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**Proceedings of
Recreational Fisheries Statistics Requirements
Management Framework Workshop**

6 – 8 September 2006

Denver, CO

The NOAA Fisheries Service (NMFS) convened a three-day workshop on Recreational Fishery Statistics Requirements in Denver, CO from September 5-7, 2006. The main topic of this meeting was to examine and discuss the basic recreational fisheries information needs of fishery managers and stock assessment scientists for the purpose of supporting the development of a new data collection program. The workshop was a collaborative effort among regional fishery managers, stock assessment scientists, and survey statisticians. State and federal agencies, interstate marine fishery commissions, and the Marine Fishery Advisory Committee (MAFAC) sent representatives to this workshop.

Specific objectives of the workshop were to identify and prioritize regional and national information requirements for successful stewardship of resources impacted by recreational fisheries, to review and prioritize possible improvements in the methods used to survey and monitor recreational fisheries catch and effort, including those recommended in a recent review by the National Research Council (NRC), and to identify better ways to coordinate and integrate regional and national statistical survey programs. The workshop also focused on generating ideas for improving communications and collaborative planning among survey managers, stock assessment scientists, fishery managers, and various recreational fishery constituents as we move forward to enhance or re-design the current programs.

To facilitate discussion, workshop participants were divided into three concurrent breakout sessions that discussed the following topics:

- Management and stock assessment practices,
- Data needs for stock assessment and management,
- Methodological improvements,
- Balancing national and regional data requirements,
- Developing an outreach and communication strategy.

The first two topics were addressed by regional groups and the latter three were composed of mixed groups with all regions represented in each session. The attached proceedings provide a summary of the discussions and recommendations of the breakout sessions. Because the management and stock assessment practices and the data needs of these practices are regionally specific, these sessions are summarized by region under each topic heading. The remaining sessions are summarized by breakout session topic. In an attempt to get these proceedings out to all our participants, data users, and constituents as soon as possible so they can be used for discussions and planning of the data collection program revisions, they are necessarily coarse while maintaining the integrity of the actual discussions.

Management and Stock Assessment Practices

Atlantic Region

A white paper submitted by Atlantic States Marine Fisheries Commission (ASMFC) provides a relatively comprehensive view of the Atlantic coast perspective of the current recreational fisheries survey, management and stock assessment information needs not currently being met by existing surveys, as well as costs of obtaining that information.

Currently, most species on the Atlantic coast are managed on either a regional or state-by-state basis. For state-by-state management, each state receives an annual quota that is based upon the most recent stock assessment and the current year's landings. State quotas are generally distributed based upon historical landings. Regulations, which consist of size limits, bag limits and seasonal closures, are either regionally uniform or state-specific and established through conservation equivalency. Some states have water body-specific regulations (e.g., striped bass in Chesapeake Bay). It was widely agreed that there is always a demand for finer resolution (temporal and spatial) data, and that current management practices stretch survey data to manage state quotas.

Many current stock assessment models utilize catch-per-unit-effort (CPUE) as an index for abundance. However, complex and regularly changing regulations are making this index less valuable. Stock assessments are generally conservative and assume 100% discard mortality. Future models should utilize mortality estimates derived through observation and experimentation. However, models should be tested for sensitivity to recreational discard mortality prior to investing in accurate mortality estimates. In addition, future stock assessment processes should have a feedback mechanism for identifying data deficiencies and planning research and monitoring programs.

The group also discussed implementation of new data collection methods; specifically financing data collection. One suggestion was that NMFS cover basic parts of the survey, while local entities pay for finer-scale resolution. This could be accomplished through compatible "plug in modules". This is already occurring in some areas through add-on sampling.

Comments regarding future management and stock assessment practices:

- In-season quota monitoring: While this may be considered, it is unlikely to be implemented within the next several years.
- Forecasting: Both management and stock assessment may consider climate change, population trends, etc and try to forecast future conditions.
- Ecosystem-based approaches to management and assessment: Focus will shift from high-profile species to entire fish communities.
- It is unlikely that industry would support separation of for-hire modes from the recreational sector for management purposes.
- Possible consideration of subsistence fishing as separate category.
- Stock assessments will continue to place more and more importance on unobserved catch.

Gulf of Mexico Region

It was widely agreed that managers and stock assessment scientists need robust, reliable and timely information at a fine resolution to confidently make management decisions. The soundness of any data collection program, including the current Marine Recreational Fisheries Statistics Survey (MRFSS) program, needs to be statistically verified. This verification should include periodic testing of assumptions and potential biases.

Comments regarding current and future management and stock assessment practices:

- Current stock assessment models should include ALL data from the previous year.
- Future management practices may utilize finer geographic scales.
- In-season quota monitoring is needed.
- There should be separate allocations between the recreational and for-hire sectors.
- Mandatory logbook reporting for the for-hire sector. Where possible, logbook reporting should utilize advances in technology (electronic reporting).
- Management measures may include gear restrictions, area closures, limited entry fisheries, temporal closures within a week.
- Stock assessment models will shift to ecosystem approaches.
- Stock assessment models will require more detailed information on angler behavior, specific fishing location and depth, gear type, fishing techniques, hook type, habitat.
- Stock assessment will require better discard information and better information on stock identification.

Pacific Region

It was agreed that data collection programs must be useful for regional management and stock assessment needs, and must not be overshadowed by a demand for a national data collection program. Management and stock assessment practices utilize total catch, including landings and released catch, as well as measures of discard mortality. Potential biases associated with these measures must be understood. Current or increased regional sampling levels are needed to support management and stock assessment demands.

Comments regarding current and future management and stock assessment practices:

- Current management practices utilize in-season quota monitoring. Fisheries are shut down once quotas are reached.
- Future management may focus on finer geographic scales.
- Future management measures may need to track behaviors of individual fishing vessels (e.g., Individual Fishing Quotas, or IFQs).
- Area closures are currently utilized. Many are imposed for non-fishery reasons.
- Compatibility between data reporting units and management units. Currently use average weight to translate catch numbers into catch weight. This adds uncertainty into the in-season monitoring process.
- Some stock assessment models utilize CPUE as index of abundance.

- Future management and stock assessment measures may utilize ecosystem-based approaches.

Data Needs

Atlantic Region

The primary data needs in the Atlantic Region are for unbiased, state-specific, annual estimates of effort, landings, discards, and participation. Annual estimates should be species-specific and based upon the fishing year, rather than the calendar year. The ultimate data need will reflect the most demanding requirement, regardless of whether it is a management need or a stock assessment need.

It was acknowledged that fixing the problems associated with recreational data collection programs will not resolve all fisheries management and stock assessment problems. These processes rely on data inputs from multiple sources, and there are tradeoffs between allocating more resources to recreational data collection programs and allocating resources to other data collection programs (e.g., observer programs, fishery independent program). The decision to improve the accuracy (bias and precision) of recreational fishing statistics should be situation specific and based upon cost-benefit analyses considering all data inputs into management and stock assessment processes. For example, improving recreational landings estimates may not benefit a stock assessment that suffers from incomplete or imprecise observer data. An integrated process that includes input from data collectors, scientists, and managers should be formed to address such issues.

Specific needs include the following:

- Size composition of catch, including all fishing modes, species and catch types (both landings and discards). It is uncertain as to whether at-sea data collection on headboats satisfies stock assessment needs.
- Collection of more biological data, including aging structures for development of age/length keys, as well as tissue for DNA analysis to identify stocks.
- Better measures of discard mortality, which may include special studies to assess discard mortality, or adding new disposition codes to more specifically reflect the condition of released catch.
- Better participation estimates that are additive across states.
- More timely final estimates. Current final estimates are available in April or May. Management would benefit by having final estimates available in March.
- Annual estimates including all waves.
- Finer temporal resolution (e.g., 1-month waves) would limit the extent to which projections are used for developing new management measures. In addition, this would increase the feasibility of moving toward in-season adjustments.
- More frequent collection of socio-economic data.
- Improved methods for contacting small charters (guide boats), which are likely being missed in intercept survey.
- More precise state-level estimates for all species. Eventually may need even finer levels of geographic stratification (bays, upstream rivers).
- Unbiased estimates of uncertainty (precision).
- Improved QA/QC of intercept sampling.

- Information about fishing methods.
- More specific information about fishing areas (Atlantic Coastal Cooperative Statistics Program (ACCSP) standards).

Gulf of Mexico Region

General needs for the Gulf of Mexico Region include robust, reliable, and timely information at a finer resolution in order to make confident management decisions. At a minimum, the spatial scale of data collection should match the management scale. Estimates should be statistically sound and verified through independent observation or parallel data collection efforts, and all assumptions and potential sources of bias, such as night and private access fishing, should be tested.

Specific needs include the following:

- More timely delivery of annual estimates, sometime between January and March.
- Finer temporal resolution (1-month waves).
- Weekly effort estimates for for-hire sector, as well as a separate survey for shot-period recall of catch rate. Electronic reporting for the for-hire sector would facilitate more timely reporting. More timely estimates for for-hire sector would support in-season quota monitoring and/or IFQ.
- More size data, including both lengths and weights, within all sample cells. Mean weights calculated and reported by data collectors and scientists should be consistent.
- More detailed trip information, such as specific locations fished, location of catch, depth of catch, target species, habitat fished, and type of fishing (trolling, bottom, fishing, etc.). This could be facilitated by allowing survey respondents to identify fishing locations on maps.
- Better estimates of discarded catch, as well as estimates of discard mortality and the size distribution of discards. With limited exceptions (at-sea sampling on headboats), the identification and number of discards are reported by anglers. This self-reported information needs to be independently verified. There is also a need for more detailed information about the disposition of discarded catch, depth of catch, and gear types used. Independent tagging studies are needed to assess discard mortality.
- Current data gaps or areas of undercoverage include night fishing, private access fishing, tournaments, guide boat fishing, invertebrate fishing, fishing for highly migratory species, biological sampling (aging structures), non-traditional gear fishing.

Pacific Region

It was reiterated that data must be useful on a regional scale and not be overshadowed by a national data collection program. Current or increased sampling levels with accompanying funding are required to achieve data needs. All data should be collected at resolutions sufficient to meet management needs.

The importance of thorough documentation was stressed. Documentation should include specifics about the survey design, as well as discussion about the limitations of survey data.

Documentation should include the estimation programs, detailed descriptions of file structures and analysis methods, and information about data availability and the frequency at which data are updated.

Data needs were categorized by survey type. Specific data needs were identified for trip-level data (catch and effort), angler-level data, vessel data, and access-site data. Socio-economic data is needed within each of these categories and included as such. The need for community-level socio-economic data is also needed to assess community dependence on recreational fishing.

Specific needs include the following:

Trip-level data

- Detailed information about areas fished, as well as areas in which fish were caught (by species). Detailed information would include information about depth of catch for each species, duration of trips (hours fished) for each target species, and whether or not fishing occurred near marine protected areas.
- Port of departure/return.
- Species landed by mode and gear type.
- Lengths and weights of landed species, as well as discards.
- Accurate discard information including species identification, numbers and size of discarded fish, and a description of how fish were released (was some sort of device used to release the fish or return them to the bottom?).
- Interactions with non-fish species such as marine mammals, sea turtles, birds, corals, etc.
- Fish gender.
- Tournament fishing, as well as tournament type.
- Increased sampling to capture pulse fisheries.
- Trip expenditures, including airfare, hotel, charter fees, and other costs including fuel, tackle, ice, etc.

Angler-level data

- Residence information including country, state, county and zip code of residence. Mailing address and telephone number should be collected where possible, as well as information about cell phone use (identify cell phone-only anglers) and internet access.
- License-type or exemption.
- Fishing avidity, membership in angler clubs, and any other information about fishing expertise.
- Demographic data, including age, income, ethnicity, education, occupation, employment, gender, etc.).

Vessel data

- Census data is needed for the for-hire sector for purposes of tracking vessel histories.
- Owner and operator information.
- Vessel capacity and number of clients.
- Number of crew.

- Fishing/non-fishing activities throughout the year.
- Costs and revenues
- Census data would include the information captured under “trip-level data”

Access-site data

- Comprehensive list of fishing access sites.
- Up-to-date matrix of fishing pressure
- Information about accessibility to samplers.
- Information about types of fishing, including night fishing.
- Site amenities, including presence of bathrooms, launch ramps, bait shops, parking, etc.

Methodological Improvements

Following the discussions of management and assessment practices likely to drive the need for recreational fishery data, and what those data needs would be, the breakout groups reformed into cross-regional, cross-discipline groups to discuss methodological improvements to collect the desired data. These discussions built on, and may have reiterated, the actual data needs, while proposing methods to collect the data. The proposed methods include modifications to existing surveys, methods to evaluate current data and estimates for potential biases, and new methods to produce the estimates currently used. The groups identified several overall ‘themes’ in these discussions and tackled some very specific methods for specific data collection.

Overall Concerns:

Standardize at regional level.

Be careful that changes don’t result in comparing apples and oranges (between states or regions).

All improvements must be regionally based.

Collection time frames are variable for different needs

Adjusting sampling efforts to account/adjust for higher spatial resolution (Species specific)

Benchmarking is necessary (per the ACCSP and Gulf Fishery Information Network (GulfFIN) standards).

Include fishing community in all discussions.

Potential Improvements to existing programs.

Fixing bias can be expensive. If the bias is small and uniform there may not be a need to eliminate it because a trend can still be quantified and the trend may be more important to fishery management. Have a national workshop to assess needs vs. availability under existing programs (gap analysis). Look at getting the best bang-for-the-buck (i.e., efficient use of financial and personnel resources to guide priority modifications).

Look at untested assumptions.

Look at quantifiable data and determine what studies have been done already and assess the current knowledge. If bias can be assessed with currently available data, is correction necessary in estimation? Can bias be eliminated through survey sampling modifications? Study these issues every few years; there may not be a need to sample every year.

Data needs identified as priorities for bias examination and / or reduction:

Private access may be the largest source of bias. A variety of ways to answer the question of bias and test the assumptions were identified. Private access – log book or other method to study issue. California is studying this issue. Potential methods include: Empanel a group of anglers, ‘capture’ them at fuel dock, weekly call/recall, or personal visits. Because Hawaii has limited number of private access sites, is there good potential for a pilot study?

Discarded catch – 1) number of fish (easier to get), 2) species identification and size, or size distribution, of fish (difficult – need direct observations by trained staff) and 3) post release mortality (independent studies).

Night fishing needs to be looked at as another assumption, but previous studies exist and suggest that may be a small source of bias (Gulf of Mexico). This topic was not identified as an issue on the Pacific mainland coast, but may be in Hawaii and in some regions on the Atlantic Coast.

Potential methods for improved / additional data collection:

Discarded fish, size reporting methods: video monitoring; punch cards; personal observations (for-hire).

Longitudinal panel of private anglers (shore and boat) – Important priority for Atlantic Coast and Pacific Islands b/c angler registry may be years off. Understand the appropriate role of panels and be wary of bias.

- Logbook reporting (mandatory?)

- Recruiting active participants (representative?)

- Credibility and buy-in (angler provided, but must be verified)

Collect info from enforcement actions (frequency of violations, sizes, etc).

Stratify for-hire industry and use separate (from private boat & shore anglers) methods:

- Vessel monitoring/electronic log books

- Independent verification needed and possible here

- Better frame for guide/small boats (identify and additional stratification)

- Survey states for their current registration requirements

- Mandatory trip reports (includes participation in all survey methods for data collection)

Independent verification of self-reported data stream (primarily effort reporting):

- Remote sensing of effort

- Could be met using angler panels plus intercept

- Dual frame on effort

- Effort trends vs. business trends (e.g., Industry cash register data; fishing tackle sales; fuel sales; bait sales) – can they be correlated to support survey effort estimates?

Angler registries

- Difficulties?

 - Compliance / Enforcement

 - Exceptions

 - Inherent biases (saltwater designation?)

- Recognize regional differences

- Validate state by state against RDD?

- Technical committee to identify strengths and weaknesses of registries.

Modifications to Household Telephone Survey (fishing effort):

- Current dialing zone – are coastal counties enough? Assess statistical validity of collecting non-coastal effort from intercept survey

- Obtain number of telephone lines in households (bias)

