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**The Marine Recreational Fishery
Statistics Survey, A Comparative
Analysis of Effort and Participation
Estimates in the Southeastern U.S.;
1979 to 1988**

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March 1991

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EXECUTIVE SUMMARY:

The overall purpose of this paper is to review the effort and participation estimates, sampling levels, and questionnaire content from the first ten years (1979-1988) of the National Marine Fisheries Service (NMFS) Marine Recreational Fishery Statistics Survey (MRFSS) in the southeastern subregions of the US.¹ Estimates of effort (trips) and participation (number of anglers) are presented by subregion and state. Estimate variation, precision, and possible trends are considered. Graphs and tables were developed for analysis and ease of reference.

Effort and participation estimates have varied considerably over the ten year period. While much of the variation may be due to factors outside the control of the survey (eg. human population movement, changing tastes and preferences, changing fish populations, etc.) - some variation stems from geographic and modal sampling differences between years. For example, as of 1986 the survey has not been conducted in Texas nor for the party/headboat mode in either the Gulf or S. Atlantic subregions so as to avoid duplication of effort with other surveys. Given that publication of the results of other surveys has never been the objective of the MRFSS, users of the data must go to two or three sources to obtain a complete picture of the Gulf and S. Atlantic.

With the focus of this paper exclusively on the MRFSS, attempts were made to adjust for differences between years in order to allow for comparison and trend analysis. It was apparent that no strong trends in MRFSS based effort or participation occurred during the ten year period.

The precision of the estimates is related to the levels of sampling. In general, the higher the sampling levels, the greater the precision of the estimates. The level of precision from 1979 to 1988 for estimates of total trips by subregion and state appears good (coefficient of variation under 15 percent). Unfortunately, the level of precision pertaining to estimates of the number of coastal anglers by subregion and state is less favorable (coefficients of variation in excess of 50 to 60 percent are common).

To promote improved state/federal communication, to avoid duplication of effort, and to supplement the survey's level funded budget, attempts have been made to encourage state participation in the survey. State enhancements in conjunction with recent large scale contractual sampling supplements (MARFIN 1987 and 1988) have boosted sampling considerably, leading to improvements in estimate precision. Variation in state and contractual participation has naturally lead to variation in the level and geographic emphasis of the sampling. It should be noted that sampling variation affects

1 NMFS divides the nation into subregions, each composed of a certain number of coastal states. This paper deals exclusively with the southeastern subregions of the US - specifically, the Gulf (Texas to West Florida) and South Atlantic (East Florida to North Carolina).

estimate precision but not estimates - given that NMFS threshold sampling levels are met, estimate values are not significantly affected by the sampling level.

Comparisons are also made of the questionnaires from 1979 to 1989. Both intercept and telephone questionnaires are compared across years to determine which questions are and are not consistently asked. Users of the raw data may be interested in knowing specifically what data was collected and when. Note that the variation in questions has no effect on the estimates or their precision, all information necessary for effort and participation calculations has been consistently collected. Movement of questions into and out of the survey has resulted from the desire to meet the specialized needs of other users (eg. the economics add-on questions in 1987).

Despite annual variation, the survey does provide a wealth of information. The survey meets the basic needs for estimation of catch and effort as well as providing a forum for the pursuit of specialized interests via supplemental questions or piggy-back add-on surveys. Few surveys provide as comprehensive a coverage over such a widespread geographic area.

INTRODUCTION:

The primary purpose of this paper is to provide current and potential users of the National Marine Fisheries Service (NMFS) Marine Recreational Fishery Statistics Survey (MRFSS) with a brief historical review of the survey in the southeastern US. This report presents in both tabular and graphical form, information from the survey's first ten years from 1979 to 1988.

Comparative analyses are presented for MRFSS telephone and intercept sampling, effort (trips) and participation (anglers) estimation and precision, and questionnaire content. Whenever possible, variations and possible trends are identified and examined.

Although the MRFSS measures catch, effort, and participation, the focus of this report is only upon effort and participation estimation. While estimates of effort and participation are used in many disciplines, they are critical for aggregation purposes in the field of recreational economics. Recreational economic models often focus upon the "average" angler or trip. In order to calculate total economic impacts from these models for a state or subregion, the impacts from the "average" angler or trip must be expanded by the appropriate estimate of subregional anglers or trips. State or subregional estimates of anglers or trips are therefore a necessary component of the overall equation. The economic impacts for the "average" angler or trip are often relatively small when compared to the aggregated estimates of effort or participation, therefore trip and angler estimates often drive the total impact estimate. As a result, it is very important to obtain accurate estimates of trips and anglers.

Marine Recreational Fishery Statistical Survey: (MRFSS)

The MRFSS is a nationwide coastal state survey conducted by the National Marine Fisheries Service (NMFS) to supply data for research and management of marine recreational fisheries. The survey was designed to provide estimates of catch, effort, and participation at the NMFS subregional level.

The MRFSS utilizes a complementary survey approach where certain information is gathered by on-site angler interviews and other information from household telephone interviews. Information from both surveys are combined to generate estimates.

Intercept Survey: The on-site angler samples are normally gathered at the end of the fishing trip. Interviewers locate themselves at docks, piers, beaches, etc. in order to sample anglers as they exit the site (site as represented by the point where the angler actually accesses the water).

Note: The definition of a trip within the MRFSS does not correspond to the traditional trip definition used in recreational economics (ie. a round-trip recreational excursion from one's residence).

MRFSS trips reflect fishing by a given mode (shoreline, party/ charter boat, private/rental boat) on a given day - it is possible the angler could use multiple modes on the same day and therefore incur multiple daily trips.

The intercept survey is designed to collect detailed information about the current fishing trip. Data collected includes number, size, and species of fish caught, target species, size of fishing party², length of fishing trip, fishing mode employed, area fished, gear used, etc.

Telephone Survey: The telephone survey contacts coastal county households within 25 to 100 miles of the coastline depending upon state and year. This survey is conducted from a random sample of the general coastal population, as such, the sample incorporates both anglers and nonanglers.

The telephone survey obtains information for each trip taken in the last two month "wave."³ It therefore provides a more comprehensive time oriented coverage than the current trip specific intercept survey. The reason trip specific data is collected via the intercept survey and not the telephone survey is to reduce both recall and identification error.

Advantages of the MRFSS:

The survey has a number of advantages as a result of thorough design reviews conducted prior to its inception back in 1979 and periodically thereafter. The following provides a short list of its major advantages:

- 1) **Comprehensiveness** - The MRFSS is quite comprehensive in that coverage is nationwide - surveys are conducted for all or most coastal states, fishing modes, seasons, and major fish species.
- 2) **Bias Avoidance** - The survey designers went to great efforts to reduce bias whenever possible. For example, the two month wave was developed to minimize recall error and the on-site survey's use of fish measurement was designed to reduce identification and measurement errors.
- 3) **Anglers and Nonanglers** - Since the survey samples both anglers and nonanglers, models can be developed to forecast both angler and nonangler behavior (model how

2 Collected only when the respondent cannot separate out his own catch from that of the entire party.

3 Data is collected across the entire year in two month waves to reduce the likelihood of recall error.

fishery management activities may impact the number of anglers in the region as well as their visitation patterns).⁴

4) Personal Interviews - Personal interviews, either on-site or over-the-phone, tend to boost response rates as compared to mail surveys. Personal interviews also allow for substantial interviewer/respondent interaction, something impossible with mail surveys. This interaction can lead to improved responses in that the interviewer can elaborate on the questions if necessary.

Disadvantages of the MRFSS:

While the survey has a number of strengths it also suffers from certain weaknesses:

1) Estimate precision: Certain estimates (eg. total number of coastal anglers by sub-region) may be imprecise - characterized by large standard errors and coefficients of variation (standard error/mean).

2) Geographic Focus: As mentioned above, the survey was designed to provide data at the subregion level. The possibility of missing cells (areas within the region where no samples were received) may cause problems for those interested in finer levels of geographical detail.

Conversely, angler estimates are currently being provided at the state level but not the regional level. The angler estimation procedure may result in double-counting of anglers if estimates are summed across states (a procedure which is not recommended by MRFSS statistical personnel).

3) Cost: Due to the wide-scale coverage and dual survey design, the survey is very costly to implement. Cost is one of the reasons NMFS has sought to encourage state level funding. Intermittent state contributions have created severe fluctuations in the annual data collection budget.

4) Time Frame: Intercept surveys are conducted continuously and telephone surveys are conducted during a two week period at the end of each two month wave. Since responses as to number of trips in the past 2 months from the telephone survey are utilized to estimate coastal trips, we have somewhat of a timing differential between those contacted at the beginning of the two week period compared to those contacted at the end.

4 Recall error - If anglers were requested to provide trip specific data on catch etc., via the telephone survey, this would require a detailed recall of previous trips taken during the wave. Given that individuals may not recall correctly, this may result in error. Identification error - Occurs when anglers misidentify fish species.

For anyone using raw intercept data on number of trips in the past two months, a substantial timing problem may exist. Individuals contacted at the beginning of the wave would be describing trips during the previous wave whereas individuals contacted at the end of the wave would be referring to trips during the current wave. At the extremes, we could see a four month time period reflected in the number of trips associated with one wave (angler A contacted on January 1st discussing trips back to November 1st, and angler B contacted on February 28th discussing trips back to January 1st).

5) Avidity Bias: Users of the raw intercept data should also be aware of the potential avidity bias associated with the intercept survey. Avidity bias refers to the likelihood of over sampling those individuals who angle frequently. The intercept survey may include a disproportionately high percentage of avid anglers - this may bias the results of any models developed from the data.

Use of the raw data from the telephone survey may be even more questionable due to the geographic limitation. Since the survey contacts only coastal households, and coastal households are liable to have more fishermen who fish more often than noncoastal households, extrapolation coastal behavior to the entire angler population may be risky.

This paper is broken down into three main sections, each of which reflects a separate long-term comparative analysis. Section I compares sampling (number of samples by year, region, state, mode, etc.), section II compares effort and participation estimates (trips and anglers by year, state, region, etc.), and section III compares questionnaire content (actual questions asked by survey and year).

SECTION I: COMPARATIVE ANALYSIS OF GULF AND SOUTH ATLANTIC MRFSS SAMPLING (1979-1988)

This section attempts to compare the MRFSS telephone and intercept samples across years, waves, states, and modes. The objective of the analysis is to point out variation on an annual, seasonal, geographic, or modal basis. Sampling variation is likely to have an effect upon estimate precision but should not impact the value of point estimates assuming sample sizes are maintained above a certain level (NMFS base level sampling). This sampling variation and its affect on estimate precision can have important repercussions for users.

The analyses were based on percentages of total region-wide or state samples in order to identify relative variation. It is very important to note that statements are based upon a relative comparison. For example, Eastern Florida has declined in relative terms within the South Atlantic region since 1979 based on the number of telephone surveys. In terms of pure number of samples, Eastern Florida has increased, but as a percentage of the region's samples, it has decreased. Looking at pure number of samples can often cloud the analysis (tables are presented of both raw numbers and percent).

As noted above, to understand why sampling levels vary from year to year, one should realize that the survey has enlisted financial support from various sources including states, government contracts, etc. These sources have not been able to provide consistent support thereby leading to sampling fluctuation. In recent years, through state and contractual assistance, the MRFSS has been able to maintain and even expand its sampling efforts.

With the survey funded by so many discrete sources, NMFS obviously lacks full control over the number of MRFSS interviews. Given that state and contractual funding fluctuates widely from year to year, variation in sampling is difficult to avoid. Expansions and reductions in state and/or contractual funding can significantly impact the survey's sampling base.

REVIEW: Telephone Samples by State, Year, and Wave

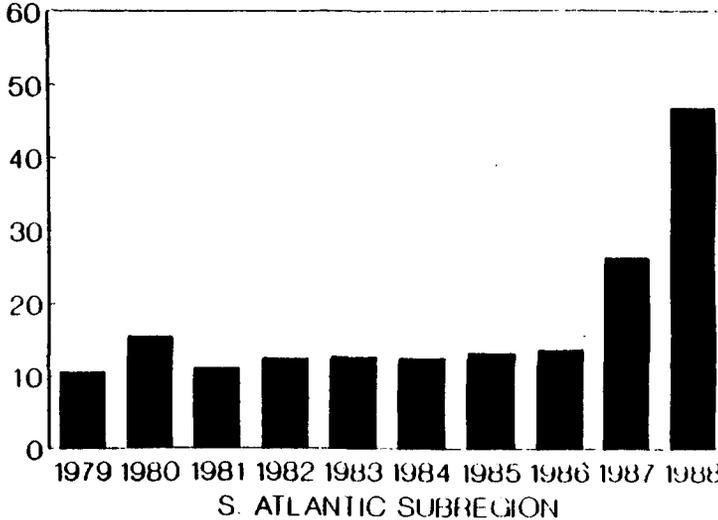
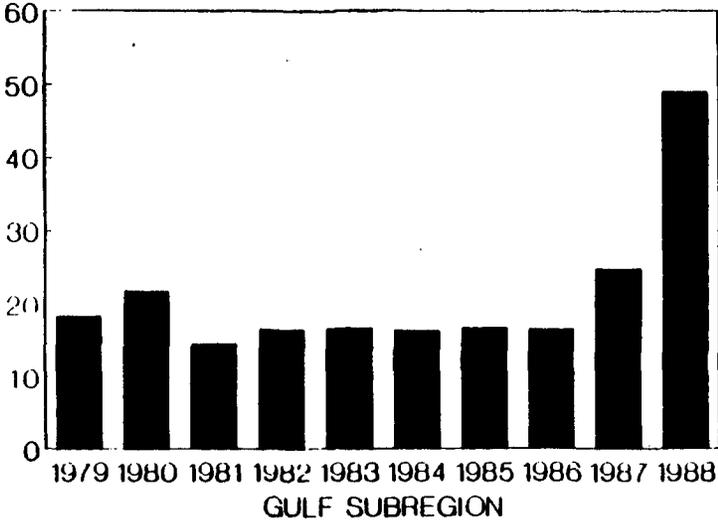
In-depth information on the number of telephone surveys by subregion, year, wave, and state allowed for detailed comparative analyses. These comparisons are important to show the varying annual, seasonal, or geographic emphasis of the MRFSS over time.

Total Sample: (See Figure-1 and Tables 1 & 2 in Appendix A)

Gulf Subregion: The total number of telephone samples ranged from 14,758 to 49,143. As expected, 1981 produced the fewest number of samples due to the missing of wave 1 as a result of contractual problems. From 1982 to 1986, the number of samples was amazingly consistent in the 16,700 range. In 1987, the GULF telephone sample jumped to 24,927 and in 1988 it almost doubled to 49,143.

FIGURE 1: TOTAL NUMBER OF TELEPHONE SAMPLES BY SUBREGION

(Thousands)



South Atlantic Subregion: The total number of telephone samples ranged from 10,766 to 46,967. The fewest number of samples occurred in 1979. As in the Gulf, sampling efforts were greatly increased in 1987 and 1988 to 26.5 and 47 thousand interviews respectively.

Overall Trends within both Subregions: The telephone sampling effort in aggregate for both subregions was fairly uniform from 1979 to 1986. Large increases in sampling resulted in 1987 and 1988 due to both nationwide and regional reallocation of sampling and large MARFIN contracts.

In 1987, the telephone samples of the entire nation were reallocated generally based upon population levels within the various states. With the rapid increases in population in the southeast, both Gulf and South Atlantic subregions benefited from the reallocation.

Also in 1987, the state of Texas no longer participated in the survey (Texas conducts its own recreational angler survey, NMFS decided to eliminate the MRFSS in Texas to avoid duplication of effort). Funds previously used to sample in Texas were reallocated throughout the Gulf.

In both 1987 and 1988, MARFIN contracts were obtained to supplement southeast sampling. Designed to gather better data for quota monitoring for King Mackerel, the expansions provided data for all species. The 1987 MARFIN grant resulted in increased sampling through wave five (October) for the west coast of Florida. In 1988, a large scale MARFIN contract was awarded which expanded telephone sampling across both the Gulf and South Atlantic subregions during waves four through six (July - December).

Geographic Comparison: Variation by State (1979-1988)

Gulf Subregion: Table 1 in Appendix A

Texas: The range of Texas sampling as a percentage of the total Gulf sample extends from zero to 37 percent from 1979 to 1988.

Excluding 1987-88 when no sampling was conducted (coordinating with state of Texas angling survey), the sampling percentage settled into the 28 to 37 percent range.

Louisiana: The range of Louisiana sampling as a percentage of the total Gulf sample extends from 22 to 37 percent from 1979 to 1988.

This subsample was very consistent in the 22 to 26 percent range except for 1987 and 1988 where the percentage increased to .37 as a result of redistribution of nationwide and Texas samples, and MARFIN contracts.

Mississippi: The range of Mississippi sampling as a percentage of the total Gulf sample extends from 4 to 10 percent from 1979 to 1988.

The Mississippi percentage of the overall Gulf sample was consistently in the 8 to 10% range except for 1979/80 (lower in the 3 to 4% range).

Alabama: The range of Alabama sampling as a percentage of the total Gulf sample extends from 5 to 10 percent from 1979 to 1988.

Like Mississippi, 1979/80 appears to be the lower bound.

West Florida: The range of West Florida sampling as a percentage of the total Gulf sample extends from 27 to 47 percent from 1979 to 1988.

In 1987 and 1988, West Florida jumped to 47 percent of the Gulf sampling due to redistribution of nationwide and Texas sampling and the large MARFIN contracts. With 38% of the Gulf sample, 1980 also appears to be good year for West Florida due to a large state funded expansion. From 1979 to 1986 (excluding 1980), the percentage was consistently in the 27 to 29 range.

South Atlantic Subregion: Table 2 in Appendix A

East Florida: The range of East Florida sampling as a percentage of the total Gulf sample extends from 34 to 73 percent from 1979 to 1988.

A substantial decline in East Florida as a percentage of subregion sampling has occurred since 1979/80. With a high of 73 percent in 1980 due to the large state funded expansion noted above, the state has fallen to only 34 percent in 1988 because of substantial sampling increases in other states within the subregion (eg. North Carolina).

Georgia: The range of Georgia sampling as a percentage of the total Gulf sample extends from 5 to 21 percent from 1979 to 1988.

The lower bound occurred in 1979/80 at 5 and 6%, upper bound in 1986 at 21 percent. Otherwise, the range condenses to 10 to 16%.

South Carolina: The range of South Carolina sampling as a percentage of the total Gulf sample extends from 9 to 20 percent from 1979 to 1988.

The state's range condenses to 14 to 20 percent of subregion total when the lower bound of 1980 (9%) is considered an outlier.

North Carolina: The range of North Carolina sampling as a percentage of the total Gulf sample extends from 13 to 42 percent from 1979 to 1988.

In 1987 and 1988, this state has become dominant in the region with 42 percent of the total subregion interviews as a result of reallocation of nationwide telephone sampling. North Carolina especially benefited from the reallocations - its "coastal zone" was expanded from 25 to 100 miles to remedy past problems of low coastal zone coverage.

Seasonal Comparisons: Variation by Wave (1979-1988)

Gulf: Table 1 in Appendix A

The Gulf sampling by wave has proven fairly consistent over time with the exception of 1981, 1987, and 1988. In 1981, the lack of sampling during wave one resulted in slight percent increases during waves 2-5. In 1987, a slight shift occurred whereby wave 2 and 3 increased at the expense of wave 4-6. In 1988, a strong reversal occurred with waves 4-6 benefiting from MARFIN funded wave expansions (during 1988, waves 1-3 represented the lowest percentage of total samples and waves 4-6 the highest percentage of total samples for the entire 1979-1988 period).

Seasonal Variation by Gulf state:

Texas: Very little variation between waves within the state for those years sampled (1981 created some variation due to wave 1 problem).

Louisiana: In 1988, the sampling follows the general trend of the region with a shift from waves 1-3 to waves 4-6.

Mississippi: In 1987, Mississippi samples shift from wave 5 to waves 3 and 4. State follows the general shift trend of 1988.

Alabama: In 1987, we again see a general shift from waves 4-6 to waves 1-3. State follows the 1988 pattern.

West Florida: Same as Alabama.

South Atlantic: Table 2 in Appendix A

Seasonal comparisons within the South Atlantic were complicated by the intermittent sampling during wave one. For each state, a separate review of the wave one sampled years versus wave one nonsampled years was conducted. The presence of sampled and nonsampled years will obviously create substantial variation.

Georgia: In Georgia, the MRFSS sampled during wave one from 1979-1980 and 1985-1988, but not from 1981-1984.

sampled years: Not a lot of consistency across waves during sampled years. Outliers on the high side appear to be 1986 waves 2 & 3, and 1988 wave 4. Outliers on the low side appear to be 1988 waves 1-3 & 5, 1987 wave 5, and 1986 waves 5 & 6. Outliers

during same year indicate a sampling shift, eg. 1986 and 1988. General downward trend in sampled years for wave 5.

nonsampled years: Sampling looks very consistent from 1981-1984.

South Carolina: In South Carolina, sampling was conducted during wave one in 1979, 1980, and 1988.

sampled years: Given we are only comparing three years, it is difficult to speak of consistency. Nevertheless, wave 3 in 1979 appears somewhat high and in 1988 we see a shift from waves 1 and 2 to wave 4.

nonsampled years (1981-1987): Consistent except for 1987 which shows a shift into wave 3 from virtually all other waves.

North Carolina: North Carolina followed the sampling scheme of South Carolina with wave one sampling occurring only in 1979, 1980, and 1988.

sampled years: In 1988, there appears to be a shift from waves 1-3 to waves 4-6.

nonsampled years (1981-1987): In 1987, there appears to be shift from waves 2 & 3 into wave 5.

East Florida: Eastern Florida did not experience the problem of intermittent sampling during wave one. Except for 1981, wave one samples were conducted in every year. As a result, a comparison of sampled and nonsampled years is no longer appropriate.

Other than 1981 wave one reallocation due to the contract problem (samples shifted into waves 2-5), only 1987 and 1988 showed variation. In 1987, wave 4 & 5 samples were reallocated to waves 1-3 and 6. In 1988, wave 4 benefited significantly from reallocations from waves 1-3 and 5.

REVIEW: Intercept Samples by State and Year, and by Mode

Information as to levels of intercept sampling information allows for comparison of sampling variation by: 1) year, 2) state and year, and 3) mode and year. Table 3 compares state sampling by year and Table 4 mode sampling by year.

Total Sample: (See Figure 2 and Table 3 in Appendix A)

The total number of intercept samples in both the Gulf and South Atlantic varied by year with 1981 resulting in the lowest sampling level due to the exclusion of wave one. A general upward trend in sampling has occurred in both regions since 1979. Recently, Gulf samples increased by 3582 interviews or 34 percent (1986) due to state funded expansion in Louisiana. From 1986-88, the sampling remained high due to MARFIN contract expansions mainly in the state of Florida. In 1987, South Atlantic sampling expanded by 6930 interviews or 59 percent due to state funding support in Georgia, South Carolina, and North Carolina.

Range of samples in the Gulf: 6,390 (1981) to 14,860 (1988)
Range of samples in the South Atlantic: 3,807 to 18,773
(1981) (1988)

Geographic Comparison: Variation by State (1979-1988)

Gulf Subregion: Table 3 in Appendix A

Texas: The range of Texas sampling as a percentage of the total Gulf sample extends from zero to 31 percent from 1979 to 1988.

Disregarding the years of 1986-88 where MRFSS sampling in Texas was eliminated to avoid duplication of effort with state run surveys, the range condenses to 17 to 30% of the Gulf sample.

Louisiana: The range of Louisiana sampling as a percentage of the total Gulf sample extends from 11 to 43 percent from 1979 to 1988.

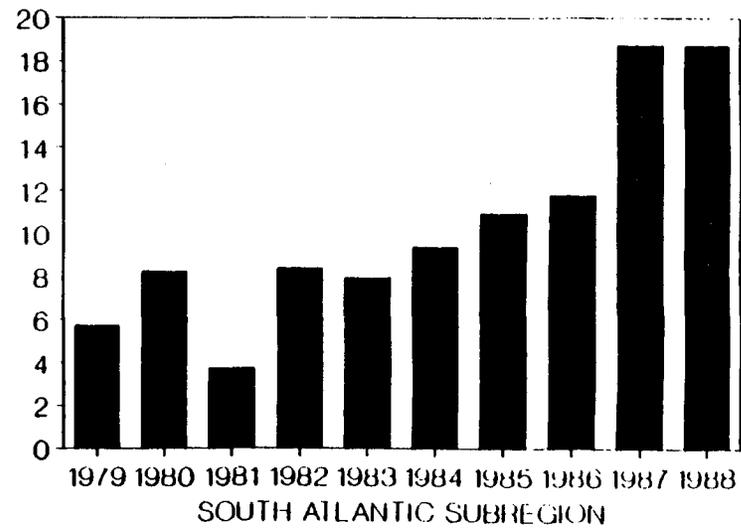
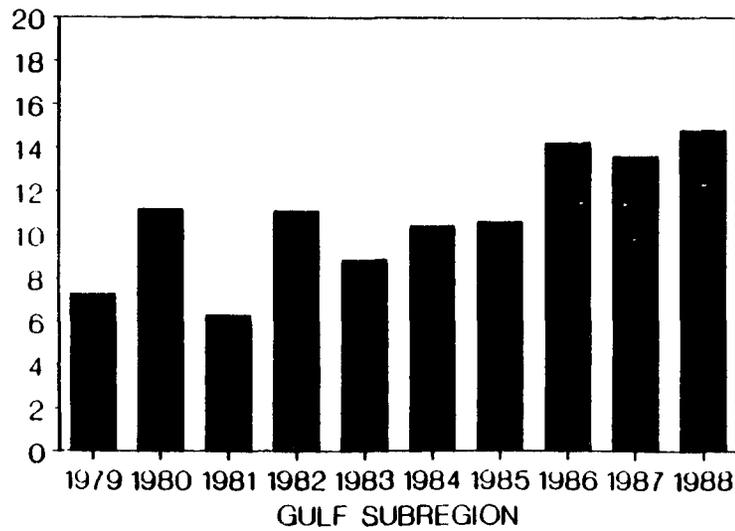
Disregarding 1986, the range condenses to 11 to 20 percent of the Gulf sample. In 1986, the state contributed heavily to an increase in intercept sampling, this pushed the state's sampling as a percentage of the subregion up to 43 percent.

Mississippi: The range of Mississippi sampling as a percentage of the total Gulf sample extends from 6-12 percent from 1979 to 1988.

Alabama: The range of Alabama sampling as a percentage of the total Gulf sample extends from 7 to 13 percent from 1979 to 1988.

FIGURE 2: TOTAL NUMBER OF INTERCEPT SAMPLES BY SUBREGION

(Thousands)



West Florida: The range of West Florida sampling as a percentage of the total Gulf sample extends from 36 to 60 percent from 1979 to 1988.

The state experienced a fair amount of sampling variation even when disregarding the sampling boost received from MARFIN contracts in 1987 and 1988. During 1980 and 1981, West Florida constituted in excess of 50 percent of the Gulf sample (1980 increase due to the state funded expansion).

South Atlantic Subregion: Table 3 in Appendix A

East Florida: The range of East Florida sampling as a percentage of the total Gulf sample extends from 25 to 62 percent from 1979 to 1988.

The years of 1983 and 1984 appear higher than normal at 61 and 62 percent of the South Atlantic sample, while 1987 and 1988 appear low at 25 and 32 percent of the sample. These findings for 1987 and 1988 illustrate the impact of state funded sampling in Georgia, North and South Carolina.

Georgia: The range of Georgia sampling as a percentage of the total Gulf sample extends from 6 to 27 percent from 1979 to 1988.

The years of 1985-1987 appear high at 27 to 22% of the regional sampling due to state sampling supplements. Disregarding these years, the range closes to 6 to 16 percent.

South Carolina: The range of South Carolina sampling as a percentage of the total Gulf sample extends from 10 to 18 percent from 1979 to 1988.

North Carolina: The range of North Carolina sampling as a percentage of the total Gulf sample extends from 16 to 42 percent from 1979 to 1988.

The years 1987 and 1988 appear much higher than 1979-1986 as a result of the state funded sampling increases. North Carolina has displaced Eastern Florida as the dominant sampling state in the South Atlantic subregion.

Modal Comparisons: Variation by Mode (1979-1988)
Table 4 Appendix A

Gulf Subregion: From 1979 to 1985, the shoreline mode⁵ received a significant amount, in most years the majority of, Gulf intercept samples. The percent of shoreline

5 Shoreline mode in this paper refers to fishing from both beach/bank and man-made structures (prior to 1986, the MRFSS considered these as separate categories).

samples ranged from 45 to 61 percent. However, from 1986-1988 the shoreline mode received a much lower percentage of subregional samples (15 to 25 percent).

During the 1979 to 1985 time period, the private and rental boat mode experienced the exact opposite variation in sampling as compared to the shoreline mode. Private/rental boat sampling gradually declined as a percentage of total sampling from 1979-1985 from 51 to 32 percent. A reversal in 1986 pushed the private/rental boat mode share of total sampling to 67 percent (1987 and 1988 remained in excess of 60% as a result of MARFIN boat mode enhancements).

While the party/charter boat mode has never received a dominant share of the Gulf sample, it has general increased in importance over time. After starting at only 5% of the 1979 sample, this mode increased to 16-18% from 1983 to 1987 before dropping back down to 13% in 1988. One should note that this expansion resulted despite the discontinuance of partyboat sampling in 1986.

South Atlantic: The South Atlantic has followed a similar pattern to the Gulf in terms of the shift in modal emphasis from shoreline to private/rental boat modes.

SECTION II: COMPARATIVE ANALYSIS OF MRFSS TRIP AND ANGLER ESTIMATES: 1979-88

The MRFSS provides aggregated estimates of trips by state and subregion. In addition, estimates of total anglers are available at the state level but not at the sub-region level due to the likelihood of double-counting across states.

REVIEW: Trip Estimates

Trip estimates are presented for the Gulf and South Atlantic subregions via Figure 3. Figures 4 and 5 show the trip estimates by state for the Gulf and South Atlantic subregions respectively (also see Tables 5 & 6 in Appendix A).

When considering these estimates, it is likely that substantial variation in visitation could occur from year to year for a multitude of reasons: weather conditions, changes in disposable income, changing regional populations, etc. However, one should consider the impacts of sampling variation, especially where sampling is nonexistent in a season, state, or mode. Note that no sampling was conducted for the following:

1981 - 1982: Survey not conducted during the January to February wave of 1981 due to late award of the data collection contract.

Due to the high cost of sampling during the January to February wave, sampling during this wave in 1982 was restricted to the Gulf states and eastern Florida in the S. Atlantic.

During 1982, trip estimates for the Gulf of Mexico do not include party/charter and private/rental boat modes in Texas.

1983 - 1984: Due to the high cost of sampling during the January to February wave, sampling during this wave in 1983 and 1984 was restricted to the Gulf and eastern Florida in the S. Atlantic.

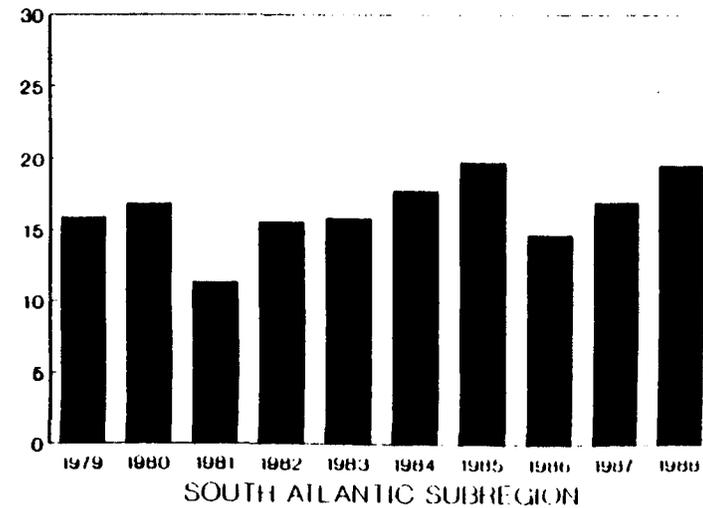
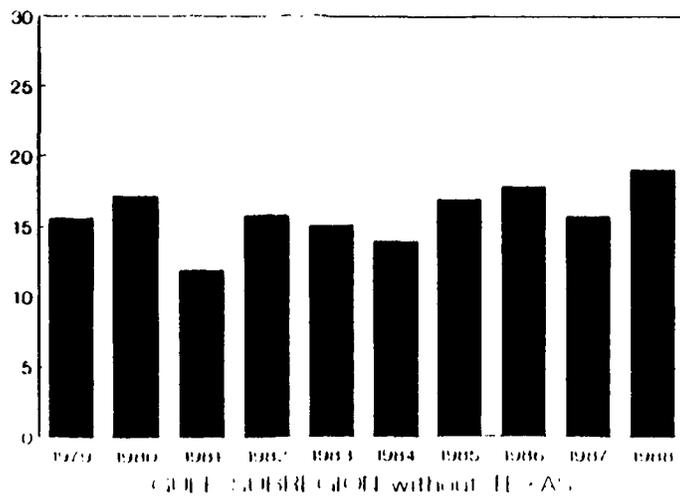
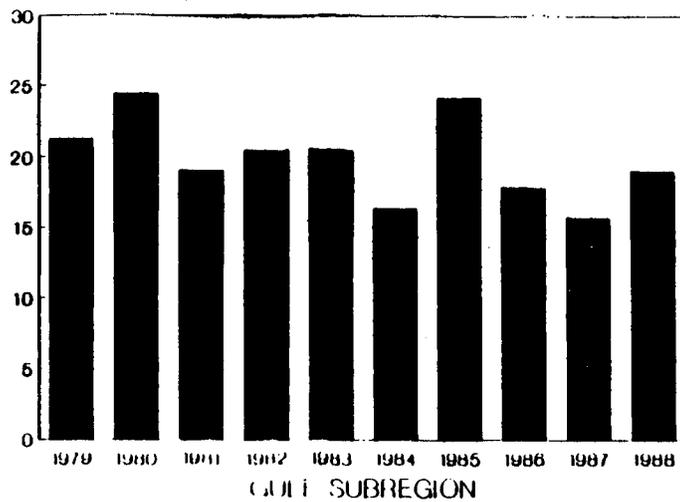
During 1983 and 1984, trip estimates for the Gulf of Mexico do not include party/charter and private/rental boat modes in Texas.

1985: Due to the high costs of sampling during the January to February wave, 1985 sampling during wave 1 was restricted to the Gulf states and Atlantic coast of Florida and Georgia.

1986 & 1987: Due to the high costs of sampling during the January to February wave, 1986-7 sampling during wave 1 was restricted to the Gulf and the Atlantic coast of Florida and Georgia.

FIGURE 3: TOTAL TRIPS: GULF & S. ATLANTIC SUBREGIONS

(Millions)



Surveys not collected in Texas via any mode

Party boats in both the S. Atlantic and the Gulf were not sampled via the MRFSS.

1988: Surveys not collected in Texas via any mode.

Party boats in both the S. Atlantic and the Gulf were not sampled via the MRFSS.

Gulf Subregion: In order to develop the best estimates of trips (or anglers) in the Gulf of Mexico from 1986 on, one really should obtain information from the MRFSS, the NMFS Party/Headboat survey, and the Texas Parks and Wildlife Department surveys. Even when combining estimates across these surveys, certain "holes" in the data are apparent (eg. lack of shoreline sampling and angler estimates for the state of Texas).

Given the purpose of this report is to focus on the MRFSS, we decided not to include estimates from other surveys (since those surveys apply different estimation methodologies). Instead, we developed estimates of Texas trips (and anglers) based on 1985 MRFSS percentages (most recent year where Texas was included in the MRFSS - see Appendix B for estimation methodology)⁶. Where appropriate, comparisons are made from our expanded Gulf estimates or Gulf estimates excluding Texas.

MRFSS estimates of Gulf trips from 1979 to 1988 ranged from 15.8 to 24.5 million (see Figure 3 and Table 5 in Appendix A). Given the MRFSS has not estimated Texas trips since 1985, Gulf trends should not be evaluated without adjustment. If we consider either the expanded Gulf region totals or the Gulf region totals exclusive of Texas, the trend in Gulf visitation appears to be rising somewhat since 1981.⁷

The states of Florida, Louisiana, and Texas dominate the Gulf due to their abundant coastlines (represent in excess of 90 percent of total Gulf trips - Figures 4A & B).

6 Since the party/headboat mode in the Gulf is relatively small when compared to the shoreline, private, and charter boat modes, no adjustment was made for the lack of party/headboat estimates.

7 This trend may be even more discernable if one considers that since 1987, a change occurred in the procedure used to adjust for outliers. It is estimated that this change lead to a 10-15 percent reduction in trip estimates as compared to prior techniques.

State trip estimates vary considerably across the years both in terms of their predicted values and percentages. For example, western Florida, the most dominant Gulf state, ranged from 48 to 78 percent of Gulf trips. Since 1986, the Florida percentage has increased to over 70 percent of the MRFSS Gulf total due to the exclusion of Texas estimates. Even during those years where Texas was included in the MRFSS sampling, Florida still dominated the Gulf ranging from 48 to 60 percent of the subregion's total trips. Despite the lack of obvious trends at the state level, Florida and Louisiana appear to be the driving force behind the Gulf-wide trend (see Figures 4A & B).

S. Atlantic Subregion: From 1979 to 1988, S. Atlantic trip estimates varied from 11.3 to 19.8 million (see Figure 3 and Table 6 in Appendix A). Since 1981, region-wide trip estimates also appear to be trending somewhat upward.

In this subregion, Eastern Florida and North Carolina dominate with from 80 to 90 percent of regional trips. Florida (eastern portion) is the most dominant state, representing from 49 to 72 percent of S. Atlantic trips. Again, the increase in Florida visitation appears to be driving the subregion (see Figures 5A & B).

Precision of Trip Estimates:

As noted previously, variation in sampling will not substantially alter point estimates (mean values) assuming a "threshold" level of sampling is achieved. Variation in sampling can however impact the precision of point estimates - generally, the greater the sampling the more precise the estimate.

Trip Precision Tables 1-3 (Appendix C) provide information as to the precision of trip estimates based upon the standard errors and coefficients of variation⁸ (CV) of the estimates. The tables reflect trip estimate precision by subregion and state.

Gulf Subregion: For the subregion-wide trip estimates (Precision Table 1 in Appendix C), the CV has been quite good - the highest value recorded in 1982 at less than 15 percent. In other words, the Gulf subregion trip estimates have been consistently precise over time.

8 Coefficient of variation (CV) is equal to the standard error divided by its mean. CV is a useful indicator of the relative level of precision of the estimate, with the lower the CV the better. Note also that the CV says nothing about the accuracy of the estimate, an estimate could be very precise but also very inaccurate.

FIGURE 4A: NUMBER OF GULF TRIPS BY STATE

(Millions)

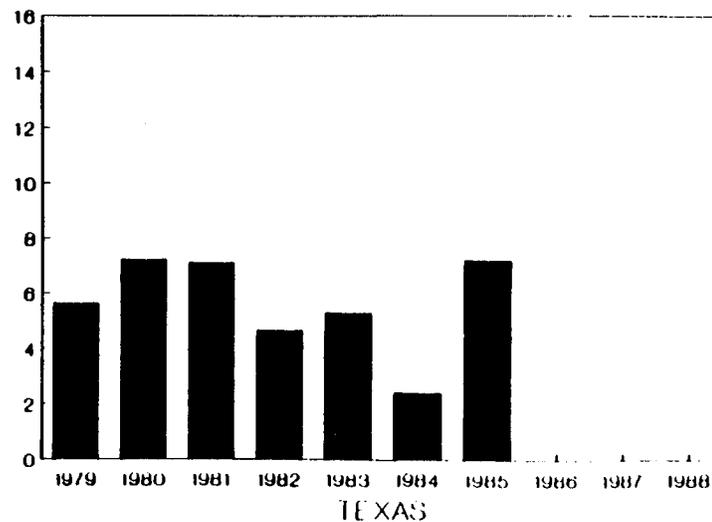
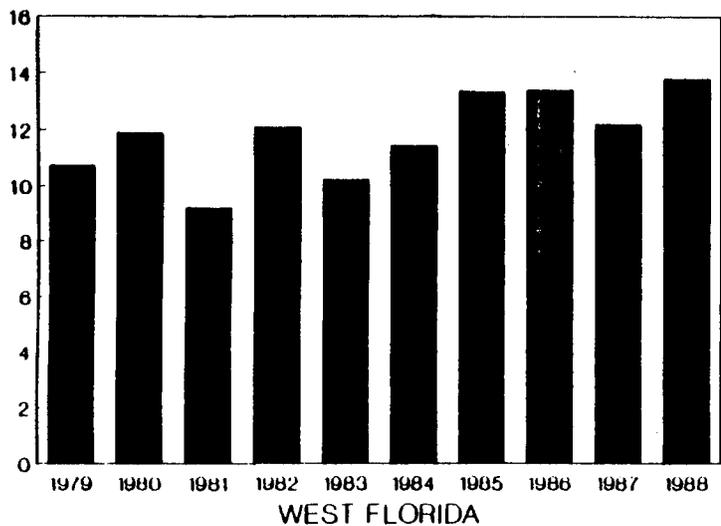


FIGURE 4B: NUMBER OF GULF TRIPS BY STATE

(Millions)

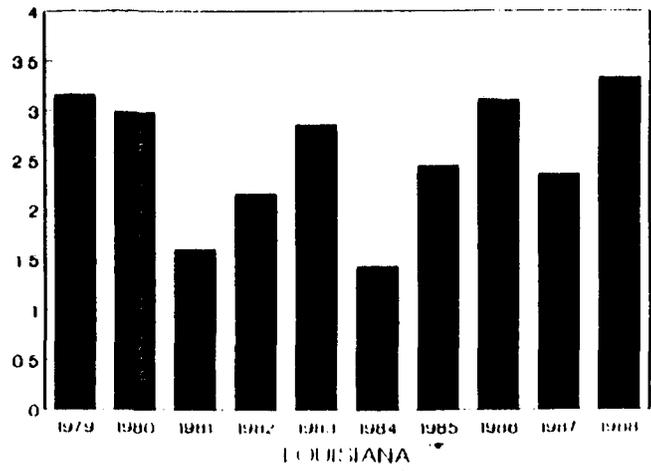
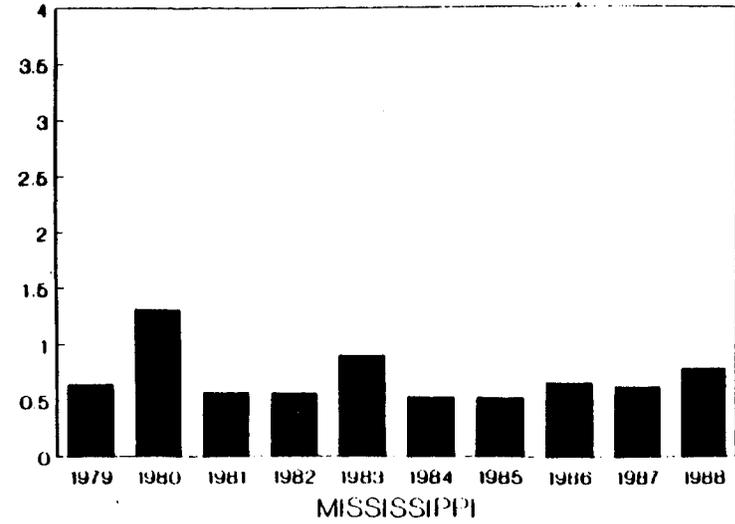
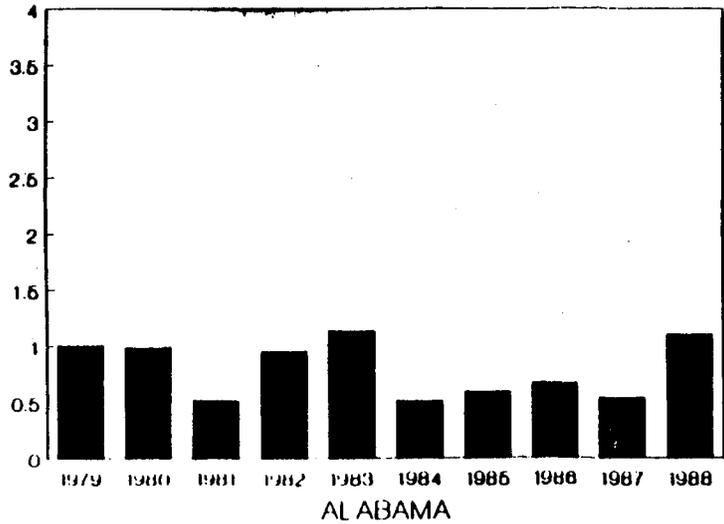
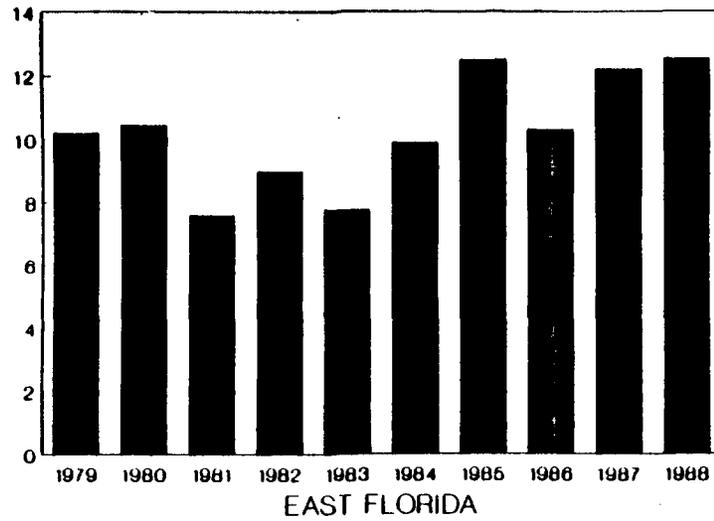


FIGURE 5A: NUMBER OF S. ATLANTIC TRIPS BY STATE

E. Florida in Millions



Georgia in Thousands

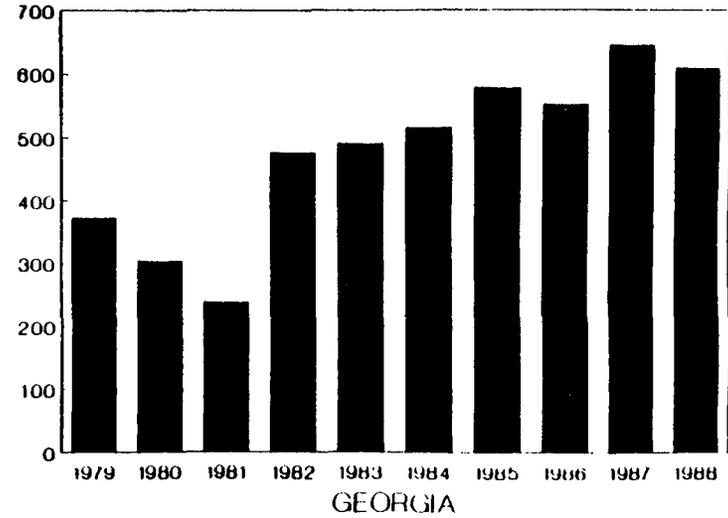
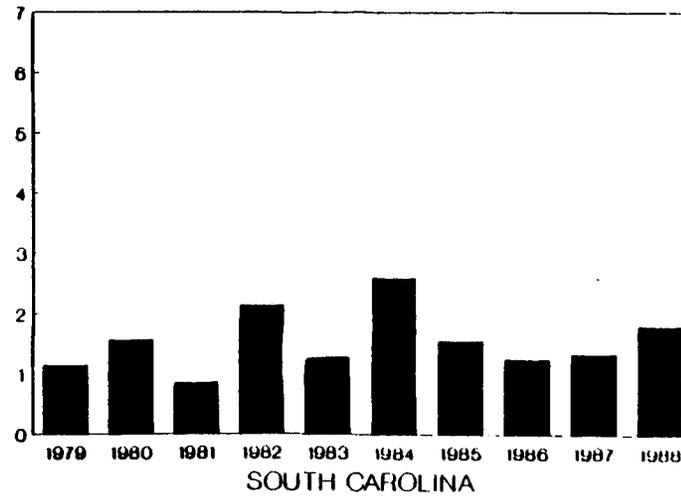
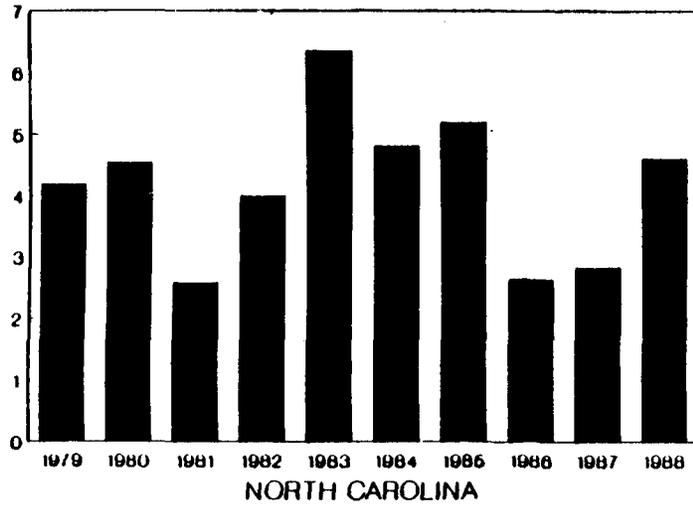


FIGURE 5B: NUMBER OF S. ATLANTIC TRIPS BY STATE

(Millions)



Given that the critical coastal county trip estimates are generated primarily from the telephone survey, we would expect changes in telephone sampling to drive the precision of the trip estimates. This expectation appears correct in that the highest telephone sampling years are associated with low CV's (1980, 1987, 1988). The most notable being 1988 - by doubling the 1987 sampling level, the lowest CV to date has been achieved.

Looking at the individual states (Precision Table 2 in Appendix C), the CV still remains satisfactory, generally under 25 percent. Notice that the states with the highest telephone sampling (west FL, LA, TX) experience lower CV's as a whole.

South Atlantic Subregion: The S. Atlantic subregion follows the pattern of the Gulf. The CV's are quite good with the most precise estimates coming from those years with expanded telephone sampling (see Precision Table 1, Appendix C).

Telephone sampling expansions in North Carolina, South Carolina, and eastern Florida for 1987 and 1988 have resulted in increased estimate precision (see Precision Table 3 in Appendix C).

REVIEW: Angler Estimates

Total anglers for the Gulf and S. Atlantic subregions are presented in Figures 6A & B (also Tables 7-10 in Appendix A). Figure 6A represents the summation of total angler estimates across states and is therefore subject to problems of double-counting. These figures should be considered only "ballpark" estimates, if at all.⁹ Figure 6B represents the summation of in-state anglers (excludes out-of-state anglers) and therefore avoid double-counting problems. Despite the fact that these figures represent only a portion of regional anglers, the estimates may provide information on trends.

Estimates of total anglers by state for both the Gulf and South Atlantic are presented in Figures 7 & 8 (also tables 7-10 in Appendix A), note that aggregation to the state level is legitimate (double counting only occurs when summing total angler estimates across states).

Neither subregion shows much by way of trends in angler populations either in aggregate or at the individual state level. However, as with the trip estimates, a slight upward trend can be witnessed in non-Texas aggregate angler estimates since 1981. However, the trend is characterized by reversal (see Figure 6B). The state-wide estimates show even less by way of patterns.

⁹ MRFSS statistics personnel do not recommend combining "total" angler estimates.

FIGURE 6A: TOTAL ANGLERS: GULF & S. ATLANTIC SUBREGIONS

(Millions)

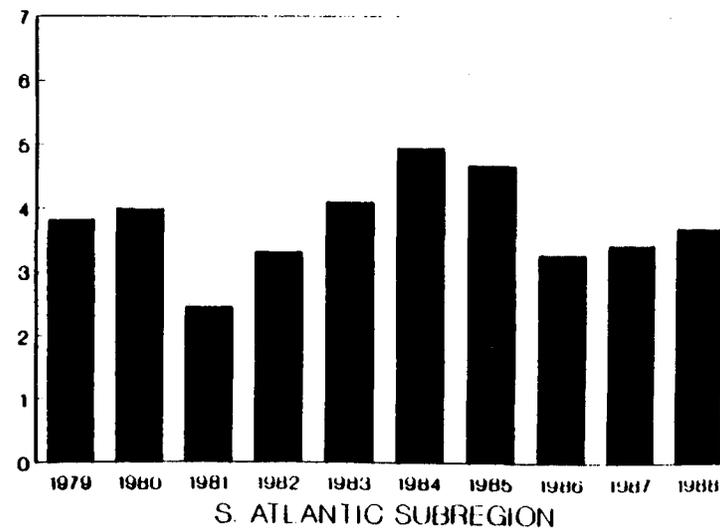
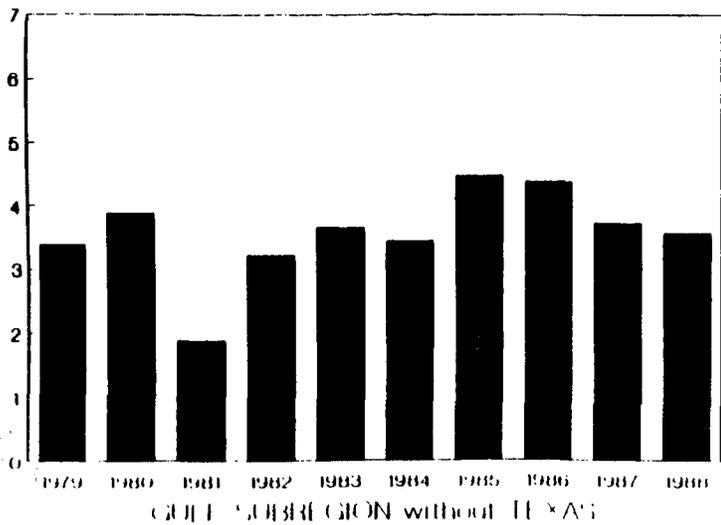
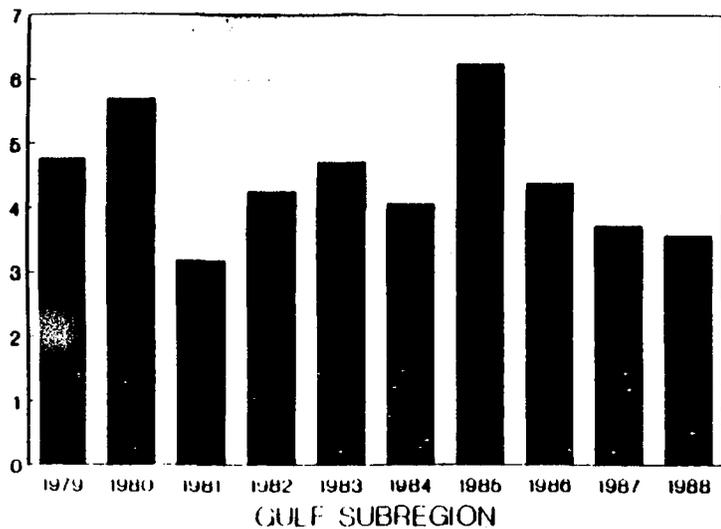


FIGURE 6B: TOTAL IN-STATE ANGLERS: GULF & S. ATLANTIC

(Millions)

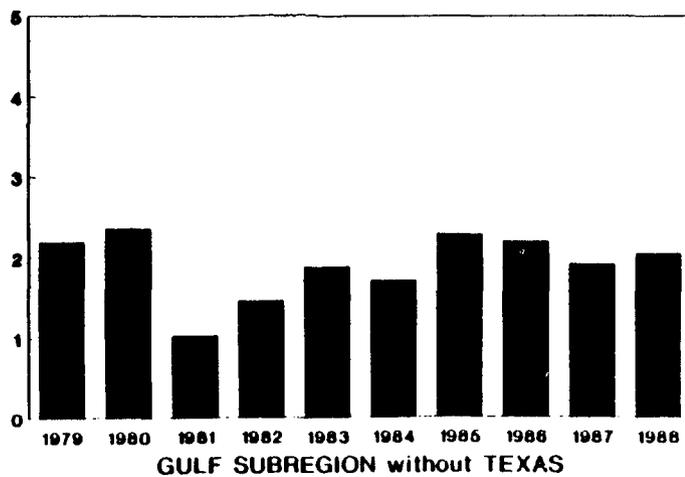
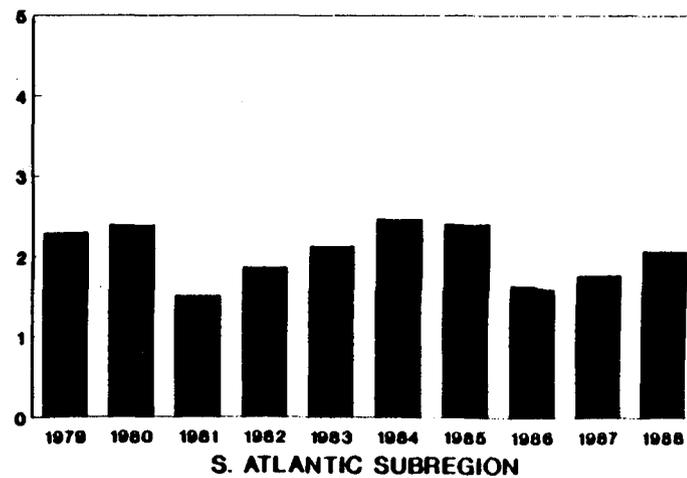
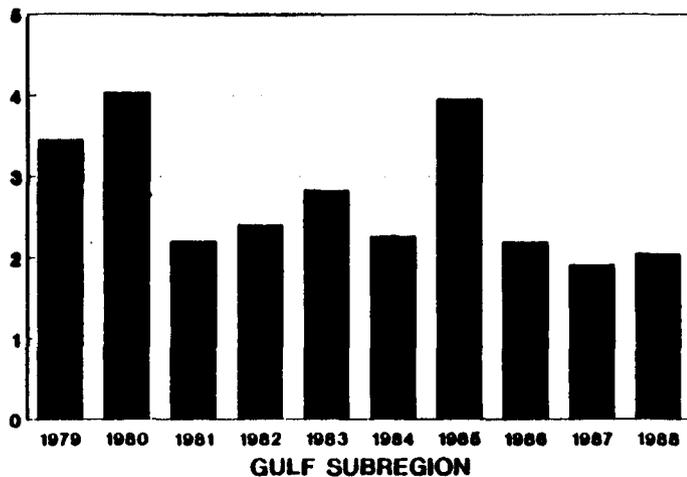


FIGURE 7A: NUMBER OF GULF ANGLERS BY STATE

(Millions)

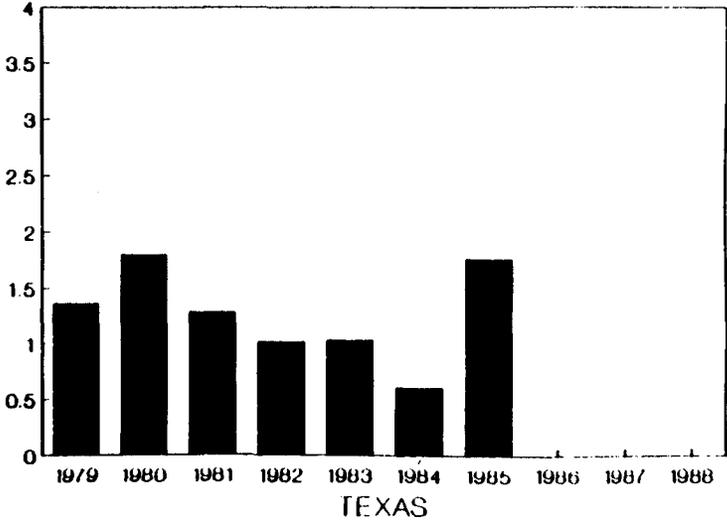
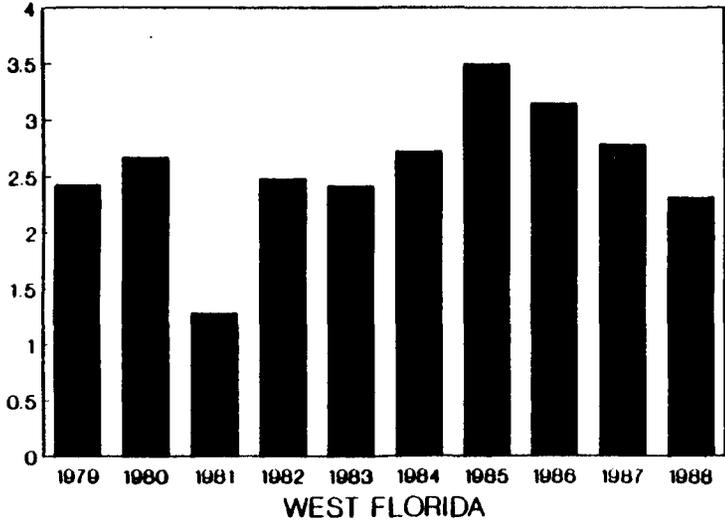
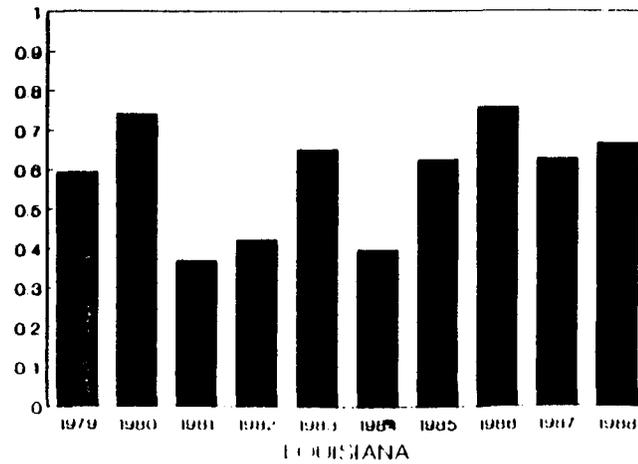
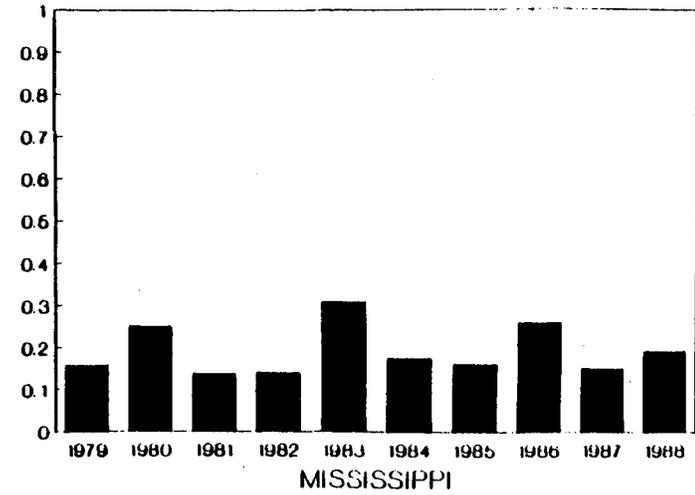
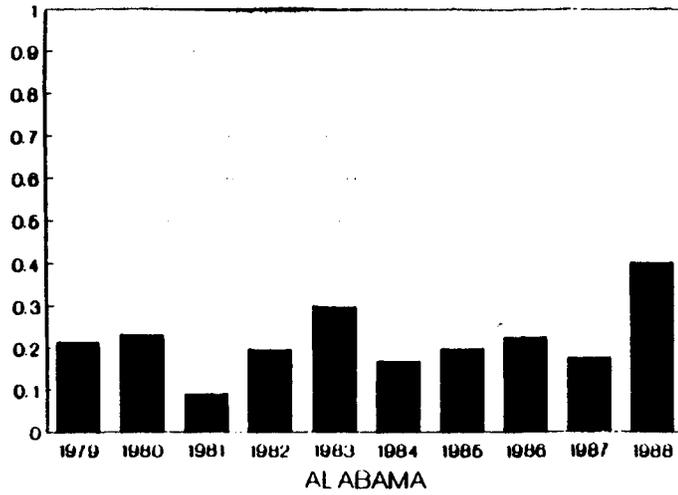


FIGURE 7B: NUMBER OF GULF ANGLERS BY STATE
(Millions)



**FIGURE 8A: NUMBER OF S. ATLANTIC ANGLERS BY STATE
(Millions)**

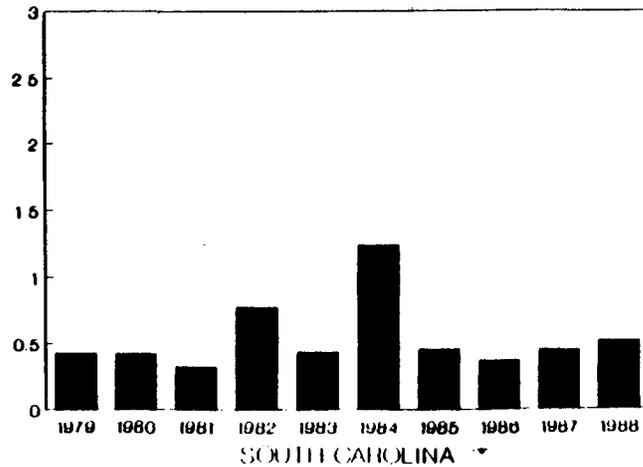
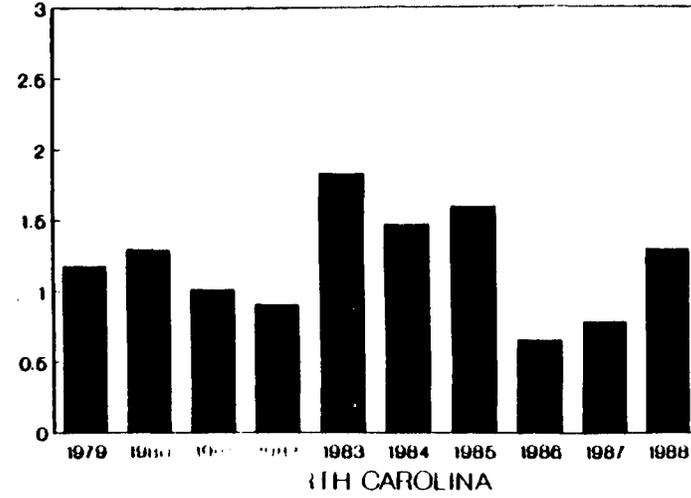
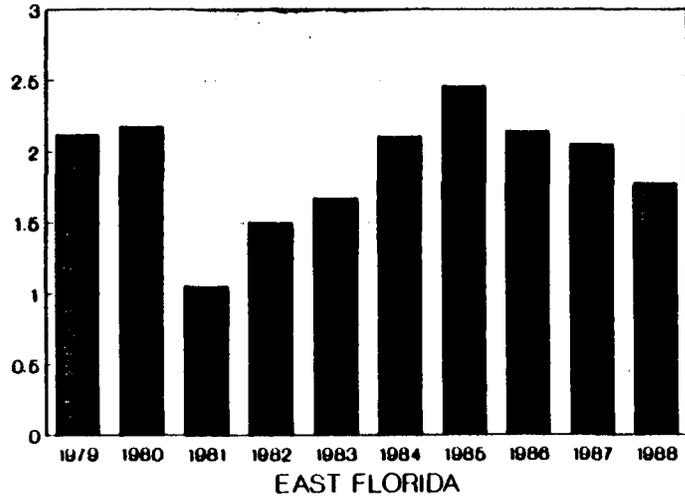
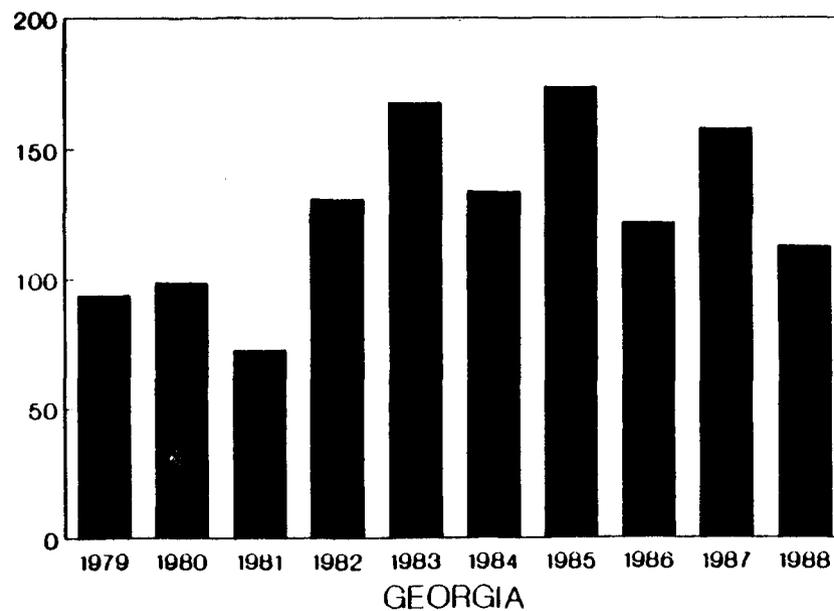


FIGURE 8B: NUMBER OF S. ATLANTIC ANGLERS BY STATE

(Thousands)



Note: Georgia scaling different from remainder of region

Precision of Angler Estimates:

Angler Precision Tables 4-6 (Appendix C) provide information as to the standard errors and coefficients of variation of angler estimates by subregion and state.

Subregion-wide Gulf and S. Atlantic angler estimate precision (Precision Table 4 in Appendix C) is presented for the coastal county category due to the potential double-counting problem associated with non-coastal county angler estimation.

As a whole, the precision of the angler estimates is considerably lower than that of the trip estimates. The range of coefficients of variation (CV) from 1980-1988 extends from 35 to nearly 60 percent across both subregions. In addition, it does not appear that the recent intercept and telephone sampling increases have improved the precision of the angler estimates.

At the state level (Precision Tables 5 & 6 in Appendix C), the total angler CV's on average appear in excess of 40 percent from 1980-88.

SECTION III: COMPARATIVE ANALYSIS OF MRFSS SOUTHEAST QUESTIONNAIRES: 1979-89

In addition to the previous comparisons of sampling coverage and effort estimation, users may also be specifically interested in the type of information being collected on a year to year basis.

To facilitate this need, the following tables compare data (variables) being collected each year from 1979 to 1989. Table A presents the intercept survey and Table B the telephone survey. To develop these tables, actual questionnaires from the southeast region were reviewed.

Table A separates intercept data by record type (1-5) and variable. Type 1 record variables were further grouped into categories based upon similar areas of emphasis. The variable groupings are as follows:

<u>Variables</u>	<u>Category</u>
1-9	Interview Specifics
10-12	Socioeconomics
13-21	Mode
22	Endangered Species
23-24	Targets
25-31	Area of Fishing
32-33	Gear
34-37	Fishing Time
38-41	Number of Days Fished
42-44	Cost & Mileage
45-49	Residence
50-53	Allocation of Catch

Reviewing Table A, it becomes immediately apparent that the data collected varies considerably from 1979 to 1989. However, recalling the basic objective of the MRFSS is to estimate catch, trips, and anglers, one notices for example that the critical intercept catch data (record type 1, variables 50-53, record types 2-4) is consistently obtained.

Other data which is consistently obtained includes the intercept specifics, mode (asked), targeting, area (ocean, bay, river; state versus federal waters), gear, fishing time, number of fishing days in the past 2 and 12 months, city/county of residence, name and phone or address. In summary, all data for catch and effort estimation has been collected each year without fail. Noncritical data (that which is not used for catch and effort estimation), is collected only on a periodic basis in order to meet the needs of special types of analysis (eg. economics).

Table B compares the telephone survey from 1979 to 1989. The survey is separated into its two components: the screening survey (determines if there are any anglers in the household) and the trip questionnaire (asks specific questions of the contacted household angler).

Reviewing Table B, one immediately notices that the telephone survey is much more consistent in terms of data availability over time. The only variation appears to be the result of the concentration on finfish starting back in 1981. The needs of "other analyses" have generally been met via adjustments to the intercept, not telephone survey.

TABLE A: INTERCEPT SURVEY

		Analysis of Variables in MRFSS (1979 - 1989)										
Variable Number	Variable Description	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
(SCREENING SURVEY)												
1	Primary purpose of trip (recreation, income)	-	-	-	-	-	-	-	-	X	X	X
2	Saltwater fishing?	-	-	-	-	-	-	-	-	X	X	X
3	Finfish Fishing?	-	-	-	-	-	-	-	-	X	X	X
4	Catch anything?	-	-	-	-	-	-	-	-	X	X	X
5	Finished trip?	-	-	-	-	-	-	-	-	X	X	X
6	Going elsewhere to fish?	-	-	-	-	-	-	-	-	X	X	X
7	By same mode?	-	-	-	-	-	-	-	-	X	X	X
(TYPE 1 RECORD)												
35	1 Variation in Form Type (finfish, shrimp, spiny lobster)	X	X	X	-	-	-	-	-	-	-	-
	2 Interviewer	X	X	X	X	X	X	X	X	X	X	X
	3 Interview number	X	X	X	X	X	X	X	X	X	X	X
	4 Time of interview	X	X	X	X	X	X	X	X	X	X	X
	5 Date of interview	X	X	X	X	X	X	X	X	X	X	X
	6 State	X	X	X	X	X	X	X	X	X	X	X
	7 County	X	X	X	X	X	X	X	X	X	X	X
	8 Site Code	X	X	X	X	X	X	X	X	X	X	X
	9 Interview status	X	X	X	X	X	X	X	X	X	X	X
	10 Respondent Language	X	X	X	-	-	-	-	-	-	-	-
	11 Sex	X	X	X	-	-	-	-	X	X	X	X
	12 Age	X	X	-	-	-	-	-	X	X	X	X

Variable Number	Variable Description	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
13	Mode (observed)	X	X	X	X	-	-	-	-	-	-	-
14	Mode (asked)	X	X	X	X	X	X	X	X	X	X	X
15	Use any other modes?	X	X	X	X	-	-	-	-	-	-	-
16	Other modes used (list)	-	X	-	X	X	-	-	-	-	-	-
17	Number of places fished	X	-	-	-	-	-	-	-	-	-	-
18	Can you separate fish caught by mode?	-	X	X	X	X	-	-	-	-	-	-
19	Total number modes used	-	X	X	X	X	-	-	-	-	-	-
20	If boat mode, involved in a fishing tournament?	-	-	-	-	-	-	-	-	-	-	X
21	Tournament < 7 days, Targeting: Gamefish?	-	-	-	-	-	-	-	-	-	-	X
22	See any sea turtles?	-	-	-	-	-	-	-	-	-	-	X
23	Targeting	X	X	X	X	X	X	X	X	X	X	X
24	Which species (top 2, except for 1979, top 3 otherwise)?	X	X	X	X	X	X	X	X	X	X	X
25	Mainly fishing in what area (ocean, bay, river)?	X	X	X	X	X	X	X	X	X	X	X
26	Estuaries by name	-	-	-	-	-	-	-	-	-	X	-
27	Rivers and sounds by name	-	-	-	-	-	-	-	-	-	-	X
28	If ocean & boat, > 3 miles	X	X	X	X	X	X	X	X	X	X	X
29	" , 3-10 miles in FL & TX	-	X	-	X	X	X	X	X	X	X	X
30	State boat fished the most	X	X	X	X	X	X	X	-	-	-	-
31	Near oil/gas platform or artificial reef?	-	-	-	-	-	X	X	X	X	X	X
32	Gear	X	X	X	X	X	X	X	X	X	X	X
33	# gears used simultaneously	X	-	-	-	-	-	-	-	-	-	-

Variable Number	Variable Description	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
34	Fishing Time	-	X	X	X	X	X	X	-	-	-	-
35	Fishing Time (with gear in the water)	X	X	X	X	-	-	-	X	X	X	X
36	If incomplete trip, add'l hours planning to fish	X	X	X	X	X	X	X	-	-	-	-
37	hours planning to fish with gear in the water	-	-	-	-	-	-	-	-	X	X	X
38	0 days in state in last 12 months (exclude today)	X	X	X	X	X	X	X	X	X	X	X
39	" 2 months (exclude today)	X	X	X	X	X	X	X	X	X	X	X
40	0 days from other states in last 12 months	X	-	-	-	-	-	-	-	-	-	-
41	" last 2 months	X	-	-	-	-	-	-	-	-	-	-
42	Miles from last night's lodging (1987: see type 5 record)	X	X	X	-	-	-	-	-	X	-	-
43	One way miles from residence to site (1987: see type 5 record)	-	-	-	-	-	-	-	X	X	-	-
44	Total cost of fishing here today (exclusive of gas)	X	X	X	-	-	-	-	-	-	-	-
45	City, county, and state of residence	X	X	X	X	X	X	X	X	X	X	X
46	Zip code of residence (1987: see type 5 record)	-	-	-	-	-	-	-	-	X	X	X
47	Private residence?	-	X	X	X	X	X	X	X	X	X	X
48	Have phone?	X	X	X	X	X	X	X	X	X	X	X
49	Name & phone or name & address	X	X	X	X	X	X	X	X	X	X	X

Variable Number	Variable Description	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
50	Catch any inspectible fish?	X	X	X	X	X	X	X	X	X	X	X
51	Catch fish yourself?	X	X	X	X	X	X	X	X	X	X	X
52	If multiple anglers, can you separate your catch?	X	X	X	X	X	X	X	X	X	X	X
53	Number of anglers who have fish here	X	X	X	X	X	X	X	X	X	X	X
54	Number of type 2, 3, and 4 records (1987: type 5 record)	X	X	X	X	X	X	X	X	X	X	X

(TYPE 2 RECORD: Unavailable catch)

1	Species Name	X	X	X	X	X	X	X	X	X	X	X
2	Species Code	X	X	X	X	X	X	X	X	X	X	X
3	Disposition	X	X	X	X	X	X	X	X	X	X	X
4	Number Caught	X	X	X	X	X	X	X	X	X	X	X

(TYPE 3 RECORD: Identified Catch)

1	Species Name	X	X	X	X	X	X	X	X	X	X	X
2	Species Code	X	X	X	X	X	X	X	X	X	X	X
3	Planned Disposition	-	-	-	-	-	-	-	-	-	X	X
4	Number Caught	X	X	X	X	X	X	X	X	X	X	X
5	Length	X	X	X	X	X	X	X	X	X	X	X
6	Weight	X	X	X	X	X	X	X	X	X	X	X

(TYPE 4 RECORDS: Catch on another angler's form)

1	Date	X	X	X	X	X	X	X	X	X	X	X
2	Interviewer number	X	X	X	X	X	X	X	X	X	X	X
3	Interview number	X	X	X	X	X	X	X	X	X	X	X

Variable Number	Variable Description	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
(TYPE 5 RECORDS: Economics)												
1	Primary purpose of trip is fishing?	-	-	-	-	-	-	-	-	X	-	-
2	One way miles from residence for those with primary purpose of fishing	-	-	-	-	-	-	-	-	X	-	-
3	One way miles from last night's lodging for those with nonfishing primary purpose	-	-	-	-	-	-	-	-	X	-	-
4	Trip length in days	-	-	-	-	-	-	-	-	X	-	-
5	Zip code of residence	-	-	-	-	-	-	-	-	X	-	-

TABLE B: TELEPHONE SURVEY (composed of the screening and trip questionnaires)

Variable Number	Variable Description	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
(Screening Survey)												
1	County	X	X	X	X	X	X	X	X	X	X	X
2	Town	X	X	X	X	X	X	X	X	X	X	X
3	Permanent Residence	X	X	X	X	X	X	X	X	X	X	X
4	Anyone in household fished in state within the past 12 months?	X	X	X	X	X	X	X	X	X	X	X
5	Number of household anglers in past 12 months	X	X	X	X	X	X	X	X	X	X	X
6	" who were shrimping "	X	X	-	-	-	-	-	-	-	-	-
7	Number of household anglers in the past 2 months	X	X	X	X	X	X	X	X	X	X	X
(Trip Survey)												
1	Date of last trip	X	X	X	X	X	X	X	X	X	X	X
2	Finfishing/shrimping trip?	X	X	-	-	-	-	-	-	-	-	-
3	Mode of trip	X	X	X	X	X	X	X	X	X	X	X
4	Number of trips in the past two months if angler can't recall trip dates	X	X	X	X	X	X	X	X	X	X	X
5	Primary gear used	X	X	X	X	X	X	X	X	X	X	X
6	Area utilized (ocean, bay, river, etc.)	X	X	X	X	X	X	X	X	X	X	X
7	If ocean and boat mode, > 3 miles offshore?	X	X	X	X	X	X	X	X	X	X	X
8	For boat mode, state and county where you returned	X	X	X	X	X	X	X	X	X	X	X

Note: Ask questions for each trip in the past two months.

CONCLUSION:

In conclusion, it is obvious that significant variation can be found in sampling levels and questionnaire content from 1979 to 1988/9. However the variation in neither of these components severely impacts the basic objective of the MRFSS - which is to provide estimates of catch, effort (trips), and participation (number of anglers) over time. The variation in sampling affects the level of precision and therefore the confidence intervals of the estimates, but not their means given that the threshold level of sampling is achieved (NMFS base rate). Questionnaire content has also changed over time, however the basic questions needed to estimate catch, visitation, and participation have remained intact.

Estimates of catch, visitation, and participation have varied over time. Much of this variation may be due to factors outside the control of the survey, however one must be aware of comparison difficulties created by lack of sampling in Texas since 1986, lack of boat mode sampling in Texas from 1982-4, lack of partyboat sampling in both Gulf and S. Atlantic subregions since 1986, etc. This lack of sampling has generally been the result of actions taken to reduce duplication of effort with other federal and state surveys collecting the desired information. Noting that this is not currently an objective of the MRFSS, I would suggest attempts be made to include these "missing" areas based on estimates from other surveys so as to provide (to the extent possible) complete coverage of catch, effort, and participation region-wide. The MRFSS could at least relegate the estimates from other sources to an appendix and pass responsibility as to accuracy and precision to the appropriate organizations.

No strong trends in effort or participation were noticed over the relatively short ten year timeframe.

In my opinion, estimate precision has been relatively good for subregion and state level trip estimation, but unfortunately, not so good for statewide angler estimation (based upon coefficients of variation).

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Appendix A

TRIP and ANGLER ESTIMATES

Tables 1-10

TABLE 1: TELEPHONE SURVEY SAMPLING BY WAVE, STATE, and YEAR

(GULF SUBREGION)											
	Wave #	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Texas	1	748	649	0	526	513	540	527	530	0	0
	2	845	1023	690	677	697	666	678	720	0	0
	3	1370	1364	882	878	883	728	883	858	0	0
	4	1395	1476	1055	1088	1094	1036	1095	1063	0	0
	5	1292	1324	1026	1008	1045	983	1039	1045	0	0
	6	1097	1081	670	672	681	730	664	665	0	0
	TOTAL		6747	6917	4323	4849	4913	4683	4886	4881	0
Louisiana	1	531	495	0	425	426	433	436	431	862	875
	2	688	738	578	566	578	572	555	612	1097	1034
	3	849	905	714	706	705	667	706	704	2168	2142
	4	950	1081	843	871	841	854	872	864	2173	5410
	5	928	859	801	799	800	786	822	823	1717	5295
	6	777	777	535	544	552	581	548	522	1082	3375
	TOTAL		4723	4855	3471	3911	3902	3893	3939	3956	9099
Mississippi	1	69	56	0	187	204	196	184	182	249	239
	2	88	99	254	244	254	242	260	252	295	299
	3	143	162	291	292	288	295	283	284	468	466
	4	151	173	346	360	352	352	346	353	573	1466
	5	153	174	331	322	337	328	338	327	114	1249
	6	92	107	232	239	243	247	241	206	273	896
	TOTAL		696	771	1454	1644	1678	1660	1652	1604	1972
Alabama	1	90	81	0	167	168	144	169	171	242	242
	2	101	130	226	224	224	222	210	220	336	335
	3	169	202	312	312	315	321	321	320	473	454
	4	200	224	376	391	392	386	432	394	430	1079
	5	192	208	356	364	367	351	375	373	322	983
	6	117	133	220	217	222	242	219	217	262	842
	TOTAL		869	978	1490	1675	1688	1666	1726	1695	2065

TABLE 1: Continued

Wave #	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1	719	809	0	520	515	497	499	510	1459	1178
2	748	1397	672	671	672	678	670	648	2558	2350
W. Florida	3	957	1514	804	825	825	826	845	817	2491
4	1091	1697	964	1010	1068	992	1005	994	1764	5312
5	1005	1558	943	931	990	962	959	900	2096	6388
6	883	1384	637	644	640	644	633	630	1423	4453
TOTAL	5403	8359	4020	4601	4710	4599	4611	4499	11791	22462
ANNUAL TOTAL:	18438	21880	14758	16680	16891	16501	16814	16635	24927	49143
State as a Percentage of Total Sample:										
Texas	0.366	0.316	0.293	0.291	0.291	0.284	0.291	0.293	0.000	0.000
Louisiana	0.256	0.222	0.235	0.234	0.231	0.236	0.234	0.238	0.365	0.369
Mississippi	0.038	0.035	0.099	0.099	0.099	0.101	0.098	0.096	0.079	0.094
Alabama	0.047	0.045	0.101	0.100	0.100	0.101	0.103	0.102	0.083	0.080
W. Florida	0.293	0.382	0.272	0.276	0.279	0.279	0.274	0.270	0.473	0.457
Wave Totals:										
Wave 1 Total:	2157	2090	0	1825	1826	1810	1815	1824	2812	2834
Wave 2 Total:	2470	3387	2420	2382	2425	2380	2373	2452	4286	4018
Wave 3 Total:	3488	4147	3003	3013	3016	2837	3038	2983	5600	5513
Wave 4 Total:	3787	4651	3584	3720	3747	3620	3750	3668	4940	13267
Wave 5 Total:	3570	4123	3457	3424	3539	3410	3533	3468	4249	13915
Wave 6 Total:	2966	3482	2294	2316	2338	2444	2305	2240	3040	9566
Wave as a Percentage of Total Sample:										
Wave 1	0.117	0.096	0.000	0.109	0.108	0.110	0.108	0.110	0.113	0.058
Wave 2	0.134	0.155	0.164	0.143	0.144	0.144	0.141	0.147	0.172	0.082
Wave 3	0.189	0.190	0.203	0.181	0.179	0.172	0.181	0.179	0.225	0.113
Wave 4	0.205	0.213	0.243	0.223	0.222	0.219	0.223	0.220	0.198	0.270
Wave 5	0.194	0.188	0.234	0.205	0.210	0.207	0.210	0.208	0.170	0.283
Wave 6	0.161	0.159	0.155	0.139	0.138	0.148	0.137	0.135	0.122	0.195

TABLE 1: Continued

Wave Sample as a Percentage of Total State Sample

(GULF SUBREGION)

	Wave #	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Texas	1	0.111	0.094	0.000	0.108	0.104	0.115	0.108	0.109	0.000	0.000
	2	0.125	0.148	0.160	0.140	0.142	0.142	0.139	0.148	0.000	0.000
	3	0.203	0.197	0.204	0.181	0.180	0.155	0.181	0.176	0.000	0.000
	4	0.207	0.213	0.244	0.224	0.223	0.221	0.224	0.218	0.000	0.000
	5	0.191	0.191	0.237	0.208	0.213	0.210	0.213	0.214	0.000	0.000
	6	0.163	0.156	0.155	0.139	0.139	0.156	0.136	0.136	0.000	0.000
Louisiana	1	0.112	0.102	0.000	0.109	0.109	0.111	0.111	0.109	0.095	0.048
	2	0.146	0.152	0.167	0.145	0.148	0.147	0.141	0.155	0.121	0.057
	3	0.180	0.186	0.206	0.181	0.181	0.171	0.179	0.178	0.238	0.118
	4	0.201	0.223	0.243	0.223	0.216	0.219	0.221	0.218	0.239	0.298
	5	0.196	0.177	0.231	0.204	0.205	0.202	0.209	0.208	0.189	0.292
	6	0.165	0.160	0.154	0.139	0.141	0.149	0.139	0.132	0.119	0.186
Mississippi	1	0.099	0.073	0.000	0.114	0.122	0.118	0.111	0.113	0.126	0.052
	2	0.126	0.128	0.175	0.148	0.151	0.146	0.157	0.157	0.150	0.065
	3	0.205	0.210	0.200	0.178	0.172	0.178	0.171	0.177	0.237	0.101
	4	0.217	0.224	0.238	0.219	0.210	0.212	0.209	0.220	0.291	0.318
	5	0.220	0.226	0.228	0.196	0.201	0.198	0.205	0.204	0.058	0.271
	6	0.132	0.139	0.160	0.145	0.145	0.149	0.146	0.128	0.138	0.194

TABLE 1: Continued

	Wave #	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Alabama	1	0.104	0.083	0.000	0.100	0.100	0.086	0.098	0.101	0.117	0.061
	2	0.116	0.133	0.152	0.134	0.133	0.133	0.122	0.130	0.163	0.085
	3	0.194	0.207	0.209	0.186	0.187	0.193	0.186	0.189	0.229	0.115
	4	0.230	0.229	0.252	0.233	0.232	0.232	0.250	0.232	0.208	0.274
	5	0.221	0.213	0.239	0.217	0.217	0.211	0.217	0.220	0.156	0.250
	6	0.135	0.136	0.148	0.130	0.132	0.145	0.127	0.128	0.127	0.214
	Wave #	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
W. Florida	1	0.133	0.097	0.000	0.113	0.109	0.108	0.108	0.113	0.124	0.066
	2	0.138	0.167	0.167	0.146	0.143	0.147	0.145	0.144	0.217	0.105
	3	0.177	0.181	0.200	0.179	0.175	0.180	0.183	0.182	0.211	0.110
	4	0.202	0.203	0.240	0.220	0.227	0.216	0.218	0.221	0.150	0.236
	5	0.186	0.186	0.235	0.202	0.210	0.209	0.208	0.200	0.178	0.284
	6	0.163	0.166	0.158	0.140	0.136	0.140	0.137	0.140	0.121	0.198

TABLE 2: TELEPHONE SURVEY SAMPLING BY WAVE, STATE, AND YEAR

(S. ATLANTIC SUBREGION)

	Wave #	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Georgia	1	68	62	0	0	0	0	240	239	200	204
	2	75	103	230	278	280	272	306	635	447	444
	3	136	182	321	340	343	276	410	798	666	645
	4	120	201	379	419	421	417	481	487	564	1821
	5	156	176	362	362	405	403	458	465	451	601
	6	99	98	229	262	268	280	310	261	497	996
	TOTAL	654	821	1521	1661	1717	1648	2205	2885	2825	4711

	Wave #	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
S. Carolina	1	146	110	0	0	0	0	0	0	0	229
	2	182	213	354	397	404	388	395	423	553	556
	3	359	274	438	500	504	497	508	500	1377	1421
	4	279	315	537	584	621	631	605	619	779	2715
	5	278	309	518	536	579	550	580	574	880	1220
	6	212	218	339	371	385	413	389	377	537	798
	TOTAL	1456	1439	2186	2388	2493	2479	2477	2493	4126	6939

	Wave #	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
N. Carolina	1	154	171	0	0	0	0	0	0	0	236
	2	173	225	349	437	443	437	439	454	679	660
	3	295	422	505	561	539	546	578	543	1716	1722
	4	394	494	604	668	667	639	682	661	2786	8658
	5	400	429	581	593	641	629	634	630	3705	4801
	6	237	232	341	417	423	437	422	421	1744	3448
	TOTAL	1653	1973	2380	2676	2713	2688	2755	2709	10630	19525

	Wave #	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
E. Florida	1	943	1268	0	671	678	672	664	679	1211	1231
	2	993	1836	886	874	910	885	898	891	1804	1863
	3	1197	1961	1022	1025	1028	1042	1034	1040	1849	1895
	4	1383	2343	1208	1274	1257	1248	1279	1254	937	5669
	5	1330	2137	1189	1191	1163	1154	1217	1173	1500	1942
	6	1157	1870	854	860	874	905	855	833	1649	3192
	TOTAL	7003	11415	5159	5895	5910	5906	5947	5870	8950	15792

GRAND TOTAL 10766 15618 11246 12620 12834 12721 13381 13957 26531 46967

TABLE 2: Continued

State as a
Percentage of
Total Sample:

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Georgia	0.061	0.052	0.135	0.132	0.134	0.130	0.165	0.207	0.106	0.100
S. Carolina	0.135	0.092	0.194	0.189	0.194	0.195	0.185	0.179	0.156	0.148
N. Carolina	0.154	0.126	0.212	0.212	0.211	0.211	0.206	0.194	0.401	0.416
E. Florida	0.650	0.729	0.459	0.467	0.461	0.464	0.444	0.421	0.337	0.336

Wave 1 Total:	1311	1611	0	671	678	672	904	918	1411	1900
Wave 2 Total:	1423	2377	1819	1986	2037	1982	2038	2403	3483	3523
Wave 3 Total:	1987	2839	2286	2426	2414	2361	2530	2881	5608	5683
Wave 4 Total:	2176	3353	2728	2945	2966	2935	3047	3021	5066	18863
Wave 5 Total:	2164	3050	2650	2682	2788	2736	2889	2842	6536	8564
Wave 6 Total:	1705	2418	1763	1910	1950	2035	1976	1892	4427	8434

Wave as a
Percentage of
Total Sample:

Wave 1	0.122	0.103	0.000	0.053	0.053	0.053	0.068	0.066	0.053	0.040
Wave 2	0.132	0.152	0.162	0.157	0.159	0.156	0.152	0.172	0.131	0.075
Wave 3	0.185	0.181	0.203	0.192	0.188	0.186	0.189	0.206	0.211	0.121
Wave 4	0.202	0.214	0.243	0.233	0.231	0.231	0.228	0.216	0.191	0.402
Wave 5	0.201	0.195	0.236	0.213	0.217	0.215	0.216	0.204	0.246	0.182
Wave 6	0.158	0.155	0.157	0.151	0.152	0.160	0.148	0.136	0.167	0.180

TABLE 2: Continued

Wave Sample as a Percentage of Total State Sample

(S. ATLANTIC SUBREGION)

	Wave #	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Georgia	1	0.104	0.076	0.000	0.000	0.000	0.000	0.109	0.083	0.071	0.043
	2	0.115	0.125	0.151	0.167	0.163	0.165	0.139	0.220	0.158	0.094
	3	0.208	0.222	0.211	0.205	0.200	0.167	0.186	0.277	0.236	0.137
	4	0.183	0.245	0.249	0.252	0.245	0.253	0.218	0.169	0.200	0.387
	5	0.239	0.219	0.238	0.218	0.236	0.245	0.208	0.161	0.160	0.128
	6	0.151	0.119	0.151	0.158	0.156	0.170	0.141	0.090	0.176	0.211
S. Carolina	1	0.100	0.076	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.033
	2	0.125	0.148	0.162	0.166	0.162	0.157	0.159	0.170	0.134	0.080
	3	0.247	0.190	0.200	0.209	0.202	0.200	0.205	0.201	0.334	0.205
	4	0.192	0.219	0.246	0.245	0.249	0.255	0.244	0.248	0.189	0.391
	5	0.191	0.215	0.237	0.224	0.232	0.222	0.234	0.230	0.213	0.176
	6	0.146	0.151	0.155	0.155	0.154	0.167	0.157	0.151	0.130	0.115
N. Carolina	1	0.093	0.087	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012
	2	0.105	0.114	0.147	0.163	0.163	0.163	0.159	0.168	0.064	0.034
	3	0.178	0.214	0.212	0.210	0.199	0.203	0.210	0.200	0.161	0.088
	4	0.238	0.250	0.254	0.250	0.246	0.238	0.248	0.244	0.262	0.443
	5	0.242	0.217	0.244	0.222	0.236	0.234	0.230	0.233	0.349	0.246
	6	0.143	0.118	0.143	0.156	0.156	0.163	0.153	0.155	0.164	0.177
E. Florida	1	0.135	0.111	0.000	0.114	0.115	0.114	0.112	0.116	0.135	0.078
	2	0.142	0.161	0.172	0.148	0.154	0.150	0.151	0.152	0.202	0.118
	3	0.171	0.172	0.198	0.174	0.174	0.176	0.174	0.177	0.207	0.120
	4	0.197	0.205	0.234	0.216	0.213	0.211	0.215	0.214	0.105	0.359
	5	0.190	0.187	0.230	0.202	0.197	0.195	0.205	0.200	0.168	0.123
	6	0.165	0.164	0.166	0.146	0.148	0.153	0.144	0.142	0.184	0.202

TABLE 4: INTERCEPT SURVEY SAMPLING BY SUBREGION AND MODE

(GULF SUBREGION)

MODE	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Shore	3275	5564	2996	6254	5484	6307	5537	2094	2319	3743
Party/Charter	346	939	832	700	1626	1845	1738	2579	2418	1938
Private/Rental	3726	4755	2562	4251	1830	2334	3408	9592	8955	9179
GULF TOTAL	7347	11258	6390	11205	8940	10486	10683	14265	13692	14860

Mode Categories as a Percentage of Subregion Total

MODE	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Shore	0.446	0.494	0.469	0.558	0.613	0.601	0.518	0.147	0.169	0.252
Party/Charter	0.047	0.083	0.130	0.062	0.182	0.176	0.163	0.181	0.177	0.130
Private/Rental	0.507	0.422	0.401	0.379	0.205	0.223	0.319	0.672	0.654	0.618

(S. ATLANTIC SUBREGION)

MODE	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Shore	3332	4424	1969	4411	4278	4634	5522	2381	4219	5595
Party/Charter	501	816	496	457	1617	2268	1489	2107	3543	3192
Private/Rental	1973	3090	1342	3592	2117	2551	3998	7352	11008	9986
S. A. TOTAL	5806	8330	3807	8460	8012	9453	11009	11840	18770	18773

Mode Categories as a Percentage of Subregion Total

MODE	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Shore	0.574	0.531	0.517	0.521	0.534	0.490	0.502	0.201	0.225	0.298
Party/Charter	0.086	0.098	0.130	0.054	0.202	0.240	0.135	0.178	0.189	0.170
Private/Rental	0.340	0.371	0.353	0.425	0.264	0.270	0.363	0.621	0.586	0.532

TABLE 5: TRIP ESTIMATES: BY YEAR AND STATE (All Estimates in THOUSANDS)

(GULF SUBREGION)											
State	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988 *	
AL	1012	989	523	962	1139	521	603	675	548	1104	
FL	10750	11904	9217	12103	10224	11451	13372	13436	12217	13822	
LA	3170	2994	1611	2167	2862	1434	2446	3114	2364	3338	
MS	655	1319	581	576	909	546	536	672	638	799	
TX	5685	7265	7157	4712	5365	2445	7270	N/A	N/A	N/A	
TOTAL	21272	24471	19089	20520	20499	16397	24227	17897	15767	19063	
TOTAL w/o TEXAS:	15587	17206	11932	15808	15134	13952	16957	17897	15767	19063	
								Texas Estimate *	7672	6759	8172
								Expanded Total	25569	22526	27235

State as a Percentage of GULF Total										
State	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
AL	0.018	0.040	0.027	0.047	0.056	0.032	0.025	0.038	0.035	0.058
FL	0.505	0.486	0.483	0.590	0.499	0.698	0.552	0.751	0.775	0.725
LA	0.149	0.122	0.084	0.106	0.140	0.087	0.101	0.174	0.150	0.175
MS	0.031	0.054	0.030	0.028	0.044	0.033	0.022	0.038	0.040	0.042
TX	0.267	0.297	0.375	0.230	0.262	0.149	0.300	N/A	N/A	N/A **
TOTAL	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

* State of Texas trip estimates for 1986-1988 based on Texas trips as a percentage of total non-Texas Gulf trips in 1985 (see Appendix B for estimation procedure).

** Percentages based on actual (not expanded) Gulf trip estimates.

TABLE 7: ANGLER ESTIMATES: BY YEAR, STATE, AND RESIDENCE (All Estimates in THOUSANDS)

(GULF SUBREGION)

State	Residence	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
AL	Coastal	113	152	41	100	156	86	73	68	73	105
	Non-coastal	43	43	24	60	58	22	57	55	36	150
	Out-of-State	60	37	27	37	84	62	68	103	66	148
	Total	216	232	92	197	298	170	198	226	175	403
FL	Coastal	1391	1334	541	863	926	1143	1508	1281	1143	1108
	Non-coastal	0	0	0	3	9	11	9	2	0	0
	Out-of-State	1040	1335	751	1612	1483	1566	1986	1867	1643	1214
	Total	2431	2669	1292	2478	2418	2720	3503	3150	2786	2320
LA	Coastal	525	688	306	285	540	351	535	650	524	528
	Non-coastal	22	4	31	76	67	17	28	22	46	41
	Out-of-State	49	51	35	64	45	30	63	88	59	98
	Total	596	743	372	425	652	398	626	760	629	667
MS	Coastal	92	132	63	69	90	60	69	81	81	114
	Non-coastal	16	23	40	22	44	34	12	49	24	18
	Out-of-State	51	97	36	51	176	84	82	133	47	62
	Total	159	252	139	142	310	178	163	263	152	194
TX	Coastal	993	1074	658	522	690	416	1207	N/A	N/A	N/A
	Non-coastal	265	586	507	404	258	130	462	N/A	N/A	N/A
	Out-of-State	111	143	124	98	93	69	102	N/A	N/A	N/A
	Total	1369	1803	1289	1024	1041	615	1771	N/A	N/A	N/A
Texas Estimate (1985 percentage):								1735	1476	1414	

Totals: Totals are likely to be distorted upwards due to double-counting, consider as ballpark estimates only.

Coastal	3114	3380	1609	1839	2402	2056	3392	2080	1821	1853
Non-coastal	346	656	602	565	436	214	568	128	106	209
Out-of-State	1311	1663	973	1862	1881	1811	2301	2191	1815	1522
Gulf Total	4771	5699	3184	4266	4719	4081	6261	4399	3742	3584
Gulf Total w/o Texas:	3402	3896	1895	3242	3678	3466	4490	4399	3742	3584
Total with Texas Expansion:								6134	5218	4998

State Estimate as a Percentage of Regional Estimate:

State	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Alabama	0.05	0.01	0.03	0.05	0.06	0.01	0.03	0.05	0.05	0.11
Florida	0.51	0.47	0.11	0.58	0.51	0.67	0.56	0.72	0.71	0.65
Louisiana	0.12	0.13	0.12	0.10	0.11	0.10	0.10	0.17	0.17	0.19
Mississippi	0.03	0.01	0.01	0.03	0.07	0.01	0.03	0.06	0.04	0.05
Texas	0.29	0.32	0.10	0.21	0.22	0.15	0.28	N/A	N/A	N/A

TABLE 9: ANGLER ESTIMATES BY YEAR, STATE, AND RESIDENCE (All Estimates in THOUSANDS)

(SOUTH ATLANTIC SUBREGION)

State	Residence	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
FL	Coastal	1255	1384	644	949	999	1299	1471	1134	1032	1085
	Non-coastal	0	0	0	0	0	2	2	5	1	5
	Out-of-State	871	793	410	554	674	808	990	1008	1020	688
	Total	2126	2177	1054	1503	1673	2109	2463	2147	2053	1778
GA	Coastal	57	57	49	69	83	62	58	62	76	68
	Non-coastal	7	29	19	28	56	41	48	34	48	30
	Out-of-State	30	13	5	34	29	31	68	26	34	15
	Total	94	99	73	131	168	134	174	122	158	113
NC	Coastal	244	223	345	226	296	245	170	139	274	392
	Non-coastal	561	500	341	355	458	341	441	113	154	224
	Out-of-State	374	575	332	333	1079	888	988	408	366	690
	Total	1179	1298	1018	914	1833	1474	1599	660	794	1306
SC	Coastal	118	133	74	69	179	287	172	120	130	171
	Non-coastal	68	72	44	176	70	203	60	50	70	110
	Out-of-State	245	222	206	535	193	752	227	204	249	241
	Total	431	427	324	780	442	1242	459	374	449	522
Totals: Totals are likely to be distorted upwards due to double-counting, consider figures as ballpark estimates only.											
	Coastal	1674	1797	1112	1313	1557	1893	1871	1455	1512	1716
	Non-coastal	636	601	404	559	584	587	551	202	273	369
	Out-of-State	1520	1603	953	1456	1975	2479	2273	1646	1669	1634
S. Atlantic Total		3830	4001	2469	3328	4116	4959	4695	3303	3454	3719

State Estimate as a Percentage of Regional Estimate:

State	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Florida	0.56	0.54	0.43	0.45	0.41	0.43	0.52	0.65	0.59	0.48
Georgia	0.02	0.02	0.03	0.04	0.04	0.03	0.04	0.04	0.05	0.03
N. Carolina	0.31	0.32	0.41	0.27	0.45	0.30	0.34	0.20	0.23	0.35
S. Carolina	0.11	0.11	0.13	0.23	0.11	0.25	0.10	0.11	0.13	0.14

Appendix B

1986 EXPANSIONS

1986 Texas Trip and Angler Expansions:

The following analysis was developed to try estimate trips and anglers in 1986 for the state of Texas (recall Texas was excluded from the 1986 survey). Texas estimates were then combined with the remainder of the Gulf states in order to better reflect aggregated trips and anglers for the subregion as a whole.

Using data from 1979 through 1985, expanded estimates were developed based on their percentage of the remainder of the Gulf from 1979 to 1985. A range of estimates were provided based on the following percentages:

- 1) Average percentage across all years
- 2) Average percentage excluding 1981-1984
- 3) Lowest percentage
- 4) Highest percentage
- 5) 1985 percentage (used as best guess estimate since it was the most recent fully comprehensive sampling year).

Note: The same procedure was used to estimate Texas effort for 1987 and 1988.

GULF TRIP ANALYSIS: 1979 - 1986

(1)	(2)	(3)	(4)	(5)
Year	Total Gulf Trips (K)	Texas Trips (K)	Remaining Trips (K) (2) - (3)	Texas as a % Remaining Trips (3)/(4)
1979	21273	5685	15588	0.364703
1980	24471	7265	17206	0.422236
1981	19089	7157	11932	0.599815
1982	20520	4712	15808	0.298076
1983	20500	5365	15135	0.354476
1984	16397	2445	13952	0.175243
1985	24227	7270	16957	0.428731
1986	?	?	17897	

- Notes: * No sampling during wave 1 in 1981
 * No boat mode sampling in Texas from 1982-1984

Average % (w/o 81 thru 84) **0.405223**

Average % (all years) **0.377612**

1986 Trip Expansion:

	Expansion Value	1986 Trips w/o Texas	Estimated Texas Trips	Estimated Total Gulf Trips
Average (w/o 81 - 84)	0.405223	17897	7252	25149
Average (all years)	0.377612	17897	6758	24655
Lowest Percentage	0.175243	17897	3136	21033
Highest Percentage	0.599815	17897	10735	28632
1985 Percentage	0.428731	17897	7673	25570

* Best Guess Estimate

GULF ANGLER ANALYSIS:

(1)	(2)	(3)	(4)	(5)
Year	Total Anglers (K)	Texas Anglers (K)	Remaining Anglers (K) (2) - (3)	Texas as a % Remaining Anglers (3)/(4)
1979	4771	1369	3402	0.402410
1980	5698	1802	3896	0.462525
1981	3184	1288	1896	0.679324
1982	4265	1023	3242	0.315545
1983	4720	1041	3679	0.282957
1984	4083	615	3468	0.177335
1985	6261	1771	4490	0.394432
1986	?	?	4399	

Notes: * No sampling during wave 1 in 1981
 * No boat mode sampling in Texas from 1982-1984

Average % (w/o 81 thru 84) 0.419789

Average % (all years) 0.387790

1986 Angler Expansion:

	Expansion Value	86 Anglers w/o Texas	Estimated Texas Anglers	Estimated Total Gulf Anglers
Average (w/o 81 & 84)	0.419789	4399	1847	6246
Average (all years)	0.387790	4399	1706	6105
Lowest Percentage	0.177335	4399	780	5179
Highest Percentage	0.679324	4399	2988	7387
1985 Percentage *	0.394432	4399	1735	6134

* Best Guess Estimate

Appendix C

PRECISION TABLES 1-6

PRECISION TABLE 1: TRIPS BY SUBREGION

TOTAL NUMBER OF TRIPS: GULF SUBREGION

# Intercept Samples	# Telephone Samples	YEAR	(K) Std Error	(K) Mean Estimate	(%) Coeff. of Variation
7347	18438	1979	1067	21273	5.02
11258	21880	1980	1306	24471	5.34
6390	14758	1981	2299	19089	12.04
11205	16680	1982	3044	20520	14.83
8940	16891	1983	1609	20500	7.85
10486	16501	1984	965	16397	5.89
10683	16814	1985	1578	24227	6.51
14265	16635	1986	1170	17897	6.54
13692	24927	1987	987	15767	6.26
14860	49143	1988	704	19064	3.69

TOTAL NUMBER OF TRIPS: S. ATLANTIC SUBREGION

# Intercept Samples	# Telephone Samples	YEAR	(K) Std Error	(K) Mean Estimate	(%) Coeff. of Variation
5806	10766	1979	1222	15947	7.66
8330	15648	1980	1056	16898	6.25
3807	11246	1981	881	11345	7.77
8460	12620	1982	1546	15648	9.88
8012	12833	1983	1437	15928	9.02
9453	12721	1984	1419	17840	7.95
11009	13384	1985	1351	19840	6.81
11840	13957	1986	887	14783	6.00
18770	26531	1987	739	17063	4.33
18773	46967	1988	655	19594	3.34

PRECISION TABLE 2: GULF SUBREGION TRIPS BY STATE

# Intercept Samples -----	# Telephone Samples -----	YEAR -----	(K) Std Error -----	(K) Mean Estimate -----	(%) Coef. of Variation -----
ALABAMA:					
850	869	1979	187	1012	18.48
836	978	1980	267	989	27.00
518	1490	1981	105	523	20.08
1282	1675	1982	225	962	23.39
949	1688	1983	295	1139	25.90
948	1666	1984	78	521	14.97
974	1726	1985	91	603	15.09
1191	1695	1986	109	675	16.15
1813	2065	1987	80	548	14.60
1362	3935	1988	232	1104	21.01
WEST FLORIDA:					
2796	5403	1979	846	10750	7.87
5645	8359	1980	995	11904	8.36
3212	4020	1981	2124	9217	23.04
4900	4601	1982	2989	12103	24.70
3222	4710	1983	1482	10224	14.50
3726	4599	1984	911	11451	7.96
4151	4611	1985	1325	13372	9.91
5417	4499	1986	1070	13436	7.96
7953	11791	1987	964	12217	7.89
8965	22462	1988	613	13822	4.43
TEXAS:					
2090	6747	1979	467	5685	8.21
1932	6917	1980	655	7265	9.02
1506	4323	1981	838	7157	11.71
2264	4849	1982	435	4712	9.23
2749	4913	1983	426	5365	7.94
3177	4683	1984	244	2445	9.98
2831	4886	1985	692	7270	9.52
0	0	1986-88	N/A	N/A	N/A

PRECISION TABLE 2: GULF SUBREGION TRIPS BY STATE
 (Continued)

# Intercept Samples	# Telephone Samples	YEAR	(K) Std Error	(K) Mean Estimate	(%) Coeff. of Variation
LOUISIANA:					
973	4723	1979	405	3170	12.78
1944	4855	1980	351	2994	11.72
680	3471	1981	203	1611	12.60
1443	3911	1982	285	2167	13.15
1253	3902	1983	315	2862	11.01
1503	3893	1984	163	1434	11.37
2129	3939	1985	495	2446	20.24
6121	3956	1986	425	3114	13.65
2501	9099	1987	177	2364	7.49
2926	18131	1988	239	3338	7.16
MISSISSIPPI					
638	696	1979	89	655	13.59
901	771	1980	306	1319	23.20
474	1454	1981	136	581	23.41
1316	1644	1982	104	576	18.06
767	1678	1983	163	909	17.93
1132	1660	1984	97	546	17.77
598	1652	1985	67	536	12.50
1536	1604	1986	178	672	26.49
1425	1972	1987	76	638	11.91
1607	4615	1988	93	799	11.64

PRECISION TABLE 3: S. ATLANTIC SUBREGION TRIPS BY STATE

# Intercept Samples	# Telephone Samples	Year	(K) Std Error	(K) Mean Estimate	(%) Coeff. of Variation
-----	-----	-----	-----	-----	-----
EAST FLORIDA:					
2714	7003	1979	772	10215	7.56
4188	11415	1980	595	10460	5.69
1771	5159	1981	747	7636	9.78
4547	5895	1982	775	9005	8.61
4883	5910	1983	658	7793	8.44
5819	5906	1984	847	9891	8.56
4734	5947	1985	996	12493	7.97
4907	5870	1986	792	10298	7.69
4657	8950	1987	695	12210	5.69
5990	15792	1988	542	12540	4.32
GEORGIA:					
951	654	1979	92	375	24.53
811	821	1980	56	306	18.30
240	1521	1981	42	239	17.57
806	1661	1982	70	477	14.68
1004	1717	1983	100	492	20.33
893	1648	1984	83	517	16.05
3021	2205	1985	85	580	14.66
2989	2885	1986	55	554	9.93
4071	2825	1987	72	646	11.15
2008	4711	1988	62	611	10.15

PRECISION TABLE 3: S. ATLANTIC SUBREGION TRIPS BY STATE
 (Continued)

# Intercept Samples	# Telephone Samples	Year	(K) Std Error	(K) Mean Estimate	(%) Coeff. of Variation
NORTH CAROLINA:					
1238	1653	1979	904	4200	21.52
2042	1973	1980	824	4548	18.12
1097	2380	1981	415	2601	15.96
2014	2676	1982	465	4009	11.60
1308	2713	1983	1260	6358	19.82
1519	2688	1984	856	4821	17.76
1964	2755	1985	860	5194	16.56
2473	2709	1986	342	2655	12.88
7787	10630	1987	201	2845	7.07
7964	19525	1988	331	4608	7.18
SOUTH CAROLINA:					
903	1456	1979	267	1157	23.08
1289	1439	1980	280	1584	17.68
699	2186	1981	212	869	24.40
1093	2388	1982	1252	2156	58.07
817	2493	1983	183	1285	14.24
1222	2479	1984	746	2611	28.57
1290	2477	1985	297	1573	18.88
1471	2493	1986	200	1276	15.67
2255	4126	1987	132	1363	9.68
2811	6939	1988	148	1836	8.06

PRECISION TABLE 4: PARTICIPANTS BY SUBREGION

NUMBER OF COASTAL PARTICIPANTS: GULF SUBREGION

#	#		(K)	(K)	(%)
Intercept	Telephone	Year	Std Error	Mean	Coeff. of
Samples	Samples			Estimate	Variation
7347	18438	1979	178	3114	5.72
11258	21880	1980	1193	3379	35.31
6390	14758	1981	702	1610	43.60
11205	16680	1982	706	1839	38.39
8940	16891	1983	885	2402	36.84
10486	16501	1984	927	2057	45.07
10683	16814	1985	1284	3391	37.86
14265	16635	1986	1081	2080	51.97
13692	24927	1987	894	1821	49.09
14860	49143	1988	1000	1853	53.97

NUMBER OF COASTAL PARTICIPANTS: S. ATLANTIC SUBREGION

#	#		(K)	(K)	(%)
Intercept	Telephone	Year	Std Error	Mean	Coeff. of
Samples	Samples			Estimate	Variation
5806	10766	1979	109	1674	6.51
8330	15648	1980	1066	1796	59.35
3807	11246	1981	555	1111	49.95
8460	12620	1982	694	1313	52.86
8012	12833	1983	777	1557	49.90
9453	12721	1984	917	1893	48.44
11009	13384	1985	975	1872	52.08
11840	13957	1986	812	1455	55.81
18770	26531	1987	847	1512	56.02
18773	26531	1988	832	1716	48.48

PRECISION TABLE 5: GULF SUBREGION PARTICIPANTS

		Coastal Participants:				Total Participants:		
#	#	(K)	(K)	(%)	(K)	(K)	(%)	
Intercept	Telephone	Std.	Mean	Coeff. of	Std Error	Mean	Coeff. of	
Samples	Samples	Error	Estimate	Variation		Estimate	Variation	
-----	-----	-----	-----	-----	-----	-----	-----	
ALABAMA:								
850	889	1979	37	113	32.74	71	216	32.87
836	978	1980	122	152	80.26	132	232	56.90
518	1490	1981	25	41	60.98	34	92	36.96
1282	1675	1982	76	100	76.00	91	197	46.19
949	1688	1983	113	156	72.44	131	299	43.81
948	1666	1984	53	86	61.63	62	170	36.47
974	1726	1985	46	73	63.01	64	198	32.32
1191	1695	1986	46	68	67.65	68	226	30.09
1813	2065	1987	46	73	63.01	58	175	33.14
1362	3935	1988	66	105	62.86	153	403	37.97
WEST FLORIDA:								
2796	5403	1979	124	1391	8.91	246	2431	10.12
5645	8359	1980	901	1334	67.54	1068	2668	40.03
3212	4020	1981	381	541	70.43	556	1293	43.00
4900	4601	1982	603	863	69.87	1024	2478	41.32
3222	4710	1983	712	926	76.89	1001	2418	41.40
3726	4599	1984	868	1143	75.94	1114	2720	40.96
4151	4611	1985	1092	1508	72.41	1351	3503	38.57
5417	4499	1986	1013	1281	79.08	1229	3151	39.00
7953	11791	1987	844	1143	73.84	1126	2786	40.42
8965	22462	1988	932	1106	84.27	1069	2319	46.10
TEXAS:								
2090	6747	1979	91	993	9.16	137	1369	10.01
1932	6917	1980	663	1074	61.73	711	1802	39.46
1506	4323	1981	549	658	83.43	656	1288	50.93
2264	4849	1982	297	522	56.90	349	1023	34.12
2749	4913	1983	407	690	58.99	424	1041	40.73
3177	4683	1984	227	416	54.57	237	615	38.54
2831	4886	1985	603	1207	49.96	637	1771	35.97
0	0	1986-88	N/A	N/A	N/A	N/A	N/A	N/A

PRECISION TABLE 5: GULF SUBREGION PARTICIPANTS

(Continued)

# Intercept Samples	# Telephone Samples	YEAR	Coastal Participants:			Total Participants:		
			(K) Std Error	(K) Mean Estimate	(%) Coeff. of Variation	(K) Std Error	(K) Mean Estimate	(%) Coeff. of Variation
LOUISIANA:								
973	4723	1979	82	525	15.62	98	596	16.44
1944	4855	1980	383	688	55.67	383	744	51.48
680	3471	1981	210	306	68.63	213	373	57.10
1443	3911	1982	197	285	69.12	214	424	50.47
1253	3902	1983	308	540	57.04	311	651	47.77
1503	3893	1984	219	351	62.39	221	399	55.39
2129	3939	1985	297	535	55.51	302	625	48.32
6121	3956	1986	370	650	56.92	376	759	49.54
2501	9099	1987	285	524	54.39	288	629	45.79
2926	18131	1988	345	528	65.34	348	668	52.10
MISSISSIPPI								
638	696	1979	14	92	15.22	32	159	20.13
901	771	1980	107	132	81.06	135	252	53.57
474	1454	1981	57	63	90.48	71	138	51.45
1316	1644	1982	45	69	65.22	52	143	36.36
767	1678	1983	63	90	70.00	110	311	35.37
1132	1660	1984	49	60	81.67	43	69	62.32
598	1652	1985	45	69	65.22	56	164	34.15
1536	1604	1986	60	81	74.07	140	263	53.23
1425	1972	1987	62	81	76.54	68	152	44.74
1607	4615	1988	92	114	80.70	97	194	50.00

PRECISION TABLE 6: S. ATLANTIC SUBREGION PARTICIPANTS

		Coastal Participants:				Total Participants:		
#	#		(K)	(K)	(%)		(K)	(%)
Intercept	Telephone	Year	(K)	Mean	Coeff. of	(K)	Mean	Coeff. of
Samples	Samples		Std Error	Estimate	Variation	Std Error	Estimate	Variation
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EAST FLORIDA:								
2714	7003	1979	98	1255	7.81	247	2126	11.62
4188	11415	1980	1049	1384	75.79	1100	2177	50.53
1771	5159	1981	528	644	81.99	561	1053	53.28
4547	5895	1982	667	949	70.28	710	1503	47.24
4883	5910	1983	730	999	73.07	785	1674	46.89
5819	5906	1984	875	1299	67.36	929	2109	44.05
4734	5947	1985	961	1471	65.33	1046	2463	42.47
4907	5870	1986	797	1134	70.28	887	2148	41.29
4657	8950	1987	810	1032	78.49	893	2053	43.50
5990	15792	1988	770	1085	70.97	811	1778	45.61
GEORGIA:								
951	654	1979	16	57	28.07	32	94	34.04
811	821	1980	39	57	68.42	43	99	43.43
240	1521	1981	32	49	65.31	36	73	49.32
806	1661	1982	48	69	69.57	56	131	42.75
1004	1717	1983	54	83	65.06	65	168	38.69
893	1648	1984	43	62	69.35	52	134	38.81
3021	2205	1985	34	58	58.62	53	174	30.46
2989	2885	1986	36	62	58.06	41	122	33.61
4071	2825	1987	48	76	63.16	55	158	34.81
2008	4711	1988	43	68	63.24	46	113	40.71

PRECISION TABLE 6: S. ATLANTIC SUBREGION PARTICIPANTS

(Continued)

		Coastal Participants:				Total Participants:		
#	#		(K)	(K)	(%)		(K)	(%)
Intercept	Telephone	Year	(K)	Mean	Coeff. of	(K)	Mean	Coeff. of
Samples	Samples		Std Error	Estimate	Variation	Std Error	Estimate	Variation
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NORTH CAROLINA:								
1238	1653	1979	36	244	14.75	301	1179	25.53
2042	1973	1980	115	223	51.57	387	1298	29.82
1097	2380	1981	161	345	46.67	284	1017	27.93
2014	2676	1982	177	226	78.32	319	914	34.90
1308	2713	1983	223	296	75.34	661	1833	36.06
1519	2688	1984	199	245	81.22	583	1474	39.55
1964	2755	1985	123	234	52.56	463	533	86.87
2473	2709	1986	126	139	90.65	253	660	38.33
7787	10630	1987	217	274	79.20	275	794	34.63
7964	19525	1988	285	392	72.70	433	1306	33.15
SOUTH CAROLINA:								
903	1456	1979	25	118	21.19	143	431	33.18
1289	1439	1980	98	133	73.68	159	427	37.24
699	2186	1981	53	74	71.62	140	324	43.21
1093	2388	1982	64	69	92.75	594	780	76.15
817	2493	1983	116	179	64.80	150	442	33.94
1222	2479	1984	187	287	65.16	498	1242	40.10
1290	2477	1985	110	172	63.95	157	459	34.20
1471	2493	1986	82	120	68.33	127	373	34.05
2255	4126	1987	106	130	81.54	144	449	32.07
2811	6939	1988	132	171	77.19	167	521	32.05