Another example is some permits require catch information to be reported through Interactive Voice Response (IVR) systems. Additionally, overlap exists where vessels may have both VTR reporting requirements as well as state reporting requirements for the same fishing activity. The same can be said of VTRs with the For-Hire Survey (FHS).

Vessel trip reporting is a mandated, regulatory requirement and regulation changes are necessary if any change in data elements, record retention or report timing is desired.

Other groups such as State agencies, fishing councils, sector managers, MRFFS/MRIP, etc. have data needs that differ from those of NMFS/NERO.

Applies only to northern and middle Atlantic regions, though some SE vessels may also report.

Critique

This is a census that is mandatory, so sampling issues are not relevant if the directory is kept up to date as it appears to be.

The VTR is complimentary to phone survey.

Time delay issues due to monthly reporting exist. VTRs are supposed to be filled in prior to landing so, if followed recall error should not be a problem.

The database does not contain "DID NOT FISH" reports and it is unknown to what degree reports are absent.

Redundancy with other surveys is acknowledged. Initially, this was a concern that the review team identified. However, Barry Clifford indicated that the reduction in content duplication would have to occur in the other surveys due to the fact that specific data elements are required (by regulation) in VTR reporting. The problem that arises is that any elimination of information from the other surveys in order to utilize that same data from VTRs would then be subject to the reporting time delays associated with VTRs. That is a fundamental reason why recreational data isn't able to solely rely on VTR data.

The review team asked that given that the FHS survey data collection is done fairly well; why do VTR's (which appear to be largely redundant)? For-Hire work group members reported that VTRs must likely continue in order to track individual vessel histories as this information could be used to establish vessel history if management shifted to some type of vessel quota system (e.g., individual quotas). Barry Clifford also indicated that VTRs are mandated by regulation; any holder of a Federal fisheries permit is required to fulfill VTR requirements.

Recommendations:

- Notwithstanding the point made immediately above, an overall recommendation regarding the overlap between the multiple surveys and what should be done is listed in the first two recommendations under the "At Sea Observer Angler Survey" section above (and charter boats can be added to that recommendation's coverage). In brief, if the best practice steps of using log books (not that different than the essence of what VTR is now) can be implemented, with the information needed being a merged version of the VTR and FHS (adapted as needed to be different for headboats vs. charter boats). Until then, if the corrective actions are taken to improve this survey as noted below, then the program can provide most of the needed information given resource and legal constraints while a complete logbook coverage program is implemented.

- The accuracy of reported information appears to be a potential problem. Validation efforts are needed. These might include at-sea observer comparison of observed days and non-observed days reports, or post-trip interviews with anglers on selected boats, and compare findings with later submitted VTR's, bio-sampling at random occasions. It is unclear what if any validation is currently being done to examine misreporting or non-response, which should be monitored and corrective actions taken to alleviate.
- Vessel checks for presence or absence in marina on certain days; cross-checked with later submission of VTR could identify problem vessels to be reported for probable non-compliance; especially if this can be cross-validated with other information that might reveal if they were fishing for the species that trigger compliance.
- If there is to be progress in elimination of response load due to duplication, efforts to increase the timeliness of making VTR data available should be reviewed and/or that regulations requiring specific data elements in the VTR; might be modified so that equivalent information available from other sources be allowed; and/or that the VTR required information be mandated on the other surveys also, and then phase out the VTR requirement?
- The review team is to consider options outside of existing regulations, and hence still wonder if there are ways that the duplication of data collection can be collapsed into a single overall survey that could meet all current data needs by standardizing the needed information in each survey into a master survey that could be collected in one timely data collection process instead of multiple overlapping processes?
- Alternative submission methods, such as on-line web based forms should be investigated and implemented if found to be effective and efficient.
- Apply all applicable best practice recommendations.

2.6.4 Large Pelagics Survey (LPS) (Charter Mode) (Maine through Virginia)

Description

Collects information about the recreational fishery directed at large pelagic species (e.g., tunas, billfishes, swordfish, sharks, wahoo, dolphinfish, and amberjack) in the offshore waters from Maine through Virginia. Participation in the LPS is mandatory and is a condition of obtaining a National Marine Fisheries Service Highly Migratory Species (HMS) permit.

The LPS includes two independent, complimentary survey methods, which provide the effort and mean catch-per-unit-effort estimates needed to estimate total catch by species.

The Large Pelagic Intercept Survey (LPIS) is a survey of fishing access sites, designed to intercept returning boats and collect data on catch by boats that have just completed fishing trips directed at large pelagic species. The data collected by the LPIS is used to estimate mean catch per boat trip by species.

The Large Pelagic Telephone Survey (LPTS) is a telephone survey of vessel owners who hold federal permits for highly migratory species (HMS) or Atlantic tunas. After the For-Hire Survey was implemented on the Atlantic coast in 2005, the LPTS was integrated with the For-Hire Survey's Vessel Directory Telephone Survey (VDTS).

Large Pelagics Intercept Survey (LPIS)

The Large Pelagics Intercept Survey for for-hire mode is a dockside survey of fishing access sites, primarily designed to collect catch data from charter boat captains who have just completed fishing trips directed at or catching large pelagic species. LPIS data are used to estimate the average recreational catch per large pelagic boat trip by species.

Although generally similar, there are four significant distinctions between LPIS and the Angler Access Intercept portion of the For-Hire Survey. The primary difference, as described above, is operational scope. The LPIS for for-hire mode is limited spatially to the Northeast Region, Virginia through Maine, and temporally to June through October. Further, in the for-hire mode only charter boat trips are sampled and only if large pelagic species were targeted or caught on the trip. Additionally, LPIS intercepts vessel trips as opposed to angler trips in the FHS. A single vessel representative, the captain or designee, is interviewed to collect information about the trip. Finally, individual access point sites are grouped together into site clusters. These site clusters comprise the LPIS sample frame unlike the FHS, wherein the sample frame is composed of individual sites.

Master Site Register

The MSR for LPIS is very similar to the site register used in the intercept portion of the FHS, and nearly all LPIS sites with for-hire charter mode are also sampled by the FHS. The primary distinction between the two MSR's is the LPIS site cluster. To increase LPIS interviewing efficiency, individual sites in the MSR are grouped together to form site clusters with reasonable total expectations of interviewing productivity. Sites with expected high numbers of interviews (generally more than 4 per day) are not clustered, while sites with lower expectations of interviewing success are grouped together with other nearby sites. Site clustering is designed to raise the total number of expected boat interviews while minimizing the driving distance between sites. A second important distinction is the difference in estimated fishing pressure at a site. Whereas the FHS uses a categorical scale based on expected numbers of angler-trips per day by mode, month and kind of day (weekend/weekday), the LPIS uses average historical sampling productivity (mean interviews obtained per assignment) by mode, month, and kind of day as a proxy for site fishing pressure.

Sampling

The targeted population in LPIS for-hire mode is determined by YEAR-MONTH-STATE-CLUSTER-KOD category. Months are not grouped into 2-month waves as they are in the FHS. Another small distinction is that Connecticut and Rhode Island are grouped into a single two-state survey area because of low LPIS sampling productivity in these states. Sampling is then stratified by kind of day within month. Unlike the FHS, the LPIS sampling frame is a list of site cluster-days, constructed by expanding the LPIS master site register into days within a kind of day stratum by category (YEAR-MONTH-STATE).

Sample allocation and selection follow those described for the FHS angler access intercept portion with the following exceptions:

- For-hire modes are limited to charter (no headboats)
- Assignments refer to site cluster-days (kod)
- Site cluster-day is the primary sampling unit (sample day) with a stratum
- The primary sampling unit weight is the sum of individual site pressure estimates within the site cluster by kod category
- Systematic draw is ordered uniformly by date within a month to prevent an excessively uneven sample distribution
- Missed assignments may be rescheduled to the same kind of day inside of the same week as the original sample
- Tournament site-days may be sampled if part of a selected site cluster-day assignment

Within a site cluster-day primary sampling unit, boat trips are selected as secondary sampling units making the LPIS a stratified 2-stage cluster design. A key assumption in the design is that boat trips are sampled at random from within the site cluster. There are no alternate sites in the LPIS. Each LPIS interviewing assignment consists of a cluster of sites (or a single high-pressure site), a date, and a boat type.

Large Pelagics Telephone Survey (LPTS)

The LPTS is a telephone survey of boats with NOAA Fisheries permits to fish for either highly migratory species (HMS) or Atlantic tunas. Vessels with the Charter/Headboat HMS permit comprise the "charter boat" stratum. LPTS data are used to estimate the total number of boat trips on which anglers fished with rod and reel or handline for large pelagic species. LPTS estimates of fishing trips are combined with LPIS estimates of mean catch per boat-trip to produce estimates of total catch by species.

LPTS sample frames are constructed as described for the FHS. An important distinction for LPTS is that HMS permit holders are required to participate in the survey, if selected, as a condition to purchase the permit. Not all non-HMS vessels listed in the FHS vessel directory are required to participate in the survey.

Sampling

For the charter boat stratum, sampling follows that described for the FHS, namely equal-probability stratified systematic sampling, drawn weekly by wave and state. The FHS Vessel Directory (sample frame) of known vessels is first sorted by permit category (HMS permit, no HMS permit), then by vessel length, to insure that a representative sample of HMS and Atlantic tuna permitted vessels are selected in the weekly sample draws.

Critique

Applies only to north Atlantic region states.

Other than operational and legal reporting requirements, the actual data collected is duplicative of the other major surveys done along the Atlantic coast, i.e., the FHS, VTR and SE Headboat Survey.

Regarding the intercept survey, the clustering of sites for interviewer efficiency is acceptable.

There was no reporting on if there are differences in participation between HMS and NonHMS sampled boats? And if there is, correction factors applied to adjust for this.

The LPTS procedures are good in terms of sample selection.

The idea of using "pressure" estimates to guide the sampling is a good one if you use it in conjunction with probability sampling.

Recommendations:

- As noted table 1, and another other surveys reviewed above, there are duplications between the For-Hire Survey, Vessel Trip Reports (VTR) (below), the Large Pelagic Survey (below) and the SE Headboat survey (as well as the MD and SC state logbook programs below). It appears that the FHS, VTR's, SEHB and LPS (telephone and dockside surveys) are very similar in data collected and one should suffice. The review team recommends that a careful review be done to develop a single report form that adds any additional information needed from the LPS and that format of logbook be used instead of the LPS current process. We understand the different evolutions and requirements that led to this duplicative effort; and that change in legislation or rules may need to occur to make this happen, but possibly language under the federal paperwork reduction act of 1995, could be used to facilitate this. Also, review the best practice logbook procedures earlier in this report for additional details to review in the enactment of this revised logbook program. If tighter time frames are needed to access the data, then operational processes should be constructed to allow this for the targeted pelagic boats. Even though a standardized logbook process might be used to record and report the data instead of these dovetailed existing programs, selected subsets of boats (say the pelagic boats from Maine to Virginia) could be put on a tighter reporting schedule

and a special team of data coders or processor established to produce more timely reports for the regulators to access for monitoring quotas. If there is specialized information for the pelagic boats that is not requested in the standard logbook; then a supplemental logbook or reporting form could be provided that just requires that specific information to also be sent in by this subset of boat operators.

- If the best practice steps of using a merged log book format (collecting the information that is now recorded in the LPS dockside and telephone survey) can be implemented, understanding that will take major effort in changing the law or regulations, then that should be done. Recognizing that that will take some time to implement, if the corrective actions to improve this survey as noted below are taken, then the program is appropriate given resource and legal constraints.
- For the LPIS, the second stage of sampling is a random selection of vessels at the selected site. No details are provided about how that random sample is taken. Given the NRC recommendation that there be less latitude on the part of the samplers, specific guidelines on how the boat to be surveyed should be selected, should be specified.
- If there is a difference in participation rates between HMS and nonHMS license holders in participation with the LPTS, a procedure to encourage or require participation should be considered and implemented, if feasible.
- We recommend probability proportional to size sampling with the size measure being some advance projection of the effort. This is what pressure tries to get at. Operationally, this can be done with stratified sampling and sampling of some strata at higher rates, directly with PPS (probability proportional to size) sampling, or a combination of the two.
- The review team was asked by the For-Hire Working Group if tournament site-days that are sampled as part of a selected site cluster-day assignment should be excluded if they are the only site selected for a cluster. The answer is no; any "adjustments" to a randomly selected sample unit distorts the assumption of randomness, upon which much of the estimation is based. If a unit is selected, it should be contacted for information.
- The review team was asked by the For-Hire Working Group regarding the LPIS as a stratified 2-stage cluster design where boat trips are sampled at random from within a site cluster if there should be a sub-site selection procedure? Probably not, though if there is some systematic organization to the distribution of boats at marinas (e.g., all bigger boats on north end and all smaller on south end, etc.), rather than more or less random, and that is happening at several marina's, perhaps it might make more sense. But our belief is that rarely are boats segregated in any systematic way, so the current selection process is appropriate.
- The review team was asked by the For-Hire Working Group if actual pressure at the sampled site should be recorded to aid in setting selection probabilities to use in probability proportional to size (PPS) sampling? In addition to using estimates of pressure (e.g., based on historical values) to guide sampling, recording the

observed pressure for use in estimation (so you have the correct weights) and for estimating future selection probabilities should be done.

- Apply all applicable best practice recommendations.

2.6.5 Southeast Headboat Survey (SEHB) (North Carolina through Texas)

Description

The Southeast Headboat Survey consists of two complementary components: dockside bioprofile sampling by trained port agents, and paper logbooks (daily trip reports) collected from the vessel personnel for each trip.

Bioprofile Sampling

For vessel selection, agents are instructed to systematically sample vessels in their area of responsibility on a rotational schedule in order to sample all vessels as equally as possible, based their availability in port. Some vessels run more often than others and thus are likely to get sampled more frequently. Once agents have sampled a frequently running vessel, they concentrate on getting samples from vessels that run infrequently. When deciding which vessels to sample, they note who they have and have not sampled already that month. They are instructed to try and do all vessels once, and then start over. Samplers have some personal freedom in devising sampling agenda. They are instructed to try to sample all headboats equally.

In the next stage, anglers are selected when a headboat unloads and the crew starts passing out fish, a port agent walks up to an angler and asks to measure and weigh the catch, explaining that this is part of a fish survey to obtain biological information. Most anglers willingly cooperate with the sampling. Port agents are instructed to select stringers with less common species when picking anglers whose fish will be sampled. The assumption is that stringers with less common fish will undoubtedly also have the more common fishes caught by the majority of anglers, and thus port agents will obtain a sample of the catch consisting of common, uncommon, and rarely caught species. Samplers are instructed to sample all fish on a stringer, once selected. Once ten individual lengths and weights for a given species have been obtained, however, it is not necessary to sample that species from subsequent stringers. This allows the sampler to concentrate on getting more measurements from the less common or rare species.

The purpose of the dockside sampling is to get measurements and weights for the generation of average weights by species and time and area strata, to go into the calculation of the overall catch summary, when these average weights are multiplied by the estimated numbers from the logbook portion of the survey.

Logbooks

Logbook reporting is mandatory for SE headboats. Vessel personnel are asked to submit a report for each individual trip they make (they do not fill out reports for days they did not fish). If no one on the vessel will complete the logbooks, the port agents are instructed to obtain increased numbers of personal observations of activity, so that the estimate of effort might be made without logs.

There is usually good compliance with logbook reporting requirements in most areas except southeast Florida and the Florida Keys. Non-compliance with the reporting requirement may result in non-renewal of federal permits necessary to participate in certain fisheries. Vessels that are identified as having not turned in trip reports are reported to the NMFS office in charge of issuing federal permits. Vessels are not required to have federal permits if they fish only within state territorial seas; however, they are still required to report if they fish for certain species managed by federal Fishery Management Plans and may face civil penalties for non-compliance. A recent reinforcement of reporting requirements is expected to improve compliance.

Validation of effort reporting is done by comparing the number of anglers on the logbooks versus the number of anglers counted by the port agent. The actual dates of trips reported are also compared with port agents' observations of vessel activity.

Biases in the Southeast Region Headboat Survey may occur if reporting is inaccurate. The data is largely self-reported, which likely contains some biases and errors. Reported catch (from logbooks) is validated by port agents who routinely compare the species reported on logbooks versus the species sampled on the same day (and boat). The For-Hire Working Group informed the review team that steps have been taken to increase compliance. But, there currently seems to be little will among enforcement agencies to make this a priority, though, and compliance will not improve to the degree needed until enforcement is increased.

The review team was informed by the For-Hire Working Group that the logbook survey in South Carolina is not a duplicate survey. The SC logbook form was modified into a triplicate page form, one page of which goes to the State to satisfy permit reporting requirements, one page is given to the NMFS sampler working for the SEHB, and one page can be kept by the vessel itself. Due to the state reporting requirement and the presence of actual state enforcement officers, compliance with the SEHB logbook survey in SC is over 90%. But the state does nothing with the data except use it to certify reporting, and then stores it in boxes.

Critique

Interviewers systematically sample vessels in their area of responsibility on a rotational schedule in order to sample all vessels as equally as possible; but no details were provided as to specific procedures used to accomplish that? The For-Hire Working Group assured the review team that on site vessel selection is a systematic rotating sampling schedule, trying to sample all vessels on a fairly equal basis in a given sampler's area.

Oversampling of frequently running vessels is acknowledged and not problematic if estimation calculations account for this.

The plan to add a HB (pilot survey) to E FL to the existing SEHB Survey will be a test of the FHS methods that are used to sample headboats in the other Atlantic coast states (ME-SC). The FHS is an alternative to the SEHBS.

Anglers on a selected boat are a population. The headboat bioprofile survey selects the stringer as the terminal sampling item, looking for anglers that have stringers with unusual fish. This is a purposive sample that targets a part of the population with specific characteristics of interest; which is not a random sample; so the estimation team should be aware of this to adjust accordingly. Purposive samples are legitimate to increase the efficiency of intercepting targeted sampling units.

Although it initially appeared to the review team that there was duplication of the HB survey in NC, SC, GA and E FL as headboats are covered by the FHS and SEHBS in each of these states, the For-Hire Working Group informed us that the for hire program is supposed to contact the headboat survey personnel in a given area before sampling to make sure SEHB did not already have plans to sample the same boats. This process to avoid respondent load is good, and thus, there is no duplicated effort in this case, if that procedure is followed.

It is not a problem if vessels that run more frequently are sampled more often than other vessels. If the vessel trip is the sampling unit, that's how it should be done. Otherwise reweighting the observations so that more weight is given to the more active vessels when estimating catch needs to be done, and this is more cumbersome to do.

Recommendations:

- Continue the logbook program with enhanced compliance efforts to insure greater participation.
- If the best practice steps of using a merged log book format (collecting the information that is now recorded in the SEHB survey) can be implemented, understanding that will take major effort in revising how past coded data can be linked to newly coded data for longitudinal comparisons and historical record of catch (if needed for limited entry permits, etc.), then that should be done. Recognizing that that will take some time to implement, if corrective actions are taken to improve this survey as noted below, then the program is appropriate given resource and legal constraints.
- A more structured and randomized sampling procedure for selecting boats should be implemented and adhered to.
- Implement probability sampling procedures for selecting caught fish to measure.
- Taking steps to increase compliance with the logbook reporting should be accelerated and enforced and publicized. It appears the lack of enforcement among various enforcement agencies is becoming a serious obstacle and NOAA

may need to sponsor a conference or initiate state by state meetings to educate state enforcement agencies about the need to assist in the effort to increase compliance.

- Validation efforts that are currently being utilized should continue.
- Apply all applicable best practice recommendations.

2.6.6 Maryland Chesapeake Bay Logbook Program

Description

Maryland has a logbook reporting program for charter boats and head boats operating within state waters (Chesapeake Bay and ocean bays within the 3-mile limit). Each charter or head boat owner is issued a Commercial Charter Boat Captain's Log Book containing a set of daily recording forms for each boat he/she owns. Vessel operators are required to record their fishing activities on a daily basis, including number of passengers, number of fishing trips, and number and weight of fish harvested by species (discarded fish are not recorded). In order to reduce non-reporting, an enforcement program was initiated in 2006 that places a "hold" on license renewal if reports are not supplied by June of the following calendar year.

In Maryland, effort data for vessels that operate in coastal bays, state or federal waters are sampled in the For-Hire Survey using the same methods employed in other states. However, to reduce duplication of reporting, the For-Hire Survey relies on effort data from state logbooks for vessels that operate solely within the waters of the Chesapeake Bay. The effort data are treated the same as telephone survey data collected in other states by the For-Hire Survey, and estimation procedures do not differ. Catch data from the Maryland Logbook are not integrated into the For-Hire Survey. The access-point intercept survey portion of the FHS is conducted throughout the state and catch-per-unit-effort from the intercept survey is multiplied by estimated effort from the integrated For-Hire Survey and Maryland Logbook to estimate total catch.

Critique

It is not clear from the information provided if there is any advantage in conducting this state survey over relying on FHS information.

It mentions daily record keeping requirement but then says it is due in June of each year. Does this mean it is submitted only once a year, maybe even after 18 months if they are late?

Validation efforts to assess accuracy of logbooks are lacking.

Recommendations:

- Realistically, we estimate that duplication with the Maryland reporting program is not likely to be changed, due to different reporting requirements and to some extent a greater focus on in-shore and near shore boats. Thus, after the above suggested revised logbook program becomes established, these state agencies could be approached to see if that program and logbook format would meet their needs, and if so, requests to reduce duplication by adopting the federal logbook, could be made (with perhaps some co-management cooperation from the affected captains lobbying their state legislatures to effect the change).
- Until that happens, here are some specific recommendations:
- Status of released catch should be added to the report.
- Implement accuracy of logbook data validation efforts.
- Require that logs be completed by the end of each boat trip.
- Apply all applicable best practice recommendations.

2.6.7 South Carolina Logbook Program (Charter and Headboat Modes)

Description

For-hire vessels in South Carolina are required by state law to maintain and submit daily records of fishing activity to the state resource management agency on a monthly basis. Information on date fished, location, number of persons carried, number of hours fished, number of fish kept and released by species, and disposition of the released fish (dead or alive) are captured for each trip. The state supplies standardized logbooks to each vessel operator. Operators who consistently fail to report may lose the charter license privileges for six months to one year. In the southeast headboat survey, which uses this data as its headboat logbook component in SC, it is close to a census, but we still utilize sampler observations of effort to adjust for non reporting, as sometimes trip reports are omitted. So in some vessels' cases, minor adjustments for non reporting are made. Compliance is about 95% statewide.

Critique

With rigorous enforcement, this program is considered to be close to a complete census and no extrapolation is employed for non-reporting. There is no method in place to validate self-reported catch or but on-site field personnel do adjust for non-reporting of trips as needed for effort data. Vessel operators are not required to record their data at regular intervals within a month and for operators that do not elect to fill their reports out daily, the recall period for filling out the logbook reports is up to one month. The level of completeness and accuracy in this program has not been assessed.

Recommendations:

- Realistically, we estimate that duplication with the South Carolina reporting program is not likely to be changed, due to different reporting requirements and to some extent a greater focus on in-shore and near shore boats. Thus, after the above suggested revised logbook program becomes established, these state agencies could be approached to see if that program and logbook format would meet their needs, and if so, requests to reduce duplication by adopting the federal logbook, could be made (with perhaps some co-management cooperation from the affected captains lobbying their state legislatures to effect the change).
- In the meantime, implement accuracy of logbook data validation efforts.
- Apply all applicable best practice recommendations.

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FOR-HIRE RECREATIONAL
FISHERIES SURVEYS, 2009.", page 60

Table 1. For-Hire Data Collection Program Coverage in Atlantic States.

Shaded state cells indicate for-hire data collection programs that are integrated. C = method includes charter vessels only; H = method includes headboat vessels only; CH = method includes both charter and headboat vessels [excerpts from table 2.2: Inventory of For-Hire Data Collections in the United States and U.S. Territories; NOAA, 2008, p. 79].

	For-Hire Survey	SE Headboat Survey	NE Vessel Trip Report	State-Specific Logbook	State-Specific Survey	Large Pelagic Survey	State HMS Catch Card
Maine	CH		CH			C	
New Hampshire	CH		CH			C	
Massachusetts	CH		CH			C	
Rhode Island	CH		CH			C	
Connecticut	CH		CH			C	
New York	CH		CH			C	
New Jersey	CH		CH			C	
Delaware	CH		CH			C	
Maryland	CH		CH	CH		C	?
Virginia	CH		CH			C	
North Carolina	CH	H					?
South Carolina	CH	H		CH			
Georgia	CH	H					
East Florida	C(H*)	H					

*In pilot study phase

Inventory of For-Hire Data Collections in the United States and U.S. Territories

Prepared by the For-Hire Workgroup of the Marine Recreational Information Program

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Acknowledgements:

Portions of this document were extracted from documentation provided to other MRIP Workgroups, and the authors of those documents include: Rob Andrews, Han-Lin Lai, and John Foster, NOAA Fisheries, Office of Science and Technology.

The For-Hire Workgroup would also like to acknowledge the following people who contributed to this document: Andy Strelcheck, Joe Kimmel, and Jack McGovern, National Marine Fisheries Service (NMFS), Southeast Regional Office; Nancie Cummings, NMFS, Southeast Fisheries Science Center; Linda Barker, Maryland Department of Natural Resources; Wade Van Buskirk, Pacific States Marine Fisheries Commission; Page Campbell, Texas Parks and Wildlife Division; Graciela Garcia-Moliner, Caribbean Fishery Management Council

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Introduction and Statement of Purpose

For-hire data collection programs gather information on fishing effort and catch by marine recreational anglers fishing on professionally licensed for-hire vessels (including charter, guide, and large party boats). NOAA Fisheries supports regional programs to collect these statistics, with the ultimate goal of building a system of data collection programs that are responsive to regional needs and are coordinated at the national level to provide standard data elements for both regional and national assessments of fish stocks and associated fisheries management.

Data needs for fisheries management are facing rapid change in response to the 2007 reauthorization of the Magnuson-Steven Fishery Conservation and Management Act (the Act). The Act specifically requires NOAA Fisheries to undertake a program to improve recreational fisheries management. The Act also requires each Regional Fishery Management Council to develop annual catch limits (ACLs) for each of their managed, unit stock fisheries (with some exceptions, e.g. highly migratory species). Councils may elect to allocate portions of an ACL to separate segments of a fishery (such as for-hire fishing). An ACL must be set below established overfishing thresholds, and variability in fishing mortality estimates must be taken into account to be sure overfishing is not occurring (e.g. more variable landings estimates warrant more conservative ACLs). ACLs must also include measures to ensure accountability. Accountability measures (AMs) are triggered when fishing mortality exceeds, or is projected to exceed, the set ACL for a fishery, and may include adjustments within the fishing season or penalties in the following fishing season. As a current example, in the Gulf of Mexico a new federal rule to begin August, 2008 for greater amberjack, will establish AMs that may shorten the season within the fishing year and in the following year if ACLs for recreational (including for-hire) or commercial sectors are exceeded or are projected to be exceeded. This new approach to regional fisheries management puts greater emphasis on early detection and prevention of overfishing, and places increased demands on current fisheries monitoring systems for timely and accurate data.

Recently, the National Research Council (NRC) reviewed marine recreational fisheries monitoring programs. The report, issued March 2006, included a review of NMFS-supported regional programs, including the For-Hire Survey used on the Atlantic and Gulf of Mexico coasts, a similar Party-Charter Survey on the California coast, the Vessel Trip Report program along the Northeast Atlantic coast, the Southeast Headboat Logbook program along the Southeast Atlantic and Gulf coasts, and several state supported programs that may overlap the federal programs (see chapters 2-4 of the NRC report, "Review of Recreational Fisheries Survey Methods."). Several recommendations of a general nature were provided for improvements or modifications to the existing surveys, but specific regional programs for for-hire fisheries were not endorsed or recommended.

This document provides a description of regional data needs from for-hire fisheries for fisheries assessment and management, and a detailed inventory of current data collection programs that support those functions. This document will be provided to a review panel of three experts in survey design and fisheries dependent data collection methods. The reviewers will be tasked with analyzing the strengths and deficiencies of existing data collection programs and making recommendations to meet the data needs for each region. The specific recommendations could retain current designs, improve current designs, or discard current designs and provide entirely

new (and complete) designs for data collection programs. It is expected that a narrower-scope (for-hire fisheries only) and provision of fuller information on this topic to the reviewers, will result in a more detailed review that details any needed changes in a manner that facilitates immediate implementation of those changes.

The Goal of this review is to provide the Marine Recreational Information Program (MRIP) with the precise actions that must be taken to ensure that the future systems of collecting for-hire data provide accurate (precise and unbiased) data that is most useful for regional and nationwide management needs (which specifically includes catch estimation needs and stock assessment needs). The reviewers should consider the unique aspects of each region's fisheries and the region-specific needs for assessment and management, review data collection programs currently in place, and provide their recommendations for changes and improvements that are suited to meet each region's specific needs. While it is realized that different regions of the country need data at varied levels of detail, it is also important to have landings statistics in units that are additive both within and across regions, and that can be aggregated for multi-regional and national estimates. This is important for adequate assessment and management of stocks with distributions that overlap multiple regions (such as highly migratory species and other coastal migratory species). Therefore, a coordinated system of regional data collection programs that work together to provide standard data elements is needed.

At the conclusion of this review, the reviewers will provide for each management region a prioritized set of recommendations to include:

- 1) Recommendations to retain existing methods that are adequate and require minimal or no modifications;
- 2) Recommendations to retain existing methods with substantial modifications; and detailed descriptions of those necessary modifications;
- 3) Recommendations to replace existing methods that are inadequate and recommended methodologies to replace those programs;
- 4) Recommendations to eliminate existing methods that overlap with other data collection programs and provide no additional value;
- 5) Recommendations to retain existing methods that overlap with other data collection programs, but that provide some additional value, as independent data collection programs, and recommendations for any minor or major modifications;
- 6) Recommendations to combine existing methods that overlap with other data collection programs either as dual-frame surveys or some other modified combination of the overlapping programs.
- 7) Some areas have no current methods in place to collect data from for-hire fisheries. For those locations, the Panel shall recommend methodologies to be piloted as part of the Marine Recreational Information Program (MRIP).

"Inventory of For-Hire Data Collections in the United States and U.S. Territories", page 5

The MRIP For-Hire Workgroup will use these recommendations to create a framework for implementation and guide future MRIP funding. For-Hire Workgroup proposals to the MRIP Operations Team should include proposals to retain existing programs where they are meeting regional and national needs, proposals for immediate changes that can be made to improve existing programs, funding for pilot projects to test and implement new methods, and benchmarking periods where necessary. Technical assistance may also be requested by the For-Hire Workgroup to design new methods and evaluate success of new projects.

"Inventory of For-Hire Data Collections in the United States and U.S. Territories", page 6

Section 1:
Management Regions and Data Needs for Stock Assessment and Fisheries Management

Region 1: Pacific Coast (California, Oregon, Washington)

The For-Hire Fisheries

For-hire vessels, also called commercial passenger fishing vessels (CPFV) in California, target a diverse array of species, and various regions of the state are characterized by different targeted fisheries. In southern California (districts 1 & 2) some of the most common fish caught by CPFVs in southern California include kelp and sand basses; warm-water pelagic species such as tunas, yellowtail, and California barracuda; groundfish species such as rockfishes, sand dabs, and California scorpionfish; and California halibut. In central (districts 3 & 4) and northern (districts 5 & 6) California, common fish caught by the CPFV fleet include Chinook salmon, rockfishes, lingcod, albacore tuna, California halibut, and striped bass.

The CPFV directory for the California Recreational Fisheries Survey (CRFS) lists 348 eligible vessels (as of Sept.-Oct. 2005, Table 1.1). The table below shows the number of eligible CPFVs in the directory by district and angler-capacity category for a typical wave (two month period)

Table 1.1. Number of eligible CPFVs in California in the 2005 Wave 5 sampling frame by district and angler capacity.

Passenger Capacity	District						Total	Percent of total
	1	2	3	4	5	6		
31-150	102	8	12	18	3	0	143	41%
7-30	34	8	1	27	2	3	75	22%
1-6	72	7	9	24	7	11	130	37%
Total	208	23	22	69	12	14	348	

Along the Oregon Coast in 2006, there were charter vessel operations in place out of the Columbia River (16 vessels within Astoria, Warrenton, and Hammond), Garibaldi (11 vessels), Pacific City (2 vessels), Depoe Bay (16 vessels), Newport (16 vessels), Winchester Bay (8 vessels), Charleston (3 vessels), Bandon (3 vessels), Gold Beach (2 vessels), and Brookings (7 vessels). In addition, there are a number of smaller independent and/or transient charter or guide vessels licensed by the Oregon Marine Board as ocean charters. The total number of Oregon ocean charter licenses issued by the Oregon Marine Board has been slightly over 200 in most recent years. Oregon ocean charter trips target salmon, bottomfish, Pacific halibut, albacore tuna, crab, or a combination of two or more of the basic species groups. Within the estuaries, trips are primarily for salmon, sturgeon, or crab.

Washington has four coastal ports with charter boats. In 2006, there were 25 vessels in Ilwaco, 35 vessels in Westport, 4 vessels in La Push, and 13 vessels in Neah Bay. Recreational fisheries include halibut, groundfish, salmon, albacore, and sturgeon.

Licensing Requirements

Federal

A Highly Migratory Species (HMS) license is required by the National Marine Fisheries Service for any for-hire vessel to take HMS. Reporting requirements may include submission of logbook reports.

California

The State of California requires that all vessels that permits any person to take fish for profit purchase a Commercial Passenger Fishing Vessel (CPFV) license from the Department of Fish and Game (Department). The commercial passenger fishing vessel license is issued for the vessel to the holder of a commercial boat registration. The CPFV license must be renewed annually and the Department sells about 450 CPFV licenses per year, including vessels that fish only in freshwater and vessels that fish only for shellfish (e.g., lobsters). A licensee who fishes for salmon in ocean waters north of Point Arguello is also required to purchase a commercial fishing salmon stamp for the operator and one for each crew member as required by United States Coast Guard regulations. Individual anglers on licensed for-hire vessels are also required to have a sport fishing license.

Oregon

State licensing of for-hire fishing in Oregon comes in two forms. First the vessel must be licensed by the Oregon State Marine Board (OSMB). Vessel operators must have a Coast Guard license with either an "Oceans" or "Near Coastal" endorsement. There are additional insurance, bonding, and inspection requirements depending on vessel use. Additional details on the OSMB charter licenses can be found in the source documents provided in Section 2 of this document. The second state licensing aspect applies to all anglers on a charter vessel. Any person engaged in the act of angling is subject to the angling license requirements of the Oregon Department of Fish and Wildlife. There are no special fees required for charter operators or their crew.

Washington

The state of Washington requires different licenses for for-hire vessels and operators, dependent upon the species targeted by those vessels and where the fishing takes place. Separate vessel permits are required for vessels fishing in specified marine areas (areas 1-13) for salmon and non-salmon species (sturgeon, lingcod, halibut, rockfish, etc.). If fishing outside marine areas 1-13, fishing guide licenses are required for the vessel operator to target salmon or designated gamefish species (steelhead, cutthroat, kokanee, landlocked salmon, walleye, bass, etc.). The Salmon Guide License and the Game Fish Guide License cover the vessel operator and are not specific to a vessel (though the vessel(s) operated require Coast Guard inspection for more than 6 passengers). All vessel operators carrying passengers on federally navigable waters must be Coast Guard licensed. Individual anglers on licensed for-hire vessels are also required to have a sport fishing license.

Data Requirements

California

- Species-level data needed for stock assessment: removals (catch, discards), discards (numbers and weight), discard mortality, length distribution of landed catch, length distribution of discards, CPUE, and biological data (sex, otoliths, maturity stage).

- Angler-level data needed for regulatory analysis: number of anglers, number of trips per angler by target and landing site, expenditures, angler characteristics, number of trips, number of fish retained, number of active and inactive CPFVs by home port, number of fishing trips per CPFV by target, month, and area.
- Species-level data needed for fisheries management: total fishing mortality, catch (numbers and weight), discards (numbers and weight), discard mortality, depth of fishing, and target.
- Temporal Scale for Catch and Effort Estimates: estimates are needed on a monthly basis for in-season management and on an annual basis for stock assessment and annual management.
- Spatial Scale for Catch and Effort Estimates: For fisheries management, estimates are needed by management area. For siting of Marine Protected Areas (MPA) and evaluation of regulations, data is needed at a fine scale.
- Accuracy and Precision: A mandatory level of precision has not been set. Target is a PSE less than or equal 0.20.

Oregon

- Species-level data needed for stock assessment and fisheries management include: removals (catch, discards), discards (numbers and weight), discard mortality, length distribution of landed catch, length distribution of discards, CPUE, and biological data (sex, otoliths, maturity stage, length, weight, and tag recovery (CWT, PIT, etc.)).
- Transient ocean guide fleet requires special methods for estimating catch and effort.
- Need trips identified by trip type (salmon, bottomfish, halibut, tuna, spear fishing, or combination (salmon and either bottomfish, halibut, and/or tuna)).
- Need boat trip information, including area of fishing, sub-area of fishing for bottomfish or Pacific halibut trip types, departure time, return time, number of anglers fishing, vessel ID, and trip type.
- At sea observations to determine average weight of discards and information on site and depth for management use.
- Temporal scale for catch and effort estimates is dependent on the fishery. Quota fisheries (salmon and halibut) require weekly in-season (preliminary) estimates; groundfish preliminary estimates are required monthly; and albacore seasonally. Final estimates for all species are generated in January of the following season.
- Spatial scale for catch and effort estimates: Data is required by management area (6 ocean areas and 48 area/reef complexes). Fine scale area data required.

Future management direction and potential future data requirements:

More detailed management due to depleted stock status of several species; real time sampling and analysis of CWT and possible DNA samples; more real-time estimates of catch to meet greater management restrictions; increased data for stock assessment needs; improved estimates of marine discards. There is a need for expanded at-sea observations on all trip types.

Stock assessment needs:

Expanded tagging (CWT, PIT), and biological sampling (scales, lengths, weights, DNA) by area (reef, management area). New and improved fishery independent stock status surveys, including non-extractive surveys for depleted rockfish. More research on discards (magnitude, survivability, release techniques to improve survival, etc.). Increased funding to support continued and expanded sampling (SEBS, biological, and ORBS port sampling).

Washington

- Management and/or stock assessment needs that drive data collections: Catch and effort data to manage quota fisheries in-season as well as to pattern marine survival; CWT and DNA data for current and future preseason modeling needs; scale and length data for stock assessment and preseason modeling needs; groundfish lengths and weights for stock assessment and management needs; groundfish and sturgeon tags for stock assessment.
- Temporal Scale for Catch and Effort Estimates: Dependent on fishery. Quota fisheries (salmon and halibut) require weekly in-season (preliminary) estimates; groundfish preliminary estimates required monthly; albacore seasonally. All final estimates for all species are needed in January following the season.
- Spatial Scale for Catch and Effort Estimates: Estimates are required by management area (4 ocean areas in Washington, 3 estuary areas monitored by coastal program, Puget Sound is monitored by the Puget Sound Sampling Program).
- Accuracy and Precision: Goal is estimates with CVs no higher than 5% on common species; that goal has been met each year since 1990, when variance estimates were first calculated. Exact numbers (100% sampling coverage) would be impossible with current (or any reasonable level of) funding.

Future management direction and potential future data requirements:

Tighter and more detailed management due to Endangered Species Act (ESA) listed stocks; real time sampling and analysis of DNA and CWT samples; more real-time estimates of catch to meet greater management restrictions; increased data for stock assessment needs; tighter estimates of marine survival and bycatch.

Stock assessment needs

CWTs, scales, lengths, weights, DNA

Region 2: Alaska

The For-Hire Fisheries

Marine recreational fisheries are popular in Alaska, particularly in the more populated Southeast and Southcentral regions of the state. About 904,000 angler-days of saltwater effort for finfish were expended in these two regions in 2006, representing 43% of the combined saltwater and freshwater effort in these areas. For-hire (charter) fisheries accounted for about 36% of the marine effort in these two regions. There is currently little or no marine charter fishing effort in the Arctic-Yukon-Kuskokwim region of the state.

Most charter recreational fishing effort is directed at Chinook salmon, coho salmon, Pacific halibut, lingcod, and rockfishes. There is a small but developing fishery for salmon sharks, with most harvest coming from Prince William Sound in Southcentral Alaska. Numerous other species are targeted at a lower level or harvested incidentally, including Pacific cod, starry flounder, sablefish, greenlings, walleye pollock, Dolly Varden, skates, and spiny dogfish. The halibut and groundfish¹ fisheries are supported entirely by wild stocks. Shellfish such as shrimp and crab are sometimes taken as a secondary target on charter trips targeting finfish, or on multi-day or overnight trips.

Approximately 918 sport fishing saltwater charter businesses and 1,649 saltwater charter guides were licensed and active (reported at least one trip) statewide in 2006 (Table 1.2). There were 1,376 registered active vessels in 2006; 752 in Southeast and 624 in Southcentral Alaska. Charter fishing is spread over a large area, with vessels fishing mostly in nearshore state waters, but also in offshore federal waters. In addition to the saltwater charter fleet, the state supports a substantial freshwater guide fishery, the major portion of which targets anadromous species (primarily salmon, steelhead, and Dolly Varden).

Table 1.2: For-Hire Fisheries in Alaska.

Region of the State	Fleet Size	Seasons of Operation	Areas of Operation	Target Species Groups
Southeast	439 businesses 880 guides 752 vessels	All year, peak April-September	Nearshore (state) and offshore (federal)	Salmon, halibut, groundfish
Southcentral	479 businesses 769 guides 624 vessels	All year, peak April-September	Nearshore (state) and offshore (federal)	Salmon, halibut, groundfish

¹ The term "groundfish" is defined in Alaska fishery regulations as "any marine finfish except halibut, osmerids (smelts), herring, or salmonids."

Licensing Requirements

An Alaska sport fishing license is required for most residents from 16 to 59 years of age, and for all nonresidents 16 years and older for fishing in any fresh or salt waters of the state, or in federal waters of the Exclusive Economic Zone (EEZ). Alaska resident disabled veterans (50% or more disability) and residents 60 years and older are eligible for permanent cards issued by the Alaska Department of Fish and Game (ADF&G) that serve as lifetime fishing licenses. All anglers 16 years and older, except those fishing with a lifetime license, restricted income license, or license for the blind, are also required to purchase and have in possession a king salmon stamp when fishing for Chinook salmon (except landlocked Chinook salmon) in fresh or salt water. Several species of fish in Alaska are regulated under annual limits, either statewide or in selected areas of the state. Immediately upon harvesting a species regulated under an annual limit, all anglers must record the species, date, and location on a harvest record. The harvest record is printed on the back of all paper licenses. Anglers not required to have a paper license must record the information on a free harvest record card issued by ADF&G and license vendors statewide. Neither licenses nor harvest record cards are required to be submitted at the end of the season, and serve only as an inseason enforcement tool. No federal permits or licenses are required for sport fishing in Alaska.

The state began requiring all businesses that provided saltwater and freshwater guide services to register annually with ADF&G in May 1995. In 1997 sport fishing guides were also required to register annually. The registration programs were replaced in 2005 with licensing of all saltwater and freshwater sport fishing businesses and guides (AS 16.40.260). A sport fishing business provides "sport fishing services," defined as:

"the indirect provision of assistance, for compensation or with the intent to receive compensation, to a person engaged in sport fishing in taking or attempting to take fish or shellfish by a business that employs a sport fishing guide to provide sport fishing guide services to the person during any portion of a sport fishing trip; "sport fishing services" does not include (A) an activity for which a sport fishing guide license is required; or (B) booking and other ancillary services provided by a tour broker or agent to a sport fishing services operator."

Annual sport fishing business licenses can be issued to businesses that (1) hold a current state business license, (2) present proof of a general liability insurance policy or marine protection and indemnity insurance policy that provides coverage of at least \$100,000 for each incident and \$300,000 for all incidents in a year, (3) pay the license fee (\$100), and (4) satisfy all additional requirements adopted in regulation by the Board of Fisheries.

A sport fishing guide provides "sport fishing guide services," defined as:

"assistance, for compensation or with the intent to receive compensation, to a sport fisherman to take or to attempt to take fish by accompanying or physically directing the sport fisherman in sport fishing activities during any part of a sport fishing trip; "sport fishing guide services" does not include (A) sport fishing services; or (B) services provided by an assistant, deckhand, or similar person who works directly under the supervision of and on the same vessel as a sport fishing guide."

An annual guide license can be issued to a person that (1) is a citizen of the United States, Canada, Mexico, or a resident alien, (2) is certified in first aid by the Red Cross or similar organization, (3) holds a U.S. Coast Guard license to carry passengers for hire (if required by the U.S. Coast Guard), (4) holds a current Alaska sport fishing license, and meets all additional requirements adopted by the Alaska Board of Fisheries. When guiding, guides are required to have the following items readily available for inspection: drivers license or other photo ID, guide license, proof of employment by a sport fishing business, sport fishing license, and any current licenses or tags required for the fishery in which they are participating. License fees are \$50 for a guide or \$100 for a combined business owner/guide.

Guides are held to a high standard of compliance with sport fishing regulations. A guide may not aid in the violation of a statute or regulation by a client, or permit a violation by a client without attempting to prevent (short of using force) and report it. Violations of the guide licensing statutes or regulations adopted thereunder are either violations (similar to parking violation) or misdemeanors, and courts are authorized to revoke the license of guides under certain conditions such as repeated convictions within a three-year period.

The state also monitors the number of vessels used in guided marine fisheries. The state makes no distinction between charter, headboat, or guide boats - all boats used in marine waters to provide sport fishing services are referred to as "charter boats" regardless of their size or the manner in which they are used. Before 1998, ADF&G required registration in selected years or regions of the state. From 1998 through 2004, all charter vessels used for sport fish guiding in marine waters were required to be licensed with the Alaska Commercial Fisheries Entry Commission (CFEC). In 2005 charter vessels were exempted from the CFEC licensing requirements but were required to be registered with ADF&G (at no charge). Currently all vessels that are not documented by the U. S. Coast Guard and are equipped with mechanical propulsion (gas, diesel or steam engines and electric motors) must be also registered with the Division of Motor Vehicles. Charter vessels must register with ADF&G and proof of registration must be attached to and clearly visible on the vessel while charter fishing. In addition to ADF&G registration, charter vessels operating in State Parks may be required to obtain a commercial use permit.

All ADF&G requirements for licensing, vessel registration, and reporting are provided on the ADF&G web site, and business and guide license forms are available for download (web site link provided in references section). Additionally, the web site provides information and links to requirements of the U.S. Coast Guard, Alaska Department of Natural Resources, and other agencies.

Table 1.3. Licensing requirements for for-hire fisheries in Alaska.

Vessel Type	Angler License Requirements	Vessel License Requirements	Additional State or Federal Permits	Miscellaneous Permits
Charter vessels (all for-hire boats, regardless of size)	Individual angler license or substitute if 16 yrs or older.	All businesses and guides must be licensed and charter vessels must be registered with Alaska Department of Fish and Game. All undocumented boats equipped with mechanical propulsion must be registered with the Division of Motor Vehicles.	King salmon stamp required for each individual license when fishing for Chinook salmon..	Commercial use permit required when operating in state parks.

Data Requirements

The State of Alaska manages all recreational fisheries, except halibut, in state and federal waters. Because the North Pacific Fishery Management Council (NPFMC) fishery management plans address only commercial fisheries, the State of Alaska has assumed management authority sport fisheries in the EEZ under a provision of the Magnuson-Stevens Act. Regulation changes are proposed to the Alaska Board of Fisheries (BOF) for each management area of the state on a rotating three-year cycle. In addition, statewide regulations are up for revision every three years. The BOF may also address proposals on a more frequent basis if an emergency or error warrants taking action. In addition to regulatory changes approved by the BOF to address regulatory proposals, ADF&G may also implement regulatory changes preseason or inseason (called "Emergency Orders") to manage fisheries according to management plans adopted by the BOF.

Salmon

Chinook salmon are the primary salmon species targeted by anglers in marine waters of Alaska. The degree of management and data requirements vary by region. In Southeast Alaska, the recreational fishery (guided and unguided combined) is managed for an allocation that is established by the BOF and based on a pre-season abundance index provided by the Pacific Salmon Commission. The sport fishery allocation includes only wild fish or hatchery fish of non-Alaska origin. The BOF has specified in the Southeast Alaska King Salmon Management Plan a suite of management measures to be implemented annually based on the desired range of harvest. The management plan directs ADF&G to attempt to keep the fishery open year-round and restrict guided anglers more than unguided anglers if harvest reductions are necessary.

In Southcentral Alaska, the BOF has established management plans for recreational Chinook salmon fisheries (guided and unguided combined) in the Kodiak, Upper Cook Inlet, Lower Cook Inlet, and North Gulf Coast areas. All plans but the North Gulf Coast management plan specify guideline harvest levels for either the entire year or specific periods of the year to stabilize the sport harvest. Some plans specify more liberal bag limits in "terminal harvest areas," areas where

hatchery or wild salmon return in high numbers. The Upper Cook Inlet plan prohibits guides from fishing in certain waters and the Kodiak plan specifies that guides and nonresidents will be restricted before unguided anglers or resident clients if harvest must be decreased.

Basic data requirements for Chinook salmon fisheries include annual estimates of harvest, broken out by guided/unguided sector. Harvest estimates are required at the end of each fishing season in Southeast Alaska, not only as a data input for stock assessment, but also to choose the appropriate management measures to be implemented in the following year. Although final harvest estimates for all of Southeast Alaska are not available from the statewide mail survey until the following year, harvest estimates are available for the current year from creel surveys conducted from May to September each year at Ketchikan, Juneau, and Sitka. The total Southeast Alaska harvest for the current year is estimated by expanding the creel survey estimate for these ports by the ratio between past creel survey estimates and mail survey estimates for all of Southeast Alaska. The Kodiak plan and the Lower Cook Inlet winter fishery plans are explicitly linked in regulation to harvest estimates from the statewide mail survey. Estimates of annual harvest by regulatory area and period are required for management under the Upper Cook Inlet, Lower Cook Inlet, and North Gulf management plans.

A number of additional estimates are needed for Chinook salmon management in Southeast Alaska. Because the recreational fishery allocation excludes hatchery fish of Alaska origin, the hatchery contribution must be estimated using coded-wire tag return data. These data are estimated for each of several subareas of Southeast Alaska. Inseason harvest projections use the recent 5-year average hatchery contribution. Also required are estimates of the harvest of mature wild fish of Taku River origin in the Juneau area fishery, and estimates of age composition in the Ketchikan, Juneau, Petersburg, Wrangell, and Gustavus fisheries. Genetic stock identification is also being evaluated as a management tool by the Pacific Salmon Commission. Genetic samples are required from Chinook salmon landed at all ports in Southeast Alaska.

Coho salmon are targeted in marine waters in Southeast and Southcentral Alaska. In Southeast Alaska, coho salmon harvest rates from the recreational fishery (guided and unguided) are estimated inseason for the Juneau and Ketchikan areas. These data are used, along with annual estimates of recreational harvest, in management of the commercial troll fishery for coho salmon. In order to document hatchery contributions, the relative contribution of Alaska hatchery coho salmon is estimated from coded-wire tag data for the Ketchikan, Sitka, Juneau, Craig/Klawock, Petersburg, Wrangell, Gustavus, Elfin Cove, and Yakutat area fisheries. Hatchery contribution has been estimated in some Southcentral Alaska marine fisheries but has not been needed on an annual basis.

For nearly all other marine salmon fisheries in the state, annual estimates of harvest from the SWHS are adequate for management. In most cases there are no special regulations for the for-hire sector. ADF&G is also evaluating inseason genetic stock identification as a management tool for marine salmon fisheries (primarily Chinook, coho, and sockeye). ADF&G programs are providing samples from a wide variety of locations in order to build a genetic catalog. Again, management based on genetic information would be applied to commercial as well as recreational fisheries, and would not specifically be for the for-hire sector.

Halibut

Halibut are a major target for charter (for-hire) and non-charter marine recreational fisheries in Southeast and Southcentral Alaska. Information on the magnitude and composition of recreational harvest is needed for stock assessment, management, and future allocation.

The International Pacific Halibut Commission (IPHC) estimates exploitable biomass and evaluates harvest policies using an integrated statistical stock assessment model (Clark and Hare 2006). The annual recreational fishery removals since 1996, including charter and non-charter (in pounds), are included as model inputs. Average weight is estimated by ADF&G from length data and used to convert harvest estimates from numbers of fish to pounds, and used indirectly to estimate discard mortality in the recreational fishery.

The NPFMC allocates the halibut resource among user groups, and the National Marine Fisheries Service (NMFS) manages the fishery accordingly. The charter boat halibut fisheries in Southeast and part of Southcentral Alaska (IPHC Regulatory Areas 2C and 3A) are currently managed under guideline harvest levels (GHLs) expressed in pounds. In April 2007 the NPFMC passed a motion to implement a moratorium on new entry into the charter halibut fisheries in Areas 2C and 3A – implementation of that moratorium by NMFS will require vessel-specific effort and harvest data provided by ADF&G. The NPFMC is in the process of allocating halibut between the charter and commercial sectors, and developing a management system to keep the charter fishery within its allocation or compensate the commercial sector for future reallocation. Analysis of allocation options requires information on harvest history by IPHC regulatory area. Analysis of other management alternatives, such as seasons, size limits, bag limits, and annual limits requires information on numbers of fish harvested by vessel, harvest per angler, size composition of the harvest, harvest by month, etc. Arguably the most pressing data need is for more timely estimates of charter halibut harvest. Current mail survey estimates lag the fishery by about one year. Management of the charter fleet would benefit if harvest estimates were available just after the end of the season (October or November).

No formal requirements for accuracy or precision have ever been stated for halibut data. Of course all agencies want the data to be as accurate as possible, but accuracy has not been rigorously evaluated. As far as precision is concerned, the NPFMC and NMFS typically use the point estimates of charter harvest when assessing whether the GHL has been exceeded. Some consideration has been given to estimation error in alternatives for future allocation and management. The IPHC incorporates the point estimates of sport harvest as constants in the stock assessment model. The relative precision of sport harvest estimates (in pounds) in areas 2C and 3A during 2004-2006 ranged from 5-10% for the charter harvest, 9-13% for the non-charter harvest, and 4-7% for the recreational fishery overall (all at the 95% confidence level).

Groundfish

The BOF has allocated demersal shelf rockfish (DSR) and lingcod among sport and commercial sectors in selected areas in Southeast Alaska. The Board has also specified in regulation management measures that could be implemented preseason or by Emergency Order to manage the DSR and lingcod fisheries within their allocations in these areas. Choice of the appropriate management measures to be implemented relies on annual harvest estimates as well as analysis of fish size and distribution of catch by vessel-trip. The only groundfish assessed in Southeast Alaska is the DSR assemblage (seven species). This assessment is limited to "outside" waters, or coastal waters open to the Gulf of Alaska, rather than the numerous straits and bays of the

“inside” passages. There are no other assessments of management targets for groundfish, and regulation changes are made on the regular three-year BOF cycle, typically using annual harvest estimates.

There are currently no stock assessments, management plans, or allocations for state-managed groundfish stocks in state waters of Southcentral Alaska, and no management specifically targeted on the for-hire sector. Changes to rockfish and lingcod regulations are typically made on the regular three-year BOF cycle, based on anecdotal reports of changes in catch rates, annual estimates of harvest from a statewide mail survey, or trends in age and size composition of the recreational harvest.

Federal assessment and management of commercial fisheries sometimes requires information on recreational removals. For example, DSR biomass is assessed in outside waters of Southeast Alaska using line transect estimates of yelloweye rockfish density multiplied by average weight in the commercial harvest and estimates of habitat area, and then adjusted to account for other minor DSR species based on proportions in the landed commercial catch (Brylinsky et al 2007). Recreational fishery removals are inherently accounted for in the assessment because the observed fish density is determined in part by past removals. The acceptable biological catch (ABC) recommendation is based on the $F=M$ strategy ($M=0.02$) applied to the lower 90% confidence limit of the biomass estimate. The directed commercial fishery is opened only after deducting recreational removals (including discard mortality) from the allowable harvest. Recreational harvest and discard mortality are estimated for charter and non-charter fisheries from a combination of mail survey estimates, charter logbook data, and on-site data on species composition, size composition, and average weight by species.

In the remainder of the Gulf of Alaska, the DSR assemblage is assessed using the biennial NMFS trawl survey and recreational removals are excluded from management of the fishery. Pelagic shelf rockfish (PSR) are assessed using an age-structured model that also excludes recreational harvest. Recreational rockfish harvest occurs mostly in state waters, and the pelagic species harvest is composed primarily of black rockfish, which are not part of the PSR assemblage.

The NPFMC is also moving toward assessment and management of sharks as a separate group, and has requested any available estimates of shark harvest from the recreational fishery. Information of most value might include annual estimates of harvest and release of each species by management area or statistical area, and average size.

Region 3: Pacific Islands (Hawaii and U.S. Territories)

The For-Hire Fisheries

For-hire fishing in the Western Pacific Region has elements of both recreational and commercial fishing. The primary motivation for for-hire patrons is recreational fishing, with the possibility of catching large game fish such as blue marlin. The captain and crew receive compensation in the form of the patron's fee, and are also able to dispose of fish on local markets, as is the case in Hawaii.

The catch composition of for-hire catch versus conventional commercial trolling in Hawaii reflects the different targeting in the two fisheries. Blue marlins are the dominant feature of for-hires in Hawaii, while in Guam; the composition of the for-hire catch is broadly similar to the mix of species in the commercial troll catches. For-hire catches in the Northern Mariana Islands (NMI) are dominated by skipjack, mahi mahi, and wahoo, with little yellowfin being caught, although this is a significant feature of the commercial troll catch.

Table 1.4. Estimated catches by pelagic for-hire fishing vessels in Guam, Hawaii and Northern Mariana Islands in 2005

Location	Catch (lb)	Effort (trips)	Principal species
Guam	56,692	1,748	mahimahi, skipjack, wahoo, blue marlin
Hawaii	478,650	11,318	blue marlin, mahimahi, yellowfin, wahoo
Northern Mariana Islands	21,824	572	skipjack, yellowfin, mahimahi, wahoo

Guam has a for-hire fishing sector, which unlike Hawaii, caters to both pelagic and bottomfish fishing. Until recently the troll for-hire fishery was expanding. Over the past three years however, the number of vessels involved, and level of fishing, has decreased in response to lower tourist volume from Japan due to the Asian economic recession in the late 1990s. Nonetheless, although compromising only 5 percent of Guam's commercial troll fleet, the Guam troll for-hire industry accounts for 11 percent of the troll catch and 25 and 20 percent of the Guam blue marlin and mahimahi catch respectively. The Guam bottomfish for-hire fishery has continued to increase despite the drop in tourist volume from Japan, and accounts for about 10 percent of Guam's bottomfish fishing effort. The primary catch of the bottomfish for-hire fishery are goatfish and triggerfish, which are mostly released.

For-hire fishing in NMI is limited, with about ten boats operating on Saipan, and a few vessels on Tinian conducting occasional fishing for-hires. Tourism is not a significant component of the American Samoa economy, and hence there is little for-hire fishing activity. There are few vessels suitable for for-hire-type operations and the American Samoa government does not actively promote tourism and sportfishing as the local infrastructure for this is limited².

² Tulafono, R. 2001. Gamefishing and tournaments in American Samoa. In, Proceedings of the 1998 Pacific Island Gamefish Symposium: Facing the Challenges of Resource Conservation, Sustainable Development, and the Sportfishing Ethic, 29 July-1 August, 1998, Kailua-Kona, Hawaii, Western Pacific Regional Fishery Management Council.

There are different reporting requirements for each of the island areas in the region. In Hawaii, the state administers a mandatory reporting system, and for a time, also collected voluntary for-hire data through the Hawaii Marine Recreational Fishing Survey (HMRFS). In Guam and the Northern Mariana Islands (NMI), local marine resources agencies conduct voluntary catch and effort field surveys of boat-based fishing activities.

Licensing Requirements

Currently, there are about 200 vessel operating for-hire in the main Hawaiian Islands. They are generally dispersed across the four most populated islands (Hawaii, Maui, Oahu and Kauai), and concentrated in several major ports: Honokohau Harbor (Hawaii), Kewalo Basin, Waianae and Ko'Olina (Oahu), Lahaina and Ma'alaea (Maui) and Nawiliwili (Kauai).

Table 1.5 Hawaii for-hire vessels by island, 2007	
Island	Number
Hawaii	113
Oahu	41
Maui	32
Molokai	3
Lanai	3
Kauai	17
Total	209

Any fishermen who takes marine species for commercial purposes is required by the State of Hawaii to have a Commercial Marine License (CML) and submit a monthly catch report to the Hawaii Division of Aquatic Resources (DAR). For-hire fishing is addressed specifically by Hawaii revised statute 189-2, which states that "any person providing vessel for-hire services in the State for the taking of marine life in or outside of the State shall obtain a commercial marine license." The license is issued to an individual, as opposed to a vessel, and costs \$50. Both the captain and crew are required to obtain a license. Tourists, i.e. for-hire patrons, are not required to obtain a license since they are fishing for recreational purposes.

There are no licensing requirements in the other island areas.

Data Requirements

Currently, there are existing stock assessments for bottomfish (Hawaii, American Samoa, CNMI, Guam) and some pelagics (tunas and billfish). Amendment 14 to the Bottomfish fishery management plan is pending approval. Once approved, the main Hawaiian Islands will be subject to annual quota for the "Deep 7" (onaga, opakapaka, lehi, gindai, hapuupuu, kalekale, and ehū), with the fishing year starting on September 1.

The reauthorized Magnuson-Stevens Fishery Conservation & Management Act (MSRA) has taken a tough stance on overfishing and is requiring Annual Catch Limits (ACLs) for all federally managed species. In the Western Pacific, this could be interpreted to include everything harvested. We currently operate under four fishery management plans: Bottomfish, Pelagics, Crustaceans and Coral Reef. To accurately assess fishing mortality, the catch and effort of both the recreational and commercial sectors need to be considered. In addition, both the Western and

Central Pacific Tunas Commission and the Inter-American Tropical Tuna Commission have already set national quotas for Pacific bigeye tuna and are concerned about the status of Pacific yellowfin tuna and striped marlin. These catch limits are determined by each nation's historic participation in a fishery.

In order to meet the requirements set forth in MSRA, it is felt that data will be needed monthly, at a minimum, to meet the monitoring requirements for those species. We are currently using the state of Hawaii's monthly reporting requirement to support the Deep 7 quota monitoring.

Estimates or counts are needed at the island-level for future management needs. Our charter fleet is easily separated by island. State-federal split would also be helpful.

Estimates might be acceptable for some species, assuming that this results in very low overall variance for a species complex. An exact number will be needed for specific quotas.

Region 4: Caribbean (Puerto Rico and U.S. Virgin Islands)

The For-Hire Fisheries

United States territories within the Caribbean region include Puerto Rico and the U.S. Virgin Islands. For-hire fisheries in these territories are well established and cater to an international tourist base. The charter fishery has operated for more than 50 years, with little monitoring of the development of this fishery over time. Charter trips take clients inshore for snook and tarpon fishing, bottom fishing for snapper and grouper species, and offshore pelagic fishing for billfish, tuna, dolphin, wahoo, and mackerel. Trips range from half-day to full-day in length. Vessels range in size from 15 to 58 feet, and average 35 to 36 feet. There are no large party boats operating in either territory. The charter fishery is seasonally driven by tourism and species availability. There exists a potentially large and unknown number of transient vessels that operate seasonally, particularly in U.S. Virgin Islands and particularly targeting blue marlin (January through September). This transient fleet makes keeping track of vessels for survey purposes more difficult.

The for-hire fishery in the Caribbean also includes a large number of dive boats that provide opportunities for spear fishing for finfish and hand collection for invertebrates, including spiny lobster and conch. Dive trips are regionally concentrated. For example, in the U.S. Virgin Islands, 80% of dive trips originate from St. Thomas, 13% from St. Croix, and 7% from St. Johns.

The for-hire charter and dive fisheries were characterized by Garcia-Moliner et. al (2001, 2002). The authors conducted telephone surveys of advertised for-hire operators in the region and attempted to estimate the size and magnitude of the fisheries (summarized in Table 1.6).

Table 1.6: Caribbean For-Hire Operators (extracted from Garcia-Moliner et al 2001; Garcia-Moliner et al 2002).

Sector	Estimator	Puerto Rico	U.S. Virgin Is.	Combined
Charter	Estimated # of boats	28	32	60
	Estimate # angler trips			43,200
Dive	Estimated # of dive operators	78	104	
	% of dive operators that allow fishing	37%	21%	
	Maximum estimated number of lobster fishers	3,620	3,432	
	Maximum estimated number of spear fishers	52,120	1,248	

Licensing Requirements

Puerto Rico

There are a variety of potential sample frames available, or potentially available in the near future. Under Puerto Rico Fisheries Law 278, charter vessels are required to have a state permit to operate. Enforcement of this permit requirement, though, has been less than perfect to date, though DNER is taking pro-active measures to achieve 100% compliance. Another available

license frame is the federal HMS for-hire permit. Charter vessels also require Coast Guard registration and Public Service Commission authorization. In addition, Puerto Rico DNER maintains an up-to-date database of all known operating charter vessels for the current MRFSS project. Currently, the database consists of 37 charter boat operations, with approximately 1/3 in the San Juan metropolitan area, which make an average of approximately 20,000 fishing trips per year. Of the 37 charter boat operations, 18 are known to have access to internet. The for-hire industry in Puerto Rico does not include any head-boats. It must be recognized, however, that not all dive vessels are included in the DNER database, and obtaining an up-to-date inventory would be an additional task of this project.

U.S. Virgin Islands

For-hire vessels may sell their catch commercially with a commercial license. Federal HMS permits for charter vessels are required to harvest HMS species.

Are charter and dive vessels required to hold certain licenses to operate? What about the transient vessels?

Data Requirements

In this region, the United States has jurisdiction for fisheries management within U.S. territorial seas surrounding Puerto Rico and the U.S. portion of the Virgin Islands. Caribbean fisheries in this region are managed by the Caribbean Fisheries Management Council with oversight from the NMFS Southeast Regional Office. Stock assessments for most species are conducted during Southeast Data Assessment and Review Workshops (SEDARs). Stock assessments for highly migratory species are conducted by NMFS. HMS landed in Puerto Rico and U.S. Virgin Islands count towards the United States' share of international quotas for certain billfish and tunas. A universal complaint among those responsible for assessing and managing Caribbean fish stocks is the lack of reliable, precise, long-term, and continuous data collections from this region.

In Puerto Rico, estimates of for-hire catch and effort have been collected as part of the Marine Recreational Fisheries Statistics Survey (MRFSS) since 2000. However, improved methods for the for-hire sector implemented in other regions where the MRFSS is conducted have never been employed in Puerto Rico. Catch estimates for the for-hire mode in Puerto Rico are not useful for many species. Overall, PSE's for for-hire harvest estimates (in numbers of fish) for marlin, yellowfin and bluefin tuna, sailfish and swordfish are no less than 56%, and most are in the 80% to 100% range. Year to year estimates of harvest are highly variable, with many years estimating zero fish landed. Recreational estimates of harvest for important invertebrate species, including spiny lobster and conch, are needed to support stock assessments and management in this region.

In the U.S. Virgin Islands, there are no methods in place to monitor recreational fisheries. The most basic and primary need is to monitor the size and effort of the for-hire fishery, including the geographical areas and seasons of operation. Once the universe of for-hire vessels is identified, the second, and also critically important, need is to measure and monitor the size, species composition, catch-per-unit of effort, and size composition of the for-hire catches. Baseline estimates were used to describe the size and magnitude of for-hire fishery in the previous section; however, these estimates were generated from one-time studies. The region is defined by

a small, year-round charter fleet with a seasonal influx of transient charter vessels, presumably from the mainland United States, which presents challenges to monitoring.

In both areas of this region, the for-hire fisheries are largely concentrated in a small number of ports; however, a small portion of the fleets are dispersed among islands that are not inter-connected. A survey methodology that focuses on the concentrated fleets could be highly biased. In addition, due to the small numbers of vessels, a survey will require sample sizes that have little impact on reducing reporting burden. Therefore, a census-style method may be more appropriate. Puerto Rico has a license requirement and can enforce mandatory reporting, and a pilot program with enforced mandatory reporting via electronic logbook was funded in May, 2008. It is expected that much more precise estimates for monitoring U.S. harvested HMS species in this region will result. In addition, the pilot program will also monitor lobster and conch catches, which are excluded from the MRFSS methods. For the U.S. Virgin Islands, a mandatory reporting program may not be feasible without some regulatory changes. Data needs for stock assessment for the Caribbean region were prioritized by the NMFS Southeast Fisheries Science Center (provided by Nancie Cummings), and are given below.

Primary and immediate needs:

- Determination of the universe (i.e. number of vessels). This is currently being conducted in Puerto Rico as part of the pilot study for mandatory reporting; however, there is no current effort to accomplish this in the U.S. Virgin Islands.
- Quantify effort in numbers of vessels and numbers of trips by geographical area and season (monthly).
- Quantify hours per trip, number of anglers per trip, and area (by zone/depth) of fishing
- For harvested catch: species composition
- For released catch: species composition, numbers, condition (dead, alive), size (length/weight or length or weight category for estimation of maturity)

Secondary to above and on a per trip basis:

- Size composition of harvest
- Catch-per-unit of effort by trip/boat/angler
- Depth of fishing trip
- Socio-economic aspects of the trip: costs, species preferences, interactions with commercial fisheries

Region 5: Gulf of Mexico and Florida Keys (Texas to Florida)

The For-Hire Fisheries

The U.S. Gulf of Mexico region supports a variety of inshore, nearshore, and offshore charter boats, small guide boats, and large capacity headboats from Texas to Florida. The states of Texas and Florida cover large geographic areas with distinct environmental gradients from north to south, resulting in fish assemblages that are profoundly different among different regions of the states. Important target species of for-hire fisheries in the northern Gulf include a mix of reef-associated bottom fish, pelagics, and highly migratory species. Bottom fish include red, gray, and vermillion snappers; red porgy; shallow water groupers and gray triggerfish. Pelagic and highly migratory species include king and Spanish mackerels; dolphin; wahoo; amberjacks; yellowfin and blackfin tunas, blue and white marlins, and sharks. Inshore species are targeted by small guide boats and some charter boats, and include seatrout and red drum. In central Florida, red snapper become less abundant and shallow water groupers are more important to for-hire fisheries. White grunt and lane snapper also show up in nearshore catches, and snook, which are absent in the northern Gulf, become a major target species inshore. Yellowtail and mutton snapper, dolphin, sailfish, bonefish, and tarpon increase in importance in Florida's southern latitudes. The Florida Keys is an important jurisdictional boundary for management of Gulf of Mexico and South Atlantic Ocean fish stocks, and for-hire fishing in this region may take place in either jurisdiction. The Gulf of Mexico Fishery Management Council has management jurisdiction for most managed fisheries in the EEZ (excluding highly migratory species) of the Gulf of Mexico and EEZ waters west of the Florida Keys. The South Atlantic Fishery Management Council's jurisdiction begins in the EEZ east of the Florida Keys.

Texas

Catch and effort statistics in Texas are collected using separate methods and are not directly comparable to statistics collected throughout the rest of the Gulf region. During 1993-2003, party-boat fishing in state territorial seas (STS) accounted for less than 1% of the annual coast-wide fishing pressure in Texas and less than 1% of landings. An average of 18 thousand man-hours was expended annually to land an average of 8 thousand fishes. Spotted seatrout (36%), red snapper (31%), and king mackerel (14%) were the most frequently landed species from STS party boats during that ten year period. In 2002-03, about 15 thousand man-hours were expended to land about 9 thousand fishes with nine additional species-landed by the party-boat anglers.

Party-boat fishing in the Exclusive Economic Zone (EEZ) accounted for less than 1% of the annual coast-wide fishing pressure and less than 1% of landings during 1993-2003 with an average of 35 thousand man-hours expended annually to land an average of 16 thousand fishes. In 2002-03 alone, about 40 thousand man-hours were expended to land about 26 thousand fishes. Red snapper (45%) and king mackerel (23%) were the most often landed species with twenty-two additional species being landed.

Residence of origin of most annual coast-wide STS and EEZ party-boat anglers during 1993-2003 was almost evenly divided between coastal counties adjacent to the gulf area fished and non-coastal counties at about 45% and 40%, respectively. There were differences among gulf areas, but these were less defined because of the small number of anglers encountered. During

this ten-year period, the primary species sought by STS party-boat anglers were spotted seatrout (19%), king mackerel (13%), tarpon (12%), red snapper (5%), a combination of spotted seatrout and red drum (21%), or a combination of king mackerel and red snapper (6%). About 17% of anglers sought no particular species. EEZ party-boat anglers primarily sought red snapper (26%), king mackerel (15%), or a combination of red snapper and king mackerel (17%) with many of those anglers not targeting any one particular species (29%).

A registry of known charter and guide vessels that operate primarily in waters of the Gulf of Mexico is currently maintained for the For-Hire Survey pilot study in Texas. Those vessels are summarized (see "Gulf Boats") in Table 1.7. For-Hire vessels that operate primarily inside bays and passes are not included in the For-Hire Survey pilot.

Table 1.7. Number of active for-hire vessels in Texas by vessel length (July, 2008).

Vessel Length	Bay Charter/Guide Boats	Gulf Headboat/Charter/Guide Boats
<16'		0
16' to 25.9'		10
26' to 39.9'		79
40' to 64.9'		19
65' and greater		11
Unknown		2
Total		121

The large-capacity headboat/partyboat fishery is sampled separately in Texas by the Southeast Headboat Survey (SEHS) and runs from four major ports. These are Galveston (4 vessels), Freeport (3 vessels), Pt. Aransas (9 vessels), and the Pt. Isabel-South Padre Island area (6 vessels). The vessels range in length from 45-107 ft in length. Passenger capacity is variable, ranging from as few as six to as many as 146 passengers. The Texas headboat fleet focuses its effort on the reef fish complex, with red snapper and associated fishes being the primary target species. The Pt. Aransas fleet does focus seasonally on coastal pelagics, however, with king mackerel and dolphin making up a significant part of catches. The vast majority of fishing occurs in federal waters outside of Texas's 9 mile state territorial seas boundary, and fishing may occur on a combination of natural hard bottom habitat or artificial habitat such as oil platforms. The top five ranked species landed by the headboat fleet fishing off Texas in 2007 were red snapper, vermilion snapper, lane snapper, blackfin tuna and gray triggerfish. The headboat fishery operates year round in all areas, but the majority of fishing effort occurs during the months of April through September. For example, in 2007 in the Galveston/Freeport sampling area, headboat effort went from 4,533 and 3,076 angler-days for August and September, respectively, to a total of 777 angler days for the remaining three months of the year combined. Total effort for 2007 for all Texas headboats sampled by the SEHB was 63,760 angler days (an angler day is standardized to a single full day (8 hours) of fishing; i.e., 20 anglers on a full day would be 20 angler days, while 20 anglers on a half day trip would equal 10 angler days). Trip types were mostly limited to full or overnight/multi-day trips in the northern ports due to distance to the fishing grounds, while headboats in the Pt. Aransas and South Padre Island locales run a variety of trip types, including full, half, $\frac{3}{4}$ day, and some overnight/multi-day trips.

Table 1.8. Percent of fish landed by for-hire anglers in 2007 in Texas.

	Number of Fish Landed in 2007			% of total recreational landings caught by for-hire anglers
	Headboat Anglers	Charter and Guide Boat Anglers	Shore and Private Boat Anglers	
Red Snapper	105,362			
Vermilion Snapper	90,731			
Gag Grouper	170			
King Mackerel	17,952			
Gray Triggerfish	11,809			

Louisiana, Mississippi, Alabama, Florida

Estimates of recreational fishing effort (in numbers of angler trips) are generated for each state on a bi-monthly and annual basis by NOAA Fisheries. Effort estimates since 2000 indicate between 691,000 to 876,000 charter and guide boat angler trips occur in the Gulf of Mexico from Louisiana to the Florida Keys each year. An additional 139,402 angler trips from large-capacity headboats were estimated from daily trip reports in the Southeast Headboat Survey during 2007. The number of for-hire vessels currently known to be operating in each state is summarized in Tables 1.9 and 1.10. In 2007, 73% of all for-hire trips in the Gulf (excluding Texas) originated from the west coast of Florida, 16% originated from Louisiana, 8.5% originated from Alabama, and less than 1% originated from Mississippi.

Table 1.9. Number of active for-hire vessels in Louisiana through Florida by vessel length (July, 2008).

Vessel Length	Louisiana	Mississippi	Alabama	Florida Panhandle	Florida Peninsula	Florida Keys
<16'	4		1	2	2	2
16' to 25.9'	326	11	69	118	412	211
26' to 39.9'	63	20	50	128	169	130
40' to 64.9'	4	8	53	118	47	85
65' and greater	1	4	10	21	13	3
Unknown		1	8	5	24	16
Total	398	44	191	392	667	447

In Louisiana, Mississippi, Alabama, and the northern part of Florida, for-hire fishing year has a two pronounced periods of angler activity. The low activity period runs from November-February, and most of the for-hire fishing trips are conducted by operators of inshore for-hire vessels. The high activity period runs from March-October which coincides with the influx of coastal migratory species of fish, recent historical opening of red snapper season, and warmer weather. For-hire fishing in the middle peninsula and southern portion of Florida is more of a year-round fishery; however, an influx of tourists and part-time residents during winter months, beginning around December and lasting through early spring, generates a seasonal pulse in effort.

Vessel capacity is a good indicator of the areas fished and the types of fisheries targeted by different vessels. Small vessels with a passenger capacity of 1 to 4 passengers are typically guide boats that cater to small fishing parties (often as few as 1 to 2 clients) for personalized trips. These vessels are often trailered to various locations where clients may be picked up and dropped off, which makes these vessels more difficult to intercept in field surveys than vessels that dock at a single, known location where clients board and disembark the vessel. Guide vessels are much more likely to target inshore and nearshore gamefish. Vessels licensed to carry up to six passengers are often referred to as "six packs" and cater to small and medium sized private angler parties. Vessels licensed to carry more than 10 passengers require Coast Guard certification, and these larger vessels may cater to a mix of private parties and/or walk-on passengers. Larger charter and party boats are capable of going farther offshore than small guides and offer a range of nearshore, offshore, and extended overnight trips.

Table 1.10. Number of active for-hire vessels in Louisiana through Florida by passenger capacity (July, 2008).

Passenger Capacity	Louisiana	Mississippi	Alabama	Northwest Panhandle	Western Peninsula	Keys
1 to 4	30		1	37	85	140
5 to 6	172		13	155	96	107
7 to 10	130			69	36	52
11 to 20	8		1	44	9	
21 to 30				31		2
31 to 40	1			4	1	1
41 to 50				9	3	2
51 to 100				10		
> 100		3		4	2	1
Unknown	57	41	176	29	435	142
Total	398	44	191	392	667	447

Large-Capacity Headboats

In Louisiana, there are a total of seven headboats located in Pt. Fourchon on the west side of the Mississippi River Delta, and Empire, on the eastern side of the river. These boats are generally smaller than headboats located in other parts of the Gulf (43'-65', 20-42 passengers). There are no true headboats in Mississippi, and there are six headboats in Alabama that run out of two ports (38-66 ft length range, carrying from 23-66 passengers).

Headboats in the north western Gulf target essentially the same reef fish complex as northern Texas headboats (red snapper, vermilion snapper, gray triggerfish, tunas and mackerel). Additionally, they land substantial numbers of gray snapper. Headboats and charterboats in these areas were severely impacted by Hurricane Katrina in 2005. Several of them were out of business for some time, but all headboats operating prior to Katrina have returned into operation. Fishing is concentrated on both hard bottom as well as around the hundreds of oil platforms off the Louisiana coast. Trip types are usually either full day or overnight/multiday trips. In Alabama, fishing is prosecuted on natural hard bottom as well as on artificial reefs (Alabama has had an active private artificial reef program for a number of years.

On the Gulf coast of Florida from the panhandle to Naples, there are approximately 20 headboats. Vessels range in size from 41-78 ft and carry between 24-150 passengers. Primary species targeted in this area are white grunt, lane and gray snappers, gag and red grouper. Fishing is concentrated on the natural hardbottom ledge areas of the southwest Florida shelf, in depths ranging from 50-150 ft. The Florida Keys reef tract (from Key Largo to Key West) supports a fleet of approximately a dozen headboats, ranging in size from 55-91 ft and capable of carrying from 49-155 passengers. Most fishing effort by headboats in this area occurs in the Atlantic Ocean. The fish communities of this area are more subtropical to tropical in nature, and the primary species of importance in the 2007 landings were yellowtail snapper, gray snapper, lane snapper, cubera snapper, white grunt, bluestriped grunt, red grouper and knobbed porgy. Trip types vary between full and partial day trips along the reef tract, with a small number of vessels running multi-day overnight trips to the Dry Tortugas region.

For-hire fishing accounts for a small percent of total recreational fishing effort. In 2007, charter and guide effort ranged between 1.6% and 3.9% of total fishing effort when compared to shore and private boat fishing effort within each state. Although the number of for-hire trips is small relative to shore and private boat angler trips, the percent of recreational harvest is significant, and the annual total catch and harvest estimates for some species of fish is greatly influenced by for-hire anglers (Table 1.11).

Table 1.11. Percent of fish landed by for-hire anglers in 2007, all states (Louisiana through Florida) combined.

	Number of Fish Landed in 2007			% of total recreational landings caught by for-hire anglers
	Headboat Anglers	Charter and Guide Boat Anglers	Shore and Private Boat Anglers	
Red Snapper	68,308	502,275	615,093	48.1%
Vermilion Snapper	132,365	123,940	139,358	64.8%
Gag Grouper	10,961	49,026	259,685	18.8%
Red Grouper	4,072	26,294	121,557	20.0%
Gray Triggerfish	20,909	66,751	119,108	42.4%

Licensing and Reporting Requirements

The federal fisheries management jurisdiction, called the Exclusive Economic Zone (EEZ), extends from the State Territorial Seas (STS) boundary to 200 nautical miles offshore. In Texas and along the Gulf coast of Florida, STS extend seaward 9 nautical miles. In Louisiana, Mississippi, and Alabama, STS extend 3 nautical miles. For-hire vessels in the Gulf of Mexico are required to have certain federal permits when fishing for selected groups of federally managed species.

Federal Permits and Reporting Requirements

- **Highly Migratory Species (HMS) Charter/Headboat Permit**

A HMS Charter/Headboat Permit is required for any for-hire vessel in state or federal waters fishing for highly migratory species. In the Gulf of Mexico, highly migratory species that may be targeted by the for-hire industry include a variety of sharks (large coastal, small coastal, and pelagic species groups); billfish, including blue and white marlin, swordfish and sailfish; and certain tunas, including yellowfin tuna. A complete list of species covered by the HMS Charter/Headboat Permit can be found at www.nmfs.noaa.gov/sfa/hms. Sale of fish by Charter/Headboat Permit holders is prohibited unless the vessel also has a limited access permit and the commercial fishing season is open.

Reporting requirements for this permit include an option for NMFS to select a percentage of permit holders to complete a logbook report for each trip. Vessels may also volunteer to carry an observer to monitor catch and release of fish. For particular species, including billfish species and bluefin tuna (rare in the Gulf of Mexico for-hire fishery), permit holders are required to report landed fish to the NMFS within 24 hours of landing the fish via a 24 hour toll-free hotline or on line at <http://www.hmspermits.gov/>. Enforcement of this reporting requirement is limited due to the 24 hour period in which harvesters are given to claim fish.

- **Gulf of Mexico Charter/Headboat Reef Fish Permit**

This federal permit is required for for-hire vessels that fish in federal waters for a variety of species in the federally managed reef fish complex, which includes snapper, grouper, amberjack, tilefish, hogfish and triggerfish species in the Gulf of Mexico. Vessels that fish exclusively in state waters may be excluded from this permit requirement, unless the state specifically requires it, but if they are fishing for federally managed species, they are not excluded from certain reporting requirements. There is currently a moratorium on the sale of new permits; however, existing permits may be sold or transferred. Currently, approximately 1650 permits are in existence... The reporting requirement for this permit specifies that the permit holder must be cooperative in at least one of two data collection programs, the For-Hire Telephone Survey or the Southeast Headboat Logbook Program (descriptions of these data collection programs are given in later chapters). Commercial sale of recreational bag limits caught from charter and headboats is permitted with an additional commercial permit.

- **Gulf of Mexico Charter/Headboat Coastal Pelagics Permit**

This federal permit is required for for-hire vessels that fish in federal waters for a variety of species in the federally managed coastal pelagic species complex, which includes mackerel species, cobia, dolphin, little tunny and bluefish in the Gulf of Mexico. Vessels that fish

exclusively in state waters may be excluded from this permit requirement, unless the state specifically requires it. There is currently a moratorium on the sale of new permits; however, existing permits may be sold or transferred. The reporting requirement for this permit is identical to the Gulf of Mexico Charter/Headboat Reef Fish Permit. Commercial sale of recreational bag limits caught from charter and headboats is permitted with an additional commercial permit.

- **Federally Prohibited Species**

One federally protected endangered species, smalltooth sawfish, is concentrated in southwest Florida. Gulf sturgeon, a subspecies of the Atlantic sturgeon, is listed as threatened and is found in the northern Gulf of Mexico. Other species that are prohibited from harvest due to overfishing include goliath grouper, Nassau grouper, and several species of large coastal sharks. There are no reporting requirements for incidental catches in the recreational fishery for any of these species.

Texas

A Fishing Guide License is required for any person who, for compensation, accompanies; assists; or transports any person engaged in fishing in the waters of the state. License categories and fees are:

- \$125 for operating as a resident or non-resident fishing guide in the fresh waters of Texas
- \$200 for operating as a resident fishing guide in all public waters of Texas (salt water and/or fresh water)
- \$1,000 for operating as a non-resident fishing guide in all public waters of Texas (salt water and/or fresh water)

A vessel operator's license is required from the U.S. Coast Guard (USCG) to carry for-hire passengers on waters designated as navigable by the USCG. It is the operator's responsibility to assure compliance with USCG regulations. No person operating a vessel or boat as a fishing guide on or in the salt waters of the state may be issued a Fishing Guide License unless the person presents documentation to the license deputy that the applicant possesses a valid and appropriate U.S. Coast Guard Operator's License.

Does this license cover the anglers?

What information is collected during the purchase of this license?

Does the license cover the vessel or the operator or both?

What number of licenses were sold during the most recent license year?

How useful is this license frame for data collection purposes?

Louisiana

Charter Vessel Licenses in the state of Louisiana

License	Resident	Non-Resident
Charter boat Fishing Guide (up to 6 passengers)	\$250.00	\$1,000.00
Charter boat Fishing Guide (more than 6 passengers)	\$500.00	\$2,000.00
Mothership License (carrying up to 6 skiffs)	\$1,000.00	\$1,000.00
Mothership License (carrying more than 6 skiffs)	\$2,000.00	\$2,000.00
Charter Skiff License (per skiff) (2 persons per skiff limit)	\$50.00	\$50.00

All commercial licenses expire on December 31 each year, unless noted otherwise.

The Charter Vessel License in Louisiana does not cover the license requirements of passengers on board. Recreational anglers that fish from for-hire vessels must also possess a valid, individual saltwater angler license to fish in the state of Louisiana. For passengers that do not possess an individual fishing license that permits saltwater recreational fishing in Louisiana, anglers may purchase a limited three-day license specifically to fish from a guided or charter vessel.

Residents who fish from a charter vessel in saltwater areas of the state, with a licensed guide on board at all times may possess a Charter Passenger License at a cost of \$5.00, which is valid for three consecutive days. Charter guide license number or mothership license must be provided when purchasing charter passenger licenses.

Nonresident anglers who fish from a charter vessel in saltwater areas of the state, with a licensed guide on board at all times may possess a Charter Passenger License at a cost of \$5.00, which is valid for three consecutive days. Non-resident anglers fishing under the direction of a charter operation in a licensed charter skiff in saltwater areas of the state may possess a non-resident charter skiff three-day license at a cost of \$30.00 and shall be valid for three consecutive days. Charter guide license number or mothership license must be provided when purchasing charter passenger and non-resident charter skiff licenses.

Mississippi

All resident and nonresident vessels engaged in charter boat fishing, party boat fishing, head boat and guide boat fishing must possess a valid license. Crew members and customers of the licensed vessel are not required to purchase an individual resident or nonresident saltwater fishing license while sponsored by the licensed vessels.

License fees are as follows:

Resident Charter/Party Boat	\$200.00
Non-Resident Charter/Party Boat	\$200.00
Alabama Charter boat (7-25 people)	\$300.00
Florida Fishing Boat + Captain's License	\$635.00
Mississippi Captain's License	\$10.00
Interstate Commerce for Charter boats	\$20.00

All Charter boat and Charter boat Interstate Commerce licenses expire on June 30th of each year. Before resident boat licenses can be purchased, proof of residence must be shown along with valid boat registration/documentation.

Alabama

Certified Commercial Party Boats:

Up to 6 people	\$201.00
7-25 people	\$301.00
Over 25 people	\$501.00

Persons on board a licensed for-hire vessel may fish without an individual recreational fishing license.

What info is collected, how useful for survey frame, how many sold in most recent license year?

Florida

For-Hire License (Charter, Headboat, and Guide Operations)

Charter, headboat, and guide operations require a for-hire license. Passengers on for-hire vessels are not required to possess individual fishing licenses.

For-Hire Vessel and Captain License Categories:

Charter Captain – up to 4 Customers	\$201.50
Charter Captain – up to 10 Customers	\$401.50
Charter Captain – 11 or more Customers	\$801.50
Charter boat – up to 4 Customers	\$201.50
Charter boat – up to 10 Customers	\$401.50
Charter boat – 11 or more Customers	\$801.50

The Charter Boat License covers an individual vessel which may have multiple captains. In order to purchase a Charter Boat License, a vessel must be registered as a commercial vessel and the vessel registration documentation is required. Individual counties may also require an occupational license. The Charter Captain License covers an individual captain who may operate multiple vessels. In order to purchase a Charter Captain License, A Coast Guard Captain's License is required.

Table 1.12 summarizes Charter Boat and Charter Captain licenses for the 2006/07 license year. Because the majority of for-hire licenses are Charter Captain licenses, the Florida license data base is not usable as a vessel frame for for-hire data collection programs. The For-Hire Survey in

Florida maintains a separate vessel register that is updated regularly for new vessels entering the fishery or existing vessels that are sold or leave the fishery. Certain federal permit information is not available to the state agency (FWC) that maintains the For-Hire Survey vessel registry. For example, NMFS Southeast Regional Office publishes the name and physical address of south Atlantic dolphin and wahoo permit holders, but certain information including phone numbers are kept confidential and vessel location information (port city) is not given. This information is needed to research potentially unknown vessels for their location or activity in the fishery. As a result, the For-Hire Survey vessel registry is largely maintained by vessel information collected during MRFSS intercept surveys and For-Hire Survey interviews.

For-hire vessels operating in Everglades National Park and Cape Canaveral National Seashore are required to have additional permits to fish inside park boundaries.

Table 1.12. Number of state for-hire licenses sold in Florida for the July, 2006 to June, 2007 license year.

Number of Passengers Covered by License	Charter Boat License	Charter Captain License
up to 4	448	1,926
up to 6	456	
up to 10	162	570
11 or more	164	32
Total	1,230	2,528

Data Requirements

Many recreational species that are restricted to inland and state territorial seas (STS) are managed on a state by state basis, and there is a need for state-specific monitoring. Within Florida and Texas, there is also a need for more spatial resolution due to regional differences within the large geographic areas of the states. Coordinated data collection and management among state and federal jurisdictions is very important in this region. Many of the species targeted in for-hire fisheries are managed as single Gulf of Mexico stocks, and those fisheries may be impacted by a combination of fishing in state and federal jurisdictional boundaries. Texas and Florida have jurisdiction over a large STS boundary that extends 9.0 nautical miles seaward from shore. The STS boundary in Louisiana, Alabama, and Mississippi extends 3.0 nautical miles seaward from shore. Catch and effort statistics are important on the varied scales of state and region within state, as well as area of jurisdiction (EEZ/STS). There is also a need for resolution between the Gulf of Mexico and South Atlantic jurisdictions in the Florida Keys, particularly if a survey methodology is used for regional expansions of catch and effort.

Texas surveys the for-hire fisheries operating within the state using independent methods, and catch and effort statistics are not standardized with statistics generated for the remainder of the region. This causes a great deal of difficulty for regional stock assessments and for regional management. Texas estimates are based on two fishing seasons, a high-use and low-use season, and estimates are not generated monthly or on a calendar year. No data are collected on discarded fish in the Texas survey, and estimates of numbers or species composition of discards are not available. The standard unit of effort in the Texas survey is a boat trip, compared to the

angler trip which is measured through the remainder of the region. For-hire fishing in EEZ waters has historically been under-sampled in the Texas survey design, though recent efforts have been made to improve estimates for vessels operation in the EEZ.

Improved data on discarded fish is a major need for stock assessments. Current estimates of discards have not been used for some stock assessments, such as Gulf red snapper, because they are considered unreliable. Recreational fisheries have become increasingly regulated through size limits, bag limits, and seasons, and the proportions of discards have greatly increased as a result. Stock assessments must now account for the significant amount of mortality that is attributed to discarded fish. For some species in this region, the estimated percentage of mortality for discarded fish in the recreational sector is as high as 40%. For reef-associated bottom fish, discard mortality is depth-dependent, and currently there is very low resolution of area fished in for-hire data collection programs. Depth fished, condition of released fish, reason for discard (undersized, bag limit met, etc.), magnitude of discards by depth, change in survival rate with depth, and age/size distribution of discarded fish are important data needs. Also important is improved accuracy and precision of estimates of numbers and species composition of discarded fish, and estimates of variance.

Stock assessment needs for landed fish include annual landings estimates in both numbers and pounds by state or region, estimates of error for landings, age and size data of landed fish by fishing mode and state/region, and discard estimates.

The new provisions in the Magnuson-Act Reauthorization will require regional councils to implement annual catch limits (ACL) and accountability measures (AM). As a result, regional fisheries managers will be increasingly dependent on recreational landings data to monitor annual catches and, when necessary, close recreational fisheries in-season or adjust quotas in the following season when catch limits are exceeded. Monthly estimates would be preferable. If ACLs are not monitored in season, then final annual estimates shortly after the year ends will be beneficial to allow for adjustments in recreational seasons or catch levels in the following fishing year. The level at which an ACL is set below the defined threshold for overfishing for a particular fishery will be dependent on the level of variability of catch estimates. Variability in catch estimates should be minimized to the extent possible. For fisheries with highly variable catch estimates, a more conservative ACL will need to be in place. Therefore, high amounts of variance make it difficult or impossible to monitor quotas and catch levels for infrequently caught species. The alternative approach to in-season and post-season adjustments to management is to manage recreational fisheries more conservatively with size limits, bag limits, and shortened seasons so that accountability measures can be avoided. The economic impacts to for-hire fisheries from either approach are poorly understood.

Additional data needs for management include data for bag limit analyses, size limit analyses, seasonal closure analyses, annual trends in landings, and fishing effort by species and state. An additional data need is the ability to conduct bag limit analyses for captain and crew. Current survey methods do not include captain and crew in estimates of total anglers fishing. It would be beneficial if the survey collected information on the number of captain and crew aboard a for-hire fishing trip. Other important data needs for conducting management measure analyses include target species, days fished on current trip, days fished in past month, and hours fished.

"Inventory of For-Hire Data Collections in the United States and U.S. Territories", page 35

For monitoring inshore fishing, a particular data need in this region is representative sampling of catch data from inshore guide boats. These small, trailered vessels are difficult to intercept for angler interviews or to validate reported fishing effort, due to the fact that they may be launched from a number of locations.

Region 6: South Atlantic (east Florida to North Carolina)

The For-Hire Fisheries

This region is characterized by a latitudinal gradient from tropical fisheries in the southeast portion of Florida, to a mix between sub-tropical and temperate species to the north. Many fisheries in this region are restricted by northern or southern distribution boundaries. For example, for-hire fishing for red snapper and vermillion snapper are centered in the mid-section of this region in Georgia and northeast Florida. North Carolina is an important northern boundary for distribution of many sub-tropical species. Red drum, spotted seatrout, mackerel, and many other species range throughout the south Atlantic region and may migrate seasonally into more northern areas. As a result, for-hire fisheries throughout the south Atlantic region target varied species assemblages and are influenced by the seasonal presence or absence of species. North Carolina has a significant for-hire fishery targeting bluefin tuna, and southeast Florida is an important area for swordfish and sailfish. Marlin are targeted throughout the south Atlantic.

Estimates of recreational fishing effort (in numbers of angler trips) are generated for each state on a bi-monthly and annual basis by NOAA Fisheries. Effort estimates since 2005 indicate an average of 489,300 for-hire angler trips occur in the south Atlantic from eastern Florida (excluding the Keys) to North Carolina each year. An additional 139,402 angler trips from large-capacity headboats were estimated from daily trip reports in the Southeast Headboat Survey during 2007. The number of for-hire vessels currently known to be operating in each state is summarized in Tables 1.13 and 1.14. In 2007, 42.4% of all charter and guide angler trips in the south Atlantic originated from North Carolina, 35.5% originated from the east coast of Florida (not including trips in the south Atlantic originating from the Keys), 16.8% originated from South Carolina, and 5.3% originated from Georgia.

Table 1.13. Number of active for-hire vessels by vessel length (FL as of July, 2008; GA as of February, 2008).

Vessel Length	Southeast Florida	Northeast Florida	Georgia	South Carolina	North Carolina
<16'		2	155	58	1
16' to 25.9'	53	132	11	82	316
26' to 39.9'	56	61	12	59	222
40' to 64.9'	89	39	8	32	292
65' and greater	11	7	0	5	16
Unknown	21	10	0	0	0
Total	230	251	186	236	847

Vessel capacity is a good indicator of the areas fished and the types of fisheries targeted by different vessels. Small vessels with a passenger capacity of 1 to 4 passengers are typically guide boats that cater to small fishing parties (often as few as 1 to 2 clients) for personalized trips. These vessels are often trailered to various locations where clients may be picked up and dropped off, which makes these vessels more difficult to intercept in field surveys than vessels that dock at a single, known location where clients board and disembark the vessel. Guide

vessels are much more likely to target inshore and nearshore gamefish. Medium sized vessels that carry between 5 and 10 passengers are often referred to as “six packs” and cater to small and medium sized private angler parties. Vessels licensed to carry more than 10 passengers may cater to a mix of private parties and/or walk-on passengers. Larger charter and party boats are capable of going farther offshore than small guides and offer a range of nearshore and offshore trips.

Table 1.14. Number of active for-hire vessels by passenger capacity (FL as of July, 2008; GA as of February, 2008).

Passenger Capacity	Southeast Florida	Northeast Florida	Georgia	South Carolina	North Carolina
1 to 4	22	63	0	12	0
5 to 6	61	57	179	91	0
7 to 10	15	41			
11 to 20	11	8	7	3	0
21 to 30	2	0	0	1	0
31 to 40	2	1	0	1	0
41 to 50	1	2	0	1	0
51 to 100	5	8	0	5	0
> 100	3	1	0	2	0
Unknown	108	70	0	120	847
Total	230	251	186	236	847

For-hire fishing accounted for less than 2.0% of total recreational fishing effort in 2007 (between 1.7% and 3.3% within each state). Although the number of for-hire trips is small relative to shore and private boat angler trips the annual total catch and harvest estimates for some species of fish is greatly influenced by for-hire anglers (Table 1.15).

Table 1.15. Percent of fish landed by charter and guide boat anglers in 2007, all states combined.

	Number of Fish Landed in 2007			% of total recreational landings caught by for-hire anglers
	Headboat Anglers	Charter and Guide Boat Anglers	Shore and Private Boat Anglers	
Vermilion Snapper	508,011	95,057	119,206	83.5%
Red Snapper	7,136	10,438	30,814	36.3%
Black Sea Bass	164,320	86,904	484,379	34.2%
Dolphin	6,217	443,571	770,163	36.9%
King Mackerel	34,121	112,943	692,497	17.5%

Licensing and Reporting Requirements

The federal fisheries management jurisdiction, called the Exclusive Economic Zone (EEZ), extends from the State Territorial Seas (STS) boundary to 200 nautical miles offshore. The STS boundary extend 3 nautical miles from the east coast of Florida (including the eastern side of the

Florida Keys), Georgia, South Carolina, and North Carolina. For-hire vessels in the south Atlantic are required to have certain federal permits when fishing for selected groups of federally managed species.

Federal Permits and Reporting Requirements

- **Highly Migratory Species (HMS) Charter/Headboat Permit**

A HMS Charter/Headboat Permit is required for any for-hire vessel in state or federal waters fishing for highly migratory species. In the south Atlantic, highly migratory species that may be targeted by the for-hire industry include a variety of sharks (large coastal, small coastal, and pelagic species groups); billfish, including blue and white marlin, and a concentrated swordfish fishery in southeast Florida and the Keys; sailfish; and certain tunas, including a concentrated bluefin tuna fishery in North Carolina. A complete list of species covered by the HMS Charter/Headboat Permit can be found at www.nmfs.noaa.gov/sfa/hms. Sale of fish by Charter/Headboat Permit holders is prohibited unless the vessel also has a limited access permit and the commercial fishing season is open.

Reporting requirements for this permit include an option for NMFS to select a percentage of permit holders to complete a logbook report for each trip. Vessels may also volunteer to carry an observer to monitor catch and release of fish. For particular species, including billfish species and bluefin tuna, permit holders are required to report landed fish to the NMFS within 24 hours of landing the fish via a 24 hour toll-free hotline or on line at <http://www.hmspermits.gov/>. Enforcement of this reporting requirement is limited due to the 24 hour period in which harvesters are given to claim fish. North Carolina vessels landing bluefin tuna are exempt from this reporting requirement because they are required to participate in a state-managed catch card reporting system.

- **Atlantic Charter Headboat Permit for Dolphin and Wahoo**

Charter and headboat vessels must be permitted to fish for dolphin and wahoo in federal waters of the Atlantic Ocean. In addition, operators of charter and headboat vessels must have and display an operators permit. Headboat operators are required to fill out daily trip reports (logbooks) and submit them to National Marine Fisheries Service as part of the Southeast Headboat Survey. There is no moratorium on the issuance of new permits.

- **South Atlantic Charter Headboat Permit for Pelagic Fish**

Charter and headboat operators must possess a charter/headboat vessel permit for Coastal Migratory Pelagics (cero, cobia, king mackerel, little tunny, and Spanish mackerel) when fishing in federal waters of the south Atlantic. Headboat operators are required to fill out daily trip reports (logbooks) and submit them to National Marine Fisheries Service as part of the Southeast Headboat Survey.

- **South Atlantic Charter Headboat Permit for Snapper and Grouper**

Charter and headboat operators must possess a charter/headboat vessel permit when fishing for species in the snapper/grouper management unit in federal waters of the south Atlantic. The snapper/grouper management unit includes 14 snapper, 19 grouper, 9 porgy, 3 triggerfish, 8 jack, 3 tilefish, 11 grunt, 3 sea basses, 2 wrasse, and 1 spadefish species. Headboat operators are

required to fill out daily trip reports (logbooks) and submit them to National Marine Fisheries Service as part of the Southeast Headboat Survey. There is no moratorium on the issuance of new permits.

Data Requirements

See also data requirements for fisheries management and stock assessments detailed in the Gulf of Mexico section.

The South Atlantic Fishery Management Council is currently in the process of setting annual catch limits (ACLs) and accountability measures (AMs) as required by the 2007 reauthorization of the Magnuson-Stevens Fishery Management and Conservation Act (MSA). As part of that discussion, the Council is considering separate ACLs for the for-hire sector. Industry representatives in this region have expressed a desire to receive a separate allocation for ACL-managed fisheries that is independent of the private recreational sector so that the for-hire sector can be managed with more precision. If more precise fishery landings statistics are available for the for-hire sector, this would allow ACLs for this sector of the recreational fishery to be set closer to the defined Allowable Biological Limit (ABC), which is the limit that landing must remain below to insure that overfishing is not occurring. Less precise estimates, which are expected for estimated landings for private recreational fisheries, will require ACLs to be set lower in order to guarantee catches are below the ABC. High amounts of variance will make it difficult or impossible to monitor quotas and catch levels for infrequently caught species (such as for snowy grouper, with landings that vary widely in response to presence or absence in dockside surveys). By allowing the for-hire sector to be managed with a separate ACL, the industry may be able to better gauge the length of the fishing season and maintain a more steady stream of business throughout the year. This management direction will increase the future demand for the most precise, sector-specific landings data possible to keep fisheries open and businesses running as long as possible within a season.

Region 7: Mid-Atlantic

Note: Pennsylvania and North Carolina belong to the Mid-Atlantic Fishery Management Council but are not included in this description. North Carolina is included in the South Atlantic Region and data are not available for Pennsylvania (tidal Delaware river).

Climate, physiographic, and hydrographic differences separate the New England-Middle Atlantic Area and the South Atlantic Area, with the natural division occurring at Cape Hatteras (though the division is better thought of as a mixing zone rather than a definitive boundary). The New England-Middle Atlantic area is fairly uniform physically and is influenced by many large coastal rivers and estuarine areas including Chesapeake Bay, the largest estuary in the United States; Narragansett Bay; Long Island Sound; the Hudson River; Delaware Bay; and the nearly continuous band of estuaries behind the barrier beaches from southern Long Island to Virginia. The southern edge of the region includes the estuarine complex of Currituck, Albemarle, and Pamlico Sounds, a 2500 square mile system of large interconnecting sounds behind the Outer Banks of North Carolina (Freeman and Walford 1974 a-d, 1976 a and b). In the New England-Middle Atlantic area, the continental shelf (characterized by water less than 650 ft in depth) extends seaward approximately 120 miles off Cape Cod, narrows gradually to 70 miles off New Jersey, and is 20 miles wide at Cape Hatteras. Water temperatures range from less than 33 °F off New York in February to over 80 °F off Cape Hatteras in August. Within the New England-Middle Atlantic Area, The "Mid-Atlantic Bight" is the term used to describe the sandy, relatively flat, gently sloping continental shelf from southern New England to Cape Hatteras, NC.

For-Hire Fisheries

There is a wide variety of for-hire vessels in the Mid-Atlantic region, ranging from 17-foot center consoles that take 1-2 people fishing to headboats/partyboats over 100 feet that can hold up to 300 passengers. The species that are targeted have a similar variation, from small inshore fish like croaker to offshore pelagics like bluefin tuna to deep water shelf species like tilefish. The methods employed are equally diverse. Table 1.16 lists estimated numbers of fish caught (both harvested and released) for the top twenty species by all for-hire vessels in the Mid-Atlantic Region (MRFSS data) in 2007.

The species composition of for-hire fleets can vary strongly from region to region. For example, in New Jersey black sea bass, bluefish and summer flounder are the top three, while in Maryland, with catches in the Chesapeake Bay influencing the mix, the top three species are spot, striped bass, and black sea bass. Effort also shifts strongly with the seasons, with effort generally lower in the winter and higher in the summer. That said, even in the coldest winter months there is for-hire activity, especially for seabass, tautog, and tilefish in deep water, and Virginia's highest striped catches occur in the winter months.

Table 1.16. Top 20 species caught (both harvested and released) by all For-Hire vessels in the Mid-Atlantic Region in 2007.

Rank	Species Name	Numbers of Fish
1	BLACK SEA BASS	2,252,990
2	BLUEFISH	1,447,872
3	SUMMER FLOUNDER	1,223,552
4	STRIPED BASS	900,475
5	SPOT	719,638
6	ATLANTIC CROAKER	695,784
7	SCUP	543,810
8	TAUTOG	309,504
9	SEAROBINS	259,608
10	DOGFISH SHARKS	157,132
11	SKATES/RAYS	148,580
12	WHITE PERCH	105,954
13	RED HAKE	57,045
14	TOADFISHES	56,869
15	TUNAS and MACKERELS	52,967
16	SHARKS besides DOGFISH	51,931
17	CUNNER	44,453
18	TRIGGERFISHES/FILEFISHES	23,625
19	WEAKFISH	21,133
20	KINGFISHES (drum family)	13,339

Estimates of recreational fishing effort (in numbers of angler trips) are generated for each state on a bi-monthly and annual basis by NOAA Fisheries. Effort estimates since 2000 indicate an average of 1.3 million for-hire angler trips occur in the mid-Atlantic from Virginia to New York each year. The number of for-hire vessels currently known to be operating in each state is summarized in Tables 1.17 and 1.18. In 2007, 39.0% of all for-hire trips in the mid-Atlantic originated from New Jersey, 37.3% originated from New York, 15.6% originated from Maryland, 4.3% originated from Virginia, and 3.8% originated from Delaware.

Table 1.17. Number of active for-hire vessels by vessel length. (as of Feb. 2008)

Vessel Length	Virginia	Maryland	Delaware	New Jersey	New York
<16'	107	464	29	107	48
16' to 25.9'	45	42	26	101	110
26' to 39.9'	92	116	76	470	296
40' to 64.9'	68	130	37	199	120
65' and greater	3	6	3	43	36
Unknown	0	0	0	0	0
Total	315	758	171	920	610

Table 1.18. Number of active for-hire vessels by passenger capacity. (as of Feb. 2008)

Passenger Capacity	Virginia	Maryland	Delaware	New Jersey	New York
1 to 4	6	10	3	50	24
5 to 10	159	396	48	233	261
11 to 20	1	7	5	11	2
21 to 30	2	8	0	8	4
31 to 40	0	6	0	6	4
41 to 50	0	2	0	16	9
51 to 100	0	3	0	24	21
> 100	0	0	1	8	31
Unknown	147	326	114	564	254
Total	315	758	171	920	610

For-hire fishing accounted for less than 6.2% of total recreational fishing effort in 2007 (between 1.6% and 8.4% within each state). Although the number of for-hire trips is small relative to shore and private boat angler trips the annual total catch and harvest estimates for some species of fish is greatly influenced by for-hire anglers (Table 1.19).

Table 1.19. Percent of fish harvested by charter and guide boat anglers in 2007, all states combined.

	Number of Fish Landed in 2007		% Landed by Charter and Guide Boat Anglers
	For-Hire Anglers (Charter and Party)	Shore and Private Boat Anglers	
Striped Bass	434,425	1,076,257	28.8%
Summer Flounder	327,440	2,466,061	11.7%
Bluefish	1,177,222	3,381,056	25.8%
Black Sea Bass	688,378	830,512	45.3%

Licensing and Reporting Requirements

Federal Permits and Reporting Requirements

- **Highly Migratory Species (HMS) Charter/Headboat Permit**

A HMS Charter/Headboat Permit is required for any for-hire vessel in state or federal waters fishing for highly migratory species. In the mid-Atlantic, highly migratory species that may be targeted by the for-hire industry include a variety of sharks (large coastal, small coastal, and pelagic species groups); billfish, including blue and white marlin and sailfish; and certain tunas, including bluefin tuna. A complete list of species covered by the HMS Charter/Headboat Permit can be found at www.nmfs.noaa.gov/sfa/hms. Sale of fish by Charter/Headboat Permit holders is prohibited unless the vessel also has a limited access permit and the commercial fishing season is open.

Reporting requirements for this permit include an option for NMFS to select a percentage of permit holders to complete a logbook report for each trip. Vessels may also volunteer to carry an observer to monitor catch and release of fish. For particular species, including billfish species and bluefin tuna, permit holders are required to report landed fish to the NMFS within 24 hours of landing the fish via a 24 hour toll-free hotline or on line at <http://www.hmspermits.gov/>. Enforcement of this reporting requirement is limited due to the 24 hour period in which harvesters are given to claim fish.

Due to concerns over anglers not accurately reporting bluefin harvest to the toll-free hotline in Maryland, a catch card must be filled out for bluefin tuna landed in Ocean City, Maryland, and turned into an approved catch-card station. After the catch card is completed, an angler receives a numbered landing tag to be placed on each tuna before it can be removed from the boat.

- Atlantic Charter Headboat Permit for Dolphin and Wahoo
Charter and headboat vessels must be permitted to fish for dolphin and wahoo in federal waters of the Atlantic Ocean. In addition, operators of charter and headboat vessels must have and display an operators permit. There is no moratorium on the issuance of new permits.

Other federal permits

There are charter permits required to fish in the EEZ for (grouped by permit) 1) northeast multispecies groundfish (e.g. cod and haddock), 2) summer flounder, 3) scup, 4) black sea bass, 5) squid, Atlantic mackerel, and butterfish.

Virginia

CHARTER/HEAD BOAT-6 & UNDER PASSENGERS \$190.00
CHARTER/HEAD BOAT-MORE THAN 6 PASSENGERS \$190.00 plus \$5.00 per passenger over 6

In addition to a US Coast Guard license and the regular VA charter boat license referenced above, a charter boat captain may be required to obtain additional no-cost permits. Such permits are usually set up to ensure that charter captains are aware of rules associated with special management programs for a species and to facilitate harvest reporting. Currently the only additional permit being required for charter boat captains is for the striped bass fishery, with additional reporting forms required.(e.g. <http://www.mrc.virginia.gov/Forms/charters/2008SBCharter.pdf>).

Maryland

Captains need either general commercial license (\$300) or a guide license (\$50). The fishing guide reporting system is a mandatory reporting system for vessels for-hire (charters and head boats). For-hire captains in Maryland waters, including the Maryland portion of the Chesapeake Bay, ocean side bays, and Maryland jurisdictional waters of the Atlantic Ocean, are required to record their fishing activities on a daily basis. Data reported to DNR include the number of passengers, number of fishing trips each day, and number and weight of fish harvested by species.

For-Hire Vessels can also get permits to cover fishing licenses for anglers on board:

BAY SPORT CHARTER BOAT LICENSE allows individuals on board chartered vessels operated by MD licensed fishing guides to fish in the Chesapeake Bay and its tributaries in lieu of individual licenses. These licenses are issued only to holders of Maryland Commercial Fishing Guide Licenses.

- o \$240.00 -- up to 6 passengers
- o \$290.00 -- more than 6 passengers

Delaware

Charter boat license (vessel hired on a per trip basis) - \$150 for Residents/\$300 Non-Resident

Head boat license (vessel hired on a per person basis) - \$300 Resident/\$600 Non- Resident

Reporting: All headboat/charter boat fishing permit holders shall maintain a logbook, supplied by the Department, for those finfish species that have management plans which require landings to be monitored. Headboat/charter boat fishing permit holders shall forward copies of their logbook entries to the Department as prescribed by the Department. The logbooks shall contain, but not be limited to: (1) The headboat/charter boat fishing permit number; and (2) The number and/or weight, by species, of finfish landed on each date.

New Jersey

Fillet Permit (onboard filleting) for Party Boats: \$2.00

New York

Marine and Coastal District Party and Charter Boat License : \$250

Reporting (<http://www.dec.ny.gov/regs/4015.html>)

- (i) Upon written notification from the Department, the holder of a marine and coastal district party and charter boat license issued pursuant to Section 13-0336 of the ECL shall complete and sign a Fishing Vessel Trip Report for each party or charter boat fishing trip, on forms prescribed by the Department, and submit such reports to the party designated by the Department within 15 days after the end of each month. For each trip, the operator of any permitted vessel shall complete and sign the Vessel Trip Report prior to the vessel's return to port. If no fishing trips were made during a month, a Fishing Vessel Trip Report shall be submitted to the designated party indicating that no trips were made.
- (ii) The requirements contained in subparagraph (i) of this paragraph are in addition to and do not replace or revise any other applicable reporting requirements under state or federal law.

- (iii) Upon the request of an on-board observer, who is an authorized representative of the Department or of the National Marine Fisheries Service, the holder of a marine and coastal district party and charter boat license shall carry such on-board observer at all times when engaged in activities authorized by such license, and shall report catch and effort information to the Department or the National Marine Fisheries Service when requested to do so by such agencies or an authorized representative.

Data Requirements

See also Atlantic States Marine Fisheries Commission Position on Recreational Data Collection (ASMFC 2006).

There is currently no Wave 1 (Jan-Feb) surveying, but there is Wave 1 for-hire effort, especially for striped bass in Virginia and tautog, black sea bass, and tilefish in deeper water all along the Mid-Atlantic coast.

Many species are managed on a state by state basis, and there is a need for state-specific monitoring. Many of the species targeted in for-hire fisheries are managed as single stocks shared by commercial and recreational fleets, and may also be impacted by a combination of fishing in state and federal jurisdictional boundaries. Stock assessment needs for landed fish include annual landings estimates in both numbers and pounds by state or region, estimates of error for landings, age and size data of landed fish by fishing mode and state/region, and discard estimates.

Improved data on discarded fish is a major need for stock assessments. Recreational fisheries have become increasingly regulated through size limits, bag limits, and seasons, and the proportions of discards have greatly increased as a result. Stock assessments must now account for the significant amount of mortality that is attributed to discarded fish. For some species in this region, the estimated percentage of catch discarded is 80-85% (black sea bass and summer flounder estimates respectively) and the mortality for these discarded fish in the recreational sector is 10-25% (summer flounder and black sea bass estimates respectively). Depth fished, condition of released fish, reason for discard (undersized, bag limit met, etc.), magnitude of discards by depth, change in survival rate with depth, and age/size distribution of discarded fish are important data needs. Also important is improved accuracy and precision of estimates of numbers and species composition of discarded fish, and estimates of variance.

The new provisions in the Magnuson-Act Reauthorization will require regional councils to implement annual catch limits (ACL) and accountability measures (AM). As a result, regional fisheries managers will be increasingly dependent on recreational landings data to monitor annual catches and, when necessary and/or feasible, close recreational fisheries in-season or adjust quotas in the following season when catch limits are exceeded. Monthly estimates would be preferable. If ACLs are not monitored in season, then final annual estimates shortly after the year ends will be beneficial to allow for adjustments in recreational seasons or catch levels in the following fishing year. The level at which an ACL is set below the defined threshold for overfishing for a particular fishery will be dependent on the level of variability of catch estimates. Variability in catch estimates should be minimized to the extent possible.

Additional data needs for management include data for bag limit analyses, size limit analyses, seasonal closure analyses, annual trends in landings, and fishing effort by species and state. An additional data need is the ability to conduct bag limit analyses for captain and crew. Current survey methods do not include captain and crew in estimates of total anglers fishing. Other important data needs for conducting management measure analyses include better target species data, days fished on current trip, days fished in past month, and hours fished. Additional economic data for regulatory impact analysis via bioeconomic models would also be very useful.

Region 8: North Atlantic

For-Hire Fisheries

The region can be partitioned into two biogeographical area separated by Cape Cod, with colder water species to the north in the Gulf of Maine and warmer water species to the south. Bluefish, Atlantic cod and striped bass are important target species in the charterboat industry while cod, haddock and scup are the dominant species in the headboat fishery. Scup is primarily targeted in waters south of Cape Cod while groundfish species such as cod and haddock are targeted by headboats in the Gulf of Maine. Movement among areas is common as vessels originating in southern New England may fish in the north by transiting the Cape Cod Canal into the Gulf of Maine. There are also headboat trips to Georges Bank targeting groundfish species such as cod and haddock. Charter trips targeting tunas (bluefin, yellowfin, etc.) is also an important component of for-hire fisheries and is captured in the large pelagics survey.

Estimates of recreational fishing effort (in numbers of angler trips) are generated for each state on a bi-monthly and annual basis by NOAA Fisheries, with the exception of wave 1 which is not sampled. Effort estimates since 2005 indicate an average of 452,145 for-hire angler trips occur in the north Atlantic each year. The number of for-hire vessels currently known to be operating in each state is summarized in Tables 1.20 and 1.21. In 2007, 50% of all for-hire trips in the north Atlantic originated from Massachusetts, 19.5% originated from New Hampshire, 12.8% originated from Rhode Island, 10.5% originated from Connecticut, and 6.9% originated from Maine.

Table 1.20. Number of for-hire vessels by vessel length. (as of Feb. 2008)

Vessel Length	Connecticut	Rhode Island	Massachusetts	New Hampshire	Maine
<16'	42	29	65	10	6
16' to 25.9'	42	34	295	22	80
26' to 39.9'	83	128	455	37	57
40' to 64.9'	26	26	97	14	12
65' and greater	4	7	15	4	0
Unknown	0	0	0	0	0
Total	197	224	927	87	155

Table 1.21. Number of for-hire vessels by passenger capacity (as of Feb. 2008).

Passenger Capacity	Connecticut	Rhode Island	Massachusetts	New Hampshire	Maine
1 to 4	6	15	32	2	20
5 to 10	63	62	252	22	91
11 to 20	0	1	4	1	5
21 to 30	1	0	2	0	2
31 to 40	0	0	0	1	2
41 to 50	2	1	0	2	2
51 to 100	1	0	0	2	0
> 100	4	2	0	4	0
Unknown	120	143	637	53	33
Total	197	224	927	87	155

For-hire fishing accounted for less than 5% of total recreational fishing effort in 2007 (between 2.7% and 17.4% within each state). Although the number of for-hire trips is small relative to shore and private boat angler trips the annual total catch and harvest estimates for some species of fish is greatly influenced by for-hire anglers (Table 1.22).

Table 1.22. Percent of fish landed by charter and guide boat anglers in 2007, all states combined.

	Number of Fish Landed in 2007		
	Charter and Guide Boat Anglers	Shore and Private Boat Anglers	% Landed by Charter and Guide Boat Anglers
Striped bass	122,307	515,275	19.2%
Atlantic Cod	136,906	175,632	43.8%
Summer Flounder	54,557	362,324	13.1%
Black Sea Bass	33,555	182,353	15.5%
Bluefish	274,001	1,085,084	20.2%

For-Hire fisheries in this region operate primarily between the months of March-October, with relatively little activity during the winter months. Many of the targeted species such as bluefish, striped bass, sea bass and summer flounder are seasonal migrants to the area and are generally not available until May. Early season for-hire fisheries in the Gulf of Maine generally target cod and haddock and recently in southern New England effort has increased in a winter fishery to offshore wrecks targeting black sea bass and cod. Long distance trips to Georges Bank for cod and haddock are also most frequent between December and March.

Licensing and Reporting Requirements

- Federal permits are required for charter/headboats fishing for (i) Bluefish, (ii) Black Sea Bass, (iii) Summer Flounder, (iv) Northeast Multi-species, (v) Scup, and (vi) Squid, Mackerel, Butterfish. Vessels with these permits are required to submit fishing vessel trip reports (paper logbook) for each trip.
- Federal permit required for charter/headboats fishing for highly migratory species, including billfish, certain tunas, and certain sharks.

Additional state license requirements may also apply.

Data Requirements

Accurate recreational catch information is required for many of the stock assessments in the Northeast including cod, haddock, summer flounder, bluefish, striped bass, tautog and winter flounder. Increased landing restrictions for many species result in potential increases in the number of released fish. Consequently, data pertaining to B2s (caught and released alive) becomes increasingly important, particularly length frequency data. In addition, several of these species are comprised of different stocks within the region (i.e. winter flounder stocks include Gulf of Maine, Georges Bank and southern New England). Information about catch location is necessary to partition landings and discards into the appropriate stock. Often state landed and distance from shore does not accurately reflect the stock from which the landings occurred since multiple stock areas may be fished from a given port. If a for-hire logbook system is implemented the catch location should be a required field (precision of location information should be limited to protect the confidential nature of fishing locations). Since many of these species assessed using recreational data also occur seasonally in the Mid-Atlantic region, similar data requirements apply to that region.

Additional data that are not routinely collected involves economic information. Evaluation of alternative management plans often requires consideration of addition costs imposed on a fishery. Without adequate information from the for-hire fisheries, the economic impact cannot be fully evaluated. Collection of data such as trip costs (fuel costs, bait, etc.) would go a long way towards improving economic analyses.

In the Northeast, federally permitted for-hire vessels are required to submit Vessel Trip Reports (VTRs). However, if a vessel only fishes within state waters and does not have a federal permit, they are not required to submit a VTR. During the data collection process, an effort should be made to identify permitted vessels to reduce duplication of data reporting. Coordination should also be increased among agencies to produce vessel logs that collect the required information.

"Inventory of For-Hire Data Collections in the United States and U.S. Territories", page 50

Section 2: Current Data Collection Methods

Region 1: Pacific Coast (Oregon, Washington, California)

California Commercial Passenger Fishing Vessel Logbooks

Since 1936, operators of CPFVs in southern California have been required to record data on individual fishing trips in a logbook and then submit the logbook to California Department of Fish and Game (DFG). The CPFV logbook program was suspended for a six-year period during World War II (1941-1946), but resumed again in 1947. In 1957, CPFV operators in northern California were also required to submit logbooks (Annual Status of the Fisheries Report Through 2003, Appendix B-2). Records must be kept (FGC section 7923) according to the regulations prescribed by the California Fish and Game Commission (Title 14, CCR, sections 190 and 195) and submitted to the Department (FGC section 8026). The logs or record of no fishing activity shall be forwarded to the Department on or before the 10th day of each month following the month to which the catch logs or record fishing pertain. Failure to keep and submit records may result in the revocation or suspension of a license or permit by the Department or the Commission, when recommended by the Department, for a period not to exceed one year [FGC subsection 8026 (b)].

Currently, very little is done to account for non-reporting. Department Enforcement staff will check a CPFV if they receive a complaint, receive information from Department staff, notice something in the CFIS database, such as the take of a closed species, or read something on an angler online venue. When a Fish and Game warden investigates, they check that the CPFV logs are being filled out properly and sent to the Department on time. There is a draft plan to have warning letters sent to CPFV operators to obtain missing or incomplete logs.

CPFV operators fill out the state supplied logbooks and send them to the Department of Fish and Game (Department). The Marine Region's Marine Fisheries Statistics Unit (MFSU) staff key the data into an Oracle-based program called Commercial Fisheries Information System (CFIS). A Department Biologist reviews the data and inserts it into the database and continually reviews the database for errors and entering late received logs. The following key data elements are collected by the CPFV Logbooks:

- Vessel Name*
- Port of Landing*
- Vessel ID Number
- Port Code
- Month/Day/Year
- Day of Week
- Trip Type
- Target Species (7 boxes southern CA, 9 boxes for central/northern CA)
- Fishing Method (6 boxes)
- Bait (4 types; live or dead: 8 boxes)
- Bird Interaction
- Departure Time
- Return Time
- Hours & Minutes Fished
- Number of Fishers

- Block Where Most Fish Caught
- Depth (Feet)
- Sea Surface Temperature (F)
- Species Name & Code (preprinted – 32 southern CA, 26 central/northern CA)
- Blank lines for write-ins of Species Name and Code
- Operator name*
- Number of crew who fished*
- Number of fish caught by crew*

*Written information not entered into database.

California Recreational Fisheries Survey (CRFS) on-board sampling has been used to validate trips, catch and effort to determine their accuracy. While the data has not been rigorously examined, it appears that some under reporting of passengers and over reporting of catch does occur.

Data Gaps and Bias:

- Southern CA 1936-2007: missing years 1941-1946
- Northern CA 1957-2007: data not collected from 1939-1956
- Fishing activity is reported by a single fishing block where the most fish were caught. A fishing block is based on 10 minutes latitude and longitude charts; in California fishing blocks are approximately 10 miles square. If fishing activity occurs over a wider geographic range than one fishing block, the information is not captured. The exact location of fishing location within a block (e.g. GPS coordinates or latitude & longitude) is not recorded.
- The logbook information is biased in an unknown manner according to which operators accurately complete and turn in the logs to the Department. There is believed to be about a 70% compliance rate, so about 30% is not reported.
- For what is reported, the accuracy is not known. There may be underreporting, over-reporting, or omission of reporting catch altogether.

Pros

- Mandatory with penalties associated with non-compliance.
- Validation for compliance and accuracy can be done with on-board CRFS sampling.
- Relatively inexpensive system.

Cons

- Enforcement of mandatory requirements is time-consuming.
- No system in place to confirm compliance and accuracy for every trip.
- Information is not available on a timely basis. Logs are sent in a month after data collected and by the time they go through the data entry process, it can be several months before the data is accessible in CFIS. Data are currently entered by hand which is time intensive. Several state employees are needed to input and maintain the data in the database.

The CPFV database is a 70 year plus data set that is invaluable for looking at the history of sport fishing in California. Time and effort put into compliance would prove very useful to have a better and more complete picture of the sport fishing take from year to year.

In previous years, logs were scanned; however, the scanner broke and the technology was no longer supported. Rather than investing in a new scanner, it was decided that the logs would be hand keyed. There are fewer errors with hand keying than scanning, as many stray marks were picked up as data entry points during scanning and later had to be edited, but with newer technology it might be worth pursuing this again. There are still errors with hand key entry, and it is time consuming throughout the year and at the end of the year to pull the hard copies and correct the errors. There are several fields on the log that are not captured in the data entry that have proven useful when trying to clear up data entry errors: vessel name, port of landing and day of week are handwritten and not entered into the database as is the operator's name, number of crew who fished, and number of fish caught by crew. Increased accuracy at the initial data entry stage, with flags set on the fields, could prevent errors. An alternative would be to have a website that survey operators could directly enter their catch into either at end of the day, week or month. It would be real-time data that could be accessed much more quickly for in-season information. A hard copy could continue to be filled out and sent as a back up. In regards to hard copy retention, right now the current year plus four must be kept. After five years, the logs can be shredded. It would be better to have the old logs scanned and archived into PDF files, so they can be accessed for years to come.

California Recreational Fisheries Survey

A voluntary telephone survey of commercial passenger fishing vessels (CPFVs) that operate in marine waters off California is used to collect fishing effort data. This survey is called the Party Charter Phone Survey (PCPS). The program started in mid-2001 and was fully operational beginning in 2002. Ten percent of the fleet is sampled on a weekly basis.

An independent on-site, intercept survey is used to collect data on catch. The intercept survey is conducted either onboard CPFVs at-sea or dockside at the end of the fishing trip. Owners or operators of licensed/permitted CPFVs must, as a condition of the license/permit, cooperate when asked to carry and accommodate an observer on fishing trips, at no charge to the sponsoring agency. Individual angler participation in the dockside or at-sea interview is voluntary.

A detailed description of both the PCPS and the intercept survey is available in the report titled, "Draft Review of California Recreational Fisheries Survey Methods, California Department of Fish and Game, August 2006" and can be viewed at http://www.dfg.ca.gov/marine/pdfs/crfs_review.pdf.

The PCPS effort survey is an implementation of the For-Hire Telephone Survey developed by the National Marine Fisheries Service (NMFS). The components of the PCPS include:

- Compiling and maintaining a directory of CPFVs operating in marine waters in each district,
- Conducting a weekly telephone survey of a random sample of CPFV representatives (usually the CPFV operator) in each district, and

- Conducting dockside vessel checks to document CPFV activity and validate the self-reported data from the telephone survey.

The vessel directory is stratified into six districts and the sampling rate is between ten and fifty percent. The following key data elements are collected during the PCPS weekly telephone survey for effort:

- Number of trips with paying passengers during the specified week.
- Number of saltwater fishing trips with paying passengers that targeted finfish during the specified week.
- Name of the vessel and Fish and Game Boat Number.

For each trip:

- County from which the trip originated
- Day of the week that the trip was taken
- Date the trip was taken
- Length of the trip (i.e., half-day, three-quarter day, full-day, or multi-day with the number of days)
- Mode by which the passengers paid for the trip (i.e., charter trip where passengers hired the vessel as a group, and party boat-trip where passengers pay on an individual basis)
- Type of trip (e.g., freshwater fishing, saltwater fishing for shellfish only, whale watching, scuba diving, saltwater fishing for salmon, saltwater fishing for groundfish, and saltwater fishing for pelagic species)
- Number of paying passengers
- Number of people who fished
- Primary area of fishing
- Water area (i.e., ocean or open bay, enclosed bay, and river)
- Distance from shore (i.e., 3 miles or less, 3 to 200 miles, and more than 200 miles)
- Total time for the trip
- Amount of time spent actively fishing with gear in the water to the nearest half hour

Field samplers conduct dockside vessel checks and record the activities of CPFVs. These data are used to validate the data from the telephone survey and update the CPFV directory. The dockside vessel checks are also used to identify the location of each CPFV, the angler capacity of each CPFV, the ability of each CPFV to carry an observer (sampler) on trips, changes in contact information, and changes in status (active or inactive).

In addition to the telephone survey, dockside and at-sea interviews collect information on the harvested and discarded catch from anglers after they have completed their trip. At-sea surveys collect more detailed data on discarded fish than can be collected during dockside interviews. Samplers also collect data on the lengths and weights of discarded fish while onboard CPFVs.

Intercepts of vessels in the CRFS field surveys are used to make an under coverage ratio to correct for participating vessels not included in the CPFV directory for the telephone survey and to make a response error ratio to correct for misreporting of vessel trips.

Data Gaps and Bias:

- Participation is voluntary and the percent of vessels participating has decreased since the inception of the survey. In northern California, participation has declined from 43% in 2002 to 28% in 2007, and in southern California it has declined from 44% to 35%.
- Generally, CRFS doesn't conduct onboard sampling on multi-day trips; these boats are sampled dockside. This probably results in undersampling of trips targeting highly migratory species.
- CRFS doesn't conduct on-board sampling on small CPFVs (commonly called six-packs). These boats are sampled at the dock. These boats are often sampled on an opportunistic basis at public launch ramps and partyboat landings.
- Telephone survey refusals or non-participation: The estimation method for effort from the telephone survey assumes that a random sample was taken, and that the effort on the CPFVs of participants and non-participants is the same. Any difference would introduce a bias in the effort estimates. The participation rate is currently less than 50 percent. The Department is working to increase that rate. In addition, data from the vessel checks and from the logbooks can be used to document any bias.
- Effort estimate dependent on self-reported data: The accuracy of the effort estimate is dependent on the accuracy of self-reported data. The survey incorporates several independent data sets to validate the self-reported data and improve confidence in the data.
- Charter refusals: Chartered CPFVs are not exempt from the regulations requiring CPFVs to take samplers onboard all fishing trips. However, landings often refuse access to chartered CPFVs, because the charter master who rented the CPFV may not want a sampler onboard. This will introduce bias if the catch on charter trips differs from the catch on open party trips. The bias can be reduced by sampling dockside when the CPFV returns from the fishing trip.
- Non-representative (Hawthorne effect): Some CPFV operators may alter their "game plan" when a sampler is onboard. For example, they may avoid areas that they normally fish, so that the sampler will not observe any species of concern being caught. This behavior is known to social scientists as the Hawthorne effect. Humans have been known to alter their behavior when aware of being observed. Data from such trips may introduce a bias, since trips without samplers may have different fishing behavior. The presence of samplers may induce better compliance with regulations, which leads to a lower catch rate bias.
- Busy CPFV trips: If the catch rate is high or if more than 20 anglers are onboard, the total catch of the boat-trip may be incomplete. The sampler may not always see what is thrown back, and some anglers may be too busy to be cooperative. Surveys, such as the current survey, which is based on random sampling of angler-trips rather than boats, need a sufficient number of anglers randomly selected for sampling.
- Sampling of small CPFVs that launch from ramps and hoists may not be truly random: Samplers are unable to make at-sea observations on small CPFVs (often called six-packs). These boats are sampled dockside. Samplers are assigned to interview anglers as they depart small CPFVs that return to sampled landing sites, but transient CPFVs must be sampled opportunistically. The opportunistic samples may not be selected randomly.
- Cluster effect: Interviewing multiple anglers from the same fishing trip may result in cluster effects (National Research Council, 2006). The CRFS sample selection

procedures and estimation procedures may decrease the cluster effect. Samples are systematically selected to include all kind of CPFV trips and water areas in the district each month. Effort and CPUE estimates are stratified by trip-type (target species or species group

CRFS PCPS

Pros

- Vessel directory is relatively complete due to the licensing requirements and field observations.
- Use of a vessel directory is more efficient than use of a licensed-angler directory or random-digit dialing, and allows for greater sampler size.

Cons

- Participation in the survey is voluntary.
- Self-reported data.

CRFS Intercept Survey

Pros

- Access to all trips: State law requires CPFV to allow samplers to observe all fishing trips. This allow for a random sample of boats for onboard sampling of catch.
- Vessel directory is relatively complete due to the licensing requirements.
- Can collect release/discard information and information on fishing location.

Cons

- Onboard sampling is costly.

Daily boat counts are conducted of CPFVs targeting salmon north of Point Conception (Santa Barbara County), and at least 20 percent of the salmon trips in each half-month period of the salmon season are sampled at the dock for effort (angler trips) and catch. The following key data elements are collected during interviews of anglers onboard a CPFV or interviews with anglers as they leave the CPFV at the end of a fishing trip:

- Date
- County code
- CPFV name and number
- Location where most of the fishing occurred
- Number of anglers who fished on the CPFV
- Site name and number
- Gear used
- The trip duration (departure and return times)
- Wet-gear hours (amount of time with gear in the water)
- Primary and secondary target of trip (trip-type)
- Number of fish by species or highest taxonomic order possible that were reported caught and not available for examination, and the reason why the fish is unavailable (e.g., discarded alive, discarded dead, fillet, used for bait, given away, and eaten)
- Number of fish that were landed and examined by the samplers, and, if time allows, the lengths (fork length) weights, sex, and planned use (disposition) of the examined catch
- Number of anglers who contributed to the "bag" of examined catch.

The following key data elements are collected at each fishing location during the trip:

- Date
- County code
- Site name and number
- CPFV name and number
- Type of CPFV trip (e.g., morning half-day, evening trip, or three-fourths to full-day trip)
- Latitude and longitude of the fishing location
- The amount of time spent at the location (start and stop times)
- Minimum and maximum depths of the location
- Number of anglers whose fishing activities the sampler observed (monitored) while at the location
- Fishing method (i.e., free drift, stationed, anchored, or troll)
- Data on pinniped interactions
- Species caught by the all the anglers who were observed, the number kept, the number discarded alive, and the number discarded dead (including fish that are obviously not going to survive).

California Ocean Salmon Project

The Ocean Salmon Project (OSP) is a program that has provided recreational salmon landings information continuously since 1962. It is designed to provide information necessary to sustainably manage California's ocean recreational salmon fishery and to meet biological and recovery goals for West Coast salmon populations. To do this it:

- 1) Provides recreation fishery landings estimates by time, area and fishery strata for in-season management and for developing annual salmon fishery management plans.
- 2) Samples 20% of all recreational fishery salmon landings to provide postseason estimates of the salmon catch by species, angler effort, and the contribution of coded wire tagged (CWT) fish for reporting to the Pacific States Marine Fisheries Commission (PSMFC) by December 15 of each year.
- 3) Collects other biological and recreational fishery information as necessary to manage the fishery.

Vessel skippers and crew members are contacted dockside after a salmon trip to collect data necessary to make salmon catch estimates. Individual anglers may be interviewed about their catch, and angler participation is voluntary. Less than 1% of salmon trips are sampled at-sea. Owners or operators licensed/permitted CPFVs must, as a condition of the license/permit, cooperate when asked to carry and accommodate an observer on fishing trips at no charge to the sponsoring agency.

Since OSP only uses data collected by field samplers, validation of self reporting data is not necessary to ensure accurate catch and effort estimates. However, their field observations are used to validate logbook information for salmon trips.

DATA STRATIFICATION

Fishery Sectors. The OSP makes separate estimates for Commercial Passenger Fishing Vessels (CPFVs) and private boats (PBs). Past experience has shown that very few salmon are taken from shore. The possible exceptions in some years include Pacifica Pier, Moss Landing jetties, and Humboldt Bay South Jetty.

Port Area Estimates. The OSP has traditionally produced salmon landing estimates for five statistical areas: 1. Crescent City (Oregon border to Big Lagoon), 2. Eureka (Big Lagoon to Horse Mountain near Shelter Cove), 3. Fort Bragg (Horse Mountain to Point Arena), 4. San Francisco (Point Arena to Pigeon Point), and 5. Monterey (Pigeon Point to the U.S.-Mexico border). The estimates normally are for area of landing rather than area of catch; however because of the large statistical areas, relatively few recreationally caught salmon are landed outside of the port areas in which they were caught. Sampling normally extends from Crescent City Harbor to Avila Beach. In some years when there is a southern shift in the distribution of salmon, sampling may be extended south to include Santa Barbara, Ventura and Oxnard ports.

Temporal Strata. The estimates are generated by half-month period; i.e., 1-15 and 16-end of month.

Day Type Strata. PB landing estimates are further stratified by day type including: 1) regular week days and 2) weekend and holiday days. Recognized salmon season holidays include President's Day, Memorial Day, Independence Day, Labor Day, and Columbus Day.

DATA ELEMENTS AND MARKED SALMON SAMPLING

OSP samplers collect the following data from each sampled vessel:

- Number of anglers (includes CPFV skipper and crew if they retain salmon)
- Fishing method: troll, mooch, or both
- Number of salmon landed by species
- Number of Ad-clipped (marked) salmon by species
- Number of coho (an endangered species) released
- Number of sublegal chinook released
- Number of salmon lost to pinnipeds

In recent years, the samplers have collected the following additional data from salmon and non-salmon PBs:

- Number of rockfish landed
- Number of halibut landed
- Number of lingcod landed
- Number of all other species landed
- Number of anglers in non-salmon boats

Salmon trips are defined as those trips in which salmon was the target species for all or part of the day. A combination trip, on which several species including salmon may be targeted, is considered a salmon trip.

All Ad-clipped salmon recovered in the sampling are measured in the field for fork length (to the nearest mm) and their heads removed for later CWT extraction and decoding in the lab.

Data Gaps and Bias:

- Catch and effort estimates for areas not sampled because perceived low effort.
- Released fish information: Asking anglers for information on released or lost catch may be biased as it depends on the ability of anglers to accurately recall all the salmon encounters during the day and to differentiate the different salmon species in the released catch.

Pros

- Confidence intervals for its estimates in recent years are typically, for the 95% interval for total season catch recreational landings, at + or – 10% of the estimate itself.
- Field samplers attempt to sample all landings at an assigned facility on sample days. This reduces the potential for bias associated with time of day landings are made.
- The program has been in place since 1962 and the staff has learned how to make optimal use of their limited resources.

Cons

- Collection of CWT heads and biological data is the most time consuming part of the overall OSP field sampling program.

Oregon Ocean Recreational Boat Survey (ORBS)

The unit of effort measured is at the boat level. Charter boat effort is tracked by one of three methods depending on the port and whether the charter operates from a local booking office (henceforth referred to as charters) or is transient/independent (henceforth referred to as guide boats). Angler trips (and catch) from charters are the only effort estimates that are reported as charter. Guide boat effort (and catch) is rolled into the private boat estimates.

- Charters: All trips for these boats are identified by contacting the local office and verifying the number of trips by trip type from the office staff. The total number of trips by trip type are collected in this manner. Separate effort strata are developed for charters for each port and trip type, and for each statistical week and fishery season type (if different seasons exist within an individual week).
- Guide boats operating out of Astoria, Garibaldi, Newport, Winchester Bay, Charleston, and Brookings are counted along with all private recreational craft by using an ocean entrance counting method that entails counting recreational boats as they enter the ocean. The count starts at first light and continues until 10:00 AM (11:00 AM in Garibaldi). Trips departing prior to first light or after the boat count, are extrapolated based on the percent of dockside interviews which left outside the count period (see source documents 1.6 for details). Trips are partitioned to trip type based on the proportion of trip types from both guide boats and private boats interviewed dockside.
- Guide boats operating out of Pacific City, Depoe Bay, Florence, Bandon, and Gold Beach are counted by using a moorage and slip count method that entails counting all vacated moorage slips and boat trailers in the ramp parking area at the start of the sampling day, and counting any additional departures throughout the day. Trips are partitioned to trip type based on the proportion of guide boat and private boat trip types interviewed dockside.

Interviews for catch (and angler trips) are at the boat level and only for completed trips.

- Charters: Charters operate out of discreet identified landing sites. Approximate return times for trips and trip type are often known in advance of the return of the vessel. Catch estimates are stratified by trip type, port, and week. Sampling staff meet the boat at the time of return, interview the charter crew for trip information (departure time, number of anglers, verification of target species, and area fished), interview the crew for count of released fish by species, count all fish that were retained, and examine retained species for tags. Parameters from the interview are expanded by strata (week, season type, port, boat type, and trip type) using the following formula:

$$P_t = \frac{P_s}{(S_c / E_t)}$$

Where:

P_t = Total estimated parameter for charter boats by season type, trip type, and catch area.

P_s = Sampled units by parameter (i.e. anglers, catch by species, released catch by species) for sampled charters as stratified to season, trip type, and catch area.

S_c = Number of sampled charter boats stratified to season, trip type, and catch area.

E_t = Total effort in number of charter boats stratified to season type and trip type.

- Guide boats: Guide boats often operate out of moorage sites mixed within the private boat moorages or may be trailered to port. Unlike charters, return time and trip type for guide boats are not known in advance. Boats are interviewed by sampling staff as they return using random selection of guide boats and private boats. Sampling staff meet the boat at the time of return, interview the charter crew for trip information (departure time, number of anglers, verification of target species, and area fished), interview the crew for count of released fish by species, count all fish that were retained, and examine retained species for tags. Parameters from the interview are expanded by strata (week, season type, port, and boat type) using the following formula:

$$P_{\text{trip}} = \frac{E_t}{S_{P\text{-all}}} \times P_{\text{samp}}$$

Where:

P_{trip} = Total estimated parameter for private/guide boats by season type, trip type, and catch area

E_t = Total effort in number of private boats stratified to season type

$S_{P\text{-all}}$ = Number of sampled private/guide boats stratified to season type

P_{samp} = Sampled units by parameter (i.e. anglers, catch by species, released catch by species) for sampled private/guide boats as stratified to season, trip type, and catch area

Guide boat catch (and effort) is rolled into the private boat estimates. However, since 2001 the "guide boat" boat type designation has been utilized and separate estimates of guide boat effort and catch can be generated if needed.

Biological sampling: Biological sampling refers to sub-sampling of the catch to collect information related to the size, age, genetics, etc. of catch in the fishery.

- Length of Pacific halibut – The fork lengths of all Pacific halibut landed on every other boat that is interviewed are collected. These lengths are then converted to weight, an average weight for the strata is generated, and then applied to the total catch for the strata (boat type, week, port).
- Length of albacore tuna – A random sample of 15 albacore tuna fork lengths per sampler across all boat types is taken each week when albacore tuna are available. Lengths are converted to weight and used to estimate total weight of landings.
- Length and weight of marine fish species (does not include albacore tuna, Pacific halibut, or salmonids) – The fork length and round weight of most marine species is sub-sampled from the total catch at 15 fish per species (if available) per sampler per week. For black rockfish, blue rockfish, and lingcod; 15 samples per sampler per week and boat type (charter and private) are collected.

The following key data elements are collected at each fishing location during trip sampled on-board:

1. Date
2. County code
3. Site name and number
4. Latitude and longitude of the fishing location
5. The amount of time spent at the location (start and stop times)
6. Minimum and maximum depths of the location
7. Number of anglers whose fishing activities the sampler observed (monitored) while at the location
8. Fishing method (*i.e.*, free drift, stationed, anchored, or troll)
9. Data on pinniped interactions
10. Species caught by the all the anglers who were observed, the number kept, the number discarded alive, and the number discarded dead (including fish that are obviously not going to survive).

Samplers also collect data on the lengths and weights of discarded fish while onboard charters.

Effort reporting by charters is voluntary. Ocean charter vessel trips can be cross checked against both exit count surveys and dockside sampling. Catch sampling and interview data collection is mandatory. State law requires that any person licensed by the Department of Fish and Wildlife must comply with the directions of authorized Department personnel related to the collection of sampling data or material from salmon or other food fish. Enforcement of this and other fish and wildlife laws is conducted by Oregon State Police.

Data Gaps and Bias:

- Not all minor ports are sampled each year and some ports are not sampled for the entire year. Catch and effort in these ports and time periods are extrapolated based on previously observed species specific catch patterns and catch/effort associations with sampled ports.

- SEBS is presently not funded.
- Night angling trips are not estimated. Sampling does not occur prior to 8:00 AM or after 8:00 PM. All evidence indicates that these very late trips are very rare in the ocean fishery off Oregon.
- Small ports with a single sampler are slightly biased towards peak fishing period samples of 8:00 AM to 6:00 PM. Seldom are samplers scheduled on site later than 6:00 PM.
- There are indications that anglers/charters are not accurately reporting discarded catch for some species.

PROS:

- Trained samplers examine all fish.
- Exit boat counts, combined with dockside survey which includes departure time, allow for accurate expansion of data.
- High sample rates allow for improved confidence of estimate accuracy.

CONS:

- Sampling method is expensive and each year more of the funding burden is passed to the state from the Federal government.
- Labor-intensive.

Oregon Harvest Cards

Oregon requires a harvest card (or daily license) to be filled out for all salmon, steelhead, sturgeon, and Pacific halibut that are retained. The harvest cards are spot checked for compliance by Oregon State Police. The cards are turned in via a voluntary program at the end of each season. An expansion for non-returned harvest cards is made. The expansion formula is based on a previous survey to determine percent of respondents. This data set generally has a one year lag before it is available for use. Given the present processing timeframe associated with this dataset, it is not currently used for management purposes.

Data Gaps and Bias:

- Anglers without any catch are less likely to return harvest cards. Also total reporting of catch on tags is known to under represent the total catch of anglers (anglers do not always record their catch, or will "lose" their harvest card and get a replacement).

Oregon Shore and Estuary Boat Survey

This effort and catch survey is based on the MRFSS design. The phone survey for angler effort is based on an angler license frame. Biological sampling is based on the MRFSS design. This survey is not presently funded.

Washington: Ocean

Effort is a measure of fishing pressure (e.g. number of boats or anglers fishing). For the sport fisheries, effort information is used with catch data to calculate total catch and to make catch predictions. Sport effort is determined through an actual boat count. All boats leaving (or entering) the port each day are tallied, and the total is recorded as that day's "exit count" (see Section 4). The exit count is the foundation upon which all sport catch and effort expansions are based. It is the single most important piece of sport sample data collected each day. Simplified, the exit count (actual number of boats) multiplied by the average number of anglers per boat

(calculated from sample data) gives an estimate of the total number of anglers who fished on a given day.

Catch data refers to the number and species of fish caught, both retained and released. For the sport fishery, samplers will identify each retained fish in a catch and will record the total number of each species. Remember that this might include various species of salmon, rockfish, other marine fish, etc. Anglers are interviewed to determine the number of each species released. Depth for bottom fish trips is recorded. Total sport catch is estimated by dividing the total number of exits by the number of boats sampled, then multiplying this by the sampled catch to get the total catch:

$$\frac{\text{TOTAL EXITS}}{\text{BOATS SAMPLED}} * \text{CATCH SAMPLED} = \text{TOTAL CATCH}$$

Biological data describes a variety of information used to characterize populations being fished upon. Port samplers collect coded wire tags (CWTs) from salmon, PIT tags from halibut, tags from sturgeon, scales from Chinook, and lengths from halibut, sturgeon, and other marine fish. Biological data have the most long term usefulness. These data are added to comprehensive historical databases used for age and growth studies, stock and species composition estimates, migration studies, and other research needs.

- Reporting mechanisms: Vessels are required to cooperate with samplers.
- Methods for validation of self-reported data: effort is a census of access point vessel counts and operators report catch and numbers of anglers dockside when the vessel returns. It is assumed that any catch reported and not seen is accurate.
- Methods to account for non-reporting: it is assumed that vessels cannot fail to report catch dockside.

Data gaps

Effort and catch data, November – February are not collected.

There is no catch sampling from small ports (Ocean Shores, Tokeland, etc), although effort during quota salmon fisheries is estimated based on periodic counts.

Effort and catch information are collected from some smaller ports during high-effort salmon fisheries.

Known biases

Anglers may hide fish or misreport, data that is unverifiable (ie. not witnessed by sampler)

Pros/cons of current data collection methods

PROS: Trained samplers examine all fish, all-day exit counts allow for accurate expansion of data, high sample rates allow for tight confidence intervals.

CONS: Sampling method is expensive and each year more of the funding burden is passed to the state from the Federal government; extremely labor-intensive.

Washington: Puget Sound

A telephone survey was attempted in Puget Sound for Charter boats; however, this survey was discontinued. A description of the method follows.

A phone survey of all charter operations will be used to estimate the amount of catch taken by anglers on charter fishing trips. The sampling frame is the set of licensed charter vendors. This should be a complete census of all charter operators in Puget Sound, however, not all of the charter operators in Puget Sound will be contacted due to the usual types of non-response issues (no answer, repeated busy signal, etc). Repeated contact attempts (up to 6) to each charter operator will be made during the survey.

The number of charter trips made in each MCA is the sum of those trips reported for that MCA over all charter operations interviewed. The average number of angler-trips made by charter operators (average number of recreational anglers per trip) will be expanded by the total number of operators in Puget Sound.

The mean number of angler trips per charter operator is calculated as:

$$\hat{e}_{a,m=\text{charter}} = \sum_{i=1}^H T_{a,i}$$

Where $T_{a,i}$ is the total number of angler trips in MCA a reported by charter company i , and there are h total charter operators interviewed out of a total of H licensed operators.

The variance is estimated as:

$$\hat{V}\hat{a}r(\bar{e}_{a,m=\text{charter}}) = \frac{(\sum_{i=1}^n e_{i,a,m=\text{charter}} - \bar{e}_{a,m=\text{charter}})^2}{h(h-1)}$$

This estimated mean is then expanded to all charter operators in Puget Sound to generate the estimated number of angler trips taken through the charter industry:

$$\hat{E}_{a,m=\text{charter}} = H\bar{e}_{a,m=\text{charter}}$$

with variance:

$$\hat{E}_{a,m=\text{charter}} = H^2 \hat{V}\hat{a}r(\bar{e}_{a,m=\text{charter}})$$

Data gaps

The number of charter boats in Puget Sound is small (24+) relative to the coast; however, they are currently not directly sampled for effort and catch.

(<http://www.capscharters.com/members%20list.htm>)

Source Documents

California CPFV Logbooks:

Logbooks are mailed out to the operators with two pages of detailed instructions, along with a letter highlighting any new regulation changes or changes to the logbooks. For information

contact Joann Eres, Department of Fish and Game, Marine Region, Marine Fisheries Statistics Unit, Los Alamitos, CA.

Guidelines for editing CFIS database including:

- Instructions for CPFV Extraction from CFIS
- Instructions for CPFV Logbook Batch Editing
- Instructions for CPFV End-of-the-Year Logbook Editing

Contact Wendy Dunlap-Harding, Department of Fish and Game, Marine Region, Recreational Fishery Data Project, Los Alamitos, CA.

California Recreational Fisheries Survey:

Draft – Review of California Recreational Fisheries Survey Methods, California Department of Fish and Game, August 2006. http://www.dfg.ca.gov/marine/pdfs/crfs_review.pdf

This document includes a description of sampling and estimation procedures. In addition, it includes a detailed description of the salmon sampling methods and estimation procedures.

Sampler Manual http://www.dfg.ca.gov/marine/pdfs/crfs_samplermanual.pdf

Party Charter Phone Survey: <http://www.recfin.org/pcps.html>

California Department of Fish and Game Website about CRFS:

<http://www.dfg.ca.gov/marine/crfs.asp>

Data: <http://www.recfin.org/data.htm>

Estimates: <http://www.recfin.org/forms/est2004.html>

California Ocean Salmon Project:

Samplers Manual: Contact Melodie Palmer-Zwahlen, Department of Fish and Game, Marine Region, Ocean Salmon Project, Healdsburg, CA.

Data: <http://www.recfin.org/data.htm>

Estimates: <http://www.pcouncil.org/salmon/salsafe.html>

Other California Resources:

California Department of Fish and Game Digest of Commercial Fishing Laws and Licensing Requirements:

<http://www.dfg.ca.gov/marine/pdfs/commercialdigest2007.pdf>

Oregon Recreational Boat Survey:

Copies of ORBS sampling procedures manual can be requested from Oregon Dept. of Fish and Wildlife, Marine Resources Program, 2040 SE Marine Science Dr., Newport, OR 97365

Survey methodology description is available on line.

<http://www.dfw.state.or.us/MRP/salmon/ORBS%20Backgrounder/ORBSDesign.htm>

Design: <http://www.dfw.state.or.us/MRP/salmon/ORBS%20Backgrounder/ORBSDesign.htm>

"Inventory of For-Hire Data Collections in the United States and U.S. Territories
", page 66

Sampling program descriptions of the Ocean Recreational Boat Survey and the Shore and Estuary Boat Survey (see MRFSS) – <http://www.recfin.org/cntrbtrs.htm>

Other Oregon Resources:

Oregon Department of Fish and Wildlife Sport Fishing Regulations -
<http://www.dfw.state.or.us/resources/fishing/>

Oregon State Marine Board - <http://www.oregon.gov/OSMB/index.shtml>

Application for Oregon Charter License from the Oregon State Marine Board:
Instructions -

<http://www.oregon.gov/OSMB/BoatReg/docs/outfitterguidedocs/CorpCharterInstructions.pdf>

Application and Fees-

<http://www.oregon.gov/OSMB/BoatReg/docs/outfitterguidedocs/CorpCharterApp.pdf>

Washington:

Lai, Moore, and Tagart. 1991. Methodologies for estimating catch and effort statistics of ocean sport fishery off the Washington coast with users' guide for the program 'OSFP.FOR'. State of Washington Department of Fisheries Progress Report #289

Washington OSP Sampling Manual 2006. State of Washington Department of Fisheries.

Data <http://www.recfin.org/data.htm>

Estimates <http://www.recfin.org/forms/est2004.html>

Websites:

http://www.recfin.org/OSP_manual_2000.htm

http://www.recfin.org/PSSP_manual_2004.htm

Region 2: Alaska

The major ADF&G Sport Fish Division programs that provide information and estimates related to for-hire fisheries on a sustained basis include (1) the Alaska Sport Fish Survey, commonly called the statewide harvest survey (SWHS), (2) the Statewide Saltwater Charter Logbook Program, (3) the Southeast Alaska Marine Creel Survey, and (4) the Southcentral Alaska Halibut and Groundfish Harvest Assessment Project. These programs were developed to gather information on a wide variety of species and are statewide or regional in scope. Most of these programs also collect information on unguided fisheries; only the Saltwater Charter Logbook Program collects information exclusively on guided fisheries. Recent operational plans for each project provide supporting information on sampling designs and procedures used to analyze data. In addition to these major programs, there are occasional small-scale projects to collect specific information, such as hatchery contribution, for specific areas or dates. Details of these small-scale programs are provided in reports available on the ADF&G web site.

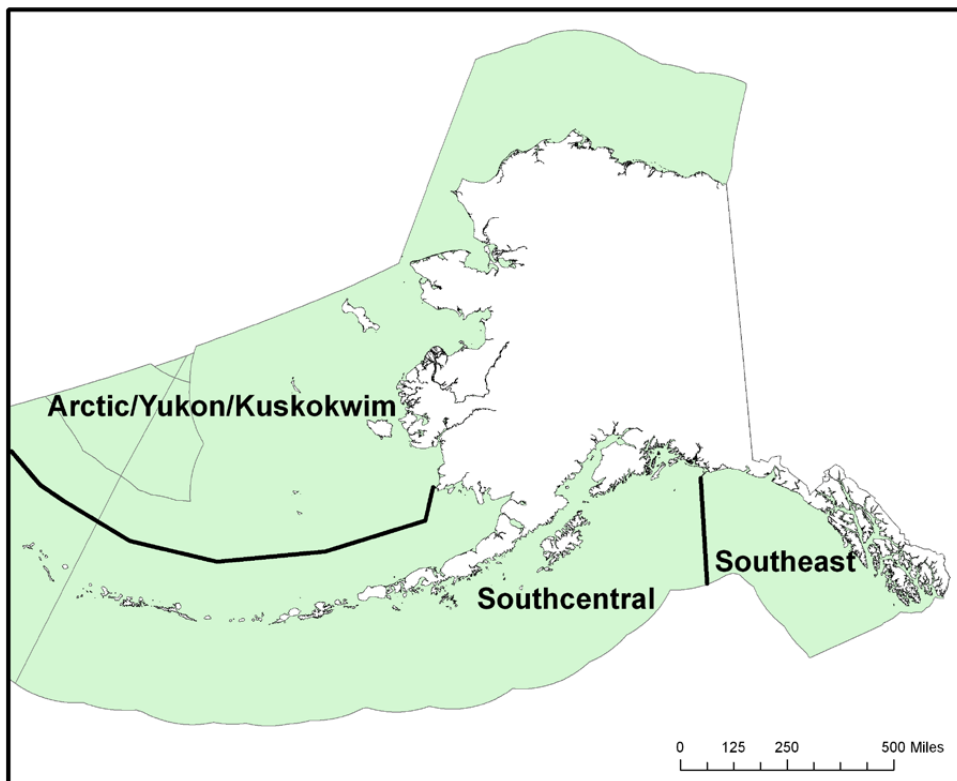


Figure 2.1. Three sport fishing regions for marine waters of Alaska, bounded by the limits of the Exclusive Economic Zone (200 miles).

Statewide Harvest Survey

The SWHS is a voluntary mail survey and has been conducted annually since 1977. Harvest and participation have been estimated every year, but catch has only been estimated since 1990. The current primary objective of the survey is to estimate participation, catch, and harvest for major freshwater and saltwater sport-caught species statewide, by area, and by site (e.g., Jennings et al. 2007). The precision target is to estimate participation and harvest to within 15% of the true values 95% of the time. Because of Alaska's vastness, providing participation and harvest estimates on a statewide basis using onsite creel surveys would be prohibitively expensive. The survey meets the needs for assessment and management of major fisheries, but also provides information for establishing priorities, formulating policies, rehabilitating fisheries through stocking and habitat enhancement or protection, planning public access acquisition, and evaluating economic benefits. Full project details are found in the project operational plan (Jennings 2007).

Two surveys are conducted annually to estimate participation, catch, and harvest. The standard survey has been administered since 1977. The supplementary survey has been administered since 1991 and is conducted to obtain estimates of parameters that cannot be estimated from the standard survey. For example, the standard survey provides effort and harvest estimates for the guided and unguided sectors only for Cook Inlet. Guided/unguided estimates for other areas of the state must be obtained using the supplemental survey.

Standard survey questionnaires are sent to a stratified random sample of about 23,000 sport fishing households from a master list of sport fishing households. Households on the list have either: (1) at least one individual who purchased a sport fishing license, or (2) at least one individual holding a permanent identification (PID) card (a free card issued on request to Alaskan residents of at least one year who are 60 years of age or older) or disabled veteran (DAV) card. At the time the questionnaires are sent the list is incomplete due to acquisition of licenses late in the season, or due to incomplete or illegible names and addresses. The final expansion of estimates is based in part on a completed household list at the end of the season.

Sampling strata for the standard survey are two dimensional. The first dimension is residency of the sport fishing households. The residency dimension is defined so that each household within each residency group has an equal probability of being surveyed. Previous surveys have indicated that response rates and degree of incompleteness in the household computer file vary by group. The second dimension of stratification is defined according to the date of first license purchase by any household member in each household and was identified to address issues related to the incomplete nature of the Sport Fish License file. An "early" and "late" date of first license purchase grouping was defined differently for the Alaska resident grouping compared to the non-Alaska resident groupings. Combining both dimensions of stratification results in eight sampling strata.

Sample sizes for each stratum are based on historic sampling levels that have achieved the objective criteria for precision. Sample sizes are allocated to be proportional to the relative stratum sizes (number of households per stratum) as approximated by the average of estimated stratum sizes from at least three years of prior surveys. Allocation of samples between the two survey types is set so that the expected responses from each type would be approximately equal. The sample size needed to meet the objectives is derived empirically from past percentile

confidence intervals calculated by using bootstrap techniques. The number of responding households for all strata is expected to be somewhat less than 11,000.

Reminder letters and questionnaires are mailed to nonrespondents. Responses from the households by mailing are modeled to correct for nonresponse bias. The dates for sending the reminder letters and questionnaires are chosen to allow adequate opportunity to respond to the previous mailing. Households that fail to respond to the first mailing within a specified time are sent a second mailing (first reminder). Households that don't respond to the second mailing are sent a third mailing (second reminder). Nonresident households with licenses purchased after mid-July are not sent a third mailing (second reminder). Each mailing of the questionnaires for each survey is accompanied by a cover letter that describes the purposes of the survey and the importance of their participation. In addition, first and second reminder cover letters note that a response to the previous mailing had not yet been received, and re-emphasize the importance of responding. As with the news release, the main purpose of the cover letters is to improve overall response rates. Response rates in recent years have been 40-50% after three mailings.

The supplementary survey questionnaire is mailed to a stratified random sample of about 24,000 sport fishing households from the incomplete sport fishing household computer file described above. The same strata identified for the standard survey are used for the supplementary survey. Since 2001 the supplementary survey questionnaire has been formatted as a "split-ballot" survey instrument to address question order bias issues. Specifically, half of the households surveyed are sent one type of supplementary survey (charter/guided fishing activities first), and the other half is sent the other type of survey (charter/guided second). Households to receive each type of questionnaire are selected at random.

Each questionnaire consists of a cover letter, instructions, area descriptions, maps, and pages on which to record participation, catch, and harvest by area. The standard questionnaire collects effort, catch, and harvest data by species and site in each of 26 defined areas of the state (SWHS Areas). The number of anglers, number of trips, and number of days fished are collected on a site-specific basis only, i.e., effort information is not associated with target species. Sites are designed to correspond with major ports or fisheries and have changed over the years to improve the accuracy of reporting. Questionnaires include spaces for reporting fishing sites not listed on the form. The standard questionnaire lists halibut, rockfish, and sharks (among other species). Rockfish and sharks information is not requested by species due to space limitations and concerns for the accuracy of the information.

The supplementary questionnaire consists of two parts: a Map/Site Booklet that contains area descriptions, fishing site names and numbers, and fish size categories, and a multi-page form with a cover letter, instructions, and space in which to record the household's sport fishing information. Respondents are asked to report participation, catch, and harvest by sites listed in the Map/Site Booklet, but can also write in unlisted sites. The list of species does not vary by area as in the standard survey questionnaire, and anglers are asked to write in unlisted species.

Estimates for the standard survey are obtained for each stratum by first calculating mean angler participation, catch, and harvest of each species over all sport fishing households that return completed surveys. The means from each mailing are then calculated and tested for nonresponse bias. Exponential regression models are used to correct for nonresponse bias. A nonresponse bias correction factor is calculated for individual major sport fish species, various participation parameters, and for groups of minor sport fish species. Participation, catch, and harvest for each

stratum are obtained by expanding the mean estimates by the total number of sport fishing households in each stratum:

$$\hat{Y}_{hk} = \hat{N}_h \hat{R}_s \frac{\sum_{i=1}^{m_s} \sum_{j=1}^{n_{hi}} y_{hijk}}{\sum_{i=1}^{m_s} n_{hi}},$$

where:

- \hat{Y}_{hk} = estimated total catch, harvest or participation for stratum h within site k;
- \hat{N}_h = estimated number of households with at least one fishing license holder in 2006 for stratum h, calculated as:
- \hat{R}_s = nonresponse ratio for each mailing group s where each mailing group represents a combination of the strata as follows:
 - Resident Early, which only includes the Early Alaska stratum;
 - Resident Late, which only includes the Late Alaska stratum;
 - Nonresident Early, which includes the Early license sale groups for the Other USA, Canadian, and Other Foreign residential groups; and
 - Nonresident Late, which includes the Late license sale groups for the Other USA, Canadian, and Other Foreign residential groups.
- y_{hijk} = catch, harvest or participation at site k by household j responding to mailing i within stratum h;
- m_s = number of mailings
- n_{hi} = number of households responding to the mailing i within stratum h;

Variances and confidence intervals are obtained by bootstrapping. Total estimates are obtained by summing stratum estimates. Variances and confidence intervals for the total estimates are also calculated.

Estimates of participation, catch, and harvest are obtained for the supplemental survey in a manner similar to the procedures followed for the standard survey above. Differences in the questionnaire design are directed at providing estimates of participation, catch and harvest for guided and unguided fishing. These estimates are not obtained directly from the standard survey, instead responses from the supplementary survey are used to calculate parameters to either obtain estimates independently (e.g., shellfish), or combined with parameter estimates from the standard survey (guided and unguided fishing). For example, guided effort and harvest for all areas of the state except Cook Inlet are estimated by applying the guided/unguided ratios from the supplemental survey to all responses from the standard and supplemental surveys. The guided and unguided estimates for Cook Inlet use the guided/unguided responses from the standard and supplemental surveys directly.

Harvest estimates from the SWHS were evaluated and compared to onsite creel survey estimates (Mills and Howe 1992). The evaluation concluded that estimates based on fewer than 12 responses should not be used, estimates based on 12-29 responses can be useful for indicating relative orders of magnitude and assessing long-term trends, and estimates based on 30 or more

responses are generally useable. A team of ADF&G biologists and other staff met several times in 2004 and 2005 to review and make recommendations for improving the statewide harvest survey. The programmatic review document is available online (Clark et al. 2007).

Saltwater Charter Logbook

The Sport Fish Division of ADF&G initiated a mandatory charter boat logbook program in 1998. The Board of Fisheries adopted regulations requiring annual registration of sport fishing guides and businesses, and logbook reporting. The logbook and registration program was intended to provide information on actual participation and harvest by individual vessels and businesses. Information on the amounts and locations of charter activity were needed by the Board of Fisheries for allocation and management of Chinook salmon, rockfish, and lingcod, and by the North Pacific Fisheries Management Council for allocation of halibut. In 2004 the Alaska legislature passed statutes requiring guide and business licensing, effective in 2005. The previous licensing of charter vessels through the Commercial Fisheries Entry Commission was repealed and replaced with vessel registration through the ADF&G logbook program.

Since 1998, the logbook design has undergone annual revision, driven primarily by changes or improvements in the collection of halibut and rockfish data. Halibut information was not collected from 2002 through 2005. With resumption of halibut data collection in 2006, the logbook was redesigned to require reporting of angler license numbers and the harvest and release numbers by angler in an effort to improve reporting and facilitate evaluation of the quality of logbook data.

The logbook program maintains and updates a statewide database on the numbers of saltwater charter vessels and associated businesses, and their activities. The data are compiled to show where fishing occurs, the extent of participation, and the species and numbers of fish caught and harvested by individual clients. This information is essential for regulation and management of fisheries, for project evaluation, and for formulation of department policies and priorities that reflect angler needs, concerns, and preferences. Full details can be found in Sigurdsson (2007).

A logbook record is required for every charter vessel trip, defined as an outing with one group of clients that ends when the clients and their fish (if fish were kept) are offloaded. For trips returning to a dock, the logbook must be completed before offloading any clients or fish. For trips returning to sites without docking facilities, the logbook must be completed before the vessel or guide departs the landing site and before offloading any fish or clients from the vessel. Every fishing trip taken with clients must be recorded in the manner specified in the logbook. For the 2007 season, all activity between January 1 and April 1 was required to be submitted to ADF&G by April 16. Activity after September 30, 2007 must be postmarked or returned to ADF&G by January 15, 2008. Activity during the primary fishing season (April 2 – September 30, 2007) was required to be postmarked or returned to ADF&G according to a weekly schedule as printed on the inside cover of the logbook. The final deadline for receipt of all 2007 data is January 15, 2008. Data submitted after the deadline is entered but designated as late, and may not count toward qualifying harvest for vessel moratoriums or limited entry.

In 2007 about 4,500 logbooks were printed in Anchorage and sent to ADF&G regional and area offices throughout the state for distribution. Logbooks are issued in Seward and Valdez by tackle shop employees trained by Sport Fish Division logbook staff. Logbooks are mailed to remote guide businesses on request. Vessel registration and issuance of required vessel stickers happens

at the time of logbook issuance. Instructions and statistical area maps are bundled with logbooks. Logbook pages include a pressure sensitive copy for the operator's records. Business owners can also submit a notarized affidavit to request a copy of their historical logbook data in electronic format.

Each trip is associated with an individual licensed business and guide. Data collected in 2007 included the date of trip; port or site of off loading; number of paying clients on the vessel (including those that did not fish); primary statistical area fished; target species category (bottomfish, salmon, or both); number of boat hours fished; individual license or PID numbers of each crew, client, and angler riding for free ("comp"); residency information (Alaska resident/nonresident); whether the angler was a resident or nonresident client, crew, or "comp;" and a listing of numbers of fish kept and released by each individual angler. Before 2006 the total numbers of fish kept and released were reported separately for clients and crew. Since 2006 catches have been reported by individual angler.

Salmon, rockfish, and lingcod data have been collected every year. Chinook salmon harvest and release data is stratified by size (< or > 28 inches). Halibut data was collected during the years 1998-2001 and 2006-2007. Before 2006, rockfish data were reported by pelagic and "other species" categories. Beginning in 2006, rockfish catch information was requested for pelagics, yelloweye, and all other non-pelagic (demersal and slope) species. Salmon shark information has included numbers of fish kept and released (1998, 2000-2006) and numbers kept only (2007). The column for released salmon sharks was dropped because operators recorded large numbers of spiny dogfish released in the salmon shark released column, effectively rendering that data useless.

Throughout most of Southcentral Alaska operators are asked to record the primary ADF&G groundfish/shellfish statistical area fished for bottomfish and salmon. In the Kodiak/Aleutian Islands portion of Southcentral Alaska, only salmon harvest is recorded by ADF&G salmon statistical area. Throughout Southeast Alaska, statistical areas based on salmon stat areas are used for salmon and bottomfish. Some of the larger areas are subdivided to align with management area boundaries. The Southeast stat areas do not extend beyond 3 nautical miles from shore. When fishing in federal waters beyond 3 miles, operators typically report the closest stat area.

Completed logbooks are returned to any ADF&G office. Incoming logbooks are date stamped and logged, then forwarded to Anchorage for review, final data entry, and archival. Review consists of scans for missing business and guide information, missing dates, missing statistical areas, invalid or missing fishing license numbers, etc. Follow-up calls are made to operators if necessary before and during keypunching. Data entry and editing programs flag problems such as harvest in excess of bag limits or harvest during closed seasons, and outlier reports are sent to area management staff for review and comment. These reports may again trigger follow-up calls to charter operators to resolve minor problems. Additional variables are added to the database to document data entry and editing, and to facilitate summarization of data by IPHC area or state management areas.

Increased emphasis was placed on outreach and data validation with redesign of the logbook in 2006, particularly during the early part of the season. Port samplers and management staff offered to conduct "courtesy logbook inspections" to make sure that logbooks were filled out correctly and answer any questions about how they should be filled out. Logbook data entry staff

contact charter operators to resolve logbook reporting issues and improve future reporting. These calls were intended to improve data quality and reinforce the message to the guide industry that logbook data is important and is constantly being reviewed.

In December 2005, the Commissioner of Fish and Game issued a statement that detailed strategies for assuring the accuracy of reporting of Pacific halibut harvest for the saltwater charter logbook. These strategies included onsite (in the field) and off-site (from the Anchorage ADF&G office) verification procedures.

Onsite verification in 2006 and 2007 involved only total counts of harvested fish because much of the effort information, such as hours or statistical areas fished and numbers of fish released could not be observed. Whenever possible, creel survey and port sampling technicians counted and recorded numbers of harvested halibut, pelagic rockfish, non-pelagic rockfish, lingcod, and salmon sharks observed during interviews with charter vessel operators. Counts were not made at the expense of the technician's other primary duties or at the expense of regular activities conducted by the charter operation, so they were available for a portion of the boat trips only. Technicians were instructed to check with the skipper to ensure that no other fish were offloaded or still on board. Procedures for verifying fish counts are described in detail in the regional creel survey and port sampling operational plans. In addition to regular creel survey crews, an additional technician roved between Homer, Anchor Point, Ninilchik (Deep Creek beach), and Seward, with sampling effort distributed among the ports in proportion to the average number of bottomfish charter trips reported in logbooks during 2002-2005. The main purpose of this additional position was to increase the proportion of trips with halibut harvest that was verified, but it was also valuable from the standpoint of outreach and enforcement.

In 2006 ADF&G professional management staff also conducted courtesy logbook inspections and some enforcement checks that included counting and recording of harvested fish. These data were recorded and merged with the verification data from creel survey technicians for later evaluation.

Off-site verification, begun in 2006, consists of a post season mail-out survey (post card) sent to randomly selected charter clients. The sampling frame is the list of license numbers recorded in logbooks, cross-referenced with the licensing database for acquisition of mailing addresses. The post card questionnaire requests the date of the trip, business or vessel name, and numbers of fish kept and released. The purpose of this survey was primarily to verify whether the angler actually made the charter trip.

Beginning in 2006, logbook data are compared to counts from verified and unverified onsite interviews at the boat-trip level, and to reported catch and harvest from the post season post card survey. In addition, logbook data are compared to estimates from the SWHS at the management area level. These comparisons are ongoing and are part of a more comprehensive evaluation of logbook data quality. An evaluation of the 2006 logbooks was presented to the NPFMC in April 2008 (Meyer et al. 2008).

Southeast Alaska Creel Survey

Creel surveys and harvest sampling have been conducted in some Southeast Alaska boat fisheries since 1972. The Southeast Alaska creel survey and catch monitoring program was primarily established to monitor harvest and hatchery versus wild contributions of Chinook salmon for compliance with the U.S./Canada Pacific Salmon Treaty and allocations of Chinook

salmon by the Alaska Board of Fisheries. Objectives include estimation of: (1) recreational effort and harvest of Chinook salmon, coho salmon, pink salmon, halibut, rockfish, and lingcod at Juneau, Sitka, and Ketchikan, (2) the hatchery contribution to Chinook and coho salmon harvests at these same ports as well as several other fisheries, (3) the harvest of mature wild Chinook salmon in the Juneau spring fishery, (4) the age composition of the spring Chinook harvest at Ketchikan and Juneau, (5) the average weight of halibut, lingcod, and rockfish harvested at all major ports throughout Southeast Alaska, (6) the shellfish effort and harvest of Dungeness crab and shrimp at Juneau and Ketchikan, and king crab at Juneau. In addition to these objectives, additional information is gathered related to management of salmon and Dolly Varden fisheries. Full details are found in the project operational plan (Jaenicke 2007). A copy of the operational plan is sent to the IPHC nearly every year for their review of halibut estimation procedures. The most recent report from this survey is Hubartt and Jaenicke (2004).

Effort and harvest are estimated with direct expansion creel surveys. A three-stage design is used at Ketchikan and Juneau. The first stage is the days to sample, which are selected at random. The various access sites (harbors and boat ramps) represent the second stage. At least two sites are selected randomly without replacement for sampling each day. The third stage is the boat-parties to be interviewed. The creel technician attempts to interview all exiting boat-parties at each site and tallies missed parties. A four-stage design is used for the Sitka survey. The four stages are (in order): access locations, days to sample, periods within the sampling day, and boat-parties. Inclusive dates sampled in 2007 were April 23-September 23 at all three ports.

Halibut, rockfish, and lingcod harvested at all surveyed fisheries are measured to estimate mean length or weight. Priority is given to halibut sampling on a fixed percentage of sampling days at each port, assigned systematically. Sample size goals are established for the number of length measurements from each user group at each port. Sample size goals are established using an optimum allocation for stratified sampling (Thompson 1992) to meet the desired goals for precision of the mean weight estimates. Rockfish landed at Craig/Klawock, Sitka, Ketchikan, and Yakutat are measured and weighed (when possible) for estimation of mean round weight.

It was quite common in some of the Southeast fisheries for a portion of the catch not to be available for sampling when the boat-party is intercepted. Before 2007 anglers were allowed to clean halibut and dispose of carcasses at sea as long as it was done in a manner that did not prevent determination of the number of fish caught. Effective June 1, 2007, NMFS regulations (Vol. 72 Federal Register 30714-30728, June 4, 2007) prohibited charter boats from cleaning at sea unless the carcass of the fish was retained intact, allowing a length measurement. This regulation was put into place to allow enforcement of the 32-inch maximum size limit on at least one of the fish in the daily bag limit for charter anglers. Creel survey technicians are instructed to measure halibut only if all of the boat-party's fish (or carcasses) are available to be sampled. In the case of rockfish, partial bag limits can be sampled as long as all fish of a given species are available.

The following information is recorded during creel survey interviews: Location sampled, number of rods fished, hours fished, trip type (charter or non-charter), number of days in trip, primary statistical area fished, target category (bottomfish, salmon, or both), and numbers of fish kept and released by species. In 2007 only, the numbers of halibut released were recorded by size class (over/under 32 in) and hook type (circle hook or "other" hook type). The same statistical areas are used as for logbooks. Charter skippers are interviewed for all charter trips to help ensure that the most accurate information is obtained. Logbook numbers and boat names were recorded for

all charter vessels interviewed. Whenever possible, technicians counted and verified the reported numbers of fish harvested for later comparison to logbook data.

Participation in angler interviews is voluntary, but state regulations require that a person must present for inspection any fish taken or possessed, or any gear used to take fish, to any peace officer or any representative of the Department of Fish and Game upon request.

Efforts are made to ensure that data collection procedures are standardized throughout the region. Technicians are supplied with the project operational plan, which includes a creel technician manual outlining all sampling and data recording procedures. Nearly all new creel survey technicians are provided with at least a 2-day onsite training session at the beginning of the season with either their crew leader or project supervisor.

Data are recorded in the field on weather-resistant, machine-readable Mark Sense forms. Forms are scanned and converted to digital format for editing as the season progresses. Creel survey estimates are generated inseason. At the end of the season all biological data are edited and finalized.

Analytical procedures for estimation of effort and harvest from creel surveys, hatchery stock contribution, average length and weight, age composition, etc. are described in detail in Jaenicke (2007). The most recent published report from the Southeast creel studies is Hubartt et al. (2004). Procedures used to estimate rockfish discard mortality is described in Brylinsky et al. (2007). The most recent reports on the Southeast Alaska halibut fishery (Area 2C) are Tersteeg and Jaenicke (2008) and Meyer and Jaenicke (2008).

Southcentral Alaska Halibut and Groundfish Harvest Assessment Project

Unlike the Southeast creel survey program that was designed primarily to monitor salmon fisheries, the Southcentral sampling program was established specifically to monitor the recreational groundfish and halibut fisheries. The program primarily collects information on the composition of the harvest, although harvest is not estimated. Specific objectives include estimation of: (1) mean net weight and harvest biomass of halibut taken by each user group (charter/non-charter) in each subarea of IPHC Area 3A (Kodiak, Lower Cook Inlet, Central Cook Inlet, North Gulf, and Eastern and Western Prince William Sound), (2) length and sex composition of the halibut harvest by subarea, (3) species composition of the rockfish harvest by area, (4) age, length, and sex composition of the rockfish and lingcod harvest, and (5) the spatial distribution of bottomfish effort and harvest of halibut, rockfish, and lingcod by user group (charter/non-charter) at each port. Additional tasks include estimation of (1) the proportions of the halibut harvest cleaned (and carcasses discarded) at sea at each port (needed for stratification of some mean weight estimates), (2) the proportions of released halibut that were caught on circle hooks versus non-circle hooks at each port (needed to refine estimates of halibut release mortality), (3) depths of capture for pelagic and non-pelagic rockfish that were released (for estimation of rockfish release mortality), and collection of basic size and age data from salmon sharks, Pacific sleeper sharks, and spiny dogfish harvested in the recreational fishery. Full details of the study design, data collection, and analysis are contained in the project operational plan (Meyer 2007a). This operational plan is sent to the IPHC nearly every year for review of halibut estimation procedures.

A single technician is assigned to each of six ports (Kodiak, Homer, Deep Creek/Anchor Point, Seward, Whittier, and Valdez). The sampling season generally extends from mid- to late May to early September, with some variation from year to year.

Sampling consists of collection of biological data from harvested fish and interviews with charter boat skippers and non-charter boat anglers. At all ports except Kodiak and Whittier, biological sampling and interviews are conducted on separate days. Five days per week are sampled, with two consecutive days off chosen at random. At ports other than Kodiak and Whittier, three biological sampling days and two interview days are selected at random such that each type is distributed proportionally between weekends and weekdays to minimize bias due to differences in user group composition. An effort is made to distribute interview and biological sampling effort between Deep Creek and Anchor Point proportional to harvest so those data can be pooled. Sampling hours and procedures vary somewhat by port but are described in detail in Meyer (2007a).

On interview days, technicians attempt to obtain interviews for all boats on which halibut or groundfish were targeted or caught. Angler parties that target salmon and don't catch any halibut or groundfish are not interviewed. Biological sample size goals are set based on the standard sample size equations for estimating the population mean or multinomial proportions (Thompson 1992). Rockfish sample size goals are set for each port based on numbers needed for the least common "primary" species in the harvest. The least common "primary" species is yelloweye rockfish at most Southcentral Alaska ports.

As in Southeast Alaska, samplers commonly encounter boats with a portion of their harvest already cleaned and carcasses disposed of at sea. This does not cause bias unless the length composition of these fish differs from the landed fish. Homer typically is the port with the highest proportion of charter-caught halibut cleaned at sea (22-49% in recent years), and these fish are included in the Homer charter sample for estimation of mean weight. A list of vessels that clean at sea is identified, and a vessel is selected at random each day and provided with tubs in which to retain the carcasses of fish cleaned at sea. Average weight for the Homer charter fleet is then calculated as a weighted mean, with weights determined from interview data. Technicians at all ports are instructed not to sample the catch unless all of the fish (or intact carcasses) of each species (or all rockfish) have been returned and are available for sampling.

The following information is recorded during interviews: Location sampled, time of interview, duration of trip in days, whether the trip is the first or second of the day (to facilitate logbook comparisons), total number of angler-days of fishing effort, hours fished, trip type (charter or non-charter), primary statistical area fished, target category (several codes), and numbers of fish kept and released by species (including sharks). Numbers of halibut cleaned at sea are recorded and monitored as a potential source of bias, and are used in calculation of the charter mean weight for Homer. The numbers of halibut released were recorded by hook type (circle hook or "other" hook type) in 2007 only. Numbers of rockfish kept and released are reported by management assemblage (pelagic vs. non-pelagic), and the depth of capture was recorded in 2007 only for released rockfish. The same statistical areas are used as for logbooks. Charter skippers are interviewed for all charter trips to help ensure that the most accurate information is obtained. Logbook numbers and boat names were recorded for all charter vessels interviewed.

Fork length of halibut and total length of rockfish are recorded to the nearest centimeter. Rockfish are weighed with a spring scale to the nearest 0.1 kg. Sex is determined for both

species based on direct examination of gonads. Age structures are removed from halibut, rockfish, lingcod, and sharks for age estimation. Halibut otoliths are forwarded to the IPHC for age estimation, but all other species are aged by ADF&G.

Prior to 2007 all field data were recorded on weather-resistant, machine-readable Mark Sense forms. Forms were scanned and converted to digital format at the end of the season. In 2007, interview data were entered directly into field computers with a custom data input application with error trapping and lookup tables. Biological data were entered directly into protected Excel spreadsheets with data validation checks.

Efforts are made to ensure that data collection procedures are standardized throughout the region. Technicians are supplied with the project operational plan and a separate Field Procedure Manual that provides background management and biological information, in-depth descriptions of sampling procedures, and detailed administrative information. All technicians receive 2-3 days of hands-on training with periodic visits from the supervisor, and data quality is monitored inseason.

Procedures for estimation of mean weight, harvest in pounds, age and size composition, and spatial distribution of effort and harvest are similar to methods used in Area 2C and are described in Meyer (2007a). Estimation of halibut discard mortality is described in Meyer (2007b). There are not yet any published estimates of rockfish discard mortality for Southcentral Alaska.

Meyer and Jaenicke (2008) is the most recent published report for halibut fisheries, and Stock and Meyer (2005) is the most recent report covering lingcod harvest assessment in Southcentral Alaska. A report describing rockfish harvest is in preparation.

Data Needs

Virtually all estimation methods have strengths and weaknesses, gaps, and sources of potential bias. No one sampling method can be expected to provide all the data. Ideally, fisheries harvest monitoring and stock assessment combines the most rigorous information from a variety of sources. Strengths and weaknesses are examined in the context of marine for-hire fisheries in Alaska for the three main types of data collection: mail survey, charter logbook, and on-site intercept surveys.

Statewide Harvest Survey (mail survey)

A major strength of the SWHS is that it provides comprehensive estimates (statewide, entire year) in a cost-effective manner. Creel surveys with the same coverage would cost many times more. The sampling frame, households with at least one licensed angler, is well-defined. Weaknesses or limitations of the SWHS include:

- There may be a small number of households containing only unlicensed youth anglers that would not be included in the sampling frame. This is probably not an issue for estimation of guided harvest because the high cost of participation would preclude fishing effort by most youth anglers without an accompanying adult. Estimates of unguided harvest for marine species that generally are accessed by boat (e.g., halibut, rockfish, lingcod) would not likely be biased by this gap, but estimates for shore-based fisheries might be.
- The form is complex. This may cause some anglers to fill the form out incorrectly (even though their data may be correct). One potential issue is that fish caught while charter

fishing may be recorded as non-charter, or vice-versa, potentially biasing estimates of the charter proportion of harvest.

- Location information may be requested at a greater level of detail than can be provided by some survey respondents. Some residents and many non-resident anglers, particularly those on charter boats, may not be familiar enough with the geography of where they were fishing to accurately fill out a survey. Some respondents report the locations where the fish were caught, while some report the area where the fish were landed. Although the numbers of fish caught may be recorded properly, the spatial aspect of the data is highly variable. Because of this problem, effort and catch estimates are aggregated by SWHS area or other assumed levels of accuracy.
- The survey may be biased due to recall bias or avidity bias. Some respondents do not receive the survey questionnaire until many months have elapsed since fishing. Recall bias is assumed to be highest for species with generous bag limits, or species that are typically caught and released with high frequency, and assumed to be lowest for species with low daily bag limits or annual limits on harvest (e.g., halibut, Chinook salmon). Avidity bias, or the tendency of more avid anglers to respond, is addressed through repeated mailings and corrections for non-response (see Jennings 2007).
- There are practical limits to the type of data that can be collected. Angler effort is measured in trips or days fished, rather than hours, and it is not possible to collect target species information so long after the fact. This generally limits use of the data for calculating harvest or catch rates for individual species.
- Timeliness of estimates is a frequent issue. Because this is a mail survey, estimates are not typically available until September or November of the following year. The delay is due to the time required for data entry of names and addresses into the sampling frame. If harvest estimates are needed in the interim they must be provided by creel surveys, or from projections.
- There may be bias in harvest estimates due to misidentification of many marine species by anglers that infrequently fish in salt waters. This could potentially inflate or deflate estimates of catch or harvest.

Saltwater Charter Logbook

The saltwater logbook was initiated primarily to provide effort and harvest data for the primary species taken in the marine charter boat fishery on an individual vessel basis. The primary strength is that mandatory logbook data are intended to be a complete census, rather than an estimate, and could potentially be available on a timelier basis than SWHS estimates. Another strength is that the logbook offers an opportunity to compare independent estimates of charter harvest from the SWHS. Logbook data are reported by charter operators (guides), whereas SWHS data are reported by the charter clients. The logbook program was initiated under the assumption that charter operators would be more knowledgeable about fish species and locations, and could more accurately and precisely record the harvest.

Although the logbook program is still being evaluated, it has a number of identified or potential weaknesses:

- Logbook data entry and editing for a given year are typically not done in time to use the logbook data to evaluate regulatory proposals for the following season. More timely data entry and editing may be possible with additional funding.
- There are documented problems with data quality, including missing data; errors in recording dates, statistical areas, angler license numbers, and vessel or guide registration numbers; recording harvest data in the wrong columns; and confusion over reporting requirements and procedures. These issues are inevitable, given that the data are reported by literally hundreds of charter operators.
- Data validity has not yet fully been assessed. Some comparisons have been made with on-site creel survey or port sampling interviews, and with SWHS estimates. For the years 1998-2001, there were substantial discrepancies between logbook and SWHS estimates of halibut harvest. Comparisons with on-site interview data revealed some large discrepancies between data recorded in logbooks and data for the same vessel-trip reported in a creel survey interview conducted within minutes of the landing.
- Self-reported logbook data are typically expected to be inaccurate when there is a management incentive to misreport (to avoid restrictions or qualify for access privileges), when enforcement is lacking, or when the charter operator has no vested interest in ensuring that the data are reported accurately.
- Even though the logbook is filled out by charter operators, there have been some problems with misidentification or misclassification of fish species and improper use of forms.
- Although logbooks collect information on the major species groups targeted (bottomfish versus salmon), this information isn't specific enough to develop estimates of fishery CPUE by species.

Intercept Surveys

Intercept surveys in Southeast and Southcentral Alaska offer a host of benefits not easily obtained through mail surveys or logbook programs. Trained technicians and biologists collect sex, age, size, and genetic data from numerous species of harvested fish in a standardized manner, and recover visually undetectable tags. The creel surveys in Southeast Alaska provide timely inseason estimates of catch rates and harvest. Face-to-face interviews allow collection of more precise and accurate data on target species, types of gear used, waters fished, and species landed. In some cases on-site survey personnel directly observe and validate reported landings, allowing evaluation of charter logbook data. The presence of field staff allows for in-depth communication between ADF&G and the angling public, and serves to increase compliance with sport fishing regulations and logbook reporting requirements.

Intercept surveys in Alaska are not without problems, however:

- Intercept surveys are expensive; the major portion of cost is for personnel.
- Creel surveys and port sampling are conducted only in the major ports. In Southeast Alaska and portions of Southcentral Alaska, there are unsampled areas with relatively high numbers of private lodges that provide charter fishing. Creel survey estimates of effort and harvest are therefore incomplete, and may not provide a reliable index of relative changes in harvest from year to year. Likewise, estimates of the biological

characteristics of the harvest can be biased if the age, size, sex, or species composition data collected at major ports are not representative of the entire harvest.

- Creel surveys in Southeast Alaska and port sampling interviews in Southcentral Alaska do request target species information, but anglers often target species for a portion of the day. It is generally not feasible to capture effort or catch by target species in a manner that allows for calculation of high-resolution, targeted CPUE for purposes of stock assessment.
- Accurate size data generally cannot be collected from released fish, so some other method must be used to obtain size data for estimation of catch and release mortality.

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Other Resources:

- ADF&G, Sport Fish Division Home Page:
http://www.sf.adfg.state.ak.us/statewide/sf_home.cfm
- ADF&G sport fish guide, business, logbook, charter requirements:
<http://www.sf.adfg.state.ak.us/statewide/guides/guide.cfm>
- ADF&G Publications (data reports, area management reports):
http://www.sf.adfg.state.ak.us/statewide/divreports/html/dsp_Adv_Search.cfm
- International Pacific Halibut Commission: <http://www.iphc.washington.edu>
- North Pacific Fishery Management Council Halibut Issues:
http://www.fakr.noaa.gov/npfmc/current_issues/halibut_issues/halibut.htm

Region 3: Pacific Islands

In Guam and NMI, voluntary surveys are conducted with support from the Western Pacific Fishery Information Network (WPacFIN). Established in 1981, WPacFIN's objective is to assist U.S. Pacific islands fisheries agencies in establishing and maintaining fisheries monitoring programs through technical support, and occasionally, funding. Technical support includes data collection system design and analysis, data processing system design and development, data analysis and reporting, fisheries monitoring training and a secondary offsite data archived repository.

Member agencies include American Samoa's Department of Marine & Wildlife Resources, Commonwealth of the Northern Marianas' (CNMI's) Division of Fish & Wildlife, Guam's Division of Aquatic & Wildlife Resources and Bureau of Statistic and Plans and the state of Hawaii's Division of Aquatic Resources.

Boat-based creel surveys are used to collect fisheries dependent data in American Samoa CNMI and Guam. Data collection consists of two main components – participation counts (of trips) and interviews with fishermen. Survey days are randomly selected and range from 3-8 times/month. Surveys are conducted at selected boat ports on weekdays, weekends and night shifts. Data are expanded based on port, day type, fishing method and for-hire versus not for-hire.

Table 2.1 Creel Survey Sampling

Island	Sampling Intervals	Data Available	Parameters measured
American Samoa	3-4 times/week; week day and week end; day and night surveys	1985-Present	Length/weight/total catch, species composition, gear, methods & effort
CNMI	6-8 times/month; week day and week end sampling, day time survey only. Night time surveys to be started in May of 2005.	2000-Present (some surveys conducted in 1980's and 90's but data is less reliable)	Length/weight/total catch, species composition, gear, methods & effort
Guam	6-8 times/month; week day and week end sampling; day and night surveys	1982-Present	Length/weight/total catch, species composition, gear, methods & effort

In Hawaii, monthly catch reports are due the 10th day of the following month. Reminder notices are sent out quarterly, though statute does not require them. An exception to the monthly reporting requirement is that only one person per vessel is required to submit a catch report. In the case of for-hire fisheries, that is usually the captain or owner. This is to avoid duplicative catch reports. All catch is supposed to be reported on the form – whether it is sold, kept, or released. Vessels that are chronically late in their reports are referred to the state Division of Conservation and Resources Enforcement (DOCARE).

DAR verifies reported information when something is unclear or questionable. However, data are not reconciled proactively, though there are dealer reports that could provide validation. DAR currently receives over 2,600 commercial reports monthly (for-hire reports are a small subset of these). Due to recent management action, NMFS provided funding for the hiring of

three additional staff to reconcile MHI bottomfish reporting against dealer reporting. Presumably the same could be done with for-hire data if funding were available.

In addition to the CML reports, for-hire operators and patrons were surveyed by the Hawaii Marine Recreational Fishing Survey (HMRFS) from 2001-2006. In 2001, telephone sampling began in Wave 2 (March/April), and field surveying began on Oahu, Maui and Hawaii (Big Island). The For-Hire Survey did not begin until mid-2003. In 2004, Molokai and Kauai were added to the field survey. The island of Lanai is not sampled.

Suitability of Current Methods

Resistance by captains in some areas of Hawaii and surveyor problems led to low participation in the for-hire survey for distinct areas of the state (e.g. Kewalo Basin, Oahu). Captains statewide also complained that the HMRFS was duplicative of the CML reports. Official charter estimates were never generated though many concentrated for-hire sites, like Honokohau Harbor, did have high participation.

Ultimately, the increasing costs of the survey and level funding from NMFS over the life of the program forced DAR to consider changes to sampling starting in their FY06. Since the CML reporting program already covered the for-hire sector, they decided to drop the charter mode altogether starting in January 2007.

Source Documents

State of Hawaii: www.hawaii.gov/dlnr/dar/ctchrpt/index.htm

Description of project, sample catch report forms and instructions, contacts.

WPacFIN: www.pifsc.noaa.gov/wpacfin

Description of program, data collection forms for boat-based creel survey, contacts.

Region 4: Caribbean (Puerto Rico, U.S. Virgin Islands)

Puerto Rico

Puerto Rico has participated in the MRFSS program since 2000, and improved methodologies for collecting for-hire data in the MRFSS that were implemented in other parts of the MRFSS survey range (see Atlantic and Gulf of Mexico Chapter) have never been implemented in this region. Surveys of the charter boat catch and effort are currently conducted using the original MRFSS methodology of catch data collected during angler intercept interviews combined with a random digit dial (RDD) telephone survey of coastal households for effort. This data collection methodology has known deficiencies of significant magnitude (NRC 2006, Ditton et al. 2001). The RDD survey of coastal households does not interview non-resident participants for their effort in for-hire fisheries, and correction factors based on the proportion of residents to non-residents encountered in angler intercepts are used to account for the non-resident effort. In the for-hire mode, a significant portion of fishing effort is from non-resident anglers, which results in large expansions of raw effort estimates and very low precision. In Puerto Rico, 80% of for-hire angler intercepts are from non-resident anglers on average, with a range of 67% to 91% annually for the seven years the survey has been conducted.

HMS species comprise the main focus of the charter fishery in Puerto Rico. A few short miles off of San Juan is the famous "marlin alley" where the insular shelf ends and the marlin's habitat of blue water begins. Blue marlin, white marlin, sailfish, yellowfin tuna and others are the common HMS targeted by the charter fisheries. In spite of the importance of these species to the charter industry and of the efforts by federal and state agencies to manage the populations, the current MRFSS methodology provides highly questionable estimates of catch. For example, the ICCAT harvest quota for blue marlin + white marlin combined for the entire U.S. is 250 individuals. For the year 2000, the MRFSS estimates that in Puerto Rico the charter industry harvested 126 blue marlin, with a PSE of 99.9, and in 2004, the harvest estimate is 10, with a PSE of 99.9. Overall, PSE's for for-hire harvest estimates (in numbers of fish) for marlin, yellowfin and bluefin tuna, sailfish and swordfish are no less than 56%, and most are in the 80 to 100 percent range. Year to year estimates of harvest are highly variable, with many years estimating zero fish landed.

In 2008, the MRIP Operations Team approved funding for a pilot electronic logbook reporting program for the for-hire fishery in Puerto Rico, using as a model the electronic trip ticket systems in place in other states for commercial reporting. Data collection would consist of a census design (mandatory reporting, as required by 1998 Fisheries Law in Puerto Rico) with validation and would be designed to collect catch and effort data on all target species with particular attention to HMS species and including invertebrate (queen conch, whelk and lobster) fisheries. Catch and effort data collected through this system will be compatible with that collected through the currently operating MRFSS survey, with the exception of inclusion of data on recreationally captured invertebrate species (queen conch, West Indian Top Shells, and spiny lobster), which are excluded from MRFSS. Since funding was approved, Puerto Rico has updated their inventory of for-hire vessels to include dive vessels that harvest fish and invertebrates. Hiring of a contractor to design the electronic reporting tool and implement the program is pending the release of MRIP funds. The RFP for a private contractor includes:

- Design and implementation of an electronic reporting system in Puerto Rico, with built-in electronic signature, based on the electronic trip ticket program in use in other states.
- Updating of the inventory of dive vessels which allow harvest of fish or invertebrates by clients.
- Collection of for-hire catch and effort data via an electronic reporting system, with bi-weekly reporting frequency. Charter captains would have the option of up-to daily data reporting, if they desire; bi-weekly would be the upper time limit.
- Charter captains could report fish (and invertebrate) sizes voluntarily in the system. The sizes reported would be compared to dock-side recorded sizes.
- The electronic system would allow for printing a tracking report, which the charter captains could take on the vessel to manually note catch and effort for later reporting through the electronic system.
- Collection of for-hire catch and effort data via non-electronic reporting option (telephone or paper forms) to be used by for-hire operations that do not have easy access to internet. DNER personnel would be responsible for data entry from telephone or paper forms. Paper forms would be faxed to DNER.
- Contractor would be responsible for tracking non-compliance and reporting to proper agency.
- PR DNER personnel will aid in validation of self-reported data by random visits to 10% of the charter vessels each week to note whether they are out fishing, out for other (or unknown) reason, or in the slip. Data from the observed activity patterns will be compared with the reported activity and the degree of concordance or discrepancies will be noted. Discrepancies will be discussed with the appropriate charter captain to determine how to interpret the event. Failure to comply with the data reporting requirements of the program could result in fines and/or revocation of the DNER charter boat permit. MRFSS dockside surveys of for-hire anglers will continue to be conducted, and catch data from these interviews will be used to validate self-reported catch data from logbooks. Nevertheless, it must be noted that validation of invertebrate catch will be difficult since MRFSS only covers finfish. If the pilot is successful, dockside validation of invertebrate catch will be added in the future. Diveboats identified that allow spearfishing will be added to the MRFSS dockside surveys next year.

Suitability of Methods

The main assumptions are that the trip ticket software in use in other states can be modified for the purposes of this pilot study, and that the majority of the existing charter operations will be willing and able to enter catch and effort data through this medium. An additional assumption is that random visits to charter boat docks by DNER personnel (biologists and enforcement), along with other comparisons and cross-checking will serve to validate the otherwise self-reported data, and thus ensure improved precision of the data collected.

U.S. Virgin Islands

There are no continuous programs in the U.S. Virgin Islands to monitor for-hire fisheries. Data of this type are vitally important for improving U.S. estimates of harvest of HMS for international quotas, and for improving regional stock assessments and fisheries management.

Source Documents

Ditton, R., A. Loftus, and J. Volstad. 2001. ACCSP For-Hire Review. Report to the Atlantic Coastal Cooperative Statistics Program, Washington, D.C. 143 pp.

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García-Moliner, G., W. R. Keithly, Jr. and I.N. Oliveras (2001) Recreational SCUBA Diving Activity in the US Caribbean. *Proceedings of the 52nd Gulf and Caribbean Fisheries Institute (1999)* **52**, 363-371.

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Regions 5, 6, 7, and 8: Atlantic and Gulf of Mexico Coasts

There are multiple for-hire data collection programs in place among states along the Atlantic and Gulf of Mexico coasts, and many of these programs span across multiple management regions. Some state-specific programs also exist. This section will describe all of the data collection programs in place for the Atlantic and Gulf of Mexico coasts, and describe where these data collection programs overlap or are integrated with each other.

For-Hire Survey

The For-Hire Survey (FHS) is conducted in nearly every state in the Gulf of Mexico and Atlantic coasts. The FHS collects information on fishing effort (number of angler trips) and catch by marine recreational anglers fishing on professional for-hire vessels, variously referred to as charter boats, guide boats, party boats, head boats, or multi-passenger fishing vessels. The survey design consists of two independent, complementary methods: 1) an access-point intercept survey to collect data on catch per-unit of effort, and 2) a vessel-directory telephone survey to collect data on fishing effort directly from vessel operators. Data from the two survey methods are combined to estimate total fishing effort and catch by species.

The access-point intercept survey portion of the FHS began in 1981 as the catch survey component of the Marine Recreational Fisheries Statistics Survey (MRFSS), which includes mode-specific sampling from the for-hire fisheries. The vessel-directory telephone survey portion of the FHS was integrated with the MRFS access point intercept survey in 2001 in the Gulf of Mexico (west Florida to Louisiana) and in 2005 in the Atlantic (Maine through east Florida). It should be noted that the FHS also overlaps with other charter and headboat monitoring programs, including the Northeast Vessel Trip Reporting Program (VTR), the Southeast Regional Headboat Survey (SERHS), various state logbook programs, and the Marine Recreational Fisheries Statistics Survey (Table 2.2). In some cases, these programs have been integrated with the FHS to reduce reporting burden. A description of survey integration used by the FHS for all applicable programs is included in this document.

In the northern and mid-Atlantic states of Maine through Virginia, the FHS is structured around two types or “modes” of for-hire fishing: 1) Charter vessels, and 2) Headboats. Each for-hire fishing boat can only be designated as one type of boat: either a Charter boat or a Head (or party) boat.

1. Head boat mode includes fishing on boats that are licensed by the U.S. Coast Guard to carry more than 6 passengers. On such boats fishing space and privileges are usually provided for a fee. Head boats are generally large, they may carry from 7 up to 150 paying passengers, and anglers usually pay on a per-head basis for the opportunity to fish on them. The vessel is operated by a licensed captain (guide or skipper) and crew. In some areas of the country head boats are called party boats or open boats. These boats are usually not launched until a specified number of anglers have paid and boarded. Anglers on these trips usually do not know all of the other anglers on the boat. Head boats may make half-day, full-day, or overnight trips.
2. Charter boat mode includes fishing on boats that are only licensed by the Coast Guard to carry up to six passengers. Charter boats are generally smaller in size than head

boats, and they are usually hired, or “chartered,” by a group of anglers. They are operated by a licensed captain and crew, and the participants are usually part of a pre-formed group. Thus, charters are usually closed to participants other than those who are part of the pre-formed group. A subset of charter boats are also called guide boats, which are small boats fishing inland waters with one to three clients.

Large party headboats operating in states from North Carolina through Texas participate in a separate survey (Southeast Headboat Survey, discussed later). In this region, charter vessels sampled in the FHS include some large capacity charter vessels (>6 passengers) that are not on the Southeast Headboat Survey frame.

Table 2.2. For-Hire Data Collection Program Coverage in Atlantic and Gulf of Mexico States. Colored cells within a state indicate data collection programs that are integrated. C = method includes charter vessels only; H = method includes headboat vessels only; CH = method includes

	For-Hire Survey	SE Headboat Survey	NE Vessel Trip Report	State-Specific Logbook	State-Specific Survey	Large Pelagic Survey	State HMS Catch Card
Maine	CH		CH			C	
New Hampshire	CH		CH			C	
Massachusetts	CH		CH			C	
Rhode Island	CH		CH			C	
Connecticut	CH		CH			C	
New York	CH		CH			C	
New Jersey	CH		CH			C	
Delaware	CH		CH			C	
Maryland	CH		CH	CH		C	?
Virginia	CH		CH			C	
North Carolina	CH	H					?
South Carolina	CH	H		CH			
Georgia	CH	H					
East Florida	C(H*)	H					
West Florida	C	H					
Alabama	C	H					
Mississippi	C	H					
Louisiana	C	H					
Texas	C*	H			C		

*In pilot study phase
both charter and headboat vessels.

For-Hire Survey Methods: Vessel-Directory Telephone Survey (VDTS)

Sample Frame

The sampling unit for the VDTS is the individual for-hire vessel. For each state in this survey, a comprehensive vessel directory of for-hire boats was constructed from various sources (e.g., state and federal licensing and management agencies, MRFSS intercept survey samplers, advertisements, etc.). The major components in the vessel directory are:

- Vessel identifier information (name, state/coastguard registration number)
- Location (county, site of primary port)
- Owner/captain/representative/company addresses and contact phone number
- Activity and eligibility of vessel
- Degree of cooperation to participate VDTS

A unique and confidential vessel identifier is assigned to each vessel as it is initially entered into a directory. This number will appear in the data files without any additional vessel or operator information allowing aggregation over time of all data obtained from a unique vessel without public identification of each vessels reported information. The vessel identifier can be removed from public-access vessel directories so the information about the fleet can still be provided to the public without distributing the link between the vessel directory and vessel activity data. Appendix A provides complete variable descriptions and formats for the vessel directory.

The vessel directory is updated routinely by modifying the fields shown above and by adding new vessels or removing vessels no longer active in the fishery from the directory. The sources of modifications are from:

- State and private contractors conducting the MRFSS intercept survey
- State and private contractors conducting the VDTS
- Federal permit databases, such as for-hire permits to harvest highly migratory species, reef fish and pelagics (in the Gulf and south Atlantic), etc.
- State license directories (note, some states license individual captains and the license structures are not useful for maintaining a vessel based frame)
- Direct contact from vessel representatives

Vessel updates also include information concerning the eligibility, activity and cooperation status of vessels. If a representative indicates that a vessel never participates in for-hire fishing, that vessel is coded as ineligible and is not included in future sampling frames. If a representative indicates that a vessel is inactive (out of season, being fixed, etc.), the vessel is coded as such, and the wave and month in which activity will resume is recorded. Inactive vessels are not included in the next sampling frame; however, the 'Active' status of the vessel is restored at the appropriate time for future sampling. If a representative refuses to participate in the survey (hard refusal), the vessel is coded as non-cooperative. Such vessels remain in the sample frame, but are not contacted (automatically coded as refusal) if selected for sampling. Non-cooperative vessels remain as such for four months following the initial refusal, after which time they are re-coded as cooperative. Upon subsequent refusals, the vessel is coded as non-cooperative for a period of six months.

Each wave (two month time period), the sample frame of all eligible vessels is extracted from the updated vessel directory. To be included in the sample frame, a vessel must be listed as active in the for-hire fishery, have a vessel classification assigned to it (charter or party/headboat), and have complete contact information, including a vessel identifier (either vessel name or number), at least one telephone number for a vessel representative, and the county and state in which the vessel operates. Vessels that do not meet these criteria remain in the vessel directory, but are not included in the sample frame.

During the course of telephone interviewing within a wave, any information about the boat that is obtained is incorporated into the directory and frame and referenced if the boat is selected during subsequent sample weeks. For example, if a representative reports that a vessel is inactive (and will be inactive for ten weeks) during the first week of a sampling period, that vessel should not be contacted during subsequent weeks within the sampling period. Rather, it should be coded as inactive for all weeks that it was selected within that period. Similarly, if a vessel representative provides new contact information, that information should be immediately incorporated into the vessel directory, and used for all subsequent contacts.

The key items in the interview include:

- Number of boat-trips with paying passengers in the sample week
- Dates of each boat-trip
- Mode of each boat-trip (charter or headboat)
- Number of fishing anglers for each boat-trip
- State/county and site where each boat-trip originated
- Fishing methods for each boat-trip
- Targeted species for each boat-trip
- Fishing area for each boat-trip (e.g. inland waterways, coastal bays, ocean)
- Distance to shore for each boat-trip (broadly defined as inland waters, state territorial seas, or federal waters)
- Departure and return time for each boat-trip (note: trips departing before midnight one day and returning after midnight the next day are counted as two separate trips. For trips extending across multiple days, times falling within each 24 hour time period are counted as one trip)
- Number of hours spent actively fishing for each boat-trip
- Other non-recreational fishing trips – including dates and mode

Sample Selection

Sampling for the VDTS is stratified by state (except Florida which is further stratified into five distinct regions), vessel type (headboat, charter; ME-VA only), and week, within two-month sample periods (waves). Weekly sampling is without replacement within strata (vessel type/state/region/week); however, replacement sampling is permissible among weeks within a wave (e.g. a vessel may be selected multiple weeks within a wave). Sample weeks are distributed among waves for administrative purposes, as well as for consistency with other sampling programs (see **Table 3, Weekly Wave Assignments, for the distribution of sample weeks among waves**). The sample frame is created prior to the start of each wave, and sample is drawn for all weeks within the wave (i.e. sample is drawn for all weeks within a wave prior to the start of each wave).

A SAS program has been developed by NOAA Fisheries that produces the sample frame from the vessel directory, and draws each stratified weekly sample within a wave (available upon request). Once the frame has been extracted by state and vessel strata, each is sorted by permit category (if Large Pelagic Survey is included in the regional survey), vessel operating county and descending vessel-length category. After randomly sorting vessels within each permit/county/vessel-length category, the frame is sampled by identifying a random start point and selecting every n^{th} vessel, such that sampling requirements are met on one complete pass through the sample frame (frame number= N ; sample size= k , $n=N/k$).

Output from the sample draw program includes a sample frame ("good list") for each state, the sample draw for each stratum (vessel identifier and several auxiliary variables from the directory), a list of vessels that were omitted from the frame as a result of incomplete contact information ("bad list"), and an archive of ineligible for-hire boats. All outputs from the sample draw program shall be delivered to NOAA Fisheries, as well as the contractor responsible for conducting the intercept survey, at least three weeks prior to the start of each wave. Appendix A provides variable descriptions, formats and naming conventions for the sample frame and sample draw files.

Sample Sizes

Vessels are sampled at a rate of 10% (rounded to next highest whole number) within each stratum (state/region/vessel type/week), with a minimum sample size of 3 vessels. Table 1 shows the distributions of charter and head boats by state based on current information, as well as estimated weekly sample sizes.

Data Collection Procedures

Data collection is conducted on a weekly basis during all weeks within each wave. A week is defined as Monday through Sunday. All weekly dialing is conducted during the week following a specified week of fishing (the sample week). Respondents are asked to report angler and vessel fishing activity for the prior week that ended on a Sunday. This approach results in a recall period of 7-14 days. Participation in the FHS is voluntary, with the exception of some vessels permitted to harvest federally managed species in the Gulf of Mexico that are required to participate in the survey for permit renewal.

An advance letter is sent to the representative of each selected vessel one week prior to the week for which the vessel is selected to report (the sample week). The letter notifies the representative of the vessel's selection for the survey, the week for which he or she will be asked to provide data, and the week in which the interview will take place. Representatives are also provided with instructions for completing the survey through alternative reporting modes including web, fax and dial-in phone contacts. A blank paper logsheet with the basic questions that will be asked during the survey is included in the mailing.

Telephone calls are made during the time of day that maximizes the potential to contact vessel operators. Interviewers continue to attempt to contact vessel representatives until they have conducted an interview, determined that the boat is no longer operating, or made attempts to contact all listed representatives (there may be more than one captain, owner, or representative).

The result of each dialing attempt for each sampled vessel is recorded and compiled into a contact database. Up to 10 attempts are made before a selected vessel is deemed a non-respondent. Although repeated attempts to contact an individual vessel representative may occasionally result in a final outcome of “no answer”, “busy” or “answering machine”, the percentage of such results should not exceed 25 percent of the total calls attempted in any state/wave combination. If a vessel representative is contacted but the interview cannot be completed at that time, future calls to that individual are made on an appointment basis. Respondents at the contact number are also asked what the best time to call is in order to interview the eligible respondent(s) for future use if the vessel is selected again.

To maximize response rates, alternative response options are made available (options vary by state). Vessel representatives may fax completed logsheets to a toll-free fax line, which are then key-entered into the survey database. If a logsheet is accepted as complete for a sampled vessel, further attempts to contact the vessel are discontinued for that sample week. Every effort is made to avoid re-contact of a vessel once it has reported via fax. Vessel representatives in some states also have the option of submitting data via an online tool (website data entry) developed specifically for the FHS. The tool is PIN protected through a unique sample identification number, assigned once the draw has been completed for that wave, and included in the advance mailing. Near real-time sample monitoring is required with this option, so that attempts to contact a vessel representative by telephone are discontinued following completion of an online survey. Every effort is made to avoid re-contact of a vessel once they have reported via the web. In 2006, approximately 3.5 percent of sampled captains utilized the web option where available.

Dockside Validation of Self-Reported Data

Dockside validation of the self-reported trip data collected from party (head) and charter boat operators through the FHS is conducted by the intercept survey contractor. Charter and head boats that are selected for the FHS and are docked at public access marinas in assigned slips, or that are assigned to a permanent location in a storage shed, are validated during the week that they are selected to report in the FHS. Trailered charter vessels that use various access sites can not be validated. The FHS dockside validation consists of visiting the access site and recording whether the vessel is docked or away. If the vessel is away from the dock, an attempt is made to determine the vessel’s activity. Sites are visited at a time of day when it would be likely that the vessel would be away from the dock on a for-hire fishing trip (e.g. 8 am - 5 pm). All sampled vessels that can be validated should be validated at least once during the sample week, and multiple validations per vessel per week are encouraged; however, only one validation per vessel per day is allowed.

Quality Control

Project supervisors oversee the operation of the FHS. These individuals are experienced in telephone interviewing and are knowledgeable about the MRFSS, the FHS, and of other monitoring programs. Supervision of dialing operations include direct observation of interviewer procedures, silent monitoring of in-progress interviews, call-backs to vessel representatives to verify an interviewers recorded data, and/or taping of calls followed by comparison to entered data. Additional training of telephone interviewers or remedial action is taken whenever appropriate.

Error checking of the data is accomplished through the use of table look-ups during data entry, by running editing routines on datasets following data entry for the wave, and reviewing summary tables of responses. All codes are controlled by the data entry system to the extent possible, such that only valid, documented values are incorporated into the datasets. Every data element is checked for data entry errors, inclusion within an acceptable range, use of valid codes, and logic in relation to other data elements. NOAA Fisheries has provided an error-checking program to FHS contractors, but additional checks to ensure clean and accurate data may be developed with NMFS approval. Any changes made to the data following initial entry are documented and the resultant database of edits is delivered to NMFS.

Databases and Record Formats

A CATI system for data entry is used during all FHS telephone interviewing by the federal contractor, but the state agencies sub-contracting the telephone survey may use data transcription and key-entry vehicles at their discretion. Following acquisition, the data from all modes of reporting are compiled into a single database for delivery to NOAA Fisheries, including those data provided by state sub-contractors. FHS interview datasets contain information about each vessel selected for inclusion in the weekly survey of fishing effort, regardless of the result of the interview, contact attempt, or activity of the vessel. Each record consists of vessel and trip information, including the vessel identifier, total number of trips taken by the vessel (if any), and details about each trip. If a vessel reports multiple trips during a sample week, then the dataset will contain a single record for each trip taken; if a vessel is not contacted or reported no trips taken during the sample week then there will be one record indicating such. Each vessel is identified in the data by its unique, seven-digit vessel identification number (vessel_id) only.

Computation of Estimated Effort

Each responding vessel representative reports on the number of for-hire fishing trips (= one day of fishing up to 24 hours) taken during the sample week, the number of anglers per fishing trip, the time of departure and return, the state, county, and site to which the vessel returned, the primary area fished (inland, state, or federal waters), and several other parameters of the trip and fishing party. The sample size for the sample week, the frame size (list of all boats the sample is drawn from), the number of respondents and the number of trips reported by vessel and number of anglers reported per trip are all used to produce weekly estimates of angler-trips on listed vessels, which are then summarized to produce the unadjusted estimate of angler-trips per vessel type (charter boat, head boat) per wave.

Adjustment factors for undercoverage are produced based on the proportion of for-hire fishing vessels encountered in the field, but not included on the sample frame, during the Angler Access Intercept Survey portion of the FHS. Adjustments for over and under reporting by the vessel representatives are also calculated based on dockside validations of self-reported data.

Total angler trips that fished primarily in a given area (inland, state, federal waters) are calculated separately for charter boats and headboats in each week by pi-expansion of the trips reported for sampled boats as follows:

$$a_trips_a = N/n * \sum at_{(b)}$$

where:

a_trips_a = the pi-estimator of the number of angler trips in area a from vessels in the sample frame for the sampled state (or region in the case of Florida),

a = primary area fished (inland, state territorial seas, federal waters)

N = the total number of vessels in the sample frame,

n = the total number of sampled vessels for which effort data was supplied by respondents,

at = the total number of angler trips reported by representatives of boat b taken primarily in area a.

This estimation method assumes simple random sampling of the vessels in the frame each week, and it assumes that mean reported fishing effort does not differ between non-respondent vessel representatives and respondent vessel representatives.

Variance of the estimate, a_trips , is computed by:

$v_atrs = NN * NN * [1 - (n/NN)] * s2_at/n$, where:

$s2_at$ = variance of average number angler-trips per respondent, $ma_trips (\sum at_{(b)} / n)$.

The weekly numbers of angler-trips estimated and the variances estimated are summed across weeks within the wave to produce the unadjusted estimate of angler-trips per wave and its associated variance.

Two adjustment factors are computed and applied to the estimate, a_trips , to produce the adjusted number of angler-trips per wave for the fleet and the appropriate variance is calculated using the Taylor expansion. The two adjustment factors are: 1) undercoverage adjustment for off-frame vessels, and 2) under/over reporting adjustment from dockside validation of self-reported trip activity.

Undercoverage adjustment for off-frame vessels (from Lai and Foster, 2008)

Assume that CH and HB boat-trips are selected at random from the targeted population. We can identify whether or not the selected vessels are on the sampling frame of for-hire survey (FHS). The estimated proportion of listed FHS vessels in field is used as an expansion factor to adjust out-of-frame fishing effort for the FHS sector.

Let indicator variable $I_{mi} = 1$ if the vessel is listed in the FHS sampling frame and $I_{mi} = 0$ otherwise. Also, let X_{mi} be the total number of angler-trips (variable PARTY in I1) in the i-th sampled vessel. The proportion of angler-trips aboard in-frame vessels is estimated by a weighted binomial distribution:

$$\hat{p}_m = \frac{\sum_i I_{mi} X_{mi}}{\sum_i X_{mi}}$$

The variance of $\hat{\rho}_m$ is approximated by weighted variance.

Under/Over Reporting Adjustment from Dockside Validation of Self-Reported Trip Activity
(from Andrews and Lai, 2008)

A dockside validation is carried out by random sampling of vessel-days within stratum defined by state, vessel type, year, and wave. Within the stratum, the samplers observe (audit actually) the number of trips for each of sampled vessel-days. The observed number of trips is compared with that reported in FHS telephone interviews on a vessel-day base. The difference between audited and interviewed trips (x_{im}) is calculated. This procedure is summarized as below (omit the subscripts for state, vessel type, year, and wave):

Vessel	Sampled vessel-days (m_i)	Observed changes (x_{im})	\bar{x}_i	s_i^2
1	m_1	$x_{1m}, m = 1, \dots, m_1$	\bar{x}_1	s_1^2
2	m_2	$x_{2m}, m = 1, \dots, m_2$	\bar{x}_2	s_2^2
\vdots	\vdots	\vdots	\vdots	\vdots
i	m_i	$x_{im}, m = 1, \dots, m_i$	\bar{x}_i	s_i^2
\vdots	\vdots	\vdots	\vdots	\vdots
n	m_n	$x_{nm}, m = 1, \dots, m_n$	\bar{x}_n	s_n^2

where

$$\bar{x}_i = \frac{1}{m_i} \sum_m x_{im}$$

$$s_i^2 = \frac{1}{m_i - 1} \sum_m (x_{im} - \bar{x}_i)^2$$

The first target is to estimate total error in a given stratum, $z_i = M_i \bar{x}_i$, where $M_i = 56$ is the population number of vessel-days of the i th vessel. Let $M = \sum_{i=1}^N M_i$ be the population total number of vessel-days in any given strata.

The unbiased estimator of population mean daily error and its variance are

$$\bar{z} = \frac{N}{M} \frac{1}{n} \sum_i M_i \bar{x}_i = \frac{N}{M} \frac{1}{n} \sum_i z_i = \frac{1}{M} \frac{1}{n} \sum_i z_i$$

$$v(\bar{z}) = \left(\frac{N-n}{N} \right) \left(\frac{1}{nM^2} \right) s_b^2 + \frac{1}{nNM^2} \sum M_i^2 \left(\frac{M_i - m_i}{M_i} \right) \left(\frac{s_i^2}{m_i} \right)$$

where s_i^2 is the estimated with-vessel variance for x_i described above, and

$$s_b^2 = \frac{1}{n-1} \sum_i^n (M_i \bar{x}_i - \bar{M}\bar{z})^2 = \frac{1}{n-1} \sum_i^n (z_i - \bar{M}\bar{z})^2 \text{ is the between-vessel variance.}$$

The proportion of active vessels in a given stratum is estimated from the combination of vessels obtained from phone and validation surveys. That is, if the vessels are validated in validation survey but non-active, then they will be active vessels. Let

λ be the number of active vessels sampled in the given stratum,
 λ' be the number of non-active vessels sampled,
 $\Lambda = \lambda + \lambda'$ be the number of all vessels sampled, and
 T be the population total number of vessels in the given stratum.

The estimated proportion of active vessels and its variance are

$$p = \lambda / \Lambda$$

$$v(p) = \left(\frac{p(1-p)}{\Lambda-1} \right) \left(\frac{T-\Lambda}{T} \right)$$

The population number of active vessels (y) in the given stratum and its variance are

$$y = Tp$$

$$v(y) = T^2 v(p)$$

Assuming that y and \bar{z} are independent variables, the estimated total error in any given strata and its variance (Goodman 1960) are

$$\Delta = y\bar{z}$$

And its variance

$$v(\Delta) = v(y\bar{z}) = \bar{z}^2 v(y) + y^2 v(\bar{z}) - v(y)v(\bar{z}).$$

How are the two factors applied to the a_trips?

Unadjusted Angler Trips * cf1 * cf2 = Adjusted Angler Trips ???

For-Hire Survey Methods: Access-Point Angler Intercept Survey for Charter mode

The access-point angler intercept survey (intercept survey) for charter mode is conducted at either public or private marine/brackish-water fishing access points to collect catch data

individual anglers fishing from professional for-hire vessels. Data collected in this portion of the For-Hire Survey include species identification, total number of each species harvested and released, and length and weight measurements of harvested fish, as well as some angler-specific information about the fishing trip.

The intercept survey is a multiple purpose survey, providing data in the following analyses:

- Estimates of catch per angler-trip (CPUE) by species as a parameter of the two complementary survey methods approach,
- Estimates of mean body weight of harvested fish by species as a parameter of the two complementary surveys approach,
- Proportion of angler-trips aboard listed FHS vessels to adjust for FHS vessels that are not listed in FHS frame.

This section is taken largely from a more detailed report generated for the MRIP Design and Analysis Workgroup (Lai and Foster, 2008). This section describes the instruments and practices of MRFSS intercept survey specifically in regards to the charter fishing mode, and the methods used for estimating CPUE and total catch and harvest by species for the For-Hire Survey. This section:

- 1) Describes the Master Site Register (MSR) used to construct sampling frame. The MSR is a list of fishing access sites where anglers from for-hire vessels may be intercepted and includes the location of each site, as well as the expected fishing pressure by mode, state, wave and month and day-type (weekend or weekday).
- 2) Describes the methods for constructing a sampling frame using the MSR and calendar and for selecting site-days. An example is given in Appendix A.
- 3) Describes interview procedures, data recording and reporting, and rules for selecting alternate sites and modes.
- 4) Describes the estimation method for total catch and total harvest by species.

Master Site Register (MSR)

The MSR includes identified access-point sites for marine recreational fishing from for-hire vessels in each state (trailer launch ramps, public docks, marinas, etc.). It does not include private access sites where field interviewers are not allowed access, such as dry docking facilities or locked marinas. Also excluded are transient sites where for-hire captains may arrange to drop off clients before taking their vessels back to trailer launch sites.

Each site in the MSR includes a two-digit state code, a three-digit county code, a unique four-digit site code, and the estimated fishing pressure by mode, month and KOD (kind of day = weekday or weekend/holiday). The fishing pressure is categorized into nine fishing pressure categories based on the expected number of angler-trips in for-hire mode observed at the site on an average eight hour working day (8:00 AM to 4:00 PM) as shown below:

Pressure Category	Expected Number of Angler-trips	Weight
0	1~4	0.5
1	5~8	2.5
2	9~12	9
3	13~19	13
4	20~29	20
5	30~49	30
6	50~79	50
7	80+	80
8	Unable to determine	0
9	Mode not present at site or inactive sites	0

The weight is assigned to each pressure category as the relative number of angler-trips for site-days in the sampling frame. The pressure categories 0 and 1 are down-weighted by giving relatively low values of weight (equal to $\frac{1}{2}$ of the minimum expected number of angler-trips) for a typical 8-hour interviewing assignment. Down-weighting low pressure sites reduces the probability of drawing assignments for sites with an expected number of interviews less than the minimum target of 8 (i.e., an average of one interview per hour). This is done in order to prevent selecting an excessive number of low pressure site-days which would, in turn, increase survey costs (i.e., lower productivity per assignment) to reach the desired sample size for generating meaningful and reasonably precise estimates.

The MSR is updated each wave to reflect changes in fishing activity over time. Procedures for updating the MSR include:

- Site Description Forms are submitted by field staff after intercept assignments. Contractors deliver updated site lists to NMFS each wave, according to the specified delivery schedule (approximately four weeks prior to the beginning of the next wave).
- The contractor or grantee attempts to physically inspect every site at least once a year to update MSR fields.
- The MSR updates are completed before the assignment draw for each wave (approximately three weeks before the wave begins) to allow enough time to schedule assignments and inform interviewers of their schedule.
- If more than one set of pressure estimates for a site are submitted by different interviewers, field supervisors make the final determination of the appropriate values to be used.
- More weight is placed on pressure estimates for waves during which sites were visited and empirical data was gathered, as opposed to pressures estimated up to a year in advance during a routine "site inspection." The interviewing results summarized in the Assignment Summary Data files are also used for evaluating the site-specific fishing pressure categories provided in MSR.
- Each new site is assigned a new and unique four-digit code from a master list of available numbers, which is maintained by NMFS.

Sampling for Site-Days

The targeted population in the intercept survey is specified by YEAR, WAVE, SUBREGION (Atlantic or Gulf of Mexico), STATE (note: Florida is sampled as two “states”, see box below), and MODE (charter or headboat mode for the FHS). Within the targeted population, sampling is stratified by MONTH-KOD (within the sampling wave) to assure a representative temporal distribution of samples. Excessive uneven temporal distribution in a wave, such as “front-loading” of samples, is not acceptable by the NMFS. Currently, intercept survey sampling is not stratified by county.

Regional Sampling Issues in Florida

Because Florida covers a much larger geographic area than other states, the state is sub-divided into smaller sampling regions. For catch data collected in the Access Point Angler Intercept Survey portion of the FHS, Florida is divided into two large sub-regions, the Gulf coast and the Atlantic coast. However, for effort data collected in the vessel directory telephone survey portion of the FHS, Florida is sub-divided into five sample regions. The Gulf coast sub-region includes three sample regions from the telephone survey, and the Atlantic coast sub-region of Florida includes two.

Table X: Florida survey sample regions for the two components of the For-Hire Survey.

Access Point Angler Intercept Portion	Vessel Directory Telephone Survey Portion
Gulf coast (all west coast counties, including the Keys)	Panhandle (region 1) Western Peninsula (region 2) Keys (region 3)
East Florida (all east coast counties, excluding the Keys)	Southeast (region 4) Northeast (region 5)

For-Hire effort estimates are generated for each Florida region (regions 1 through 5) by area fished (inland, state and federal waters), and intercept catch data from each of the five regions is applied to regional for-hire effort to generate catch estimates for each region. The mismatch in survey sample frames in Florida for catch and effort statistics also results in uneven sampling distribution for catch data among the five Florida For-Hire Survey regions. For example, within the Gulf of Mexico sub-region, the red snapper fishery is closed for six months of the year, and the resulting seasonal changes in fishing pressure draws site selection for for-hire mode intercept assignments north to Region 1 when red snapper is open, and further south to Regions 2 and 3 when red snapper is closed. Seasonal temperatures from northern to southern latitudes also impact relative fishing pressure and availability of some important migratory species, such as king mackerel and cobia, on both coasts of Florida. In addition, many important target species in Florida are restricted to southern portions of the state, such as snook, mutton snapper, bonefish, tarpon, and yellowtail snapper, to name a few. Uneven sampling of catches among the For-Hire Regions may have implications for accuracy and precision of catch estimates, particularly for seasonal and regionally concentrated fisheries. For the Florida Keys, there is no distinction given to catch or effort in the Atlantic Ocean versus the Gulf of Mexico, which creates difficulty during stock assessments and fisheries management between the two jurisdictions.



The sampling frame of a targeted population is a list of site-days, that is, every active site in the MSR joins with calendar days. The frame is stratified by MONTH-KOD. For example, Appendix A illustrates a sampling frame for April-Weekend stratum in the targeted population of 2007-5-NJ-Charter boats.

For each mode, site-day is a primary sampling unit (PSU) within a stratum. The “per draw selection probability” of the i -th site-day is

$$z_i = w_i / \sum_i^N w_i \text{ subject to } \sum_i z_i = 1$$

and N is the number of site-days in the sampling frame of a stratum. The site-day selection is the method of Madow (1949), which implements a systematic draw from the completely randomized list of sampling frame (Hansen, Hurwitz and Madow, 1953, Vol. I, p.341-348 and Cochran, 1977, p.265-266).

The advantages of this sampling procedure are:

- The inclusion probability $\pi_i = nz_i$; that is, each unit in the sampling frame is selected once by probability π_i subject to a fixed sample size of n ;
- A poor measure of weight may not bias the point estimate; however, it may result in a large variance (Hansen, Hurwitz and Madow 1953, Vol. I, p.346, Exercise 6.3);
- If the weight of a site-day is very small, an appropriate approach is to combine the site-days with the adjoining site-days (Hansen, Hurwitz and Madow, 1953, Vol. I, p.347).

The disadvantage is that this sampling procedure does not provide a second order (joint) inclusion probability that is required for variance using Horvitz-Thompson (HT) estimator (see Theorem 9A.5; Cochran 1977, p.260). See Hájek (1981) for some approximations.

The sample allocation within a targeted population is determined by the following factors:

- The ratio of total weights between MONTH-KOD strata.
- A minimum number of interviews for each of SH, PC, PR, CH and HB modes (PC mode is eliminated in 2007.) as determined by NMFS;
- The minimum number of assignments needed to achieve a specified target sample of angler-trip interviews for any given sampling stratum can be approximated by dividing the historical mean number of interviews per assignment into the number of interviews established as the goal. For example, if the mean number of interviews per assignment over the last three years of the survey has been 5.5 and the sampling goal is 200 interviews for a given stratum in a target population, then the minimum number of assignments needed is calculated as follows:

$$\begin{aligned} \text{Minimum number of assignments} &= (200 \text{ interviews needed}) / (5.5 \text{ interviews/assignment}) \\ &= 36.4, \text{ which rounds up to } 37 \text{ assignments} \end{aligned}$$

1. Once the minimum number of assignments has been estimated, this number is increased by some amount to set the number of assignments to be drawn and issued to interviewers (see discussion of “reserve” assignments below).

The sampling program will draw the specified minimum number of assignments in three separate rounds of sampling. The assignments drawn in the first two rounds are described below:

2. Assignments drawn in the first round are “fixed assignments”. Fixed assignments must be completed even if interviewing goals are reached before the end of a month or wave.
3. Assignments drawn in the second round are “flexible assignments”. Flexible assignments must be completed unless interviewing goals for the month or wave have already been reached.
4. Fixed and flexible assignments may be rescheduled due to bad weather or unexpected interviewer problems.
 - If the weather on the assigned date is so bad that no fishing is likely to occur at the assigned site, then the assignment may be rescheduled to the same KOD in the subsequent week of the same month.
 - If the assignment could not be completed on the assigned date because the assigned interviewer became ill, had car trouble, or failed to visit the site for some other reason, then the assignment may also be rescheduled according to the same KOD in the subsequent week of the same month.
 - Interviewer failures to complete issued assignments on the assigned dates should be minimized.
 - Any failed assignments initially assigned to the last week of a month are cancelled because they cannot be rescheduled to a later week.

The Contractor can determine an additional number of assignments to draw for each MONTH-KOD beyond the “minimum number” as described above to meet the sampling goals and held as “reserved assignments”. These “reserve assignments” are issued if interviewing productivity is running lower than expected during the first two weeks of the month or during the first month of the wave. Reserve assignments provide additional sampling coverage for the remainder of the month or wave in an attempt to meet the specified sampling goals. Reserve assignments are assigned to samplers in the same order as they were drawn. Overuse of reserve assignments may lead to temporal distributions of samples that are not representative of true distributions of fishing effort. The use of reserve assignments should be minimized and should not exceed 50% of the total assignments (fixed + flexible) originally issued.

Some rescheduling of sampling assignments may be necessary to prevent overlaps with interviewers from other surveys. This is of particular concern when the Large Pelagics Survey (LPS) is conducted, typically from June through October in the mid-Atlantic (Virginia through New York), and July through October in the North Atlantic (Connecticut through Maine). The NMFS staff provide LPS assignment schedules to the Intercept Contractor prior to their issuing of assignments. In the event that an interviewer arrives at a site and finds an LPS interviewer on-site, or vice-versa, the MRFSS (FHS) interviewer takes precedence unless: 1) the site is an alternate site for the MRFSS interviewer (i.e., not originally assigned), in which case the MRFSS interviewer should relocate to another alternate site; OR 2) the site is the only one in the LPIS cluster, in which case the MRFSS interviewer should relocate to an alternate site. Both interviewers are expected to cooperate in determining who should relocate to another site.

Sampling within Site-Day Assignment

The primary sampling unit (PSU) in the intercept survey is a site-day. Within a selected PSU, the ultimate sampling unit is an individual angler-trip. For boat-based assignments, including for-hire modes, angler-trips are clustered by boat-trip although sampling design does not include boat-trip as a cluster or sampling unit. Considering the experiences and behavior of crew members and fishers, it is assumed that the samplers select boat-trips at random first, and then, select angler-trips from the boat-trips for interviewing. This is a stratified 3-stage cluster sampling design, in which boat-trips are the secondary sampling units (SSU) and anglers are the tertiary sampling units (TSU). The questionnaire includes the following information:

Angler information

- State and county of residence
- Type of residence (e.g., private or institutional housing)
- Possession of telephone in his/her household
- Number of fishing trips taken in the past two and twelve months and year

Trip information

- Mode of fishing (charter, headboat)
- Fishing area (inland, state or federal waters)
- Type of gear used
- Target species (primary and secondary)
- Number of anglers who contributed to the available catch (harvested fish the interviewer can observe)
- total number of anglers on the boat-trip
- Number of kept and released fish by species or species group
- Measurements of weights and lengths from the kept fish

The “complete” interviews include the following key items: fishing mode, fishing area, state and county of residence, numbers and dispositions of fish caught by species, number of anglers who contributed to the catch, and total number of anglers on the boat (boat trips only). For available catch, numbers of fish may be summed for the fishing party (which can be later divided by number of contributors). Unavailable catch, which includes any fish that are not available for the interviewer to see (fish released, used for bait, already filleted, angler would not or could not show), may only be summed for each individual angler interviewed, and can not be grouped at the party level. This procedure is in place to avoid anglers in a group estimating the numbers of fish other anglers caught.

For each assignment, the primary goal is to obtain 20 to 30 complete intercept interviews in the assigned mode in eight hours or less. In the Northeast region, the maximum is 20 interviews in the assigned mode. In the Southeast and Gulf, the maximum is 30 interviews in the assigned mode.

Alternate sites

While the goal is to obtain 20 or 30 “complete” interviews per assignment, interviewers may not always be able to meet this goal. Interviewers may need to visit one or two alternate sites before

completing an assignment. However, an interviewer must visit his/her assigned site first. Exceptions to this rule include:

- An interviewer is unable to locate the assigned site, or
- The assigned site is an official tournament weigh station.

In order to increase interviewing productivity, interviewers may visit alternate sites if:

- There is no for-hire fishing activity at the assigned site;
- For-hire fishing activity is low and a preliminary canvass shows that it will be quite a while before any anglers will be finished for the day (e.g., if the interviewer checks with the marina operator or charter boat booking agents and they don't expect any boats in for 4 or 5 hours); or
- The interviewer has reason to believe that at least one for-hire interview per on-site hour cannot be obtained.

The following rules apply when selecting alternate sites:

- Any alternate site(s) selected must be the nearest to the assigned site in the same state and mode, and must not be further than a one hour drive;
- The site must have fishing activity in the assigned mode (for-hire). The for-hire pressure estimate listed on the site register for that particular site must range from "0" to "7";
- Only two alternate sites (or a total of three sites) may be visited on one assignment. The only exception to this rule is if an alternate site is an official tournament weigh station, or if another interviewer is already at the site. In these particular cases, that site does not have to be counted as a visited site.
- Interviewers may select a hostile site as an alternate site if it meets the above mentioned requirements; however, they are not required to do so.

These restrictions on selecting alternate sites prevent interviewers from continually visiting the same highly productive sites as alternates. This is commonly referred to as "hot spotting" and is a practice that NMFS closely monitors and corrects immediately once detected.

If an interviewer has reason to believe that the assigned mode is not active within a one hour drive of the assigned site prior to going out on the assignment, the interviewer postpones the assignment and informs the field supervisor.

Traditional Estimation Method

As stated above, the sampling design is a stratified (by MONTH-KOD) multi-stage cluster sampling with unequal selection probability for site-days within a targeted population specified by Year, Wave, Subregion, State, and Mode. However, the traditional estimation method assumes that all interviewed individual angler-trips and/or groups of angler-trips are selected within a targeted population defined by Year, Wave, Subregion, and State by using a simple random sampling with equal selection probability without replacement (Ghosh 1981). The variables, MODE and MONTH-KOD, in the original sampling design are discarded. In the traditional estimation method, the APAIS data are post-stratified by fishing mode (mode_fx) and fishing area (area_x) that are reported by interviewed anglers. In this section, we ignore the

subscripts for Year, Wave, Subregion, and State. In the rest of chapter, let subscripts m denote mode_fx, a denote area_x, and i denote each interviewed angler-trip or interviewed group of angler-trips.

CPUE for Type B Fish

The CPUE is estimated by number of fish per angler-trip. In general, the CPUE of the j-th Type B1 or B2 species and variances in the m-th mode_fx and a-th area_x are estimated by

$$\hat{y}_{maj} = \sum_i y_{mai} / n_{ma} \quad (2.6)$$

$$Var(\hat{y}_{maj}) = \frac{1}{n_{ma}(n_{ma}-1)} \sum (y_{mai} - \hat{y}_{maj})^2$$

The finite population correction (fpc) factor in the variance equation is ignored.

CPUE for Type A Fish

The CPUE for Type A fish is an application of ratio estimator. Let x_{mak} be the number of contributed angler-trips in a group, where $k = 1, \dots, K_{ma}$ groups, then the CPUE of the j-th Type A species in the m-th mode_fx and a-th area_x are estimated by:

$$\hat{y}_{maj} = \frac{\sum_k y_{majk}}{\sum_k x_{mak}} = \frac{\sum_k y_{majk} / K_{ma}}{\sum_k x_{mak} / K_{ma}} = \frac{\hat{y}'_{maj}}{\hat{x}'_{ma}} \quad (2.7)$$

The variance of the ratio estimator is traditionally derived from Taylor series expansion or so-called delta method:

$$Var(\hat{y}_{maj}) = \frac{\sum_k (y_{majk} - \hat{y}_{maj} x_{mak})^2}{\hat{y}_{maj}^2 K_{ma} (K_{ma} - 1)} \quad (2.8)$$

The fpc in the variance equation is ignored.

How is total catch and total harvest calculated?

CPUE * Adjusted Angler Trips = total catch
(by year, wave, state or region, mode, area fished)

Mean Weight of Fish

During access-point intercept surveys, a sub-sample of inspected fish are measured and weighed. The average weight of inspected fish for a particular species within an individual stratum, or "cell" (year/wave/state/mode/area), is multiplied by the estimated number of fish in that stratum to get the estimated weight. However, weight samples at the species level may be sparse and inconsistent, and estimates of weight should be used with caution. Weight estimates are only generated for harvested fish, since un-inspected fish (mainly released fish) can not be weighed.

For-Hire Survey Methods: At-Sea Angler Observer Survey for Headboat mode

Prior to 2005, headboats and charter boats were sampled as one combined mode (referred to as Party Charter mode) from Maine to Virginia. Intercept samplers had the option for headboats to board the vessel and collect interviews at-sea, using the same interview methods as if conducted dockside. South of North Carolina, where headboat coverage in the Southeast Headboat Survey begins, headboats were excluded from the For-Hire Survey until 2005. Beginning in 2005, the For-Hire Survey sampled headboats (also called party boats) from Maine through Georgia as a separate fishing mode and generated separate estimates of effort and catch-per-unit-effort for the mode. Florida and Alabama also conducted pilot studies for headboat mode sampling in the south Atlantic and Gulf of Mexico (Table 2.3). The For-Hire Survey overlaps with several other data collection programs for headboats throughout the region (Table 2.3). Overlap and subsequent integration of the For-Hire Survey with some of these programs is discussed in following sections.

Table 2.3. For-Hire Survey sampling for headboat mode and overlap with other for-hire data collection programs in the Atlantic and Gulf of Mexico.

States	Year(s) Piloted	Years Implemented	Pre-Existing Programs	Comments
Maine to Virginia	2004	2005 to 2008	Vessel Trip Reports (VTR) MD Chesapeake Bay Logbook	VTR and MD Logbook do not provide full coverage of all headboats.
North Carolina to Georgia	2004	2005 to 2008	Vessel Trip Reports (VTR) SC Logbook Program Southeast Headboat Survey	VTR provides minimal coverage for headboats in this region. Southeast Headboat Survey is considered the official survey method for this region.
East Florida	2005 to 2008		Southeast Headboat Survey	Southeast Headboat Survey continues to be the official survey method for these states.
West Florida	2005 to 2007	discontinued	Southeast Headboat Survey	
Alabama	2004 to 2007	discontinued	Southeast Headboat Survey	

Major differences in the For-Hire Survey between headboat mode and charter mode since 2005 are summarized below.

Angler Intercept Methods:

- Headboat mode sample selection is vessel based, whereas charter mode sample selection is site based.

- Headboat mode surveys are conducted at-sea, charter mode surveys are conducted at dockside intercept sites.
- Intercept surveyors directly observe and record the species, number of fish, disposition, and length of discarded fish while anglers are fishing; charter mode interviews rely on angler recall for species identification, number, and disposition of discarded fish and no length measurements are recorded.

Detailed methods for headboat mode and charter mode are provided in For-Hire Survey procedures manuals (see Source Documents).

Effort Methods:

- Effort from headboat mode is collected from the vessel-directory telephone survey as a separate mode using the same methods as described for charter mode.
- Is the percent of vessels sampled weekly 10% or greater?

Estimation methods:

- Separate mode-specific catch and effort estimates are generated for headboat mode and charter mode.
- CPUE's for headboat mode are calculated using the same methods described for charter mode.
- Effort estimates for headboat mode from the vessel-directory telephone survey are applied to CPUE's using the same methods as described for charter mode.
- Headboat vessels are easily located; therefore vessel registries are maintained as complete survey frames. There is no off-frame correction factor for vessels not on the sample frame.
- Over/Under reporting correction factors from dockside vessel validations are calculated using the same methods described for charter mode.

Vessel Trip Report Program

Fishing Vessel Trip Reports (VTRs) are a paper-based self-reported trip report for catch and effort that are mandatory for vessels licensed to participate in certain federally managed fisheries in the north Atlantic and mid-Atlantic (Maine to Virginia). The program is administered by the NMFS Northeast Regional Office (NERO). Federal permit types that require VTRs include: (i) Bluefish, (ii) Black Sea Bass, (iii) Summer Flounder, (iv) Northeast Multispecies, (v) Scup, and (vi) Squid/Mackerel/Butterfish. Vessels from the south Atlantic may also possess these permits, and all permitted vessels are required to submit VTRs for each fishing trip, regardless of area fished (federal or state waters) and species targeted or caught.

Fishing Vessel Trip Reports (VTRs) are the primary source of spatial data, which is imperative in the monitoring of Total Allowable Catch (TAC) programs, quotas, and fishery specific management areas. VTRs are also used for catch per unit effort (CPUE) calculations, and as a source of discard data, which are critical components of stock assessments.

The VTR frame comes from the Vessel Permit System (VPS), which is a comprehensive directory of federally permitted boats. The VTR frame does not distinguish between for-hire vessel types (headboat vs. charter boat). NERO issued fishing vessel permits with VTR requirements in the mid and north Atlantic (Virginia to Maine) are summarized in Table 2.4.

Table 2.4.

Year	Permits	Number of submitted VTRs
2000	4905	187,850
2001	4820	191,408
2002	4890	183,011
2003	4706	173,628
2004	4797	173,748
2005	4921	181,276
2006	4598	182,388
2007	4355	166,554 *

2007 data is incomplete

VTRs are completed prior to the vessel entering port with all known data elements (excluding dealer number, dealer name, and date sold). VTRs must be postmarked or received by NERO by the 15th of the month following the month in which the fishing trip occurred. Catch data is based on estimated hail weights, and data elements are required for vessel identification, gear, effort, location, catch, and vessel operator. The specific data elements are:

- Vessel name
- USCG Doc number or state registration number
- Vessel permit number
- Date/time sailed
- Trip type
 - Commercial
 - Party
 - Charter
- Number of crew
- Number of anglers if a party or charter trip
- Gear fished
- Mesh or ring size
- Quantity of gear
- Size of gear
- Chart area
- Average depth in fathoms
- Latitude & longitude or loran station bearings
- Number of hauls
- Average tow / soak time
- Species caught

- Amount kept (commercial trips in pounds, party and charter trip in count)
- Amount discarded (commercial trips in pounds, party and charter trip in count)
- Dealer permit number
- Dealer name
- Date sold
- Port and state landed
- Date / time landed
- Operator license number
- Operator license name
- Operator signature and date

The VTR program is designed to be a complete census of catch and effort for for-hire vessels participating in the defined fisheries; however, reporting compliance is less than 100%. The database does not contain "DID NOT FISH" reports and it is unknown to what degree reports are absent. Inaccurate reporting also exists in this method of data collection, although it is impossible to quantify or qualify. Intentionally or unintentionally, mis-reporting does exist either in earnest or in attempt to disguise catch (species or quantities), fishing effort, gear characteristics, location data, etc. VTRs can be cross referenced with other data sources as a means of validation. Other data sources include dealer reports, bio-sampling, observer coverage, etc.

Timing delays are problematic in this data collection program. A vessel is required to submit VTRs by the 15th of the month following the month in which the trip occurs. For example, a trip that lands on June 10 is due by July 15. Consequently, availability of vessel data can be significantly slower by comparison to other data collection methods. Some overlap and redundancy in reporting exists with other data collection programs. Examples of redundancy include the requirement of some vessel permits to submit catch reports through their VMS units. Another example is some permits require catch information to be reported through Interactive Voice Response (IVR) systems. Additionally, overlap exists where vessels may have both VTR reporting requirements as well as state reporting requirements for the same fishing activity. The same can be said of VTRs with the For-Hire Survey (FHS). Integration of the NERO VTR Program with the FHS is discussed in the next section.

Altering any aspect of vessel trip reporting is typically a long and potentially difficult process. Vessel trip reporting is a mandated, regulatory requirement and regulation changes are necessary if any change in data elements, record retention or report timing is desired. This is one reason why vessel reporting consolidation efforts have in the past been difficult. Other groups such as State agencies, fishing councils, sector managers, MRFFS/MRIP, etc. have data needs that differ from those of NMFS/NERO.

The VTR form includes five (5) parts: NMFS copy; Vessel copy; State copy; Dealer copy 1; Dealer copy 2. NERO is in the beginning stages of development of vessel electronic reporting. For a multitude of reasons, it is desirable to transition away from a paper form towards electronic reporting. Various methods of electronic reporting that are being considered include:

- Web site submissions utilizing land based computers
- Web site submissions utilizing satellite transmissions

➤ VTR submissions utilizing VMS units

Integration of For-Hire Telephone Survey and Vessel Trip Report Program

Data from vessel trip reports are also included in effort estimates from the For-Hire Survey for the states of Maine through Virginia. A detailed description of how the two surveys are integrated is provided by Andrews and Lai, 2008.

Maryland Chesapeake Bay Logbook Program

Since 1994, Maryland has conducted a logbook reporting program for charter boats and head boats operating within state waters (Chesapeake Bay and ocean bays within the 3-mile limit). Each charter or head boat owner is issued a Commercial Charter Boat Captain's Log Book containing a set of daily recording forms for each boat he/she owns (about 602 boats in 2006). Vessel operators are required to record their fishing activities on a daily basis, including number of passengers, number of fishing trips, and number and weight of fish harvested by species (discarded fish are not recorded).

A daily report is required even if the vessel was not used and the forms are supposed to be forwarded to the state resource management agency every week; however, when logbooks are not returned, it is assumed that the vessel did not operate. (Note that in Table 2.5, there is a marked increase in non-reporting in the lower fishing-activity months of the winter). Because reported fishing is considered total fishing, Maryland logbook reports may under-estimate actual harvest. In order to reduce non-reporting, an enforcement program was initiated in 2006 that places a "hold" on license renewal if reports are not supplied by June of the following calendar year. The "hold" is removed when reports are received.

In addition to use in the FHS, logbook data are used by Maryland Department of Natural Resources (MDNR) for harvest calculations for selected species. The most crucial historical use of the data was for the 2002-2006 estimates of the spring Striped Bass harvest, which was under a quota set by the Atlantic States Marine Fisheries Commission. MDNR has also used the data to perform spatially-distributed estimates of Summer Flounder harvest.

Table 2.5. Reported Maryland Charter/Head Boat Activities in 2006 (as of March 2007)

Month	Number of Boats Reported	Response Rate (%)	Pounds of Fish Harvested	Number of Paid Anglers	Number of Boat Trips
April	507	84.2	218,185	13,774	2,320
May	504	83.7	227,976	16,369	2,476
June	498	82.7	236,399	18,117	2,410
July	494	82.1	384,517	23,994	2,555
August	471	78.2	210,005	16,130	1,911
September	448	74.4	114,971	9,123	1,349
October	420	69.8	84,748	7,135	1,114
November	385	64.0	39,821	3,456	576
December	367	61.0	1,722	161	25
Total		75.6	1,518,454	108,259	14,736

Integration of For-Hire Telephone Survey and Maryland Chesapeake Bay Logbook Program

In Maryland, effort data for vessels that operate in coastal bays, state territorial seas, or federal waters are sampled in the For-Hire Survey using the same methods employed in other states. However, to reduce duplication of reporting, the For-Hire Survey relies on effort data from state logbooks for vessels that operate solely within the waters of the Chesapeake Bay. For these vessels, NMFS provides the state of Maryland with a list of weekly boat samples (sample week runs from Mon-Sun). If logbook reports have not been received from vessels one week after the due date (the next Thursday), the state sends a reminder to selected boats. Within 29 days of the end of each wave, the reported logbook data from vessels that are selected to report in the For-Hire Survey are provided by the state to NOAA Fisheries for inclusion in the For-Hire Survey. The effort data are treated the same as telephone survey data collected in other states by the For-Hire Survey, and estimation procedures do not differ. Sampled boats that do not supply logbook reports within 29 days of the end of each month are considered to have fished at the average rate as the boats that supplied information and effort could be overestimated if non-reporting vessels were biased (e.g. non-reports represent a higher proportion of vessels that did not fish).

Catch data from the Maryland Logbook are not integrated into the For-Hire Survey. The access-point intercept survey portion of the FHS is conducted throughout the state and catch-per-unit-effort from the intercept survey is multiplied times estimated effort from the integrated For-Hire Survey and Maryland Logbook to estimate total catch.

Large Pelagics Survey (LPS), For-Hire Mode (Virginia through Maine)

Extracted from Lai and Foster, 2008

Since 1992, the National Marine Fisheries Service has administered the LPS to collect information about the recreational fishery directed at large pelagic species (e.g., tunas, billfishes, swordfish, sharks, wahoo, dolphinfish, and amberjack) in the offshore waters from Maine through Virginia. Participation in the LPS is mandatory and is a condition of obtaining a National Marine Fisheries Service Highly Migratory Species (HMS) permit. The authority to collect LPS data comes from the Atlantic Tunas Convention Act and the Magnuson-Stevens Fishery Conservation and Management Act. The collection of catch and effort information on large pelagics also fulfills U.S. obligations to the International Commission for the Conservation of Atlantic Tunas (ICCAT).

Because large pelagic species are only sought on a relatively small proportion of the total marine recreational angler fishing trips made in the Northeast Region, the fishing effort directed at such species, and the resulting angler catches are generally not estimated very precisely by surveys designed to sample all types of recreational fishing. Therefore, the LPS was designed as a specialized survey focused specifically on the recreational fishery directed at large pelagic species. This specialization has allowed higher levels of sampling needed to more precisely estimate pelagic fishing effort and catches of large pelagic species.

The LPS includes two independent, yet complimentary survey methods, which provide the effort and mean catch-per-unit-effort estimates needed to estimate total catch by species. The Large Pelagic Intercept Survey (LPIS) is a survey of fishing access sites, designed to intercept returning boats and collect data on catch by boats that have just completed fishing trips directed at large pelagic species. The data collected by the LPIS is used to estimate mean catch per boat trip by species. The Large Pelagic Telephone Survey (LPTS) is a telephone survey of vessel owners who hold federal permits for highly migratory species (HMS) or Atlantic tunas. After the For-Hire Survey was implemented on the Atlantic coast in 2005, the LPTS was integrated with the For-Hire Survey's Vessel Directory Telephone Survey.

Large Pelagics Intercept Survey (LPIS)

The Large Pelagics Intercept Survey for for-hire mode is a dockside survey of fishing access sites, primarily designed to collect catch data from charter boat captains who have just completed fishing trips directed at or catching large pelagic species. LPIS data are used to estimate the average recreational catch per large pelagic boat trip by species.

Although generally similar, there are four significant distinctions between LPIS and the Angler Access Intercept portion of the For-Hire Survey. The primary difference, as described above, is operational scope. The LPIS for for-hire mode is limited spatially to the Northeast Region, Virginia through Maine, and temporally to June through October. Further, in the for-hire mode only charter boat trips are sampled and only if large pelagic species were targeted or caught on the trip. Additionally, LPIS intercepts vessel trips as opposed to angler trips in the FHS. A single vessel representative, the captain or designee, is interviewed to collect information about the trip. Finally, individual access point sites are grouped together into site clusters. These site clusters comprise the LPIS sample frame unlike the FHS, wherein the sample frame is composed of individual sites. These differences will be expanded on in the following subsections.

Reference documents for this section are:

- http://www.st.nmfs.noaa.gov/st1/recreational/Large_Pelagics_Intercept_Survey.htm
- "2006-2009 Large Pelagics Intercept Survey Statement of Work"
- "Final 2007 LPIS Procedures Manual"

Master Site Register

The MSR for LPIS is very similar to the site register used in the intercept portion of the FHS, and nearly all LPIS sites with for-hire charter mode are also sampled by the FHS. The primary distinction between the two MSR's is the LPIS site cluster. To increase LPIS interviewing efficiency, individual sites in the MSR are grouped together to form site clusters with reasonable total expectations of interviewing productivity. Sites with expected high numbers of interviews (generally more than 4 per day) are not clustered, while sites with lower expectations of interviewing success are grouped together with other nearby sites. Site clustering is designed to raise the total number of expected interviews while minimizing the driving distance between sites. Factors considered in assigning sites to clusters include the relative fishing pressures at each site, the proximity of sites within a cluster and the historical interviewing productivity at sites within a cluster. Sites within a cluster may vary from month to month (e.g., two sites may be part of the same cluster for June but not July).

A second important distinction is the difference in estimated fishing pressure at a site. Whereas the FHS uses a categorical scale based on expected numbers of angler-trips per day by mode, month and kind of day (weekend/weekday), the LPIS uses average historical sampling productivity (mean interviews obtained per assignment) by mode, month, and kind of day as a proxy for site fishing pressure. For new LPIS sites, an estimate of productivity is used until a representative number of sampling events has occurred at the site. This estimate may be based on productivities from sites in the same cluster, other similar sites, or productivity estimated from site visits made by field supervisors.

Procedures for updating the LPIS MSR generally follow those described for the FHS.

Sampling for Site Cluster-Days

The targeted population in LPIS for-hire mode is determined by YEAR-MONTH-STATE category. Months are not grouped into 2-month waves as they are in the FHS. Another small distinction here is that Connecticut and Rhode Island are grouped into a single two-state survey area because of low LPIS sampling productivity in these states. Sampling is then stratified by kind of day within month.

Unlike the FHS, the LPIS sampling frame is a list of site cluster-days, constructed by expanding the LPIS master site register into days within a kind of day stratum by category (YEAR-MONTH-STATE).

Sample allocation and selection follow those described for the FHS angler access intercept portion with the following exceptions:

- For-hire modes are limited to charter (no headboats)
- Assignments refer to site cluster-days

- Site cluster-day is the primary sampling unit (sample day) with a stratum
- The primary sampling unit weight is the sum of individual site pressure estimates within the site cluster by category
- Systematic draw is ordered by day within month to prevent an excessively uneven sample distribution
- Missed assignments may be rescheduled to the same kind of day inside of the same week as the original sample
- Tournament sites may be sampled if part of a selected site cluster-day assignment

Sampling within Site Cluster-Day Assignment

Within a site cluster-day primary sampling unit, boat trips are selected as secondary sampling units making the LPIS a stratified 2-stage cluster design. A key assumption in the design is that boat trips are sampled at random from within the site cluster.

Information recorded during LPIS sampling varies somewhat from FHS:

- Vessel information
 - Mode of primary operation
 - NMFS HMS permit status and number
 - Vessel identifiers: name, registration or documentation number
 - State of principal port
- Trip information
 - Mode of fishing
 - Target species
 - Tournament participation
 - Fishing effort: hours fished, number lines, number anglers
 - Location information: coordinates, distance, depth, surface temperature
 - Number of kept and released fish by species – any finfish
 - Measurements of lengths from observed fish – only large pelagic species

Currently, there are no LPIS sampling goals or maximums per assignment. LPIS interviewer productivity, outside of tournament activity, is considerably lower than APAIS due to the exclusion of trips that did not target or catch large pelagic species.

Alternate sites

There are no alternate sites in the LPIS. Each LPIS interviewing assignment consists of a cluster of sites (or a single high-pressure site), a date, and a boat type. Interviewers may start their assignments at any of the sites in the assigned cluster. The starting time on the specified date for each assignment is determined based on the time of day when boats that fish for large pelagic fishes are most likely to return from fishing. In order to determine the optimal time of day, interviewers must gather information on the temporal distribution of returning boats at assigned sites prior to each assignment. Sources of information include but are not limited to:

- Master Site Register
- Call the site(s)

- Ask the Field Supervisor
- Fishing reports on large pelagic fishing
- State natural resource agency personnel, NMFS regional personnel, and NMFS port agents

The interviewer may then proceed to visit other sites in the assigned site cluster to assess the interviewing potential and appropriate interviewing times at all sites assigned for that day.

Once the interviewer has assessed the interviewing potential at all sites in the assigned cluster, he/she should use a strategy for moving from site to site that maximizes the number of potential completed interviews for the assignment. Interviewers should move from site to site with the intent of maximizing sampling of returning boats at all access points within the defined cluster.

The interviewer may obtain interviews at any or all of the assigned sites and may move from site to site in whatever manner is appropriate to maximize the number of interviews obtained on the assignment. Under no circumstances is the interviewer allowed to move to another marina or ramp that is not within the boundaries of the assigned site, or site cluster.

Alternate modes

Due to relatively low productivity, alternate mode interviewing is allowable in LPIS and less restricted than in APAIS. Although priority is given to the drawn mode on any given interviewing assignment, interviewers may obtain interviews with operators of both charter boats and private boats on all assignments. However, priority is always given to getting interviews for the assigned mode. For example, if “charter boat” is the assigned boat type and both a charter boat and a private boat return at about the same time, priority is given to intercepting and interviewing the operator of the charter boat rather than the private boat.

Tournament sampling

Interviewers are not prohibited from interviewing at a site where a fishing tournament is in progress. However, when interviewing at a tournament site the interviewer records information identifying the tournament, and whether or not the reporting vessel was participating in the tournament.

Data

Data deliverables for the LPIS include the following:

- MSR
- Draw
- Completion
- Assignment Summary
- Site Description
- Interview datasets
 - Main: vessel and trip characterization information
 - Catch: Numbers of kept and released fish by species
 - Size: Measurements of length of observed large pelagic species by species

LPIS data go through several layers of quality control which include screening through SAS error checking programs, follow up validation with survey respondents, and periodic data review meetings.

Large Pelagics Telephone Survey (LPTS)

The LPTS is a telephone survey of boats with NOAA Fisheries permits to fish for either highly migratory species (HMS) or Atlantic tunas. Vessels with the Charter/Headboat HMS permit comprise the “charter boat” stratum. LPTS data are used to estimate the total number of boat trips on which anglers fished with rod and reel or handline for large pelagic species. LPTS estimates of fishing trips are combined with LPIS estimates of mean catch per boat-trip to produce estimates of total catch by species. Since 2003, the charter boat stratum in the LPTS has been sampled weekly as part of the FHS (also referred to as the LPTS Add-on).

Reference documents to this section are:

- http://www.st.nmfs.noaa.gov/st1/recreational/Large_Pelagics_Telephone_Survey.htm
- “2008-2012 Large Pelagics Telephone Survey Statement of Work”

Vessel Directory

For the LPTS Add-on, part of the FHS, all vessels with a Charter/headboat category HMS permit are included in the FHS vessel directory. Prior to the beginning of each wave, NOAA Fisheries supplies a list of all vessels with a Charter/headboat category permit to the FHS contractor. The Contractor incorporates this list into the FHS vessel directory by updating existing vessel directory records with HMS permit information or adding new vessels to the FHS directory.

Sampling Frame

LPTS sample frames are constructed as described for the FHS. An important distinction for LPTS is that HMS permit holders are required to participate in the survey, if selected, as a condition to purchase the permit. Not all non-HMS vessels listed in the FHS vessel directory are required to participate in the survey.

Sample Selection

For the charter boat stratum, sampling follows that described for the FHS, namely equal-probability stratified systematic sampling, drawn weekly by wave and state. The FHS Vessel Directory (sample frame) of known vessels is first sorted by permit category (HMS permit, no HMS permit), then by vessel length, to insure that a representative sample of HMS and Atlantic tuna permitted vessels are selected in the weekly sample draws.

LPS Estimation Methodology

Reference documents for this section include

- G:\ST1\MRFSS\Highly Migratory Monitoring\LPS General\LPS Summary.doc
- G:\ST1\MRFSS\Highly Migratory Monitoring\LPS General\ Ad Hoc HMS Committee Report 2004.pdf
- SAS programs

LPIS CPUE

LPIS CPUE is generally calculated as described for the intercept portion of the FHS. However, CPUE as calculated for vessel trip, not angler trip, and there is no need to separate catch among anglers. While no distinction is made between observed and unobserved catch, LPIS has four types or categories of catch:

- Kept – landed fish
- Alive – fish released alive
- Dead – fish discarded dead at sea
- Sell – any landed fish that were sold (a subset of Kept).

In 2006, another category, *Observe*, was added, which is a subset of Kept fish directly observed by the field sampler. Finally, for-hire mode CPUE is calculated for the target population of Year-Month-State, and samples are not post-stratified by fishing area (inland, state, federal waters).

Off-frame adjustment for total vessel trips in LPTS

A simple adjustment factor, similar to the out-frame adjustment factor for total angler-trips in FHS, is calculated from LPIS sampled vessels by mode. Intercepted trips are designated as on frame if the vessel is listed in the LPTS sample frame for the given state. All out of state trips are designated as off frame.

LPTS Effort

LPTS estimation generally follows that described for the FHS with the following differences:

- Vessel-trip (boat-trip), not angler-trip, is the unit of measure.
- Effort is not calculated by fishing area, so boat trips are not post-stratified as in VDTS
- Maryland-Delaware, Connecticut-Rhode Island, and New Hampshire-Maine are grouped into two-state survey areas (matching survey design between the LPTS and LPIS for private sampling but not for charter sampling). Potential biases from this mismatch between survey design and estimation procedures have not been evaluated.
- No adjustment is made for reporting errors

Total number of boat-trips is calculated as for the FHS, with minor differences. First, LPTS target population for for-hire mode is Year-Month-State. Second, fishing area is not considered.

LPTS undercoverage adjustment follows that described for the FHS. The adjustment factor for for-hire mode is specified by Year-Month-State and estimated from the LPIS (previously discussed).

Calculations follow as for the FHS with vessels replacing anglers, such that m' refers to intercepted on-frame vessels and m refers to total intercepted vessels (on-frame + off-frame).

LPS Total Catch in Number

In general, Kept (\hat{Y}_1), Alive (\hat{Y}_2), and Dead (\hat{Y}_3) catches and their variances by Year-Month-State-Mode (charter mode for the case of for-hire) are estimated as:

$$\hat{Y}_i = \hat{y}_i \hat{T}_R \quad (7.1)$$

$$Var(\hat{Y}_i) = \hat{T}_R^2 Var(\hat{y}_i) + \hat{y}_i^2 Var(\hat{T}_R) - Var(\hat{y}_i) Var(\hat{T}_R)$$

where \hat{y}_i and $Var(\hat{y}_i)$ are the estimated catch in number per boat-trip for any species by catch category and its variance; \hat{T}_R and $Var(\hat{T}_R)$ are the estimated total trips and its variance subject to frame under-coverage correction. Assuming no correlation among catch categories, the total catch and variance are given by

$$\hat{Y} = \sum_i \hat{Y}_i \quad (7.2)$$

$$Var(\hat{Y}) = \sum_i Var(\hat{Y}_i)$$

Southeast Headboat Survey (North Carolina through Texas)

The Southeast Headboat Survey is administered by the NMFS Southeast Fishery Science Center. The program began in 1972 in North Carolina and South Carolina, expanded into Georgia and North Florida in 1976, and further expanded into the southeast Florida area and the Florida Keys in 1978. In the Gulf of Mexico, the program began in 1985 and encompassed the coastal area from Naples, Florida through Pt. Isabel, Texas. The survey has always consisted of two complementary components: dockside bioprofile sampling by trained port agents, and paper logbooks (daily trip reports) collected from the vessel personnel for each trip.

Bioprofile Sampling

Vessel Selection

Agents are instructed to systematically sample vessels in their area of responsibility on a rotational schedule in order to sample all vessels as equally as possible. Some vessels run more often than others and thus are likely to get sampled more frequently. Once agents have sampled a frequently running vessel, they concentrate on getting samples from vessels that run infrequently. Phone calls by the port agents to the vessel booking offices or vessel crew are a common means of finding out if a boat is running a trip on any given day. It is possible for port agents to obtain more than one vessel sample per day, given the variety of trip types and durations. For example, a half-day trip may be sampled at noon, and then the agent might drive to another port two hours away and sample a full day trip arriving later in the afternoon. Multiple vessels docked at the same marina with staggered arrival times, may allow for multiple samples per port per day.

Angler Selection

When a headboat unloads and the crew starts passing out fish, a port agent walks up to an angler and asks to measure and weigh the catch, explaining that this is part of a fish survey to obtain biological information. Most anglers willingly cooperate with the sampling. Occasionally an angler will not allow the catch to be sampled, either because he is in a hurry to leave or for some other reason. In these instances, we have instructed our samplers to just move on and pick someone else. There are usually plenty of anglers to choose. Port agents are instructed to select

stringers with less common species when picking anglers whose fish will be sampled. The assumption is that stringers with less common fish will undoubtedly also have the more common fishes caught by the majority of anglers, and thus port agents will obtain a sample of the catch consisting of common, uncommon, and rarely caught species. Port agents are instructed that once they have measured 10 individuals of a given species they do not need to measure any more of that species from that trip. This speeds up sampling, increasing the number of less common species sampled. If they reach the 10-individual level in the middle of processing a stringer and still have more of that species left on the stringer, they finish measuring the rest of that species on the stringer, in order to avoid any selectivity bias. A general goal we give our port agents is 30 fish measured per vessel sample, but many of our agents routinely exceed this number.

Logbooks

Logbook reporting is mandatory for the headboat survey. The statutory authority is given in the Federal Register 50 CFR part 622.5: "The owner or operator of a vessel for which a charter vessel/headboat permit for Gulf coastal migratory pelagic fish...Gulf reef fish... has been issued, ...or whose vessel fishes for or lands such coastal migratory pelagic fish, reef fish, snapper-grouper, or Atlantic dolphin or wahoo in or from state waters adjoining the applicable Gulf, South Atlantic or Atlantic EEZ, who is selected to report by the Science Research Director (SRD) must maintain a fishing record for each trip....on forms provided by the SRD...Completed fishing records must be submitted to the SRD monthly and must either be made available to an authorized statistical reporting agent or be postmarked no later than 7 days after the end of each month. Information to be reported is indicated on the form and its accompanying instructions."

Port agents collect logbooks (trip report forms) from vessel personnel (captain or deckhands). Port agents explain to the vessel personnel the importance of accurate and timely information. Vessel personnel are asked to submit a report for each individual trip they make (they do not fill out reports for days they did not fish). Port agents take the time to instruct the crew in the proper completion of the report, asking them to record date, trip type (duration), number of anglers, fishing location in a 100 square mile grid, total numbers of fish harvested by species, the total weight (lbs) of each species harvested, total number of fish discarded by species and condition (number released dead and number released alive), distance from shore, total number of passengers, and whether or not the trip is a headboat or charter trip. If port agents cannot get cooperation from vessel personnel, we instruct them to try someone else on the boat. If no one will cooperate, we instruct the port agents to talk to the owner of the vessel, reminding them of the legal requirement to submit a logbook record for each trip. If no one on the vessel will complete the logbooks, the port agents are instructed to obtain increased numbers of personal observations of activity, so that the estimate of effort might be more reliable. Upon receipt of trip reports from a vessel, the port agent looks them over individually for completeness, correct species identifications, and both legibility and reliability of data recorded. This is accomplished by reviewing the number and total weight of the species harvested to determine if these are representative of the normal size for these species. If the numbers and weights are unrealistic (e.g., 10 gag @ 1000 lbs total weight) these logbooks are flagged and the port agent contacts the record keeper to resolve the inconsistency. The port agent must enhance any data that is not legible, so the key entry personnel can read it.

There is usually good compliance with logbook reporting requirements in most areas except southeast Florida and the Florida Keys. Federal enforcement is essentially non-existent in southeastern Florida. Compliance with logbook reporting requirements averages 75% throughout the Gulf of Mexico, with compliance lowest in Louisiana. In 2008, certified letters were sent to all headboat vessel operators to inform them of their reporting requirements. Beginning in 2008, non-compliance is monitored by comparing reported logbook trips with validation records kept by area port agents. Vessels that are identified as having not turned in trip reports will be reported to the NMFS office in charge of issuing federal permits. Non-compliance with the reporting requirement may result in non-renewal of federal permits necessary to participate in certain fisheries. Vessels are not required to have federal permits if they only fish within state territorial seas; however, they are still required to report if they fish for certain species managed by federal Fishery Management Plans and may face civil penalties for non-compliance. This recent reinforcement of reporting requirements is expected to improve compliance.

Effort Calculation

Reported effort is calculated from logbooks. The term "reported" refers to data actually provided by the vessel personnel in the form of logbooks. Data on effort are provided as number of anglers on a given trip. Numbers of anglers are standardized, depending on the type of trip (length in hours), by converting number of anglers to "angler days" (e.g., 40 anglers on a half-day trip would yield $40 * 0.5 = 20$ angler days).

Port agents utilize a worksheet called a headboat activity report (HAR) to record every piece of information they can gather about an individual vessel's activity for that month. The numbers of angler days from logbooks are summed to yield catch record angler days (CRADs). This data, along with all other observations of activity or inactivity recorded by the port agent, are used to calculate estimated angler days (EADs). This is the adjustment for non-reporting. If there is complete reporting by vessel personnel, i.e., a logbook submitted for every trip made, then $CRAD = EAD$. More often than not there are varying degrees of incompleteness of reporting. Once we have calculated both CRAD and EAD, we can compute the correction factor, or K-factor, as $EAD/CRAD$. Effort is estimated for each vessel month.

Validation of effort reporting is done by comparing the number of anglers on the logbooks versus the number of anglers counted by the port agent. The actual dates of trips reported are also compared with port agents' observations of vessel activity.

Estimated Catch Calculation

To correct for non-reporting, the total estimated number of fish is computed by multiplying the reported catch data from logbooks by the effort K-factor (e.g., 1000 vermilion snapper reported from logbooks for a given month with an effort K-factor of 1.5 would translate into a total estimated catch for vermilion snapper of 1500 fish). Mean weight of fish are calculated, by species and month, for each species using the bioprofile measurements. In the case of uncommon or rare species, time and area strata are combined until a total of 10 weights are available to be used in the calculation. Once obtained, mean weights are multiplied by estimated numbers of fish, by species, area and month strata to obtain total estimated weight of fish caught.

Data Uses

The strength of the Gulf of Mexico headboat survey is in the long-term continuity of the survey and the high percentage of trips for which a logbook record exists. Because of this complete, long-term, consistent reporting and sampling, the survey has become one of the most important data sources for stock assessments conducted in the Gulf of Mexico and south Atlantic regions. The survey provides accurate catch estimates, biological data, and most importantly, a catch-per-unit-effort abundance index from the reported logbook catches. Much of the quality of the data is due to the rapport the port agents have built over time with the industry.

Fishery dependent catch-per-unit-effort abundance indices are often criticized. The critics note that fishery dependent indices of abundance are often influenced by targeting and technology issues. Both effective targeting and technology can allow fishermen to maintain high catch rates despite a declining population. The headboat survey does not face the targeting criticism to the same degree that other fishery dependent indices do. Headboat captains do not typically target a single species when leaving the dock with a boat load of anxious anglers. Instead they prefer to target areas of fish in general. This results in a good sampling design for determining abundance and puts to rest many of the targeting concerns that exist with other fishery dependent abundance indices. The headboat survey catch-per-unit-effort indices are not completely unbiased. Technology has considerably improved the fishing power of headboats, particularly the advent of GPS, providing headboat captains the ability to pinpoint fishing locations. This is often addressed in stock assessments by including a time-varying component to catchability, greatly reducing the effect of technology bias on headboat derived abundance indices.

Biases in the Southeast Region Headboat Survey are minimized provided reporting is accurate. The data is largely self-reported, which likely contains some biases and errors, but is no different than any other self-reporting survey used for recreational fisheries. To evaluate any biases, there would need to be an independent survey for comparison. Reported catch (from logbooks) is validated by port agents who routinely compare the species reported on logbooks versus the species sampled on the same day.

One advantage of this survey is the legal requirement to fill out trip logbooks in a timely manner. This reduces recall bias, a known problem in other recreational surveys that ask anglers to recall fishing activities months after the fishing.

The bioprofile data collection contains no known biases.

With the addition of the discard field to the logbook reporting forms in 2004, almost all the necessary data for stock assessment and management is now collected. Future data collection should focus on verification/validation studies to determine the accuracy of logbook reports.

Stock Assessment Needs

Fishery dependent status notwithstanding, the long term nature of the headboat survey dataset makes it invaluable to stock assessment scientists in the Southeast Region. The survey provides valuable long term data on length frequencies of important species, mean weights of species, and

estimated total headboat landings based on logbooks. The daily logbook forms have been used to generate an index of abundance for SEDAR stock assessments, an index that has been the only index useable for many of the stock assessments done to date.

Overlap and Potential for Integration of the Southeast Headboat Survey and the For-Hire Survey

The Southeast Headboat Survey and the For-Hire Survey both sample the same vessels in the states of North Carolina, South Carolina, Georgia, and the east coast of Florida. Pilot studies to include headboats in the For-Hire Survey in Alabama and the west coast of Florida were discontinued in 2007. The Southeast Headboat Survey is considered the official method in the South Atlantic and Gulf of Mexico regions for estimates of headboat catch and effort. Participation in the Southeast Headboat Survey is mandatory, but has been poorly enforced until recently. Participation by headboats in the For-Hire Survey is voluntary.

Until 2004, the Southeast Headboat Survey logbook form did not request that vessel operators provide information on the number or weight of discarded fish. The For-Hire Survey generates estimates of discarded catch, expanded from catch rates based on direct-observations from at-sea observers. A direct comparison of self-reported logbook data from the Southeast Headboat Survey from trips that were also sampled by at-sea observers from the east coast of Florida was done in preparation for the SEDAR stock assessment for vermillion snapper. That preliminary analysis indicated that harvest data were not significantly different between the two data collection methods; however, there were significant differences in numbers of discarded fish recorded between the two programs (SEDAR 17, 2008). There is potential for the at-sea observer methods from the For-Hire Survey to be integrated with the Southeast Headboat Survey in this region to provide a validation method for self-reported catch data and improve estimates for discards. Detailed species composition and length frequency information of recreational discards are vital for future stock assessments.

A summary of estimated catch and effort from the For-Hire Survey and the overlapping Southeast Headboat Survey will be provided to the reviewers as a separate document.

South Carolina Logbook Program

Methods for this program were described by an independent review for ACCSP (ACCSP 2001). For-hire vessels in South Carolina are required by state law to maintain and submit daily records of fishing activity to the state resource management agency on a monthly basis. Information on date fished, location, number of persons carried, number of hours fished, number of fish kept and released by species, and disposition of the released fish (dead or alive) are captured for each trip. The state supplies standardized logbooks to each vessel and reports for each month are due back to the agency by the 10th day of the following month. Total turn-around time for a month's data is approximately 45 days from the report month (i.e. July data would be available by September 15). Compliance is tracked on a daily basis and operators who fail to meet the deadline of the 10th are mailed a courtesy reminder asking them to FAX or hand deliver their reports within 5 days of the date of notice. If reports are not received after this grace period, the operator's license information is transferred to state law enforcement and may result in a written warning, citation, and/or fine for failure to report. Operators who consistently fail to report may lose the charter license privileges for six months to one year.

With rigorous enforcement, this program is considered to be close to a complete census and no extrapolation is employed for non-reporting. There is no method in place to validate self-reported catch or effort data on logbook reports. Vessel operators are not required to record their data at regular intervals within a month, and for operators that do not elect to fill their reports out daily, the recall period for filling out the logbook reports is up to one month. The level of completeness and accuracy in this program has not been assessed (R. Wiggers, SCDNR, personal communication).

Overlap and Integration of the South Carolina Logbook Program with Other Surveys

The state-run logbook program is integrated with the Southeast Headboat Survey (for headboats). To minimize reporting burden in South Carolina between the two programs, forms are filled out in triplicate with one copy for the state agency, one copy for NMFS Southeast Fisheries Science Center (SFSC), and one copy for the vessel operator's record. South Carolina archives the logbooks received from headboats, but does not generate catch and effort statistics from them. Official estimates of catch and effort come from the Southeast Headboat Survey. The Southeast Headboat Survey also conducts bioprofile sampling for headboats and compiles headboat activity reports to confirm reported and unreported fishing trips and fishing effort in South Carolina using the same methods already described. Catch and effort from logbook reports are then adjusted for missing trips identified by the activity reports. In 2001, the Atlantic Coast Cooperative Statistics Program (ACCSP) funded an independent review of the integrated logbook program in South Carolina for the headboat fishery. The reviewers concluded that the integrated logbook system (state logbook and Southeast Headboat Survey) was a reliable method for collecting data from the for-hire fishery for three crucial reasons: 1) the logbook is mandatory and is a condition of being licensed to operate in the state, 2) logbook reporting was actively enforced; and 3) the program was financially sustainable.

The state-run logbook program overlaps with the For-Hire Survey for both charter boat and headboat modes in the state of South Carolina. Participation in the South Carolina logbook is mandatory, whereas duplicate participation in the For-Hire Survey is voluntary. The 2001 ACCSP review conducted a direct comparison of the state-run logbook program and the For-Hire Survey (FHS) for the charter fishery in South Carolina. One disadvantage the reviewers identified with the state logbook program was that there was no dockside sampling of charter vessels for biological data (lengths, weights, etc.). Both methods were found to provide reliable estimates of effort. When the two methods were compared, catch-per-unit-effort and total catch estimates between the two methods closely matched for many species. For some important species, the FHS provided poor estimates as a result of spatial sample coverage for species that are rare or highly patchy. An advantage to the FHS method was reduced reporting burden.

Texas Marine Sport-Harvest Monitoring Program

The state of Texas conducts an independent survey of the coastal recreational fisheries. The methods employed differ from the For-Hire Survey, which is not conducted in Texas. Major differences between the state run survey and the For-Hire Survey include:

- Estimates are generated for a "fishing year" rather than a calendar year. A fishing year is divided into two seasons (high use season, low use season). The FHS divides a calendar year into six two-month waves.

- Effort is estimated from surveys of fishing sites, rather than through interviews with angling households.
- Effort is estimated by number of boat trips, rather than angler trips.
- Texas only estimates numbers of fish landed. No information is collected on numbers of discarded fish.
- Originally designed to estimate catch and effort in state waters, though recent changes have been implemented to improve estimates for offshore and federal waters.

Procedures used to collect data through this survey have changed over time. Major changes to the survey occurred in May 1983 and remained in affect through May 2003. Refinements were made to the survey in May 1992, and procedures are updated as needed.

The program consists of collecting on-site effort and harvest data to estimate fishing pressure, landings, and catch rates via end-of-trip interviewing of all boat parties. Key data elements collected from angling parties include:

- Boat identification number
- Boating-activity type (private or for-hire)
- Time when interview was conducted
- Trip length to nearest 0.5 hour (not fishing time)
- Type of fishing activity (i.e., party-boat)
- Number of anglers and residence of origin of each (not including non-fishing party members)
- Location where most of the harvested fish were caught or location where most fishing effort occurred if no fish were harvested
- Gear and bait used to catch harvested fish or gear and bait used most if no fish were harvested
- Location where trailer was parked during trip (or if wet-slip used, then whether wet-slip was rented for the boat)
- Species sought and trip satisfaction level for one randomly selected party member
- Number of each species landed (if any)
- Total lengths to nearest millimeter for up to six randomly-selected specimens of each species landed (if any).

Data elements collected from non-angling boat parties include boat identification number; time when interview was conducted; type of boating activity; location where most of the boating activity occurred; and location where trailer was parked during trip (or if wet-slip used, then whether wet-slip was rented for the boat). This information is useful for estimating the relative proportion of boats counted on-site that are fishing boats.

Spatial Survey Design

Texas marine waters are divided into two primary areas for the survey:

1. The bay and pass area includes marine waters shoreward of barrier islands, including the openings or passes that connect bays with the Gulf of Mexico and extending 1.9 km gulf-ward from the gulf-ward end of the pass. Bay and pass areas are divided geographically into eight bay systems: Sabine Lake, Galveston Bay, Matagorda Bay (including East

Matagorda Bay), San Antonio Bay, Aransas Bay, Corpus Christi Bay, upper Laguna Madre, and lower Laguna Madre.

2. The Gulf area was included in the survey beginning in 1992 and is divided into five geographic areas based on proximity of access. These include Gulf of Mexico waters offshore of Sabine Lake; Galveston Bay; Matagorda and San Antonio Bays; Aransas Bay, Corpus Christi Bay, and upper Laguna Madre; and lower Laguna Madre. Each of these areas is additionally divided into two areas based on governmental jurisdiction: Texas Territorial Sea (TTS) (i.e., Gulf of Mexico waters from the surf line to 16.7 km offshore, excluding the 1.9-km area around the gulf-ward end of passes) and United States Exclusive Economic Zone (EEZ) (i.e., Gulf of Mexico waters off Texas beyond 16.7 km offshore).

Temporal Survey Design

Surveys are conducted year-round, and a "fishing year" is sampled in two seasons. The "high use" season begins May 15 and ends November 20, and the "low use" season begins November 21 and ends May 14. Each season is further divided into weekend days (Saturday and Sunday) and weekdays (Monday through Friday).

Target Population

The target population for intercept surveys is sport-boat angling parties with trip lengths of 12 hours or less that end their fishing trips between 10:00 am and 6:00 pm at inventoried boat access sites. Sport-boat angling parties are classified as private-boat parties or party-boat parties. Party-boat parties are identified as groups of 10 or fewer anglers fishing from a vessel with a professional fishing guide.

Survey Sample Frame

An inventory of boat-access sites is updated twice annually. The sample frame includes boat ramps and wet-slip sites (added in May, 1983) accessible to the general public and survey personnel. Boat access sites at private facilities and private residences are not included in the survey.

Survey Sample Size

From Green and Campbell, 2005:

The targeted level of precision for the survey from 15 May 1983 forward was based on survey data collected prior to that date. Sample sizes were set to detect a 50% difference in fishing pressure and landings estimates, 80% of the time, at the 95% confidence level. This level of sampling was expected to produce coefficients of variation around 10% for coast-wide fishing pressure and landings.

Since 15 May 1983, 1,014 routine surveys were scheduled annually to estimate bay and pass fishing pressure and landings. In high-use season, 26 weekend and 46 weekday surveys were scheduled for Sabine Lake and San Antonio Bay systems, and 31 weekend and 66 weekday surveys were scheduled for the other six bay systems. In low-use season, 12 weekend and 24 weekday surveys were scheduled for all bay systems.

About 36 "gulf only" surveys were scheduled each high-use season to supplement routine surveys for estimation of gulf fishing pressure and landings. These surveys were initiated on 15 May 1992, and their distribution was variable between weekend days and weekdays. During gulf-only surveys, only sport-boat gulf fishing parties were interviewed in full; other boating parties were given abbreviated interviews. Gulf-only surveys were conducted only at sites known to have sport-boat gulf fishing activity.

Sample Selection

Pressure files are used to select boat-access sites to be surveyed. Relative fishing pressure files are created prior to each fishing season for each geographic survey area.

From Green and Campbell (2005):

Bays and Passes: For each season, roving counts for each site from the previous three years were averaged for each day-type; counts from the most recent year were weighted 50% and counts from the other two years were weighted 25% each. For each day type, the average count at a given site was adjusted for target-area, bay and pass, private-boat fishing activity and for boat trailer parking location based on survey data collected at that site during the previous three years. For sites in each bay system with less than ten interviews during the previous three years, a single generic adjustment was created for each day type by pooling the survey data from all such sites in the bay system. Adjustment for boat-trailer parking location accounted for trip-ending parties at each site that would not have had an empty boat trailer or empty wet slip available for counting during a rove.

For each day type in each season, the adjusted average count for each site was divided by the sum of the adjusted average counts from all sites in that bay system to produce a relative fishing pressure value for each site. This value represented the proportion of the total bay system fishing pressure occurring at this site.

Roving counts for Gulf areas are averaged and adjusted similar to methods described above for bays and passes; however, since there are much fewer gulf interviews, more than three previous years (four to six years) of interview data must be used and interview data must be pooled for sites within each of the five gulf areas for Texas territorial seas and federal EEZ waters.

Effort and Harvest Estimation Procedures

To estimate the number of boating parties, roving surveys of inventoried boat-access sites are conducted in each bay system by driving site to site and counting empty boat trailers and empty boat slips. Wet-slip counts are adjusted for non-rented slips at the time of the count. The roving counts are conducted between 8:00 am and 12:30 pm on weekends and weekdays during high-use and low-use seasons. Roving counts are conducted on "good-weather" days to maximize counts and allow detection of differences in relative fishing pressures among sites. Information collected from angler-intercept surveys, including boating-activity type (private, party), boating-activity location, and boat-trailer location, are used to adjust roving counts. Angler-intercept surveys may be cancelled on "bad-weather" days and on days with low fishing activity (Green and Campbell 2005).

Methods to calculate effort and harvest estimates prior to May, 1992, were described by Osburn and Osborn (1991) and Warren et al. (1994). Methods described in Green and Campbell (2005) are included in Appendix X. (scan pg.90-94 and include in this document as Appendix)

Texas For-Hire Telephone Survey

In 2002, a pilot project was initiated in Texas to use methodologies modeled after the Vessel Directory Telephone Survey portion of the For-Hire Survey to improve coverage within Texas for for-hire fishing in all areas, including vessels that fish in federal waters. The state-run recreational fishing survey focused primarily on inshore and state water trips. Initially, the telephone survey sampled all vessels and generated effort estimates for all areas (inland, state, and federal waters). State personnel felt they had good coverage for for-hire vessels operating in inshore and state waters, so the pilot telephone survey was later reduced to only for-hire vessels operating in offshore federal waters. The pilot telephone survey originally sampled Texas as three regions, but two regions were later combined due to low numbers of vessels in one region. Catch estimates were generated using catch rates from the state survey of boat-based intercepts and the estimates of boat trips (not angler trips?) from the telephone survey. Estimates were generated for the fishing year, rather than the calendar year, to match the Texas state intercept survey design for high-use/low-use seasons. Initially, sample sizes for offshore trips in the state intercept survey were low, but those sample sizes were improved over the duration of this pilot study.

Funding for this pilot program will be discontinued in January, 2009. The decision was based on the abnormally high correction factors for off-frame vessels in Texas. Correction factors were generated based on the proportion of vessels in the state-run intercept survey that were not on the vessel directory for the telephone survey. The FHS vessel directory was maintained by state personnel, and the directory was often not updated for new vessels encountered in the state-run intercept survey. The high correction factors in Texas often more than doubled the estimated boat trips. Based on the results of this pilot, the state intends to modify their methods to improve coverage for offshore for-hire fishing.

Everglades National Park Guide Logbook

In 1965, a permitting system was established for professional for-hire fishing guides operating within the boundaries of Everglades National Park (ENP) in Florida. Prior to 1972, permitted professional guides were only required to report monthly harvest by species. In 1972, the NPS required daily trip reports to collect complete census data on harvest, catch, and fishing effort to improve precision of catch rates and total fishing effort. In 1974, fish length data were added to evaluate age structure, mortality rates, and response to changes in fishing effort and harvest.

Approximately 300 professional guides currently hold ENP permits (Tom Schmidt, personal communication). Daily trip reports are mandatory, and renewal of annual permits may be denied based on non-compliance; however, this rule is not strictly enforced. Reporting compliance in 2005 was estimated to be less than 29%, based on independent field observations of NPS staff (Osborne et al. 2005). Mean annual catch rates and harvest rates are calculated using methods described by Malvestuto (1983). Only anglers that catch or harvest a given species are used to calculate CPUE and HPUE to avoid bias due to changes in the proportion of directed effort for a particular species (Osborne et al. 2005). Estimates of total catch and harvest are calculated by dividing the reported catch (including discards) and the reported harvest by the percentage of guides that are estimated to comply with reporting requirements.

Management objectives of the NPS include preservation of the diversity and ecological integrity of fish populations within the ENP system. For reporting purposes, the ENP is divided into ecologically distinct fishing areas and catch and effort data are reported by area fished. Currently, there are 11 ecologically distinct areas identified within the fresh and saltwater fishing areas of the park. Distribution of smalltooth sawfish, which has been protected under the Endangered Species Act since 2003, is concentrated within the ENP region. Over a 15 year period (1998-2004) 424 smalltooth sawfish encounters (63% from professional guide trips) were reported in the recreational fishery inside ENP boundaries (Osborne et al. 2005). Recreational data from ENP recreational fisheries are used to monitor abundance of smalltooth sawfish, goliath grouper (federally protected species, prohibited from harvest), and large predatory shark populations, and are used in assessments of state managed fisheries, including spotted seatrout, red drum, snook, and gray snapper.

Overlap of the For-Hire Survey and Everglades National Park Survey

The ENP logbook overlaps with the For-Hire Survey in Florida. Guide vessels that operate inside ENP may also be included in the vessel directory telephone survey portion of the FHS if they are known vessels listed on the FHS vessel frame. However, the access-point angler intercept survey portion of the FHS is not conducted inside ENP boundaries to avoid interference with the ongoing ENP survey. Localized fisheries are often rare events in FHS intercepts in Florida, which samples recreational catches from two large geographic sub-regions (east coast and west coast). The ENP survey more effectively samples species that are unique to the area and with distributions limited to the extreme southern portion of Florida, such as sawfish, bonefish, and tarpon.

Source Documents

Atlantic Coast Data Needs:

ASMFC (Atlantic States Marine Fisheries Commission), 2006. Summary of Session to Address Improvements to Recreational Fisheries Data, August, 2004. Report submitted to ISFMP Policy Board. Updated, July, 2006. 11 pp.

For Hire Survey:

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Ditton, R., A. Loftus, and J. Volstad. 2001. ACCSP For-Hire Review. Report submitted to the Atlantic Coast Cooperative Statistics Program, December, 2001. 144 pp.
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Van Voorhees, D., T. Sminkey, J. Schlechte, D. Donaldson, K. Anson, J. O'Hop, M. Norris, J. Shepherd, T. Van Devender, and B. Zales. 2002. The new Marine Recreational Fisheries

Statistics Survey method for estimating charter boat fishing effort. Gulf and Caribbean Fisheries Institute. 53: 332-343. http://research.myfwc.com/publications/publication_info.asp?id=41919

Vessel Trip Report Program:

The NMFS Northeast Regional Office website can be found at:
<http://www.nero.noaa.gov/nero>

The regulations by which vessel reporting is governed can be found at:
[Electronic Code of Federal Regulations](#)

The instructions for completing vessel trip reports can be found at:
[Vessel Trip Report Instructions](#)

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