



NOAA FISHERIES

Key Takeaways At a Glance

- ◆ Based on the pilot study, the potential exists for using logbook data in conjunction with dockside validation as a useful means of estimating for-hire catch.
- ◆ It is clear that the immediate implementation of a logbook program is not likely to achieve a complete and accurate census of catch in the for-hire fishery.
- ◆ Moving forward, implementing an effective logbook-based survey would require a strategy by all data partners to address a range of resource, compliance, validation, outreach and related issues.

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Implementing Regional Electronic Logbook Reporting Programs in the For-Hire Fleet

Findings, Recommendations, Implications and Considerations from the MRIP Gulf of Mexico For-Hire Pilot Study

Synopsis

There is growing interest among fishery scientists and managers, charter boat and headboat operators, and other stakeholders in using new technologies and new methods to gather catch and trip information from the for-hire fishery. Stakeholders are particularly interested in exploring the possibilities of:

1. Converting all for-hire reporting from paper logbooks to electronic logbooks as a potential method for improving timeliness and accuracy of reporting.
2. Using a census – instead of a sample-based survey – of the for-hire fishery to generate trip and catch data for this mode, analogous to the way most commercial fishery landings are now measured.

Many stakeholders believe that a logbook-based census would provide data that is more timely and accurate. Stakeholders also believe that the catch statistics derived through a logbook reporting program will be more widely accepted by the for-hire fishing community than estimates derived from sample surveys. A study conducted by the Marine Recreational Informational Program (MRIP) indicates that there are many potential benefits of implementing electronic logbook reporting, but that implementing such initiatives will not be a “turnkey” operation. Implementation of electronic logbook reporting will require the development of new reporting tools, the certification of new data collection methodologies, the creation of effective validation checks and the existence of effective enforcement mechanisms. Serious thought will need to be given to what agencies will take on these responsibilities and how they will be funded.

This paper summarizes the peer-reviewed key findings of the Gulf of Mexico for-hire pilot study, the implications of those findings and key considerations that regional partners must take into account when seeking to create an electronic logbook reporting program. Those considerations include the need to:

- ◆ Ensure a complete and accurate vessel registry;
- ◆ Develop and implement effective means of validation;
- ◆ Establish data collection, QA/QC and integration protocols;
- ◆ Develop the appropriate software and identify the appropriate hardware, in consultation with for-hire operators;
- ◆ Create effective enforcement mechanisms and potential penalties to ensure both participation and timeliness of reporting;
- ◆ Determine how the expanded reporting, validation and enforcement work will be funded; and
- ◆ Determine roles, responsibilities and resource commitments among state, regional and federal partners.

Implementation of for-hire electronic logbook reporting is a regional decision that should be driven by the requirements and capabilities of the regional fisheries data collection partners from NMFS, the States, Regional Fishery Management Councils and Interstate Marine Fisheries Commissions. These partners' participation in determining regional data collection methods and standards is crucial in developing a program that responds to regional needs and takes advantage of existing regional opportunities and capabilities. Given these needs, MRIP will work with the Fishery Information Networks (FINs) and their equivalents to facilitate such a dialogue.

As our regional partners on the Atlantic and Gulf coasts consider whether to pursue for-hire electronic logbook reporting, MRIP will continue to work with them to estimate for-hire catch using our current methods, which themselves have undergone substantial improvements and continue to evolve.

Overview

In its 2006 review of NOAA Fisheries data collection methods, the National Research Council (NRC) recognized the data collection and estimation challenges presented by the "hybrid" nature of the for-hire fishery, which shares characteristics of both commercial and recreational fishing. Among its recommendations for addressing these challenges, the NRC stated that:

"In most cases, 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."

Following its establishment, MRIP created an Operations Team consisting of senior technical staff from NMFS and its partner organizations to develop new and improved survey and estimation methods that would address the NRC recommendations. The Operations Team developed a process for working with expert independent consultants, our data collection partners and stakeholders to develop and pilot test new survey designs. Once new designs have been successfully pilot-tested and peer-reviewed, the Operations Team may recommend that they be certified for use by NMFS and its partners. Going forward, MRIP will provide technical and financial support for implementation of MRIP-certified survey designs and methodologies.

To support this effort, the Operations Team established a For-Hire Working Group to recommend and prioritize a program of research and development that would address the NRC recommendations related to for-hire sector data

collection. Initial projects recommended by the Working Group included a complete documentation of for-hire survey designs being used nationwide, and a consultant review of the documented designs with recommendations for specific improvements and best practices. The final reports for these studies are located on the Web at www.st.nmfs.noaa.gov/mdms.

The consultant review report included recommendations for use of electronic logbook reporting as a preferred method for developing for-hire catch statistics, with recommendations for the design of valid logbook programs. The For Hire Working Group then recommended testing the designs in a pilot logbook program, with a dockside validation component.

The Operations Team and the For-Hire Working Group worked collaboratively with state partners, for-hire operators and other stakeholders to launch a pilot study in the Gulf of Mexico in 2010 to determine the feasibility of conducting a census of charter boats using electronic reporting methods with dockside validation of the self-reported catch and effort data. The study covered more than 400 Federally permitted charter boats in the Gulf of Mexico, with weekly reporting required for permit renewal. The findings of the study were evaluated through an independent peer review and the final report was approved by the MRIP Executive Steering Committee. The full report is available at www.st.nmfs.noaa.gov/mdms.

Key Findings and Recommendations from the Study

A summary of the key Findings and Recommendations is provided below. A detailed version is appended at the end of this document.

- ♦ **Reporting Tools:** Electronic reporting with built-in quality control features that prevent data entry errors and omissions was an effective method for receiving high-quality self-reported data from a large number of participants.
- ♦ **Enforcement:** Current authority to enforce reporting requirements for Federally permitted vessels was effective for achieving reporting compliance, but was not effective for achieving timely reporting.
- ♦ **Reporting Compliance and Timeliness:** Based on the results and design of this pilot study, a census of for-hire catch and effort using logbooks was not achieved. If logbooks were to be used as a census of catch and effort, the timeliness and accuracy of reporting would need to be improved.
- ♦ **Reporting Frequency:** The frequency with which participants were required to report during this pilot

study was weekly, and this frequency was sufficient to produce precise and timely catch and effort statistics.

- ◆ **Validation and Estimation:** Comparisons between logbook reports and independent field validations confirm that self-reported data are subject to recall bias and inaccuracies in reporting; therefore individual logbook trip reports cannot be considered a one-to-one match with independent validations. However, given an adequate sample size, aggregated logbook data are potentially very useful for developing estimators for total effort, catch-per-unit effort (CPUE) and total harvest at the regional scale.
- ◆ **Field Validation:** The three field validation methods employed in this study were variable both in terms of cost and the granularity of information provided for direct comparisons with logbook trip reports. Effort validation through vessel activity status verification is the least costly method and was effective for measuring reporting compliance, though additional methods may need to be considered during periods of low fishing activity or in states with low numbers of vessels. Dockside sampling is the least costly method for validation of catch, but is not effective for validation or estimation of released catch. At-sea validation is the most costly method for validating catch, but provides high resolution data on numbers and size of landed and released fish, depth of capture and area fished.
- ◆ **Feasibility for Regional Implementation:** Several potential benefits from a logbook reporting system were recognized from this study. Given adequate resources and long-term funding commitments, this method would be feasible for a large geographic area with a large number of vessels, but may not be for smaller areas. Regional implementation would need to consider whether to include vessels that do not possess federal permits and mechanisms to enforce reporting. A complete registry of all for-hire vessels is recommended before mandatory logbook reporting is implemented in a region.

Implications and Next Steps

Key Lessons from the Pilot Study

As regions evaluate options for improving estimates of for-hire fishing activity, the pilot study offers numerous important insights, including:

- ◆ **A clearer picture of the resource commitments necessary for the successful implementation of a logbook program.** The study clearly indicated that not only is there a need for the upfront costs of developing and deploying an electronic reporting system, but that sustained resources will need to be committed throughout the life of the program to issues such as enforcement, validation and outreach.
- ◆ **Detailed recommendations for the necessary elements of a logbook program.** The study showed that while emerging technologies may provide a path toward improved reporting, there are numerous critical choices that must be made to successfully navigate that path. These include the need to work closely with industry to develop trip reporting software that for-hire operators can easily use and to choose hardware that is feasible for use on vessels of all types and durable enough to withstand the demands of reporting in a variety of conditions. Also important is the need to ensure that quality control features – tools that can minimize input error at its source – are built into the reporting tools.
- ◆ **The necessity for effective compliance and enforcement mechanisms to complement validation and improve participation, timeliness and accuracy.** The study indicated that not all for-hire operators will comply with a mandatory reporting requirement. Even among those who do, data might not be input in a timely fashion, and may not accurately represent actual catch on all reported trips.
- ◆ **The potential for using logbook data in conjunction with dockside validation data to develop a useful estimator of catch.** The study indicated that, regardless of whether an electronic logbook program achieves a full census, a properly designed system can use logbook-reported data in combination with dockside validation data to develop a reliable estimate of catch. A follow up technical report was conducted to further explore this potential.

Implications for Implementing For-Hire Electronic Logbook Reporting

The results of the pilot study indicate that although electronic logbook programs have promise to improve data collection and reporting, there are important short-term considerations that must be taken into account, and decisions that must be made, to maintain continuity of high-quality data delivery.

It is clear that immediate implementation of a logbook requirement for Federal permit holders is not likely to achieve a complete and accurate census of catch. To address the findings and recommendations of the pilot study, more work is needed to develop an effective logbook-based census or estimation design.

Until new certified methods are developed and ready for implementation by our partners, MRIP expects to maintain the current surveys of the for-hire sector, incorporating

improvements that have already been made to our catch surveys. These improvements include:

- ◆ Collecting data on the number of angler trips and other information from a sample frame of registered vessel operators, as recommended by the NRC;
- ◆ Working to build a more complete and accurate registry of for-hire vessels;
- ◆ Developing an improved estimation method for calculating catch estimates from intercept data; and
- ◆ Implementing a new, design-unbiased, angler catch survey.
- ◆ Simultaneously, we will work with our regional data collection partners, the Atlantic Coastal Cooperative Statistics Program (ACCSP) and the Gulf Fisheries Information Network (FIN), to explore the potential for establishing logbook and validation programs that complement our current surveys. The MRIP role will be to:
 - Help incorporate findings and lessons learned from the pilot study into these programs;
 - Support further studies that lead to MRIP certification of a trip reporting and validation methodology; and
 - Potentially assist with the implementation of new methods through technical and funding support.

Next Steps for Regional Implementation

MRIP was conceived from the beginning as a series of regional data collection programs all adhering to a rigorous set of national scientific standards. As outlined in our 2013 Implementation Plan Update, the MRIP strategy for implementation of new survey methods will continue to follow the national standards/regional surveys model. NOAA Fisheries (through MRIP) will maintain a central role in developing and certifying survey methods and establishing national standards and best practices. The regions (through the regional FINs or their equivalents) will have responsibility for selecting survey methods; identifying needs and priorities for enhanced data collection (i.e. for improved coverage, timeliness, precision, and special needs); and managing data collection.

Specifically, MRIP national leadership will identify issues regarding implementation; seek feedback from regions on progress in implementation and any problems being encountered; determine if regional needs are being met and identify information gaps; and determine how MRIP can provide assistance in filling in those gaps. At the regional level, the FINs and their equivalents (i.e., ACCSP) will help facilitate a dialogue about whether an electronic logbook program is an appropriate way to meet their regional needs and, if it is, how to move forward in its development.

While any regional electronic logbook program ultimately created will be unique, the pilot study indicated there are a set of common issues that MRIP and the FINs must jointly address for successful implementation. These include:

- ◆ **Identification of all eligible vessels, including non-federal permit holders.** Current for-hire vessel registries are incomplete. Not only does this fact make a census impossible, it also introduces the potential for bias into any survey program.
- ◆ **Enhanced independent validation of logbook reports beyond dockside sampling.** The study indicates that to ensure quality data, additional validation measures must be put into place. These could include reporting requirements such as hail-out/hail-in, or electronic reporting prior to landing that could be validated in part using enforcement assets. The costs of both developing the validation protocols, as well as the ongoing validation, must be taken into account in any design.
- ◆ **Assuring compliance in a timely manner** through such potential means as permit sanctions, civil penalties, enforcement actions, etc. Federal, state and regional authorities will have to work together to develop mechanisms that ensure complete, accurate and on-time reporting.
- ◆ **Development and approval of “user friendly” reporting technologies in consultation with the industry.** Industry buy-in is a critical component of the success of any program, and the quicker industry comes on board, the quicker the access to the quality data being sought.
- ◆ **Testing, development and implementation of new sampling survey designs** that could provide the means for independent validation of logbook reports and/or correction of any measurable self-reporting errors.
- ◆ **Shared resource commitments to address implementation issues.** The costs of designing, testing, implementing and maintaining an electronic logbook program will be substantial and ongoing. A full accounting of those costs – and how they will be shared among states, regions and the federal government – will be a fundamental first step. Resource issues to be addressed include, but are not limited to:
 - Building, maintaining and operating systems to receive electronic logbook data and perform data quality analysis, editing and integration;
 - Dockside sampling for validation of landings and at-sea sampling for validation of released catch;
 - Compliance and enforcement actions; and
 - Outreach activities to inform vessel operators of reporting requirements, which include the tracking of reporting and issuing reminder notifications.

APPENDIX

Key Findings and Recommendations From The Gulf of Mexico Charter Boat Logbook and Dockside Validation Pilot Project

Reporting Tools

Electronic reporting with built-in quality control features that prevent data entry errors and omissions was an effective method for receiving high quality self-reported data from a large population of participants. Paper logbooks and electronic reporting options without built-in quality control features required more follow-up with participants to verify and attempt to correct self-reported data. Electronic reporting options that allow users the ability to record and store logbook data at-sea facilitate better record keeping and accurate recall by offering more flexibility for when and how users keep track of trip details and record logbook data.

Recommendations:

- ◆ Participants in the fishery should be involved in the design of electronic logbooks to improve data reporting accuracy and efficiency, and to ensure data entry fields are clearly described.
- ◆ Electronic reporting is preferred over paper logbook reporting and it is recommended that electronic reporting be required for participation in a fishery, whenever it is practical to do so.
- ◆ Electronic reporting tools should have quality control features built in to prevent data entry errors and omissions by users, and electronic reporting options be certified to include all required quality controls before they become available for use.
- ◆ Electronic reporting tools should include a feature that requires an entry of either inactivity or activity for each day in the reporting period. Alternative options, such as hail out/hail in requirements or vessel monitoring systems, should also be considered for reporting activity.
- ◆ Regardless of whether or not real-time reporting is required of participants in a fishery, electronic reporting options that offer users the ability to record and store logbook data at-sea during reported fishing trips (example, smart-phone applications, tablets, etc.) are highly recommended to facilitate record keeping and accurate recall of logbook information.
- ◆ Electronic logbook records should be accessible, with password protection, to vessel owners for their record-keeping purposes. This will help create cooperation and incentive for participation.

Enforcement

Current authority to enforce reporting requirements for Federally permitted vessels was effective for achieving reporting compliance, but was not effective for achieving timely reporting. Under the current authority, a delinquent vessel may continue to fish until the permit is due for renewal on an annual basis. Prior to the permit expiration date, the permit holder may submit delinquent records for the previous 12 months to become compliant and clear the permit for renewal. These data are not reliable in most cases. After the permit is issued, the same vessel can be non-compliant in the same manner the following year with the same consequences and results. Authority to require and enforce charter vessel trip reporting for non-Federally permitted vessels varies by state and some states require legislative changes to gain such authority.

Recommendations:

- ◆ As with any mandatory reporting program, timely reporting by participants should be required for logbooks and this requirement should be enforceable. It is recommended that authority to enforce reporting requirements be modified to enhance the timeliness of reporting. The authority should include permit suspension, permit termination and civil penalties to facilitate enforcement of timely reporting.
- ◆ It is highly recommended during the initial implementation of a logbook reporting requirement that planned methods are in place for initiating a quick response if compliance is low at the onset of the reporting requirement.
- ◆ Follow-up procedures to track reporting compliance should be designed to facilitate timely enforcement (see recommendations below under “Reporting Compliance and Timeliness”).

Reporting Compliance and Timeliness

Based on the results and design of this pilot study, a census of for-hire catch and effort using logbooks was not achieved due to non-responses (both at the individual trip-level and vessel-level) by vessels required to report. For an ongoing logbook reporting program to remain effective, a consistent and high level of effort by port samplers and law enforcement is required to validate and maintain reporting compliance and timely reporting. If logbooks were to be used as a census of catch and effort, the timeliness and accuracy of reporting would need to be improved.

Throughout the pilot study, reporting compliance gradually improved and most likely would have continued to improve had this pilot study run for a longer period and fishermen became more familiar with reporting requirements. However, the issue of vessels reporting inactivity during weeks when they actively fished would continue to be an obstacle to achieving a complete census and must be accounted for. A requirement to report vessel activity or inactivity each day within a reporting period is needed to effectively track and monitor compliance for a complete census of all trips, and to conduct timely follow-up for late and missing reports (i.e., within a given reporting week, participants should be required to report inactivity or activity for each day). A large number of vessels with Federal permits did not actively charter fish during the pilot study (100 of 358 in Florida and 43 of 58 in Texas), and different reporting requirements may be necessary for inactive permit holders.

Recommendations:

- ◆ While we do not rule out logbook reporting as a feasible method for the collection of catch and effort statistics from the for-hire sector, logbooks are not recommended if a complete census is necessary due to the significant additional resources in manpower and funding required for a logbook reporting method to achieve a complete census.
- ◆ To achieve maximum compliance and timeliness, we strongly recommend that before any logbook program is implemented, provisions for the following components are included in the initial design and implementation phases for the program, and that long-term, recurring funds are appropriated to ensure that these tasks are maintained over the duration of the program:
 - A large upfront effort to inform participants of upcoming reporting requirements prior to implementation;
 - Methods to track and quickly identify missing and late reports both at the onset of the program and over the long-term duration of the program;
 - Follow-up procedures that are timely and maintain compliance and timely reporting over the duration of the reporting program; and
 - Multiple stages of follow-up procedures that are maintained over the long-term duration of the program, including an early prompt to remind participants when reporting deadlines are approaching, notifications to participants immediately after the deadlines are missed, and later follow up if reports are still delinquent.

Reporting Frequency

The frequency with which participants were required to report during this pilot study was weekly, and this frequency was sufficient to produce precise and timely catch and effort statistics. The effort required to effectively monitor compliance with timely follow-up for missing and late reports in this study would have been much greater if the selected reporting frequency was daily, and the cost would be even greater if certifying the accuracy of daily reporting at the individual vessel level was required (such as in commercial fisheries managed with individual fishing quotas or IFQs). Decreasing the reporting frequency (bi-weekly or monthly) to further reduce costs would come at the expense of increased recall bias and is not recommended.

Recommendations:

- ◆ The selected reporting frequency and required reporting accuracy should be considered both in terms of the cost and necessity for management and assessment before implementing a region-wide logbook reporting methodology.
- ◆ The project team recommends a weekly reporting frequency combined with a daily reporting requirement for a logbook reporting design as the most feasible method, both in terms of cost and the benefits for minimizing recall bias and tracking compliance. Daily reporting frequency is only recommended if adequate resources can be dedicated to compliance tracking and timely follow up, and only if daily or individual vessel monitoring is necessary for fisheries management.

Validation and Estimation

The logbook reporting methods pilot tested in this study did not achieve a complete census. Logbook reports in this study were submitted for a large portion of the total effort (approximately 70% overall), which was verified through field validations of vessel status. Comparisons in this study between logbook reports and independent field validations confirm that self-reported data are subject to recall bias and inaccuracies in reporting; therefore individual logbook trip reports cannot be considered a one-to-one match with independent validations. However, given an adequate sample size, aggregated logbook data are potentially very useful for developing estimators for total effort, catch-per-unit effort (CPUE), and total harvest at the regional scale. It is unlikely that logbook records can be used to provide precise daily estimates, and precision could also be low for weekly estimates, particularly during months of low fishing activity. We believe it is feasible to develop estimators for cumulative monthly catch and effort during periods of high fishing activity, and bi-monthly during periods of low fishing activity. Seasonal (lower frequency than bi-monthly) estimates would not be useful to regional fisheries managers and are not recommended.

Recommendations:

- ◆ The project team worked with an MRIP Consultant to develop appropriate methods for estimating effort and catch using data from this study. A report for this task, which includes recommendations for consideration, was provided to the MRIP Operations Team in December, 2012, and is currently undergoing peer-review.
- ◆ Given 30% of total trips validated did not submit logbooks, it is recommended that additional research be conducted to determine if adjustment methods are needed to account for sampling bias associated with vessels that did not report logbooks.
- ◆ Methods currently in place to estimate catch and effort for for-hire fisheries in the Gulf of Mexico and Texas should be evaluated to determine whether sample sizes are sufficient for precise and accurate estimates. In addition, potential bias associated with non-response (both refusals and non-successful contacts) should be evaluated for each methodology. If sample sizes in current surveys are not sufficient, then the cost to achieve necessary sample sizes should be compared to a logbook reporting system to determine whether a logbook reporting system is a more affordable alternative for achieving larger sample sizes.

Field Validation

If individual logbook records could be considered one-to-one equivalents of what would result from dockside sampling, then a small validation monitoring program would be sufficient. However, based on the results of this study, logbook records should not be viewed as giving values similar to dockside sampling of the same trip (e.g., a small number of dockside samples should not be expected to agree with a small number of corresponding logbooks reports). The three field validation methods employed in this study were variable both in terms of cost and the granularity of information provided for direct comparisons with logbook trip reports. Effort validation through vessel activity status verification is the least costly method and was effective for measuring reporting compliance, though additional methods may need to be considered during periods of low fishing activity or in states with low numbers of vessels. Dockside sampling is the least costly method for validation of catch, but is not effective for validation or estimation of released catch. At-sea validation is the most costly method for validating catch, but provides high resolution data on numbers and size of landed and released fish, depth of capture and area fished. The feasibility of placing fisheries observers on charter vessels to collect high quality validation data at-sea was demonstrated during this study; however, due to low sample sizes we were not able to determine necessary sample sizes for validating discards at-sea.

Recommendations:

- ◆ Any census-style logbook reporting program should have vessel activity validation methods to measure and account for incomplete reporting. This is important both for achieving an accurate estimate for the total number of trips and accounting for unreported catch.
- ◆ Released catch represents a major portion of total catch and contributes significantly to total fishing mortality for many managed fisheries in the Gulf of Mexico. In this study, neither logbook trip reports nor dockside validations provided accurate estimates for released catch; therefore, it is highly recommended that some form of at-sea validation methodology be incorporated into logbook validations. For harvested catch, data from dockside validations and logbook trip reports were similar in aggregate; therefore a combination of dockside and at-sea validation methods may be employed.

Feasibility for Regional Implementation

Several potential benefits from a logbook reporting system were recognized from this study, and we do not rule out logbook reporting as a feasible method for the collection of catch and effort statistics from the for-hire sector. Given adequate resources and long-term funding commitments, this method would be feasible for a large geographic area with a large number of vessels, but may not be feasible for small states or regions with small numbers of vessels. This study included only charter vessels with federal permits, and regional implementation would also need to consider whether to include vessels that do not possess federal permits and mechanisms to require and adequately enforce logbook reporting, or else exclude those vessels from logbook reporting and survey them separately. Challenges to surveying small, inshore guide vessels in current survey methods would also apply to field validation sampling if they were required to report in a logbook program.

Recommendations:

- ◆ If logbooks are implemented on a large regional scale, implementation should be phased in at smaller regional scales so that adequate resources can be dedicated to necessary up-front efforts for outreach and follow-up with non-respondents to achieve high compliance.
- ◆ A regional logbook reporting program should exclude non-federally permitted vessels unless each state has authority to require reporting and a mechanism to enforce timely reporting.
- ◆ State license frames are often not adequate for identifying all vessels in a fishery, and a complete universe of known vessels is recommended before mandatory logbook reporting is implemented for all for-hire vessels in a region.