

CONSULTANTS' REPORT

**FOR-HIRE RECREATIONAL
FISHERIES SURVEYS**

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

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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 to 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.

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 inseason 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 de-passenger, 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.

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