UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

MAR - 4 2011

MEMORANDUM FOR: Eric C. Schwaab
Assistant Administrator for Fisheries

FROM: Ned Cyr, Ph.D.
Director, Office of Science and Technology

SUBJECT: Approval of Implementation of a New Method for Estimating Recreational Catch from Survey Data--DECISION MEMORANDUM

I request that you approve the implementation of a new method for estimating recreational catch from data collected via the Access Point Angler Intercept Survey (see: http://www.st.nmfs.noaa.gov/st1/recreational/overview/overview.html#angler) as developed by the Marine Recreational Information Program (MRIP).

BACKGROUND

The Marine Recreational Fisheries Statistics Survey (MRFSS), initiated in 1979 as a requirement of the Magnuson-Stevens Fishery Conservation and Management Act of 1976 (MSA), continues to be the primary source for national recreational fishery statistics in the United States. The MRFSS is a complementary survey design that includes the Coastal Household Telephone Survey (CHTS) and the Access-Point Angler Intercept Survey (APAIS). The CHTS collects data on angler fishing effort from a random sample of coastal residential households in each state. The APAIS is a shore side survey that collects data on angler catch through probabilistic sampling of fishing access points and days. Data from the two independent surveys are combined to estimate total fishing effort, participation, and catch by species. The MRFSS is currently conducted in all regions except the Pacific Coast, Alaska, Texas, the Western Pacific Territories, and the U.S. Virgin Islands.

In response to the growing demand for an improved recreational fishing data collection program, NMFS commissioned the National Research Council (NRC) of the National Academies of Science to conduct a high level, scientific review of the existing survey methods used by NMFS and its partners to monitor catch and effort in marine recreational fisheries throughout the US.

Specifically, the NRC was asked to:

- Assess existing surveys and their suitability in monitoring effort and catch in the shore-based, private boat, and for-hire boat recreational fisheries;

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- Evaluate how well these methods were providing the quality of information required to support accurate stock assessments and responsible fisheries management decisions; and
- Recommend improvements to ensure more accurate and precise estimates of recreational effort and catch.

The NRC's Ocean Studies Board formed a 10-member committee of experts in sampling design and statistics to conduct the requested review independent of NMFS. A final report of their findings (*Review of Recreational Fisheries Survey Methods*) was published in April 2006. The committee identified a number of potential problems with the sampling and estimation designs, and questioned the adequacy of existing surveys in providing the statistics needed to support stock assessments and the kinds of fishery management decisions required by current law and practice. The report includes recommendations to redesign current surveys to improve: their effectiveness; the appropriateness of their sampling procedures; their applicability to various kinds of management decisions; and their usefulness for social and economic analyses.

Section 401(g) of the MSA, added via the 2006 reauthorization, established statutory requirements for improving recreational fisheries data collection:

- § 401(g)(3)(A): "Within 24 months after the date of enactment of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006, the Secretary, in consultation with representatives of the recreational fishing industry and experts in statistics, technology, and other appropriate fields, shall establish a program to improve the quality and accuracy of information generated by the Marine Recreational Fishery Statistics Survey, with a goal of achieving acceptable accuracy and utility for each individual fishery."
- § 401(g)(3)(B): "The program shall take into consideration and, to the extent feasible, implement the recommendations of the National Research Council in its report Review of Recreational Fishing Survey Methods (2006), including...redesigning the survey to improve the effectiveness of sampling and estimation procedures, its applicability to various kinds of management decisions, and its usefulness for social and economic analyses..."

NMFS established the Marine Recreational Information Program (MRIP) in 2007 to address the findings and recommendations of the NRC report and to carry out the requirements of § 401(g) of the MSA. MRIP is a collaborative effort among NOAA Fisheries, regional fisheries managers and stock assessment scientists, and the recreational fishing industry to develop and implement an improved recreational fisheries statistics program. The new program consists of a system of regional surveys that provides the best possible scientific information for use in the assessment and management of the Nation's marine fisheries. Decisions to implement new data collection methods are informed by a technically-sound scientific process that includes testing of new or enhanced survey methods, peer reviews of survey methods and project results, and reviews by stakeholder groups.

An Executive Steering Committee (ESC) is overseeing MRIP. The ESC has established four MRIP leadership teams that are developing an improved data collection program for recreational fisheries, as well as promoting communication between and among NMFS, partner organizations, and constituents. Leadership teams include representatives from a broad range of

organizations, expertise, and interests, and have the flexibility to establish work groups and/or project teams to address topical, national, and regional issues, as needed. The Operations Team (OT) is charged with developing improvements to data collection programs under the auspices of MRIP. Each year, the OT members identify and prioritize research needs for the coming year and commission work groups or project teams to develop projects that address the top priorities. Work groups and project teams include experts in survey design and management, natural resource management, and stock assessments, and obtain input from knowledgeable recreational fishing stakeholders.

In its Review of Recreational Fisheries Survey Methods (2006), the NRC expressed three major concerns regarding the traditional design of the MRFSS' APAIS:
(a) "..., the estimation procedure for information gathered onsite does not use the nominal or actual selection probabilities of sample design and therefore has the potential to produce biased estimates for both the parameters of interest and their variances."
(b) "The statistical properties of various sampling, data-collection, and data-analysis methods should be determined. Assumptions should be examined and verified so that biases can be properly evaluated."
(c) "The statistical properties associated with data collected through different survey techniques differ and are often unknown. The current estimators of error associated with various survey products are likely to be biased and too low. It is necessary, at a minimum, to determine how those differences affect survey results that use differing methods."

In response to these concerns, the members of the OT established a working group to evaluate survey designs and test ideas for improvements. The first project of this Design and Analysis Work Group was to develop technical documentation describing sampling and estimation procedures for ongoing recreational fishing surveys. The resulting report (*Surveys and Statistical Methods for Estimation of Catch and Effort in U.S. Marine Recreational Fisheries*) serves as a technical source document for assessment of survey and estimation designs.

The Work Group's next research project, the results of which are being recommended for implementation herein, was to develop an estimation approach for the APAIS that more closely matches the sampling design and subsequently accounts for selection probabilities in the estimation design. The project was funded in 2008 and completed by a project team consisting of David Van Voorhees and Han-Lin Lai (NMFS staff), and Jay Breidt and Jean Opsomer (consultants from Colorado State University with expertise in the field of survey design and estimation). The project team's final report, entitled *A Report of the MRIP Sampling and Estimation Project: Improved Estimation Methods for the Access Point Angler Intercept Survey Component of the Marine Recreational Fishery Statistics Survey* (attached), was delivered to the OT on January 20, 2011. The stated purpose of the final report is to outline proposed changes to estimation procedures for the APAIS that will ensure that estimation methods being applied to the APAIS are statistically valid. The authors cite the most important change to the APAIS to be development of a design-unbiased, weighted estimation method for estimating catch rate and its variance using the APAIS data.

The authors provide a thorough discussion of the sources of bias associated with past MRFSS estimates and recommend ways to minimize them in re-estimating historical catch estimates and

for estimates from future surveys. The methodology can be used to produce reliable estimates from historical MRFSS APAIS data from 2003 to the present using a combination of design-based and model-based estimation methods as well as from future, design-based surveys.

The improved methodology is design-unbiased and will provide a correct estimation method for mean catch rates when the sampling, data collection, and data processing for the APAIS are conducted in accordance with the documented sampling design. In fact, much of the "Discussion" section of the report describes flaws in the current APAIS design, how such flaws interject bias into estimates if not properly accounted for, and how new surveys need to be designed to eliminate potential biases. Many of the recommended improvements to intercept survey design are being tested in a survey design pilot project being conducted in NC.

The final report was evaluated by three independent sources of peer review. The project team subsequently addressed the reviewers' comments and questions. The peer review comments and the project team's responses are attached. Many of the comments related to the use of a mix of model-based and design-based methodologies. Such a mix is necessary for the re-estimation of historical MRFSS APAIS data. Other comments applied to deficiencies in the current survey design and suggested ways to improve future surveys—many of which are incorporated into the NC pilot project. The members of the OT concluded that the project team responded completely and effectively to all peer review comments.

Accordingly, on February 11, 2011, the members of the OT expressed their support to the ESC for the estimation methodology described in the project team's report and for its certification for use in future surveys and for application to historical MRFSS data consistent with the necessary adjustments in the historical survey design. At its February 28, 2011, meeting, the ESC determined that it will support implementation of the new method and its use to prepare estimates of recreational catch from APAIS data beginning in calendar year 2011, and to compute and publish revised estimates of recreational catch for the years 2003 to 2010, the previous years in which the current APAIS design has been conducted.

I conclude that implementation of the estimation method described in the report entitled, *A Report of the MRIP Sampling and Estimation Project: Improved Estimation Methods for the Access Point Angler Intercept Survey Component of the Marine Recreational Fishery Statistics Survey*, will result in substantially improving the accuracy of recreational catch estimates calculated using data collected by the APAIS, and recommend that this method be used to calculate such estimates for the years 2003 to the present, and continue to be used so long as the current APAIS intercept survey design is used. I further conclude that implementing this new estimation method implements recommendations of the NRC in its 2006 report, *Review of Recreational Fisheries Survey Methods,* and is consistent with the provisions of § 401(g)(3)(B) of the MSA.

RECOMMENDATION

I recommend that you approve the implementation of the new estimation method described in the attached report, and its use to generate estimates for recreational catch using data collected by the APAIS from 2003 to the present.

I concur _____ 3-14-11
Date

I do not concur _____
Date

Attachments:

A Report of the MRIP Sampling and Estimation Project: Improved Estimation Methods for the Access Point Angler Intercept Survey Component of the Marine Recreational Fishery Statistics Survey

Independent Peer Reviews (3)

Responses to Reviewers

Memorandum dated February 11, 2011, from the Operations Team to the Executive Steering Committee, subject *Review of the final report on improved estimation methodology for the Angler Intercept Survey*

Report of the meeting of the MRIP Executive Steering Committee, February 28, 2011