# Testimony of Dr. Cynthia Jones

House Resources Committee
Subcommittee on Fisheries, Conservation, Wildlife, and Oceans
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Good Afternoon, Mr. Chairman and members of the Committee. My name is Dr. Cynthia Jones. I am a professor of Oceanography at Old Dominion University. I was a member of the National Academies' Committee on Improving the Collection, Management and Use of Marine Fisheries Data. The National Academies was charted by Congress in 1863 to advise the government on matters of science and technology.

The study evolved from a request by Congress to review assessments of summer flounder stocks along the East Coast of the United States. Following that request, the National Research Council, National Marine Fisheries Service (NMFS), and congressional staff agreed to broaden the study into a more comprehensive review of marine fisheries data collection, management and use. Funding for the study was provided by NMFS.

The committee consisted of 11 volunteer experts and was chaired by Patrick Sullivan, an associate professor in the Department of Natural Resources at Cornell University. This written testimony provides some detail related to recreational fisheries data. A more comprehensive review of all types of fisheries data is provided in the report.

Marine fish are important as a source of food, item of commerce, focus of recreational opportunity, and element of cultural tradition in the United States and worldwide. Data from marine fisheries contribute to our understanding of the marine environment and how humans use living marine resources. A comprehensive understanding of the challenges currently facing marine fisheries science and management requires consideration of both the biological and human dimensions.

Fisheries management requires high-quality observations and analysis of the status and dynamics of fish populations. Stock assessment scientists, economists, and social scientists must work with managers to design appropriate methods to collect, manage, and use accurate and precise biological, economic, and social data to accomplish their management responsibilities.

There are two types of fisheries data collected by NMFS: fishery independent and fishery-dependent data. Fishery-independent data are obtained by NOAA through surveys and research conducted by federal, state, and university scientists. Fishery-dependent data are gathered from fishermen and processors through log books, trip tickets, and landing bills. They are also collected by state and federal agencies (or their contractors), through dockside intercepts (for both commercial and recreational fishermen), through telephone surveys that relate to recreational fishing activities (e.g., Marine Recreational Fisheries Statistical Survey), through telephone surveys that gather socio-economic information, and through observer programs that provide detailed commercial catch, effort, and bycatch data.

Fishery dependent data from recreational fisheries are essential for assessing the mortality and other stresses that result from fishing. These data provide a direct measure of the effectiveness of management and regulations. Recreational fisheries, with some important exceptions, result in

fewer landings and are rarely reported. Recreational data are more difficult to obtain because surveys have to cover large geographic areas with multiple access points throughout the year for all major and most minor target species. No single survey type can achieve all of these goals without some compromise. For this reason, statistical sampling approaches must be used to estimate total effort, harvest, and discards.

There are several different survey methods currently being employed and funded by NMFS to implement state/federal cooperative programs for monitoring marine recreational fishery catch, effort, and participation (Table 1; Appendix). The Marine Recreational Fisheries Statistics Survey (MRFSS) is being used to monitor Atlantic, Pacific and part of the Gulf Coast for catch and effort for shore fishing and private/rental boat fishing. The MRFSS design is based on a household telephone survey coupled with an access-site intercept survey. The telephone survey was designed to assess effort by estimating the number of fishing trips per year categorized by mode (i.e., shore, party and charter vessel, or private and rental boat access) in two-month waves. The intercept survey was designed to complement data collected in the telephone survey by sending interviewers into the field to collect data on catch and effort by species, length, and weight. In addition, NMFS conducts a variety of surveys to cover the offshore recreational fisheries targeting large pelagic species such as bluefin tuna, billfishes and sharks. The Large Pelagic Survey (LPS) covers private and for hire boats from Virginia through Maine and an Automated Landings Reporting System (ALRS) that requires reporting of landings of bluefin tuna and all billfish species.

Differences between gathering data from commercial versus recreational fisheries can be compared through analogy to methods used to estimate store inventory. Developing a stock assessment based on commercial and fishery independent data is like obtaining a computerized list of goods sold at the registers in Walmart. Developing a stock assessment using recreational fishery survey data is more similar to conducting a market survey by asking people at random in the parking lot at the Mall of America how many of a particular item they bought, and using that information to estimate store inventory.

Particularly in the case of recreational fisheries, timeliness of data availability was a major problem. To stay within the total allowable catch limits, for example, total catch data (commercial and recreational) and data on discards in other fisheries should be available in time to allow closing a season early. Although most commercial data meet this criterion, recreational catch data generally are not available in this time frame. Expansion of the recreational share of many fisheries has exacerbated the problem. Presently, in-season management of most recreational fisheries is not possible. New data collection is constrained by state and federal budget limitations. To meet expanding information needs, NMFS should work to improve the quality of data available from commercial and recreational fisheries.

## CONCLUSIONS AND RECOMENDATIONS
## Improving Data Collection

### *Matching Data Collection Costs to Benefits from Fisheries*

Data collection could be made more cost effective through changes in the allocation of survey effort, collection of commercial and recreational catch and effort statistics, and optimization of regional monitoring through observer programs and vessel monitoring systems. Congress should encourage NMFS to conduct a nationwide analysis of the costs and benefits of optimizing data

collected for each fishery, including the value of the fish stocks for commercial, recreational, and non-consumptive uses. Analysis should include appropriate multipliers to capture benefits of recreational and commercial fisheries to the broader economy (e.g., bait and tackle purchases, boat rentals, sales by fish dealers and retailers), as well as ecosystem benefits, as in the table below.

| Species or Species Complex | Potential Value of Harvest & Other Benefits | Spawning Stock Biomass | Long-Term Potential Yield | Importance of Species in Food Web/ Endangered Status | Precision Needed | Estimated Data Collection Cost (itemize by data source) |
|---|---|---|---|---|---|---|
| | | | | | | |

The primary intent of such an analysis would be to guide the federal investment in fisheries data collection and management and states could use a similar approach.

Surveys almost always focus on groups of species because NMFS doesn't have the resources (financial, personnel, ships) to optimize surveys for individual species, and the value of most individual species does not merit such an approach. Each survey will be sub-optimal for any given species, requiring additional resources for NMFS to determine how surveys characterize individual species within multi-species complexes. If better data are needed for any single species, then additional funds would be needed to increase surveys, increase value of fishery-dependent data, or develop new methods for data collection.

***Greater Use of Fishery-Dependent Data***

NMFS and the councils should invest in finding ways to improve data from commercial and recreational fisheries to make these data more useful in stock assessments, rather than establishing new fishery-independent surveys. Existing surveys should be made more cost-effective by incorporating new technologies and management methods. In implementing this recommendation, NMFS will need to understand, account for, and reduce (if possible) the biases in fishery-dependent data. Use of fishery-dependent data also should be guided by the evaluation of costs and benefits.

***Accuracy of Survey Data: Frequency and Spatial Extend of Surveys***

An examination of the costs and benefits of data collection should include the frequency and timing of surveys in each region, with consideration of factors such as the biology of the managed species, state of the stocks, the current and potential economic value of the species, and the availability of other accurate indices of trend (e.g., commercial CPUE).

The range of a stock can be monitored through spatial distribution of abundance indices in the surveys and the locations of commercial or recreational catches. Using fishery activity to detect changes in a species range may not be effective however, if management is changed in such a way that fishing time or place are restricted (e.g., trip limits for summer flounder reduce fishing activities far from port).

***Data from Commercial Fisheries***

If confounding influences can be accounted for, fishery dependent data can provide an important source of information regarding trends in fish populations and, more generally, trends in the fishery. Many different motivations influence the time, place, and gear employed by fishermen. These motivations may be unrelated to the condition of the fish stock, but nonetheless will affect the use of fishing effort and catch for stock assessment. Consequently, research is needed to understand

the motivations of harvesters to enable accurate interpretation of the fishery-dependent data, including the determinants of catch in commercial, recreational, and subsistence fisheries.

***Incentives for Timely and Accurate Reporting***

Commercial and recreational fishermen may misreport catch, bycatch and discards, or landings for a variety of reasons, some of which may be intentional (e.g., underreporting to avoid regulatory limitations and penalties or over-reporting to increase standing for future allocation decisions based on historical catch level). Reducing the incentives for misreporting (or increasing the incentives for accurate reporting) would ultimately improve the credibility and quality of fishery-dependent data. Good evidence exists that improved cooperation among scientists, managers, and fishermen in designing and participating in a meaningful way in data collection can improve the quality of fishery-dependent data.

***Logbook Data***

Commercial logbooks will be more useful for stock assessments if a standardized format is required. The standards may differ by type of vessel, gear, stock, and fishery but there should be a minimum set of information collected from all fisheries and all vessels, including starting and ending times and coordinates of each tow (for trawl fisheries), or soak time and coordinates (for longline, trap and pot fisheries), species and amounts caught, and species and amounts discarded. Congress should consider mandating logbooks for charter/party vessel fisheries in the recreational sector to increase the accuracy of assessments currently available from the MRFSS. Finally it should be recognized that if logbooks are required by more than one level of government (state, regional, federal, and international), agencies should coordinate their efforts to reduce the burden of duplicative reporting (which may involve more than merely multiple logbooks). The use of logbook data is particularly important for fisheries in which fishery-independent surveys are conducted infrequently or not at all.

***Data from Recreational Fisheries***

Unlike most commercial fishery operations, in which a small number of vessels land large volumes of fish in a highly regulated manner at designated ports, most recreational fisheries tend to have a great number of individual fishermen who are highly dispersed in where they fish and how they land fish, operating in a system that is not uniformly regulated or licensed. To estimate recreational fish catch, MRFSS uses phone surveys of households in coastal counties to assess effort and on-site intercept surveys to assess CPUE and species composition of recreational landings and bycatch. This is relatively expensive and inefficient because of the large reference frame of coastal households surveyed by random digit dialing, a relatively small proportion of which include marine anglers, and the large number of recreational fishing sites. Although MRFSS often provides sufficient information to be used in assessments for the following year, it was not designed to support in-season management. There is a three- to four-month delay in providing recreational catch estimates. This was not a great problem when MRFSS was developed, but the increasing proportion of catch taken by recreational fishermen is creating management problems in some fisheries. For example, it has been estimated that the summer flounder recreational fishery exceeded its share of the TAC by 40 percent in 1998. Such overruns require compensation through reductions in the following year's allowable catch.

In the short term, MRFSS should be extended to all coastal states with significant marine recreational fisheries that have requested inclusion. Additionally, methods to improve efficiency, such as longitudinal sampling (a high priority for MRFSS), should be included. In longitudinal

sampling, households that report angling or a likelihood of future angling are re-contacted in subsequent sampling waves. The retention of identified angling households, at least for the next sampling wave, would increase survey efficiency. Efficiency could also be increased if sampling strata were built up of the phone numbers of individuals who fish regularly, ones who fish occasionally, and ones who fish rarely, and sampling effort is allocated optimally among these strata. NMFS should work with regional councils and interstate commissions to identify region-specific recreational data needs and establish the essential degree of nationwide standardization.

In addition to improving MRFSS, other options for improving recreational data include mandatory logbooks for all charter boat and party boat fisheries and mandatory marine recreational fishery licenses nationwide. The list of licensees could be used as a targeted sampling frame for more efficient surveys. Charter boat/party boat data could be improved through development of a complete list of vessels with requirements for logbooks to verify catch rates.

***In-Season Monitoring of Recreational Fisheries Catch***

MRFSS was designed to monitor recreational catch and effort each year to use in stock assessments run in subsequent years. Recreational fishing harvest will meet target catch levels unless data on the catch are timely and accurate enough to allow in-season closures. It is difficult to monitor in-season recreational catch because there are so many participants (often unlicensed and hence difficult to contact and interview) and there are many, widespread access points.

Each MFRSS sampling wave lasts two months and post-wave processing may require an additional two months. Because MRFSS is a sampling survey, statistical procedures are necessary arrive at total catch estimates. Thus, a catch limit reached early in a given sampling wave would not be detected until two to four months later. MRFSS, as currently conducted, would have difficulty providing catch estimates timely enough to be used for closure of recreational fisheries with seasons shorter than four months.

In-season monitoring of recreational catch is as important as monitoring commercial catch in heavily exploited fisheries with a substantial recreational component because both sectors can contribute to TAC overruns. Attempts to use MRFSS for in-season monitoring (particularly at fine scales) usually have not been successful. This lack of success should not be taken as proof that MRFSS is ineffective nor does it mean that in-season monitoring is impossible. A different type of monitoring system will be necessary if in-season recreational catch and effort are necessary.

MRFSS data might be made timelier by using shorter, more numerous sampling waves; increasing the number of phone calls in the telephone surveys; and/or using license list frames and longitudinal sampling. An alternate approach to obtain in-season measures would be to institute a survey to monitor specific recreational fisheries. Such a survey might contact anglers weekly or even more frequently during the season. However, such a survey would still have to undergo quality control and statistical expansion procedures to produce estimates of total effort (and potentially catch) and this would incur some lag time, although possibly less than for MRFSS. Although such a targeted approach could make recreational data timelier, it still might be difficult to use in short-season fisheries and for seasonally migrating stocks. Each of these options would undoubtedly increase the cost of collecting recreational fisheries data.

Despite these hurdles, the value of in-season estimates of recreational catch for important fisheries such as summer flounder deserves further study. Implementation of in-season tracking of

recreational catch data could revolutionize management of fisheries with significant recreational catch (Appendix Table 2).

***Social and Economic Data***

Many fishery problems are rooted in the economic incentives that affect fishing practices, such as overcapitalization of fisheries. Economic data are needed to document the extent of overcapitalization and to assist in designing mechanisms to bring fishing, economic stability, and sustainable yields into balance. Congress should authorize and support NMFS in the routine collection of economic data for commercial and recreational fisheries. Congress must first make such data collection legal by lifting current prohibitions on collecting economic and financial fisheries data in the Magnuson-Stevens Act (Sec. 303[b][7] and 402[a]).

***Cooperation with Recreational Fishermen***

The lack of a national program for saltwater fishing licenses greatly complicates estimation of recreational catch and effort. Such a requirement is controversial because many states do not presently require licenses, and anglers in those states do not want to face additional regulations and government oversight. However, requiring licenses for marine recreational fishing could improve data collection efforts by providing a comprehensive sampling frame and eliminating the inefficient random-digit dialing surveys. In theory, recreational effort assessments could be less costly (in terms of time, money, and staff) if based on license sample frames, because surveys would be more targeted. NMFS should increase its dialogue with recreational fishermen to jointly develop and implement improved data collection for recreational fisheries. MRFSS should continue to evaluate whether saltwater fishing licenses and longitudinal sampling would provide cost-effective alternatives to random-digit dialing.

## IMPROVING DATA MANAGEMENT

***Databases and Data Management Systems***

NMFS should continue to attempt to find ways to contain costs and increase benefits from its fisheries data management activities. In part, this could be accomplished by continued cooperation with states and regions in data management and by opportunities to build on existing efforts.

***Cooperation and Communication***

Part of the image problem shared by NMFS and the regional councils is lack of communication on a level that is informative and accessible to stakeholders. Few stakeholder groups have a good understanding of why fisheries data are collected and how they are used. Greater outreach to these audiences will improve their understanding and the perceived credibility of fisheries data. In the current fisheries management system, several activities occur sequentially:

- Data are collected.
- Stock assessments are conducted.
- Management recommendations are made.
- Fish are allocated among user groups.
- Fishing regulations are designed and implemented.

For individuals, this process may determine their opportunity to make a living (commercial and charter sectors) or their ability to engage in recreational activities. A more open and innovative assessment process could improve the credibility of the resulting assessments and perhaps reduce controversy.

In addition to direct outreach to stakeholders, communication could be increased by making more data more accessible through internet -based queries and more sophisticated forms of graphical presentation. Several efforts by NMFS and other parts of NOAA—providing the ability to query aggregated commercial and recreational data through the NMFS internet site and data visualizations provided through the Pacific Marine Environmental Laboratory internet site—are a first step in the next generation of data access.

In communicating data and results of analyses, NMFS should tailor its approaches to different audiences that may require different levels of detail. It would be useful for the public to see what the different data sources (commercial, recreational, and survey) indicate about a fish stock, including overlays on maps to illustrate geographic coverage. Such communication should avoid statistical and other jargon so that non-specialists, fishermen, and the public can understand the significance of the information. NMFS should consider using state Sea Grant Marine Advisory Service units more often to help with outreach.

One innovative and useful approach is to conduct fishery assessment and management simulations with stakeholders using real fisheries data in a workshop setting. This approach has been used by several fishery scientists to provide opportunities to focus attention of stakeholders on the models and data, rather than on each other (Holling, 1978; Walters, 1986, 1994). In using this approach, it is important that the objectives of the workshops be very specific and that they be conducted outside NMFS, to provide an objective mediator. Simulation workshops should explore issues such as the following:

- What are the management implications of using random stratified methods for surveys versus going where fishermen know there are concentrations of fish?
- Why are survey gear and methods kept constant over time?
- Why is it difficult to use short-term charter vessels for trawl surveys?
- Does it make a difference in setting target catch levels whether a decline in recruitment, biomass, or catches are caused by fishing versus climate, habitat loss, pollution, or other environmental factors?
- How do unreported landings and bycatch affect assessments and subsequent management?
- How would observations of fishermen change the analyses if included? What kind of observations could and could not be included?

In each case, the goal should not be to justify NMFS procedures, but to expose the assumptions and procedures of modeling and TAC setting to the stakeholder communities and explore what might be the consequences of changing assumptions. Preparation for simulation workshops should include thoughtful analysis and development of techniques and software. Opportunities to discuss the assessments with stakeholders could provide new insights to all participants. NMFS should seek assistance for such an effort from other parts of NOAA (e.g., the Joint Research Institutes and National Sea Grant College Program) and other sources.

Table 1: Current recreational surveys.

| Geographic Area | Survey Type | Survey Method | Data | Mode |
|---|---|---|---|---|
| Atlantic Coast | MRFSS | Telephone Survey<br>Access Point Intercept | catch and effort | shore fishing<br>private/rental boat fishing |
| | FHS | Telephone survey<br>Access point intercept | catch and effort | charter boats<br>party/head boats |
| Gulf of Mexico | MRFSS | Telephone<br>Access Point Intercept | catch and effort | shore and private rental boats |
| | FHS* | Telephone survey<br>Access point intercept | catch and effort | charter boat fishing |
| | SEHS* | | | headboat fishing |
| | TPWD* | Roving Instantaneous Boat Counts<br>Port-based Intercept Survey | effort<br>catch per unit effort | private rental and charter boats |
| Washington | OSP* | | | private/rental for hire boat fishing |
| | PSSP* | telephone survey<br>access point intercept | effort<br>catch per unit effort | shore and boat fishing<br>specialized salmon & halibut landings for hire boats |
| | ORBS* | on-site entrance count<br>port-based intercept | effort<br>catch per unit effort | |
| Oregon | ORBS | On-site exit count<br>Port-based intercept | effort<br>catch per unit effort | private & charter boats |
| | SEBS* | telephone survey<br>Access point intercept | effort<br>catch per unit effort | shore inland boats |
| California | CRFSS* | Telephone survey<br>Access point intercept<br>On site survey | catch and effort | for hire boat, private/rental boat, inland boat, pier/dock, beach/bank/shore |
| Hawaii | MRFSS | Telephone<br>Access Point Intercept | catch and effort | shore & private boat |
| | FHS | Telephone survey<br>Access point intercept | catch and effort | for-hire boats |
| Puerto Rico | MRFSS | Telephone<br>Access Point Intercept | catch and effort | |
| Offshore Virginia to Maine | LPS* | | effort<br>catch per unit effort<br>catch of highly migratory species | private/for hire boats |
| Offshore North Carolina & Maryland | ALRS | mandatory catch-card surveys | landings of bluefin tuna & all billfish | |
| NMFS Northeast Office | VTR | mandatory logbook census | | commercial & for-hire boats w/federal permits |

*FHS (For-hire Survey); SEHS (Southeast Headboat Survey); TPWD (Texas Parks and Wildlife Dept.); OSP (Ocean Sampling Program); PSSP (Puget Sound Sampling Program); ORBS (Ocean Recreational Boat Survey); SEBS (Shore

and Estuarine Boat Survey); CRFSS (California Recreational Fishery Statistics Survey); LPS (Large Pelagics Survey); ALRS (Automated Landings Reporting System); VTR (Vessel Trip Report).

Table 2: Catch and Effort Data for U.S. Recreational Fisheries in 2001

| Region | Catch Data (pounds) | Effort Data (number of trips) |
|---|---|---|
| **North Atlantic** | | |
| Total | 27,987,725 | 9,034,770 |
| Cod and Hake | 8,983,084 | |
| Temperate Bass | 5,924,889 | |
| Bluefish | 4,357,518 | |
| Tuna and Mackerel | 3,187,587 | |
| Porgy | 2,539,260 | |
| **Mid-Atlantic** | | |
| Total | 62,788,754 | 21,205,803 |
| Drum | 14,455,783 | |
| Temperate Bass | 13,222,607 | |
| Flounder | 10,723,188 | |
| Tuna and Mackerel | 8,671,825 | |
| Bluefish | 6,895,689 | |
| **South Atlantic** | | |
| Total | 58,838,927 | 21,596,108 |
| Tuna and Mackerel | 16,633,416 | |
| Dolphin | 13,425,710 | |
| Drum | 9,119,705 | |
| Jack | 3,289,567 | |
| Porgy | 2,805,402 | |
| **Gulf of Mexico** | | |
| Total | 78,276,170 | 22,889,697 |
| Drum | 32,444,582 | |
| Tuna and Mackerel | 8,626,073 | |
| Porgy | 6,103,032 | |
| Snapper | 5,982,297 | |
| Sea Bass | 5,972,956 | |
| **Pacific** | | |
| Total | 34,535,163 | 9,621,111 |
| Rockfish | 5,520,409 | |
| Tuna and Mackerel | 4,140,847 | |
| Sea Bass | 2,095,020 | |
| Flounder | 1,996,078 | |
| Jack | 1,191,628 | |
| **Total for All Fisheries** | 265,728,670 | 87,171,375 |