

# Review of Recreational Fisheries Survey Methods

A report of the National Academies

Patrick Sullivan, Committee Chair

## STATEMENT OF TASK

This study will critically review the types of survey methods used to estimate catch per unit effort and effort in recreational fisheries, including state/federal cooperative programs. The committee will examine representative survey types, but will not evaluate every regional or state survey method currently in use. The study will consider the match or mismatch between options for collecting recreational fisheries data and alternative approaches for managing recreational fisheries.

## STATEMENT OF TASK

In particular, the committee will assess current types of survey methods giving consideration to:

- the suitability for monitoring different types of fishing (e.g., charter boats vs. private boats; offshore vs. near shore species, fisheries with temporally or spatially restricted fishing seasons)

# STATEMENT OF TASK

- the adequacy for providing the quality of information needed to support various approaches for managing recreational fisheries, with reference to how the management approach might be restricted by the type of survey method, stratification scheme, and sample size required.
- For example, is the management time frame (in-season, annual, or multi-year) consistent with temporal design of the survey; is the geographic scale of management (e.g. state vs. regional) appropriate for the resolution provided by the survey? How would the survey design need to be modified to match the requirements of the management approach?

## STATEMENT OF TASK

- make recommendations regarding possible improvements to current surveys and/or possible implementation of alternative approaches, including setting priorities for revising monitoring methods that will yield the greatest improvements in effort and catch per unit effort estimates.

# STATEMENT OF TASK

Current survey methods and recommended alternatives will be compared with relation to costs, sources of bias, precision, and timeliness.

# COMMITTEE ON THE REVIEW OF RECREATIONAL FISHERIES SURVEY METHODS

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# PROJECT BACKGROUND

- Recreational fisheries are an important and growing part of today's science and management of marine fisheries
- Recreational fishing is a more dispersed activity, thus information is more difficult to gather than with commercial fishery ventures
- NOAA, NMFS implemented the Marine Recreational Fisheries Statistical Survey (MRFSS) in 1979 to gather important marine recreational fisheries statistics such as total harvest



# PROJECT BACKGROUND

- Things have changed
  - Recreational fishing is making up larger part of the pie now
  - Recreational managers wish to exercise finer control
  - Spatial and temporal scales differ from original scales of concern
  - Broader range of factors now go into fisheries management
    - Biological, economic, social concerns

## OVERVIEW

- **General**
- **Sampling Issues**
- **Statistical Estimation Issues**
- **Human Dimensions**
- **Program Management and Support**
- **Communication and Outreach**

# General

## Findings and Recommendations

# PRINCIPAL FINDINGS

## General

- Marine recreational fishing is a significant source of fishing mortality for many marine species
- Adequate scientific information on the nature of that mortality in time and space is required for successful management of those species.

# PRINCIPAL FINDINGS

## General

- Marine fisheries management goals, objectives, and context have changed since the MRFSS program was begun in 1979.
- Management decisions are often made at finer spatial and temporal scales than they were earlier.
- The mix of recreational and commercial fishing has changed for many areas and species.
- Stock-assessment models now make greater use of data from recreational fisheries.

# PRINCIPAL FINDINGS

## General

- The MRFSS is in need of additional financial resources so that technical and practical expertise can be added to assist in a major overhaul of the design, implementation, and analysis of data from the MRFSS program.
- Both the telephone and access components of the current approach have serious flaws in design or implementation and use inadequate analysis methods that need to be addressed immediately.

# PRINCIPAL FINDINGS

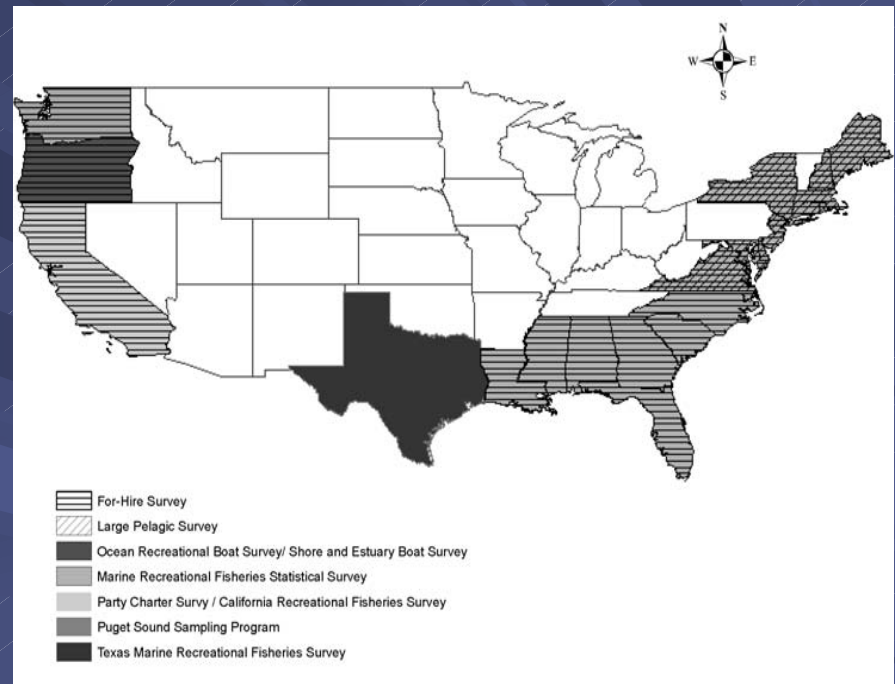
## General

- While the review has focused primarily on the MRFSS program, many of the component surveys of the MRFSS that are conducted by state agencies (with various degrees of federal funding) suffer from the same shortcomings as do the central MRFSS surveys.
- As a result, many of this committee's recommendations apply to state surveys as well as to the MRFSS.

# PRINCIPAL FINDINGS

## General

- Many of the independent surveys conducted by the states, as well as state-run surveys that are components of the MRFSS, are different from each other and from the central MRFSS in important ways, including sampling, data collection, and preparation of estimators.





# PRINCIPAL FINDINGS

## General

- The committee concludes that users' concerns about the use of the MRFSS in fishery management are justified by the above-mentioned weaknesses, but they also result from inadequate communication and outreach on the part of the managers of the MRFSS at NMFS.

# PRINCIPAL FINDINGS

## General

- The for-hire sector of marine recreational fisheries (i.e., charter, guide, and party-boat operations) is more like a commercial sector than it is like the private–angler sector.

# PRINCIPAL RECOMMENDATIONS

## General

- The MRFSS (as well as many of its component or companion surveys conducted either indirectly or independently) should be completely re-designed to improve the effectiveness and appropriateness of sampling and estimation procedures, applicability to various kinds of management decisions, and usefulness for social and economic analyses.

# PRINCIPAL RECOMMENDATIONS

## General

- After the revision is complete, provision should be made for ongoing technical evaluation and modification as needed to meet emerging management needs.
- To improve the MRFSS, the committee further recommends that the existing MRFSS program be given a firm deadline linked to sufficient program funding for implementation of this report's recommendations.

# PRINCIPAL RECOMMENDATIONS

## General

- A much greater degree of standardization among state surveys, and between state surveys and the central MRFSS, should be achieved. This will require a much greater degree of cooperation and coordination among the managers of the various surveys.

# PRINCIPAL RECOMMENDATIONS

## General

- The for-hire sector of marine recreational fisheries should be considered a commercial sector and survey methods and reporting requirements for that sector should therefore be different from those for private anglers.

# Sampling Issues

## Findings and Recommendations

# PRINCIPAL FINDINGS

## Sampling Issues

- Current methods in the MRFSS for sampling the universe of anglers and determining their catch and effort are inadequate.
- Onsite and offsite methods suffer from weaknesses that may lead to biases in catch and effort estimation.
- Offsite sampling methods that rely on telephone interviews are complicated by the increasing use of cell phones, especially in surveys of residents of coastal counties.
- The existing random digit dial (RDD) survey suffers in efficiency from the low proportion of angling households among the general populations and may allow bias in estimation from its restriction to coastal counties only.



# PRINCIPAL FINDINGS

## Sampling Issues

- The lack of a universal sampling frame (registry or license requirement) for all saltwater anglers is a major impediment to the development of a reliable and accurate survey program.
- The survey fails to provide a valid and reliable method of accounting adequately for fish caught and *not* brought to the dock.
- The correct identification of fish species, especially in places with diverse fish faunas, is a difficult challenge.

# PRINCIPAL RECOMMENDATIONS

## Sampling Issues

- A comprehensive, universal sampling frame with national coverage should be established.
- The most effective way to achieve this is through a national registration of all saltwater anglers or through new or existing state saltwater license programs that would allow no exemptions and that provide appropriate contact information from anglers fishing in all marine waters, both state and federal.

# PRINCIPAL RECOMMENDATIONS

## Sampling Issues

- Charter, party, 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.
- Studies are needed to understand the extent to which fish are kept and inspected as well as the extent of catch not available for inspection to improve the accuracy of catch estimates.

# PRINCIPAL RECOMMENDATIONS

## Sampling Issues

- Panel surveys, which contact individual anglers repeatedly through time, should be considered
- The onsite sampling frame should be re-designed.
- Dual-frame procedures should be used wherever possible to reduce sample bias.
- Internet surveys should be considered

# Statistical Estimation Issues

## Findings and Recommendations

# PRINCIPAL FINDINGS

## Statistical Estimation Issues

- The designs, sampling strategies, and collection methods of recreational fishing surveys do not provide adequate data for management and policy decisions
  - Unknown biases, unverified assumptions
- The statistical properties associated with data collected through different survey techniques differ and often are unknown.
- Current analysis procedures used in the MRFSS survey do not exploit the current knowledge of finite-population sampling theory

# PRINCIPAL RECOMMENDATIONS

## Statistical Estimation Issues

- 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.
- A research group of statisticians should design new analyses based on current developments in sampling theory. These examinations should include experimentation, such as specific sampling of activities like nighttime fishing or fishing from private property, whose current under-representation in the MRFSS sampling has the potential to create bias.

# Human Dimensions

## Findings and Recommendations



# PRINCIPAL FINDINGS

## Human Dimensions

- The MRFSS was not designed with human dimensions (i.e., collection of social, behavioral, attitudinal, and economic data) in mind.
- To ensure adequate coverage of the recreational fishery, a periodic updating of lists and descriptions of fishing locations and access sites is needed

# PRINCIPAL RECOMMENDATIONS

## Human Dimensions

- An independent national trip and expenditure survey should be developed to support economic valuation studies, impact analyses, and other social and attitudinal studies.
- The national database on marine recreational fishing sites and their characteristics should be enhanced to support social, economic, and other human dimensions analysis.

# Program Management and Support

## Findings and Recommendations

# PRINCIPAL FINDINGS

## Program Management and Support

- A large number of complex, technical issues associated with surveys of marine recreational fishing remain unsolved, and a significant investment in intellectual and technical expertise is therefore needed.
- A greater degree of coordination between federal, state, and other survey programs is necessary to achieve the national perspective on marine recreational fisheries that is needed.
- The recommended changes to the design and operation of the MRFSS program and its continued development and operation will require additional funding above current levels.

# PRINCIPAL RECOMMENDATIONS

## Program Management and Support

- A permanent and independent research group should be established and funded to continuously evaluate the statistical design and adequacy of recreational fishery surveys and to guide necessary modifications or new initiatives.
- Additional funding is needed for a survey office devoted to the management and implementation of marine recreational surveys, including coordination between surveys conducted in various state and federal agencies.

# Communication and Outreach

## Findings and Recommendations

# PRINCIPAL FINDINGS

## Communication and Outreach

- Unless anglers believe that the survey is well designed and implemented and that it is being used intelligently to address appropriate management issues, they are unlikely to participate.
- If anglers believe that their input is influencing the design and use of surveys, they are more likely to be satisfied with those surveys than otherwise.
- If anglers understand the basic purposes and decisions to which recreational fishing survey data are being applied, and how those data are interpreted and used, they are more likely to feel confident that the approaches used are legitimate, and are more likely to participate willingly and provide valid information.

# PRINCIPAL RECOMMENDATIONS

## Communication and Outreach

- Outreach and communication should be improved in several ways.
- The MRFSS managers should advise anglers and data users on the constraints that apply to the use of the data for various purposes.
- Managers and anglers also should be informed clearly about any limitations of the data.



# PRINCIPAL RECOMMENDATIONS

## Communication and Outreach

- Outreach and communication should be institutionalized as part of an ongoing program, so that their importance is acknowledged and appropriate expertise can be developed.

# PRINCIPAL RECOMMENDATIONS

## Communication and Outreach

- Angler associations should be engaged as partners with survey managers through workshops, data collection, survey design, and participation in survey advisory groups. Many NRC and other reports stress the importance of making use of local and traditional knowledge, capacity building, and involving local communities in knowledge-gathering and dissemination activities. Those recommendations apply, as well, to the recreational fishing community.

To read the report online, refer to the publications list on the Ocean Studies Board website (<http://dels.nas.edu/osb>).

To request a final copy of the report, contact Jodi Bostrom at [jbostrom@nas.edu](mailto:jbostrom@nas.edu).