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MRFSS User's Manual

A Guide to Use of the National Marine Fisheries Service Marine Recreational Fisheries Statistics Survey Database

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National Marine Fisheries Service

Marine Recreational Fisheries Statistics Survey

Database

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Atlantic States Marine Fisheries Commission
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National Marine Fisheries Service
and the
U.S. Fish and Wildlife Service

Preface

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Acknowledgements

This manual is the result of a workshop sponsored by the Atlantic States Marine Fisheries Commission on June 10-11, 1993 in Annapolis, MD. Presentations on the National Marine Fisheries Service's Marine Recreational Fishery Statistics Survey (MRFSS) and data analysis procedures were provided by the staff of the Fisheries Statistics Division, National Marine Fisheries Service. We would like to extend our appreciation to them for providing specific analyses, data tables, graphics and SAS analysis programs for inclusion in this manual. We would like to extend our appreciation to the National Marine Fisheries Service for allowing the participation and assistance of the staff of the Fisheries Statistics Division in all aspects of this project.

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Introduction

This manual is based on a series of presentations prepared by the National Marine Fisheries Service (NMFS) as part of a workshop sponsored by the Atlantic States Marine Fisheries Commission, in cooperation with the NMFS and the U.S. Fish and Wildlife Service. The purpose of the workshop and the resulting user's manual is to assist in the use and analysis of the National Marine Fisheries Service's Marine Recreational Fishery Statistics Survey (MRFSS), and to encourage consistency in data analyses.

Chapters 1-3 of this manual provide an overview of the MRFSS survey design, data files and structures, and quality assurance. Methodology for the telephone and intercept portions of this survey are described, and a brief description of the catch and effort estimation procedures is provided to familiarize the reader with all aspects of the survey. Data files and structures are reviewed, with details provided in Appendices A-F. Users of the MRFSS database should familiarize themselves with the survey design, and the data files and structures prior to performing the data analyses described in this manual.

Specific analyses are presented in Chapters 4-7 for catch-per-trip, length frequency, post-stratification, and bag limit analyses. SAS programs have been prepared by the NMFS to accompany each analysis (see Appendix G for a list of SAS programs). The NMFS is re-estimating all data from 1979-1993 using new estimation procedures. The adjustment of missing weights is being performed for all past years of data during the re-estimation procedure, and will be incorporated in the estimation methods for all future years of data; however, there will still be occasional missing weights. Chapter 8 provides a method for adjusting missing weights where required.

Chapter 9 discusses the difficulties involved in analysis of rare species and pulse events. Specific analyses and programs are not provided for these issues, however, users of the MRFSS data should address these issues prior to performing analyses for these types of data. Chapter 9 also discusses various methods of defining directed effort and several problems associated with application of these definitions to various species. The data analyses described in Chapter 7 is based on a specific definition of directed effort. Users who wish to use an alternative definition of directed effort should modify these programs prior to use.

Chapter 10 describes a method to optimize state allocation of add-ons to the MRFSS. This chapter provides an overview of the analysis methodology and examples of the data necessary to perform the analysis. Complete data tables and assistance in using this optimization method can be obtained by contacting the National Marine Fisheries Service.

Please contact the authors of the manual for further information on the analysis methods or for assistance in running the provided SAS programs. The National Marine Fisheries Service and the Atlantic States Marine Fisheries Commission may update analyses described in this user's manual as further analyses or topics of interest become available.

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Chapter 1.
SURVEY METHODOLOGY

Introduction

The Magnuson Fishery Conservation and Management Act of 1976 (MFCMA - Public Law 94-265) mandated a national program for management of fishery resources in the Exclusive Economic Zone (EEZ), which ranges from 3 to 200 miles from shore. The MFCMA also requires that fishery management plans for the EEZ consider harvest data for both recreational and commercial fisheries. The Marine Recreational Fishery Statistics Survey (MRFSS), conducted annually by the National Marine Fisheries Service (NMFS), was established as a national program in 1979 to provide a reliable data base for estimating the impact of marine recreational fishing on marine resources. MRFSS information is used by Fishery Management Councils, Interstate Fisheries Commissions, and State and Federal fishery management agencies to draft fishery management plans, to evaluate future demands on fish stocks, to predict and evaluate the impact of fisheries regulations, and to develop recreational facilities for anglers. The MRFSS provides fisheries managers with information on the numbers and size distributions of each fish species caught in each mode and area of fishing within each state and subregion.

Survey Design

The MRFSS data collection methodology consists of two independent, but complementary, surveys: a telephone survey of households and an intercept survey of anglers at fishing access sites. Numerous NMFS methodological studies indicated that the survey should be structured around this data collection approach (Brown 1977, Brown et al. 1977, Chandler 1977, Chandler and Brown 1978, Hiett and Ghosh 1977, Hiett and Worrall 1977, Metze 1977). These studies showed that a telephone survey could be used to collect reliable data on certain aspects of recreational fishing, such as number of trips made in the previous two months, locations fished, and dates on which those trips were made. Data on fishing trips became less reliable beyond a two-month period due to recall problems. Information on the actual catch such as species identity, number, and weights and lengths of fish caught could not be reliably collected by telephone. These data are obtained from anglers intercepted by trained interviewers stationed at fishing access sites. Data from the two independent surveys are combined to produce estimates of total participation, effort and catch. Survey sampling and estimate generation is stratified by subregion, state, fishing mode (shore, private/rental boat, and charter/party boat), fishing area, and bimonthly wave.

Using the complementary surveys approach, marine recreational fishing estimates (not including shellfishing) are calculated for six two-month periods, or waves, during an annual survey period. Results from the 1979 and 1980 surveys indicated that only about five percent of the annual recreational catch on the Atlantic and Gulf coasts was taken during the January/February period. Costs to sample these months are very high due to low fishing

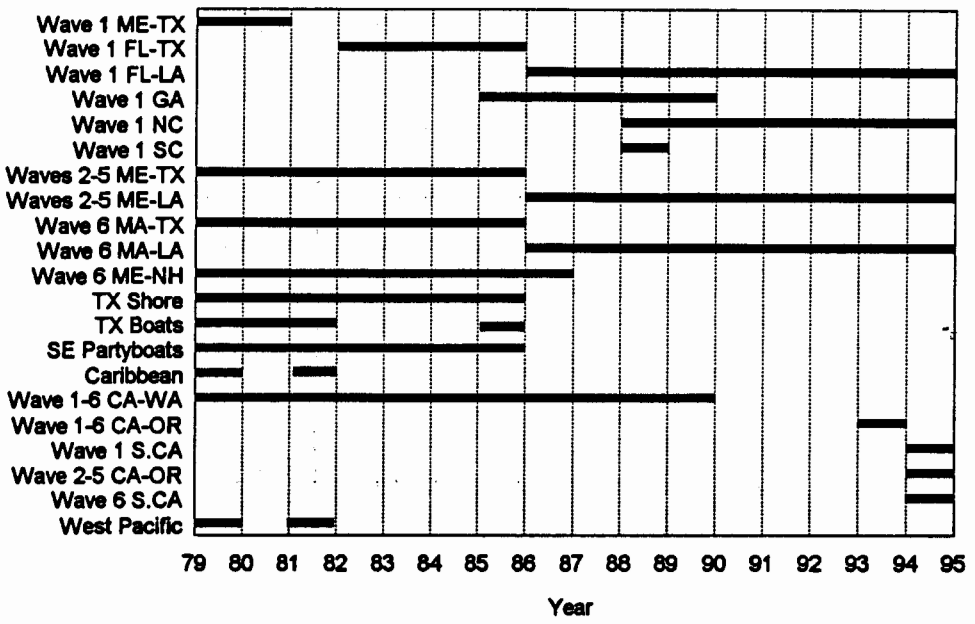


Figure 1. MRFSS sampling coverage by wave, state and mode, 1979-1994.

activity, particularly in the North and Mid-Atlantic subregions. Therefore, sampling efforts are conducted bimonthly on a 12 month basis on the Pacific and Gulf coasts, and the Atlantic coast of Florida, and on a bimonthly basis for 10 months (March through December) on the Atlantic coast north of Florida. Additionally, for New Hampshire and Maine, wave six (November/December) has been dropped since 1986 due to low fishing effort. Texas has not been included in the survey since 1985. Figure 1 shows the spatial and temporal coverage of the survey from 1979 to 1994.

Telephone Survey Methods

Telephone household survey interviews are carried out in two-week periods starting the last week of each wave of fishing activity and continuing in the first week of the following month. Respondents are asked to recall on a trip-by-trip basis all marine recreational fishing trips made within their state during the 60 days prior to the interview. Telephone sampling effort is directed at households located in counties extending within 25 miles of ocean coastline, including major bays or estuaries. The sampling effort in the South Atlantic and Gulf of Mexico subregions is expanded during May through October to include households in counties within 50 miles of the coast. Currently, the dialing area in North Carolina has been increased to counties within 50 miles of the coast during November to April and within 100 miles of the coast during May through October due to the high proportion of non-coastal anglers intercepted in the access intercept portion of the survey.

The telephone interview quota for each wave varies with the amount of seasonal fishing activity expected. To maintain the statistical properties of the expanded estimates, probability based sampling of households is used. Interview allocations for each county are based on the ratio of the square root of the population within each county to the sum of the square roots of all county populations within the state. The allocation of calls made in each telephone prefix is based on the frequency of households assigned that prefix. The appropriate number of samples (household telephone numbers) is then randomly generated for each county and for each wave, with replacement. That is, all households are eligible for contact each wave, regardless of whether they were contacted in a previous wave.

Telephone interviews are conducted between 10:00 am and 9:30 pm (respondent's local time) on weekdays and weekends. Up to six attempts are made to reach each household and repeated attempts are made to households who contain marine anglers in order to complete the questionnaire for each angler in the household. Interviews are conducted in Spanish when required. Information on marine recreational fishing activity is obtained from each angler in the household or from a responsible adult when appropriate. A sample telephone questionnaire is included in Appendix A.

The critical data elements of the telephone survey include:

1. Household Information

   - Participation in marine recreational fishing
   - Number of marine anglers in household

2. Angler Information

   - Number of fishing trips

3. Trip Information

   - Fishing mode
   - State and county of trip
   - Date of fishing trip
   - Time of return

Intercept Survey Methods

The intercept survey consists of on-site interviews which gather catch and demographic data from marine recreational anglers in three fishing modes: party/charter boat, private/rental boat, or shore based (e.g., man-made structures, beaches, and banks). In the South Atlantic and Gulf subregions the MRFSS has not collected catch data from partyboats since 1985. Sampling is conducted continuously in two-month waves. Prior to 1993, sam-

pling was divided evenly between the two months within a wave. Beginning in 1993, sampling was allocated between months of a wave according to the proportion of fishing pressure in each month.

Sampling is stratified by state, mode and two-month wave with a minimum base number of 30 intercepts in each stratum. Samples are allocated beyond the minimum in proportion to average estimates of fishing pressure from the three previous survey years. Complete coastwide inventories of access sites for marine recreational fishing were created and are continuously updated. Survey sampling sites are randomly selected from the access site lists, but are weighted by expected fishing activity. Sampling is distributed among weekdays, weekends and holidays, with allocation of about 60 percent of the interviews on weekends and holidays.

Anglers are interviewed at assigned access sites upon completion of their fishing trips. In the beach/bank subcomponent of the shore mode, up to 50% of the interviews may be conducted with anglers who have not completed their fishing trip. At heavy use access sites, subsampling procedures are used to interview every n^{th} angler. Each interview consists of an introduction to the survey, information on the Privacy Act of 1974, an oral interview concerning the fishing trip just completed, and an examination of the respondent's catch, including measurement of lengths and weights for a random sample of fish of each species.

Interview procedures vary slightly among fishing modes. When assigned to party/charter boats, the interviewer occasionally rides on party boats to interview anglers and to examine their catch. Private/rental boat anglers are interviewed while recovering or cleaning their boats at ramps or docks. Shore anglers are often widely distributed along beaches and banks with multiple access points, requiring interviewers to rove within the defined boundaries of the site. However, man-made structures often have a single egress point allowing the interviewers to easily intercept departing anglers. Interviewing procedures have been developed to allow for unique conditions, including catch unavailable for identification, available catch not easily subdivided among anglers, and trips lasting for more than one day. A sample intercept questionnaire is included in Appendix A.

The critical data elements of the intercept survey include:

1. Angler Information

   - State and county of residence

2. Trip Information

   - State and county of trip
   - Fishing mode
   - Water area fished

- Number of anglers contributing to catch

3. Catch Information

- Species caught
- Angler reported catch (number released alive and number harvested, but not available for identification)
- Observed catch (number in catch, length, and weight)

Estimation Procedures

Data derived from the telephone and intercept surveys are combined with U.S. Bureau of Census data to provide estimates of catch and effort (Figure 2). The estimation procedures can be categorized as follows: 1) effort estimation (the number of fishing trips taken); 2) catch estimation (the number and weight of finfish caught and either landed or released alive); and 3) participation estimation (the number of participants in recreational fishing activities).

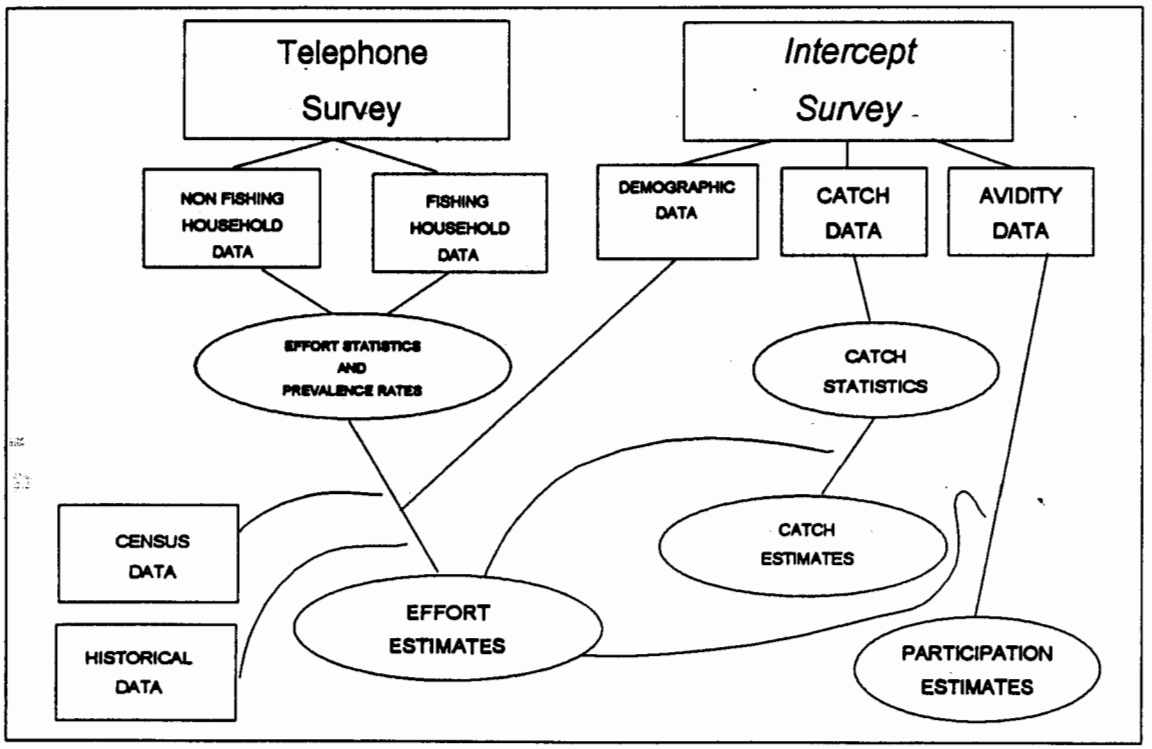


Figure 2. MRFSS information flow for data derived from the telephone and intercept surveys, and combined with U.S. Bureau of Census data.

Effort Estimation

The MRFSS measure of fishing effort is the estimated number of fishing trips taken by individual anglers. The number of individual fishing trips is estimated for each state, mode, and bimonthly wave stratum (note that East and West Florida and Northern and Southern California are treated as independent states). Total effort estimates are the sum of the effort estimates for coastal county residents, noncoastal county residents, and out-of-state residents.

Data from the telephone survey are used to derive mean numbers of trips per household in each fishing mode during each wave. This number is multiplied by the number of permanent, full-time occupied households in the coastal zone of each state (Bill Communications, Inc. 1991, 1992) to estimate total number of fishing trips in each mode by coastal county residents. Data on the number of households in the coastal zones are updated annually.

The telephone survey does not provide information on the number of trips taken by persons who reside in households beyond the 25- or 50-mile coastal zone from which the telephone numbers are drawn. Therefore, ratio estimators derived from the intercept survey are used to estimate the number of trips taken by out-of-state residents and residents of noncoastal counties. In certain circumstances a ratio estimator obtained from the intercept survey is also used to estimate trips taken by anglers who reside in coastal counties but did not have a telephone. Those circumstances occur if the proportion of coastal county residents living in full-time occupied households with telephones differs significantly between the intercept survey sample of anglers and the most recent U.S. Bureau of Census data. Estimation equations and variances of all estimates are referenced in Estimation of Recreational Fishing Trips, Catch, and Participation by John Witzig (revised August 2, 1991).

Estimation of Fishing Effort by Fishing Area

Post-stratification is used to proportionally allocate the estimated number of fishing trips and the associated variance in a wave/state/mode stratum to fishing areas based on the ratio of the number of intercept interviews in the mode and area to the total number of intercept interviews conducted in the mode. The MRFSS data is post-stratified on the basis of three broad fishing areas: 1) inland coastal waters; 2) state territorial seas, or inshore ocean waters less than or equal to three miles from shore; and 3) offshore ocean waters greater than three miles from shore. For West Florida and Texas, the territorial sea extends to 10 miles from shore.

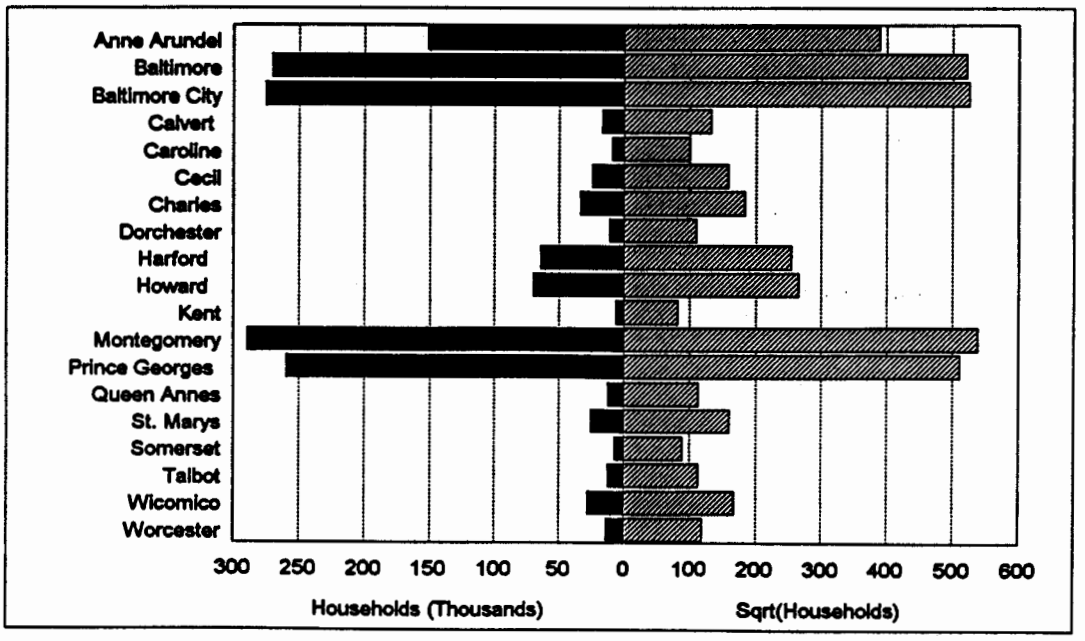
Telephone Sample Allocation Effects

Telephone survey sample allocation within a state is proportionally allocated based on the square root of the number of full-time occupied households in each county. The proportionality of sample sizes between counties only changes between counties with a small

number of full-time occupied households as compared to counties with a larger number of households. For example, comparison of the total number of full-time occupied households in Calvert and Baltimore City without the square root adjustment provides a ratio of approximately 17,500 to 275,500 (0.06) (Figure 3). However, with the square root allocation strategy the ratio increases to approximately 132,000 to 525,000 (0.25) The overall effect of the square root allocation strategy is to provide for more equitable sample allocation among counties with varying population sizes.

Due to the effects of the square root allocation strategy on county sample sizes, household survey data must be reweighted prior to calculation of county level statistics in order to avoid overestimation of fishing effort. For example, calculation of mean fishing effort for Calvert and Baltimore City counties without reweighting of the data produces estimates of 0.99 and 0.05, respectively (Figure 4). Weighting of the data prior to calculation of effort for these counties causes the estimates to decrease to 0.01 and 0.009, respectively (Figure 4). Since the estimate of total fishing effort for coastal county residents is used to

Figure 3. Total number of full-time occupied households in Maryland and the MRFSS telephone survey sample allocation based on the square root of the number of full-time occupied households.



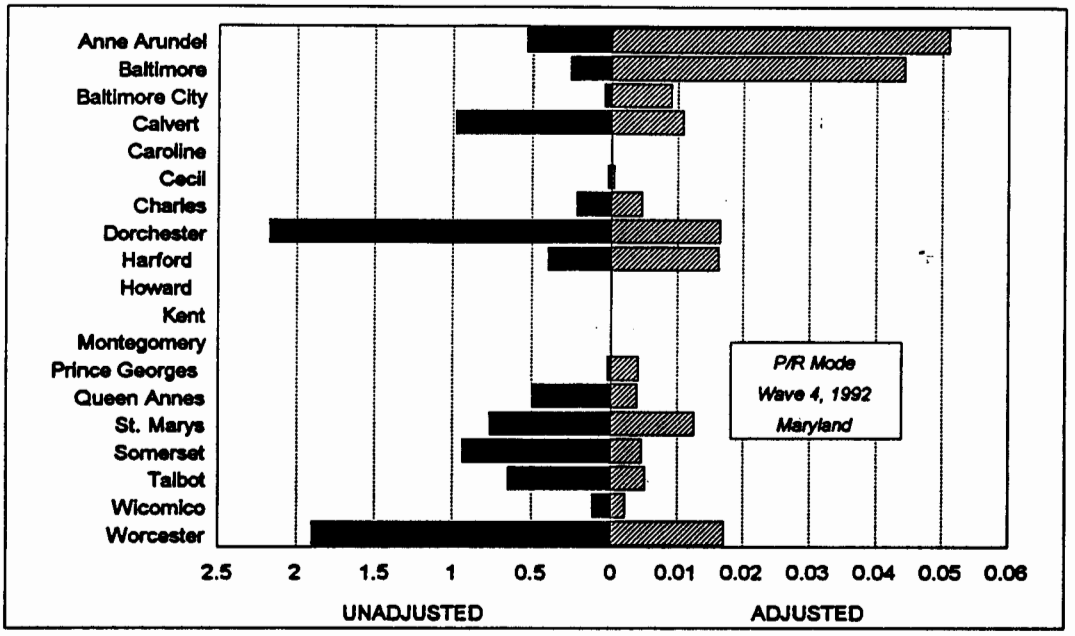


Figure 4. Example of the effects of the square root allocation strategy on the estimation of mean fishing activity for Maryland counties.

estimate non-coastal and out-of-state resident fishing effort, an overestimate of coastal county resident fishing effort would cause a similar overestimate for these sectors of the fishing population. The estimate of total fishing effort (the sum of effort for coastal county, non-coastal county, and out-of-state resident fishing effort) is used to post-stratify fishing effort by fishing area. An overestimate in the total fishing effort would cause a similar over-estimate of fishing effort by area.

Adjustments to Estimates of Fishing Effort

Population estimates of total fishing effort are subject to wide variability when based on a small number of interviews. The protocol used in the MRFSS to produce estimates of total catch and effort is very sensitive to the inclusion of a few extreme observations in reported trips by individual households and to intercept survey ratios of coastal to non-coastal and out-of-state anglers. The NMFS developed procedures to identify and adjust extreme or "outlying" observations.

Telephone survey households that report an extreme number of fishing trips for a sample period tend to have a disproportionate effect on the estimate of average fishing effort, producing unrealistically high estimates of total fishing effort. Since 1987 the results from the telephone survey of coastal county households have been compared with the statistical

distribution of reported fishing effort for the previous four-year period plus the current year. Frequency distributions of reported fishing activity are produced from this historical data base for every two-month sampling period by state and fishing mode. Any household which reports more fishing trips than the 95th percentile for the five-year distribution is reduced to the value of the 95th percentile (Figure 5). Reduction of reported fishing effort using this procedure typically results in a 15 to 20 percent reduction in the estimates of total fishing effort (Figure 6).

Estimation of fishing effort for the party and charter boat sectors of the recreational fishery is difficult due to the relatively low incidence of reported fishing activity in these modes by households contacted in the telephone survey. During peak periods of fishing activity less than two percent of the households contacted in the southeast report having taken a fishing trip on a charter boat. Typically, households either report a large number of fishing trips on a charter boat, having hired the boat for a day or more, or no fishing effort in the mode. This fishing activity pattern frequently results in either an effort estimate greater than the maximum number of fishing trips possible for that state's charter boat fleet or an estimate of zero fishing effort.

To reduce the effect of small sample sizes on effort estimates for the charter boat fishery, telephone survey data from the previous four years plus the current year are com-

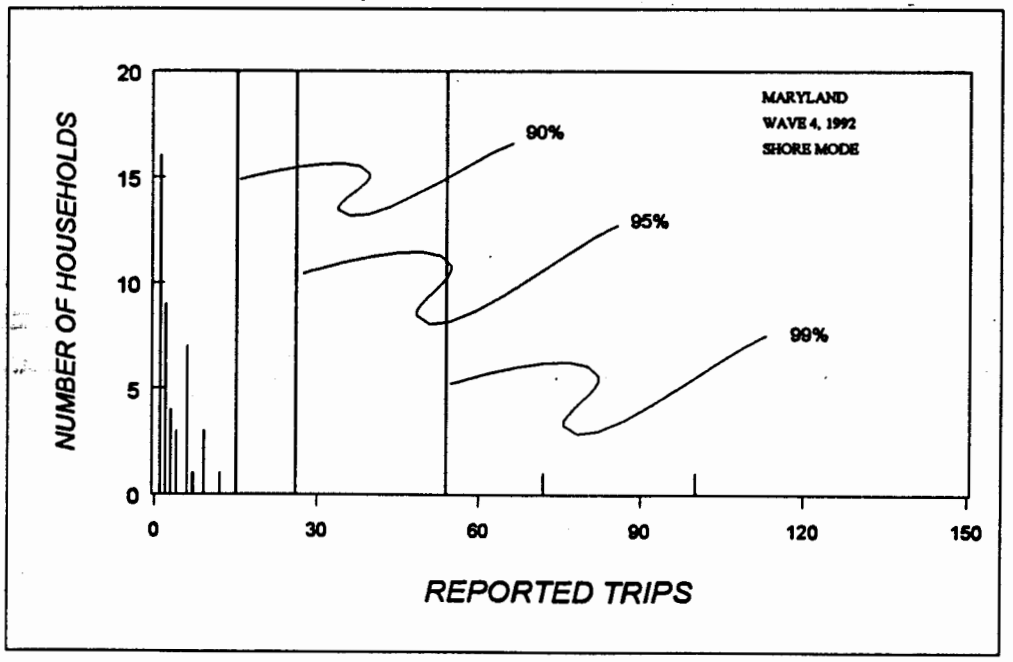


Figure 5. Frequency distribution of reported fishing activity for Maryland Wave 2, 1992 shore mode of fishing based on five-years of MRFSS data. Any household reporting more trips than the 95th percentile is reduced to the value of the 95th percentile.

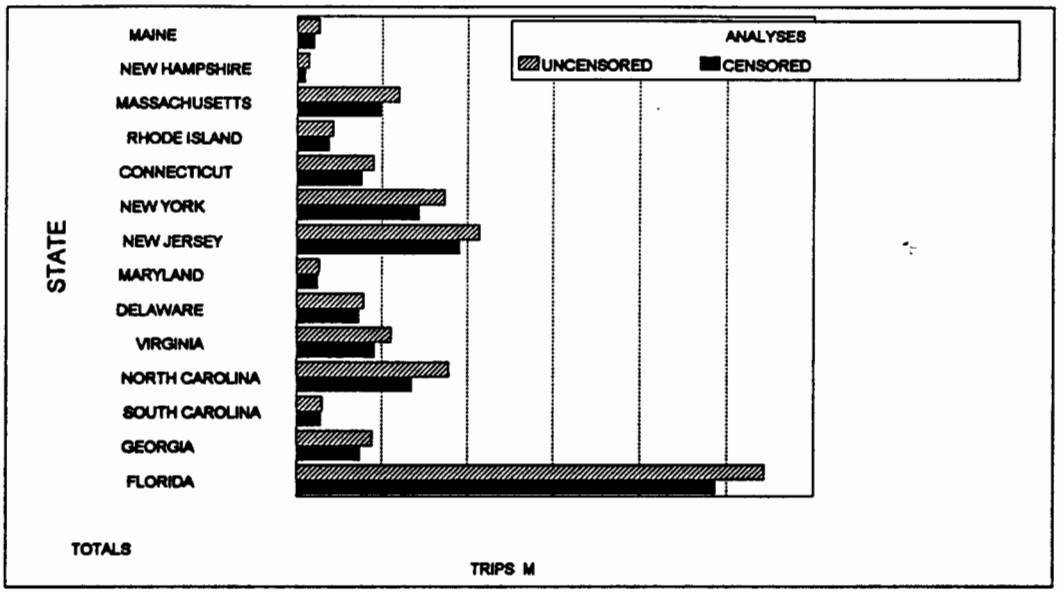


Figure 6. Effects of outlier reduction on effort estimates for Atlantic coast states Maine-Florida.

bined at the state and wave level and estimates are produced using a prevalence rate from the combined data base. One drawback of this approach is the possible masking of trends in the fishery. However, pooling data across years provides more reliable estimates for a relatively small proportion of the coastal population.

Normally the majority of charter and party boat customers are from non-coastal counties or are from out-of-state. In some cases, this causes unusually high ratios of non-coastal and out-of-state anglers to coastal resident anglers and leads to unrealistically high estimates of fishing effort attributable to non-coastal or out-of-state anglers. This is common in the charter boat fishery in the South Atlantic and Gulf of Mexico subregions where there is a clustering effect of sampling all anglers on a boat who have similar demographic charateristics. Adjustments to expansion ratios are handled on a case-by-case basis. When examination of individual estimates indicates an unusually high ratio when compared to historical averages, ratios based on the pooled data are used in lieu of the ratios based on the current year's data.

Catch Estimation

The catch of each finfish species is estimated for each subregion, state, fishing mode, fishing area, and wave. The total number of fish caught in a particular fishing mode and area is estimated from the estimated number of fishing trips taken in that mode, the average num-

ber of fish caught per trip in that particular mode, and the percent of intercepted trips in that mode and area. The data from the telephone and intercept surveys are combined to estimate total catch as follows:

Telephone Data		Intercept Data		Results
Number of finfishing trips by mode and area	X	Mean catch per trip by species, mode, and area	=	Number of each species caught by mode and area

Multiplying the estimated number of trips in a given state/mode/fishing area/wave stratum by the mean catch per trip of a given species in the same stratum results in an estimate of the total number of that species caught in the stratum. Catch estimates are added across strata to obtain estimates of catch of each species at the subregion, state, mode, fishing area, or wave levels.

The MRFSS survey distinguishes between several different catch types (Figure 7), with catch estimation procedures performed separately for each type. The intercept survey and estimation procedures distinguish between fish brought ashore in whole form which are available for inspection by the interviewer (Type A Catch) and those not brought ashore in whole form (Type B Catch). Those not brought ashore in whole form are further separated into those used as bait, filleted, or discarded dead (Type B1 Catch) and those released alive (Type B2 Catch). The purpose of the separation of catch types is to distinguish between those fish identified and measured by trained interviewers, and those fish reported to the interviewers by the angler. Previously cited methodological studies indicated species were often misidentified by anglers and their reported measurements subject to several types of bias. Total harvest can be calculated by summing the catch estimates for Type A and B1 catches. Total catch can be calculated by summing the catch estimates for Type A, B1, and B2 catches. Variances for summed harvest or catch estimates are additive.

Estimation of Catch in Weight

Lengths and weights are obtained by measurement of fish that are caught and brought ashore in whole form (Type A Catch). In estimating the weight of Type B1 Catch, it is assumed that the mean weight is equal to that of Type A Catch for each subregion, state, mode, area, wave, and species. Weight estimates for Type A Catch are calculated by multiplying the mean weight for a state/mode/fishing area/wave/species stratum times the estimated number of Type A catch in the same stratum. Harvest weight estimates (Type A and B1 Catch) are calculated by multiplying the mean weight for a state/mode/fishing area/wave/species stratum times the estimated numbers of Type A and B1 catch in the same stratum. Weight estimates and variances are additive across strata. The weight estimates also are converted to weight in pounds.

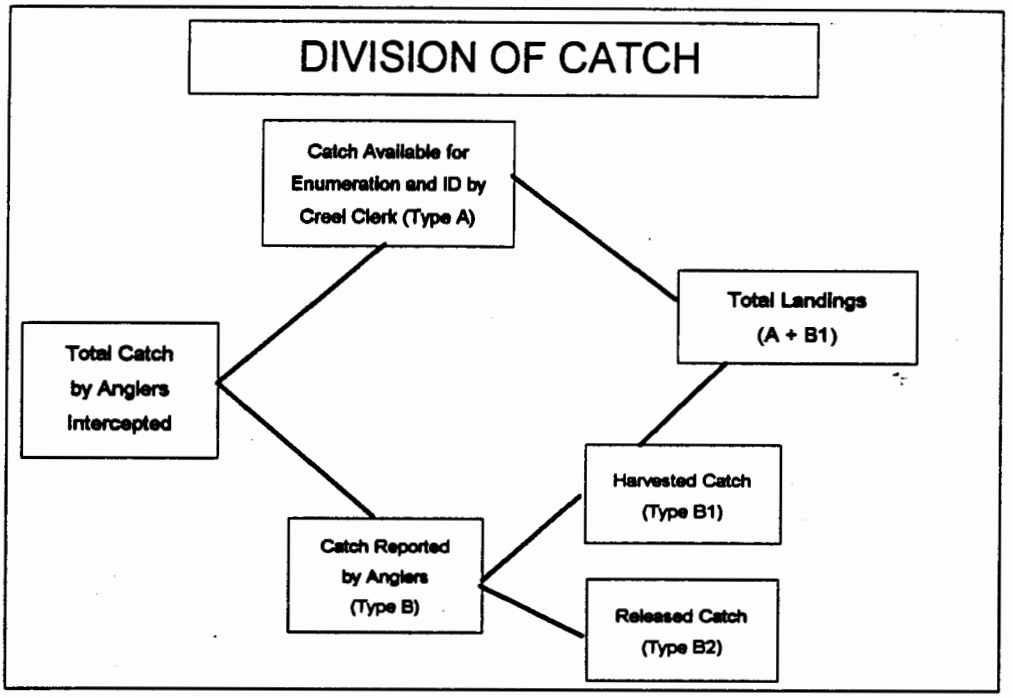


Figure 7. MRFSS catch type distinctions for the intercept survey.

Participation Estimation

Estimates of participation in saltwater angling are derived from the intercept data and the estimated total fishing effort by coastal county residents. The estimation procedure accounts for varying levels of reported fishing avidity, since some people fish very frequently and others very infrequently. The probability of selection in the intercept survey is higher for a person who fishes frequently than for a person who seldom fishes. Differences in probability of selection are corrected by using the reciprocal of the mean number of trips each intercepted angler reported having taken in the previous 12 months. Estimates of participation are made annually on a state basis. However, these estimates are not additive across states since an individual angler can fish in more than one state during the year.

Sampling Variances

A simple random sample model stratified at the county level is used for conduct of the telephone survey of coastal county households. Estimation of the variances associated with the average catch and weight of catch estimates obtained from the intercept survey is based on the assumptions that the primary sampling unit is a fishing trip by an individual angler and that there is no clustering effect due to the collection of groups of interviews at each visited site. These assumptions have been empirically verified in pilot surveys. Therefore, the variance is estimated using the standard variance equation for a stratified random sample.

The sampling variance of the estimated total catch (for individual species and for species groups) is calculated in terms of the expected values and sampling variance the average catch and the total number of trips for each stratum. Total catch is not normally distributed and therefore direct examination of the precision of the estimates is difficult. However, simulation experiments indicate that a normal approximation is satisfactory for constructing 95 percent confidence intervals around the estimated total catch.

Precision of the Estimates

Precision refers to the dispersion of the sample measurements used to calculate an estimate and the resultant variability in the estimate. The standard error of an estimate is the square root of the sampling variance of the estimate. Even though an unbiased estimate of the sampling variance can be developed from the sample, no unbiased estimate of the standard error can be calculated from the sample. Nevertheless, the square root of the estimate of sampling variance is a consistent estimate of the standard error of the estimate, and is almost universally used in sample surveys. The standard error is necessary for calculating confidence intervals around an estimate. The width of a confidence interval is a function of the probability level selected, and is determined from the Student's t distribution. The most commonly used confidence interval of 95 percent is given by: estimate ± 1.96 X (estimate of standard error).

Confidence intervals provide an indication of the precision of the estimated total catch. At the same confidence level, a broad interval relative to the estimate indicates a less precise estimate than does a narrow interval. The 95 percent confidence interval indicates that we can be 95 percent certain that the actual total catch is between the upper and lower confidence limits.

The proportional standard error (PSE) expresses that standard error as a percentage of the estimate. It provides an alternative measure of precision and is useful in comparing the relative precision of two estimates. A small PSE indicates a more precise estimate than does a large PSE. Tables 1a-1e show examples of the best and worst PSE's for several species groups by sub-region on an annual basis. For most commonly caught sport fish, the annual PSE's are less than 20 percent, and many are below 10 percent.

Table 1a. Examples of Precision in the MRFSS, 1993, Pacific Subregion. Est=Numbers x 1,000 Catch Types A and B1.

Species	Sub-region/ State	Species Group		Species	
		Est	PSE(%)	EST	PSE(%)
Best					
	Pacific	4,267	3	1,199	7
Rockfish/	S. CA	1,962	4	406	12
Blue	N. CA	1,764	4	685	9
	OR	541	8	108	11
Croakers/	Pacific	1,045	6	846	7
White	S. CA	645	8	448	10
Croaker	N. CA	400	9	399	9
	OR				
Sea Basses/	Pacific	1,589	4	814	6
Kelp Bass	S. CA	1,588	4	813	6
	N. CA				
Worst					
Herrings/	Pacific	494	24	219	49
Pacific	S. CA	137	22		
Herring	N. CA	139	22		
	OR	219	49	218	49
Smelts/	Pacific	1,522	25	1,490	25
Surf Smelt	S. CA				
	N. CA	1,489	25	1,489	25
	OR				

Table 1b. Examples of Precision in the MRFSS, 1993, North Atlantic Subregion. Est=Numbers x 1,000 Catch Types A and B1.

Species	Sub-region/ State	Species Group		Species	
		Est	PSE(%)	EST	PSE(%)
Best					
	North Atlantic	1,002	6	1,002	6
Bluefish	MA	322	8	322	8
	RI	114	16	114	16
	CT	524	10	524	10
Temp Basses/	North Atlantic	66	9	64	9
Striped Bass	MA	40	14	38	14
Flounders/	North Atlantic	545	8	206	11
	ME	70	37		
Summer	MA	274	10	85	21
Flounder	RI	86	13	75	14
	CT	96	15	45	20
Winter	North Atlantic			303	11
Flounder	ME			52	42
	MA			179	11
	RI				
Worst					
	CT			49	22
Eels	North Atlantic	38	46		
	RI	37	47		
Sculpins	North Atlantic	62	44		
	ME	49	54		

Table 1c. Examples of Precision in the MRFSS, 1993, Mid Atlantic Subregion. Est=Numbers x 1,000 Catch Types A and B1.

Species	Sub-region/ State	Species Group		Species	
		Est	PSE(%)	EST	PSE(%)
Best					
	Mid -Atlantic	1,915	6		
Bluefish	NY	1 126	8		
	NJ	514	11		
	DE	104	20		
	MD	128	19		
	VA	44	20		
Drums/	Mid-Atlantic	8,632	7	540	9
Weakfish	NJ	178	19	147	23
	DE	189	14	166	15
	MD	1,765	10	144	14
	VA	6,484	9	73	19
Flounders/	Mid -Atlantic	5,184	5	4,150	5
Summer Flounder	NY	1,445	6	899	7
	NJ	2,848	7	2,362	8
	DE	265	14	265	14
	MD	134	18	134	18
	VA	492	10	490	10
Worst					
	Mid -Atlantic	833	54		
Mullets	NJ	586	68		
	DE	228	90		
	Mid -Atlantic	529	21	234	38
Cods and Hakes	NY	255	25		

Table 1d. Examples of Precision in the MRFSS, 1993, South Atlantic Subregion. Est=Numbers x 1,000 Catch Types A and B1.

Species	Sub-region/ State	Species Group		Species	
		Est	PSE(%)	EST	PSE(%)
Best					
	South Atlantic	1,396	6		
Bluefish	NC	532	9		
	SC	90	19		
	FLE	767	8		
Drums/	South Atlantic	7,748	5	1,049	7
Weakfish	NC	2,508	6	143	9
	SC	1,973	14	230	16
	GA	1,141	8	422	15
	FLE	2,126	6	254	11
Worst					
	South Atlantic	51	26		
Wrasses	FLE	46	29		
Puffers	South Atantic	200	22		
	NC	185	23		

Table 1e. Examples of Precision in the MRFSS, 1993, Gulf of Mexico Subregion. Est=Numbers x 1,000 Catch Types A and B1.

Species	Sub-region/ State	Species Group		Species	
		Est	PSE(%)	EST	PSE(%)
Best					
	Gulf	13,342	4	1,675	5
Drums/	FLW	3,164	6	169	7
Red Drum	AL	1,128	13	47	21
	LA	8,590	5	1,441	6
Snappers/	Gulf	4,203	4	1,544	8
Red Snappers	FLW	2,868	5	653	12
	AL	943	12	535	14
	LA	283	12	256	13
Worst					
	Gulf	153	22		
Wrasses	FLW	152	23		
Barracudas	Gulf	71	20		
	FLW	68	21		

Chapter 2.
DATA FILES AND STRUCTURES

The MRFSS data bases include:

Raw data files:

- creel intercept interviews, and
- telephone interviews.

Summary files:

- non-fishing/fishing households (from the telephone survey),
- coastal county files,
- census files,
- trip estimates, and
- catch estimates.

The raw data files have multiple record types in the data base. The summary files have only one record type.

Creel Intercept Interview Files

There are five record types in the creel intercept interview data bases. For every interview, there is a unique ID_CODE coded on all records associated with that interview. The ID_CODE is used to link all records of an interview. The ID_CODE consists of survey type, interviewer number, date of the survey, and interview number. Interview numbers begin with one and are assigned consecutively to interviews within a site/date combination.

Record Types

Type 1 - Angler/Trip Data

- I1 records contain fisherman and trip information including ID_CODE, location of the interview, fishing area and mode, hours fished, gear used, geographic residence and avidity of the angler, species targeted, presence/absence of catch, number of contributors to the catch, and total numbers of I2-I3, I5 and I7 records associated with the interview, the ID_CODE of the angler whose records contain combined type A catches when those catches cannot be separated for individual anglers (previously contained on the type 4 record), and since 1991, the ID_CODE of the first individual interviewed within a fishing party (previously contained on the type 6 records).

- Special questions such as artificial reef fishing, sea turtle sightings, tournament fishing, etc. vary by year and area, and are usually recorded on the I1 records.

- There is only one I1 record per interview.

Type 2 - Unavailable Catch (Catch Type B1 and B2)

- I2 records contain the ID_CODE, and the number and disposition of unavailable catch by species. Dsiposition codes categorize catch as released alive (catch type B2), and used for bait, filleted, or other consumptive use (catch type B1). For unavailable catch, the species name is reported by the angler but can not be verified by the interviewer.

- There can be multiple I2 records for each interview, one record for each species code/disposition combination. More than one disposition code can be used for a particular species code.

- The variable containing the numbers of fish caught (NUM_FISH) is additive across all records.

- In certain years and areas, shellfish catch information was collected and coded on I2 records. These records are kept in separate data files.

Type 3 - Available Catch (Catch Type A)

- I3 records contain the ID_CODE, species code, numbers of fish, disposition of the catch, and length and weight measurements for fish brought to land and identified to species by the interviewer (catch type A).

- There can be multiple I3 records for an interview, one record for each individually weighed/measured fish. If no fish were weighed or measured, there will be one record for a species. Only one disposition code can be used for each species.

- The variable containing the number of fish caught (FISHINSP) is not additive across records. This number is the total number of that species caught and is carried across all records for that species with individual length/weight measurements.

- In certain years and areas, shellfish catch information was collected and coded on I3 records. These records are kept in separate data files.

Type 5 - Socio-Economic Data

- I5 records contain the ID_CODE and socio-economic data collected in 1983 on the Pacific coast, in 1987 nation-wide, and in 1990 on the Atlantic and Gulf coasts, and in wave 3-6 in the Northeast in 1994.

- Questions and resulting data vary between the years. Travel costs were the primary emphasis until the 1994 survey. The 1994 survey was conducted to collect data primarily for sportfishing demand models.

- There is only one I5 record per interview.

Type 7 - Socio-Economic Data

- I7 records contain the ID_CODE and socio-economic data collected in waved 3-6, 1994 in the Northeast.

- I7 records contain data from a telephone follow-up of the intercept interview.

- There is only one I7 record per interview.

File Naming Conventions

The intercept SAS file naming conventions are standard across years and regions (Table 2).

Table 2. Naming conventions for SAS intercept files from the MRFSS. YY = year; W = wave; ST = state.

Record Type	Coastwide Sets	State Sets
1	I1_YYW.SSD	ST1_YYW.SSD
2	I2_YYW.SSD	ST2_YYW.SSD
3	I3_YYW.SSD	ST3_YYW.SSD
5	I5_YYW.SSD	ST5_YYW.SSD
7	I7_YYW.SSD	ST7_YYW.SSD

The naming conventions for the ASCII intercept files are: Atlantic/Gulf coast datasets are named AG_ YYW.INT, and state sets are named STYYW.INT. YY is year, W is wave, and ST is state. In the ASCII files, all record types are kept together in one file per wave. For each angler interview, the type 1 record will be followed by all the type 2 records, then then the type 3 records, etc. The first column contains the record type.

Fishing Household Telephone Interview Files

There are four record types in the fishing household telephone interview files. The record types for the telephone fishing household interview files are similar to the intercept interviews, in that a distinct CODENUM is included in every record associated with a specific household. CODENUM is a unique number for each household dialed during a wave.

Record Types

Type 1 - Household Information

- T1 records contain fishing household information including CODENUM, state and county of residence, number of anglers who went fishing in the last 12 months and the last 2 months, number of interviewed anglers, number who refused to be interviewed, number who were never unavailable, and the number otherwise not interviewed due to language barriers, age, death, etc., but who have proxy data obtained from interviewed anglers.

- Special questions such as number of shellfishing or spiny lobster fishermen (12-month and 2-month) exist on the T1 records for certain years.

- There is only one T1 record per fishing household.

Type 2 - Angler Information

- T2 records contain information for each interviewed angler including an id number for each angler within a household, whether the information was provided by the angler or by someone else, language, whether the angler could recall all trips in the 2-month period, and the total number of trips taken by the angler.

- T2 records for 1993 include tournament participation data for Connecticut.

- There is one T2 record for each interviewed angler in a fishing household.

Type 3 - Fishing Trip Information

- T3 records contain trip information including CODENUM, the angler id code, a consecutive number for each trip taken by the angler, date of the trip, fishing mode, gear used, area fished, boat access site characteristics, and state and county where the trip occurred.

- There is one T3 record for each trip taken by an interviewed angler, unless the angler cannot remember key details of the trip. In that case, the total number of T3 records may be less than the total number of trips reported by an angler on the T2 record.

- T3 records for some years and areas contain special trip information on spiny lobster trips, numbers of striped bass caught and kept, tournament trip data, oil platform/artificial reef use, etc.

Type 4 - Socio-Economic Data

- T4 records contain the CODENUM and socio-economic data collected in waves 3-6, 1994 in the Northeast.

- Telephone interviews were conducted with four categories of respondents: 1) never saltwater fished, 2) have not saltwater fished in the last year, 3) fished in the last year but not in the last two months, and 4) two-month anglers (routine MRFSS angler). T4 records for categories 1-3 are kept separately from category 4.

- There is only one T4 record per interview.

File Naming Conventions

The telephone SAS file naming conventions are standard across regions and years (Table 3).

Table 3. Naming conventions for SAS telephone files from the MRFSS. YY = year; W = wave; ST = state.

Record Type	Atlantic and Gulf Coast Sets	State Sets
1	T1_YYW.SSD	ST1_YYW.SSD
2	T2_YYW.SSD	ST2_YYW.SSD
3	T3_YYW.SSD	ST3_YYW.SSD
4	T4_YYW.SSD	ST4_YYW.SSD

The naming convention for ASCII telephone files is: Atlantic/Gulf Coast files are named WAVEX_YY.HSE, and state files are named STYYW.HSE. All record types are kept together in one file per wave. For each household, the type 1 record will be followed by all the type 2 records, then the type 3 records. The first column contains the record type.

Non-Fishing Household Files

Non-fishing household files are derived from telephone interview data. They contain the number of sampled fishing and non-fishing households for each coastal county by wave. There is one record per county. The naming convention is NFYYW.SSD for SAS files and NFYYW.DTA for ASCII files. These files are not currently separated into state files and are not generally distributed but can be made available upon request. The primary use of these files is in the estimation procedure; however, they are also used for calculating prevalence rates (% of households that fish), in conjunction with the census files. The sampling procedure weights counties by the square root of the county population to ensure that rural, less populated areas have at least some representation. Therefore, when prevalence rates are calculated, they should be weighted by the county population.

Coastal County Files

Coastal county files maintain a record of which counties were included in the telephone survey by year and coastal boundaries. Only counties that are designated coastal are interviewed through the telephone survey. Use of the 25-, 50-, and 100-mile definitions varies by wave and state through time, although generally the coastal definition is counties within 25 miles of the coast during waves 1, 2, and 6, and counties within 50 miles of the coast during waves 3-5. There are two files per year, one for the 25-mile range and the other for the 50-mile range. Naming conventions are coYY_25.SSD and coYY_50.SSD. The two files have one record for each county included under each of the two definitions. These files are not currently separated into state files and are not generally distributed but can be made available upon request. The primary use of the coastal county file is to determine if an intercept interview is considered coastal or not, in order to calculate the coastal/non-coastal ratio adjustment for trips. The intercept files contain a variable "coastal" that is set by the coastal files before distribution to users.

Census Files

Census files are used to expand trips per household from the telephone survey into an estimate of coastal resident trips. There is one file, census90.SSD, which contains population by year for each county that has ever been included in the survey. Population estimates are derived from census data and Survey of Buying Power annual projections. These files should be used for proper weighting when calculating prevalence rates (% of households that fish). The sampling procedure weights counties by the square root of the county population to ensure that rural, less populated areas have at least some representation. Therefore, when the raw data are used to calculate prevalence rates, they should be reweighted, or rural county activity levels will be given too much weight. These files are not currently separated into state files and are not generally distributed but can be made available upon request.

Catch Estimate Files

The catch files have one record for each stratum (state, wave, fishing mode, and fishing area) and species combination. Each catch file record contains the estimates for each of the three catch types (A, B1, and B2), their variances, mean weights and variances, sample size information, and other variables and variances used to calculate the estimates. The naming conventions for catch files are AG_YYW.SSD and ST_YYW.SSD for Atlantic/Gulf Coast and state SAS datasets, respectively; and AG_YYW.EST and ST_YYW.EST for ASCII datasets.

Note: *Catch records also contain trip estimates by strata/species. Care must be taken using these estimates for trips since there are multiple species records in each cell with duplicate trip records.*

Trip Estimate Files

Trip files have one record for each state, wave, and fishing mode combination. Each trip record then has trip estimates for the separate fishing areas. Trip files also contain adjustment ratios such as non-coastal residents, households without telephones, sample sizes, and variance estimates for trips and other variables used for estimation procedures. Naming conventions for trip files are AG_YYW.SSD and ST_YYW.SSD for Atlantic/Gulf Coast and state SAS datasets, respectively; and AG_YYW.TRP and ST_YYW.TRP for ASCII datasets for the Atlantic/Gulf Coasts and the separate states, respectively.

Appendix A contains sample intercept and telephone questionnaires. Appendices B-E contains variable names and codes, and presence/absence of variables from 1979-1994 for the intercept and telephone interview data. Appendices F-G list estimate catch and effort variable file variables. Appendices H-J list variables from the non-fishing household files, coastal files, and census files, respectively.

Chapter 3.
QUALITY ASSURANCE

The actual data collection programs for the MRFSS telephone and intercept surveys are contracted out by the NMFS to private companies, with KCA Research Division of David C. Cox & Associates (KCA) having the contract for both surveys in 1993-1995. The details concerning the survey procedures and quality assurance are outlined by the NMFS in the Marine Recreational Fishery Statistics Survey Procedures Manual.

Telephone Survey

The dialing sample for the telephone survey is stratified by county within each state and by 5-digit blocks of working residential numbers within each county. A national sample frame of blocks of telephone working numbers in coastal county households has been developed under past MRFSS contracts. Each block must have had at least one residential number assigned to be included in the sample frame. Blocks are identified by the first five digits of every telephone number within each area code. The fourth and fifth digits are often designated for business or residential use, so blocks including business numbers can be screened out of the sample frame for more efficient dialing. Unassigned blocks have also been eliminated from the sample frame. The sample frame is maintained on a continuing basis through the use of current telephone directories, reverse directories (sorted by blocks instead of names), and information from telephone companies.

The last two digits of the telephone numbers to be dialed are generated randomly. This approach ensures that all telephone households, even those with unlisted numbers, are eligible to be reached in the survey. Duplicate telephone numbers must be screened out of the generated set of random numbers for each wave; however, with replacement sampling across waves, it is possible that in sparsely populated counties households will be contacted that have been interviewed during previous waves. Special tracking procedures are used to ensure that no more than one percent of the households contacted are included in the sample frame more than once during the year.

To screen for residential households and their eligibility for interviews at least five attempts are made to contact a household member for each number. These attempts are distributed across daytime and evening hours on both weekdays and weekend days. At least five additional attempts are made to reach eligible anglers in each household. The percentage of "no answer" or "busy" results are not to exceed 10 percent of the total calls attempted in any subregion.

The contractor utilizes an automated sample management system to increase the accuracy and efficiency of data collection. County samples are automatically spread over the dialing period to prevent cluster effects, and target quotas by county are automatically monitored by the system.

Interviews are conducted using a computer-assisted telephone interviewing system which includes "skip patterns" in question sequencing and "snap backs" for illogical question responses. These assist the interviewer in following the questionnaire and in identification of invalid or illogical data. Further advantages of this quality assurance system include built-in range-checking and cross-referencing of response variables, as well as the elimination of a separate key-entry step.

An extensive training session is held for all personnel who have not worked on the survey in previous waves. This training covers general telephone interviewing procedures as well as procedures specific to the MRFSS. Training sessions include a general overview of the background, purpose, and design of the MRFSS, as well as an item-by-item explanation of the data collection instruments and a review of all materials used in conduct of the interview. All trainees must conduct practice interviews with supervisors to allow first-hand criticism of their interviewing technique.

Project supervisors oversee the operation of the telephone household survey. Supervisors validate 10 percent of each interviewer's work through both monitoring of interviews in progress and recontact of interviewed respondents. In interview monitoring, the supervisor listens to an interview in progress and records the respondent's answers on a second questionnaire. Following the interview, the two questionnaires are compared and any discrepancies resolved. During re-contact of respondents the supervisor attempts to verify that the interview took place and that the interviewer responses were coded correctly.

Supervisors review all completed questionnaires for completeness and accuracy on a daily basis during the dialing period. Any apparent mistakes or inconsistencies are checked with interviewers and, if necessary, the respondent is recontacted to clarify an answer. Respondents who report an abnormally high number of trips (greater than the 95th percentile for each wave, state, and mode calculated from the five most recent years of data, exclusive of the current year) are recontacted for verification.

Intercept Survey

The actual sites to be sampled in the intercept survey are randomly selected according to fishing activity from a master list of all marine fishing locations in each state, called the site register. Fishing pressure is estimated for each site by mode of fishing, month, and weekend versus weekday fishing, and is a scaled value representing the average number of anglers using that site on a weekend day. The site register is continuously updated using feedback from intercept interviewers, field supervisors, and state fisheries personnel. The fishing pressure information is used in the selection process so that the more heavily used sites have a higher probability of selection. All sites with a scaled pressure value from "0" to "7", inclusive, are eligible for assignment. Sites are selected randomly with non-uniform probability based on angling pressure.

Within each state, a base level of intercepts is allocated for each unique wave and mode combination to assure that sufficient data is available to produce estimates. These base levels are 30 intercepts in the shore and private/rental boat modes and 45 intercepts in the party/charter boat mode. The higher base level in the party/charter boat mode was chosen to reduce the clustering effect for this mode due to the high proportion of group catches. Further allocations beyond this base level are proportional to three-year historical mean fishing effort by mode and wave.

Sites are randomly assigned to a date within a wave, with more intercepts targeted for weekend days due to increased recreational fishing effort during this time. The required ratio of weekend to weekday intercepts is 60:40. Sites are assigned throughout each wave and between months within each wave on the basis of monthly pressure estimates. This requirement is intended to ensure that sampling is geographically and temporally distributed in relation to fishing activity.

Prior to MRFSS training, field interviewers must be able to identify on sight the 20 most frequently occurring species in his/her geographic sampling area. Interviewers are also tested for their ability to correctly fill out forms and look up codes in manuals. Initial testing also verifies the interviewer's aptitude for successfully interviewing anglers. Interviewers who successfully pass the initial fish identification test are trained in proper procedures for conducting the intercept interview. Training programs are designed to ensure quality and consistency of site selection and visitation procedures, interviewing methods, and coding and editing.

Additional testing and training of prospective interviewers is conducted in the field by a field supervisor. Each new interviewer is observed in the field during one of his/her first three assignments and at least once during each successive six-month period following their initial field observation. A minimum of the first 100 coding forms from each new interviewer is reviewed for accuracy, completeness, legibility, and consistency of coding. Supervision by KCA includes overall supervision by the project manager, regional oversight by two marine biologists, and state-wide supervision by either state or regional representatives (Figure 8). Oversight by the regional representatives includes weekly phone contacts with individual interviewers, on-site visits to evaluate interviewer performance, and quarterly survey review meetings.

Intercept survey data is key-punched using a DBASE III key-entry program, with built-in range checks on all variables, data checks for correspondence between variables, and flagging of unusual fish records having possible geographic distribution and weight-per-length errors. Further data checks are performed using a SAS error-checking program, a review of downloaded fish records, and a detailed review of preliminary species-specific catch estimates. The review of individual fish records includes checks for correct taxonomic and species level fish identification, confirmation of species geographic distribution, and checks for appropriate gear type, disposition of catch, number caught, weight/length measurements, and primary area of fishing.

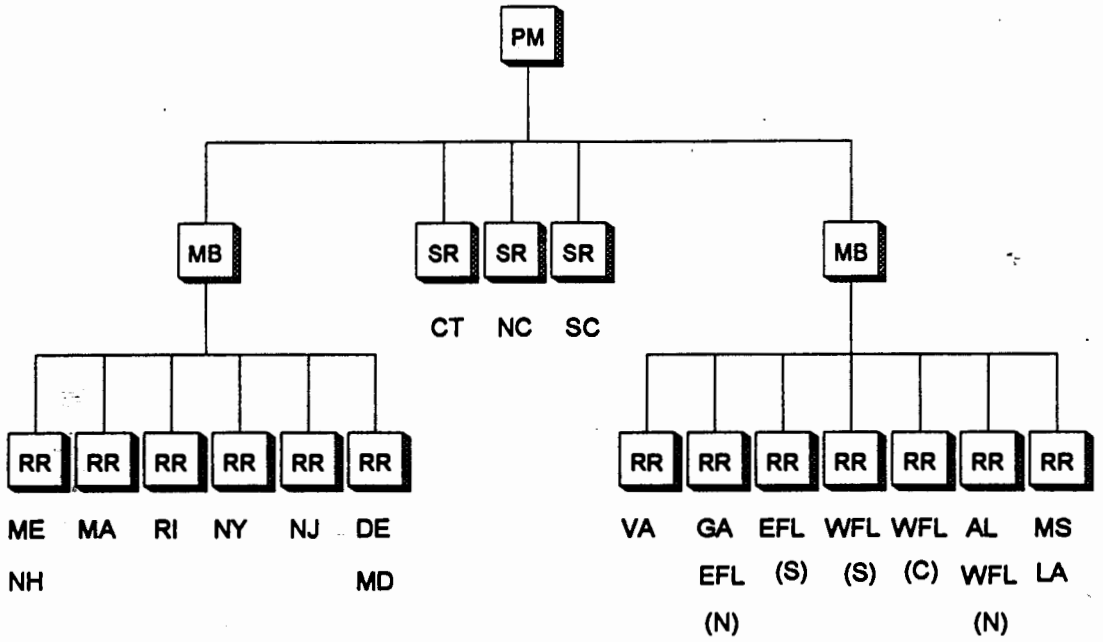


Figure 8. Supervisory organization of MRFSS intercept survey interviewers by KCA Research Division, David C. Cox & Associates (KCA). PM = Project Manager, MB = Marine Biologist, SR = State Representative, RR = Regional Representative

Chapter 4.
CATCH-PER-TRIP ANALYSIS

When performing catch-per-trip analyses within a state/mode/wave stratum, reweighting of data is not necessary since intercept sampling is random within each stratum and an assumption can be made that the true effort distributions are represented. However, if catch-per-trip analyses are performed among state/mode/wave strata, data must be reweighted prior to pooling among strata. Reweighting of state/mode/wave data on the basis of total estimated trips is necessary for any trip-based variables, including fishing hours, fishing target, gear type, and interview time.

Reweighting of data is necessary due to the non-random distribution of intercepts among strata. Distribution of sampling among state/mode/wave strata is not representative of true fishing effort due to the following factors: 1) heavier sampling of fishing effort in the boat modes; 2) variations in sampling levels among states due to state add-ons to the MRFSS; 3) variations in sampling levels among waves; and 4) variable success rates in achieving sampling targets. Variability in the level of sampling among states and particularly among modes of fishing is demonstrated through a comparison of the distribution of intercepted trips by state and fishing mode from Wave 4 of the 1992 MRFSS intercept survey (Figure 9) with the distribution of total estimated trips (Figure 10). A much higher proportion of trips are intercepted in the boat modes and sampling levels are higher in states that add-on to the MRFSS. Weighting of catch-per-trip data by the total estimated fishing effort will adjust for the effects of non-random sampling across strata.

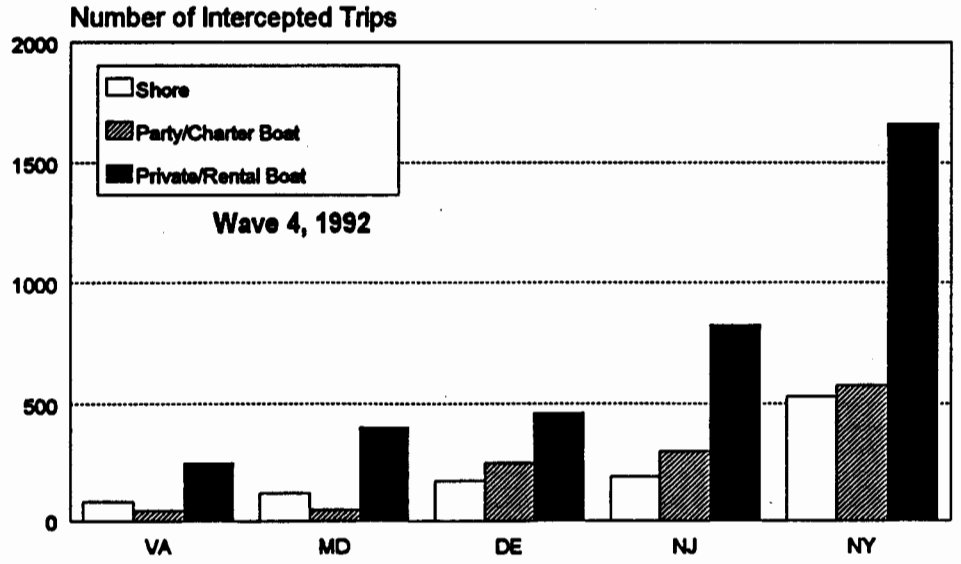


Figure 9. Distribution of intercepted trips by state and mode of fishing from Wave 4 of the 1992 MRFSS intercept survey.

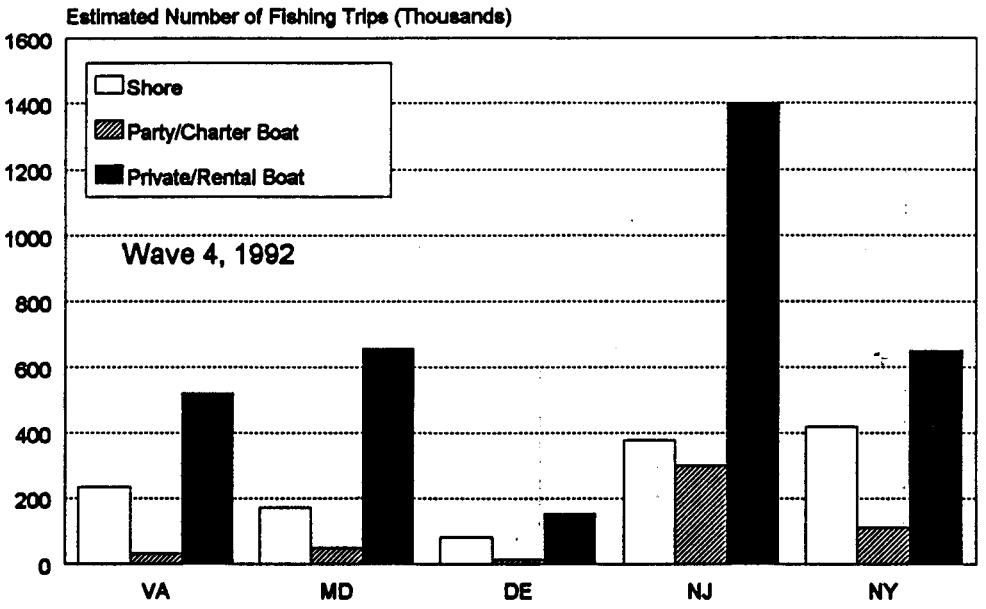


Figure 10. Distribution of total estimated trips by state and mode of fishing from Wave 4 of the 1992 MRFSS intercept survey.

To estimate the number of trips in a given catch class for pooled state/mode/wave strata, the number of trips in the given catch class in each state/mode/wave stratum is weighted by the total number of estimated trips in that state/mode/wave stratum following the equation:

$$\tau_{C=X} = \sum_{i,j,k} \frac{t_{C=X\,(ijk)} \times \tau_{ijk}}{\sum_{C} t_{ijk}}$$

where:

i	=	state
j	=	mode
k	=	wave
C	=	catch class
X	=	number of fish in catch
$\tau_{C=X}$	=	total estimated number of trips with C=X over all pooled state/mode/wave strata

τ_{ijk} = estimated number of trips in a given state/mode/wave stratum

$t_{C=X\ (ijk)}$ = number of intercepted trips with C=X in a given state/mode/wave stratum

$\Sigma\ t_{ijk}$ = total number of intercepted trips in a given state/mode/wave stratum (all catch classes included)

Computational Steps:

Pooling among states for catch-per-trip analyses is demonstrated using hypothetical MRFSS data for Wave 4, private/rental boat mode for the states of New York and New Jersey. The number of intercepted trips with a catch of one fish (C=1) in the private/rental boat mode Wave 4 for each state ($t_{C=1\ ijk}$), the total number of intercepted trips pooled over all catch classes for the given state/mode/wave stratum ($\Sigma\ t_{ijk}$), and the estimated total number of trips for each state/mode/wave stratum (τ_{ijk}) are shown in Table 4.

Table 4. Hypothetical MRFSS data for New York and New Jersey in Wave 4 for the private/rental boat mode, including data on the number of intercepted trips with a catch of one fish in the state/mode/wave stratum, the total number of intercepted trips in the state/mode/wave stratum over all pooled catch classes, and the estimated total number of fishing trips for the state/mode/wave stratum.

State	Mode	Wave = 4	Intercepted Trips With C = 1	Total Intercepts (pooled catch class)	Total Trip Estimate
NY	PR	Jul/Aug	60	1500	500,000
NJ	PR	Jul/Aug	50	500	700,000

The incorrect procedure for estimating the total number of trips that caught one fish is to pool New York and New Jersey data without weighting by stratum as follows:

$$\tau_{C=1} = \frac{(t_{C=1\ NY,PR,4} + t_{C=1\ NJ,PR,4}) \times (\tau_{NY,PR,4} + \tau_{NJ,PR,4})}{(t_{NY,PR,4} + t_{NJ,PR,4})}$$

$$\tau_{C=1} = \frac{(60 + 50) \times (500{,}000 + 700{,}000)}{(1500 + 500)} = 66{,}000$$

The correct procedure for estimating the total number of trips that caught one fish for pooled New York and New Jersey data weights the intercepted trips for each stratum by the total estimated trips for that stratum as follows:

$$\tau_{C=1} = \frac{(t_{C=1\ NY,PR,4} \times \tau_{NY,PR,4})}{t_{NY,PR,4}} + \frac{(t_{C=1\ NJ,PR,4} \times \tau_{NJ,PR,4})}{t_{NJ,PR,4}}$$

$$\tau_{C=1} = \frac{(60 \times 500{,}000)}{1500} + \frac{(50 \times 700{,}000)}{500} = 90{,}000 \textit{ trips that caught 1 fish of the given species}$$

The difference in the unweighted and weighted estimation procedures is demonstrated for pooling among states and modes of fishing for black sea bass and weakfish using Wave 4, 1992 MRFSS data. The mean number of black sea bass caught varies minimally with the two estimation procedures, with an unweighted mean of 5.71 fish per trip and a weighted mean of 5.47 fish per trip (Figure 11). The two estimation procedures produce a much greater difference in mean number of weakfish caught, with an unweighted mean of 2.94 fish per trip and a weighted mean of 4.26 fish per trip (Figure 12).

A similar weighting procedure must be performed when pooling catch-per-trip data among waves and modes of fishing within a state due to variable MRFSS sampling levels among waves and modes of fishing. Variability in the level of sampling among waves and modes of fishing is demonstrated through a comparison of the distribution of intercepted trips by wave and fishing mode for New Jersey during the 1992 MRFSS intercept survey

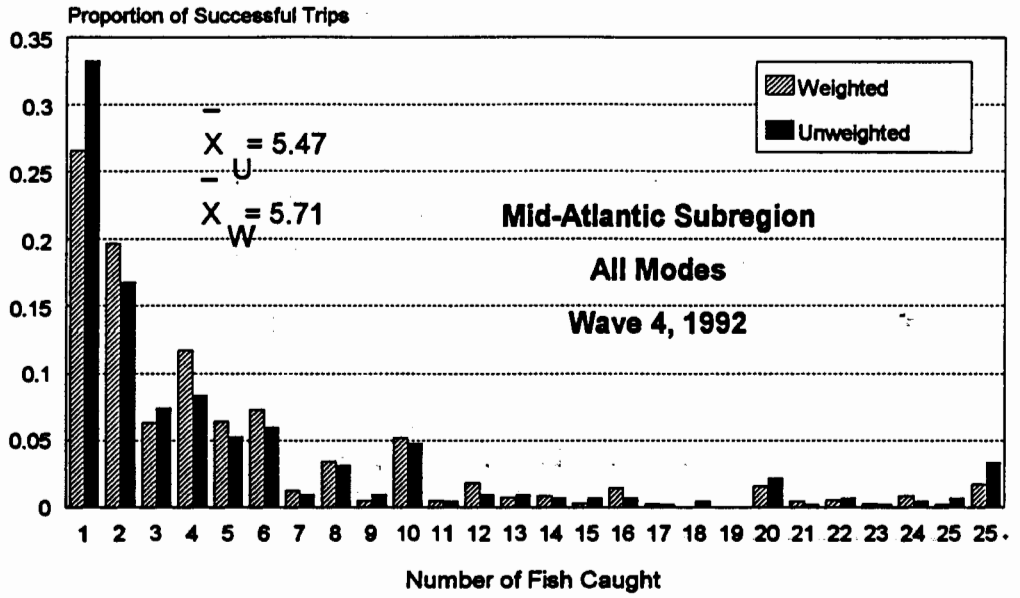


Figure 11. Distribution of successful trips catching black sea bass in the mid-Atlantic region during Wave 4 of the 1992 MRFSS survey. Proportions were estimated using an unweighted and weighted catch-per-trip analysis. Data are pooled across states and modes of fishing. (u = unweighted, w = weighted)

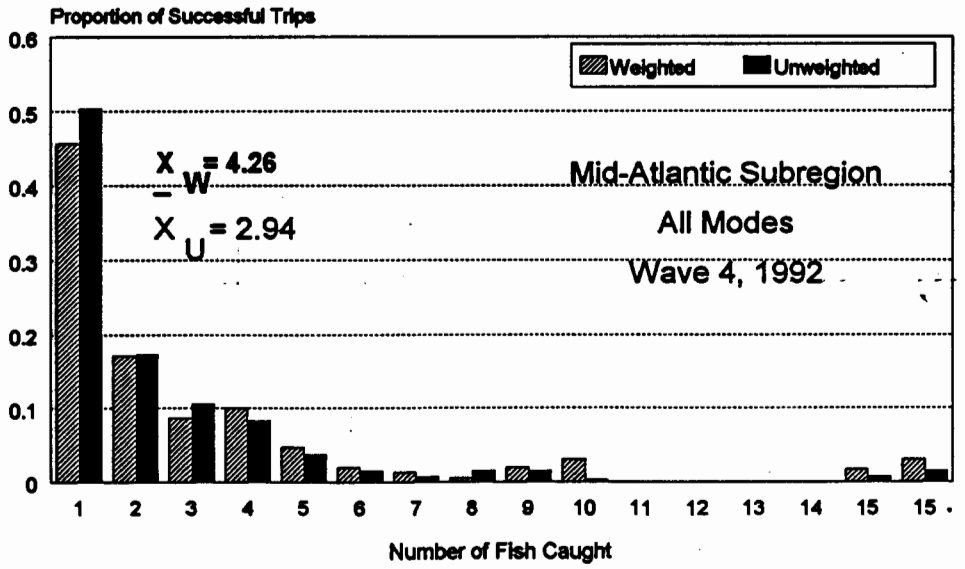


Figure 12. Distribution of successful trips catching weakfish in the mid-Atlantic region during Wave 4 of the 1992 MRFSS. Proportions were estimated using an unweighted and weighted catch-per-trip analysis for pooling among states and modes of fishing. (u = unweighted, w = weighted)

(Figure 13) with the distribution of total estimated trips (Figure 14). Without proper weighting, the potential exists for estimating a higher number of trips in a particular mode or wave due only to the increased level of sampling. Catch-per-trip analyses using the unweighted estimation procedure and pooling among both waves and modes of fishing provided an estimate of the mean number of bluefish per trip of 4.77, while the weighted estimation procedure provided a mean value of 3.97 bluefish per trip (Figure 15).

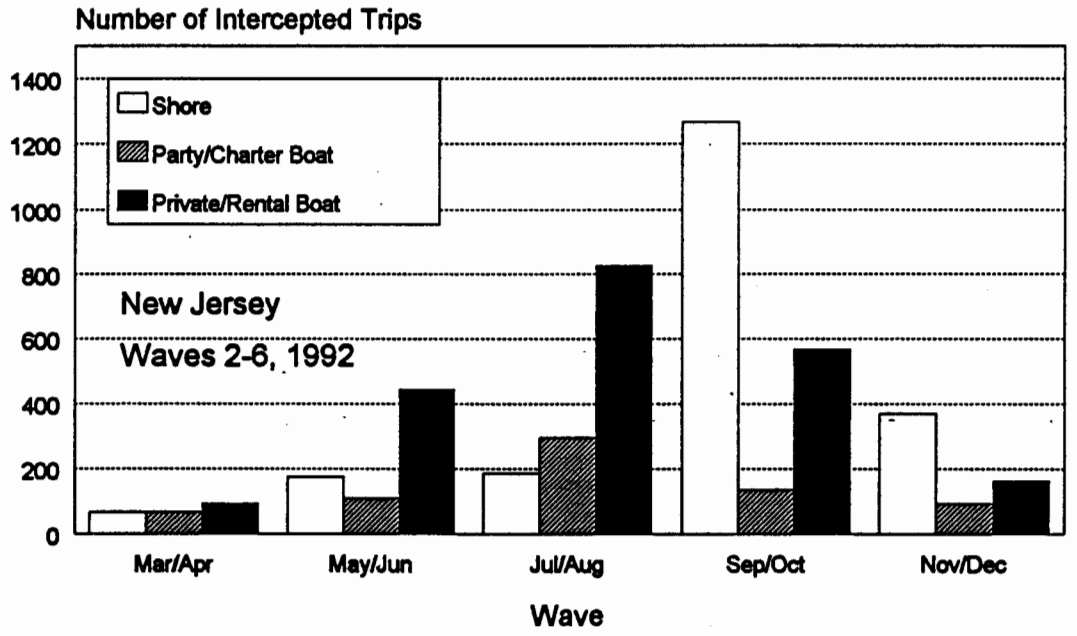


Figure 13. Distribution of intercepted trips by wave and mode of fishing for New Jersey during the 1992 MRFSS intercept survey.

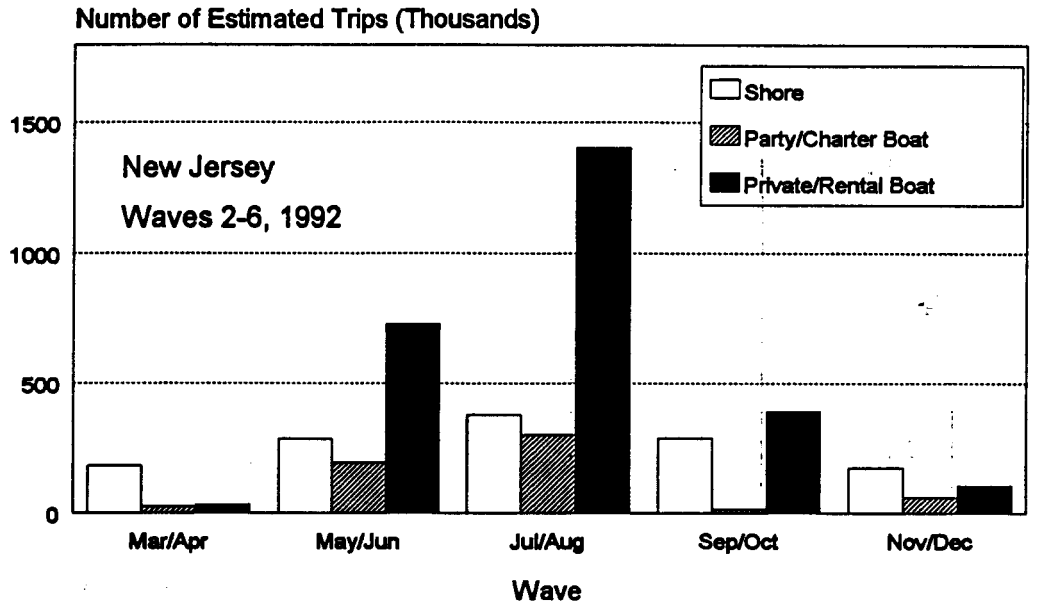


Figure 14. Distribution of total estimated trips by wave and mode of fishing for New Jersey during the 1992 MRFSS intercept survey.

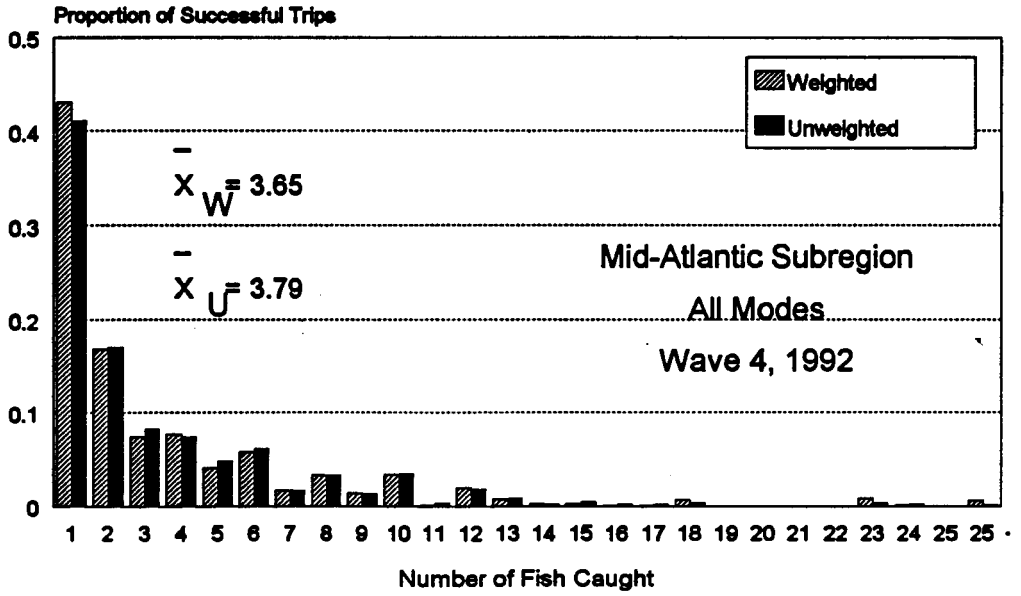


Figure 15. Distribution of successful trips catching bluefish in New Jersey during Waves 2-6 of the 1992 MRFSS survey. Proportions were estimated using both unweighted and weighted catch-per-trip analyses. Data are pooled among waves and modes of fishing.

The specific steps in catch-per-trip analyses using the MRFSS SAS datasets are as follows:

1. Calculate the total number of fish of a given species unavailable for inspection (Type B1 and B2 Catch) for each separate interview (ID_CODE) for a given state/mode/ wave stratum.

    a. From the Type 2 records, select the records with the given species code (SP_CODE) and disposition (DISPO).
    b. From the Type 2 records, sum the variable NUM_FISH by ID_CODE and label this variable SUM_FISH.

2. Calculate the total number of fish of a given species available for inspection (Type A Catch) for each separate interview (ID_CODE) for a given state/mode/wave stratum.

    a. From the Type 3 records, select the records with the given species code (SP_CODE).
    b. Keep only the first record for each ID_CODE.
    c. Keep the variable FSHINSP (# of Type A fish inspected).

3. Merge the data from steps 1 and 2 with the Type 1 records.

    a. Merge the Type 2 records with the variable SUM_FISH with the Type 1 records by ID_CODE.
    b. Merge the subsetted Type 3 records with the merged Type 1 and Type 2 records by ID_CODE.

4. Calculate the total number of fish caught (Type A + B1 + B2 Catch) for each separate interview (ID_CODE) for the given state/mode/wave stratum.

    a. Add SUM_FISH and FSHINSP by ID_CODE.

5. Keep only the records with one contributor (CNTRBTRS = 1).

6. Calculate catch frequencies by state/mode/wave stratum.

7. Calculate total intercepts by state/mode/wave stratum.

8. Merge the catch frequency data with the total intercept data by state/mode/wave stratum.

9. Calculate relative frequencies by state/mode/wave stratum.

10. From the SAS trip estimation files select the records with the given state/mode/wave stratum and keep the variable NUMRTRIP (total estimated number of trips for that stratum).

11. Merge the trip data (NUMRTRIP) with the relative catch frequency data by state/ mode/wave stratum.

12. Calculate the estimated number of trips by catch class for each state/mode/wave stratum by multiplying each relative catch frequency times NUMRTRIP.

Chapter 5.
LENGTH FREQUENCY ANALYSIS

When performing length frequency analyses within a state/mode/wave stratum, reweighting of the data is not necessary assuming that the landed catch within a stratum was randomly sampled and that the true size distribution is represented. However, if length frequency analyses are performed among state/mode/wave strata, data must be reweighted prior to pooling. Reweighting of data is necessary due to non-random sampling of the catch among strata. Distribution of sampling among state/mode/wave strata is not representative of the true size distributions due to the following factors: 1) heavier sampling of the boat-mode catch; 2) variation in sampling levels among states; 3) variation in sampling levels among waves; and 4) differential success in obtaining fish length measurements. Variability in the proportion of fish measured for length among states and particularly among modes of fishing is demonstrated through a comparison of the distribution of measured bluefish by state and mode of fishing in the mid-Atlantic subregion for Wave 4, 1992 of the intercept survey (Figure 16) with the distribution of total estimated catch (Figure 17). Higher proportions of fish lengths are obtained in the private/rental boat mode. Weighting of length frequency data by the total estimated landings will adjust for the effects of non-random sampling of the catch across strata.

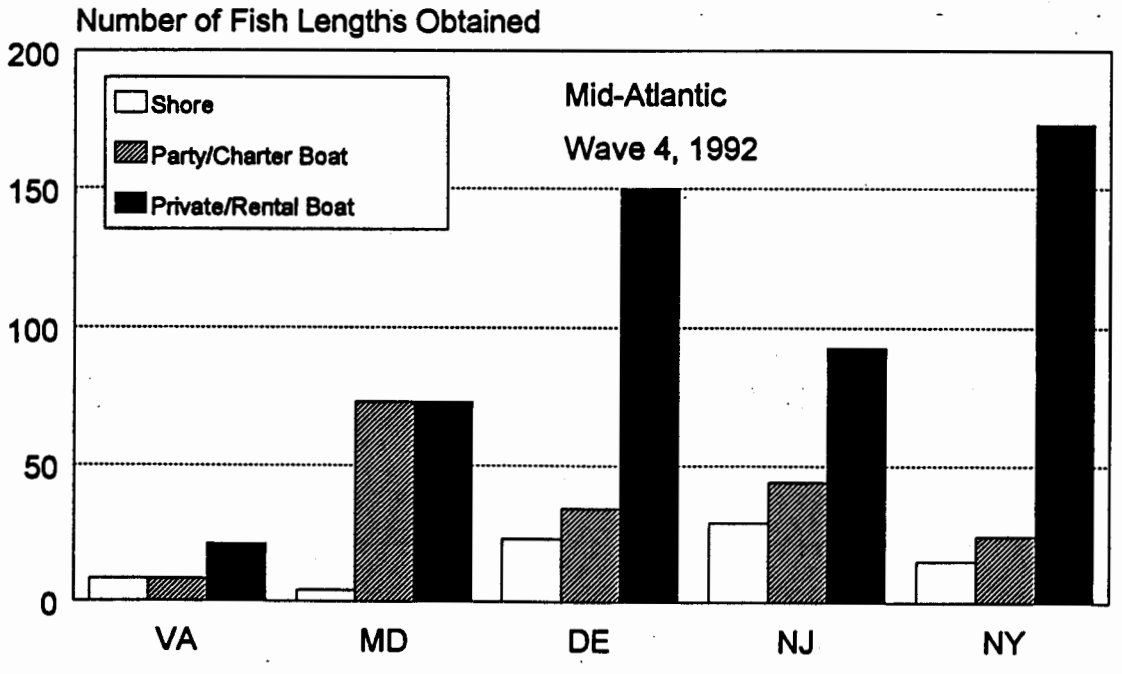


Figure 16. Distribution of measured bluefish by state and mode of fishing in the mid-Atlantic subregion during Wave 4 of the 1992 MRFSS intercept survey.

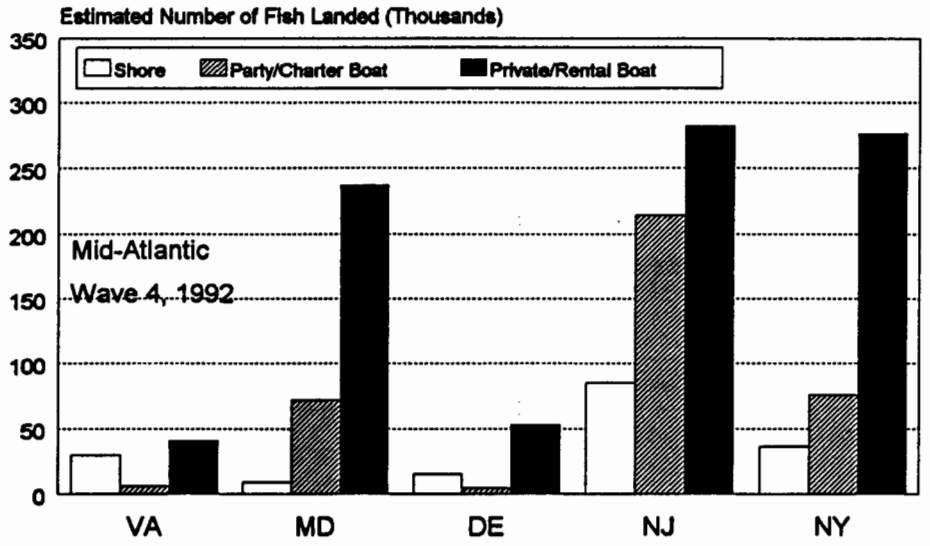


Figure 17. Distribution of bluefish landings by state and mode of fishing in the mid-Atlantic subregion during Wave 4 of the 1992 MRFSS intercept survey.

To estimate the number of fish landed in a given size class for pooled state/mode/wave strata, the number of fish landed and measured in a given size class and state/mode/wave stratum is weighted by the estimated total number of fish landed in the given state/mode/wave stratum prior to summing across pooled strata as follows:

$$\gamma_{S=X} = \sum_{ijk} \frac{I_{S=X\,ijk} \times \gamma_{ijk}}{\sum_{S} I_{ijk}}$$

where
- i = state
- j = mode
- k = wave
- S = size class
- X = range of sizes
- $\gamma_{S=X}$ = estimated number of fish landed of size X over all pooled state/mode/wave strata

γ_{ijk} = estimated number of fish landed in a given state/mode/wave stratum

$l_{S=X\ ijk}$ = number of fish landed and measured of size X in a given state/mode/wave stratum

l_{ijk} = total number of fish landed and measured in a given state/mode/wave stratum

Computational Steps:

Pooling among states for length frequency analyses is demonstrated using hypothetical MRFSS data for bluefish landed in Wave 3 in the private/rental boat mode for the states of North Carolina and South Carolina. The number of bluefish landed and measured with a length of 300-400 mm ($l_{S=300\text{-}400\ ijk}$), the total number of bluefish landed and measured pooled over all size classes ($\Sigma\ l_{ijk}$), and the estimated total catch of bluefish for each state/mode/wave strata (γ_{ijk}) are shown in Table 5.

Table 5. Hypothetical MRFSS data for North Carolina and South Carolina for bluefish landed in Wave 3 for the private/rental boat mode, including data on the number of fish sampled in the state/mode/wave stratum having lengths between 300-400 mm, the total measured sample of bluefish in each state/mode/wave stratum, and the estimated total catch of bluefish in the state/mode/wave stratum.

State	Mode	Wave=3	Sample, 300-400 mm	Total Measured	Catch Estimate
NC	PR	May/Jun	30	300	50,000
SC	PR	May/Jun	40	100	30,000

The incorrect procedure for estimating the total number of bluefish landed having lengths between 300-400 mm pools North Carolina and South Carolina data without weighting as follows:

$$\gamma_{S=300\text{-}400} = \frac{(l_{S=(300\text{-}400)NC,PR,3} + l_{S=(300\text{-}400)SC,PR,3}) \; x \; (\gamma_{NC,PR,3} + \gamma_{SC,PR,3})}{(l_{NC,PR,3} + l_{SC,PR,3})}$$

$$\gamma_{S=300\text{-}400} = \frac{(30 + 40) \; x \; (50{,}000 + 30{,}000)}{(300 + 100)} = 14{,}000$$

The correct procedure for estimating the total number of bluefish landed having lengths between 300-400 mm for pooled data over North Carolina and South Carolina is as follows:

$$\gamma_{S=300\text{-}400} = \frac{(l_{S=(300\text{-}400)NC,PR,3} \; x \; \gamma_{NC,PR,3})}{l_{NC,PR,3}} + \frac{(l_{S=(300\text{-}400)SC,PR,3} \; x \; \gamma_{SC,PR,3})}{l_{SC,PR,3}}$$

$$\gamma_{S=300\text{-}400} = \frac{(30 \; x \; 50{,}000)}{300} + \frac{(40 \; x \; 30{,}000)}{100} = 17{,}000 \textit{ fish landed within length interval between 300 and 400 mm}$$

Relative catch frequency for 50 mm length classes for landed recreational catch of bluefish (Figure 18) and weakfish (Figure 19) in the mid-Atlantic subregion Wave 4 was calculated using the incorrect unweighted estimation procedure and the correct weighting procedure, demonstrating the differences between the relative frequencies for length classes obtained using the correct and incorrect estimation methods.

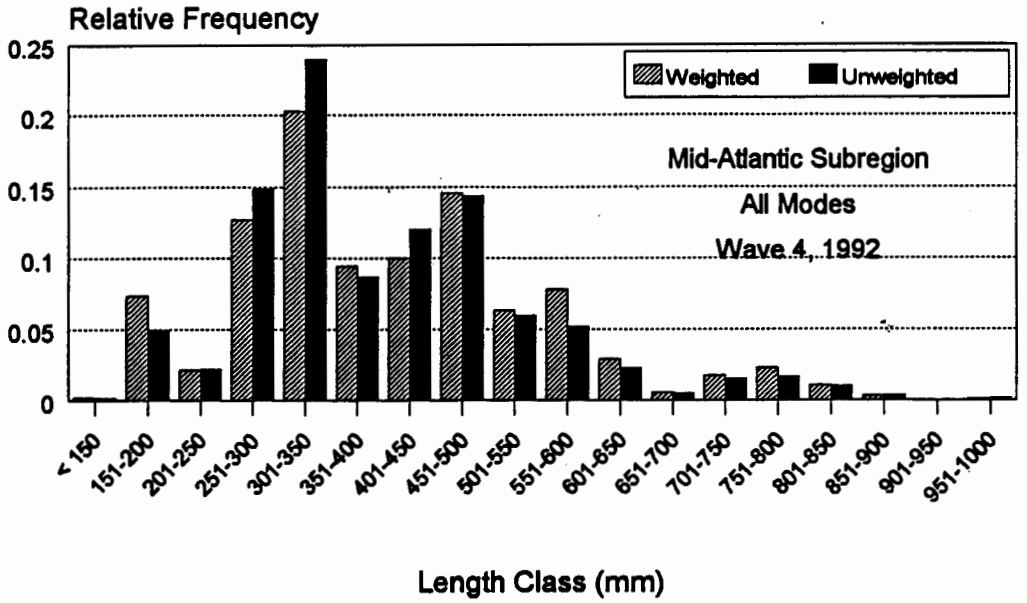


Figure 18. Length-frequency distribution of bluefish in the mid-Atlantic subregion during Wave 4 of the 1992 MRFSS. Relative frequency was calculated using an unweighted and weighted length frequency analysis for pooling among states and modes of fishing.

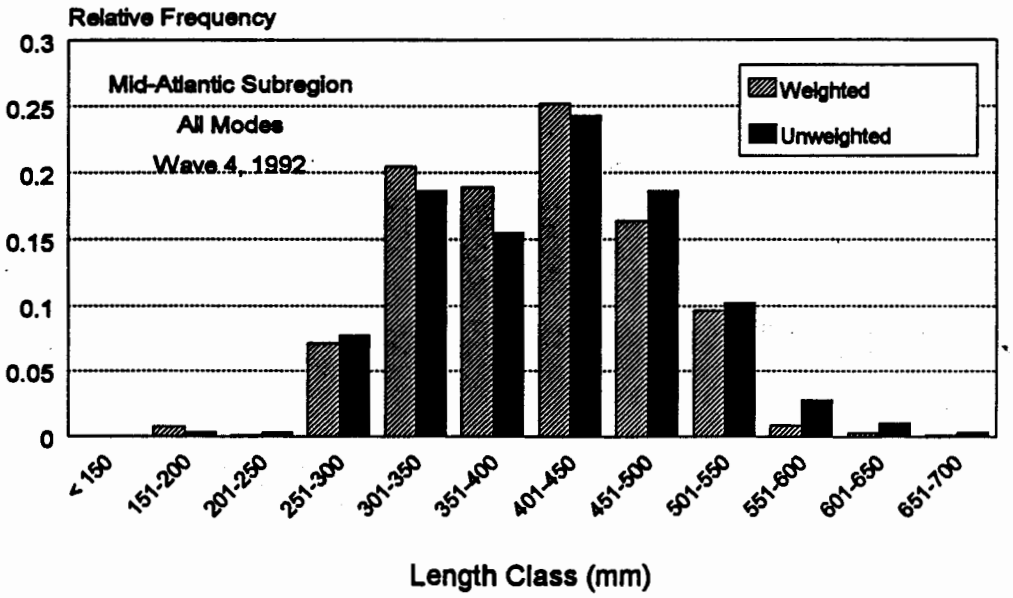


Figure 19. Length-frequency distribution of weakfish in the mid-Atlantic subregion during Wave 4 of the 1992 MRFSS. Relative frequency was calculated using an unweighted and weighted length frequency analysis for pooling among states and modes of fishing.

The specific steps in analysis of fish length measurements using the MRFSS SAS datasets are as follows:

1. Delete records with missing length data
   a. From the Type 3 records, select records with the given SP_CODE.
   b. From the Type 3 records, drop the records with missing length measurements (LNGTH=.)

2. Merge the Type 3 data with the Type 1 records.

3. Calculate length frequencies by state/mode/wave strata.

4. Calculate the total number of records by state/mode/wave strata.

5. Merge the length frequencies with the total number of records by state/mode/wave strata.

6. From the catch estimate files, select the records for the given state/mode/wave stratum to be pooled and calculate estimated landings (ESTLAND = ESTCLAIM + ESTHARV).

7. Merge the estimated landings with the relative length frequencies by state/mode/wave strata.

8. Calculate estimated landings for each length class by state/mode/wave strata, by multiplying each relative length class frequency times the estimated landings (ESTLAND).

9. Sum the estimated landings for each length class over state/mode/wave strata to be pooled.

Chapter 6.
POST-STRATIFICATION

The MRFSS survey design is based on stratified random sampling, with stratification on the basis of year, state, wave, and mode of fishing. Stratified sampling will usually increase the precision of estimates and often results in lower variance estimates within each stratum. The total variance for all combined strata will also usually be lower than for simple random sampling. The designations of strata in stratified random sampling are based on prior knowledge of the population, with the heterogenous sampling frame being divided into relatively homogenous strata. Due to the inability to anticipate all data requirements, the "default" stratification used in the MRFSS may not be useful for all analyses and post-stratification may be necessary.

The MRFSS data can be post-stratified, which is stratification after selection of the sample. Post-stratification may be necessary for several reasons, including: 1) stratification variables are unknown prior to sampling; 2) estimates may be required for management regions, as opposed to state-specific data; and 3) post-stratification can reduce the variance of estimates if the post-stratification variables are effective. Post-stratification is not quite as efficient in reducing variance as stratification performed at the time of sampling.

Computational Steps:

1. Redefine the strata boundaries from the original year/state/wave/mode strata. For example, the MRFSS survey design is not stratified by area fished since this variable is unknown until after the angler has been interviewed. The MRFSS data is post-stratified by three fishing areas; inland, ocean less than 3 miles, and ocean greater than three miles. Estimates of catch and fishing effort are then re-calculated for each year/state/wave/mode/area stratum.

2. Distribute the total estimated number of trips for each original year/state/wave/mode stratum to the new post-stratified year/state/wave/mode/area strata using proportional allocation (see Chapter 1 - Estimation of Fishing Effort by Fishing Area).

3. Recalculate CPUE statistics for each year/state/wave/mode/area stratum following the estimation procedures in Chapter 1.

4. Multiply the CPUE times the trip estimates for each year/state/wave/mode/area stratum to calculate catch estimates.

5. Calculation of variance for catch and effort statistics for the redefined strata boundaries are more complicated, but similar in the calculation procedures.

Post-stratification is demonstrated in the following example using Maryland, Wave 4, 1992 MRFSS data (Table 6). MRFSS data is typically post-stratified by three broad fishing area categories: inland waters, ocean waters less than or equal to three miles, and ocean waters greater than three miles. In the following example, post-stratification is performed for the MRFSS data on the basis of four areas of fishing: inland, ocean <=3 miles, ocean >3 miles, and Chesapeake Bay. In the present MRFSS post-stratification scheme, the Chesapeake Bay data is included in the inland waters fishing area. Therefore, the total trip estimates will be re-allocated from the inland water category to the Chesapeake Bay category based on proportional allocation.

The total estimated number of fishing trips in the shore mode is 142,107 trips, with 49,000 trips fished in ocean waters less than or equal to three miles and 137,207 fishing trips in inland waters (Table 6). Post-stratifying the data to separate out the Chesapeake Bay will proportionally decrease the number of fishing trips in inland waters by the percentage of the total fishing effort in the Chesapeake Bay. Proportional allocation of shore mode fishing trips to the Chesapeake Bay produces estimates of 3,500 fishing trips in inland waters, and 133,707 trips in the Chesapeake Bay, with the Chesapeake Bay having approximately 84% of the total fishing trips for inland waters (Table 7). The estimated number of trips for ocean waters less than three miles (4,900) and the total estimated number of trips for the year/state/wave/mode strata (142,107) are unaffected by this proportional allocation method. Similar calculations are performed for the charter/party boat and private/rental boat modes of fishing, with the Chesapeake Bay accounting for 100% and 86% of all inland fishing trips, respectively (Table 7).

Recalculation of catch-per-unit effort and total catch is then performed for Type A caught fish, Type B1 harvested fish, and Type B2 released fish for each year/state/wave/mode/area stratum using the methods described in Chapter 1. Estimates of total numbers of fish for Maryland, Wave 4, 1992 by mode and area of fishing are shown in Table 6 for the three fishing areas and in Table 7 when post-stratifying for the separation of the Chesapeake Bay.

Poststratification programs in Statistical Analysis Software (SAS) language are available from the National Marine Fisheries Service upon request.

Table 6. 1993 MRFSS trip and summer flounder catch estimates for Maryland, Wave 4. Estimates are stratified by mode of fishing (shore, party/charter boat, and private/rental boat) and area fished (ocean <=3 miles and ocean inland).

Wave of Data	Mode of Fishing	Collapsed Area of Fishing	Number of Trips in Area Fished	Estimated Fish Claimed	Estimated Fish Harvested	Estimated Fish Released
July-August	Shore	Ocean (<=3mi)	4,900	2,100	0	0
		Ocean (inland)	137,207	0	0	0
		Wave/Mode Total	142,107	2,100	0	0
	Party/ Charter	Ocean (>3mi)	31,719	0	0	0
		Ocean (inland)	58,632	3,575	0	2,884
		Wave/Mode Total	90,352	3,575	0	2,884
	Private/ Rental	Ocean (<=3mi)	0	0	0	0
		Ocean (>3mi)	25,276	1,099	0	7,434
		Ocean (inland)	614,058	139,493	16,355	301,825
		Wave/Mode Total	639,334	140,592	16,355	309,259

Table 7. 1993 MRFSS trip and summer flounder catch estimates for Maryland, Wave 4. Estimates are post-stratified by area fished (ocean <=3 miles, ocean inland, and Chesapeake Bay).

Wave of Data	Mode of Fishing	Collapsed Area of Fishing	Number of Trips in Area Fished	Estimated Fish Claimed	Estimated Fish Harvested	Estimated Fish Released
July-August	Shore	Ocean (<=3mi)	4,900	2,100	0	0
		Ocean (inland)	3,500	0	0	0
		Chesapeake Bay	133,707	0	0	0
		Wave/Mode Total	142,107	2,100	0	0
	Party/ Charter	Ocean (>3mi)	31,719	0	0	0
		Ocean (inland)	0	0	0	0
		Chesapeake Bay	58,632	3,575	0	2,884
		Wave/Mode Total	90,352	3,575	0	2,884
	Private/ Rental	Ocean (<=3mi)	0	0	0	0
		Ocean (>3mi)	25,276	1,099	0	7,434
		Ocean (inland)	86,236	43,118	10,408	206,668
		Chesapeake Bay	527,822	96,360	5,947	95,157
		Wave/Mode Total	639,334	140,577	16,355	309,259

Chapter 7.
BAG LIMIT ANALYSIS

A bag limit analysis is used to determine the effect a simulated bag limit would have on a particular fishery either by estimating the percent of positive catch trips for a given species that exceed the bag limit or by evaluating the reduction in overall harvest resulting from a simulated bag limit regulation. The four basic steps involved in the analysis of a simulated bag limit are as follows:

1. Definition of directed effort

   Directed effort can be defined as those trips where the species of interest was actually caught, or those trips that targeted the species of interest, or either the species of interest was caught or targeted on a given trip. Another option for defining directed effort is to include species associations. For instance, trips targeting one species would be redefined as targeting a group of associated species. The decision of how to define directed effort should be based on the specific management questions to be addressed (see Chapter 10 for further discussion of directed effort). For this bag limit analysis directed effort is defined as those trips where the angler harvested at least one fish of the species of interest.

2. Weighting of strata

   When performing catch-per-trip analyses among state/mode/wave strata, data must be reweighted prior to pooling among strata. Reweighting of data is necessary due to the non-random distribution of intercepts among strata (see Chapter 4 for details on proper weighting of strata for catch-per-trip analyses).

3. Calculations involving group catches

   Group catches are those catches that cannot be separated into catch for each individual angler in the fishing party. A group consists of one leader whose record contains the catch of one or more followers. Followers can be linked to leaders using the Record Type 4 data of the intercept interview files. Group catches can either be removed from the data prior to performing a bag limit analysis or used in the analysis by dividing the total group catch by the total anglers in the group. In either case, it is important to identify the biases introduced into the analysis with either the removal or averaging of group catch data.

4. Quasi post-stratification

   The post-stratification variable in this analysis is catch (-per-trip), therefore, the strata are the number of fish caught. This is termed quasi post-stratification since an analy-

sis variable ("catch") is used as the strata variable. This method is valid for the bag limit analysis since the mortality reduction associated with a specific bag limit is being calculated. As a check, the harvest estimate from the bag limit should be nearly identical to the MRFSS estimate for that species. The estimate calculated from the bag limit analysis should not, however, replace the MRFSS estimate because the variances associated with quasi post-stratification are artificially reduced (see Chapter 6 for details on post-stratification).

Computational Steps:
(see Chapter 4 for details on catch-per-trip analysis shown in steps 1-10)

1. Calculate the total number of fish of a given species available for inspection (Type A Catch) and the number of fish not brought back in whole form (Type B1 Catch) for each separate interview (ID_CODE) for a given state/mode/wave stratum.

    a. From the Type 2 and Type 3 records, select the records with the given species code (SP_CODE).
    b. On the Type 2 records, drop the records with disposition coded for fish released alive.
    b. Keep only the first record for each ID_CODE.
    c. Keep the variable NUM_FISH (Type 2 records: # of Type B1 fish) and FSHINSP (Type 3 records: # of Type A fish inspected).

2. Merge the subsetted Type 2 and Type 3 records with the Type 1 records by ID_CODE. Sum NUM_FISH and FSHINSP.

3. Deal with group catches by either ignoring them or by dividing the group catches evenly among anglers. To ignore group catches, delete any records where CNTRBTRS <> 1.

    a. Calculate the total number of fish caught by ID_CODE from the Type 2 and Type 3 records (NUM_FISH + FSHINSP).
    b. Distribute the total catch for the group evenly among all contributors. (Note that some followers are not interviewed and records need to be created. Other followers may have their own Type 2 fish that are not released alive which need to be added to their bag)

4. Calculate catch frequencies by state/mode/wave stratum.

5. Calculate total intercepts by state/mode/wave stratum.

6. Merge the catch frequency data with the total intercept data by state/mode/wave stratum.

7. Calculate relative frequency by state/mode/wave stratum.

8. From the SAS trip estimation files, select the records with the given state/mode/wave stratum and keep the variable NUMRTRIP (total estimated number of trips for that stratum).

9. Merge the trip data (NUMRTRIP) with the relative catch frequency data by state/ mode/wave stratum.

10. Calculate the estimated number of directed trips by catch frequency for each state/ mode/wave stratum by multiplying each relative catch frequency times NUMRTRIP.

11. Sum the estimated number of directed trips for each catch frequency across strata.

12. Calculate the fish harvested for each catch frequency by multiplying the estimated catch by the total number of directed trips.

13. Calculate total harvest by summing all catches.

14. To simulate a bag limit, add all directed trips for catch frequencies greater than the simulated bag limit to the catch frequency equal to that bag limit.

15. For all catch frequencies greater than the bag limit, set the number of directed trips equal to zero.

16. Recalculate the total harvest following steps 12 & 13.

Data on the number of intercepted directed fishing trips and the total number of intercepted trips for a given year/state/wave/mode stratum for each catch class from the intercept survey, and the estimated number of fishing trips for a given year/state/wave/mode stratum are used to estimate the number of directed fishing trips by year/state/wave/mode stratum for each catch class (Table 8) following the equation:

$$T_{C=X} = \frac{t_{C=X\ (ijk)}}{A_{ijk}} \times T_{ijk}$$

where: i = state
j = mode

k = wave

C = catch class

X = number of fish in catch

$\tau_{C=X}$ = total number of directed trips with C=X in a given state/mode/wave stratum

τ_{ijk} = estimated number of trips in a given state/mode/wave stratum

$t_{C=X\ ijk}$ = number of intercepted directed trips with C=X in a given state/mode/wave stratum

A_{ijk} = total number of intercepted trips in a given state/mode/wave stratum

Table 8. 1990 MRFSS trip and angler data for estimating total number of directed trips by wave/mode strata and catch class in a bag limit analysis.

Wave/Mode Strata	Catch	Intercepted Directed Trips	Total Intercepted Trips	Total Estimated Trips	Total Directed Trips
Wave 3	1	3	357	285,769	2,401
Shore	6	1	357	285,769	801
Wave 3 Party/Charter	1	1	243	103,809	431
Wave 3	1	71	1417	776,287	39,824
Private/	2	46	1417	776,287	25,802
Rental	3	26	1417	776,287	14,583
	4	11	1417	776,287	6,170
	..	....	.....	.....	.....

For example, the total number of directed trips for Wave 3 shore mode for a catch of one fish is:

$(3/357) \times (285,769) = 2401$ trips

The estimated number of directed fishing trips for each catch class is obtained by summing the directed trips across wave/mode strata. The total estimated bluefish harvest is then obtained by multiplying the number of bluefish caught per trip times the estimated number of directed fishing trips within each catch class (Table 9). For example, for the catch class of two fish per trip, the total estimated number of directed trips is 94,815 leading to an estimated bluefish harvest in the catch class of:

2 bluefish/trip $\times$ 94,815 trips = 189,630 bluefish harvested

Table 9. Estimated bluefish harvest for catch classes of bluefish from the 1990 MRFSS catch and trip estimates for New York.

# Bluefish Caught	Frequency %	Cumulative Freqeuncy %	Estimated Directed Trips	Estimated Bluefish Harvested
1	31	31	174,419	174,419
2	17	48	94,815	189,630
3	12	60	68,986	206,959
4	7	67	38,608	154,432
5	6	73	33,750	168,750
6	5	78	28,347	170,082
7	3	81	16,457	115,201
8	4	85	23,722	189,773
9	1	86	7,548	67,934
10	3	89	16,570	165,699
11	1	90	4,842	53,265
12	3	93	15,347	184,164
13	1	94	3,769	48,997
14	1	95	3,486	48,806
15	1	96	6,592	98,882
>15	4	100	26,160	766,226
		Totals	563,418	2,803,219

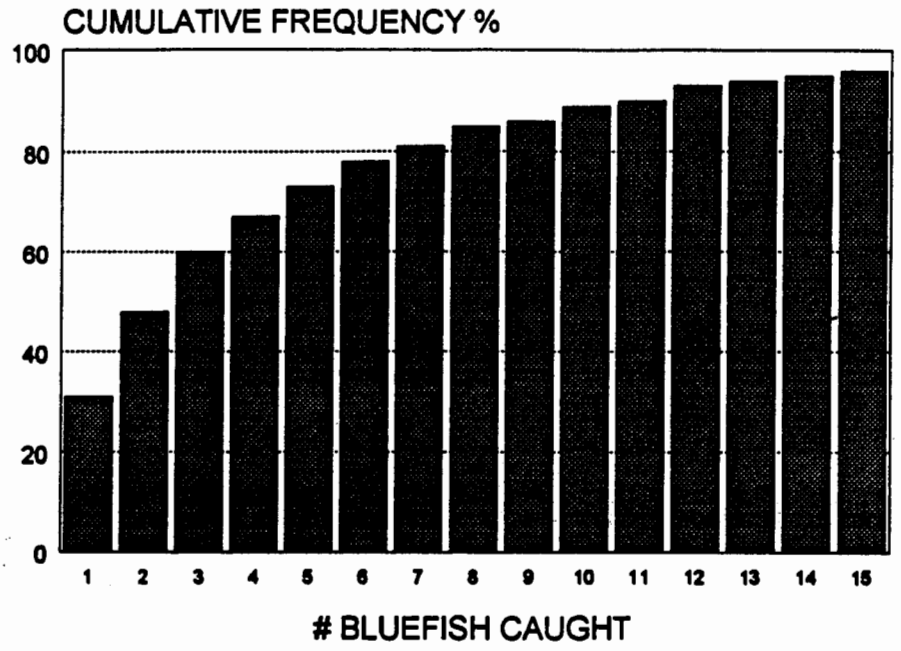


Figure 20. Bluefish catch frequency data from the 1990 MRFSS for New York.

The effects of a simulated bag limit on bluefish harvest are demonstrated using 1990 MRFSS data for New York. The catch frequency of bluefish caught in New York in 1990 is calculated and cumulative frequency is obtained (Figure 20). To simulate a bag limit of 10 bluefish, it is assumed that a cumulative catch frequency of 100% is reached at the 10 fish bag limit instead of the greater than 15 fish catch frequency (Table 9). Estimation of the number of directed trips for the bag limit analysis is performed by summing the estimated number of directed trips for catch classes 11 through >15 (60,196 directed trips) and adding them to the estimated number of directed trips for a catch class of 10 fish (16,570 directed trips), giving an estimate of 76,766 directed trips (Table 10). The estimated number of directed trips for catch classes greater than 10 fish are set to zero. The estimated bluefish harvest for each catch class is recalculated by multiplying the number of bluefish caught times the estimated number of trips. The estimates of harvest will remain the same for all catch classes below the bag limit and will only differ for the catch class corresponding to the bag limit; in this example, 10 fish. For example, the estimated bluefish harvest for New York in 1990 for 10 fish was 165,699, while the estimated harvest based on the simulated bag limit of 10 fish is 767,656 (Table 10, Figure 21).

Table 10. Simulation of the effects of a 10 fish bag limit on estimated bluefish harvest for the state of New York. Data are based on the 1990 MRFSS.

# of Bluefish	Frequency %	Cumulative Frequency %	Estimated Directed Trips	Estimated Bluefish Harvest
1	31	31	174,419	174,419
2	17	48	94,815	189,630
3	12	60	68,986	206,959
4	7	67	38,608	154,432
5	6	73	33,750	168,750
6	5	78	28,347	170,082
7	3	81	16,457	115,201
8	4	85	23,722	189,773
9	1	86	7,548	67,934
10	14	100	76,766	767,656
11	0	100	0	0
12	0	100	0	0
13	0	100	0	0
14	0	100	0	0
15	0	100	0	0
>15	0	100	0	0
		Totals	563,418	2,204,835

*** *Result would be a 21% harvest reduction.*

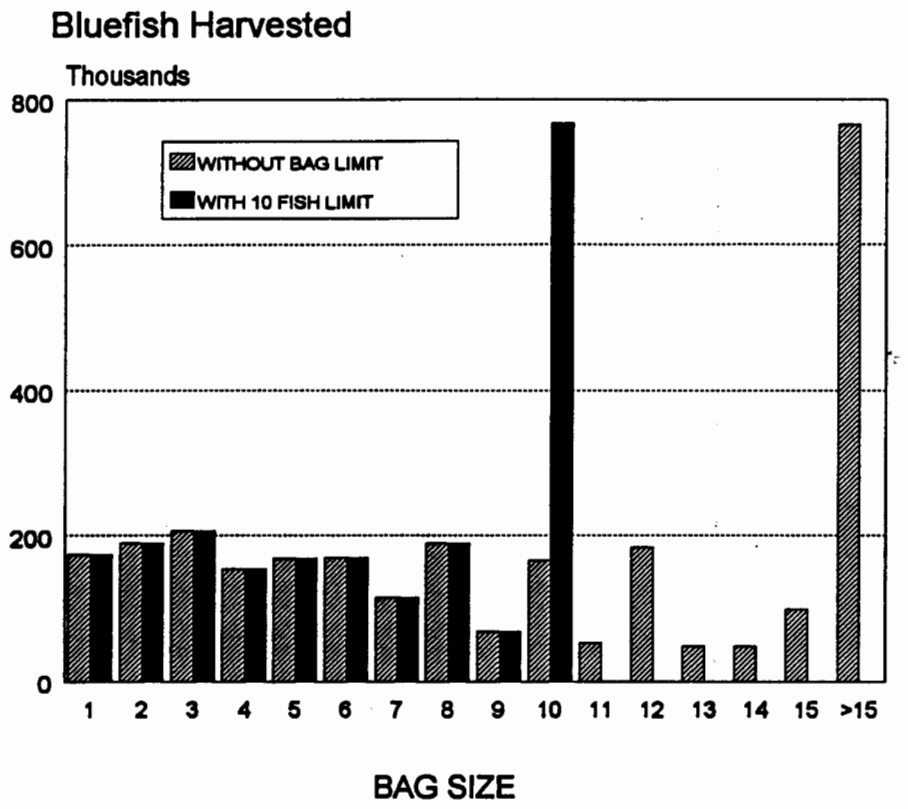


Figure 21. Comparison of New York bluefish harvest without a bag limit and with a 10 fish bag limit. Data are from the 1990 MRFSS.

The total estimated number of trips in the bag limit analysis will remain the same at 563,418 fishing trips for bluefish in New York in 1990. However, the total estimated bluefish harvest is reduced from a total harvest of 2,803,219 bluefish with no bag limit to 2,204,835 bluefish with a bag limit of 10 fish, corresponding to a harvest reduction of 21% (Table 10).

The bag limit analysis can be performed for various bag limits to monitor the effect on total harvest reduction. For example, a similar bag limit analysis using the MRFSS data in Table 11 for a bag limit of 5 bluefish would reduce the total estimated bluefish harvest by 41%, from a total harvest of 2,803,219 bluefish harvested with no bag limit to 1,658,390 bluefish harvested under a 5 fish bag limit (Table 11).

Table 11. Simulation of the effects of a five fish bag limit on estimated bluefish harvest for the state of New York. Data are based on the 1990 MRFSS.

# of Bluefish	Frequency %	Cumulative Frequency %	Estimated Directed Trips	Estimated Bluefish Harvest
1	31	31	174,419	174,419
2	17	48	94,815	189,630
3	12	60	68,986	206,959
4	7	67	38,608	154,432
5	33	100	186,590	932,950
6	0	100	0	0
7	0	100	0	0
8	0	100	0	0
9	0	100	0	0
10	0	100	0	0
11	0	100	0	0
12	0	100	0	0
13	0	100	0	0
14	0	100	0	0
15	0	100	0	0
>15	0	100	0	0
		Totals	563,418	1,658,390

*** *Result would be a 41% harvest reduction.*

Several other associated management issues may need to be considered when evaluating the bag limit analysis:

1) Possible changes in directed fishing effort on the species may occur due to the imposition of a bag limit. For example, if the species is of great importance to the angler, anglers may use the bag limit as a goal and therefore increase fishing effort in an attempt to catch the maximum allowable catch for that species. On the other hand, fishing effort may decline if anglers consider the limit too restrictive and therefore not worth targeting the species.

2) Compliance issues will need to be considered before implementation of bag limit regulations. Specific considerations may need to be given to whether anglers will comply with the regulation, and what type of enforcement would be required to monitor compliance.

3) Consideration must be given on how to express the bag limit regulation; as fish per individual angler, or fish per boat, or fish per fishing party? This may be influenced by the specific fishery under consideration, with some fisheries lending themselves better to management on an individual angler basis and others better managed on a boat or fishing party basis. The expression of the bag limit regulation may also influence the manner in which group catches will be analyzed. For example, if the bag limit regulation is expressed on the basis of boat or fishing party catches then group catches would be an important component of the bag limit analysis.

4) The imposition of a bag limit regulation may cause additional hooking mortality due to increased catch and release in the fishery. This hooking mortality needs to be factored into any model designed to reduce overall mortality through a bag limit.

5) Consideration must also be given to the effect the bag limit will have on the directed effort of other managed species. The use of bag limit regulations to decrease fishing effort on one species may cause an associated increase in directed fishing effort for another species of interest to the angler.

Chapter 8.
ADJUSTMENT OF MISSING WEIGHTS

Weight estimates for Type A and B1 catches are calculated from the mean weight of individual species within a year/state/wave/mode/area stratum. In some instances, it may be impossible to calculate weight estimates at the stratum level. Intercept survey interviewers may be unable to weigh any individual fish, making it impossible to calculate a mean weight for that stratum. In some cases, only one fish weight is present for a stratum, providing a mean weight but no variance estimate. Factors affecting the ability to collect weight data include abundance of the species in the recreational fishery, seasonality of the species, and limited sample sizes within a stratum.

Lack of weight data varies by species and fishing area. Using the New England subregion as an example, Maine has a low percentage of Type 3 records with missing individual weights, but the highest number of missing strata weight estimates (Figure 22). Massachusetts has the highest number of missing individual weights, but an intermediate number of missing strata weight estimates. Comparison of five New England species shows the highest percentage of missing estimates and variances for cunner, even though this species has an intermediate number of missing weights on individual fish (Figure 23).

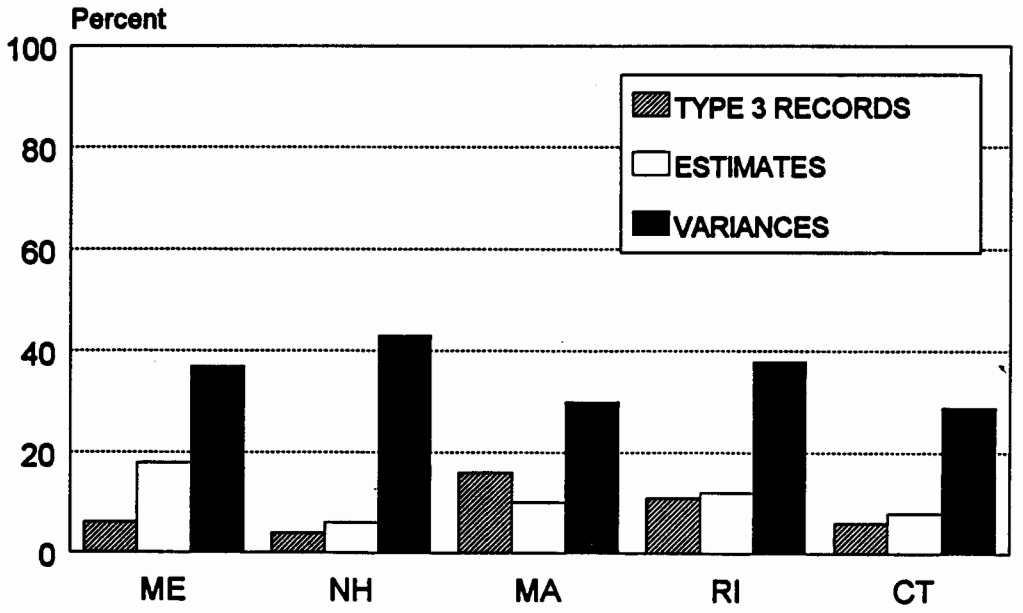


Figure 22. Comparison of the number of Type 3 records containing individual fish weight measurements with missing strata weight and variance estimates for individual states in the New England region.

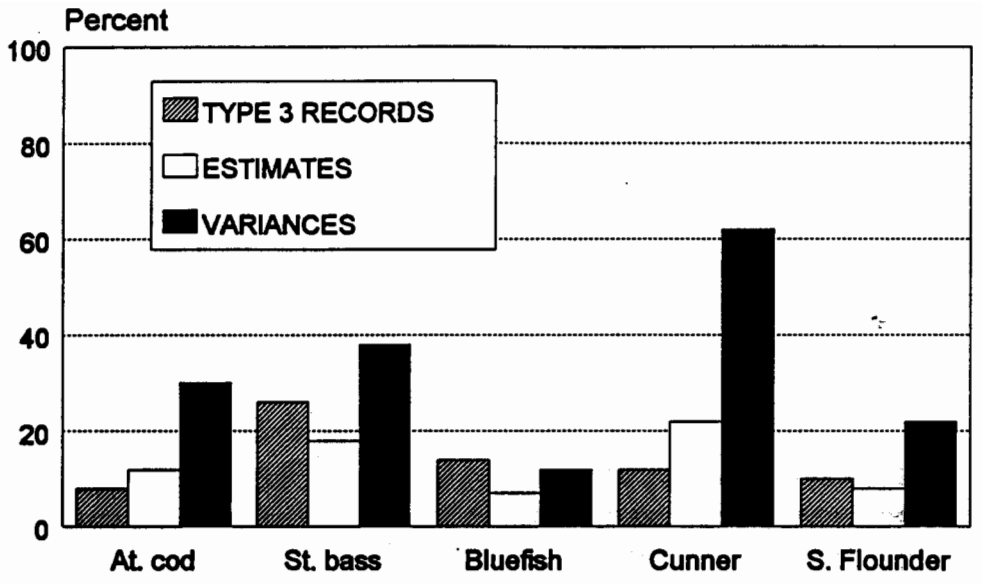


Figure 23. Comparison of the number of Type 3 records containing individual fish weight measurements with missing strata weight and variance estimates for individual speices in the New England region.

Catch and variance by species are estimated by year/state/wave/mode/area stratum and are then additive across stratum. If weight and/or variance estimates are missing for a stratum, the addition of estimates across strata will result in an underestimate of total weight and its associated variance. Therefore, an adjustment for missing weights and variances must be performed. The simplest adjustment is to substitute mean weights and/or variances from pooled strata. Prior analysis of the data is necessary to determine homogenous strata for pooling.

Computational Steps:

1. Examine the catch estimate data to determine the presence of missing weights and/or variances.

2. If weights and/or variances are missing within a stratum, examine the raw intercept weight data by wave, fishing mode, and fishing area within a state to determine which combinations are most homogenous for substitution. Data may be pooled across years to compensate for yearly variations in sampling the recreational catch or sparse data. This may be particularly important for species with a wide range in length across years, seasons, and/or modes of fishing.

3. Calculate mean weights and/or variances from the raw intercept data for the selected pooling combinations.

4. Substitute the pooled mean weights and/or variances into the estimate records where values are missing.

5. After substitution at the base strata level (for example: state/wave/mode/area), the procedure is repeated using incrementally larger strata (state/wave/mode stratum followed by state/wave, and finally subregion/wave stratum) until all records with Type A or B1 catches have associated weights and variances.

MRFSS data for striped bass during 1992 are used to illustrate this process. The fishing area level of stratification was ignored in this analysis for simplicity. Examination of the catch estimates for striped bass in Connecticut and Delaware shows missing weight and variance estimates for several waves and modes (Table 12). There are missing variance estimates for Connecticut in waves 2, 3, 4, and 5; however, not all of these missing variance estimates need adjustment. In several strata, no striped bass of Catch Type A or B1 were reported; therefore, there are no weight or variance estimates since the MRFSS does not estimate weights for released fish. Examination of the observation for wave 5 in Connecticut shows that striped bass Catch Types A and B1 were reported, but no associated weight or variance estimates were calculated for this stratum because no fish were weighed. For Delaware, only the observation for wave 5 needs to be adjusted. This stratum has an estimated mean weight value but no associated variance estimate due to the measurement of only one fish.

Table 12. Striped bass MRFSS data with missing weight and/or variance estimates, 1992. Periods indicate missing data.

Wave	State	Mode	Mean Weight (kg)	# Type A Fish Harvested	# Type B1 Fish Harvested	Estimated Weight of Catch	Estimated Variance of Catch
2	CT	P/R	0.00	0.00	0.00	0.00	.
3	CT	P/C	2.89	797.71	0.00	2,305.37	624,247.21
3	CT	S	0.00	0.00	0.00	0.00	.
4	CT	P/C	9.70	408.54	1,021.34	3,962.80	163,564.04
4	CT	S	0.00	0.00	0.00	0.00	.
5	**CT**	**P/C**	**.**	**15.45**	**7.27**	**0.00**	**.**
2	**DE**	**P/R**	**5.50**	**69.92**	**0.00**	**384.54**	**.**
3	DE	S	4.90	2,392.71	0.00	11,724.28	8,415,842.49
3	DE	P/C	0.00	0.00	0.00	0.00	.
4	DE	P/R	0.00	0.00	0.00	0.00	.

Mean weights and variances were calculated from all modes combined within a state and wave to adjust for missing mean weights and variances (Table 13). However, if no data was present at the state/wave level, as was the case for Connecticut Wave 5 and Delaware Wave 2, pooling was conducted at the subregion/wave level. Before substitution at the state/wave level, 48 records had incomplete weight and variance estimates (Table 14). After the first substitution, 28 records at the state/wave/mode level were corrected. A second iteration was necessary at the subregion/wave level to adjust for the 20 records still uncorrected. Missing weight and variance data may still exist after this iteration if mean weights and variances are missing at the subregion level. Further pooling would be needed until all records are complete.

Table 13. Striped bass MRFSS data with substitute values for missing weight and variance estimates. Substitutions were calculated from pooled mode data within a state and wave or within a subregion and wave. Periods indicated missing data.

Wave	State	Mode	Mean Weight (kg)	# Type A Fish Harvested	# Type B1 Fish Harvested	Estimated Weight of Catch	Estimated Variance of Catch
2	CT	P/R	0.00	0.00	0.00	0.00	.
3	CT	P/C	2.89	797.71	0.00	2,305.37	624,247.21
3	CT	S	0.00	0.00	0.00	0.00	.
4	CT	P/C	9.70	408.54	1,021.34	3,962.80	163,564.04
4	CT	S	0.00	0.00	0.00	0.00	.
5	**CT**	**P/C**	**.**	**15.45**	**7.27**	**0.00**	**.**
2	**DE**	**P/R**	**5.50**	**69.92**	**0.00**	**384.54**	**.**
3	DE	S	4.90	2,392.71	0.00	11,724.28	8,415,842.49
3	DE	P/C	0.00	0.00	0.00	0.00	.
4	DE	P/R	0.00	0.00	0.00	0.00	.

Table 14. Number of records with complete and incomplete weight and variance estimates for striped bass MRFSS data before and after substitution at the state/wave and subregion/wave level.

	Before Substitution	After Substitution
Records with complete weights and variances	44	72
Records with no Type A or B1 catch (no substitution needed)	66	66
Records with incomplete weights and variances	48	20
Total	158	158

The NMFS is currently modifying their estimation programs to automate the adjustment of estimates for missing weights and variances. Those adjustments first pool all modes within a state and wave, followed by subregion/wave pooling. These programs have been applied to the most recently generated 1992 and 1993 MRFSS survey data, therefore, no adjustments should be required of this data. There may be a few missing weights or variances if the subregion/wave level pooling was not adequate to substitute for all remaining missing weights. All historical data prior to 1992 will eventually be processed with these programs. Until this is accomplished, it is necessary for all users of the 1979-1991 MRFSS estimates to perform these adjustments. The pooling combinations used in this manual may not meet the needs of all users or substitute for rigorous analytical examination of the data. Different poolings may be more appropriate for a specific analysis or stock assessment.

Chapter 9.
MISCELLANEOUS TOPICS

Rare Species/Pulse Events

The analysis of catch and effort data for rare species and pulse events is difficult due to the problems associated with collection of accurate and precise data for these fisheries. Rare species are those species only occasionally sampled in the MRFSS intercept survey, while pulse events are caused by highly migratory species or short fishing seasons. The definition of a rare species or pulse event will vary for different regions, states, and areas, and must be defined by each individual user of the MRFSS data prior to initiation of any analysis or stock assessment. The definition may be based on apriori knowledge of the fish species and fishery within the region of study, or can be based on the examination of the variance estimates about the MRFSS catch and effort estimates.

Variances about catch and effort estimates will be extremely high for rare species and pulse event fisheries due to small sample sizes, lack of intensity of MRFSS sampling, or rapid changes in the fishery so that the event would not be detected by any reasonable amount of sampling. There are two major solutions for detection of these fisheries and for possibly decreasing the variances associated with catch and effort estimates. An increase in the level of funding for the MRFSS survey could be used to increase sampling effort to a level that would detect these fisheries. This solution could be implemented through increases to the NMFS budget for MRFSS sampling, through state add-ons to the MRFSS, or by state supplemented sampling. An increase in sampling effort would allow better detection of these fisheries, as well as decrease the variances about catch and effort estimates.

The use of smoothing techniques on the data may also improve detection of these fisheries and also decrease the variances of catch and effort estimates. Moving averages can be applied to the MRFSS data either over time (ie., years, waves) or in space (ie., subregion level data). Disadvantages of applying smoothing techniques include a trade-off between bias and variance, difficulties in data interpretation, and the masking of real fluctuations or trends within the data. The decrease in estimate variances is a beneficial consequence of the application of smoothing techniques, however, consideration must be given to the evaluation of possible biases in the estimates.

Smoothing of the data may also have practical and political implications for fisheries management. Management strategies should be consistent with the level of smoothing. For example, estimates based on subregion smoothing of state level data may no longer be applicable for state management purposes or applying a 3-year running average of yearly data may result in this data being no longer suited for annual management strategies. Smoothing of data may also cause political complications in the management process for the above reasons, as well as due to difficulties in explaining the smoothing technique to the fishing public.

Directed Effort

Several data analyses, including bag limit analyses, require a measure of directed effort for a given species as the measure of fishing effort. Directed effort must be defined prior to performing these analyses. There are various definitions of directed effort that can be applied to the MRFSS data:

1. Inclusion of all anglers who catch a given species. This definition of directed effort ignores all zero catches.

2. Inclusion of all anglers who claim to have targeted a given species. The MRFSS data include the species of fish targeted by the angler. If the target species is used as the definition of directed effort, the analysis will ignore all anglers who reported that they were fishing for no specific species. This definition of directed effort may be influenced by "prestige bias" since the question is asked after the completion of a fishing trip. The angler may have begun the fishing trip targeting for a particular species other than the one caught, but may later report that he was targeting the species caught.

3. Inclusion of all anglers in an area where one angler caught a given species. This definition of directed effort may be used for a species that is known to have a well-defined schooling pattern.

4. Inclusion of any angler who fished in a manner that might have led to a given species being caught. For example, directed effort for summer flounder may be defined as all anglers who were bottom fishing. At the present time, the MRFSS survey is not designed to provide the variables to subset the data on the basis of this definition. Specific fishing techniques for a given species would need to be defined and included in the MRFSS survey questionnaire to identify anglers who were fishing for that particular species.

5. Directed effort could also be defined as any combination of the above definitions.

Various problems may be encountered when attempting to define directed effort for a particular species and also in subsetting the MRFSS data on the basis of these definitions. The MRFSS data may not include the appropriate variable for subsetting data due to the lack of specific questions being asked of anglers during the interview process. Variables contained within the MRFSS datasets should be reviewed to verify that the data can be subsetted appropriately for the definition of directed effort.

Each of the above definitions of directed effort has its own possible measurement method and associated problems. The definition of directed effort should be driven by the overall management objectives for that particular fishery. When defining directed effort for a

fishery it may be necessary to consider the importance of zero catches, with zero catches being necessary for socio-economic studies, but of little importance in bag limit analyses. The consideration of ancillary data, such as a special fishing license, may also assist in defining directed fishing effort.

Chapter 10.
OPTIMUM STATE ALLOCATION OF ADD-ONS

Increasing sample sizes of the MRFSS telephone and intercept surveys through state add-ons can reduce the overall variance of catch and effort estimates, provide better biological information, and allow optimization of data collection for selected species. The NMFS has developed procedures to assist states in optimizing their state allocations of add-on funds to the MRFSS. These procedures provide the best estimates for the money by offering guidance when making trade-offs between the telephone and intercept survey. However, they will only provide a guideline to the most effective allocation scheme and will not provide all the necessary decisions for proper management. Someone within the state with knowledge of the fisheries of interest, the relative importance of the various species, and the need for management information must be available to arrive at the necessary compromises.

The steps suggested by the NMFS for optimal allocation are to first allocate samples across waves and then allocate samples between the telephone and intercept surveys within each wave. The allocation method across waves is based on standard sampling theory where the larger waves and waves with higher variances are allocated a larger sample. Allocation within a wave is based on minimizing the variance for a fixed cost. It may also be possible to consider cost/benefit ratio in the allocation scheme, although this has not been included in this manual.

The allocation can be based on a single important species, or on a group of important species. States attempting to allocate funds must first decide which species should be included in the allocation process. Some compromise may be required if several species are chosen. Allocation could be performed for each species and then the average of all species used as a compromise, or higher weights may be given to more important species or modes of fishing before averaging. Minor species and fisheries not usually considered in the allocation process may also influence the allocation to varying degrees. The allocation process provides an optimal sampling scheme with no adjustment for the base level of MRFSS sampling. Therefore, individual states need not worry about zero allocations resulting in no estimates for a wave. The base level MRFSS sample will ensure that estimates are available for all waves and species.

Computational Steps:

There are several steps to optimal allocation of add-on funds. A brief outline of the process might go as follows:

1. Decide which species (or group of species) is important.

2. Using these species, allocate the funds across waves.

   A. If several species are chosen, some compromises by be necessary. You cannot simultaneously optimize for more than one species.

   B. If there is a restriction on the season, adjustments will need to be made to ensure that the allocation adds up to 100%. This can be accomplished simply by dividing the percentages from the unrestricted allocation by the sum of the percentages of waves where fishing is allowed.

   C. The allocation should be tempered with common sense. For example, a wave with an allocation of 1% could probably just as well be set to zero. Remember that even the most sophisticated allocation is still based on historical information, so it will never be perfect for the current year. Rounding allocations to the nearest 5% is probably okay.

   D. Considerations of other factors, such as minor species or the need for biological information, may influence the outcome.

3. Now for each wave allocate the funds between the telephone and the intercept portion of the survey. The actual mathematics here are somewhat complicated (details are available from the NMFS), but the basic idea is to allocate the funds in a way that minimizes the variance of the catch estimate. The catch estimate for a given state and wave is basically calculated as:

   $$\text{total catch estimate} = (T) \times (\text{cpue}) \times (1/q)$$

   where T is the estimated number of fishing trips by coastal residents; cpue is the estimated catch per fishing trip for that particular state, wave, and species; and q is the proportion of coastal resident anglers in the intercept survey. Thus the optimal allocation of funds within a wave will be based on the interrelationship of three factors:

   A. The coefficient of variation for the total number of fishing trips by coastal anglers (CV{T}).

   B. The coefficient of variation for the catch per fishing trip (CV{cpue}).

   C. The proportion of coastal resident anglers in the intercept survey (q).

The NMFS can provide estimates of the above for each state, wave, and mode of fishing.

The sampling efficiency is a concept used by statisticians to compare different sampling methodologies. Briefly, this efficiency is measured with something called the "design effect" that compares the variance based on the sampling design in the survey of interest with a simple random sample of the same size. Stratified sampling (the method used in the telephone survey) generally has a design effect that is less than one, indicating that stratification is more efficient than random sampling. Cluster sampling (the method used in the intercept survey), on the other hand, is commonly less efficient than simple random sampling. The relative efficiency of the stratified and cluster sampling will vary from state to state. The NMFS can provide estimates of each for your state.

It should be obvious by now that this part of the process requires a lot of estimates, decisions, and compromises. For example, you may wish to use "average" values of CV's for the entire year, or you may wish to use different estimate for each wave. You may wish to use exact cost figures for your state, or you may wish to use some "average" figure. The relative sampling efficiency is hard to estimate, so you may choose to pool several previous years to get a good estimate. Here again, common sense should help in the decisions. The NMFS can provide some guidance in the decision making process.

Example:

As a simple example, we will go through the optimization process for an add-on for the state of Maryland.

The actual figures a given state uses will depend on many factors, some of which change from year to year and species to species. Thus we will not list all of the many possibilities here. If you are interested in carrying out the optimization for your state, the NMFS can provide you with information similar to that used in this example.

First we decide to concentrate on three species: striped bass, bluefish, and summer flounder. Based on the catch estimates for 1992, we allocate funds across waves for each of the three species as shown in Table 15.

Now for each wave, we need to decide how to apportion the funds between the telephone and the intercept portion of the survey. In this simple example, we will use "average" figures for all waves. The average CV{T} is about 10, the average CV{cpue} is about 3, and the average q is about 0.75. These numbers are based on catch estimates for Maryland for 1992. If we wanted, we could use a different value for each wave, or even for each species/wave combination. The variability of CV{cpue} between different species may be considerable.

Table 15. Allocation of funds across waves for striped bass, bluefish, and summer flounder as an example of optimal allocation of add-on funds to the MRFSS.

Species	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6
Striped Bass	0	0	16	49	22	13
Bluefish	0	0	9	56	32	2
Summer Flounder	0	0	16	59	25	0
"Average"	**0**	**0**	**14**	**55**	**26**	**5**

Finally, for simplicity we will use a relative telephone to intercept cost ratio of 0.10, and a relative telephone to intercept efficiency of 2. These figures are reasonable based on historic MRFSS information. Again, for a given state the NMFS can provide more individualized information if desired.

Given all of the above information, we consult a chart similar to Figure 24 to determine the optimal allocation of funds. In this example, the chart indicates that approximately 26% of the total funds available should be spent on the telephone portion of the MRFSS survey.

Thus as a final step, we take the percent of funds that are allocated to each wave and apportion that percentage between the telephone and intercept survey, giving 26% to the telephone and 74% to the intercept.

Thus we arrive at an optimal allocation of funds as follows:

Survey	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6
Telephone	0	0	2	5	3	1
Intercept	0	0	12	50	23	4

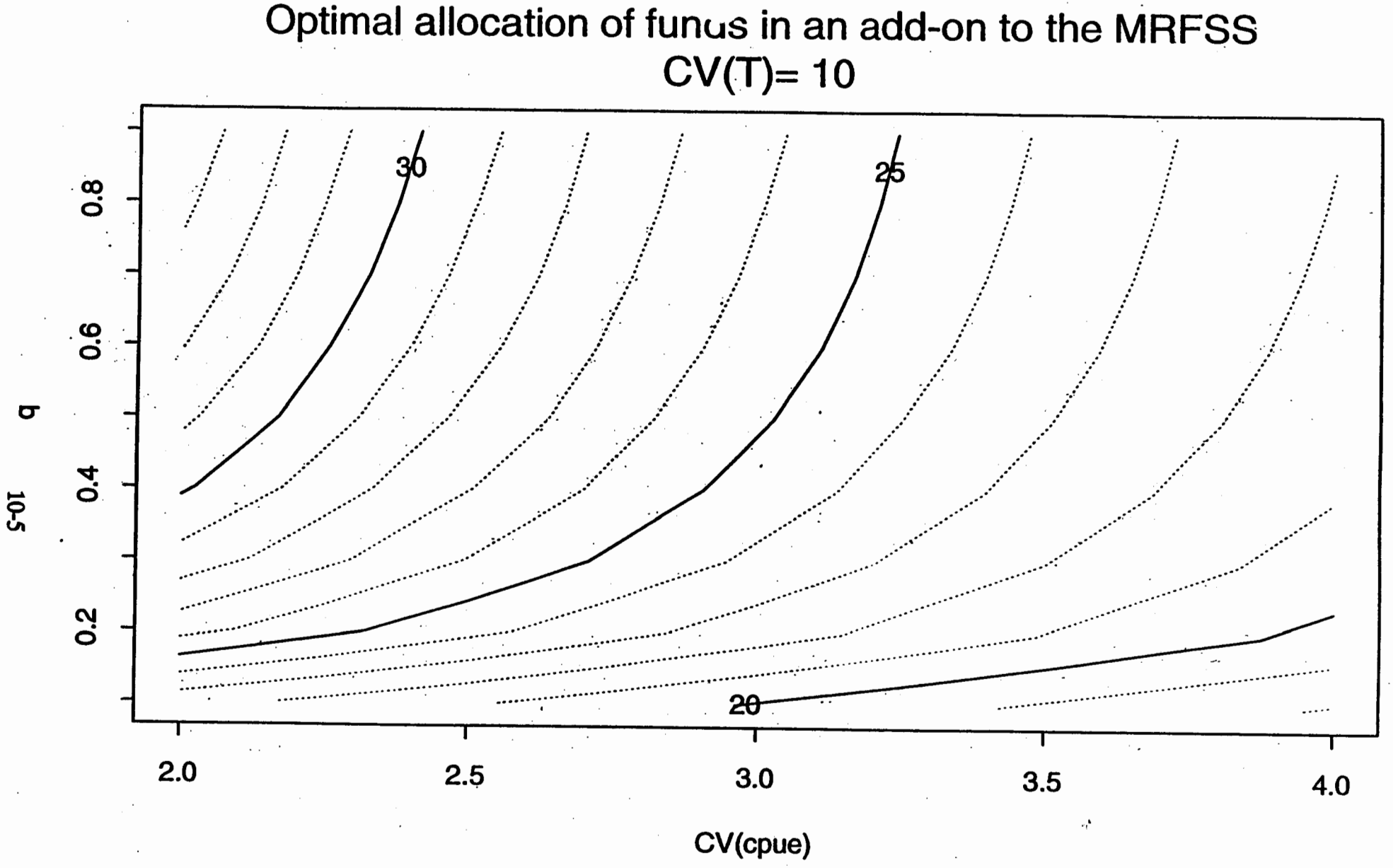


Figure 24. **Optimal percent of funds allocated to the telephone survey as a function of CV(cpue) and q when the telephone/intercept cost ratio is 0.1, the telephone design effect (deff) is 0.2, and the intercept design effect is 2.**

Appendix A. Sample Marine Recreational Fishery Statistics Survey Intercept and Telephone Questionnaires

2. ASSIGNMENT NO. [1] Cross the '1' out & write in a '2' if this is your second assignment today.

Interviewer ID [ ][ ][ ][ ]

4 YR/MO/DAY [9][3] [ ][ ] [ ][ ]

5. INTERCEPT NO. [ ][ ]

6. INTERVIEW TIME [ ][ ][ ][ ] Enter the time this interview was completed.

7. STATE CODE [ ][ ] See your assignment schedule.

8. COUNTY CODE [ ][ ][ ] See your assignment schedule.

9. SITE CODE [ ][ ][ ][ ] See your assignment schedule or your site register.

10. INTERVIEW STATUS [ ]

Questionnaire Complete...1 Language Barrier.....4
Refused Non-Key Item.....2 Refused Key Item.....5
Initial Refusal.....3
(KEY ITEM = *)

This study is being conducted in accordance with the Privacy Act of 1974. You are not required to answer any question that you consider to be an invasion of your privacy.

*11. Would you say you were fishing from (SPECIFY APPROPRIATE MODE COMBINATION)?

SH: Pier, dock . . . . . 1; Jetty, breakwater, breachway . . . 2; Bridge, causeway . . . . . 3; Other man-made structure (SPECIFY) 4; Beach or bank 5
PC: Partyboat . . . . . 6; Charter boat 7
PR: Private or rental boat 8

[ ] 11

*12. Was most of your (SPECIFY MODE) fishing effort today in the ocean/gulf, a sound, river, bay or inlet?
IF SOUND, RIVER OR BAY, ASK: What (sound/river/bay) was that? PROBE TO DETERMINE CORRECT AREA.
Open water (ocean/gulf, open bay) . . 1 GO TO Q.13

[ ] 12

Sound (other than those specified ...2	Other (specify) 5	Hudson/Raritan Est...D	→ GO TO Q.14 & CODE Q.13 AS '8'
River (other than those specified ...3	Narragansett Estuary . A	Delaware Estuary ....E	
Bay (other than those specified ...4	Buzzards Bay Estuary . B	Chesapeake Estuary...F	
	Long Island Estuary .. C	Pamlico/Albemarle ...F	

*13. IF SHORE, CODE '1', GO TO Q. 14. IF PC or PR ASK: Was that 3 miles or less from shore, or more than 3 miles? Three miles or less . . 1 More than three miles . . 2

[ ] 13

14. Were you fishing for any particular kinds of fish today? IF YES, ASK: What kinds?
1ST TARGET: _____
2ND TARGET: _____

[ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]
[ ][ ][ ][ ][ ][ ][ ][ ][ ][ ] 14

15. Have you been fishing here today primarily with a hook and line? Yes . . . 01
IF NO, ASK: What type of gear have you primarily been using?

IF 'NO':
Dip net, A-frame net . 02; Seine . . . . . 05; Spear 08
Cast net . . . . . 03; Trawl . . . . . 06; Hand 09
Gill net . . . . . 04; Trap . . . . . 07; Other (SPECIFY) . . . 10

[ ][ ] 15

16. To the nearest half-hour, how many hours have you spent (SPECIFY MODE) fishing today? That is, how many hours have you actually spent with your gear in the water?

[ ][ ].[ ] 16

17. CODE 88.8 UNLESS YOU ARE INTERVIEWING A BEACH/BANK ANGLER USING THE INCOMPLETE TRIP METHOD. THEN ASK: How many additional hours do you expect to fish from shore today? That is, how many more hours will you actually have your gear in the water today?

[ ][ ].[ ] 17

18. Not counting today, within the past 12 months, how many days have you gone saltwater sport finfishing in this state, or from a boat launched in this state?
Don't know ...998 Refused ... 999

[ ][ ][ ] 18

19. Not counting today, how many days within the past two months?
Don't know ...98 Refused ... 99

[ ][ ] 19

*20. What is your state and county of residence? IF COUNTY UNKNOWN, ASK: What city or town do you live in?

State Name and Code _____
County Name and Code _____

[ ][ ]
[ ][ ][ ] 20

What is the ZIP Code of your residence?
Foreign Country .. 99997 Don't Know...99998 Refused.....99999

[ ][ ][ ][ ][ ] 21

22. Do you live in a private residence, or in some type of housing such as a dorm, barracks, nursing home or rooming house?
Private residence . . . 1 Institutional housing unit ...2 (IF '2' CODE Q.23 '8', GO TO Q.24)

[ ] 22

23. Does your home have a telephone? Yes . . . 1 No . . . 2 [ ] 23

24. In the event that my supervisor wishes to verify that I have been conducting interviews here today, may I have your name and a phone number? [ ] 24
Name and phone provided . . . 1 Name and phone not given . . 9
Angler's Name _____ Angler's Phone Number _____

*25. Did you catch any fish while you were (SPECIFY MODE) fishing today that I might be able to look at? [ ] 25
Yes ..... 1 (If '1', THERE MUST BE AT LEAST ONE TYPE 3 RECORD)
No ..... 2 (IF '2', CODE Qs. 26-28 WITH '8''s, GO TO Q.29.)
Fish on another ... 3 (Type 3 CATCH ON ANOTHER ANGLERS FORM. CODE Q'S 26-28 WITH '8''S, GO TO Q.29
angler's form IF '3', YOU MUST RECORD A TYPE 4 RECORD.)

*26. Did you catch these yourself or did someone else catch some of them? [ ] 26
All caught by angler ..... 1 (CODE Q's. 27-28 with '8''s, GO TO Q.29.)
Other contributors 2

*27. Can you separate out your individual catch? [ ] 27
Yes . . 1 (CODE Q's.28 with '8''s, GO TO Q.29.) No . . 2

*28. How many anglers including yourself have their catch here? Please don't include anyone who did not catch anything. Only count those anglers who have their catch here. [ ][ ] 28

*29. UNAVAILABLE CATCH. Did you land any fish that are not here for me to look at? For example, any you may have thrown back or used for bait? IF YES, COMPLETE TYPE 2 RECORDS BY ASKING: What type of fish did you land? What did you do (do you) plan to do with the (SPECIES)? How many (SPECIES) did you (will you) (DISPOSITION)? NOTE: FILLETED FISH ARE UNAVAILABLE CATCH.

*30. AVAILABLE CATCH. COMPLETE TYPE 3 RECORDS BY ASKING: May I look at your fish? What do you plan to do with the majority of the (SPECIES)?

DISPOSITION CODES FOR Qs. 29-30

Thrown back alive/legal 1	Thrown back dead/Plan to throw away 6
Thrown back alive/not legal/legality refused 2	Some other purpose (SPECIFY) . . . 7
Eaten/Plan to eat 3	Don't Know/Didn't Ask (NOT TYPE 2) 8
Used for bait/Plan to use for bait. 4	Refused (NOT TYPE 2). 9
Sold/Plan to Sell 5	

... IF SHORE CODE 31 and 32 WITH '8'S. GO TO Q.33.
How many people fished on your boat today? IF ONLY 1, CODE Q.32 AS '8'. GO TO Q.33. [ ][ ] 31
*32. Are you the first person on your boat I have interviewed? [ ] 32
Yes ...1 No ... 2 IF 'NO', COMPLETE TYPE 6 RECORD.

33. NUMBER OF TYPE 2 RECORDS: ENTER NUMBER OF LINES FILLED OUT FOR CATCH UNAVAILABLE FOR INSPECTION. [ ][ ] 33

34. NUMBER OF TYPE 3 RECORDS: ENTER NUMBER OF LINES FILLED OUT FOR CATCH AVAILABLE FOR INSPECTION. [ ][ ] 34

35. IS THERE A TYPE 4 RECORD LISTED BELOW? YES . . . 1 NO . . . 0 [ ] 35

36. IS THERE A TYPE 5 RECORD LISTED BELOW? YES . . . 1 NO . . . 0 [ ] 36

37. IS THERE A TYPE 6 RECORD LISTED BELOW? YES . . . 1 NO . . . 0 [ ] 37

*38. TYPE 4 RECORD.
INTERVIEW # WITH ANGLERS TYPE 3 RECORDS ON IT [ ][ ]

*39. TYPE 6 RECORD.
INTERVIEW # WITH ANGLERS TYPE 3 RECORDS ON IT [ ][ ]

*29. TYPE 2 RECORDS.
(CATCH UNAVAILABLE IN WHOLE FORM)

		SPECIES CODE	DISP	# OF FISH	
1. _____	2				1.
2. _____	2				2.
3. _____	2				3.
4. _____	2				4.
5. _____	2				5.

*30. TYPE 3 RECORDS. (CATCH AVAILABLE IN WHOLE FORM)

		SPECIES CODE	# OF FISH	LENGTH (mm)	WEIGHT (kg)	DISP
1.	3				.	
2.	3				.	
3.	3				.	
4.	3				.	
5.	3				.	
6.	3				.	
7.	3				.	
8.	3				.	
9.	3				.	
10.	3				.	
11.	3				.	
12.	3				.	
13.	3				.	
14.	3				.	
15.	3				.	

RECREATIONAL FISHING QUESTIONNAIRE
SCREENING QUESTIONNAIRE

Wave 5, 1993 | Connecticut |

Hello, I'm calling long distance for a survey being conducted for the National Marine Fisheries Service of the U.S. Department of Commerce. We're surveying recreational fishermen in various Connecticut counties. Your telephone number has been selected at random.

Q1. To help me assign your information to the correct location, do you live in _____ county?

Q2. Is this your permanent, year-round residnece?

Q3. Does anyone in this household go fishing? (IF NONE, THANK & TERMINATE)

Q3a. We want to gather information from people who have been saltwtaer sportfishing for finfish, not shellfish, in the last 12 months. Saltwater fishing includes fishing in oceans, sounds, bays, or in tidal or brackish portions of rivers. How many people in your household have been saltwater sportfishing in the last 12 months in Connecticut or from a boat launched from Connecticut? (IF NONE, THANK & TERMINATE)

Q4a. Thinking just about the past 2 months, how many people in your household have been saltwater sportfishing in Connecticut or from a boat launched from Connecticut? (IF NONE, THANK & TERMINATE)

Are you that fisherman/one of those fishermen? (GO TO APPROPRIATE INTRODUCTION)

INTRODUCTION WHEN RESPONDENT IS FISHERMAN)

I'd like to ask you a few questions about your most recent finfishing trips. This survey is being conducted in accordance with the Privacy Act 10 1974, therefore you are not obligated to answer any question if you find it to be an invasion of your privacy.

INTRODUCTION WHEN OTHER FISHERMAN IN HOUSEHOLD COMES TO THE PHONE)

Hello, I'm conducting a survey on saltwatersportfishing for the National Marine Fisheries Service. By saltwater fishing, I mean fishing in oceans, sounds, bays, or in tidal or brackish portions of rivers. For the purpose of this survey, it includes only fishing for finfish, not shellfish. I understand that you've been saltwater fishing in the past 2 months, and I'd like to ask you a few questions about your most recent trips. This survey is being conducted in accordance with the Privacy Act 10 1974, therefore you are not obligated to answer any question if you find it to be an invasion of your privacy.

FISHING QUESTIONNAIRE

Again, we're interested in those trips where you went after finfish, whether you caught any or not, and in those trips where you might have been going after shellfish, but caught finfish. We're not interested in any trips hwere your main purpose was to catch fish which you would sell to make money.

Q1. How many times did you go saltwtaer sportfishing during the past 2 months, that is, between (date) and (date)?

Q2. Please list the dates of your saltwater sportfishing trips during the past 2 months, starting with your most recent trip and working backwards in time. I have a calender here in front of me so I can help you with the dates.

Q2a. When did you last go fishing? (ASSIGN TRIP NUMBER AND RECORD DATE. IF DON"T KNOW DATE< ASK MONTH & IF WEEKEND OR WEEKDAY.)

Q2b. Were you fishing from a pir, a jetty, a beach. a bank, or a boat? (IF MORE THAN ONE MODE WITHIN A MODE CATEGORY, CODE THE ONE USED LAST THAT DAY. IF MORE THAN ONE MODE CATEGORY, CODE AS 2 SEPARATE TRIPS WITH THE SAME DATE.)

Q2c. If boat, was that a party boat, a charter boat, or a private or rental boat?

REPEAT QUESTIONS Q1-2a-c. UNTIL ALL TRIPS FOR THE PAST 2 MONTHS HAVE BEEN COVERED. THEN GO TO Q3.

Now, I'd like a little more information about each of the trips you just mentioned. (STARTING WITH THE 1ST TRIP MENTIONED, ASK Q3.-7 FOR EACH TRIP BEFORE GOING ON TO THE NEXT TRIP)

Q3. (IF PRIVATE BOAT, ASK) Thinking about your trip on (date), does the public have access to the place where your boat left from or is it private?

(IF PUBLIC, ASK) Was it a launch ramp, boat slip, moored from a dock or something else?

(IF PRIVATE, ASK) Was it a personal residence or dock, a private locked gate marina, a private property unlocked marina, or something else?

(ALL OTHER MODES, ASK) Thinking about your trip on (date), does the public have access to this fishing site or is it private?

Q4. (IF BOAT, ASK) What time did your boat return? (IF NOT BOAT, ASK) What time did you stop fishing?

Q5. Was most of your effort that day in the ocean, sound, river or bay?

(PROBE RIVER) Were you fishing in the lower part of the river which is brackish or affected by tides? (IF NO, DISREGARD TRIP; IF YES, CONTINUE).

(PROBE BAY) Was that an open bay or an enclosed bay? (IF OPEN BAY CODE OCEAN)

(PROBE INLET) Were you more toward the outside or more toward the inside of the inlet? (IF OUTSIDE INLET CODE OCEAN)

Q6. (IF BOAT,ASK) To what coastal county did your boat return to? (IF NOT BOAT,ASK) In what coastal county were you fishing?

(VERIFY PHONE #, THANK & TERMINATE)

Appendix B. Variable Codes, Marine Recreational Fisheries Statistics Intercept Survey

KEY NO.	VARIABLE	DESCRIPTION
TYPE 1 RECORDS:		
1	Rectype	Record Type, on ASCII files only 1=background info on fisherman 2=Type B catch (unavailable) 3=Type A catch (available) 4=group fishermen (identifies interview on which fisherman's catch is recorded) 5=socioeconomic data 6=party fisherman (identifies interview of 1st member of fishing party)
2	Surtyp	Survey Type (ASCII only) / Assignment # **1979** 1=telephone survey 2=Intercept finfish survey 3=Shrimp survey 4=Spiny lobster survey 5=Dungeness crab survey **1980** 2=Intercept finfish survey **1981-1986** 1=Intercept finfish survey 2=Shrimp survey 3=Spiny lobster survey **1987-1988** 1=Intercept finfish survey
	Assign	**1989-1994** (ASCII data only, in ID_CODE on SAS files) 1=first assignment 2=second assignment
3	Intvuer	Interviewer Number (ASCII only, in ID_CODE on SAS files) **1979-1980** First digit was a data collector code: 1=HSR, 2=SMS, 3=Clapp and Mayne, 4=Pacific States Marine Fisheries Commission
4	Year	Year of survey (last two digits)
5	Month	Month of survey, 01=January, etc.
6	Day	Day of survey (ASCII only, in ID_CODE on SAS files)

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
TYPE 1 RECORDS (Cont.):		
7	Intnum	Interview number (begin with 1, consecutive within interviewer/ site/date combination) (ASCII only, in ID_CODE on SAS files)
8	ID_CODE	Combination of variables 2 through 7 provides a unique code for each individual interview.
9	Time	Time interview conducted (2400hrs)
10	Sub_reg	Subregion Code 1=Southern California 2=Northern California 3=Oregon and Washington 4=North Atlantic (ME;NH;MA;RI;CT) 5=Mid-Atlantic (NY;NJ;DE;MD;VA) 6=South Atlantic (NC;SC;GA;EFL) 7=Gulf of Mexico (WFL;AL;MS;LA)
11	St	FIPS state code
12	Cnty	FIPS county code
13	Intsite	Interview site code - unique within states
14	Status	Completion status of interview (ASCII data only) **Note:** Interviews with the status codes of 3-6 are tallied but not key-entered in the data base. That is why there may be missing INTNUM's within a site/day. **1979** AG (Atlantic and Gulf coasts) and PC (Pacific coast), **1980** PC only 1=Agrees to interview (Questionnaire usable) 2=Refuses interview 3=Language barrier, etc. 4=Refuses after start, not usable **1980** AG only, **1981-1993** AG and PC 1=Questionnaire completed 2=Refused non-key item, questionnaire usable 3=Initial refusal 4=Language barrier, etc. 5=Refused key item, questionnaire not usable **1994, ME-VA** 6=Refused MRFSS due to Economic add-on

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION

TYPE 1 RECORDS (Cont.):

15	Mode_fx	Collapsed fishing mode code 1=Man-made shore 2=beach/bank 3=Shore (1 and 2 collapsed) 4=Party boat (sub_reg=6 or 7 & mode_f=6) 5=Charter boat (sub_reg=6 or 7 & mode_f=7) 6=Party/Charter boat (sub_reg=4 or 5 & mode_f=6 or 7) 7=Private/Rental Boat
16	Mode_f	Fishing Mode - Uncollapsed 1=Pier, dock 5=Beach or bank 2=Jetty, breakwater, breachway 6=Partyboat 3=Bridge, causeway 7=Charter boat 4=Other man-made 8=Private/Rental boat **Note:** 1979-82 AG and PC, 1983 PC, there were 2 questions for mode: interviewer's and angler's. Mode_f contains the angler response. Interviewer's is mode_I, key no. 55.
17	Area_x	Collapsed area of fishing 1=Ocean <= 3 mi (all but WFL and TX) 2=Ocean > 3 mi (all but WFL and TX) 3=Ocean <= 10 mi (WFL and TX only) 4=Ocean > 10 mi (WFL and TX only) 5=Inland 6=Unknown
18	Area	Uncollapsed area of fishing 1=Ocean 2=Sound 3=River 4=Bay 5=Other 6=Don't know (DK), PC only, disc. 1986 **Estuary Codes 1985-1994** A. Naragansett B. Buzzards C. Long Island D. Hudson/Raritan E. Delaware F. Chesapeake G. Albemarle/Pamlico H. Biscayne I. Whitewater J. Sarasota K. Tampa L. Mobile M. Atchafelaya N. San Francisco P. Puget Sound Q. Galveston R. Oceanside (MD) S. Potomac River (MD) **Note:** Other collapses into 5=Inland in area_x **Note:** These codes apply only to cleaned-up data sets supplied with re-estimated "new" estimates. For uncleaned data sets, codes differ from year to year.

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
TYPE 1 RECORDS (Cont.):		
19	Dist	Distance from shore **1979, 1980** PC only: 1. >3 miles, 2. <=3 miles, 3. DK, 9. Refusal (R), **1980** AG only, **1981-1994** AG and PC: 1. <= 3 miles, 2. > 3 miles, 3. >3 & <=10 miles (WFL & TX only), 4. >10 miles (WFL & TX only), 6. DK, PC only 1984-1985, 8. NA
20	Prim1	Primary species sought (see NODC codes)
21	Prim2	Secondary species sought (see NODC codes)
22	Gear	Primary Gear used 1=hook & line 2=dip/A-frame net 3=cast net 4=Gill net 5=Seine 6=Trawl 7=Trap 8=Spear 9=Hand 10=Other 99=R, 1979, 1980 PC only, 1989 AG
23	Hrsf	Hours fished (nearest 1/2 hour): **1979** To the nearest half hour, how many hours have you spent "mode" fishing today with your gear in the water? **1980-1982** - To the nearest half hour, how many hours have you spent "mode" fishing today? An additional question was asked about how much time the gear was actually in the water (key note 60). **1983-1985**, AG an PC, **1986** PC only - To the nearest half hour, how many hours have you spent "mode" fishing today? No prompt on time gear in the water. **1986** AG only, **1987-1994** AG and PC. To the nearest half hour, how many hours have you spent "mode" fishing today? That is, how many hours have you actually spent with your gear in the water? 99.8=DK, 99.9=R
24	Add_hrs	Additional hours fishing expected. Beginning 1990?, shore mode trips only. **1979** 00.0=complete trip/NA. **1980-1985** AG and PC, **1986** PC only. **1987-1994** AG and PC, 88.8=NA
25	Ffdays12	Not counting the survey day, the number of days fished in the last year: 998 = DK, 999=R
26	Ffdays2	Not counting the survey day, the number of days fished in last 2 months: 98 = DK, 99=R

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
TYPE 1 RECORDS (Cont.):		
27	Sex	**1979** AG & PC, 1=Male, 2=Female, 3=unknown, 9=R/not asked **1980** PC only **1981** AG through July, PC **1982** PC only **1983-1984:** Not asked. **1985** PC only. **1986-1992** AG&PC, **1993-1994** PC only.
28	Age	**1979** Ag and PC, **1980** PC only 01=<5 years 02=5-13 03=14-17 04=18-24 05=25-34 06=35-44 07=45-54 08=55-64 09=65+ 99=R **1980** AG only, **1981** AG and PC, discontinued on AG in August 1981 0=<5 years 1=5-13 2=14-17 3=18-24 4=25-34 5=35-44 6=45-54 7=55-64 8=65+ Blank/missing=R **1982-1984** Not asked. **1985** PC only, actual age coded, 98=DK, 99=R. **1986-1992** AG and PC, actual age coded. 98=DK, 99=R. **1993-1994** PC only.
29	St_res	FIPS code for state of residency, special codes for other countries
30	Cnty_res	FIPS code for county of residency, 998 used for other countries
31	Reg_res	Subregion code for region of residency
32	ZIP	**1988-1994** ZIP code, 99997=foreign country, 99998=DK, 99999=R
33	Pvt_res	Live in private residence **1979** AG and PC. **1980** PC, This question was combined with telefon, key note 33. **1980** AG only. **1981-1994** AG and PC. 1=Yes, 2=No, Institutional housing, 9=R.

KEY NO.	VARIABLE	DESCRIPTION
TYPE 1 RECORDS (Cont.):		
34	Telefon	Does home have phone? **1979** AG and PC, **1980** PC only 1=Private residence and have home telephone 2=Private residence, but no telephone 3=Institutional housing (NA) 9=R **1980** AG only, **1981-1994** AG and PC 1=Yes, 2=no, 8=NA, 9=R
35	Add_ph	Phone # provided for verification **1979-1980** AG only **1981-1986** AG only, 1=Phone number provided, 2=Address provided, 3=Phone and address R. **1987-1988** AG and PC, 1=Yes, 2 = No, 9=R **1989-1994:** AG and PC, 1=name and phone given, 9=R
36	Catch	Did you catch any fish **1979** AG and PC, **1980** PC only, 1=Yes 2=No, **1980** AG only, **1981-1994** AG and PC, 1=Yes, 2=No, 3=yes, described on other form
37	F_by_p	All fish caught by individual **1979** AG and PC. **1980** PC only, fishermen were asked if they could separate their catch, if not, the number of contributors. Before producting the final tape, all fish were parceled out to separate fishermen, the number of contributors was set to 0 if no catch or 1 if there was catch, the number of type 4 records was set to zero, and all type 4 records were deleted. **1980** AG only, 1=yes, 2=no, 8=NA **1981** AG through July, PC,1=yes, 2=other contributors, 3=NA/no available catch on this form (this may have been a typo on the interview form and needs to be checked). **1981** AG Aug-Dec, **1982-1994** AG and PC, 1=Yes, 2=other contributors, 8=NA/no available catch on this form
38	Sep_fish	Can group catch be separated **1979** AG and PC, **1980** PC only, see F_by_p. **1980**, AG only, **1981-1994** AG and PC, 1=Yes, 2=No, 8=NA/all caught by fisherman or no available catch on this form

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
TYPE 1 RECORDS (Cont.):		
39	Cntrbtrs	Number of contributors to catch, **1979** AG and PC, **1980** PC only, See F_by_p. **1980** AG only, **1980-1994** AG and PC, 88=NA/all caught by fisherman or no available catch on this form
40	Party	**1991-1992** AG only, **1993-1994** AG & PC, no. people in party
41	First	**1991-1992** AG only, **1993-1994** AG and PC, first person in party to be interviewed: 1=yes, 2=no
42	Num_typ2	Number of type 2 records present
43	Num_typ3	Number of type 3 records present
45	Num_typ5	Type 5 record present **1983** PC only, Type 5 records were collected, but the questionnaire does not indicate this variable was coded. **1987** AG and PC ?, **1990** South Atlantic and Gulf charter boats only, **1994**, Northeast region, waves 3-6 only: 0=No, 1=Yes
45	Gleader	**1980-1994**, Group Leader. ID_CODE of the form that contains the group catch information.
46	Pleader	**1991-1994**, Party Leader. ID_CODE of the first person interviewed in a party.
47	Year	Year of survey
48	Wave	Wave of survey
49	Date1	Date file created
50	Weekday	Day of the week (1=Sunday, 2=Monday, etc.)
51	Coastal	Resides in a coastal/non-coastal county according to the wave for the telephone survey. Y=yes, N=no.

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
TEMPORARY SPECIALIZED QUESTIONS:		
52	Punch	**1979-1989, 1993-1994** PC only, In 1981, this is not present on example questionnaire, but I believe it was asked. Washington punch card area (00 for areas other than Washington fishing). Codes are 00 to 13.
53	Rig	Fishing near an artificial reef or oil/gas platform **1980-1981** MS, LA & TX boat mode fishing in open ocean only - fish near an oil or gas platform (within 200 feet)? 1=Yes, 2=No, 3=DK **1982-1983** Not asked. **1984-1986** Gulf only, all boat fishing. fish within 200 feet of an oil/gas platform or an artificial reef only?: 1=No, 2=near oil or gas platform, 3=near artificial reef, 8=NA **1987** NC, SC, GA, EFL, WFL, Al, MS, LA, all boat mode fishing, fish within 200 feet of an oil/gas platform or an artificial reef? 1=No, 2=near oil or gas platform, 3=near artificial reef
TYPE 1 RECORDS TEMPORARY SPECIALIZED QUESTIONS (Cont.):		
53	Rig	**1988-1988** VA to LA, **1989** Mid Atlantic, South Atlantic and Gulf, all boat mode fishing. fish within 200 feet of an oil/gas platform or an artificial reef?" 1=No, 2=near oil or gas platform, 3=near artificial reef, 88=NA **1990-1992** Mid-Atlantic, South Atlantic and Gulf. **1993-1994** NC only, Mid-Atlantic phrasing: was most of your boat fishing today within 200 feet of an artificial reef? 1=No 3=near artificial Reef. Region III, fish within 200 feet of an oil/gas platform or an artificial reef? 1=No, 2=near oil or gas platform, 3=near artificial reef, 88=NA
54	Lingo	Language of respondent **1979** AG and PC, **1980** PC only 1=English 2=Spanish 3=French 4=Italian 5=Japanese 6=Chinese 7=Filipino 8=Korean 9=American Indian 10=Nat. Alaskan (Eskimo,Aleut) 11=Other 12=Unknown **1980** AG only, **1981** AG and PC 1=English 2=Spanish 3=Other 4=Unknown

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
TYPE 1 RECORDS TEMPORARY SPECIALIZED QUESTIONS (Cont.):		
55	Mode_I	**1979-1983** Mode of fishing estimated by the interviewer, same numeric codes used as for mode_f.
56	Site_oth	**1979** AG and PC, **1980** PC only, if fished at another site in the same mode on the same day, the total number of sites fished that day. 01=No fishing at other spots.
57	Mode_oth	**1980** AG only, **1981-1983** AG and PC, Any other mode fished that day? 1=Yes, 2=No.
58	Mode_sep	**1980** AG only, **1981-1983** AG and PC, can catch be separated by mode? 1=Yes, 2=No, 8=NA.
59	Tot_mode	**1980** AG only, **1981-1983:** If catch could not be separated, the total number of modes fished was coded. 8=NA.
60	Prim3	**1979** AG and PC, **1980** PC only, up to 3 preferences coded.
61	St_water	**1979-1984** AG and PC, **1985** AG only, if boat mode, angler asked in what state's waters was *most* of the effort. For shore mode, the state of intercept was entered. State FIPS codes: 98=DK, 99=R
62	Gear_no	**1979** AG and PC, **1980** PC only, total units of gear used
63	Gear_H20	**1980** AG only, **1981-1982** AG and PC, how much time spent with gear actually in the water? 88.8=NA
64	Ff12_oth	**1979** AG and PC, **1980** PC only, fishing days in the last 12 months in *other* states.
65	Ff2_oth	**1979** AG and PC, **1980** PC only, fishing days in the last 2 months in *other* states.
66	Miles	**1979-1981** AG and PC, AG discontinued in August 1981, **1985** PC only, miles to get to the site from where the respondent stayed the night before, with no side trips. 0=<0.5 miles. **1986** AG and PC, 9998=DK, 9999=R.

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
TYPE 1 RECORDS TEMPORARY SPECIALIZED QUESTIONS (Cont.):		
67	Cost	Cost of fishing that day at that site, not including gas for car. On PC a prompt was used to include gas for the boat. A prompt sheet of common expenses was shown. **1979-1980** AG and PC, **1981** PC only.
68	Tourn	**1989** Boat modes only, Mid-Atlantic and Region III, **1990** Boat modes only, Region III, **1991** Region II and III, **1992** AG, in NY the Region III question was asked. **1993-1994** NC only. Region II Question: Were you fishing in a tournament today? If yes, was that a tournament lasting < =7 days directed at 1 or more gamefish? Gamefish include tuna, sharks, billfish, and bluefish. Region III Question: Were you fishing in a tournament today? If yes, was that a tournament lasting < =7 days directed at 1 or more gamefish? Gamefish include king mackerel, Spanish mackerel, dolphin, tuna, sharks, wahoo, and billfish. Codes: 1=Yes, 2=No, 8=DK, 9=R.
69	Seals	**1989** PC only, see any seals or sea lions in the immediate vicinity of your fishing gear? 1=Yes 2=No
70	Few_fish	**1989** PC only, opinion, did presence of seals or sea lions cause you to catch fewer fish today? 1=Yes, 2=No, 3=DK
71	Rem_fish	**1989:** PC only, Did those seals remove or damage a fish while it was on/in your gear? 1=Yes, 2=No, 3=DK
72	NYreefhr	**1990-1992** New York boat modes only, Number of hours fished on 8 NY managed artificial reefs, map used. 88.8=NA, 99.9=R.
73	Turtle	Sea turtle sightings, **1989-90** NC only, 1=yes, 2=no, **1991-1992** AG only, **1993-1994** NC only, 1=yes, alive 2=yes, dead, 3=no

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
TYPE 1 RECORDS TEMPORARY SPECIALIZED QUESTIONS (Cont.):		
74	Area_NC	Alpha/numeric codes for water bodies in North Carolina, **1988-1994** 6=Alligator River 7=Bay River 8=Cape Fear River A=Chowan River B=Lockwood Folly River C=Neuse River D=New River E=Newport River F=North River - Carteret County G=North River - Currituck River H=Pasquotank River J=Perquimans River K=Roanaoke River L=Shallotte River M=Tar-Pamlico River N=White Oak River P=Albemarle Sound Q=Bogue Sound R=Core Sound S=Croatan Sound T=Currituck Sound U=Masonboro Sound V=Pamlico Sound W=Roanoke Sound X=Stump Sound Y=Topsail Sound Z=Intracoastal Waterway
75	Blength	Boat length in feet, **1991-1994** North Carolina only
76	Disto	**1992** AG only, **1993-1994** NC only. Other fishing area opposite from primary fishing area, 1=sound/river/bay, 2=Ocean, 3=no, 4=DK
77	Mass	**1992** Region II - MA, ME, NH only 1=Gulf of Maine, 2=Georges Bank, 3=no/NA
78	Cnt_elg	**1993-1994** PC only, Number of eligible anglers not interviewed, on last interview record for a day and site.

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
TYPE 2 AND 3 RECORDS:		
79	Sp_code	NODC species code
80	Dispo/ Disp3	Disposition of fish, **1979-1987** Type 2 record only, **1988-1994** Type 2 and 3 records, Dispo on type 2 and Disp3 on type 3 records. **Note:** More than one disposition code per species is allowed on type 2 records; for type 3 only 1 disposition code is allowed amd applies to the majority of fish caught. 1=thrown back alive/legal 2=thrown back alive/not legal/legality refused (begun 1991) 3=eaten/plan to eat 4=used for bait/plan to use for bait 5=sold/plan to sell 6=thrown back dead/plan to throw away 7=some other purpose (specify) 8=DK (type 3 record only) 9=R (type 3 record only) **Note:** These codes apply only to cleaned-up data sets supplied with re-estimated "new" estimates. For uncleaned data sets, codes are different form year to year.
81	Num_fish	Number of fish - B1 type catch, dead but not seen and identified by interviewers, and B2 type catch, released alive, are on type 2 records. B1 vs B2 is determined by the disposition code "dispo". This variable is additive across records
	Fshinsp	A type catch, seen & identified by interviewers, on type 3 records. This variable is repeated on every record for a species and is not additive.
82	Lngth	Type 3 records only: AG - Fork length (mm), 999.9 = missing, PC -varied
83	Wgt	Type 3 records only: AG, Weight to nearest 0.1 kg, 999.9=missing; PC, to nearest 0.01 kg, 999.99=missing
84	Calc_wt	Type 3 records only. **1993-1994** PC only, indicates whether the weight is calculated from weight-length regressions or measured.

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
Type 5 Records		**1983** PC only, Questions listed in the order asked.
85	Days	"How many days are you spending away from home on current trip?" If one day go to Miles_R. More than one day, go to Purpose.
86	Purpose	"Do you have other important purposes for this trip away from home than fishing and fishing-related activities? (Such as visiting relatives or attending a business meeting) 1=yes, go to Miles_S, 2=no, go to Miles_R.
87	Miles_S	How many miles is it from the place you stayed last night to this fishing site? 9998=DK, 9999=R. go to Car_Pass
88	Miles_R	How many miles is it from your home to this fishing site? 9998=DK, 9999=R.
89	Car_Pass	If you traveled by car today to this fishing site, how many people came with you in the car?
90	Employed	What is your current employment status? 1=employed, 2=retired, 3=other.
Type 5 Records		**1987** AG and PC
86	Purpose	What was primary purpose of trip away from home? For fishing or for some other activity? 1=For fishing, go to Miles_R., 2=Other than fishing, go to Miles_S.
88	Miles_R	If primary purpose was for fishing, to the nearest mile, how many one-way miles was it from your residence to this fishing site? 9998=don't know, 9999=refusal. Go to Trip_Day.
87	Miles_S	If primary purpose was for other than fishing, to the nearest mile, how many one-way miles was it from where you stayed last night to this fishing site? 9998=DK, 9999=R.
85	Days	Including today, how many days make up your fishing trip? 98=DK, 99=R.
91	Zip	What is the zip code of your residence? 99998=DK, 99999=refusal **1990** AG only, **1991** South Atlantic and Gulf charterboats only. Questions listed in the order asked.

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
Type 5 Records (Cont.)		**1987 AG and PC**
92	Cnty_12	Of the "X" trips you reported taking in this state in the past 12 months, how many were taken in this county?
93	Targ_12	How many of those trips did you target for "First Species Preference"/no particular species?
94	Cnty_2	Of the "X" trips you reported taking in this state in the past 2 months, how many were taken in this county?
95	Targ_2	How many of those trips did you target for "First Species Preference"/no particular species?
90	Employed	Are you currently employed? 1=Yes, 2=No
96	Wagelost	Are you giving up wages to take this trip? 1=Yes 2=No **Note:** If person is away from primary residence more than 30 days, the local home should be used for the following questions.
86	Purpose	What was primary purpose of trip away from home? For fishing or for some other activity? 1=For fishing, 2=Other than fishing
97	Day_trip	Is this a day trip for you, or will you be spending at least one night away from home? 1=day trip, end of questions. 2=spending at least one night, continue with next two questions.
85	Days	How many total days will the trip last?
98	Fish_day	How many days will involve fishing?

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
Type 5 Records		**1994** AG, Northeast Region only. Questions listed in the order asked.
97	Day_trip	Are you on a one-day fishing trip or was this day of fishing part of a longer trip in which you plan to spend at least one night away form your residence? 1=day trip, go to Timesite, 2=spending at least one night, continue with next questions, 8=DK, 9=R.
85	Days	How many days will you be away from your residence on this trip? 88=DK, 99=R.
98	Fish_day	How many days of this trip will be spent fishing? 888=DK, 99=refused.
99	Lodexp	How much did you, personally, pay for lodging on this trip? 888=DK, 999=R.
100	Timetrav	How long did it take you to travel one-way from your residence to those lodgings? 888=DK, 999=R.
86	Purpose	Would you have made this trip if you did not go fishing? 1=Yes, 2=No, 8=DK, 9=R.
101	Timesite	How long did it take you to travel from where you stayed last night to the fishing or boat site? 888=DK, 999=R.
102	Timeboat	Boat modes only. How long did it take you to travel from the boat launch site to the first fishing site? 888=DK, 999=R.
103	Travexp	How much did you, personally, spend to travel from your residence to the fishing or boat launch site (one-way)? Please consider expenditures on travel fares, gas, tolls, ferry and parking fees. 8888=DK, 9999=R.
104	Followup	I appreciate your time for this interview. There is another part to this survey that involves a follow-up by telephone. Would you be willing to participate in that follow-up survey? 1=Yes, 8=DK, 9=R. **Note:** The followup interview is recorded on record type 7.

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
Type 7 Records		**1994** AG, Northeast Region only. Questions listed in the order asked.
105	Targ_gen	Counting the day you were interviewed you stated that you fished _____ days within the past 2 months (Q.19. MRFSS). On how many days did you target bluefish, striped bass, black sea bass, summer flounder, Atlantic cod, tautog or scup (substitute weakfish for scup in the Mid-Atlantic). 888=DK, 999=R.
106	Targ_sp	On the day you were interviewed you stated that you targeted _____ on that trip (Q.14. MRFSS). On how many days within the past 2 months did you target _____ (insert species). 888=DK, 999=R.
107	Visit	On how many days within past 2 months did you fish at the site where the interview took place? 88=DK, 99=R.
108	Targ_ste	On how many of those days (fished at site where interview took place) did you target _____ (Q.2., target species). 88=DK, 99=R.
109	Ovtrip	How many overnight trips did you take during the past 2 months? 88=DK, 99=R.
110	Pref1	What would you say is the main reason why you chose to fish at that site where you were interviewed? 1=I always go there, 2= Better catch rates (access to species), 3=Convenient, 4=Less Congestion, 5=Weather or Water Conditions, 6=Scenic Beauty at the Site, 7=Access to pier, jetty, bridge, beach/bank, 8=Boat Ramp (Quality of or existence of), 9=Pre-paid Access Fee, 10=Other, 88=DK, 99=R.
111	Pref2	Same as PREF1; allows for multiple responses.
112	Pref3	Same as PREF1; allows for multiple responses.
113	Boatfee	(If mode is party/charter or rental boat) How much did you, personally, spend on boat fees for that trip? 888=DK, 999=R.
114	Yrsfish	How many years have you been SW sportfishing? 88=DK, 99=R.

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
Type 7 Records (Cont.)		**1994**
115	Fishrank	Compared to your other outdoor recreation activities during the last two months (such as swimming, tennis, golf, etc.), would you rate fishing as: 1= Your Most Important Outdoor Activity, 2=Your Second Most Important Outdoor Activity, 3=Only One Of Many Outdoor Activities, 8=DK, 9=R.
116-123	Yfish_A - Yfish_H	People have many different reasons why they like to go saltwater fishing. Please tell me whether each of the following items I state is not important, somewhat important, or very important. 1=Not important, 2=Somewhat important, 3=Very important, 4=DK, 5=R. A. To spend quality time with friends and family B. To enjoy nature and the outdoors C. To catch fish to eat D. To experience the excitement or challenge of sport fishing E. To be alone F. To relax and escape from my daily routine G. To fish in a tournament or when citations are available H. Other (specify)
124-127	Mgt_A - Mgt_D	Consider the species for which you typically fish and indicate whether you support or oppose the following conservation measures used to restrict total catch. Do you support or oppose ____ 1=Support, 2=Oppose, 8=DK, 9=R. A. limits on the minimum size of fish you can keep B. limits on the number of fish you can keep C. limits on the times of the year when you can keep the fish you catch D. limits on the areas you can fish
128	Version	Record version (1-4) of survey asked of respondent.
129	Order	Order in which questions 12 and 13 are asked. 1=Q.12 asked first, 2=Q.13 asked first. Order of questions is varied to control for order bias in contingent valuation.

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
Type 7 Records (Cont.)		**1994**
130	Wtp_sb	The current daily bag limit for striped bass in (ENTER STATE) ____ is (ENTER STATE BAG LIMIT) ____ fish. [Current limit is 1 in ME, CT, MA, MD, NJ, RI, NH, DE, and NY; limit is 2 for MD charter boats and all VA]. Suppose you could choose to buy a special license that would increase your daily bag limit from (ENTER STATE BAG LIMIT) ____ to (ENTER STATE BAG LIMIT + 1) ____ fish. If you chose not to buy the license, your daily bag limit would still be (ENTER STATE BAG LIMIT) ____ fish. What would be the maximum amount of money you would be willing to pay for this special license? 888=DK, 999=R.
131	Y_sb	(If respondent answers $0 to Q.12.) Which of the following statements best describes why you feel the way you do? 1=You don't fish for striped bass, 2=You already keep all the fish you care to, 3=You don't want to pay any more to fish than you do now, 4=You don't know how much a one fish change is worth to you, 5=Other (describe), 8=DK, 9=R.
132	Wtp_bf	The current daily bag limit for bluefish in (ENTER STATE) ____ is 10 fish. In the future it may be necessary to decrease the bag limit from 10 fish to 8 (6, 4, 2) fish. Suppose you could choose to buy a special license that would allow you to maintain the current bag limit of 10 fish. If you chose not to buy the license, your daily bag limit would be 8 (6, 4, 2) fish. What would be the maximum amount of money you would be willing to pay for this special license? 888=DK, 999=R. [Question is not asked of NJ residents, where current limit is 0.]
133	Y_bf	(If respondent answers $0 to Q.13.) Which of the following statements best describes why you feel the way you do? 1=You don't fish for bluefish, 2=You already keep all the fish you care to, 3=You don't want to pay any more to fish than you do now, 4=You don't know how much a 2 (4, 6, 8) fish change in the bag limit is worth to you, 5=Other (describe), 8=DK, 9=R.
134	Boatown	Do you or does anyone living in your household own a boat that is ever used for recreational saltwater fishing? 1=Yes, 2=No, 8=DK, 9=R.

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
Type 7 Records (Cont.)		**1994**
135	Length	What is the length of the boat? (If more than one boat, ask about primary fishing boat.) 1=Less than 10 feet, 2=10 to 14 feet, 3=15 to 19 feet, 4=20 to 24 feet, 5=25 to 29 feet, 6=30 to 39 feet, 7=40 feet or more, 8=DK, 9=R.
136	Ethnic	Would you describe yourself as white, black, hispanic, asian or of some other racial or ethnic origin? 1=White, 2=Black, 3=Hispanic, 4=Asian, 5=Other (specify), 8=DK, 9=R.
137	Age	How old were you on your last birthday? (If respondent hesitates, quickly go to Q.17a.) 777= Hesitates, 888=DK, 999=R.
138	Agegrp	That is, in which of the following age groups do you belong: 1=16 to 25, 2=25 to 34, 3=35 to 44, 4=45 to 54, 5=55 to 64, 6=65 and older, 8=DK, 9=R.
139	Gender	Code Gender. 1=Male, 2=Female.
140	Hhsize	Including yourself, how many people reside in your household? 88=DK, 99=R.
141	Educ	What was the last grade of formal education you completed? 1=Less than high school degree, 2=High school grad., 3=Vocational/community college, 4=Some college, 5=College grad., 6=Post-grad./prof. degree, 8=DK, 9=R.
142	Employed	Are you employed outside the home? 1=Yes, 2=No, 8=DK, 9=R.
143	Nowork	Are you currently 1) not employed as a result of your own choice, 2) retired, 3) unemployed but looking for work, 8=DK, 9=R.
144	Selfemp	And are you self-employed? 1=Yes, 2=No, 8=DK, 9=R.
145	Wagepymt	Do you work for an hourly wage or a salary? 1=Hourly Wage, 2=Salary, 3=Commission only, 5=Other (Specify), 8=DK, 9=R.

Appendix B. Continued.

KEY NO.	VARIABLE	DESCRIPTION
Type 7 Records (Cont.)		**1994**
146	Hrs_week	How many hours a week do you usually work? 888=DK, 999=R.
147	Flexhr	Can you choose to work more or fewer hours a week? 1=Yes, 2=No, 8=DK, 9=R.
148	Paidvac	During this fishing trip were you on a paid vacation? 1=Yes, 2=No, 8=DK, 9=R.
149	Wagelost	Did you forgo any wages by taking this trip? 1=Yes, 2=No, 8=DK, 9=Refused.
150	Inclost	About how much money could you have earned if you hadn't taken this trip? 8888=DK, 9999=R.
151	Hhinc	Into what income category does your total annual household income fall? Is is less than $15000, $15000 to $30000, $30000 to $45000, $45000 to $60000, $60000 to $85000, $85000 to $110000, $110000 to $135000, $135000 to $160000, or greater than $160000. 1=Less than $15,000, 2=$15,001 to 30,000, 3=$30,001 to $45,000, 4=$45,001 to $60,000, 5=$60,001 to $85,000, 6=$85,001 to $110,000, 7=$110,001 to $135,000, 8=$135,001 to $165,000, 9=greater than $165,000, 88=DK, 99=R.

Appendix C. Marine Recreational Fisheries Statistics Survey Intercept Interviews Variables History. SAS Files Only. This history applies only to cleaned data sent with "new" estimates.

Record Type 1

Key No.	Variable Name	79-94	82-84	85-86	87-94
4	Year	y	y	y	y
5	Month	y	y	y	y
8	ID_CODE	y	y	y	y
9	Time	y	y	y	y
10	Sub_reg	y	y	y	y
11	St	y	y	y	y
12	Cnty	y	y	y	y
13	Intsite	y	y	y	y
15	Mode_fx	y	y	y	y
16	Mode_f	y	y	y	y
17	Area_x	y	y	y	y
18	Area	y	y	y	y
19	Dist	y	y	y	y
20	Prim1	y	y	y	y
21	Prim2	y	y	y	y
22	Gear	y	y	y	y
23	Hrsf	y	y	y	y
24	Add_hrs	y	y	y	y
25	Ffdays12	y	y	y	y
26	Ffdays2	y	y	y	y
27	Sex	y		y	y
28	Age	y		y	y
29	St_res	y	y	y	y
30	Cnty_res	y	y	y	y
31	Reg_res	y	y	y	y
32	Zip				y

Appendix C. Continued.

Record Type 1 (Cont.)

Key No.	Variable Name	79	80-81	82	83-84	85-86	87	88-89	90	91-93	94
33	Pvt_res		y		y	y	y	y	y	y	y
34	Telephon	y	y		y	y	y	y	y	y	y
35	Add_ph		y	y	y	y	y	y	y	y	y
36	Catch	y	y	y	y	y	y	y	y	y	y
37	F_by_P		y	y	y	y	y	y	y	y	y
38	Sep_fish		y	y	y	y	y	y	y	y	y
39	Cntrbtrs	y	y	y	y	y	y	y	y	y	y
40	Party									y	y
41	First									y	y
42	Num_typ2	y	y	y	y	y	y	y	y	y	y
43	Num_typ3	y	y	y	y	y	y	y	y	y	y
44	Num_typ5						y		y		y
45	Gleader		y	y	y	y	y	y	y	y	y
46	Pleader									y	y
47	Year	y	y	y	y	y	y	y	y	y	y
48	Wave	y	y	y	y	y	y	y	y	y	y
49	Date1	y	y	y	y	y	y	y	y	y	y
50	Weekday	y	y	y	y	y	y	y	y	y	y
51	Coastal	y	y	y	y	y	y	y	y	y	y

Appendix C. Continued.

Record Type 1 (Cont.) - Temporary Special Interest Questions

Key No.	Variable Name	79	80	81	82	83	84	85	86	87-88
52	Punch	y		y	y	y	y	y	y	y
53	Rig		y	y			y	y	y	y
54	Lingo	y	y	y						
55	Mode_I	y	y	y	y	y				
56	Site_oth	y	y							
57	Mode_oth		y	y	y	y				
58	Mode_sep		y	y	y	y				
59	Tot_mode		y	y	y	y				
60	Prim3	y	y							
61	St_water	y	y	y	y	y	y	y		
62	Gear_no	y	y							
63	Gear-h20		y	y	y					
64	Ff12_oth	y	y							
65	Ff2_oth	y	y							
66	Miles	y	y	y				y	y	
67	Cost	y	y	y						

Key No.	Variable Name	89	90	91	92	93-94
52	Punch	y				y
53	Rig	y	y	y	y	y
68	Tourn	y	y	y	y	y
69	Seals	y				
70	Few_fish	y				
71	Rem_fish	y				
72	NYreefhr		y	y	y	
73	Turtle	y	y	y	y	y
74	Area_NC	y	y	y	y	y
75	Blength			y	y	y
76	Disto				y	y
77	Mass				y	
78	Cnt_elg					y

Appendix C. Continued.

Record Type 2			Record Type 3			
Key No.	Variable Name	79-94	Key No.	Variable Name	79-92	93-94
Carried over from Type 1 records:			*Carried over from Type 1 records:*			
4	Year	y	4	Year	y	y
5	Month	y	5	Month	y	y
8	ID_CODE	y	8	ID_CODE	y	y
10	Sub_reg	y	10	Sub_reg	y	y
11	St	y	11	St	y	y
12	Cnty	y	12	Cnty	y	y
13	Intsite	y	13	Intsite	y	y
15	Mode_fx	y	15	Mode_fx	y	y
16	Mode_f	y	16	Mode_f	y	y
17	Area_x	y	17	Area_x	y	y
18	Area	y	18	Area	y	y
19	Dist	y	19	Dist	y	y
20	Prim1	y	20	Prim1	y	y
21	Prim2	y	21	Prim2	y	y
23	Hrsf	y	23	Hrsf	y	y
24	Add_hrs	y	24	Add_hrs	y	y
39	Cntrbtrs	y	39	Cntrbtrs	y	y
47	Year	y	47	Year	y	y
48	Wave	y	48	Wave	y	y
49	Date1	y	49	Date1	y	y
New Variables:			*New Variables:*			
79	Sp_code	y	79	Sp_code	y	y
80	Dispo	y	80	Disp3	y	y
81	Num_fish	y	81	Fshinsp	y	y
			82	Lngth	y	y
			83	Wgt	y	y
			84	Calc_wt		y

Appendix C. Continued.

Record Type 5

Key No.	Variable Name	83	87	90-91	94
Carried over from Type 1 records:					
4	Year	y	y	y	y
5	Month	y	y	y	y
8	ID_CODE	y	y	y	y
47	Year	y	y	y	y
48	Wave	y	y	y	y
49	Date1	y	y	y	y
New variables:					
85	Days	y	y	y	y
86	Purpose	y	y	y	y
87	Miles_S	y	y		
88	Miles_R	y	y		
89	Car_pass	y			
90	Employed	y		y	
91	Zip		y		
92	Cnty_12			y	
93	Targ_12			y	
94	Cnty_2			y	
95	Targ_2			y	
96	Wagelost			y	
97	Day_trp			y	y
98	Fish_day			y	y
99	Lodgexp				y
100	Timetrav				y
101	Timesite				y
102	Timeboat				y
103	Travexp				y
104	Followup				y

Record Type 7 -- History is unneccessary since that economic survey has only been conducted in 1994.

Appendix D. Variable Codes, Marine Recreational Fisheries Statistics Telephone Survey

KEY	VARIABLE	DESCRIPTION
Type 1 Records:		
1	Rectype	Record Type (ASCII data only) 1 = background info on household 2 = information on angler 3 = information on trip
2	Surtyp	Survey Type (ASCII data only), **1979-1987**: 1=finfish survey, 2=Maryland crab survey, **1988-1993**: 1 = telephone interview
3	Codenum	Household ID Number
4	Reg_res	Region of Residence 1 = Southern California 2 = Northern California 3 = Pacific Northwest 4 = North Atlantic 5 = Mid-Atlantic 6 = South Atlantic 7 = Gulf of Mexico
5	St_res	FIPS Code for State of Residence
6	Cnty_res	FIPS Code for County of Residence
7	FF12	Number of 12-month anglers in household
8	FF2	Number of 2-month anglers in household.
9	Num_int	Number of 2-month anglers interviewed.
10	Notint_r	Number of 2-month anglers refused the interview
11	Notint_u	Number of 2-month anglers unavailable to be interviewed, but data available from another source (proxy data)
12	Notint_f	Number of anglers never interviewed, and no other source for trip data
13	Notint_o	Number of 2-month anglers not interviewed for some other reason, but have proxy data
14	Phonenum	Phone Number (Area Code and Prefix only - last 4 digits are zeros except for Atlantic and Gulf in 1980 and 1986.)

Appendix D. Continued.

KEY	VARIABLE	DESCRIPTION
Type 1 Records (Cont.):		
15	Year	Year of survey
16	Wave	Wave of Survey 1=Jan/Feb 2=Mar/Apr 3=May/Jun 4=Jul/Aug 5=Sep/Oct 6=Nov/Dec **1988** - Waves 4-6 sampled monthly, 4.1=July 4.2=August, etc. **1992** - Wave 1 sampled monthly, 1.1=January, 1.2=February
17	Date1	Date dataset created
18	Imp_flg	Household imputed. missing=no imputation, 3=entire household imputed, 4=1993, waves 1-3 special adjustment for trips
19	Sub_code	ID_code of household used as substitution data for the missing household.
Special Interest Questions:		
20	Lobster	**1991-1992** - FL only. No. household trips for spiny lobster **1979-1980** - No. fishermen fishing for spiny lobster in last 12 months (SL12).
21	Crab	**1991-1992** - FL only. No. household trips for blue/stone crabs
22	Shrimp	**1991-1992** - FL only. No. household trips for shrimp, **1979-1980** - No. fishermen fishing for shrimp in the last 12 months (SHRIMP12).
23	Digger	**1991-1992** - FL only. No. household trips for oysters, clams, mussels or scallops
24	Shell_o	**1991-1992** - FL only. No. household trips for other shellfish
25	Tot_shel	**1991-1992** - FL only. Total No. household trips for all shellfish
26	FW_CT	**1993** -Does anyone in the household go freshwater sportfishing (Connecticut only), 1=yes, 2=no, 9=don't know (DK)
27	FW12_CT	**1993** - Number in household who have been freshwater sportfishing in past 12 months (Connecticut only), DK=98
28	PH_800	**1993** - Respondent called in on 800 number, 1=yes, 2=no

Appendix D. Continued.

KEY	VARIABLE	DESCRIPTION
Type 2 Records:		
29	Fshrnum	Angler Number
30	Date_int	Date of Interview (YYMMDD)
31	Intvuer	Interviewer Number
32	Source	Information provided by 1=fisherman, 2=someone else
33	Lang	Language: 1=English, 2=Spanish
34	Two_mon	Recall all trips: 1=yes, 2=No
35	Num_trps	Number of trips take in last 2 months
36	Old_trps	**1993, waves 1-3** - Due to a change in contractors, the question asking how many trips were taken in the past two months was not asked up front, before profiling all trips. This resulted in a bias reducing the number of trips/household. In the final imputed data sets, this bias has been adjusted by a specialized imputation process. Old_trps contains the original data from the interview and num_trps contains upward-adjusted trips. Imp_flg is set to 4.
37	SW_tourn	**1993** - Number of marine sport-fishing tournaments participated in during past 12 months (Connecticut only), DK=98
18	Imp_flg	Fisherman imputed. missing=no imputation, 1=some trips were imputed from other trips described by the fisherman, 2=all information for the fisherman imputed from within the same household or from within the state, 3=entire household imputed, 4=1993, waves 1-3 adjustment.
19	Sub_code	ID_code of household used as substitution data for the missing household.
Type 3 Records:		
38	Trp_num	Trip Number
39	Trip_typ	Type of Trip (ASCII data only) 1=finfish, 2=spiny lobster, 3=shrimp

Appendix D. Continued.

KEY	VARIABLE	DESCRIPTION

Type 3 Records (Cont.):

40	Mode_f	Fishing mode 1 = Pier, dock 2 = Jetty, breakwater, breachway 3 = Bridge, causeway 4 = Other man-made 5 = Beach or bank 6 = Partyboat 7 = Charter boat 8 = Private/Rental boat 9 = unknown
41	Mode_fx	Collapsed fishing mode 3 = Shore 4 = Party boat (sub_reg=6 or 7 & mode_f=6) 5 = Charter boat (sub_reg=6 or 7 & mode_f=7) 6 = Party/Charter boat (sub_reg=4 or 5 & mode_f=6 or 7) 7 = Private/Rental Boat
42	Gear	Primary gear used 1 = hook and line 2 = dip or A-frame net 3 = cast net 4 = gill net 5 = seine 6 = trawl 7 = trap 8 = spear 9 = butterfly net 10 = hands 11 = other 12 or 97 = DK 13 or 98 = don't remember 14 or 99 = refused (R)
43	Area	Area of fishing trip 1 = Open water 2 = Sound 3 = River 4 = Bay 5 = Other 7 = DK 8 = don't remember 9 = R E = Delaware Bay (DE & NJ) F =Chesapeake Bay (VA/MD) R = Maryland ocean bay (1983)
44	Area_x	**1979-1989** Collapsed fishing area 1 = Ocean <= 3 mi 2 = Ocean > 3 mi 3 = Ocean 3-10 mi, WFL and TX 4 = Ocean > 10 mi, WFL & TX 5 = Inland 6 = Unknown 7 = ocean <= 10 miles, WFL + TX
45	Dist	**1979-1989** Distance from shore 0 = not applicable 1 = >3 miles from shore 2 = <=3 miles from shore 3 = 3-10 miles, WFL and TX 4 = >10 miles, WFL and TX 7 = DK 8 = don't remember 9 = R

Appendix D. Continued.

KEY	VARIABLE	DESCRIPTION
Type 3 Records (Cont.):		
46	Sub_reg	Subregion of trip, same codes as Reg_res
47	St	FIPS code for state of fishing trip
48	Cnty	FIPS county code for county of trip
49	Date_trp	Date of trip (YYMMDD)
50	Weekend	If day not known then 1 = weekday, 2 = weekend, 9 = DK
51	Min_wave	Month for monthly sampling (1988, waves 4-6. 1992, wave 1)
52	Access	Private/Public access point. 1=public access 2 = private access
53	Launch	Access type for boats. 0 = Not Applicable (NA) **Public access** 1 = launch ramp 2 = boat slip 3 = moored from dock 4 = other **Private Access** 5 = personal residence/dock 6 = locked gate marina 7 = unlocked marina 8 = other
54	Time	Hour fishing trip completed (1-24; -1 = depend on tide; -2 = DK)
55	Rig	**1988-1992** Fishing Activity near artifical reef or oil/gas rig: 1 = not fishing near rig/reef, 2 = fishing within 200' of rig/reef, 9 = DK, **1979-1987** - Gulf: 00 or 88 - NA, 01=no oil/gas platform or artificial reef fishing, 02 = oil/gas platform fishing, 03 = artificial reef fishing, **1979-1987** - Atlantic. 00 or 88 - NA, 01 = no artificial reef fishing, 02 = artificial reef fishing
56	Tourn	Trip part of gamefish tournament lasting >=7 days? 1=yes, 2=no.
57	For_bass	**1990-1992**, Atlantic coast, **1993-1994**, CT only. Catch any striped bass on the trip. 1=yes, 2=no
58	Num_bass	**1990-1992**, Atlantic coast, **1993-1994**, CT only. How many striped bass were caught?

Appendix D. Continued.

KEY	VARIABLE	DESCRIPTION

Type 3 Records (Cont.):

59	Kep_bass	**1990-1992**, Atlantic coast, **1993-1994**, CT only. How many striped bass were kept?
60	River_PC	**1993-1994** - Pacific only California Rivers 01 = Albion, 02 = Big, 03 = Eel 04 = Klamath, 05 = Mad, 06 = Napa 07 = Navaro, 08 = Noyo 09 = Redwood Creek 10 = Sacramento, 11 = San Gabriel, 12 = Smith 13 = Ten Mil, 98 = Don't Know Oregon Rivers 31=Alsea, 32=Beaver Creek, 33 = Big Nestucca 34=Chetco, 35=Columbia, 36 = Coos Bay 37=Coos Estuary, 38=Coos, 39 = Coquilla 40=D River, 41=Elk, 42 = Ithmus Slough 43=Kilchis, 44=Little Nestucca, 45 = Miami 46=Neconicum, 47=Nehalem, 48 = Netarts 49=Pistol, 50=Rogue 51 = Salmon Harbor 52=Salmon, 53=Sand Lake, 54 = Siletz 55=Siuslau, 56=Sixes, 57 = South Slough 58=Tillamook Est., 59=Tillamook, 60 = Trask 62=Wilson, 63=Winchester Bay, 64 = Winchuck 65=Yachats, 66=Yaquina Bay, 98 = DK
18	Imp_flg	Trip mode imputed. missing=no imputation, .1=trip mode from the household, .2 trip mode from the state level, .3=trip mode from the subregion level, added to the following if they occur: 1=some trips were imputed from other trips described by the fisherman, 2=all information for the fisherman imputed from within the same household or from within the state, 3=entire household imputed, 4=1993, waves 1-3 adjustment.
19	Sub_code	ID_code of household used as substitution data for the missing household.

Appendix D. Continued.

KEY	VARIABLE	DESCRIPTION
Type 4 Records:		**1994 Northeast Region Economic Survey**
61	Category	Indicates time since angler last fished. 1=no one in hh has ever fished; 2=angler has not fished in past 12 months; 3=angler has fished within 12 months, but not within 2 months; 4=angler has fished within past 2 months.
62	Target	1=angler was targeting a specific species on trip being discussed. 2=angler was not targeting specific species.
63	Targ1	First named targeted species.
64	Targ2	Second named targeted species.
65	Trip_yr	No. of saltwater trips taken in past 12 months. 888=DK; 999=R
66	Targ_trp	No. of trips in past 12 months which targeted bluefish, striped bass, black ea bass, summer flounder, Atlantic cod, tautog or scup (or weakfish in Mid-Atlantic). 888=DK; 999=R
67	Boatown	Does anyone in household own a boat used for recreational fishing. 1=Yes, 2=No, 8=DK., 9=R
68	Age	How old on last birthday? 888=DK., 999=refused.
69	Agegrp	Defines age categories 1=16 to 25 2=26 to 35 3=36 to 45 4=46 to 55 5=56 to 65 6=66 and over 8=DK. 9=R
70	Gender	1=Male, 2=Female.
71	Ethnic	1=White 2=Black 3=Hispanic 4=Asian 5=Other 8=DK 9=R
72	Educ	Last grade of formal education. 1=less than a high school degree 2=high school graduate 3=vocational or community college 4=some college 5=college graduate 6=post-grad./prof. degree 8=DK 9=R
73	Employed	Employed outside the home? 1=Yes, 2=No, 8=DK., 9=R

Appendix D. Continued.

KEY	VARIABLE	DESCRIPTION
Type 4 Records (Cont.):		**1994 Northeast Region Economic Survey**
74	Hhinc	Annual household income before taxes. 1=less than $15,000 2= $15,001 to 30,000 3=$30,001 to $45,000 4=$45,001 to 60,000 5=$60,001 to 85,000 6=$85,001 to 110,000 7=$110,001 to 135,000 8=$135,001 to 160,000 9=greater than $160,000 88=DK 99=R

Appendix E. Marine Recreational Fisheries Statistics Survey Telephone Interview Variables History. SAS Files Only. This history applies only to cleaned data sent with "new" estimates.

Record Type 1

Key No.	Variable Name	79-80	81-82	83	84-89	90	91-92	93-94
3	Codenum	y	y	y	y	y	y	y
4	Reg_res	y	y	y	y	y	y	y
5	St_res	y	y	y	y	y	y	y
6	Cnty_res	y	y	y	y	y	y	y
7	FF12	y	y	y	y	y	y	y
8	FF2	y	y	y	y	y	y	y
9	Num_int	y	y	y	y	y	y	y
10	Notint_r	y	y	y	y	y	y	y
11	Notint_u	y	y	y	y	y	y	y
12	Notint_f	y	y	y	y	y	y	y
13	Notint_o	y	y	y	y	y	y	y
14	Phonenum	y	y	y	y	y	y	y
15	Year	y	y	y	y	y	y	y
16	Wave	y	y	y	y	y	y	y
17	Date1	y	y	y	y	y	y	y
18	Imp_flg	y	y	y	y	y	y	y
19	Sub_code	y	y	y	y	y	y	y
20	Lobster	y					y	
21	Crab						y	
22	Shrimp	y					y	
23	Digger						y	
24	Shell_o						y	
25	Tot_shel							y
26	FW_CT							y
27	FW12_CT							y
28	Ph_800							y

Appendix E. Continued.

Record Type 2

Key No.	Variable Name	79-82	83	84-89	90-92	93	94
Carried over from Type 1:							
3	Codenum	y	y	y	y	y	y
4	Reg_res	y	y	y	y	y	y
5	St_res	y	y	y	y	y	y
6	Cnty_res	y	y	y	y	y	y
15	Year	y	y	y	y	y	y
16	Wave	y	y	y	y	y	y
17	Date1	y	y	y	y	y	y
18	Imp_flg	y	y	y	y	y	y
19	Sub_code	y	y	y	y	y	y
New variables:							
29	Fshrnum	y	y	y	y	y	y
30	Date_int	y	y	y	y	y	y
31	Intvuer	y	y	y	y	y	y
32	Source	y	y	y	y	y	y
33	Lang	y	y	y	y	y	y
34	Two_mon	y	y	y	y	y	y
35	Num_trps	y	y	y	y	y	y
36	Old_trps					y	
37	SW_tourn					y	y

Appendix E. Continued.

Record Type 3

Key No.	Variable Name	79-82	83	84-89	90-94
Carried over from Type 1:					
3	Codenum		y	y	y
4	Reg_res	y	y	y	y
5	St_res	y	y	y	y
6	Cnty_res	y	y	y	y
15	Year	y	y	y	y
16	Wave	y	y	y	y
17	Date1	y	y	y	y
18	Imp_flg	y	y	y	y
19	Sub_code	y	y	y	y
Carried over from Type 2:					
29	Fshrnum	y	y	y	y
New variables:					
38	Trip_num		y	y	y
40	Mode_f	y	y	y	y
41	Mode_fx	y	y	y	y
42	Gear	y	y	y	
43	Area	y	y	y	y
44	Area_x		y	y	y
45	Dist	y	y	y	
46	Sub_reg	y	y	y	y
47	St	y	y	y	y
48	Cnty	y	y	y	y
49	Date_trp	y	y	y	y
50	Weekend		y	y	y

Appendix E. Continued.

Record Type 3 (Cont.)

Key No.	Variable Name	79-87	88	89	90-91	92	93
New variables:							
51	Min_wave		y			y	
52	Access				y	y	y
53	Launch				y	y	y
54	Time				y	y	y
55	Rig				y	y	
56	Tourn				y	y	
57	For_bass				y	y	y
58	Num_bass				y	y	y
59	Kep_bass				y	y	y
60	River_PC						y

Record Type 4 -- History is unneccessary since that economic survey has only been conducted in 1994.

Appendix F. Variable Codes, Marine Recreational Fisheries Statistics Survey Catch Estimates

VARIABLE	DESCRIPTION
Cell Identifiers (Cell = Year/wave/subregion/state/collapsed fishing mode/collapsed area of fishing)	
Year	Year of estimate
Wave	Wave of data
Sub_reg	Subregion of trip
St	State of estimate
Mode	Uncollapsed mode of fishing
Mode_fx	Collapsed mode of fishing
Area	Uncollapsed area of fishing
Area_x	Collapsed area of fishing
Date1	Date estimates were created
Cell Estimates	
Numrtrip	Estimated trips in mode_fx (one level above cell level)
Percent	Percent of trips in mode_fx that are in area_fx (used to post-stratify Numrtrip into Estrips)
Estrips	Number of trips in mode_fx and area_fx
Numvar	Variance of Estrips
Sp_code	Department of Commerce National Oceanographic Data Center (NODC) Species code of fish
Common	Common name of fish
Sci_name	Scientific name of fish

Appendix F. Continued.

VARIABLE	DESCRIPTION
Cell Estimates (Cont.)	
Gp_code	Species group code of fish (used for creating Tables)
Group	Species group name of fish (used for creating Tables)
Sg_code	Super group code of fish (used for creating Tables)
Super	Super group name of fish (used for creating Tables)
Estclaim	Estimated number of type A fish
Estclvar	Variance of Estclaim
Estharv	Estimated number of type B1 fish harvested
Esthvar	Variance of Estharv
Estrel	Estimated number of type B2 fish released
Estrlvar	Variance of Estrel
Landing	Estimated total harvest (types A + B1)
Land_var	Variance of Landing
Tot_cat	Estimated total catch (types A + B1 + B2)
Tot_var	Variance of Tot_cat
Estwgt	Estimated weight of estclaim (type A - kgs)
Estwtvar	Variance of Estwgt
Wgt_AB1	Estimated weight of types A and B1 (kgs)
Var_wAB1	Variance of Wgt_AB1
Lbs_AB1	Estimated weight of types A and B1 (pounds)

Appendix F. Continued.

VARIABLE	DESCRIPTION
Sample Information	
Var_lbs	Variance of Lbs_AB1
Smp_trip	# of trips sampled in cell. This includes anglers who contributed to group catches, but who were not interviewed.
Ttrip	Number of intercept interviews conducted at the mode_fx level
Int_trip	# of intercept interviews conducted at the mode_fx/area_fx level
Tspclaim	Number of type A fish seen in intercept survey
F_per_T	Catch per trip for type A catch
Varclaim	Variance of F_per_T
Tsp_harv	Number of type B1 fish seen in intercept survey
Unahptrp	Catch per trip for type B1 catch
Varharv	Variance of Unahptrp
Tsp_rel	Number of type B2 fish seen in intercept survey
Unarptrp	Catch per trip for type B2 catch
Varel	Variance of Unarptrp
Tsp_exam	Total number of type A fish weighed in intercept survey
Tsp_wgt	Total weight of type A fish weighed in intercept survey (kg)
Tspavew	Mean weight of type A fish weighed in intercept survey (kg)
Varwgt	Variance of Tspavew
Wgtssq	Sum of squares for Tspavew

Appendix F. Continued.

VARIABLE	DESCRIPTION
Sample Information (Cont.)	
Tsp_lex	Total type A fish measured in intercept survey
Tsp_len	Sum of lengths of type A fish measured in intercept survey
Tspavel	Mean length of type A fish measured in intercept survey
Varlngth	Variance of Tspavel
Lngssq	Sum of squares for Tspavel
Statistical Adjustment Information	
Outflg	Flag to indicate telephone survey trips per household > 95th percentile were reduced to the 95th percentile value (1=outliers reduced)
Pool_flg	Flag to indicate telephone Party/Charterboat trips/household were pooled with the previous 4 years of historical data (1=data pooled)
Ex_flg	Flag to indicate intercept Party/Charterboat residency ratios were pooled with the previous 4 years of historical data (1=data pooled)
Flag_wgt	Flag to indicate the level of substitution for missing weights within a cell (0=none, X=could not find substitute at state or subregion level, 1=state level, 2=subregion level)
St_exam	Number of fish weighed in state
St_wgt	Total weight of fish weighed in state (kgs)
St_ave	Mean weight of fish weighed in state (kgs)
Stvar	Variance of St_ave
St_ssq	Sum of squares for St_ave
Sub_exam	Number of fish weighed in subregion
Sub_wgt	Total weight of fish weighed in subregion

Appendix F. Continued.

VARIABLE	DESCRIPTION
Sample Information (Cont.)	
Sub_ave	Mean weight of fish weighed in subregion
Subvar	Variance of Sub_ave
Sub_ssq	Sum of squares for Sub_ave

Appendix G. Variable Codes, Marine Recreational Fisheries Statistics Survey Effort Estimates

VARIABLE	DESCRIPTION
Cell Identifiers (Cell = Year/wave/subregion/state/collapsed fishing mode/collapsed area of fishing)	
Year	Year of estimate
Wave	Wave of data
Sub_reg	Subregion of trip
St	State of estimate
Mode_fx	Collapsed mode of fishing
Area_x	Collapsed area of fishing
Date1	Date estimates were created
Cell Estimates	
Numrtrip	Estimated trips in mode_fx (one level above cell level)
Percent	Percent of trips in mode_fx that are in area_fx (used to post-stratify Numrtrip into Estrips)
Estrips	Number of trips in mode_fx and area_fx
Numvar	Variance of Estrips
Totalvar	Intermediate variable -- DO NOT USE THIS VARIABLE!
TA1A	Estimated number of trips made by coastal residents
TA1Avar	Variance of TA1A
TA1Awot	Estimated number of trips made by coastal residents without telephones
TA1Awt	Estimated number of trips made by coastal residents with telephones
TA2A	Estimated number of trips made by non-coastal residents
TA2Avar	Variance of TA2A

Appendix G. Continued.

VARIABLE	DESCRIPTION
Cell Estimates (Cont.)	
TA3A	Estimated number of trips made by out-of-state residents
TA3Avar	Variance of TA3A
Intercept sample information	
Ttrip	Number of intercept interviews conducted at the mode_fx level
I_plus	Total number of intercept interviews with usable residency information
I_A1A	Coastal resident trips from the intercept survey
Cnt_ny	Coastal residents without a telephone in their household
Cnt_yy	Coastal residents with a telephone in their household
Cnt_ry	Coastal residents who refused to say if telephone in their household
I_A2A	Noncoastal resident trips from the intercept survey
Cnt_nn	Noncoastal residents without a telephone in their household
Cnt_yn	Noncoastal residents with a telephone in their household
Cnt_rn	Noncoastal residents who refused to say if telephone in their household
I_A3A	Out-of-state resident trips from the intercept survey
Outstate	Same as I_A3A
FactrA2A	A2A Expansion factor - Non-coastal to coastal residence ratio (I_A2A/I_A1A)
FactrA3A	A3A Expansion factor - Out-of_state to coastal residence ratio (I_A3A/I_A1A)
Tel_N	Effective number of saltwater fishing trips from telephone household contacts - takes into account the county level weighting

Appendix G. Continued.

VARIABLE	DESCRIPTION
Telephone Sample Information	
Hshldnum	Number of households in telephone survey - calculated from telephone type 3 records boiled down to individual households and the count of non-fishing households from the non-fishing household files.
Tot_cont	Total number of households contacted - not calculated, only reported in the nonfishing household file as the sum of the counts of fishing and non-fishing households.
Cont1	2-Month fishing households contacted counted from the telephone type 1 records
Count	Duplicate to Cont1
F_House	Number of fishing households contacted - calculated as Prev*Tot_cont
Cont2	2-Month non-fishing household contacted
Prev	Percent Fishing Households (F_house/hshldnum)
Hshlmean	Mean number of fishing trips reported per household
Hshldvar	Variance of hshlmean
Census Information	
Tot	Total number of households in the county
P_Tel	Proportion of coastal households with a telephone
Tot_tel	Number of households with telephones in the county
Outflg	Flag to indicate telephone survey trips per household > 95th percentile were reduced to the 95th percentile value (1=outliers reduced)
Pool_flg	Flag to indicate telephone Party/Charterboat trips/household were pooled with the previous 4 years of historical data (1=data pooled)
Ex_flg	Flag to indicate intercept Party/Charterboat residency ratios were pooled with the previous 4 years of historical data (1=data pooled)

Appendix G. Continued.

VARIABLE	DESCRIPTION
Statistical Adjustment Information	
H0	Result of hypothesis test that the proportion of coastal households with telephones from the intercept survey is similar to P_tel ('ACC' = Accept the null hypothesis, P_tel is used in trip expansions; 'REJ' = reject the null hypothes, a different adjustment is calculated from intercept data and used in trip expansions; 'NOT' = N < 20, so comparison is not made and P_tel is used.)

Appendix H. Variable Codes, Marine Recreational Fisheries Statistics Survey Non-Fishing Household Files

VARIABLE	DESCRIPTION
Cell Identifiers (Cell = Year/wave/subregion/state/county of residence)	
Year	Year of survey
Wave	Wave of survey
Reg_res	Region of resdence
St_res	State of residence
Cnty_res	County of Residence
Date1	Date SAS file created by MRFSS staff
Fle_date	Date ASCII file created by telephone survey contractor
Fle_res	Region of residence assigned by telephone survey contractor
Telephone Interview Counts	
HH_noint	Households indicating 2-month saltwater fishing activity but with no completed interviews with 2-month saltwater anglers due to never available, refusals, or no proxy data
Non_sw	Percent of households who originally indicate 2-month saltwater fishing activity but who later are found to be non-fishing households
Impute_f	Number of HH_noint households to be imputed as 2-month saltwater fishing households (HH_noint*(1-Non-sw))
Impute_n	Number of HH_noint households to be imputed as non-fishing households (HH_noint*(Non-sw))
Fishing	Total of originally reported fishing households from ASCII data plus Impute_f
Non_fish	Total of originally reported non-fishing households from ASCII data plus Impute_n
Tot_cont	Total households contacted (Sum of Fishing and Non-fish)
Percent	Percent 2-month saltwater fishing households ((Fishing/Tot_cont)*100)

Appendix I. Variable Codes, Marine Recreational Fisheries Statistics Survey Coastal Files

VARIABLE	DESCRIPTION
Cell Identifiers (Cell = Year/subregion/state/county of residence)	
Year	Year of survey
Reg_res	Region of resdence
St_res	State of residence
Cnty_res	County of Residence
County	County Name
Date1	Date SAS file created by MRFSS staff

Appendix J. Variable Codes, Marine Recreational Fisheries Statistics Survey Census Files

VARIABLE	DESCRIPTION
Cell Identifiers (Cell = Subregion/state/county of residence)	
Sub_reg	Region of resdence
Region	Name of region
St	State code of residence
State	Name of state
Cnty	County of Residence
County	County Name
Date	Date SAS file created by MRFSS staff
Date_90	Date file updated with most recent year of Survey of Buying Power (SBP) data
Census Information	
Coast25	County is within 25 miles of the coast (Y=yes, N=No)
Coast50	County is within 50 miles of the coast (Y=yes, N=No)
Coast100	County is within 100 miles of the coast (Y=yes, N=No)
Unit	Census Bureau Population Unit
House_80	Number of housing units in the 1980 census
Occ_80	Number of fully occupied houses in the 1980 census
Tot_80	Number of houses with telephones in the 1980 census
No_tel80	Number of occupied houses without telephones in the 1980 census
P_tel_80	Proportion of houses with telephones in the 1980 census

Appendix J. Continued.

VARIABLE	DESCRIPTION
Census Information (Cont.)	
Occ_90	Number of fully occupied houses in the 1990 census
Tot_90	Number of houses with telephones in the 1990 census
No_tel90	Number of occupied houses without telephones in the 1980 census
P_tel_90	Proportion of houses with telephones in the 1980 census
H80	SBP estimate of number of occupied units (12/31/80)
H81	SBPestimate of number of occupied units (12/31/80)
H82	SBPestimate of number of occupied units (12/31/81)
H83	SBPestimate of number of occupied units (12/31/82)
H84	SBPestimate of number of occupied units (12/31/83)
H85	SBPestimate of number of occupied units (12/31/84)
H86	SBPestimate of number of occupied units (12/31/85)
H87	SBPestimate of number of occupied units (12/31/86)
H88	SBPestimate of number of occupied units (12/31/87)
H89	SBPestimate of number of occupied units (12/31/88)
H90	SBPestimate of number of occupied units (12/31/89)
H91	SBPestimate of number of occupied units (12/31/90)
H92	SBPestimate of number of occupied units (12/31/91)
H93	SBPestimate of number of occupied units (12/31/92)

Appendix J. Continued.

VARIABLE	DESCRIPTION
Census Information (Cont.)	
SBP_80	SBP estimate of the number of houses with telephones in 1980
SBP_81	SBP estimate of the number of houses with telephones in 1981
SBP_82	SBP estimate of the number of houses with telephones in 1982
SBP_83	SBP estimate of the number of houses with telephones in 1983
SBP_84	SBP estimate of the number of houses with telephones in 1984
SBP_85	SBP estimate of the number of houses with telephones in 1985
SBP_86	SBP estimate of the number of houses with telephones in 1986
SBP_87	SBP estimate of the number of houses with telephones in 1987
SBP_88	SBP estimate of the number of houses with telephones in 1988
SBP_89	SBP estimate of the number of houses with telephones in 1989
SBP_90	SBP estimate of the number of houses with telephones in 1990
SBP_91	SBP estimate of the number of houses with telephones in 1991
SBP_92	SBP estimate of the number of houses with telephones in 1992

Appendix G. List of SAS Programs for Analyses of Marine Recreational Fisheries Statistics Survey Data.

Program 1: **CF_DEMO.SAS** (Chapter 4)

This program can be used to generate relative frequency distributions of marine recreational fishing trips by numbers of fish caught of a particular species.

Program 2: **LF_DEMO.SAS** (Chapter 5)

This program can be used to generate relative frequency distributions of landed fish of a particular species by length class.

Program 3: **BL1_DEMO.SAS** and **BL2_DEMO.SAS** (Chapter 7)

These programs can be used in tandem to perform a bag-limit analysis for a particular species.

Program 4: **WT1_DEMO.SAS** (Chapter 8)

This program can be used to adjust for missing mean weights in MRFSS intercept survey sampling strata where no landed fish were measured.

Program 5: **WT2_DEMO.SAS** (Chapter 8)

This program uses datasets output by WT1_DEMO and sums the weights and variances and calculates the PSE at state/wave, state, and subregion levels.