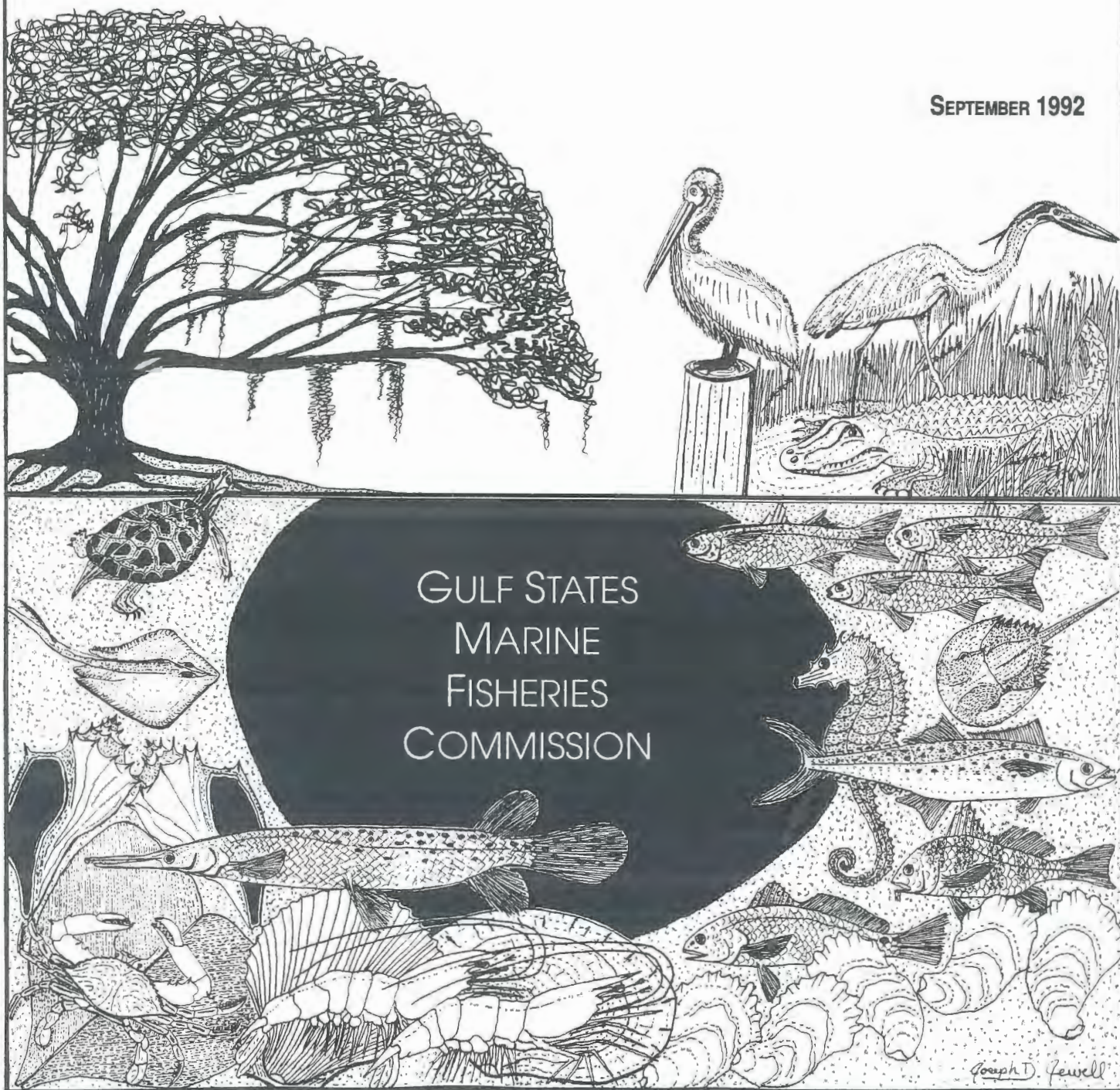


Proceedings:

**WORKSHOP ON MARINE "FOR-HIRE"
RECREATIONAL FISHERIES SURVEY METHODOLOGY**

SEPTEMBER 1992





PROCEEDINGS:

**WORKSHOP ON MARINE "FOR-HIRE"
RECREATIONAL FISHERIES SURVEY METHODOLOGY**

conducted by the
DATA MANAGEMENT SUBCOMMITTEE
of the
TECHNICAL COORDINATING COMMITTEE
GULF STATES MARINE FISHERIES COMMISSION
and the
NATIONAL MARINE FISHERIES SERVICE

EDITED BY
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EXECUTIVE SUMMARY

I. INTRODUCTION

The Workshop on Recreational Fisheries Statistics Data Collection held February 7-9, 1989, by the Technical Coordinating Committee Data Management Subcommittee (DMS) of the Gulf States Marine Fisheries Commission (GSMFC) identified items for future consideration for long term improvement in the collection of recreational fishery statistics. One such item was the investigation of improvements in data collection for the for-hire fisheries (headboats and charterboats); therefore, a series of workshops was organized for that purpose. Funding for the workshops was provided through the GSMFC by the Sport Fish Restoration Administrative program administered by the U.S. Fish and Wildlife Service. The for-hire fisheries are important components of many fisheries, yet they are not surveyed in most Gulf States intensively enough to produce precise estimates of total harvest and pressure, as well as other essential biological, social and economic data such that assessment of management measures can be accomplished.

II. GOAL

The goal of the workshops was to identify data collection needs, and to recommend the most effective method of obtaining those data for the for-hire fisheries. Recommended methods are for long term, routine, standardized monitoring programs to collect information critical for management. The recommended survey will not accommodate all needs or rare event fisheries, thus data that cannot be collected through routine monitoring programs should be collected through short term special studies.

Methodologies were evaluated in terms of reliability of the data, the types and level of data that could be collected, feasibility, and costs. The recommended survey is intended to capture the range of charterboat effort and landings, and is not intended to target one species or group of species; however, this type of survey should meet the management needs of the majority of managed fisheries.

III. OBJECTIVES

Specific objectives of a routine monitoring program for the for-hire fishery were defined:

- 1) to estimate total daylight gross catch, catch per unit of effort (CPUE) and effort of the for-hire fishery at a sub-state level on a monthly basis with the highest attainable level of precision; and
- 2) to obtain appropriate social and economic data.

IV. RECOMMENDATIONS

A. Rationale for Selection - The advantages and disadvantages of different methodologies were discussed concerning 1) the ability to collect critical information, 2) whether that information is self-reported by the angler or operators or is observed directly by the sampler, 3) presence and types of bias, 4) costs, and 5) procedural difficulties. Five general types of survey methods were discussed: logbooks, onboard observers, roving and access site surveys, telephone surveys, and mail and person-to-person surveys.

Onboard observers were considered the best method in terms of the types and quality of data that can be collected; however, they are the most expensive and in many cases are not feasible. Participants agreed that an access-site survey is the second-best methodology and is more cost-effective than on-board surveys. Telephone, mail and door-to-door surveys were not considered appropriate for a routine monitoring survey of the for-hire fisheries. Logbooks were considered to be a possible method for collection of effort data only, if validation studies are also used; they were not considered adequate for collection of harvest or biological data.

B. Preferred Methods - A complete consensus of all State and Federal representatives was not possible. There was agreement on the "best" methodologies for each component of the "for-hire" fisheries; however, in some cases, State representatives felt that an alternate methodology was more practical and affordable for long-term monitoring in their State.

Guide/Charterboats - The group agreed that the best method of surveying guides and charterboats was through intercept surveys of parties completing their trips, with pressure estimated by either a) roving counts to obtain relative pressures; b) phone surveys of operators, rather than clients; or c) logbooks. In some States, for some segments of the fishery such as guides who launch from their back yard, logbooks were felt to be the only practical method to collect both harvest and pressure data.

Headboats - The preferred method is on-board surveys of fishing trips and a phone census of operators to estimate pressure. If on-board surveys are impossible, access-site intercepts should be used. The consensus was that logbooks should only be used as a last resort due to the unreliability of self-reported data.

C. Scope - Surveys should produce daylight estimates only, since night fishing is a small component and is logistically too difficult to survey. Sample sizes should be chosen to accommodate monthly estimates to satisfy current management strategies based on quotas. Access points where on-site surveys should be conducted include public and private boat ramps, marinas and dry storage boat-houses. Shorefront residences with private boathouses, docks or launch areas could not be included in a cost-efficient manner. Wade/bank access points are not applicable to the for-hire fishery. Tournament anglers should not be included in the survey, or information for tournament anglers should be kept in a distinct category. Historical data should be used to decide whether to stratify the fishery and to select the best intercept times.

D. Essential data elements - Essential data elements to be collected include gross catch; number by species released alive and dead, and the reason for releases; lengths of landed fish; weights for specified species; sex; trip and fishing time; fishing area; gear and bait used; fishing method (trolling, bottom fishing, etc.); geographic residence of the anglers; species targeted; motivation and satisfaction; travel and fishing trip costs; years fished (experience); number of for-hire trips made; precipitation, and; water depth and bottom type of the fishing area. It is recommended that a common set of definitions and codes be developed by the States and NMFS for these data items to ensure comparability of the data.

E. Special studies - Special studies will be needed on periodic, short-term bases to a) collect data elements essential to good fisheries management but that can not be practically collected by the proposed survey, and b) to identify and quantify gaps in the sampling frame so that estimates can be adjusted to represent total harvest and pressure.

1.0 INTRODUCTION

1.1 Background

The Data Management Subcommittee (DMS) of the Technical Coordinating Committee of the Gulf States Marine Fisheries Commission (GSMFC) held a workshop February 7-9, 1989 in Miami with the following goal:

Achieve a cooperative recreational fisheries statistics survey program that provides the best possible data, in the most cost-efficient manner, to satisfy management needs of involved agencies in the Gulf of Mexico.

The workshop identified areas for future consideration for long term improvement in collection of recreational fishery statistics. One of these was to investigate improvements in data collection for for-hire fisheries (headboats and charterboats); therefore, a series of workshops was organized for that purpose.

The for-hire fisheries are important components of many fisheries in terms of percent of the total harvest and economic benefits. Although the importance of these fisheries has been recognized, they are not surveyed intensively enough in most Gulf States in a routine, consistent manner to produce precise estimates of total harvest and pressure, as well as other essential biological, social and economic data. The National Marine Fisheries Service (NMFS) surveys charterboats (smaller boats where the entire boat is hired by a party) through the Marine Recreational Fisheries Statistics Survey (MRFSS); however, they are exploring alternative methods for estimating effort due to the low participation in charterboat fishing by coastal residents. The phone survey targets coastal residents to estimate total trips while most charterboat anglers are from inland areas. Gulf headboats (larger vessels where individual anglers reserve a space on the boat) and some charterboats are surveyed by the NMFS Southeast Region using logbooks and access site sampling. These programs are intended to provide trend data on catch rates as well as some biological data; however they survey only a portion of the charter and headboats and do not provide reliable estimates of total effort and harvest. The Texas Parks and Wildlife Department (TPWD) surveys charter boats and bay headboats to estimate total effort and landings, but Gulf headboat surveys were stopped in September 1984, since most of the effort was in the Exclusive Economic Zone (EEZ). None of the other Gulf States have monitored the for-hire fisheries on a routine, on-going basis.

1.2 Participants

- 1) Maury Osborn, Texas Parks and Wildlife Department
- 2) Joseph Shepard, Louisiana Department of Wildlife and Fisheries
- 3) Tom Van Devender, Mississippi Bureau of Marine Resources
- 4) Stu Kennedy, Florida Department of Natural Resources
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- 12) Wayne Walz, South Carolina Wildlife Department
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- 20) Alan Collins, National Marine Fisheries Service
- 21) J.K. Lacey, National Marine Fisheries Service
- 22) Paul Pristas, National Marine Fisheries Service
- 23) Ron Lukens, Gulf States Marine Fisheries Commission
- 24) Nancy Marcellus, Gulf States Marine Fisheries Commission

1.3 Acknowledgements

Invaluable support in organizing the workshop was provided by the GSMFC, especially Ron Lukens and Nancy Marcellus. Appreciation is extended to the personnel of the Panama City NMFS Laboratory and especially to Dr. Eugene Nakamura for his hospitality. The workshop benefitted from the input of invited experts in various fields, and we would like to thank those individuals for their contribution to this effort.

2.0 GOALS AND OBJECTIVES

The goals of the workshop were to identify data collection needs, and to recommend the most effective method of obtaining those data for the for-hire fisheries. Recommended methods are for long term, routine, standardized monitoring programs to collect information critical for management. The recommendations will not accommodate all needs or rare event fisheries, thus data that cannot be collected through routine monitoring programs should be collected through short term special studies.

Methodologies were evaluated in terms of reliability of the data, the types and level of data that could be collected, feasibility, and costs. The recommendations are intended to capture the range of for-hire fishery effort and landings, and are not intended to target one species or group of species.

The objectives of a routine, standardized monitoring program for for-hire fisheries should be:

- 1) to estimate total daylight gross catch, catch per unit of effort (CPUE) and effort of the for-hire fishery at a sub-state level on a monthly basis with the highest attainable level of precision;
 - a) to partition gross catch into number landed, released alive, released dead, the reason for the releases, and use prior to landing at the angler level;
 - b) to determine species, sex, and size/age composition of the catch at the angler level;
 - c) to obtain CPUE measured in man-hours fished at the angler level;
 - d) to allow collection of biological data as needed; and

- 2) to obtain social and economic data including geographic origin of the angler, species targeted, motivation, satisfaction, travel and fishing trip costs, years the angler has fished, and annual number of for-hire trips made.

Harvest and effort and biological data are used by scientists for stock assessments and by managers for allocation purposes. Social and economic data are used to a) allocate and predict economic impacts due to management action, b) monitor and predict public response to regulations and other management tools, c) design management programs to maximize angler satisfaction and educate anglers, and d) predict demand for different resources over time.

The actual attainable level of monitoring depends on various factors, including the importance of the fishery, the level of cooperation among Federal and State fishery management agencies, and budgetary constraints. Different levels of coverage and precision engender different levels of risk when making management decisions. **A desirable level of precision is defined as a 15% to 20% proportional standard error (the standard error of an estimate divided by the estimate and multiplied by 100) with an α of 0.05.** The choice of making estimates on a monthly basis was based on the current management regime in many fisheries using quotas. If other management strategies are implemented in the future, the level of time to be estimated may not be as critical. The State or sub-State level of estimates depends on the fishery. The determination to collect data on catch at the angler level is due to the need to assess bag limits. The designation of effort in fishing hours is important for consistent catch rates, since search times can vary based on the levels of fish abundances; however, partitioning of trip times into search and travel time versus fishing time may not be practical or reliable except for on-board surveys or special studies.

3.0 DEFINITIONS

3.1 For-hire Components

Because of differences in definitions of charterboats and headboats in various surveys, it was decided to develop common definitions. Accurate delineation of the various components of the for-hire fishery is important from economic and methodological standpoints. The Texas Parks and Wildlife Department (TPWD) currently defines partyboats (called charterboats in most other surveys) as a boat carrying 10 or less sport anglers for a fee, and headboats as carrying greater than 10. The NMFS Southeast Region surveys define headboats as those carrying 15 or more people while charterboats carry less than 15 people, except in Louisiana. Louisiana does not have large headboats but does have a fleet that meets the Gulf of Mexico Fishery Management Council's reef fish fishery management plan definition of seven or more people and these are included in NMFS headboat survey. The MRFSS calls smaller boats charterboats (usually less than six people). The MRFSS uses an operational definition where charter means hiring the boat and headboat means that clients pay by the head, rather than a specific definition in terms of number of passengers. Guide boats are considered charterboats. Florida licenses define three categories of for-hire fisheries: a) guide - three or less people, mostly inshore trips; b) charter/party - four to ten people, mostly offshore; and c) headboat - greater than 10 people, which can be inshore or offshore. The NMFS Southeast Region charterboat survey also recognizes the guide component as boats under 25 feet which fish State waters although they do not collect data on those

boats. (Those boats do not generally fish coastal pelagics, so they were dropped from the sampling frame.) The Coast Guard requires different licensing for seven or more passengers.

There seemed to be an operational type definition: some boats, usually smaller in length, hire on a per-boat basis (charterboats). Larger boats hire out on a per-person basis (headboats). The operational definition seemed to be the clearest (per person vs. boat charter) and these types of for-hire fisheries would usually be surveyed differently, i.e. intercept spots are different. They are also probably different on an economic basis. There is a geographical difference in the way they operate and thus they would be contained in different sampling frames. Headboats are usually more visible because of their size and advertizing; guide (charter) boats are more difficult to locate and turnover is high. There are no specified access points that stand out for guide/charter- boats. Some participants felt that how the boat was hired was irrelevant; what really mattered was how many people do they carry because that determines how they fish and what they target. That may be important regarding variance estimates. If there is a large number of passengers the boat does not troll and that makes a difference as to the targeted species. There was discussion that there is overlap, i.e. big boats will drift fish and catch coastal pelagics. However, the economists felt that if you are interviewing individuals that pay to go versus a party hiring an entire boat, you might ask different questions and you may interview the captain in one case and the passengers in another. From an economic standpoint, how the different boats operate on a passenger basis is more important than how they fish. No matter the standpoint, economic or biological, it is necessary to get reliable estimates from all components of the fishery. Whatever the size of the boat, there is overlap of fishing methods and target species. **"For Hire" was defined as any boat guiding one or more sport anglers for a fee. An operational definition was adopted: guide/charterboat will mean smaller boats where passengers pay for an entire party on a per boat basis and headboat means larger boats where passengers pay on a per person basis.** A methodology based on types of access-sites may result in splitting boats into different strata based on where they launch, rather than on operational differences or the number of people carried; however, as long as the boats are covered in one survey or the other, total estimates of harvest and pressure can be made.

Different definitions for for-hire boat/vessels were usually based upon some physical criterion, such as length or number of passengers. However, to allow for consistency in data collection, it was felt that all parameters necessary to define a for-hire boat/vessel by all agencies should be collected. This will enable each agency to use the data consistent with their historical data bases.

3.2 Other Definitions

The terms in Table 1 were presented by TPWD as adapted from the FAO and these terms were agreed upon with minor changes. There was some discussion of commercial fishers versus sport anglers in that they can be both, but on different days, depending on their activity on a given day. If it is necessary to keep quotas separately, then no matter what the methodology, each fisherman must be asked if their intent is to sell their catch. It is a practical consideration, and does not make the definition wrong.

Definitions of the components of catch are presented in Figure 1. These definitions are important when considering what items different methodologies are able to collect. There was concern that released components should have three boxes;

"released alive", "released dead" and "released alive but died". It was agreed to keep "released alive" and "released dead"; "released alive but died" could only be obtained through a special study and is included in "released alive".

Non-commercial components of a commercial fisher's catch would be considered as commercial bycatch. It would not show up in commercial channels in most commercial surveys, although it would in the commercial sampling survey in Texas. Because of the methodologies being considered, anything above gross catch (for example, cryptic mortality) was not considered.

4.0 DESCRIPTION OF GULF OF MEXICO FOR-HIRE FISHERIES

4.1 Florida

Of all the states bordering the Gulf of Mexico, Florida has the largest number of charterboats (those boats which usually restrict carrying capacity to six passengers plus two crew members) operating in the Gulf. Estimates place the number of operating charterboats in the Gulf between 800 and 1,000 annually in recent years. A survey of charterboat fishing in the Gulf of Mexico during 1988 found 971 vessels operating for hire, of which 736 (approximately 75%) were operating from ports in Florida. Commonly, charterboats are located near tourism centers in the state. Major sites of charterboat activity in Florida are: Key West, Islamorada, Naples, Fort Myers Beach, Boca Grande, Clearwater, Panama City and Panama City Beach, Destin, and Pensacola. Highest numbers of charterboats in Florida were located in Destin, Panama City/Panama City Beach, and Islamorada. Results of interviews of charterboat captains from a randomly selected sample of 25% of Florida charterboats indicate that Florida charterboats made 118,202 fishing trips, carried 472,897 passengers, and averaged 128 chartered trips during 1988.

The marine fish targeted by Florida charterboats throughout the year was the most diverse of all the states bordering the Gulf of Mexico. Over half the charterboat operators in Florida target 12 or more species (Holland et al., in press). Fish targeted most by Florida charters are grouper, king mackerel, snapper, amberjack, dolphin, bonito, shark, cobia, Spanish mackerel, and wahoo. Overall, most Florida charters targeted groupers, snappers, dolphin, and king mackerel. Florida charters dominated fishing effort in the Gulf of Mexico with 84% of the total Gulf fishing effort spent fishing for targeted species. Regionally within Florida, trips chartered from the Panhandle and the peninsular Gulf Coast most often targeted groupers, snappers, and amberjack, king mackerel from the Panhandle and Florida Keys, and dolphin from the Florida Keys.

4.2 Alabama

Alabama has two types of for-hire boats. There is the guide boat which takes one to four people in a small boat, 18' to 23', fishing in the inshore areas (creeks and bayous). These boats primarily fish for red drum and speckled seatrout.

Holland, S. M., Ditton, R. B., and Gill, D. A. (in press). The U.S. Gulf of Mexico charterboat industry: activity centers, species targeted, and fisheries management opinions. Marine Fisheries Review.

The other type is the charter boat which takes six or more people fishing in the Gulf in either trolling or bottom fishing modes. In the trolling mode Spanish and king mackerel are primary focus. In bottom fishing it is the snapper/grouper complex, trigger fish, and amberjack that are fished for.

4.3 Mississippi

Though there is a lack of natural hard bottom in Mississippi's territorial waters and only a few artificial reefs constructed in nearby offshore areas, a surprisingly vigorous charterboat fleet operates from six harbors in coastal Jackson and Harrison counties. Complete information for 1991 shows a total of 42 vessels licensed as charterboats (\$100 fee) with boat lengths ranging from 26 to 60 feet. There is no saltwater fishing license in Mississippi and no other fees are required. No head boats or guide boats currently operate.

The average number of anglers aboard charterboats range from four to six, excluding captain and deckhands. Typical charters charge \$400 for a full day trip and \$285 for a half day. The majority of all day charters travel to the shallow waters of Chandeleur Sound in Louisiana or to the numerous oil platforms off the east Mississippi River Delta. Half day trips fish nearshore Gulf waters south of the barrier island chain. Most charters are booked between May and the end of September with less activity during the winter and the often rough seas of early spring. An informal survey found 60% of charters are taken by Mississippians with the remaining 40% coming from Alabama, Arkansas, Missouri, Louisiana, and Texas.

4.3 Louisiana

The for-hire fishery in Louisiana has undergone several changes in the past ten years. What was primarily a large boat (6 or more passengers) offshore fleet in the early to mid 1980's has become primarily a small boat (4 or less passengers) nearshore/inshore fishery for spotted seatrout and red drum. The magnitude of Louisiana's for-hire fishery is difficult to determine since there is no license requirement in place that would allow easy counting. In the recent past the Department of Wildlife and Fisheries has requested that the Legislature license charter operators; it has not chosen to do so.

The large boat fishery for the most part is composed of full-time year-round fishermen that make daily trips into offshore waters. The offshore oil and gas structures off the coast of Louisiana are their primary fishing locations. They engage primarily in bottom fishing for Atlantic croaker, silver seatrout, red snapper, and other structure associated species. An estimated 25 large boats continue to operate in Louisiana at this time.

Louisiana's small boat fleet is composed of an estimated 36 full-time vessels and any number of part-time, primarily weekend, vessels that spend most of their time fishing inshore waters for spotted seatrout and red drum. On occasion, as weather permits, trips are made to nearshore oil and gas structures.

4.4 Texas

Charter boats - Texas has two distinct components within the charterboat fishery; a) small, inshore boats targeting red drum and spotted seatrout, and b) larger, offshore boats targeting coastal pelagics and reef fish. Charterboats contribute about 10% of the total Texas landings. Texas does have a guide/charter license;

however, captains fishing in Federal waters in the Gulf of Mexico are not required to be licensed. Also, some of the larger offshore boats are owned by private corporations who use them to entertain clients as well as for charters, and those guides are not always licensed. High turnover in the fishery has been documented and can cause problems in maintaining a complete sampling universe. Charterboat operators are highly mobile and are seasonally involved in the fishery; most are part-time operators. Guides are located in each of Texas' eight bay systems and use smaller, trailerable boats and leave from public and private boat access sites, including docks and shorelines adjacent to their residences. The larger offshore charter boats are usually moored at marinas in ports scattered throughout Texas' eight bay systems.

Headboats - Headboats are relatively stable compared to guide/charter boats and the boats are readily identified. Headboat operators are required to be licensed. Generally headboats fish exclusively in either the bays or in the Gulf of Mexico; only a few boats fish in both areas and then usually only a few trips a year are made to the unconventional area. Some headboats switch their area of specialization from year to year. Since the early 1980's, about 15 bay headboats and about 22 gulf headboats have operated from the Galveston, Aransas, and Corpus Christi bay systems, and the lower Laguna Madre. The headboats generally are moored at their own docking facilities, generally adjacent to a booking office. Bay headboats contribute about 1% of Texas landings and 3% of the pressure while gulf headboats contribute less than 1% of the landings and 2-3% of the pressure.

5.0 OVERVIEW OF EXISTING PROGRAMS

5.1 West Coast

There is only one category of for-hire boat on the west coast and size is immaterial. There is a difference in open (per person) vs. charter (per boat) trips.

5.1.1 Oregon and Washington - Steve Crook

Only non-salmon fishery programs are addressed. Both Washington and Oregon have had a voluntary logbook system within the past decade and both were dropped after a few year's experience. In Washington it covered only Puget Sound; in Oregon it covered the whole coast and addressed the open coast fisheries. In Oregon, response rates were very poor and neither state had allocated money to keypunch the data. Washington had a voluntary program in 1986 and 1987; they worked with the MRFSS and with State sampling programs, excluding 1987 and 1988.

They dropped the program because they found that operators underestimated the number of people by half, but doubled catch estimates, while only half the trips were reported. Because of the opposite biases, overall estimates were accurate. Oregon only sampled for species composition and for biological data. They did not try to estimate total harvest of rockfish species. Salmon programs do estimate harvest, and they have also estimated Pacific halibut for the last two years.

There were 200 licensed guides in Oregon but only half were actively pursuing full-time careers in chartering. The remaining half were teachers who charter in the summer. Washington had 100 licensed guides in Puget Sound. It is not known how

many were licensed south of Puget Sound; however, most would have been involved in salmon, since there is little fishing south of Puget Sound for rockfish.

5.1.2 California - Steve Crook

California has had a mandatory logbook system since 1937 with high penalties for non-compliance. Skippers must list effort (anglers and hours fished), number of fish by species, and fishing area by 10 minute grids. In the last year enforcement issued 10 citations, and revoked one license. There were about 200-300 licensees in the last year, although there is a six-month lag on keypunching and figures were not final. They feel the logs are excellent for long-term trends due to the longevity of the program and they help to provide data for years when field sampling was not funded. A knowledge of the fishery is necessary to interpret the trends in logbooks; documentation of major shifts and changes in fisheries is important for understanding changes in trends in logbook estimates over the years.

In the late 1970's California studied at-sea sampling versus logbooks and found the same results as Washington. Skippers reported about half the effort and doubled their catch. The information was never released because of the delicate political situation of not wanting to call the captains liars.

The at-sea sampling program covers all of coastal California and is used to gather biological data. Sampling in central and northern California excludes salmon and striped bass. The program was set up to gather biological information for management, using a boat trip as the sampling unit. All boats (about 40) are sampled each week, including gathering data on the number of trips made weekly. Information is also collected on the lengths of trips, because trip length can give an indication of target species. Available trip lengths are half-day, three quarter-day, and all-day, and data are stratified accordingly. An attempt is made to sample catch by on-board surveys for 4-5% of all weekday trips; however, weekend data are not collected. It is estimated that about 40-50% of all trips occur on weekends. This fishery targets about 16 species, including 55 species aggregated under the name rockfish.

Questions and Answers

Q: Were logbooks mandatory?

A: It is mandatory for all types of charter/party boats. They only do at-sea sampling on the charterboats.

Q: What does at-sea sampling involve?

A: They measure and count as many released fish as possible and on the way back, measure and count landed fish. They do not have time to take otoliths or scales.

Q: How did the number of censused trips compare to logbook trips?

A: About half of all trips are reported on the logbooks. Logbook reporting compliance can be a problem, and can be influenced by the relationship between the boat operator and samplers.

Q: Have you had any indication that as you regulate these people that compliance rates change?

A: No, they have had instances where they have closed fisheries or allocated more to commercial fishers and it doesn't seem to affect compliance too much. They seem

to be used to reporting since the requirement has been in place for fifty or more years.

Q: Is there a reason why catch is reported accurately but people are under-reported?

A: Probably to hold their perceived gross income down. They don't report fish accurately; they report twice as many fish as are really caught. The charter boat operators reported about 90% of all passengers but only about 60% of the logs were returned so it looked like there were only about half of the number of anglers as there really were. They found that skippers overestimated all species of fish, not just the glamour species. There is still some opposition, mostly from new captains. Some skippers threatened to quit reporting when allocations changed, but they didn't. The State just got the provision to revoke licenses in the last few years and that has helped compliance. Citations for not reporting run about \$500 per incident, so that can mount up, if aggressively enforced. The sampling frame comes from registered (licensed) party boats. It is hard to prove they have not reported; the only way is for a warden to see them fishing and then for them not to report.

5.2 East and Gulf Coast

5.2.1. Guide/Charterboats

5.2.1.1 South Carolina - Wayne Walz

South Carolina has been involved with the MRFSS except for a few special studies. They increased sample sizes to get about 1,000 partyboat interviews per year but plan to reduce to about 300 in the future. They loosely define charterboats as six people or less. The State is very interested in economics, but has no current plans to conduct a survey. Instead the big push right now is for a saltwater license. There is a proposal for licensing party boats based on the number of people they carry, and that will require mandatory reporting. If that bill is passed, some sort of mandatory reporting or trip records will be implemented.

5.2.1.2 NMFS Marine Recreational Fishery Statistics Survey - John Witzig and Ron Essig

The Marine Recreational Fishery Statistics Survey (MRFSS) was initiated by National Marine Fisheries Service in 1979. The survey collects statistics on marine recreational fisheries as authorized by the Fish and Wildlife Act of 1956 (Section 5[a][4]), the Migratory Game Fish Study Act of 1959 (Title 16, Chapter 9A, U. S. Code) and the Magnuson Fishery Conservation and Management Act of 1976 (Sections 303 and 304[e]; P.L. 94-265).

The MRFSS consists of two independent but complementary surveys: a telephone survey of households and an intercept survey of saltwater anglers. The telephone survey collects data on marine recreational fishing effort in coastal counties. The intercept survey collects data on the catch of marine recreational anglers. Data from the two surveys are combined to provide estimates of the total fishing effort and catch by marine recreational anglers. Total effort is estimated as the number of fishing trips and total catch is reported for each species both by quantity and weight. The MRFSS also provides an annual estimate of the number of marine recreational anglers.

The telephone survey is designed as a stratified random sample with the primary sampling unit being a coastal county household. A stratum corresponds to a State/subregion during a 2 month sampling period (wave). A proportional sample allocation based on the historical fishing effort is used to determine the telephone interview quota for each wave and State. Allocations at the county level are based on the ratio of the square root of the number of households in each county to the sum of the square roots of the number of households in all counties in the dialing area in the state. Telephone sampling effort is directed only at households located in coastal counties, generally counties within 25 to 50 miles of marine waters. Households within defined dialing areas are contacted at random at the end of each wave. Telephone interviews are conducted with marine anglers and cover only fishing activity in the previous 2 months. Data obtained from the telephone survey includes the number of anglers per household and the number and mode of fishing trips taken during the previous 2 months.

The intercept portion of the MRFSS consists of on-site interviews of marine recreational anglers. The intercept survey is designed as a stratified random sample with the primary sampling unit being a fishing trip. A strata corresponds to a fishing mode during a 2 month sampling period. Three modes of fishing activity are sampled: shore (beach/bank sites and from all man-made structures such as piers, jetties, bridges, etc.), party or charterboats, and private or rental boats. Data collected includes information only regarding the fishing trip just completed (e.g., how long the person had fished, what gear was used), selected demographic information (state and county of residence) followed by an examination of the respondents's catch. Length and weight data are recorded for a sample of each species in the respondent's catch.

Intercept sampling in the Gulf of Mexico is conducted continuously in six 2-month sampling periods from January through December. The allocation of intercept interviews is based on MRFSS results from the previous three years with sample allocations for each State being in proportion to the average of the estimated number of fishing trips from the previous three years. The stratified design of the survey allows differential sample allocations at the mode level with the shore mode receiving approximately one third of the allocation based on a proportional sampling scheme.

The allocation of interviews by fishing mode and wave is based on empirical data and previous Marine Recreational Fishery Statistics Survey results. Complete coast-wide site lists are created and site assignments are selected based on historical information on site-specific fishing activity. Sampling is scheduled to cover all weekdays, weekends and holidays.

It is difficult to obtain precise estimates of fishing effort for the charterboat fishery due to the relatively low fishing activity of coastal county residents in this mode. Generally less than 2% of all households contacted in the telephone survey have been active in the charterboat fishery. The prevalence of charterboat fishing activity varies considerably by time of year and geographic location. Obtaining precise estimates of fishing effort for a fishery with a such a low prevalence by use of random-digit dialing methods would require unrealistically large sample sizes. Statistical methods of imputing effort values for the charterboat fishery have been used to reduce the effect of small sample sizes. These methods, however tend to mask the year-to-year changes in the fishery.

Currently about 8,000 intercept interviews and 28,000 telephone interviews are conducted annually from West Florida through Louisiana. Of the 8,000 intercept interviews about 1,000 are conducted in the charterboat stratum.

The following are some general comments regarding the MRFSS:

1. Having a low fishing prevalence for the charterboat fishery among coastal county residents does not result in a biased estimate. Estimates based on the telephone survey are still unbiased; they just may not be very precise.
2. Fluctuating effort estimates are due in part to demographic and sociological factors. See comments in the recent MRFSS publication under outliers.
3. Unstable expansion factors are due in part to the sampling protocol which allows all individuals on a boat to be interviewed. Thus in many cases the MRFSS samples boat trips rather than individual fishing trips. It is not unusual for all individuals on a boat to be from out-of-state and since the prevalence of charterboat fishing by coastal county residents is low, high expansion factors and thus unrealistically high effort estimates may result. Use of historical data to compute expansion factors for the non-coastal and out-of-state components of the charterboat fishing effort have mitigated the effect of cluster sampling of fishing trips in this mode.
4. Refusal to participate in the telephone survey has remained fairly constant at 5 to 7%. Some states such as New Jersey have a somewhat higher rate. The belief that telephone surveys are becoming more difficult to conduct due to the proliferation of answering machines and survey saturation is not supported by MRFSS data. It is possible that it will become more difficult to conduct telephone surveys but that has not yet occurred.
5. In 1991 each telephone survey interview cost \$4.05.

5.2.1.3 NMFS Gulf Coast - Harold Brusher

Since 1975, with the exception of one year, all NMFS Southeast Regional surveys looked primarily at relative CPUE, mostly for allocation purposes. These surveys started in Dade County to estimate catch per unit of effort for king mackerel. Initially, daily postcard questionnaires were used which targeted private boats, charterboats, and headboats, with a prize system to reward those who participated. Subsequently, private boats and headboats were dropped and only charterboats (less than 25 feet in length and carrying less than 15 passengers) were sampled. This was done primarily because there was a well known sampling universe with relatively few access points and high fishing intensity. Also sampling costs are relatively low, responses are generally good, and CPUEs consistent. The coastal pelagic complex of fish species was the primary target group.

In 1976, postcard questionnaires were dropped and logbooks were distributed to selected charterboat captains in Florida, Alabama, and Mississippi. Louisiana had a lottery system, and Texas conducted their own survey. After a brief interruption in the survey, NMFS began surveying charterboats in 1982, contracting with

charterboat captains to fill out logbooks for the sum of \$100 per month. Five areas were targeted (northwest Florida, southwest Texas, south Florida, North Carolina, and Louisiana) with two captains per area cooperating. At that time, compliance with the logbooks was estimated to be 90%. In 1983, the survey was expanded to 15 areas with an estimated 99% response rate. In 1984 the survey was reduced to using 8 to 10 charterboats due to budget constraints; however, in 1985 the full survey was again implemented, using three charterboats per survey area. The response rates for 1984 and 1985 were 99% and 94%, respectively.

In 1986, a voluntary logbook program was initiated, with logbooks sent to over 900 captains. Only 564 captains reported at least once, which translates to a 58% response rate. In 1987, mandatory reporting was implemented, and response rates dropped to 23%, becoming less toward the end of the year. In 1988 the survey was discontinued, to allow time for restructuring. In 1989 the voluntary logbook survey was again initiated, using 112 charterboats with a 67% response rate. By 1990, 123 captains were cooperating. It is felt that education of the charterboat captains toward the need for and benefits to be realized from reliable data from their fishery will result in a greater degree of cooperation and a better data base.

During 1989 and 1990, captains were asked why they did or did not desire to participate in logbook reporting. The following reasons were given for not participating:

- 1) upset with federal fishery regulations,
- 2) do not fish enough, or
- 3) fish in bays, not in the Exclusive Economic zone.

Captains who agreed to participate did not offer an explanation as to why they were willing to participate.

The survey was not originally designed to estimate total landings, and such estimates are highly biased due to sampling only the most active or interested captains. Due to changing management needs, there has been an attempt to quantify the universe to identify biases and major shifts in the indices. The data are primarily used for stock assessment purposes, bag limit impacts, and migration information. It is agreed that the survey could be integrated with other efforts; however, the survey managers feel it is important to maintain the integrity of the time series.

Questions and Answers

Q: What about compliance and writing out of various reef species?

A: They feel compliance is good, although the forms have not always listed the same species. If you get landings changes you do not know if it was not caught or was just omitted in previous years. Mostly they get trolling boats; they don't have a lot of reef species caught. With passage of the license law, they have mandatory reporting and they are evaluating what to require. Responses have also depended on visibility and communication with agents.

Q: What about impacts of quotas?

A: You'd be surprised. Some of the captains like limits because it limits their fishing time. They have looked at the data to see if captains were going to substitute species. For example, for king mackerel, vermilion snapper were a substitute. When they caught the bag limit, they would shift to bottom fishing instead of trolling for other pelagics.

Q: Is there correlation of target species and how they say they are fishing?

A: Some captains check all fishing types; many are very opportunistic.

Q: Do they collect weight data (to Brusher)?

A: Yes, although the weights are estimated by species.

Q: There is confusion whether the survey is mandatory.

A: Technically mandatory reporting is in effect but they are selecting who they want to respond. They ask who is willing to respond within their criteria. Mandatory reporting without enforcement will not work.

Q: Stu Kennedy brought up their mandatory requirements and what will be required then. For Florida, with passage of their fishing license, that law made reporting mandatory. He wants ideas on what should be made mandatory and how it will impact other surveys. He assumes it covers all fishing areas if you are licensed in Florida.

A: Brusher noted that in 1982 they paid \$100/month; that went down to \$50/month. Jeff Isely commented that education is critical; their best response is in the Panama City area because of the ease of communication. He also noted that travel requirements will restrict their ability to respond to captains' requests. Brusher recommended that they adhere to federal reporting requirements so systems in place are not proliferating and stay consistent. Stu agreed in the long run that would be nice. Right now he is in between getting baseline levels of information in effort; at the top he is getting information on all the species in the fishery. His feeling is that mandatory reporting should be across the board.

Q: What is the motivation of participants?

A: Brusher feels that many of them know the importance of the information to fishery managers. Gene Nakamura noted that when mandatory enactments take effect, NMFS will not be able to pay for responses. Ron Lukens commented that he knows of a captain who represents a lot of people who said that with mandatory reporting he would lie. That is one reason NMFS chose to keep voluntary reporting. Lukens suggested using the existing network of marine agents and educational agents to improve communications.

Q: Have you ever compared your results with the MRFSS?

A: They have had validation of species composition using MRFSS, in a special study of a small area where MRFSS interviewers recorded vessel names. The major species were in the ballpark, whereas minor, low value species did not match at all. They also looked at bag limit data and that matched very well.

Q: Is there a non-voluntary option?

A: Not the way the law is worded.

Q: What happens to a captain who does not comply?

A: They could lose their license, even for falsification. Has anyone tried business audits to verify that at least they are reporting all their trips?

Q: When the captains apply for their license in Florida, what information is required?

A: Virtually nothing. The license is one of those things you keep fighting for but when you finally get it, it doesn't look like what you asked for. You take what you can get. They feel lucky to have at least 100% of the names and addresses of people in the business. For the recreational license they only get 1 in 10 on their survey cards. They do get name, address and vessel documentation or FL number, so they hope they can track it from that point. They have access to boat registration files

and resource use licenses, but there is no common thread linking those files that is keypunched correctly. When you try to track people you don't get good matches against what is put on the forms and what people enter on the license. We should not give out licenses until the vessel number is validated and we know it is a real vessel number.

Q: Are you limited by the legislation as to what you can ask them to put on the application?

A: No. Texas has it as a bonded license. In Florida, it is at the county government level. Either way you have problems with having no control over the people responsible for filling out the license forms.

5.2.1.4 Texas - Maury Osborn

Texas began surveying charterboats (10 anglers or less) in 1978 including small inshore boats targeting red drum and spotted seatrout and larger offshore boats targeting coastal pelagics and reef fish. Beginning September 1978, an inventory of licensed and unlicensed guides was set up, and operators were contacted by phone to try to arrange dockside sampling at the end of their trips on randomly selected survey days. Some boats, owned by private corporations who use them to entertain clients, may also do other charters; those guides are not always licensed. The sampling frame included checking telephone book ads and contacting marina operators. High turnover in the fishery caused problems in maintaining a complete inventory. During the summer of 1979, 232 survey days were randomly selected. Operators were called ahead of time to see when they planned to return to the dock, and interviewers made an effort to interview them on their return. Only 73 interviews were accomplished. Percent mean error for the summer estimates in 1979, 1981 and 1982 ranged from 2-3% for effort and 4-13% for landings. Texas did not make trip estimates the first year of the survey; the primary aim was to get CPUE. Beginning with the summer of 1979, total trips were estimated by contacting each operator at the end of the summer and asking the total number of trips made. Total harvest was calculated by multiplying the number of trips by the mean catch per trip.

That survey was discontinued because of numerous problems. Contacting operators was difficult because of their high mobility and seasonality; most were part-time operators. During the summer studies, nine of the captains in the Galveston area and 29 captains in the Aransas/Corpus Christi area were never contacted. Captains fishing in the Gulf of Mexico and businesses that hired captains to take company personnel and/or clients fishing were not required to obtain a guide license and were hard to maintain in the inventory. Owner/captain non-cooperation was believed to be a problem since many captains did not return when they told us they expected to.

Beginning May 1983, charterboats were incorporated into the private-boat access point survey with no increase in sampling effort. This was made possible by including marinas and boat-houses in the boat access inventory (which previously included only boat ramps) and by assigning parties unique activity codes which allowed data to be extracted for separate estimates in distinct strata. Boat access sites were chosen using non-uniform probability random sampling based on relative pressure for each site calculated for all fishing activities in all areas (bays, passes, territorial sea (TTS) and Exclusive Economic Zone (EEZ)). This may result in higher variances than would be achieved by complete stratification but results in major gains in efficiency. Over 1,000 survey days were conducted each year; party-boat

interviews ranged from 454-1,018 per year for bay fishing, and 149-195 per year for Gulf fishing. Mean percent standard errors ranged from 13-20% for bay effort and 14-23% for bay landings, 50-100% for TTS effort and landings, and 30-40% for EEZ effort and 38-45% for EEZ landings. The Gulf variances could be reduced by making a single estimate combining TTS and EEZ interviews while politically separate estimates could still be calculated when necessary. Variances also could be reduced by analyzing the data to redefine more homogenous seasons for making estimates; the current season (15 May - 20 November for the high use season) was delineated using only private-boat bay fishing data.

Questions and Answers

Q: There was a question about clarification of procedures.

A: When interviewers go to a private-boat access site, they interview every party crossing that site (shrimpers, crabbers, oyster fishers, sailors, etc.) which allows estimation for all activities in that stratum.

5.2.2. Headboats

5.2.2.1 NMFS Atlantic and Gulf Coast - Gene Huntsman

NMFS conducts headboat surveys on the Atlantic and Gulf coasts with logbooks and sampling. The survey includes boats carrying 15 or more anglers with the exception of Louisiana, where they include boats carrying seven or more people.

The primary goal is to provide indices of stock status of reef fish. A secondary goal, to provide estimates of total landings and pressure, was added to the survey later. It is felt that the primary goal is not adversely affected by some of the problems usually associated with logbooks.

The NMFS survey includes time and area strata in which estimates of catch by species-number-weight, angler-trips, angler-days, size distribution, and species dispersion are acquired. Logbooks are voluntary in the Atlantic and mandatory in the Gulf of Mexico due to the regulatory mechanisms passed by the respective Federal Fishery Management Councils. Data elements include catch by species-number-weight, number of anglers, hours fished, and area fished by ten minute grid. Overt and covert compliance checks are conducted. At dockside, agents weigh and measure fish and collect biological samples.

As of this writing, there are 176 headboats operating from Cape Hatteras to Mexico in the EEZ. Two headboats in Galveston Bay and in Pamlico Sound fish in the TTS only and are not included in the survey. Atlantic boats are sampled every 7-10 days, whereas boats in the Gulf of Mexico are sampled every 10-14 days. This difference is primarily due to less management resources available for the Gulf region. Sampling began off North Carolina in 1972, and was extended to the South Atlantic Bight and Cape Canaveral in 1976. By 1980 the entire south Atlantic region was included. Partial sampling in the Gulf of Mexico began in December 1985, and was fully implemented during 1986. Enforcement of the logbook maintenance is important and is expected to receive more emphasis in the future. The entire headboat survey program, including salaries, forms, overhead, etc., is funded at about \$300 thousand per year (FY88).

There are some problems with the survey, including variance estimates, which are not computed due to the complex nature of the way the data are collected and due to data gaps. The lack of variance estimates precludes any evaluation of the risks

associated with decisions made based on the data. Some problems also exist related to how to handle missing data. There are also some internal, political, and funding problems associated with the program. Non-reporting is a problem, but is expected to improve as education and enforcement improves. Another problem, related to the number of people on a headboat, is that agents can be saturated with samples at dockside when the headboat returns. This results in many lost opportunities for length, weight, and biological samples.

Questions and Answers

Q: Have you looked at validity of what they report as far as fish? And do you adjust the reported number of trips upwards?

A: It is hard to get an unbiased estimate due to non-random sampling of fish. They did do a systematic survey to get every 3rd stringer, and found about a 1/3 overestimate on fish. They are more accurate on red snapper and grouper than for such species as porgies and grunts. He feels the samplers know when the captains are really not reporting correctly. They do feel they get good data on trips from their personal logbooks, especially since most people allow access to them.

Q: Were the vessels listed in the South Atlantic only those you are sampling or were they all the vessels? Has there been a change in number of boats?

A: That's all of them. At last count they had 88 in the Atlantic and the same in the Gulf. They have seen a slow diminishing over time in the number of boats. In late 1985, the best estimate was 100 on each coast.

Q: Do the owners change much?

A: Perhaps the structure of the industry is changing (the number of vessels looks the same, but ownership may be changing). They don't really keep track of owners unless it has some kind of bearing on reporting. The industry seems fairly stable. The boats cost a lot but they make a lot (or used to). In 1972, they were grossing over \$2,000 a day; even with a 100-day season that's a quarter of a million dollars.

Q: There was a question about using individual angler logs (such as catch cards) on a voluntary basis.

A: NMFS has never tried it. A lot of passengers are tourists from inland areas and would be hard to identify. Dr. Hayne commented that in inland waters this has resulted in cooperation for prestige species. The West coast has done that for salmon, trout, and muskellunge. You have to spend more time explaining how to do things for long-term angler logs. There was some discussion of the punch card system on the West Coast. There is a problem with anglers correctly identifying their catch. One other problem with the logbook data is that it is hard to use for evaluating the effects of bag limits, because you don't get catch per angler and because of the sampling scheme. You can use aggregate data for the whole boat for common species, except that non-random sampling would probably bias the results, and for uncommon species it does not work.

Q: Boats in Texas provide a stringer with a numbered metal tag. Is it pretty much the same on most boats?

A: Yes. Most do not allow anglers to bring their own coolers because of space problems and most have galleys that sell food and drinks, so they do not want passengers bringing their own refreshments.

Q: Have you thought about having your people go on board?

A: They have not used on-board sampling because it is too labor intensive; one sample may use up half or a third of a clerk's work week. He also feels that catch variance between trips is higher than that between anglers on the same trip. In California, at-sea sampling is necessitated by the fact that anglers can fillet their catch on board. Brusher commented that they have an interesting situation with boats that get contracted for military personnel. Those people are so used to standing in line, you have to take a whip and beat them away!

5.2.2.2 Texas - Maury Osborn

Texas began surveying headboats in 1978. Headboats which fish the EEZ were dropped in September 1984. Bay headboats are surveyed using de-facto, non-uniform probability random sampling. Offshore headboat methodology was the same. A list of headboat operators is maintained for each bay system; this is relatively easy since this stratum is more stable than the charterboat stratum and the boats are readily identified. Prior to a randomly scheduled survey day, a list of all headboats in random order is prepared, and each headboat operator is contacted to see if a trip is scheduled. The first operator scheduled for a trip is the one that is sampled, although all are contacted to get a count of all trips made that day. Sampling is conducted on-board where all anglers are interviewed for residence information, all fish kept are identified and counted, and up to 100 of each species are measured. Landings on a trip are expanded by the relative trips for that boat (all trips for that boat counted through telephone contacts divided by all trips for all boats and adjusted by the mean party size for that boat in a season and day type). That expansion is multiplied by the mean number of trips per day for all boats in a season and day type, and then averaged and multiplied by the number of days in that season and day type. Sample size is 126 survey days per year and mean standard errors have been about 10% for effort and 14% for bay headboat landings.

6.0 DATA ELEMENTS

Maury Osborn from Texas provided a table of data elements used in the Texas surveys. That table was evaluated as to the need for particular data elements. Table 2 represents the final consensus of the group as to those data elements that are considered important for use in fishery management. The table provides information regarding the most likely methodologies which would be employed to collect each data element.

Data elements were categorized under Demographics-Sociology-Economics (operator and client), Effort, Biological, and Abiotic, and are shown as low, medium, or high priority. Methodologies are split into on-site and off-site and include rove, access site, catch cards, aerial, on-board observer, logbook, random phone, mail, and door-to-door. No single methodology could satisfy all data elements required. Much of the information listed is critical for management and should be collected on a long-term basis from the majority of the fishery; however, some of the information can be collected by add-on surveys or special projects on a periodic basis.

6.1 Demographic, Social and Economic Variables

Residence is needed for the operator for commercial purposes, and for the angler in order for economists to develop travel cost models, and for allocation purposes. How residence is asked must be carefully considered in areas where "winter residents"

are a significant component of the fishery. Boat identification was felt to be an important piece of information for standardizing catch rates in CPUE indices; however, some participants thought that obtaining boat identification may compromise other aspects of a survey through non-cooperation. Party size is needed to develop effort estimates and for economic considerations in calculating costs per trip. Participation, in terms of the total number of participants, is needed for effort, allocation and economic models. Avidity is needed for social and economic models. Economists need the number of for-hire trips a client makes. Gender information was seen as a low priority for routine data gathering, since fishing is a male dominated activity, and changes can be tracked on an infrequent basis. Age, income, and race or ethnic group variables are important to economists since they can serve as a constraint on the number of trips. Motivational factors, at the angler level, are important in terms of catch-related items and can affect the number of trips made. Satisfaction is a product of the trip, and can be seen as an evaluation of management efforts. This should be measured on a routine, per-trip basis, and may be important enough to have multiple questions. The satisfaction and motivation of the charterboat operators has been measured by several research efforts and has been found to be relatively constant. This was not considered an important variable for continuous monitoring. Experience has been used in some economic models, and seems to be related to catch-per-unit-of-effort and number of years in the fishery for operators. For anglers, it can be measured in terms of number of years of fishing participation and number of trips made per year. Experience and specialization are related, but are not the same thing. Specialization is important for social studies, but it is very complex in terms of many different variables. It was not felt that it should be monitored on a per trip basis. For some fisheries, specialization may be very important for monitoring, for example tarpon, billfish and bonefish. As more catch and release regulations are implemented, specialization may become more important as a way of explaining response to satisfaction variables, since catch rates and species composition of an angler's creel will not tell as much. The best two variables recommended for monitoring specialization were years fished and self-perceived skill. Species preference was defined as important at the angler level, while species targeted on a trip basis (directed effort) is important on the operator level. Asking anglers whether they have been surveyed before and, if so, how many times in a specified time period, was identified as data useful for quality control and was given a medium priority. Operator revenues and fixed and variable costs are important for economics, but may not be appropriate for a routine survey of for-hire fisheries. Expenditures by the anglers are important and should be collected by component: travel cost (can be allocated by whether a trip's primary purpose was fishing), fishing trip costs, and capital expenditures during a year. Willingness to pay is not as important as travel cost components. Willingness to pay was described as situation specific and can be modeled from other variables. Disposition of the catch is an important sociological variable.

6.2 Effort Variables

The access site is important for economic modeling and to improve survey efficiency. Fishing area is important for management; however, the geographical precision of the defined areas may vary. Time of return and trip time are important for survey design and effort calculation, respectively. Trip time can be broken into travel and searching time, but there was concern that asking anglers to break trip time into these components was not realistic. As long as there is a consistent measure of trip time, calculation of catch rates will not be compromised; however, if there is a lack of fishery independent data, search time versus trip time may indicate changes in abundance. Fishing power is important but it is a composite of many different

factors and difficult to calculate. Boat length, passenger capacity, speed, fishing gear, fishing method (trolling, bottom fishing, etc.), and bait type were defined as important variables that could be handled in a routine survey. Hook type may be of interest on a special study basis.

6.3 Biological Variables

The following items were defined as important to gather on a routine survey: gross catch in terms of numbers (released alive and dead), species composition, length, weight, sex and other biological information if possible (maturity stage, gonads, fin spines, otoliths, scales, etc.), and landings in terms of numbers, species composition, length, weight, sex and other biological information. Data on the number of fish released and the reasons for releases will increase in importance as regulations increase. It was also noted that data used for determining age (lengths or hard parts where lengths are inadequate) should be collected as a random sample of the catch. It was felt that weights need to be collected unless length-weight regressions are available. In some situations, weight needs to be collected even though length-weight relationships are generally known, for example, to calculate condition factors, or where there is evidence of "lighter" stocks of some species, such as mackerel. It was not felt to be important to ask anglers whether they caught any tagged fish, although samplers should collect information on tagged fish when encountered.

6.4 Abiotic Variables

Although many factors may affect fish abundance, fishing effort and catch rates, the factors listed in Table 2 were designated as important for monitoring on a routine basis. Some are important for management, and some for sampling efficiency. Some factors may be important in modeling trends in catch rates by explaining some of the variability.

7.0 METHODOLOGY

The advantages and disadvantages of different methodologies are based on 1) the ability to collect critical information, 2) whether that information is self-reported by the anglers or operators or is observed directly by the sampler, 3) presence and types of bias, 4) costs, and 5) procedural difficulties. Discussion considered the advantages and disadvantages of five general types of survey methods: logbooks, onboard observers, roving and access site surveys, telephone surveys, mail and person to person surveys.

7.1 Logbooks

Participants felt that logbooks may be useful for obtaining effort data in certain fisheries; but they are not adequate for critical biological and socio-economic data. Steve Crook from California had three major recommendations if a logbook survey were to be implemented. Because of their long-term use (50 years), the West Coast has relied on logbooks as an indicator of the status of the fishery in years when the State has been unable to sample in the field. He recommended 1) mandatory reporting with heavy penalties, 2) improved communication and education efforts with the industry, and 3) ability to process the data in a short period of time in order to use the data and to effectively enforce reporting. He feels West Coast operators are accustomed to logbooks, and that they have become a way of life. One

disadvantage is the lack of biological and angler-specific social and economic data. The cost for logbooks in California is \$70,000 for a full-time biologist, \$35,000 for data entry, and \$50,000 for enforcement for 1,000 logbooks with 50 pages each. The cost is far less than sampling programs. The cost for the NMFS logbook survey on the Atlantic and Gulf Coasts is \$300,000 per year; including a lot of dockside sampling. It costs \$5,000 for data entry and \$100,000 results in 5,000 records. Logbooks cost \$5.00 each.

The quality of logbook data was discussed. All overviews of existing logbook programs found under-reporting of effort and over-reporting of landings. There are also problems with species identification and accurate reporting of less desirable species. Some captains actually count the fish while many just estimate the numbers. Although logbooks are generally cheaper than sampling, you get what you pay for. As fisheries are subjected to more and more regulations, especially quotas, it may not be in the operators' own self-interest to report accurately. Some participants felt that with verification studies and education of the operators, that quality problems can be minimized. Others felt that most operators were not sophisticated enough to fake successfully enough to change management for their benefit; most felt that non-reporting was more prevalent. Bias can occur if those who do report are not representative of the population of the for-hire fishery as a whole. Timeliness was also a problem if there is a lag in turning in books. Participants also felt that operators should be involved when logbooks are being designed and that the amount of data required should take five minutes or less per trip to fill out.

7.2 Onboard Observers

Onboard surveys are labor-intensive and expensive; however, the types and quality of data collected make this the best of all methods. This was recommended as the best method for surveying headboats, although costs may make this method unattainable. Participants also agreed that onboard sampling will only work with headboats; charterboats do not have the passenger capacity to allow an onboard observer.

If seasons can be delineated, instead of making monthly estimates, the required sample size may be feasible for onboard sampling. Texas samples about five percent of all headboat trips in a year with 126 survey days. That level of sampling can detect 75% differences among years. The California onboard sampling program costs \$350,000 per year with 650 sample days covering about 25,000 trips per year. Their survey documents the numbers of fish by species that are thrown back and they found a large inconsistency with the MRFSS which relies on self-reported data. Onboard they found a one-to-one ratio for fish thrown back to those retained; the MRFSS found a ten-to-one ratio. Species with a low catch rate or high value were reported most accurately. Misreporting of released fish on the MRFSS artificially drives down the variance of those estimates.

7.3 Roving and Access Site Surveys

Participants agreed that an access-site survey was the second best methodology, next to on-board surveys, due to the types and quality of data that can be collected. They also recommended access-site surveys as the best method for charterboats since most do not have the passenger capacity to allow on-board observers, they are more cost effective than on-board surveys, and clerk saturation at dockside is not a problem as it is for headboats. Participants also agreed that an alternative to the current MRFSS method of estimating effort for charterboats using telephone surveys

of coastal residents should be implemented. Expertise to conduct this type of survey already exists through the Texas and MRFSS surveys. The bus-stop method was discussed in general terms and may be an excellent method for obtaining charterboat data; however, none of the participants felt expert enough to make that evaluation for this report. This method should certainly be investigated for possible application to the for-hire fishery.

Texas did a type of roving survey of charterboats in the early years of their program, but it did not work well. It was hard to contact captains by phone and the captains did not return to docks when they planned. Texas got better results with less effort by incorporating charterboats into the regular access site survey. This was done by incorporating marinas and boathouses into the access site inventory; there are still missing trips originating from waterfront residences. MRFSS samples charterboats with their access site surveys; however, estimation of effort with the telephone survey causes problems. Dr. Hayne felt that access site surveys are feasible for charterboats; the main problem is creating and maintaining a complete inventory of all possible access sites and surveying all of them. Sometimes a survey must be designed for the universe that can be sampled, and then other types of periodic estimates made (mail surveys, etc.) for the part of the universe that is too difficult or expensive to sample. Administrators and managers can then use the additive estimates; this is not a problem as long as the amount of unsurveyed portions is known and is not a majority of the activity. Catch rates must usually be assumed to be the same as for the surveyed component of the fishery, unless special studies are conducted. This type of approach allows agencies to get the most possible data for the money, and then fill in the gaps. It was felt that trips from private residences are more of a problem for private and rental boats, and possibly guide boats (2-3 clients), than for the larger charterboats.

7.4 Telephone Surveys

Telephone surveys of operators were determined to be feasible for some for-hire fisheries for the estimation of effort; they were not generally considered a viable method for collecting biological data. Telephone surveys of for-hire clients (rather than operators) have proven to be inadequate, even for pressure estimates.

It was agreed that an alternative to the MRFSS telephone method to estimate effort for charterboats needs to be developed and implemented. The highest variances in the MRFSS occurs in effort estimates for the charterboat fishery and have been mentioned in Gulf of Mexico Fishery Management Council correspondence. Telephone counts of trips obtained from operators, roving count estimates of relative pressure, or logbooks for effort data only are workable alternatives. A standard method across the Gulf is desirable, but may not be possible due to geographical and resource (manpower and money) differences, and is not completely necessary if complementary surveys are carefully designed with the cooperation of the States and NMFS.

7.5 Mail and Door-to-Door Surveys

Participants agreed that mail and door-to-door surveys were not appropriate for routine monitoring of for-hire fisheries since biological data can not be reliably collected; however, these types of surveys are preferred for special studies intended to collect certain types of sociological and economic data. They are particularly useful for in-depth studies of specialized fisheries and economic studies

of the for-hire fisheries on the operator level. They also are useful to quantify gaps in sampling frames of other surveys.

8.0 PROPOSED PROGRAMS

8.1. Scope

The scope of surveys to estimate for-hire harvest and effort was delineated. Surveys should produce daylight estimates only, since night fishing is a small component and is logistically too difficult to survey. Sample sizes should be chosen to accommodate monthly estimates to satisfy current management strategies based on quotas. Access points where on-site surveys should be conducted include public and private boat ramps, marinas and dry storage boat-houses. Shorefront residences with private boathouses, docks or launch areas could not be included in a cost-efficient manner. Wade/bank access points are not applicable to the for-hire fishery. Tournaments should not be included in the survey or data kept in a distinct category. Historical data should be used to decide how to stratify the fishery and to select the best intercept times. Essential data elements to be collected on an on-going routine basis include gross catch; number by species released alive, dead, and the reason for the releases; lengths of landed fish; weights for specified species; sex; trip and fishing time; fishing area; gear and bait used; fishing method (trolling, bottom fishing, etc.); geographic residence of the angler; species targeted; motivation and satisfaction; travel and fishing trip costs; years fished; number of for-hire trips made; precipitation, and; water depth and bottom type of the fishing area.

8.2 Preferred Methodology

A complete consensus of all State and Federal Representatives was not possible. There was agreement on the "best" methodologies for each component of the "for-hire" fisheries; however, in some cases, State representatives felt that an alternate methodology was more practical and affordable for their State.

8.2.1 Guide/Charterboats

It was agreed that the best method of surveying this component was through on-site intercept surveys of parties completing their trips, with pressure estimated by either a) roving counts, b) phone surveys of operators, or c) logbooks. Not all representatives agreed that logbooks are a valid methodology; however, in some States, for some segments of the fishery such as guides who launch from their back yard, logbooks were felt to be the only practical method to collect both harvest and pressure data.

8.2.2 Headboats

The preferred method is on-board surveys of fishing trips and a phone census of operators to estimate pressure. If on-board surveys are impossible, access-site intercepts should be used. If access-site intercepts are necessary, then technological innovations (such as using video cameras) must be explored to eliminate bias and obtain representative samples of the catch. The options of paying mates to record data or requiring logbooks were discussed; the consensus was that these methods should only be used as a last resort due to the unreliability of the data.

8.3 Future State Plans

8.3.1 Guide/Charterboats

8.3.1.1 Florida

Guide/Charterboat - Florida plans to conduct a pilot study to compare four methods of estimating charterboat harvest and pressure. The comparison will be among logbooks and intercepts combined with either aerial counts or roving counts for pressure. Phone surveys of operators to estimate pressure is probably not feasible; although there is a sampling frame of operators through their licensing system, there are too many boats (1200 licensed operators) to conduct a phone census. After the pilot study is conducted, the methods will be compared in terms of accuracy, precision and cost. A decision on the final methodology would occur then. Florida has a group of guides that would have to be surveyed by logbook; these are one to two person for-hire boats for bonefish and tarpon that mainly launch from their own property. They would have to go through the regulatory process to establish a recreational survey.

8.3.1.2 Alabama

Guide/Charterboat - The Alabama representative felt that the only feasible way to survey the small group of one to three person for-hire boats who launch from their own property and fish mainly for red drum and spotted seatrout is with a logbook survey. Some effort to verify the logbooks should be made. Larger boats who launch from marinas should be surveyed with an on-site survey. Pressure could be estimated through either a roving count or a phone census of the operators. They feel that they have a complete sampling universe of all operators through cooperation with a guide organization and the Gulf Coast Conservation Association. They have a good, non-adversarial relationship with the guides.

8.3.1.3 Mississippi

Guide/Charterboat - Mississippi currently collects biological data on species taken by the charter fishery. There are a total of 55 operators; however, only 20 regularly operate on a for-hire basis. Typically, approximately 10 are surveyed on site. Operators are called ahead of time to determine if trips are planned. Pressure could be estimated with either rove counts or phone surveys of operators. There are only about four marinas where these charter operators originate.

8.3.1.4 Louisiana

Guide/Charterboat - Louisiana prefers on-site surveys for catch data with weekly phone counts of trips. They do not have a charter license in effect so the universe cannot be identified. They do have some boats that leave from private docks that would be missed in on-site intercepts. Because of their geography, roving counts or aerial surveys are too costly. If necessary due to manpower and/or budget problems, Louisiana would fall back to logbooks.

8.3.1.5 Texas

Guide/Charterboat - Texas plans to continue the current survey using on-site intercepts combined with roving counts. Texas will continue to provide bimonthly estimates to NMFS for use with MRFSS data for the entire Gulf of Mexico.

8.3.2 Headboats

8.3.2.1 Florida, Mississippi, and Louisiana

For the near future, the States of Florida, Mississippi, and Louisiana have no specific plans to initiate monitoring of the headboat fisheries in their respective jurisdictions.

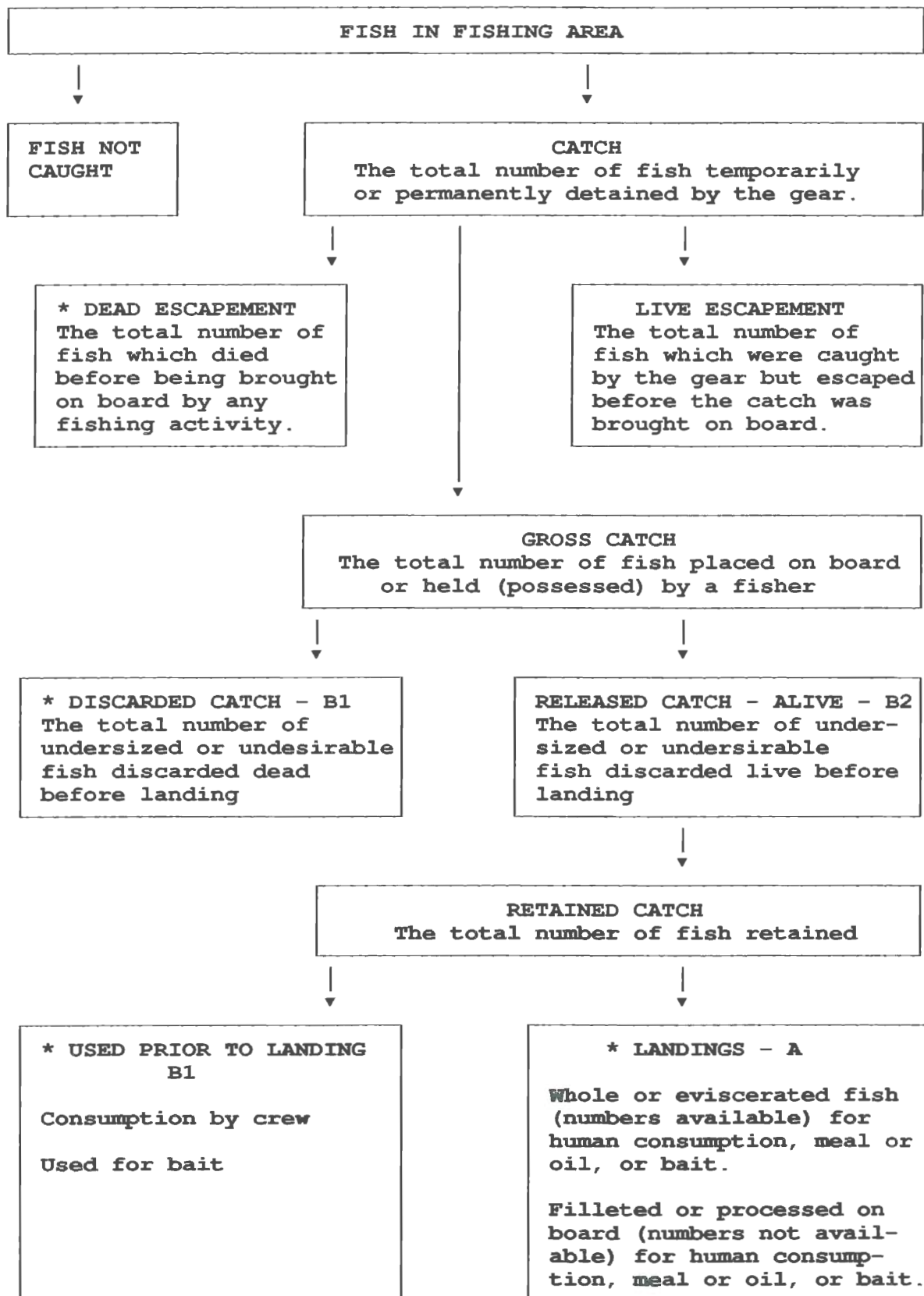
8.3.2.2. Alabama

The State of Alabama currently conducts a survey of its headboat fishery in conjunction with their charterboat survey. Plans for the foreseeable future are to continue that survey.

8.3.2.3 Texas

At the time of the workshop, Texas was surveying only bay headboats. Gulf headboats were discontinued since most of their fishing was in the Exclusive Economic Zone and Texas felt those boats should be monitored by the NMFS. Gulf headboats are surveyed by the Southeast Regional Headboat Survey operated from Beaufort; however Texas has not used data from that survey. In 1990, bay headboat surveys were discontinued by TPWD. The headboat fishery had been extremely stable in terms of the amount and species composition of the harvest and personnel were needed for other monitoring projects. Both bay and Gulf headboats may be surveyed in the future, using the current bay headboat methodology, to provide an update on their status.

Figure 1. Components of Catch and Their Relation to Fishing and Fishing Mortality.



* The sum of these quantities is total fishing mortality (harvest).

Table 1. Definitions of Terms for For-hire Fisheries Data Collection Programs.

Term	Definition
Catch	The total number of aquatic organisms temporarily or permanently removed from a population.
Commercial Fisher	Any fisher who sells, barter, or exchanges any or all of his catch or who is paid for attempting to catch aquatic organisms.
Fisher	Any person who attempts to catch aquatic organisms.
Fish Guide	A person who is compensated for accompanying or transporting a recreational angler. A fish guide is a commercial fisher if he/she sells any or all of his catch or the catch derived from his/her services.
Gross Catch	All aquatic organisms possessed by a fisher or angler.
Harvest	The total number of aquatic organisms permanently removed from a population.
Land	The solid part of the earth's surface not covered by water. Barges or vessels anchored to land are an extension of land.
Sport Angler	Any fisher who is not a commercial fisher.
To Catch	To temporarily or permanently remove aquatic organisms from a population.
To Harvest	To permanently remove aquatic organisms from a population.
To Land	To initially bring aquatic organisms to land from water.

Table 2. Data items needed in the management of a fishery, assessed as to different data collection methodologies.
S=Self-reported, O=Observed, Dash=Not Collectable.

Category Item	On-Site					Off-Site					Priority
	Rove	Access Site	Catch cards	Aerial	On-board Observer	Log Book	Random Phone	Known Phone	Mail	Door to Door	
Demographics/Sociology/Economics											
Operator											
Residence - Zip	S	S	S	-	S	S	O	O	S	O	High
Boat ID	O	O	S	-	O	S	S	S	S	S	Low
Annual or seasonal no. of trips	S	S	S	-	S	S	O	O	S	S	High
Motivation	S	S	S	-	S	S	S	S	S	S	Low
Satisfaction	S	S	S	-	S	S	S	S	S	S	Low
Experience (years)	S	S	S	-	S	S	S	S	S	S	Low
Species targeted by trip	S	S	S	-	O	S	S	S	S	S	High
Revenues	-	-	S	-	-	-	-	S	S	S	High
Fixed costs	-	-	S	-	-	-	-	S	S	S	High
Variable costs	-	-	S	-	-	-	-	S	S	S	High
Client											
Residence - Zip	S	S	S	-	S	S	O	O	S	O	High
Party size	O	O	O	O	O	S	S	S	S	S	High
No. of participants	-	-	-	-	-	-	S	S	S	S	High
For-hire avidity	S	S	S	-	S	S	S	S	S	S	High
Gender	O	O	S	-	O	S	S	S	S	O	Low
Age	S	S	S	-	S	S	S	S	S	S	High
Income	S	S	S	-	S	S	S	S	S	S	High
Race/ethnic group	S	S	S	-	S	S	S	S	S	S	High
Motivation (catch-related)	S	S	S	-	S	S	S	S	S	S	High
Satisfaction	S	S	S	-	S	S	S	S	S	S	High
Experience (years fished)	S	S	S	-	S	S	S	S	S	S	Low

Table 2. Continued.

Category Item	On-Site					Off-Site					Priority
	Rove	Access Site	Catch cards	Aerial	On-board Observer	Log Book	Random Phone	Known Phone	Mail	Door to Door	
Demographics/Sociology/Economics											
Client (cont.)											
Specialization (self-perceived skill)	S	S	S	-	S	S	S	S	S	S	Low
Species preference	S	S	S	-	S	S	S	S	S	S	High
Travel costs	S	S	S	-	S	-	-	S	S	S	High
Fishing costs	S	S	S	-	S	-	-	S	S	S	High
Willingness to pay	S	S	S	-	S	-	-	S	S	S	Low
Disposition - catch	S	S	S	-	S	-	-	S	S	S	High
Surveyed before (frequency)	S	S	S	-	S	S	S	S	S	S	Medium
Effort											
Geographic area where landed	S	S	S	0	0	S	S	S	S	S	High
Geographic area where fished	0	0	0	-	0	S	S	S	S	S	High
Time and date of return	0	0	S	-	0	S	S	S	S	S	High
Trip duration	S	S	S	-	0	S	S	S	S	S	High
Fishing time	S	S	S	-	0	S	S	S	S	S	Low
Fishing power											
Boat length	0	0	S/O	-	0	S	S	S	S	S	High
Passenger capacity	S	S	S/O	-	S	-	-	S	S	S	High
Speed	S	S	S	-	S	-	-	S	S	S	High
Fishing gear	0	0	S/O	0	0	-	-	S	S	S	High
Fishing method	0	0	S/O	0	0	-	-	S	S	S	High
Bait type	0	0	S/O	-	0	-	-	S	S	S	High
Hook type	S	S	S	-	0	-	-	S	S	S	Low

Table 2. Continued.

Category	On-Site					Off-Site					Priority
	Item	Rove	Access Site	Catch cards	Aerial	On-board Observer	Log Book	Random Phone	Known Phone	Mail	
Biological											
Gross catch											
Number released											
Dead	S	S	S	-	O	S	S	S	S	S	High
Alive	S	S	S	-	O	S	S	S	S	S	High
Reason	S	S	S	-	O	S	S	S	S	S	High
Species											
composition	S	S	S	-	O	S	S	S	S	S	High
Sex	S	S	S	-	O	-	-	-	-	-	High
Biological											
data ^a	S	S	S	-	O	-	-	-	-	-	High
Tag returns	S	S	S	-	O	S	S	S	S	S	Low
Weight	S	S	S	-	O	-	-	-	-	-	Low
Length	S	S	S	-	O	-	-	-	-	-	High
Landings											
Number	O	O	S	-	O	S	S	S	S	S	High
Species											
composition	O	O	S	-	O	S	S	S	S	S	High
Sex	O	O	S	-	O	S	-	-	-	-	High
Biological											
data ^a	O	O	S	-	O	S	-	-	-	-	High
Tag returns	O	O	S	-	O	S	S	S	S	S	Low
Weight	O	O	S	-	O	S	-	-	-	-	Low
Length	O	O	S	-	O	S	-	-	-	-	High
Abiotic											
Windspeed	O	O	S	O	O	S	S	S	S	S	High
Wind direction	O	O	S	O	O	S	S	S	S	S	High
Cloud cover	O	O	S	O	O	S	S	S	S	S	High
Moon phase	O	O	S	O	O	S	S	S	S	S	High

Table 2. Continued.

Category Item	On-Site					Off-Site					Priority
	Rove	Access Site	Catch cards	Aerial	On-board Observer	Log Book	Random Phone	Known Phone	Mail	Door to Door	
Abiotic (cont.)											
Current											
Surface	S	S	S	-	O	-	-	S	S	S	High
Bottom	S	S	S	-	O	-	-	S	S	S	High
Water temperature	S	S	S	-	O	-	-	S	-	-	High
Air temperature	O	O	S	O	O	-	-	S	-	-	High
Barometric pressure	O	O	S	O	O	S	S	S	S	S	High
Precipitation	O	O	S	O	O	S	S	S	S	S	High
Fog	O	O	S	O	O	S	S	S	S	S	High
Wave height	S	S	S	O	O	S	S	S	S	S	High
Tide	O	O	S	O	O	S	S	S	S	S	High
Water depth	S	S	S	O	O	S	S	S	S	S	High
Bottom type	S	S	S	O	O	S	S	S	S	S	High

^a Biological data includes such items as maturity stage, gonads, fin spines, otoliths, scales, etc.)