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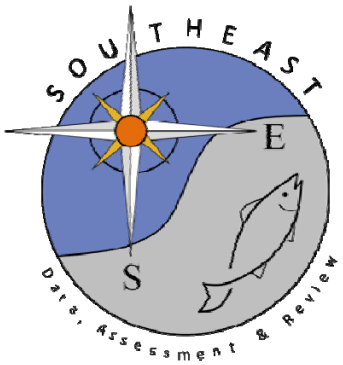

Recreational Indices for Cobia and Spanish Mackerel in the Gulf of Mexico

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Introduction

The recreational fisheries in the Gulf of Mexico are surveyed by three programs:

- Marine Recreational Fishery Statistics Survey (MRFSS) conducted by the NOAA Fisheries (NMFS).
- Texas Marine Sport-Harvest Monitoring Program by the Texas Parks and Wildlife Department (TPWD).
- Headboat Survey (HBS) conducted by NMFS, Southeast Fisheries Science Center, Beaufort, NC.

These three surveys together provide estimates of catch in numbers, estimates of effort, and length and weight samples. The MRFSS and the TPWD survey are both sampling-based, while the Headboat Survey strives to be a census of headboats using logbooks.

MRFSS provides information on participation, effort, and species-specific catch. Data are collected to provide catch and effort estimates in two-month periods ("waves") for each recreational fishing mode (shore fishing, private/rental boat, charterboat, or headboat/charterboat combined) and area of fishing (inshore, state Territorial Seas, U.S. Exclusive Economic Zone) in each state, except TX. MRFSS was conducted in TX through 1985 and did not include all modes in all years. Starting in 1986, MRFSS no longer covered headboats in the Gulf of Mexico and South Atlantic. Catch estimates are made for strata used in the intercepts: fish landed whole and observed by the samplers ("Type A"), fish reported as killed by the fishers ("Type B1") and fish reported as released alive by the fishers ("Type B2"). The Headboat Survey covers the Gulf of Mexico headboats starting in 1986. Total catch per trip and fishing effort is reported in logbooks provided to all headboats in TX through NC.[1]

This work uses the catch and effort observations from the MRFSS and Headboat Survey to develop standardized catch per unit effort (CPUE) indices of abundance from these two sectors

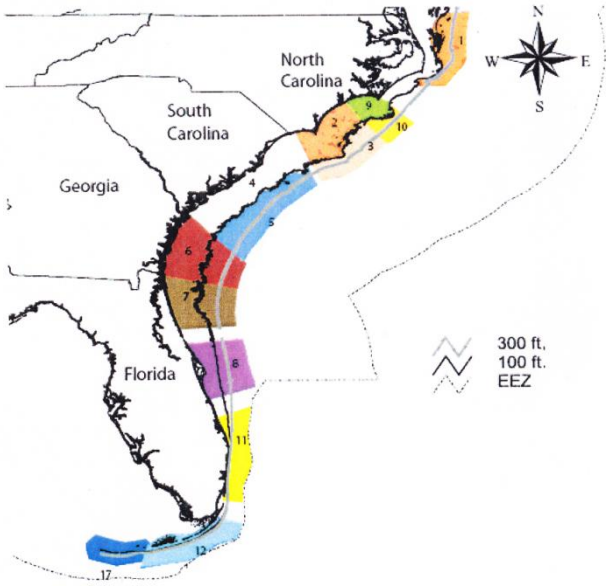
[1] General overview of the recreational surveys from the following: Recreational Survey Data for Gag and Black Grouper in the Gulf of Mexico. Patty Phares, Vivian Matter, and Steve Turner. National Marine Fisheries Service, Southeast Fisheries Science Center, Sustainable Fisheries Division, January, 2006. Sustainable Fisheries Division Contribution No. SFD-2006-008.

of the recreational fishery for cobia (*Rachycentron canadum*) and Spanish mackerel (*Scomberomorus maculatus*) in the Gulf of Mexico. A delta lognormal modeling approach was used to develop these indices. The Species Association Approach (Stephens and MacCall 2004) was explored to try and identify directed cobia trips and directed Spanish mackerel trips, while balancing these subsets of the data with sample size. Results from these data explorations are presented in this document for further panel discussion.

Methodology

The MRFSS and Headboat Survey data sets were looked at across different strata to assess the sample size of total trips and positive trips within each of the strata. For both species, data from Texas, present in the years 1981 through 1985, were removed from the MRFSS data because the State of Texas has its own survey. In addition, data from the headboat mode in MRFSS, also present in the years 1981 through 1985, were removed because this information is covered by the Headboat Survey program. For cobia, the shore mode was removed from the data because less than 0.1 percent of the shore mode trips encountered a cobia and cobia are typically not caught from shore. For the headboat survey, only one-day trips for Spanish mackerel were included in the analysis as done during the last Spanish mackerel assessment (Ortiz 2003).

The datasets have been partitioned according to the decisions that were made during the SEDAR 28 data workshop during the plenary sessions. For cobia, the stock boundary dividing the gulf of Mexico from the South Atlantic stock during the data workshop was determined to be the state boarder between Florida and Georgia. For Spanish mackerel, the stock boundary dividing the Gulf of Mexico from the South Atlantic stock during the data workshop was determined to be the Florida Keys. With the Headboat Survey, for cobia, the dataset was partitioned where fish surveyed in areas 1,2,3,4,5,6,9 and 10 were considered to be part of the South Atlantic Stock, while fish in all other areas were considered to be part of the Gulf of Mexico Stock. With the Headboat Survey, for Spanish mackerel, the dataset was partitioned where fish surveyed in areas 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, and 17 (all the areas shown on the map in Figure 1) were considered to be part of the South Atlantic Stock, while fish in all other areas are considered to be part of the Gulf of Mexico Stock (these areas are not shown on this map). For cobia, the MRFSS data was split using the state code designations at the Florida-Georgia state boarder, while for Spanish mackerel, the MRFSS data was split at Monroe County.



For the MRFSS data, if there were anglers on a trip that actively fished but were not interviewed, the data were adjusted to account for the catch and effort of these non-interviewed anglers. This

adjustment was made by dividing the total catch made by those individuals who were interviewed by the number of people interviewed. This average catch per person was then multiplied by the number of anglers that were not interviewed and the resulting catch was then added to the total catch for that trip.

The Species Association Approach (Stephens and MacCall 2004) was explored to try and identify cobia directed trips and Spanish mackerel directed trips. This approach, however did not work well for either of these species because it eliminated many trips (see results section for further discussion about this). As a result, individual indices for each species were estimated using a delta lognormal model. In addition, an index was developed for each species using a subset of the trips from each dataset that only caught that species (i.e., the positive trips only) using a generalized linear model that assumes a lognormal error structure. Furthermore, a number of "ad hoc" approaches to subset directed trips for cobia and Spanish mackerel from the MRFSS and Headboat Survey data were explored by the analysts. These approaches were abandoned because they either eliminated too many trips leading to the same conclusion as the Species Association Approach, or were not thought to be empirically defensible.

This issue was explored further by the catch per unit effort index working group during the SEDAR 28 data workshop. Various additional approaches were discussed. For the Headboat Survey, this included trying to follow and identify the behavioral fishing history of individual vessels that tend to target the species being assessed, and taking a subset of the data that only uses the trips taken by these vessels. Although this approach seemed possible for the South Atlantic where there are fewer vessels and more information was known about these boats, the approach could not be implemented in Florida where there is a large volume of vessels and the inability to track an individual vessel given frequent changes in a vessel's unique identifying number. For the MRFSS dataset, the targeting information collected during the survey was explored as a possible way to identify effort that was directed at either of these species. The problem, however was unlike for the South Atlantic portion of the dataset, in the Gulf of Mexico subset of the MRFSS data, only about 50 percent of the trips reported a primary target species (the "prim1" data field), while only about 20 of the trips reported a secondary target species (the "prim2" data field).

The SEDAR 28 data workshop indices working group and panel evaluated and discussed these various alternatives to identifying targeted trips, and agreed that they served little utility for the Gulf of Mexico subset of the data. The working group also noted that there was little difference in the indices that were estimated for the entire dataset and the indices estimated for the subset of only positive trips. Therefore, it was reluctantly decided at the data workshop, that fishing effort for cobia and Spanish mackerel would be based on all trips. This decision was made because cobia is rarely a species fishers target, and both cobia and Spanish mackerel represent an opportunistically captured fish while targeting other species. Therefore, most trips in the Headboat and MRFSS databases represent potential fishing effort for cobia and Spanish mackerel.

For the indices constructed on the complete datasets, the delta lognormal model approach (Lo et al. 1992) was used. This method combines separate generalized linear model (GLM) analyses of

the proportion of successful trips (trips that landed cobia or Spanish mackerel) and the catch rates on successful trips to construct a single standardized CPUE index. Parameterization of each model was accomplished using a GLM procedure (GENMOD; Version 8.02 of the SAS System for Windows © 2000. SAS Institute Inc., Cary, NC, USA). For each GLM procedure of proportion positive trips, a type-3 model was fit, a binomial error distribution was assumed, and the logit link was selected. The response variable was the proportion successful trips. During the analysis of catch rates on successful trips, a type-3 model assuming lognormal error distribution was examined. The linking function selected was "normal", and the response variable was ln(CPUE). The response variable was calculated as the natural log of CPUE. For the MRFSS data, CPUE for each trip was equal to the number of fish caught on a given trip divided by the effort, where effort was angler hours fished. Angler hours fished was calculated as the product of the number of anglers in the group that was interviewed and the total hours fished. For the Headboat Survey data, CPUE for each trip was equal to the number of fish caught on a given trip divided by the effort, where effort was calculated as the product of the number of people on the headboat and the hours fished.

A stepwise approach was used to quantify the relative importance of the explanatory factors. First a GLM model was fit on year. These results reflect the distribution of the nominal data. Next, each potential explanatory factor was added to the null model sequentially and the resulting reduction in deviance per degree of freedom was examined. The factor that caused the greatest reduction in deviance per degree of freedom was added to the base model if the factor was significant based upon a Chi-Square test ($p<0.05$), and the reduction in deviance per degree of freedom was $\geq 1\%$. This model then became the base model, and the process was repeated, adding factors and interactions individually until no factor or interaction met the criteria for incorporation into the final model. All 2-way interactions among significant main effects were examined, however higher order interaction terms were not examined. The final delta-lognormal model was fit using a SAS macro, GLIMMIX (Russ Wolfinger, SAS Institute). All factors were modeled as fixed effects except two-way interaction terms containing year which were modeled as random effects. To facilitate visual comparison, a relative standardized index and relative nominal CPUE series were calculated by dividing each value in the series by the mean value of the entire time-series.

Results

The tables and figures presented in this document represent the preliminary development of standardized cpue indices for cobia and Spanish mackerel in the GOM. Many of the tables show sample size across strata and suggest that there are a limited number of trips within these strata that caught cobia or Spanish mackerel. As a result, in some cases the inclusion of factors, and often times interaction effects, was limited by the sample size. Efforts were made to apply the Species Association Approach (Stephens and MacCall 2004) to the datasets for each of these species however these efforts were met with limited success. In only one case (headboat for cobia) the Species Association model converged, however the results were not informative and the approach ended up eliminating most of the trips. Some possible reasons for this could be because the two species of interest, cobia and Spanish mackerel, are often not targeted directly. Instead, these species are caught more opportunistically, meaning they are either encountered by

chance when targeting another species, or may be caught by making a brief stop while in transit between ports and fishing grounds. Due to the inability to use this approach, an index was constructed using the Delta lognormal approach for the entire database of all trips, and an index was constructed using a subset of only positive trips using a lognormal model.

Various factors were tested for significance using the stepwise approach and accordingly included or excluded from the model. From the Headboat Survey data year, area, and month were considered as well as all first level interactions, where area represents the large fishing area blocks as defined in the Headboat Survey. From the MRFSS data, year, mode, month, and state were considered as well as all first level interactions, where mode represents the fishing mode and included fishing from shore (Spanish mackerel only), charter boat or a private boat/rental boat. The following final models resulted from the standardization procedures where *Success* is a binomial indicating whether or not a trip caught the species of interest, α represents the parameter estimate of each factor, μ represents the mean, and ε represents the error term.

Cobia Headboat

$$Success = \mu + (Year)\alpha_1 + (Area)\alpha_2 + \varepsilon$$

$$\ln(CPUE) = \mu + (Year)\alpha_1 + (Area)\alpha_2 + (Month)\alpha_3 + (Area * Month)\alpha_4 + (Year * Area)\alpha_5 + (Year * Month)\alpha_6 + \varepsilon$$

Cobia MRFSS

$$Success = \mu + (Year)\alpha_1 + (Area)\alpha_2 + (State)\alpha_3 + (Mode)\alpha_4 + (Month)\alpha_5 + \varepsilon$$

$$\ln(CPUE) = \mu + (Year)\alpha_1 + (Mode)\alpha_2 + (Month)\alpha_3 + (Area)\alpha_4 + (Year * Area)\alpha_5 + (Year * Month)\alpha_6 + (Mode * Month)\alpha_7 + \varepsilon$$

Spanish Mackerel Headboat

$$Success = \mu + (Year)\alpha_1 + (Area)\alpha_2 + (Month)\alpha_3 + \varepsilon$$

$$\ln(CPUE) = \mu + (Year)\alpha_1 + (Area)\alpha_2 + (Month)\alpha_3 + (Year * Area)\alpha_4 + (Year * Month)\alpha_5 + \varepsilon$$

Spanish Mackerel MRFSS

$$Success = \mu + (Year)\alpha_1 + (Month)\alpha_2 + \varepsilon$$

$$\ln(CPUE) = \mu + (Year)\alpha_1 + (Mode)\alpha_2 + (State)\alpha_3 + (Month)\alpha_4 + (Year * Month)\alpha_5 + (Year * State)\alpha_6 + \varepsilon$$

Plots, tables, and model structures presented in this document should be considered preliminary. One of the primary reasons for this is because the data workshop panel decided that the assessments for these species should include 2011 data, which is not yet ready for analysis, but is projected to be ready in time for the assessment workshop. The starting year for the Headboat database for both species was 1986. The start year used for preliminary analyses for both cobia

and Spanish mackerel was 1981, the inaugural year of the MRFSS data collection program however the Headboat Survey sampling program had not been fully implemented in the Gulf of Mexico until 1986. Future analyses using the MRFSS database for the assessment workshop was recommended to start in year 1983 for both species due to data gaps in 1981 and 1982. Finally, the indices group recommended that cpue indices for cobia should be developed using the Headboat and MRFSS data and indices for Spanish mackerel should be developed using the MRFSS database.

Results for the cobia Headboat index shows an apparent departure between the observed and standardized CPUE in years 1993-1997. This is likely due to significant year-month and month-area interactions. In all years, except 1993-1997, the proportion of positive trips increases from January-June, peaks in June, and then declines. Additionally, this dome-shaped relationship, with a peak in proportion positives in June, is apparent on a per area basis for Lousiana, Northeast Texas, Northeast Florida, South Texas, and Central Texas; all other areas are rather flat or increase in later months.

Results from the cobia MRFSS index standardization is highly variable, potentially driven by the variable proportion of positive observations from year to year. Departure from the nominal index in some years is likely due to the comparably strong effect of the significance of fishing mode on the model. The Headboat Survey Spanish mackerel index standardization did not vary as sharply from one year to the next and tracks the nominal index with consistency. The increases and decreases in this index could be the effect of year class strength in the fishery as this pattern is also seen in the annual residuals. The proportion of positive observations for Spanish mackerel from the Headboat Survey are variable year to year, but increase in recent years. The MRFSS index of Spanish mackerel is very flat in the recent part of the time series, with some variability each year in the earlier portion of the time series. The proportion of positive observations is variable year to year.

Additional Analyses

During the time that this paper was written, the 2011 catch and effort data for the recreational surveys in the Southeastern Region was not yet available. Once this year of data becomes available, these analyses will be re-run to include this year in the indices presented in this document, as per the decision made during the SEDAR 28 Data Workshop to include 2011 in the stock assessment.

References

Ortiz, M. 2003. Standardized catch rates of king and Spanish mackerel from the US Gulf of Mexico and South Atlantic Recreational Fisheries. SFD-02/02-006-(1).

Stephens, A. MacCall, A. 2004. A multispecies approach to subsetting logbook data for purposes of estimating CPUE. Fisheries Research 70: 299-310.

Tables

Table 1. Fitted indices of abundance for the recreational surveys where effort represents all trips.

	HEADBOAT SURVEY								MRFSS SURVEY							
	Cobia				Spanish Mackerel				Cobia				Spanish Mackerel			
Year	Index	Lower CI	Uppder CI	CV	Index	Lower CI	Uppder CI	CV	Index	Lower CI	Uppder CI	CV	Index	Lower CI	Uppder CI	CV
1981									0.705	0.349	1.424	0.363	0.974	0.523	1.814	0.318
1982									0.898	0.546	1.476	0.252	1.292	0.784	2.131	0.254
1983									0.627	0.324	1.211	0.339	0.826	0.451	1.515	0.310
1984									0.605	0.335	1.092	0.302	0.631	0.325	1.223	0.340
1985									0.532	0.278	1.018	0.333	0.701	0.380	1.293	0.313
1986	0.576	0.411	0.808	0.170	0.816	0.432	1.544	0.327	0.495	0.316	0.775	0.227	1.906	1.256	2.892	0.211
1987	0.560	0.402	0.780	0.166	1.624	0.894	2.949	0.305	0.604	0.394	0.926	0.216	1.395	0.920	2.115	0.210
1988	0.563	0.403	0.785	0.168	0.505	0.263	0.970	0.335	0.860	0.554	1.336	0.223	0.802	0.514	1.252	0.225
1989	0.541	0.384	0.764	0.173	0.789	0.419	1.486	0.324	0.889	0.558	1.417	0.236	1.138	0.717	1.807	0.234
1990	0.709	0.513	0.979	0.162	0.998	0.556	1.793	0.299	1.350	0.885	2.059	0.213	1.851	1.199	2.856	0.219
1991	0.799	0.587	1.089	0.155	2.023	1.145	3.572	0.290	1.505	1.034	2.191	0.190	1.350	0.871	2.092	0.222
1992	0.910	0.700	1.183	0.132	1.288	0.722	2.301	0.296	1.032	0.747	1.425	0.163	1.408	0.976	2.031	0.185
1993	1.259	0.982	1.612	0.124	0.960	0.533	1.732	0.301	1.007	0.695	1.459	0.187	0.657	0.427	1.011	0.218
1994	1.136	0.879	1.467	0.129	1.292	0.726	2.298	0.294	1.440	1.021	2.030	0.173	0.613	0.406	0.926	0.208
1995	1.194	0.914	1.561	0.135	0.777	0.423	1.427	0.311	0.673	0.446	1.014	0.207	0.420	0.262	0.673	0.239
1996	1.147	0.860	1.530	0.145	0.777	0.422	1.431	0.313	1.406	1.004	1.970	0.170	0.736	0.477	1.134	0.219
1997	1.309	0.995	1.723	0.138	0.685	0.367	1.279	0.320	1.734	1.274	2.360	0.155	0.627	0.414	0.950	0.210
1998	1.069	0.801	1.427	0.145	0.353	0.181	0.686	0.342	1.241	0.914	1.686	0.154	0.772	0.521	1.146	0.199
1999	0.955	0.687	1.327	0.165	0.705	0.374	1.329	0.325	1.129	0.852	1.495	0.141	1.315	0.922	1.875	0.179
2000	0.777	0.554	1.089	0.170	1.044	0.568	1.916	0.311	0.915	0.679	1.233	0.150	0.960	0.667	1.383	0.184
2001	1.043	0.750	1.450	0.166	0.401	0.201	0.801	0.357	1.019	0.765	1.356	0.144	0.998	0.688	1.449	0.188
2002	0.980	0.702	1.367	0.168	0.789	0.421	1.481	0.323	1.030	0.777	1.365	0.142	0.912	0.630	1.320	0.186
2003	0.931	0.657	1.319	0.176	0.569	0.292	1.108	0.343	1.158	0.870	1.542	0.144	0.987	0.676	1.440	0.191
2004	1.005	0.718	1.408	0.169	0.523	0.273	1.003	0.334	0.978	0.729	1.312	0.148	1.063	0.738	1.532	0.184
2005	1.271	0.939	1.719	0.152	0.542	0.285	1.031	0.330	0.967	0.705	1.325	0.159	0.712	0.478	1.059	0.201
2006	1.105	0.802	1.522	0.161	1.011	0.544	1.880	0.318	0.889	0.650	1.216	0.158	0.871	0.594	1.277	0.193
2007	1.205	0.884	1.641	0.155	1.552	0.861	2.798	0.301	0.984	0.721	1.343	0.156	0.902	0.620	1.310	0.189
2008	1.153	0.845	1.575	0.157	1.961	1.099	3.498	0.296	1.164	0.864	1.569	0.150	1.003	0.687	1.464	0.191
2009	1.304	0.992	1.714	0.137	1.916	1.088	3.374	0.289	0.960	0.693	1.330	0.164	0.822	0.570	1.187	0.185
2010	1.498	1.133	1.981	0.140	1.098	0.603	2.001	0.307	1.205	0.871	1.666	0.163	1.354	0.923	1.987	0.193

Table 2. Annual (1986-2010) number of headboat trips (total), trips catching cobia (i.e., positive trips), and the percentage of trips capturing cobia in the Gulf of Mexico. The GOM region includes all Florida fishing regions.

Year	Total Number of Trips	Positive Trips	Percent Positive
1986	15832	947	5.98
1987	15831	988	6.24
1988	15678	906	5.78
1989	15976	785	4.91
1990	19856	908	4.57
1991	17979	1008	5.61
1992	22707	1653	7.28
1993	21854	1802	8.25
1994	20689	1634	7.90
1995	18515	1461	7.89
1996	14878	1158	7.78
1997	15689	1299	8.28
1998	13880	1189	8.57
1999	11833	923	7.80
2000	11178	824	7.37
2001	10545	933	8.85
2002	9713	883	9.09
2003	9671	727	7.52
2004	10339	812	7.85
2005	10031	1015	10.12
2006	9449	940	9.95
2007	10176	1028	10.10
2008	13320	924	6.94
2009	16073	1309	8.14
2010	14686	1220	8.31
Total	366378	27276	

Table 3. Annual (1986-2010) number of headboat trips catching cobia in the GOM per month. The GOM includes all Florida fishing regions.

	Month											
Year	1	2	3	4	5	6	7	8	9	10	11	12
1986	40	26	55	79	109	163	164	148	55	33	45	30
1987	31	36	46	113	151	186	157	110	52	26	34	46
1988	31	45	55	119	126	131	125	99	41	49	41	44
1989	54	55	87	84	99	73	110	81	44	41	36	21
1990	68	45	82	119	91	91	79	79	64	59	70	61
1991	67	61	76	108	106	87	135	98	79	72	40	79
1992	74	113	176	148	174	194	230	174	110	100	67	93
1993	94	137	145	196	235	207	253	169	125	94	66	81
1994	68	82	104	175	268	215	217	150	111	97	87	60
1995	73	65	58	133	199	216	216	168	139	80	63	51
1996	44	64	52	65	143	176	186	147	118	84	38	41
1997	38	48	79	80	148	168	211	178	118	86	99	46
1998	70	47	70	115	168	173	204	122	57	63	49	51
1999	51	63	58	100	154	154	133	83	32	27	32	36
2000	30	27	22	80	143	157	145	92	40	48	22	18
2001	23	35	35	70	112	137	180	134	82	41	39	45
2002	45	27	64	82	119	120	155	130	47	38	24	32
2003	18	31	51	65	125	115	83	97	41	49	15	37
2004	26	21	34	81	106	128	172	124	33	41	36	10
2005	25	40	33	79	168	187	172	143	43	52	35	38
2006	25	39	46	82	129	163	148	115	93	50	25	25
2007	29	41	52	73	82	194	185	161	86	43	43	39
2008	33	58	66	86	115	176	152	81	22	52	44	39
2009	41	46	59	104	134	263	264	166	80	71	45	36
2010	33	31	70	107	237	240	159	118	69	57	45	54
Total	1131	1283	1675	2543	3641	4114	4235	3167	1781	1453	1140	1113

Table 4. Annual (1986-2010) number of headboat trips fishing in the GOM per month. The GOM includes all Florida fishing regions.

	Month											
Year	1	2	3	4	5	6	7	8	9	10	11	12
1986	861	952	1015	1171	1197	1897	2219	2002	1238	1057	1236	987
1987	1122	1190	1301	1660	1549	1703	1815	1677	1134	850	815	1015
1988	899	1102	1320	1590	1695	1836	1947	1644	849	1016	775	1005
1989	1175	1106	1411	1437	1378	1498	1752	1704	1206	1270	1156	883
1990	1364	1240	1731	1858	1756	2143	2144	2172	1540	1339	1280	1289
1991	1459	1368	1525	1604	1578	1928	2084	1926	1311	1126	973	1097
1992	1226	1423	2112	2141	2396	2313	2938	2391	1686	1512	1156	1413
1993	1516	1608	1812	1961	1977	2233	2747	2288	1619	1582	1254	1257
1994	1173	1508	2002	1992	2110	2105	2455	2146	1396	1404	1193	1205
1995	1237	1430	1778	1909	1881	2069	2389	1759	1352	845	1037	829
1996	953	1152	1092	1310	1416	1675	1927	1695	1198	896	655	909
1997	1012	1252	1443	1142	1382	1662	1835	1921	1195	1088	1017	740
1998	1181	913	1303	1360	1420	1551	1964	1497	627	762	718	584
1999	738	1007	1127	1101	1267	1407	1598	1238	595	578	578	599
2000	633	762	920	1093	1213	1347	1610	1176	694	721	582	427
2001	515	723	811	1049	1073	1265	1536	1279	765	618	456	455
2002	589	547	841	935	938	1250	1474	1142	556	710	401	330
2003	445	577	811	848	1124	1290	1395	1074	599	724	371	413
2004	625	628	987	1078	1162	1449	1588	1030	367	666	426	333
2005	574	630	785	1002	1340	1343	1383	1014	504	550	471	435
2006	489	554	992	965	1062	1223	1262	909	645	540	441	367
2007	547	627	1001	955	941	1458	1514	1080	589	514	430	520
2008	505	845	1146	1387	1462	1845	2072	1237	482	740	712	887
2009	1034	1106	1318	1388	1498	2160	2446	1797	918	887	706	815
2010	771	744	1329	1569	1510	1820	1640	1395	876	1258	984	790
Total	22643	24994	31913	34505	36325	42470	47734	39193	23941	23253	19823	19584

Table 5. Annual (1986-2010) percentage of headboat trips catching cobia in the GOM per month. The GOM includes all Florida fishing regions.

	Month											
Year	1	2	3	4	5	6	7	8	9	10	11	12
1986	4.65	2.73	5.42	6.75	9.11	8.59	7.39	7.39	4.44	3.12	3.64	3.04
1987	2.76	3.03	3.54	6.81	9.75	10.92	8.65	6.56	4.59	3.06	4.17	4.53
1988	3.45	4.08	4.17	7.48	7.43	7.14	6.42	6.02	4.83	4.82	5.29	4.38
1989	4.60	4.97	6.17	5.85	7.18	4.87	6.28	4.75	3.65	3.23	3.11	2.38
1990	4.99	3.63	4.74	6.40	5.18	4.25	3.68	3.64	4.16	4.41	5.47	4.73
1991	4.59	4.46	4.98	6.73	6.72	4.51	6.48	5.09	6.03	6.39	4.11	7.20
1992	6.04	7.94	8.33	6.91	7.26	8.39	7.83	7.28	6.52	6.61	5.80	6.58
1993	6.20	8.52	8.00	9.99	11.89	9.27	9.21	7.39	7.72	5.94	5.26	6.44
1994	5.80	5.44	5.19	8.79	12.70	10.21	8.84	6.99	7.95	6.91	7.29	4.98
1995	5.90	4.55	3.26	6.97	10.58	10.44	9.04	9.55	10.28	9.47	6.08	6.15
1996	4.62	5.56	4.76	4.96	10.10	10.51	9.65	8.67	9.85	9.38	5.80	4.51
1997	3.75	3.83	5.47	7.01	10.71	10.11	11.50	9.27	9.87	7.90	9.73	6.22
1998	5.93	5.15	5.37	8.46	11.83	11.15	10.39	8.15	9.09	8.27	6.82	8.73
1999	6.91	6.26	5.15	9.08	12.15	10.95	8.32	6.70	5.38	4.67	5.54	6.01
2000	4.74	3.54	2.39	7.32	11.79	11.66	9.01	7.82	5.76	6.66	3.78	4.22
2001	4.47	4.84	4.32	6.67	10.44	10.83	11.72	10.48	10.72	6.63	8.55	9.89
2002	7.64	4.94	7.61	8.77	12.69	9.60	10.52	11.38	8.45	5.35	5.99	9.70
2003	4.04	5.37	6.29	7.67	11.12	8.91	5.95	9.03	6.84	6.77	4.04	8.96
2004	4.16	3.34	3.44	7.51	9.12	8.83	10.83	12.04	8.99	6.16	8.45	3.00
2005	4.36	6.35	4.20	7.88	12.54	13.92	12.44	14.10	8.53	9.45	7.43	8.74
2006	5.11	7.04	4.64	8.50	12.15	13.33	11.73	12.65	14.42	9.26	5.67	6.81
2007	5.30	6.54	5.19	7.64	8.71	13.31	12.22	14.91	14.60	8.37	10.00	7.50
2008	6.53	6.86	5.76	6.20	7.87	9.54	7.34	6.55	4.56	7.03	6.18	4.40
2009	3.97	4.16	4.48	7.49	8.95	12.18	10.79	9.24	8.71	8.00	6.37	4.42
2010	4.28	4.17	5.27	6.82	15.70	13.19	9.70	8.46	7.88	4.53	4.57	6.84

Table 6. The number of headboat trips catching cobia in the Gulf of Mexico per month and area. The Gulf of Mexico region includes all Florida fishing regions.

	Month											
Area	1	2	3	4	5	6	7	8	9	10	11	12
NORTH-EAST_FLORIDA	36	29	127	308	389	528	513	358	164	160	182	96
EAST_CENTRAL_FLORID	641	744	846	679	675	756	826	660	388	332	404	623
SOUTHEAST_FLORIDA	166	170	301	646	664	344	244	181	89	97	105	130
FL_KEYS_ATL_VESS	66	94	119	169	96	74	92	60	30	24	51	60
DRY_TORTUGAS	36	41	36	49	21	8	13	10	5	18	14	27
NAPLES-CRYSTAL_RIVER	63	59	79	81	52	54	52	43	53	97	51	81
FL_MIDDLE_GROUNDS	10	11	9	12	13	8	13	12	12	8	4	5
NW_FLORDIA_&_ALABAMA	10	8	9	105	186	271	318	216	125	90	38	8
LOUISIANA	12	21	33	117	392	499	470	334	297	264	157	44
NE_TX_SABNE-FREEPORT	22	25	39	100	431	672	744	594	253	157	40	5
CENTRAL_TX_PTARANSAS	63	70	71	253	656	766	791	550	304	171	58	28
SOUTH_TX_PTISABEL	6	11	6	24	66	134	159	149	61	35	36	6
	1131	1283	1675	2543	3641	4114	4235	3167	1781	1453	1140	1113

Table 7. The number of headboat trips in the Gulf of Mexico per month and area. The Gulf of Mexico region includes all Florida fishing regions.

	Month											
Area	1	2	3	4	5	6	7	8	9	10	11	12
NORTH-EAST_FLORIDA	242	381	880	1251	1344	1679	1792	1377	758	612	516	350
EAST_CENTRAL_FLORID	2137	2568	3439	3800	3811	4432	4952	4095	2295	1912	1829	2049
SOUTHEAST_FLORIDA	6324	6336	6954	7653	7712	7174	8001	7400	5638	5499	5333	5737
FL_KEYS_ATL_VESS	5168	4949	5303	4813	3768	4710	5351	4447	2136	2569	3535	3998
DRY_TORTUGAS	170	181	171	164	121	87	76	61	38	61	83	120
NAPLES-CRYSTAL_RIVER	6177	7005	8621	8111	6953	7088	7893	6589	4206	5223	5493	5526
FL_MIDDLE_GROUNDS	103	99	104	107	126	134	124	82	50	48	52	35
NW_FLORDIA_&_ALABAMA	570	1143	3170	5071	6617	9073	9753	6951	4019	3414	1044	613
LOUISIANA	121	149	258	416	806	965	1003	820	612	590	423	181
NE_TX_SABNE-FREEPORT	280	394	775	918	1536	2072	2524	2256	1332	877	310	132
CENTRAL_TX_PTARANSAS	957	1208	1687	1708	2713	3745	4567	3745	2163	1950	974	554
SOUTH_TX_PTISABEL	394	581	551	493	818	1311	1698	1370	694	498	231	289
	22643	24994	31913	34505	36325	42470	47734	39193	23941	23253	19823	19584

Table 8. The percentage of headboat trips catching cobia in the Gulf of Mexico per month and area. The Gulf of Mexico region includes all Florida fishing regions.

	Month											
Area	1	2	3	4	5	6	7	8	9	10	11	12
NORTH-EAST_FLORIDA	14.88	7.61	14.43	24.62	28.94	31.45	28.63	26.00	21.64	26.14	35.27	27.43
EAST_CENTRAL_FLORID	30.00	28.97	24.60	17.87	17.71	17.06	16.68	16.12	16.91	17.36	22.09	30.41
SOUTHEAST_FLORIDA	2.62	2.68	4.33	8.44	8.61	4.80	3.05	2.45	1.58	1.76	1.97	2.27
FL_KEYS_ATL_VESS	1.28	1.90	2.24	3.51	2.55	1.57	1.72	1.35	1.40	0.93	1.44	1.50
DRY_TORTUGAS	21.18	22.65	21.05	29.88	17.36	9.20	17.11	16.39	13.16	29.51	16.87	22.50
NAPLES-CRYSTAL_RIVER	1.02	0.84	0.92	1.00	0.75	0.76	0.66	0.65	1.26	1.86	0.93	1.47
FL_MIDDLE_GROUNDS	9.71	11.11	8.65	11.21	10.32	5.97	10.48	14.63	24.00	16.67	7.69	14.29
NW_FLORDIA_&_ALABAMA	1.75	0.70	0.28	2.07	2.81	2.99	3.26	3.11	3.11	2.64	3.64	1.31
LOUISIANA	9.92	14.09	12.79	28.13	48.64	51.71	46.86	40.73	48.53	44.75	37.12	24.31
NE_TX_SABNE-FREEPORT	7.86	6.35	5.03	10.89	28.06	32.43	29.48	26.33	18.99	17.90	12.90	3.79
CENTRAL_TX_PTARANSAS	6.58	5.79	4.21	14.81	24.18	20.45	17.32	14.69	14.05	8.77	5.95	5.05
SOUTH_TX_PTISABEL	1.52	1.89	1.09	4.87	8.07	10.22	9.36	10.88	8.79	7.03	15.58	2.08

Table 9. Annual (1981-2010) number of trips catching cobia (i.e., positive trips), total trips, and the percent of trips capturing cobia in the GOM obtained from MRFSS, with the MRFSS dataset subset according to the cobia stock boundaries.

Year	Positive Trips	Total Trips	Percent Positive
1981	26	2469	1.05
1982	63	4636	1.36
1983	33	3066	1.08
1984	40	4003	1.00
1985	31	3963	0.78
1986	78	12548	0.62
1987	89	11939	0.75
1988	80	12904	0.62
1989	69	9660	0.71
1990	92	8614	1.07
1991	127	9635	1.32
1992	216	19914	1.08
1993	132	15728	0.84
1994	172	17778	0.97
1995	101	16040	0.63
1996	174	19946	0.87
1997	246	20791	1.18
1998	244	24399	1.00
1999	356	33054	1.08
2000	276	30764	0.90
2001	316	32193	0.98
2002	354	34225	1.03
2003	331	32963	1.00
2004	298	32771	0.91
2005	231	29855	0.77
2006	236	31840	0.74
2007	239	31553	0.76
2008	272	30309	0.90
2009	198	29717	0.67
2010	204	29551	0.69
Total	5324	596828	

Table 10. Annual (1981-2010) number of trips catching cobia (i.e., positive trips), total trips, and the percent of trips capturing cobia by month and state in the GOM obtained from MRFSS as partitioned for cobia.

	All Trips					Positive Trips					Percent Positive Trips				
Year	LA	MS	AL	West FL	East FL	LA	MS	AL	West FL	East FL	LA	MS	AL	West FL	East FL
1981	395	235	185	1008	646	9	2	5	10	0	2.28	0.85	2.70	0.99	0.00
1982	521	543	517	1564	1491	13	9	14	15	12	2.50	1.66	2.71	0.96	0.80
1983	434	196	266	860	1310	18	4	5	2	4	4.15	2.04	1.88	0.23	0.31
1984	690	300	295	960	1758	12	5	4	12	7	1.74	1.67	1.36	1.25	0.40
1985	910	179	339	1087	1448	7	1	6	10	7	0.77	0.56	1.77	0.92	0.48
1986	3417	709	674	3821	3927	24	8	4	36	6	0.70	1.13	0.59	0.94	0.15
1987	1256	804	855	5425	3599	10	11	18	36	14	0.80	1.37	2.11	0.66	0.39
1988	1804	938	613	5576	3973	6	11	4	48	11	0.33	1.17	0.65	0.86	0.28
1989	1212	668	548	3640	3592	2	5	7	41	14	0.17	0.75	1.28	1.13	0.39
1990	1156	528	386	3204	3340	21	9	13	35	14	1.82	1.70	3.37	1.09	0.42
1991	1275	609	626	3178	3947	27	12	21	55	12	2.12	1.97	3.35	1.73	0.30
1992	2886	1370	922	7900	6836	24	35	25	82	50	0.83	2.55	2.71	1.04	0.73
1993	1708	638	568	6915	5899	11	11	16	62	32	0.64	1.72	2.82	0.90	0.54
1994	1860	805	704	7723	6686	22	10	34	81	25	1.18	1.24	4.83	1.05	0.37
1995	1692	602	577	6827	6342	13	9	11	58	10	0.77	1.50	1.91	0.85	0.16
1996	2129	888	866	8760	7303	31	8	11	84	40	1.46	0.90	1.27	0.96	0.55
1997	2392	939	862	9036	7562	77	19	7	108	35	3.22	2.02	0.81	1.20	0.46
1998	2491	1021	1152	11092	8643	14	14	12	163	41	0.56	1.37	1.04	1.47	0.47
1999	3444	1457	1431	15735	10987	17	18	15	234	72	0.49	1.24	1.05	1.49	0.66
2000	3525	1202	1339	13846	10852	18	11	28	180	39	0.51	0.92	2.09	1.30	0.36
2001	3218	1003	1335	14385	12252	9	5	26	210	66	0.28	0.50	1.95	1.46	0.54
2002	3517	859	1222	15630	12997	28	16	22	228	60	0.80	1.86	1.80	1.46	0.46
2003	3262	1025	1223	15769	11684	36	8	14	196	77	1.10	0.78	1.14	1.24	0.66
2004	3787	1010	1086	16814	10074	38	8	15	187	50	1.00	0.79	1.38	1.11	0.50
2005	3217	693	1148	14677	10120	27	2	10	149	43	0.84	0.29	0.87	1.02	0.42
2006	3851	1029	1138	13928	11894	34	3	17	106	76	0.88	0.29	1.49	0.76	0.64
2007	3826	1071	1234	14595	10827	33	7	15	135	49	0.86	0.65	1.22	0.92	0.45
2008	4237	1116	1159	14501	9296	16	8	12	188	48	0.38	0.72	1.04	1.30	0.52
2009	3819	1137	1302	14950	8509	10	6	13	110	59	0.26	0.53	1.00	0.74	0.69
2010	3395	919	1165	14844	9228	1	1	6	117	79	0.03	0.11	0.52	0.79	0.86
Total	71326	24493	25737	268250	207022	608	276	410	2978	1052	0.85	1.13	1.59	1.11	0.51

Table 11. Annual (1981-2010) number of total trips per month in the GOM from the MRFSS database as subset for cobia.

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1981				197	223	248	232	616	199	441	238	75
1982			165	254	615	662	790	747	250	595	324	234
1983	139	156	219	367	314	545	255	292	143	302	231	103
1984	54	530	373	337	570	533	439	133	394	192	351	97
1985	109	176	471	212	417	493	367	287	373	339	411	308
1986	398	932	673	1157	1094	1412	1445	1137	1177	1026	1079	1018
1987	703	998	941	1224	1243	1278	1414	1014	1163	821	685	455
1988	457	627	692	609	1004	904	1548	1386	1416	1880	1217	1164
1989	733	569	870	665	1301	604	1108	1025	911	649	898	327
1990	148	769	729	808	890	856	859	763	850	525	764	653
1991	622	604	594	817	935	1170	905	828	904	826	825	605
1992	958	1406	1422	2458	2527	1272	2321	1384	1303	2095	1381	1387
1993		1872	1521	981	1645	1507	1591	1622	1348	1146	1530	965
1994	1330	1722	1426	1307	1600	2013	1845	1450	1415	1306	1228	1136
1995	1370	1293	1378	1170	1514	1692	1452	1490	1462	1129	1099	991
1996	992	1093	1409	1887	1825	1967	1654	2118	1526	2266	1667	1542
1997	1233	1256	1788	1466	2179	2118	1888	1726	1882	2007	1869	1379
1998	1593	1358	1602	1868	2056	1944	2513	2794	1037	2042	2840	2752
1999	3313	3202	3685	3956	2286	2590	3111	2801	1817	2178	2356	1759
2000	1812	2548	2244	3278	3225	3337	2914	2577	2425	2417	2171	1816
2001	2404	2287	2595	2810	2951	3144	3186	2997	2832	2140	2487	2360
2002	2256	2085	3193	3370	3206	3309	3386	3183	2602	2981	2381	2273
2003	2051	2989	3267	3113	3488	3401	3326	2685	2251	2338	2281	1773
2004	2030	2172	2965	3134	3299	3367	3407	2842	1698	3433	2419	2005
2005	2391	2036	2766	3059	3535	3052	2911	2645	1762	1725	1889	2084
2006	2349	2182	2704	3335	2795	2978	3030	2949	2698	2393	2187	2240
2007	2114	1992	2653	2778	3047	3330	3029	2917	2515	2190	2647	2341
2008	1859	2497	2928	2455	2965	3247	2935	2346	2071	2529	2350	2127
2009	2221	1998	2281	2962	3245	2754	2902	2712	2507	2476	2303	1356
2010	1552	1739	2308	3036	3386	2949	2750	2628	2863	2473	2379	1488
Total	37191	43088	49862	55070	59380	58676	59513	54094	45794	48860	46487	38813

Table 12. Annual (1981-2010) number of trips capturing cobia per month in the GOM from the MRFSS database.

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1981				0	2	8	6	5	1	3	1	0
1982			2	3	14	9	18	7	5	2	1	2
1983	0	0	0	1	8	9	7	2	0	2	4	0
1984	1	5	0	4	6	11	7	2	2	2	0	0
1985	1	4	0	2	5	2	10	3	2	2	0	0
1986	1	3	5	6	13	10	8	8	11	7	1	5
1987	3	3	2	7	21	16	8	13	11	5	0	0
1988	1	2	0	2	10	14	9	13	13	7	7	2
1989	1	4	8	5	19	7	5	5	11	3	1	0
1990	0	2	5	7	11	14	8	13	16	9	3	4
1991	6	8	2	7	15	18	24	8	16	14	9	0
1992	9	6	8	26	31	16	55	28	10	16	7	4
1993		2	6	7	27	20	14	19	20	7	6	4
1994	3	3	5	19	14	44	31	21	19	5	6	2
1995	1	2	5	13	21	11	8	11	21	3	3	2
1996	5	3	8	27	24	17	13	20	6	28	13	10
1997	4	3	33	21	45	18	36	20	34	16	11	5
1998	6	4	18	13	28	21	34	43	16	18	28	15
1999	12	27	30	71	46	27	44	29	31	15	15	9
2000	4	9	13	48	47	27	29	31	29	12	18	9
2001	13	20	27	42	31	41	36	44	27	12	14	9
2002	26	11	23	49	46	65	43	25	25	26	10	5
2003	12	12	45	37	56	40	34	27	28	19	18	3
2004	6	11	13	57	40	29	39	33	11	31	18	10
2005	5	4	20	31	43	27	33	21	15	9	14	9
2006	3	18	16	27	29	35	35	33	19	10	8	3
2007	4	9	11	36	27	35	27	30	22	15	9	14
2008	10	25	7	27	29	40	34	24	27	22	18	9
2009	2	2	20	15	26	40	23	24	24	13	5	4
2010	11	6	10	26	47	41	17	15	14	10	2	5
Total	150	208	342	636	781	712	695	577	486	343	250	144

Table 13. Annual (1981-2010) percentage of trips capturing cobia per month in the GOM from the MRFSS database.

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1981	0.00	0.00	0.00	0.00	0.90	3.23	2.59	0.81	0.50	0.68	0.42	0.00
1982	0.00	0.00	1.21	1.18	2.28	1.36	2.28	0.94	2.00	0.34	0.31	0.85
1983	0.00	0.00	0.00	0.27	2.55	1.65	2.75	0.68	0.00	0.66	1.73	0.00
1984	1.85	0.94	0.00	1.19	1.05	2.06	1.59	1.50	0.51	1.04	0.00	0.00
1985	0.92	2.27	0.00	0.94	1.20	0.41	2.72	1.05	0.54	0.59	0.00	0.00
1986	0.25	0.32	0.74	0.52	1.19	0.71	0.55	0.70	0.93	0.68	0.09	0.49
1987	0.43	0.30	0.21	0.57	1.69	1.25	0.57	1.28	0.95	0.61	0.00	0.00
1988	0.22	0.32	0.00	0.33	1.00	1.55	0.58	0.94	0.92	0.37	0.58	0.17
1989	0.14	0.70	0.92	0.75	1.46	1.16	0.45	0.49	1.21	0.46	0.11	0.00
1990	0.00	0.26	0.69	0.87	1.24	1.64	0.93	1.70	1.88	1.71	0.39	0.61
1991	0.96	1.32	0.34	0.86	1.60	1.54	2.65	0.97	1.77	1.69	1.09	0.00
1992	0.94	0.43	0.56	1.06	1.23	1.26	2.37	2.02	0.77	0.76	0.51	0.29
1993	0.00	0.11	0.39	0.71	1.64	1.33	0.88	1.17	1.48	0.61	0.39	0.41
1994	0.23	0.17	0.35	1.45	0.88	2.19	1.68	1.45	1.34	0.38	0.49	0.18
1995	0.07	0.15	0.36	1.11	1.39	0.65	0.55	0.74	1.44	0.27	0.27	0.20
1996	0.50	0.27	0.57	1.43	1.32	0.86	0.79	0.94	0.39	1.24	0.78	0.65
1997	0.32	0.24	1.85	1.43	2.07	0.85	1.91	1.16	1.81	0.80	0.59	0.36
1998	0.38	0.29	1.12	0.70	1.36	1.08	1.35	1.54	1.54	0.88	0.99	0.55
1999	0.36	0.84	0.81	1.79	2.01	1.04	1.41	1.04	1.71	0.69	0.64	0.51
2000	0.22	0.35	0.58	1.46	1.46	0.81	1.00	1.20	1.20	0.50	0.83	0.50
2001	0.54	0.87	1.04	1.49	1.05	1.30	1.13	1.47	0.95	0.56	0.56	0.38
2002	1.15	0.53	0.72	1.45	1.43	1.96	1.27	0.79	0.96	0.87	0.42	0.22
2003	0.59	0.40	1.38	1.19	1.61	1.18	1.02	1.01	1.24	0.81	0.79	0.17
2004	0.30	0.51	0.44	1.82	1.21	0.86	1.14	1.16	0.65	0.90	0.74	0.50
2005	0.21	0.20	0.72	1.01	1.22	0.88	1.13	0.79	0.85	0.52	0.74	0.43
2006	0.13	0.82	0.59	0.81	1.04	1.18	1.16	1.12	0.70	0.42	0.37	0.13
2007	0.19	0.45	0.41	1.30	0.89	1.05	0.89	1.03	0.87	0.68	0.34	0.60
2008	0.54	1.00	0.24	1.10	0.98	1.23	1.16	1.02	1.30	0.87	0.77	0.42
2009	0.09	0.10	0.88	0.51	0.80	1.45	0.79	0.88	0.96	0.53	0.22	0.29
2010	0.71	0.35	0.43	0.86	1.39	1.39	0.62	0.57	0.49	0.40	0.08	0.34
Total	0.40	0.48	0.69	1.15	1.32	1.21	1.17	1.07	1.06	0.70	0.54	0.37

Table 14. The total number of trips, positive trips, and the percentage of positive trips by wave for cobia, from the MRFSS dataset subset for the cobia stock boundary.

Year	Total Number of Trips						Positive Trips						Percentage Positive Trips MRFSS Cobia					
	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6
1981	0	197	471	848	640	313	0	0	10	11	4	1	0.00	0.00	2.12	1.30	0.63	0.32
1982	0	419	1277	1537	845	558	0	5	23	25	7	3	0.00	1.19	1.80	1.63	0.83	0.54
1983	295	586	859	547	445	334	0	1	17	9	2	4	0.00	0.17	1.98	1.65	0.45	1.20
1984	584	710	1103	572	586	448	6	4	17	9	4	0	1.03	0.56	1.54	1.57	0.68	0.00
1985	285	683	910	654	712	719	5	2	7	13	4	0	1.75	0.29	0.77	1.99	0.56	0.00
1986	1330	1830	2506	2582	2203	2097	4	11	23	16	18	6	0.30	0.60	0.92	0.62	0.82	0.29
1987	1701	2165	2521	2428	1984	1140	6	9	37	21	16	0	0.35	0.42	1.47	0.86	0.81	0.00
1988	1084	1301	1908	2934	3296	2381	3	2	24	22	20	9	0.28	0.15	1.26	0.75	0.61	0.38
1989	1302	1535	1905	2133	1560	1225	5	13	26	10	14	1	0.38	0.85	1.36	0.47	0.90	0.08
1990	917	1537	1746	1622	1375	1417	2	12	25	21	25	7	0.22	0.78	1.43	1.29	1.82	0.49
1991	1226	1411	2105	1733	1730	1430	14	9	33	32	30	9	1.14	0.64	1.57	1.85	1.73	0.63
1992	2364	3880	3799	3705	3398	2768	15	34	47	83	26	11	0.63	0.88	1.24	2.24	0.77	0.40
1993	1872	2502	3152	3213	2494	2495	2	13	47	33	27	10	0.11	0.52	1.49	1.03	1.08	0.40
1994	3052	2733	3613	3295	2721	2364	6	24	58	52	24	8	0.20	0.88	1.61	1.58	0.88	0.34
1995	2663	2548	3206	2942	2591	2090	3	18	32	19	24	5	0.11	0.71	1.00	0.65	0.93	0.24
1996	2085	3296	3792	3772	3792	3209	8	35	41	33	34	23	0.38	1.06	1.08	0.87	0.90	0.72
1997	2489	3254	4297	3614	3889	3248	7	54	63	56	50	16	0.28	1.66	1.47	1.55	1.29	0.49
1998	2951	3470	4000	5307	3079	5592	10	31	49	77	34	43	0.34	0.89	1.23	1.45	1.10	0.77
1999	6515	7641	4876	5912	3995	4115	39	101	73	73	46	24	0.60	1.32	1.50	1.23	1.15	0.58
2000	4360	5522	6562	5491	4842	3987	13	61	74	60	41	27	0.30	1.10	1.13	1.09	0.85	0.68
2001	4691	5405	6095	6183	4972	4847	33	69	72	80	39	23	0.70	1.28	1.18	1.29	0.78	0.47
2002	4341	6563	6515	6569	5583	4654	37	72	111	68	51	15	0.85	1.10	1.70	1.04	0.91	0.32
2003	5040	6380	6889	6011	4589	4054	24	82	96	61	47	21	0.48	1.29	1.39	1.01	1.02	0.52
2004	4202	6099	6666	6249	5131	4424	17	70	69	72	42	28	0.40	1.15	1.04	1.15	0.82	0.63
2005	4427	5825	6587	5556	3487	3973	9	51	70	54	24	23	0.20	0.88	1.06	0.97	0.69	0.58
2006	4531	6039	5773	5979	5091	4427	21	43	64	68	29	11	0.46	0.71	1.11	1.14	0.57	0.25
2007	4106	5431	6377	5946	4705	4988	13	47	62	57	37	23	0.32	0.87	0.97	0.96	0.79	0.46
2008	4356	5383	6212	5281	4600	4477	35	34	69	58	49	27	0.80	0.63	1.11	1.10	1.07	0.60
2009	4219	5243	5999	5614	4983	3659	4	35	66	47	37	9	0.09	0.67	1.10	0.84	0.74	0.25
2010	3291	5344	6335	5378	5336	3867	17	36	88	32	24	7	0.52	0.67	1.39	0.60	0.45	0.18
Total	80279	104932	118056	113607	94654	85300	358	978	1493	1272	829	394	0.45	0.93	1.26	1.12	0.88	0.46

Table 15. The number of trips catching cobia (i.e., positive trips), total trips, and the percent of trips capturing cobia by month and state in the GOM obtained from MRFSS as partitioned for cobia. States are as follows: 2 - Lousiana, 3 - Mississippi, 4 - Alabama, 5 – West Coast Florida, and 6 – East Coast Florida.

	Total Number of Trips					Positive Trips					Percentage of Positive Trips				
Month	LA	MS	AL	West FL	East FL	LA	MS	AL	West FL	East FL	LA	MS	AL	West FL	East FL
1	3982	1173	877	16430	14729	3	1	0	87	59	0.08	0.09	0.00	0.53	0.40
2	4074	1330	1309	19149	17226	7	0	1	128	72	0.17	0.00	0.08	0.67	0.42
3	5033	1780	1745	23779	17525	17	3	2	196	124	0.34	0.17	0.11	0.82	0.71
4	5684	2155	2373	26652	18206	27	25	50	408	126	0.48	1.16	2.11	1.53	0.69
5	7048	2492	2992	27316	19532	94	45	73	425	144	1.33	1.81	2.44	1.56	0.74
6	7458	2776	3019	25806	19617	102	35	75	361	139	1.37	1.26	2.48	1.40	0.71
7	8398	2682	3191	25367	19875	120	56	73	320	126	1.43	2.09	2.29	1.26	0.63
8	7369	2473	2881	22616	18755	86	48	57	291	95	1.17	1.94	1.98	1.29	0.51
9	6349	2257	2045	19891	15252	66	34	41	304	41	1.04	1.51	2.00	1.53	0.27
10	6119	2187	1984	23011	15559	51	20	26	209	37	0.83	0.91	1.31	0.91	0.24
11	5567	1983	2069	20759	16109	24	8	10	158	50	0.43	0.40	0.48	0.76	0.31
12	4245	1205	1252	17474	14637	11	1	2	91	39	0.26	0.08	0.16	0.52	0.27
Total	71326	24493	25737	268250	207022	608	276	410	2978	1052	0.85	1.13	1.59	1.11	0.51

Table 16. Annual (1981-2010) number of trips catching cobia (i.e., positive trips) and total trips per mode in the Gulf of Mexico obtained from MRFSS as partitioned for cobia. Modes are as follows: 3 - Charter and 4 – Private/Rental.

	All Trips		Positive Trips		Percentage Positive Trips	
Year	Charter	Private/ Rental	Charter	Private/ Rental	Charter	Private/ Rental
1981	278	2191	10	16	3.60	0.73
1982	206	4430	6	57	2.91	1.29
1983	598	2468	18	15	3.01	0.61
1984	793	3210	20	20	2.52	0.62
1985	479	3484	12	19	2.51	0.55
1986	2027	10521	40	38	1.97	0.36
1987	1317	10622	29	60	2.20	0.56
1988	1576	11328	24	56	1.52	0.49
1989	1361	8299	22	47	1.62	0.57
1990	1154	7460	28	64	2.43	0.86
1991	1280	8355	60	67	4.69	0.80
1992	2281	17633	67	149	2.94	0.85
1993	1480	14248	33	99	2.23	0.69
1994	1413	16365	50	122	3.54	0.75
1995	1255	14785	28	73	2.23	0.49
1996	1555	18391	57	117	3.67	0.64
1997	2381	18410	61	185	2.56	1.00
1998	3641	20758	75	169	2.06	0.81
1999	5770	27284	118	238	2.05	0.87
2000	6523	24241	118	158	1.81	0.65
2001	5723	26470	143	173	2.50	0.65
2002	6208	28017	151	203	2.43	0.72
2003	6308	26655	155	176	2.46	0.66
2004	6000	26771	169	129	2.82	0.48
2005	5181	24674	116	115	2.24	0.47
2006	4165	27675	105	131	2.52	0.47
2007	4266	27287	108	131	2.53	0.48
2008	4055	26254	119	153	2.93	0.58
2009	3364	26353	61	137	1.81	0.52
2010	3670	25881	73	131	1.99	0.51
Total	86308	510520	2076	3248	2.41	0.64

Table 17. Total number of trips, positive trips, and the percent positive trips by year in the Gulf of Mexico from the Headboat Survey data as spatially partitioned for Spanish mackerel.

Year	Total Trips	Positive Trips	Percent Positive Trips
1986	4459	134	3.01
1987	4597	186	4.05
1988	6288	95	1.51
1989	6920	123	1.78
1990	10336	270	2.61
1991	9111	381	4.18
1992	10273	322	3.13
1993	10755	232	2.16
1994	10691	334	3.12
1995	9001	166	1.84
1996	8417	166	1.97
1997	8288	143	1.73
1998	7675	90	1.17
1999	6665	125	1.88
2000	6421	181	2.82
2001	6229	73	1.17
2002	6420	132	2.06
2003	6339	101	1.59
2004	6823	131	1.92
2005	6527	133	2.04
2006	5896	143	2.43
2007	6404	262	4.09
2008	6622	325	4.91
2009	8401	325	3.87
2010	6626	215	3.24

Table 18. Total number of trips by month in the Gulf of Mexico from the Headboat Survey as spatially partitioned for Spanish mackerel.

Year	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1986	218	211	327	320	315	594	762	567	342	300	271	232
1987	205	246	341	418	532	575	653	562	323	272	235	235
1988	223	283	438	582	757	892	1002	779	309	445	265	313
1989	381	437	542	644	710	728	891	860	559	544	363	261
1990	543	601	907	948	895	1161	1250	1204	835	775	656	561
1991	583	638	712	789	797	1062	1189	1015	710	653	473	490
1992	496	573	835	864	1025	1148	1425	1213	802	788	540	564
1993	650	677	858	887	1007	1199	1563	1231	866	799	532	486
1994	462	683	969	1026	1126	1181	1374	1260	823	734	569	484
1995	410	539	789	903	931	1221	1397	1054	753	352	378	274
1996	298	417	497	666	845	1116	1327	1152	789	544	364	402
1997	449	563	735	544	753	1071	1125	1126	747	550	432	193
1998	466	392	642	703	923	970	1317	937	383	433	293	216
1999	325	554	615	633	772	868	945	744	371	347	260	231
2000	239	381	504	643	747	906	1002	731	423	475	210	160
2001	172	365	430	663	742	787	1010	768	492	436	202	162
2002	249	295	478	605	633	895	1078	832	408	505	245	197
2003	223	318	470	546	763	891	958	764	449	508	243	206
2004	323	393	691	721	837	999	1069	690	328	426	181	165
2005	333	342	484	601	923	984	906	698	351	416	264	225
2006	281	333	565	509	711	811	826	612	438	361	279	170
2007	263	334	613	552	688	1016	1011	683	403	377	222	242
2008	178	328	504	678	712	1051	1125	662	278	455	313	338
2009	381	406	648	679	797	1359	1516	1057	471	461	334	292
2010	271	289	588	726	644	917	846	620	427	652	408	238
Total	8622	10598	15182	16850	19585	24402	27567	21821	13080	12608	8532	7337

Table 19. Total trips, positive trips, and percentage of positive trips that encountered Spanish mackerel from the MRFSS database as subset for Spanish mackerel.

Year	Total Trips	Positive Trips	Percentage Positive Trips
1981	3760	177	4.71
1982	6633	331	4.99
1983	4286	185	4.32
1984	5200	149	2.87
1985	5930	181	3.05
1986	10551	693	6.57
1987	10506	689	6.56
1988	12467	506	4.06
1989	8968	436	4.86
1990	7723	540	6.99
1991	8568	511	5.96
1992	18782	1243	6.62
1993	17628	636	3.61
1994	20027	758	3.78
1995	18023	413	2.29
1996	18652	622	3.33
1997	19110	682	3.57
1998	22447	930	4.14
1999	30760	1701	5.53
2000	27005	1380	5.11
2001	27225	1391	5.11
2002	28550	1470	5.15
2003	29287	1317	4.50
2004	29978	1704	5.68
2005	27006	1000	3.70
2006	26818	1217	4.54
2007	28081	1415	5.04
2008	28436	1276	4.49
2009	29071	1482	5.10
2010	28181	1637	5.81

Table 20. Total number of trips by month in the Gulf of Mexico from MRFSS as spatially partitioned for Spanish mackerel.

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1981				208	275	330	323	825	327	719	538	215
1982			354	642	1024	800	1061	1003	213	778	443	315
1983	107	103	462	647	498	592	401	376	261	440	156	243
1984	167	482	434	381	675	552	568	239	616	444	458	184
1985	150	275	372	549	552	585	645	503	545	642	552	560
1986	255	647	710	871	918	1120	1189	1031	1038	1017	917	838
1987	463	701	842	1091	1128	1047	1461	834	1060	952	685	242
1988	541	601	707	584	1035	744	1324	1501	1340	1804	1262	1024
1989	889	424	913	513	1249	549	905	978	937	634	688	289
1990	136	735	669	822	740	787	701	682	701	467	780	503
1991	357	707	629	717	786	1091	789	600	763	848	785	496
1992	933	1593	1358	2345	2274	1103	1915	973	1343	2083	1851	1011
1993		1776	1903	1137	1807	1712	1840	1978	1414	1367	1636	1058
1994	1330	1768	1681	1574	1813	2239	2204	1811	1599	1319	1456	1233
1995	1494	1258	1655	1484	1695	1829	1799	1743	1671	1114	1250	1031
1996	954	1041	1342	1728	1671	1809	1586	1998	1429	2205	1562	1327
1997	1143	1175	1505	1435	1917	1882	1796	1670	1949	1876	1774	988
1998	1513	1282	1540	1535	1924	1699	2409	2478	882	2196	2483	2506
1999	3076	2892	3587	3978	2192	2337	3012	2552	1683	1978	1911	1562
2000	1608	2185	2322	2774	2736	2936	2663	2257	2033	2193	1714	1584
2001	1750	1998	2306	2631	2655	2743	2571	2503	2529	1931	2003	1605
2002	1753	1794	2640	2690	2990	3113	2550	2724	2122	2350	2044	1780
2003	1742	2573	2725	2715	3089	3021	3001	2441	2208	2021	2238	1513
2004	1788	1810	2865	2828	3038	3177	3086	2662	1921	2980	1935	1888
2005	2094	1933	2541	2898	3073	2806	2562	2286	1458	1762	1889	1704
2006	1753	1582	2176	2458	2462	2689	2688	2492	2437	2202	1864	2015
2007	1497	1653	2316	2471	2861	3075	2736	2550	2418	2160	2306	2038
2008	1704	2209	2671	2223	2703	2887	2883	2163	1995	2581	2548	1869
2009	2067	1758	2245	2845	3338	2811	2887	2480	2586	2393	2222	1439
2010	1497	1437	2142	2859	3182	2734	2578	2441	2653	2803	2396	1459
Total	32761	38392	47612	51633	56300	54799	56133	50774	44131	48259	44346	34519

Table 21. Number of positive trips that caught Spanish mackerel by month in the Gulf of Mexico from MRFSS as spatially partitioned for Spanish mackerel.

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1981				10	31	11	16	50	20	27	9	3
1982			7	42	72	49	33	83	4	35	4	2
1983	1	0	0	31	29	24	36	17	16	31	0	0
1984	0	2	4	3	10	52	40	1	13	20	3	1
1985	1	0	1	32	19	33	41	12	4	20	13	5
1986	1	5	12	98	86	111	82	82	77	62	72	5
1987	7	2	16	60	145	80	97	80	125	60	17	0
1988	1	4	15	63	96	49	56	84	44	62	25	7
1989	1	7	8	34	49	9	70	132	77	34	15	0
1990	0	16	43	63	34	37	48	96	98	66	35	4
1991	9	8	27	83	61	65	55	43	78	60	12	10
1992	15	52	162	309	224	65	85	56	59	157	53	6
1993		11	17	62	46	70	31	72	148	81	83	15
1994	3	66	55	115	79	82	59	114	83	45	50	7
1995	3	15	25	36	31	24	30	52	110	52	27	8
1996	1	2	17	96	87	56	75	85	82	80	27	14
1997	11	36	72	51	47	48	72	40	131	96	60	18
1998	14	8	13	62	76	66	108	165	59	125	140	94
1999	69	60	143	284	190	154	149	168	144	182	103	55
2000	24	66	171	182	158	153	142	161	136	113	64	10
2001	8	44	58	208	137	137	94	184	226	105	111	79
2002	16	15	99	229	174	159	120	206	150	192	76	34
2003	13	31	197	162	102	69	76	160	173	170	149	15
2004	20	64	287	246	195	147	118	180	83	201	134	29
2005	22	18	57	176	291	125	84	99	39	42	37	10
2006	4	2	19	131	148	222	175	176	129	109	61	41
2007	41	12	130	264	170	135	112	84	119	127	122	99
2008	21	73	122	165	106	126	104	130	138	158	98	35
2009	18	29	117	111	269	131	107	149	184	181	130	56
2010	8	14	50	265	196	124	176	150	214	289	141	10
Total	332	662	1944	3673	3358	2613	2491	3111	2963	2982	1871	672

Table 22. Percentage of positive trips that caught Spanish mackerel by month in the Gulf of Mexico from MRFSS as spatially partitioned for Spanish mackerel.

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1981	0.00	0.00	0.00	4.81	11.27	3.33	4.95	6.06	6.12	3.76	1.67	1.40
1982	0.00	0.00	1.98	6.54	7.03	6.13	3.11	8.28	1.88	4.50	0.90	0.63
1983	0.93	0.00	0.00	4.79	5.82	4.05	8.98	4.52	6.13	7.05	0.00	0.00
1984	0.00	0.41	0.92	0.79	1.48	9.42	7.04	0.42	2.11	4.50	0.66	0.54
1985	0.67	0.00	0.27	5.83	3.44	5.64	6.36	2.39	0.73	3.12	2.36	0.89
1986	0.39	0.77	1.69	11.25	9.37	9.91	6.90	7.95	7.42	6.10	7.85	0.60
1987	1.51	0.29	1.90	5.50	12.85	7.64	6.64	9.59	11.79	6.30	2.48	0.00
1988	0.18	0.67	2.12	10.79	9.28	6.59	4.23	5.60	3.28	3.44	1.98	0.68
1989	0.11	1.65	0.88	6.63	3.92	1.64	7.73	13.50	8.22	5.36	2.18	0.00
1990	0.00	2.18	6.43	7.66	4.59	4.70	6.85	14.08	13.98	14.13	4.49	0.80
1991	2.52	1.13	4.29	11.58	7.76	5.96	6.97	7.17	10.22	7.08	1.53	2.02
1992	1.61	3.26	11.93	13.18	9.85	5.89	4.44	5.76	4.39	7.54	2.86	0.59
1993	0.00	0.62	0.89	5.45	2.55	4.09	1.68	3.64	10.47	5.93	5.07	1.42
1994	0.23	3.73	3.27	7.31	4.36	3.66	2.68	6.29	5.19	3.41	3.43	0.57
1995	0.20	1.19	1.51	2.43	1.83	1.31	1.67	2.98	6.58	4.67	2.16	0.78
1996	0.10	0.19	1.27	5.56	5.21	3.10	4.73	4.25	5.74	3.63	1.73	1.06
1997	0.96	3.06	4.78	3.55	2.45	2.55	4.01	2.40	6.72	5.12	3.38	1.82
1998	0.93	0.62	0.84	4.04	3.95	3.88	4.48	6.66	6.69	5.69	5.64	3.75
1999	2.24	2.07	3.99	7.14	8.67	6.59	4.95	6.58	8.56	9.20	5.39	3.52
2000	1.49	3.02	7.36	6.56	5.77	5.21	5.33	7.13	6.69	5.15	3.73	0.63
2001	0.46	2.20	2.52	7.91	5.16	4.99	3.66	7.35	8.94	5.44	5.54	4.92
2002	0.91	0.84	3.75	8.51	5.82	5.11	4.71	7.56	7.07	8.17	3.72	1.91
2003	0.75	1.20	7.23	5.97	3.30	2.28	2.53	6.55	7.84	8.41	6.66	0.99
2004	1.12	3.54	10.02	8.70	6.42	4.63	3.82	6.76	4.32	6.74	6.93	1.54
2005	1.05	0.93	2.24	6.07	9.47	4.45	3.28	4.33	2.67	2.38	1.96	0.59
2006	0.23	0.13	0.87	5.33	6.01	8.26	6.51	7.06	5.29	4.95	3.27	2.03
2007	2.74	0.73	5.61	10.68	5.94	4.39	4.09	3.29	4.92	5.88	5.29	4.86
2008	1.23	3.30	4.57	7.42	3.92	4.36	3.61	6.01	6.92	6.12	3.85	1.87
2009	0.87	1.65	5.21	3.90	8.06	4.66	3.71	6.01	7.12	7.56	5.85	3.89
2010	0.53	0.97	2.33	9.27	6.16	4.54	6.83	6.15	8.07	10.31	5.88	0.69
Total	1.01	1.72	4.08	7.11	5.96	4.77	4.44	6.13	6.71	6.18	4.22	1.95

Table 23. Total trips, positive trips, and percentage of positive trips that caught Spanish mackerel by wave in the Gulf of Mexico from MRFSS as spatially partitioned for Spanish mackerel. Missing values of positive trips in the database for waves one, two, five and six in the year 2009 are due to programming error and is currently being addressed.

	Total Number of Trips						Positive Trips						Percentage of Positive Trips					
Year	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6
1981	0	208	605	1148	1046	753	0	10	42	66	47	12	0.00	4.81	6.94	5.75	4.49	1.59
1982	0	996	1824	2064	991	758	0	49	121	116	39	6	0.00	4.92	6.63	5.62	3.94	0.79
1983	210	1109	1090	777	701	399	1	31	53	53	47	0	0.48	2.80	4.86	6.82	6.70	0.00
1984	649	815	1227	807	1060	642	2	7	62	41	33	4	0.31	0.86	5.05	5.08	3.11	0.62
1985	425	921	1137	1148	1187	1112	1	33	52	53	24	18	0.24	3.58	4.57	4.62	2.02	1.62
1986	902	1581	2038	2220	2055	1755	6	110	197	164	139	77	0.67	6.96	9.67	7.39	6.76	4.39
1987	1164	1933	2175	2295	2012	927	9	76	225	177	185	17	0.77	3.93	10.34	7.71	9.19	1.83
1988	1142	1291	1779	2825	3144	2286	5	78	145	140	106	32	0.44	6.04	8.15	4.96	3.37	1.40
1989	1313	1426	1798	1883	1571	977	8	42	58	202	111	15	0.61	2.95	3.23	10.73	7.07	1.54
1990	871	1491	1527	1383	1168	1283	16	106	71	144	164	39	1.84	7.11	4.65	10.41	14.04	3.04
1991	1064	1346	1877	1389	1611	1281	17	110	126	98	138	22	1.60	8.17	6.71	7.06	8.57	1.72
1992	2526	3703	3377	2888	3426	2862	67	471	289	141	216	59	2.65	12.72	8.56	4.88	6.30	2.06
1993	1776	3040	3519	3818	2781	2694	11	79	116	103	229	98	0.62	2.60	3.30	2.70	8.23	3.64
1994	3098	3255	4052	4015	2918	2689	69	170	161	173	128	57	2.23	5.22	3.97	4.31	4.39	2.12
1995	2752	3139	3524	3542	2785	2281	18	61	55	82	162	35	0.65	1.94	1.56	2.32	5.82	1.53
1996	1995	3070	3480	3584	3634	2889	3	113	143	160	162	41	0.15	3.68	4.11	4.46	4.46	1.42
1997	2318	2940	3799	3466	3825	2762	47	123	95	112	227	78	2.03	4.18	2.50	3.23	5.93	2.82
1998	2795	3075	3623	4887	3078	4989	22	75	142	273	184	234	0.79	2.44	3.92	5.59	5.98	4.69
1999	5968	7565	4529	5564	3661	3473	129	427	344	317	326	158	2.16	5.64	7.60	5.70	8.90	4.55
2000	3793	5096	5672	4920	4226	3298	90	353	311	303	249	74	2.37	6.93	5.48	6.16	5.89	2.24
2001	3748	4937	5398	5074	4460	3608	52	266	274	278	331	190	1.39	5.39	5.08	5.48	7.42	5.27
2002	3547	5330	6103	5274	4472	3824	31	328	333	326	342	110	0.87	6.15	5.46	6.18	7.65	2.88
2003	4315	5440	6110	5442	4229	3751	44	359	171	236	343	164	1.02	6.60	2.80	4.34	8.11	4.37
2004	3598	5693	6215	5748	4901	3823	84	533	342	298	284	163	2.33	9.36	5.50	5.18	5.79	4.26
2005	4027	5439	5879	4848	3220	3593	40	233	416	183	81	47	0.99	4.28	7.08	3.77	2.52	1.31
2006	3335	4634	5151	5180	4639	3879	6	150	370	351	238	102	0.18	3.24	7.18	6.78	5.13	2.63
2007	3150	4787	5936	5286	4578	4344	53	394	305	196	246	221	1.68	8.23	5.14	3.71	5.37	5.09
2008	3913	4894	5590	5046	4576	4417	94	287	232	234	296	133	2.40	5.86	4.15	4.64	6.47	3.01
2009	3825	5090	6149	5367	4979	3661	47	228	400	256	365	186	1.23	4.48	6.51	4.77	7.33	5.08
2010	2934	5001	5916	5019	5456	3855	22	315	320	326	503	151	0.75	6.30	5.41	6.50	9.22	3.92
Total	71153	99245	111099	106907	92390	78865	994	5617	5971	5602	5945	2543	1.40	5.66	5.37	5.24	6.43	3.22

Table 24. Total trips, positive trips, and the percentage of positive trips that caught Spanish mackerel by mode in the Gulf of Mexico from MRFSS as spatially partitioned for Spanish mackerel.

Year	Total Number of Trips			Positive Trips			Percentage Positive Trips		
	Shore	Charter	Private/ Rental	Shore	Charter	Private/ Rental	Shore	Charter	Private/ Rental
1981	1937	232	1591	54	32	91	2.79	13.79	5.72
1982	3488	177	2968	83	37	211	2.38	20.90	7.11
1983	2530	362	1394	72	43	70	2.85	11.88	5.02
1984	2955	442	1803	39	59	51	1.32	13.35	2.83
1985	3415	326	2189	39	63	79	1.14	19.33	3.61
1986	1930	1303	7318	89	201	403	4.61	15.43	5.51
1987	2166	1014	7326	90	184	415	4.16	18.15	5.66
1988	3536	1017	7914	62	132	312	1.75	12.98	3.94
1989	2900	770	5298	87	107	242	3.00	13.90	4.57
1990	2449	592	4682	177	118	245	7.23	19.93	5.23
1991	2880	696	4992	105	118	288	3.65	16.95	5.77
1992	5704	1322	11756	375	174	694	6.57	13.16	5.90
1993	7799	901	8928	356	60	220	4.56	6.66	2.46
1994	8935	885	10207	394	68	296	4.41	7.68	2.90
1995	8325	709	8989	173	72	168	2.08	10.16	1.87
1996	6009	883	11760	200	72	350	3.33	8.15	2.98
1997	5881	1484	11745	199	184	299	3.38	12.40	2.55
1998	6691	2539	13217	292	249	389	4.36	9.81	2.94
1999	8693	4859	17208	561	462	678	6.45	9.51	3.94
2000	7093	5480	14432	334	544	502	4.71	9.93	3.48
2001	7284	4259	15682	458	332	601	6.29	7.80	3.83
2002	7322	4376	16852	468	305	697	6.39	6.97	4.14
2003	8008	4997	16282	342	373	602	4.27	7.46	3.70
2004	7281	4966	17731	418	418	868	5.74	8.42	4.90
2005	7271	4043	15692	223	243	534	3.07	6.01	3.40
2006	6872	3218	16728	333	178	706	4.85	5.53	4.22
2007	7355	3394	17332	411	295	709	5.59	8.69	4.09
2008	7423	3345	17668	365	259	652	4.92	7.74	3.69
2009	7863	2873	18335	427	272	783	5.43	9.47	4.27
2010	7858	3077	17246	520	290	827	6.62	9.42	4.80
Total	169853	64541	325265	7746	5944	12982	4.56	9.21	3.99

Table 25. Total number of trips, positive trips, and the percentage of positive trips that caught Spanish mackerel by state in the Gulf of Mexico from MRFSS as spatially partitioned for Spanish mackerel.

Year	Total Number of Trips				Positive Trips				Percentage Positive Trips			
	LA	MS	LA	FL West	LA	MS	LA	FL West	LA	MS	LA	FL West
1981	568	367	422	2403	5	33	48	91	0.88	8.99	11.37	3.79
1982	952	1084	1101	3496	26	71	139	95	2.73	6.55	12.62	2.72
1983	873	544	768	2101	11	40	73	61	1.26	7.35	9.51	2.90
1984	1090	855	723	2532	4	56	58	31	0.37	6.55	8.02	1.22
1985	1603	449	803	3075	9	48	51	73	0.56	10.69	6.35	2.37
1986	3811	1056	884	4800	15	81	105	492	0.39	7.67	11.88	10.25
1987	1563	1035	1276	6632	20	93	153	423	1.28	8.99	11.99	6.38
1988	2254	1243	1060	7910	33	81	55	337	1.46	6.52	5.19	4.26
1989	1659	1040	906	5363	33	73	99	231	1.99	7.02	10.93	4.31
1990	1501	882	771	4569	30	97	118	295	2.00	11.00	15.30	6.46
1991	1746	1020	1172	4630	50	78	91	292	2.86	7.65	7.76	6.31
1992	3869	1977	1630	11306	84	163	106	890	2.17	8.24	6.50	7.87
1993	2645	1173	1129	12681	24	28	64	520	0.91	2.39	5.67	4.10
1994	3013	1547	1388	14079	24	32	83	619	0.80	2.07	5.98	4.40
1995	2649	1204	1112	13058	29	32	69	283	1.09	2.66	6.21	2.17
1996	2732	1414	1392	13114	14	37	90	481	0.51	2.62	6.47	3.67
1997	3059	1411	1319	13321	43	65	60	514	1.41	4.61	4.55	3.86
1998	3178	1526	1711	16032	15	94	93	728	0.47	6.16	5.44	4.54
1999	4325	2106	2065	22264	28	124	226	1323	0.65	5.89	10.94	5.94
2000	4390	1743	1873	18999	42	81	187	1070	0.96	4.65	9.98	5.63
2001	4048	1470	1964	19743	15	61	140	1175	0.37	4.15	7.13	5.95
2002	4314	1362	1781	21093	33	43	81	1313	0.76	3.16	4.55	6.22
2003	4076	1571	1786	21854	20	47	72	1178	0.49	2.99	4.03	5.39
2004	4551	1511	1543	22373	23	38	99	1544	0.51	2.51	6.42	6.90
2005	4018	1074	1960	19954	31	22	62	885	0.77	2.05	3.16	4.44
2006	4718	1602	1679	18819	41	23	80	1073	0.87	1.44	4.76	5.70
2007	4753	1650	2028	19650	24	36	79	1276	0.50	2.18	3.90	6.49
2008	5135	1689	2026	19586	21	46	69	1140	0.41	2.72	3.41	5.82
2009	4698	1703	2218	20452	35	60	82	1305	0.74	3.52	3.70	6.38
2010	4056	1462	1901	20762	6	22	106	1503	0.15	1.50	5.58	7.24
Total	91847	38770	42391	386651	788	1805	2838	21241	0.86	4.66	6.69	5.49

Figures

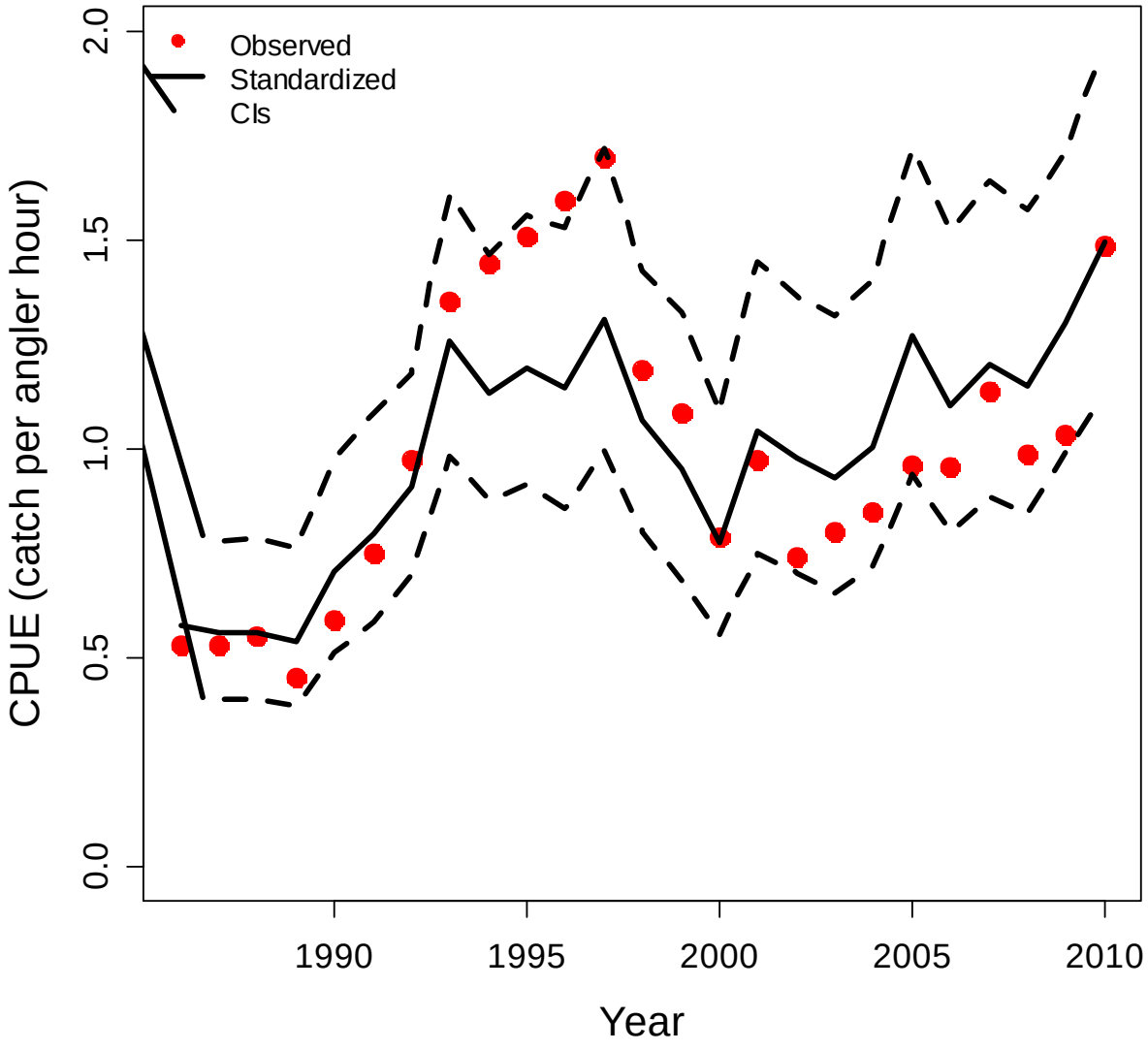


Figure 1. Nominal (observed) and standardized CPUE and the 95% confidence intervals for cobia from the Headboat Survey in the GOM. CPUE values were normalized by the mean.

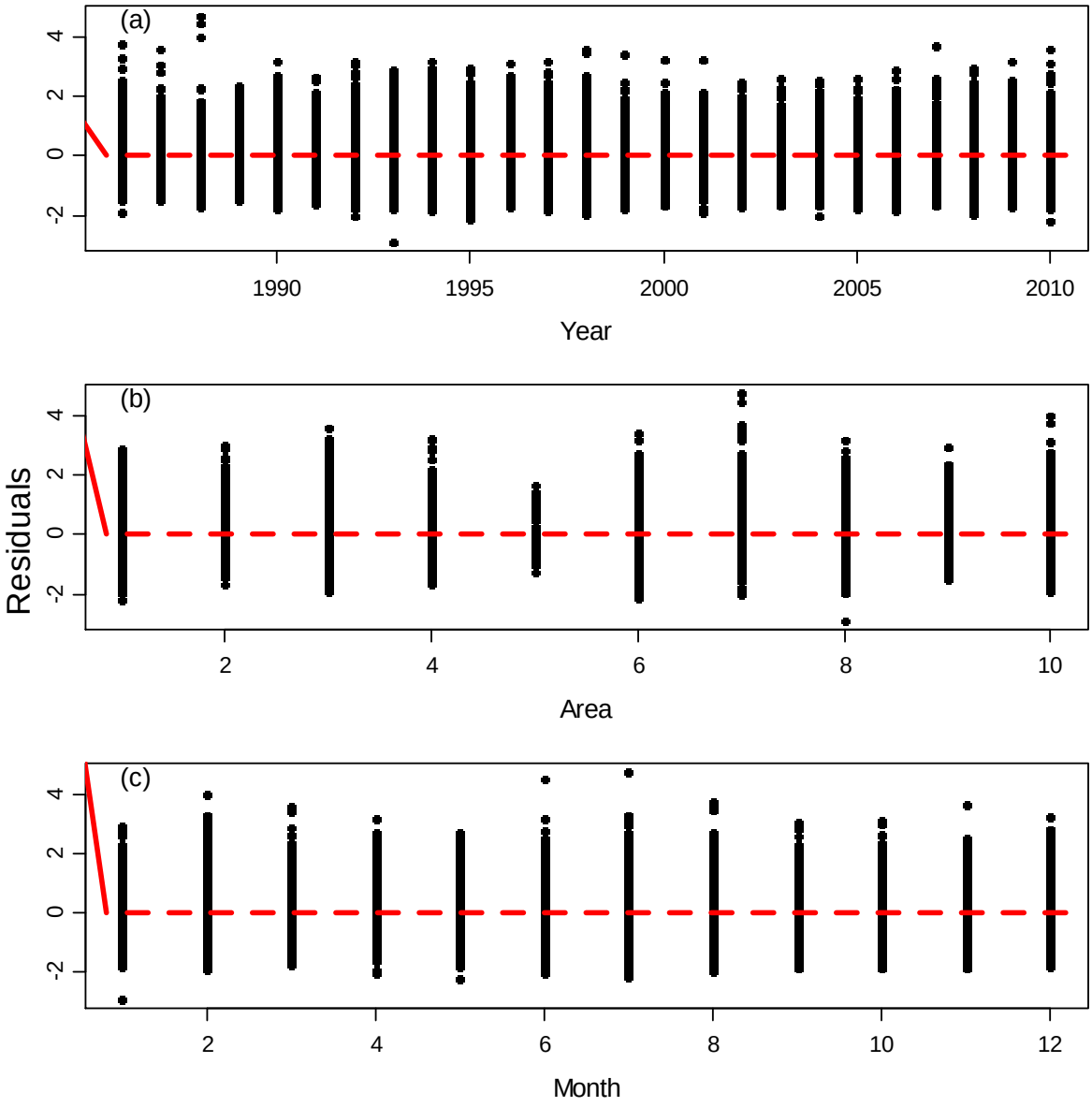


Figure 2. CPUE residuals by explanatory variable for Headboat Survey cobia.

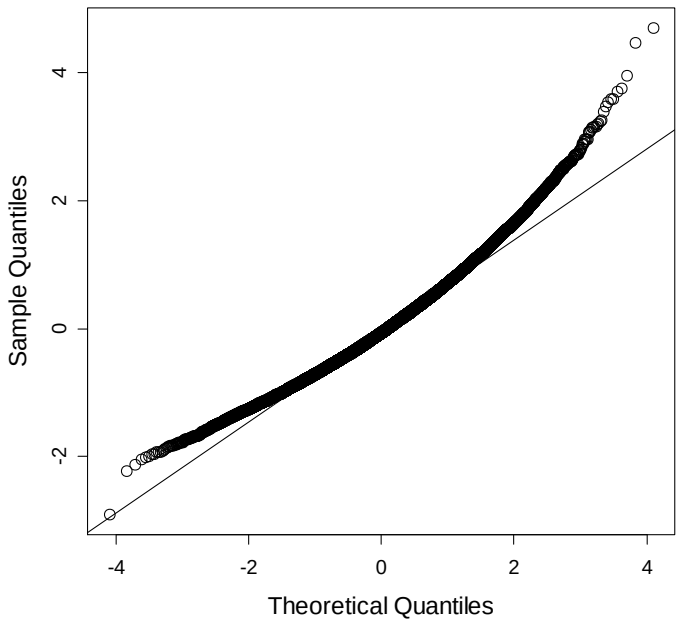


Figure 3. Q-Q plot of CPUE for cobia in the GOM Headboat Survey.

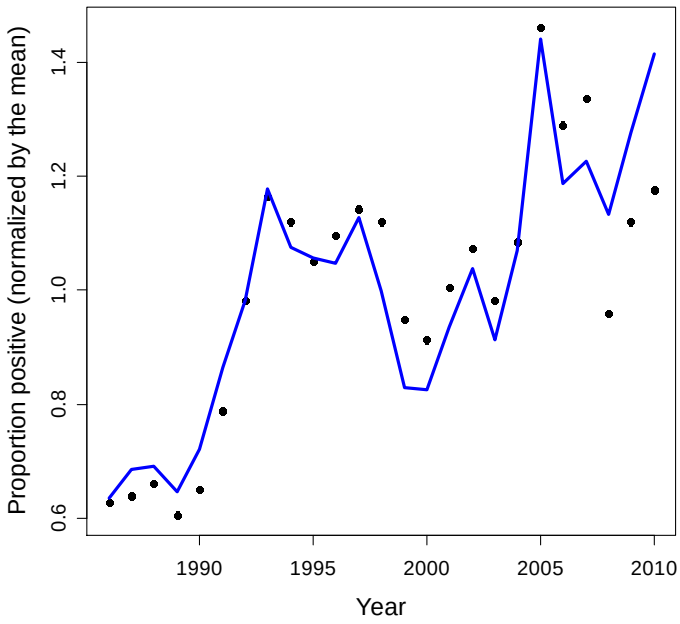


Figure 4. Observed proportion of trips catching cobia (black points) and the binomial model fit (blue line) to the data normalized by the mean for the Headboat Survey.

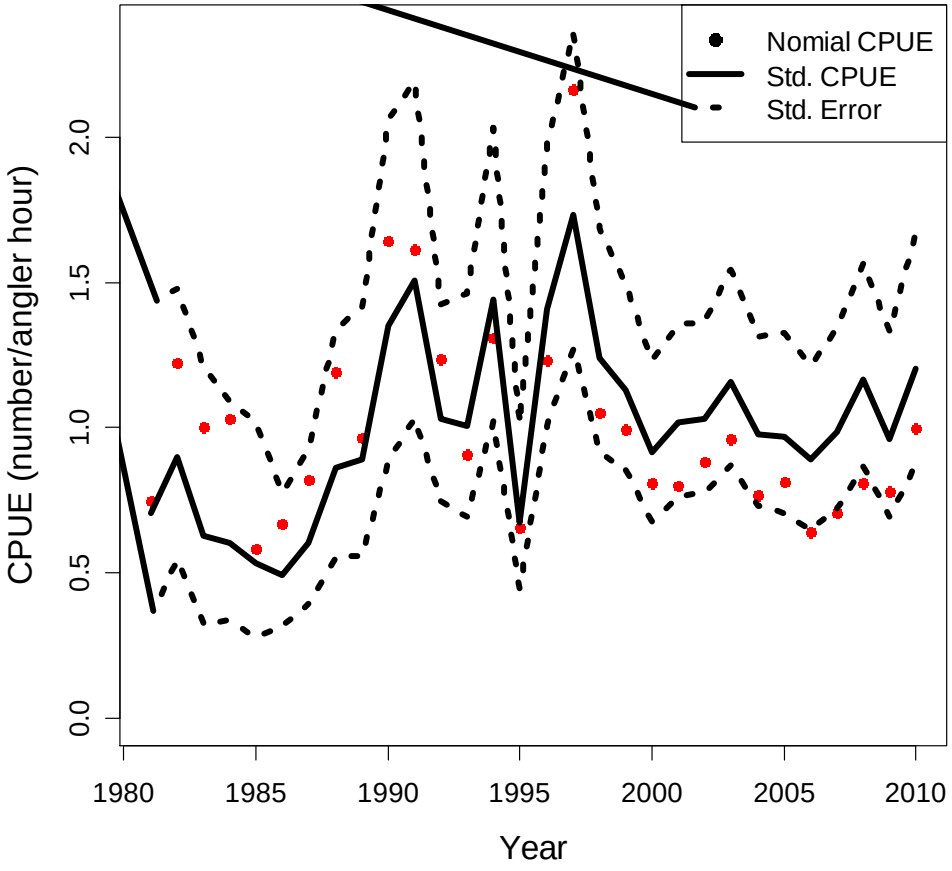


Figure 5. Nominal (observed) and standardized CPUE and the 95% confidence intervals for cobia from MRFSS in the GOM. CPUE values were normalized by the mean.

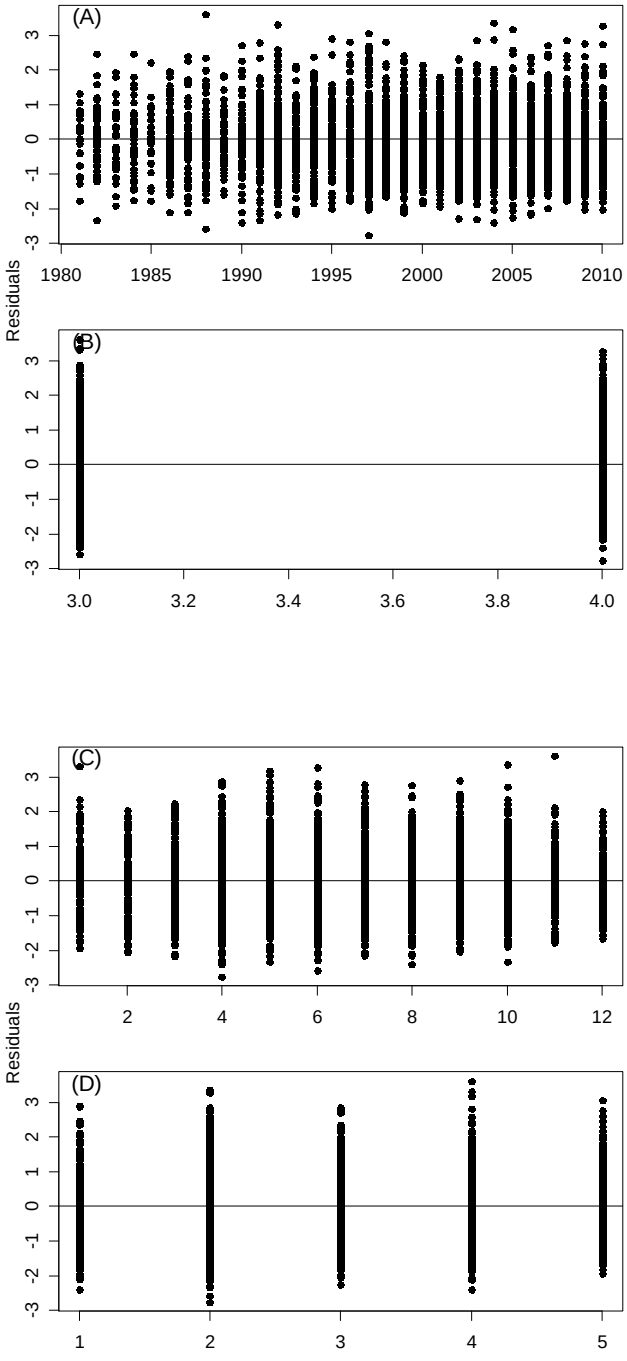


Figure 6. CPUE residuals by explanatory variable for cobia from MRFSS. Panel A are residuals by year, B are residuals by mode, Care residuals by month, and D are residuals by area.

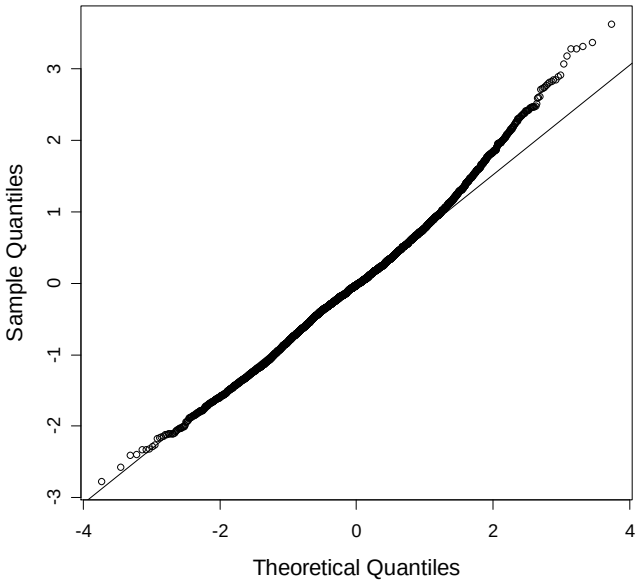


Figure 7. Q-Q plot of CPUE for cobia in the GOM MRFSS Survey.

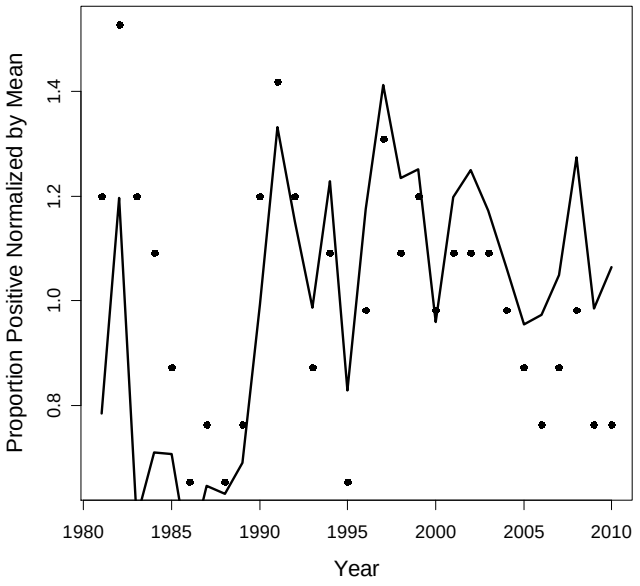


Figure 8. Observed proportion of trips catching cobia (black points) and the binomial model fit (blue line) to the data normalized by the mean for MRFSS.

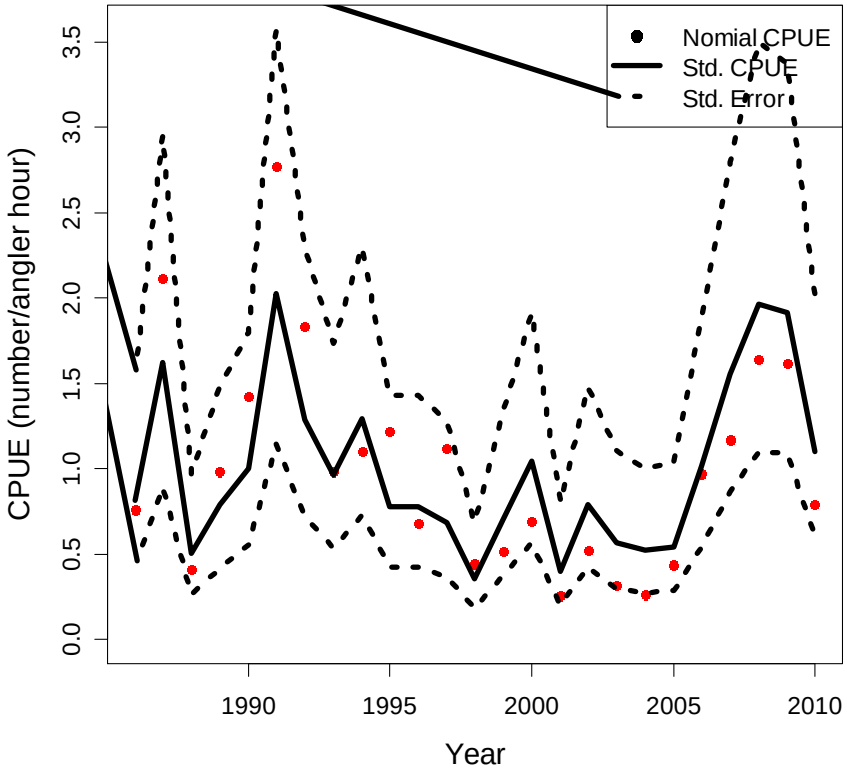


Figure 9. Nominal (observed) and standardized CPUE and the 95% confidence intervals for Spanish mackerel from the Headboat Survey in the GOM. CPUE values were normalized by the mean.

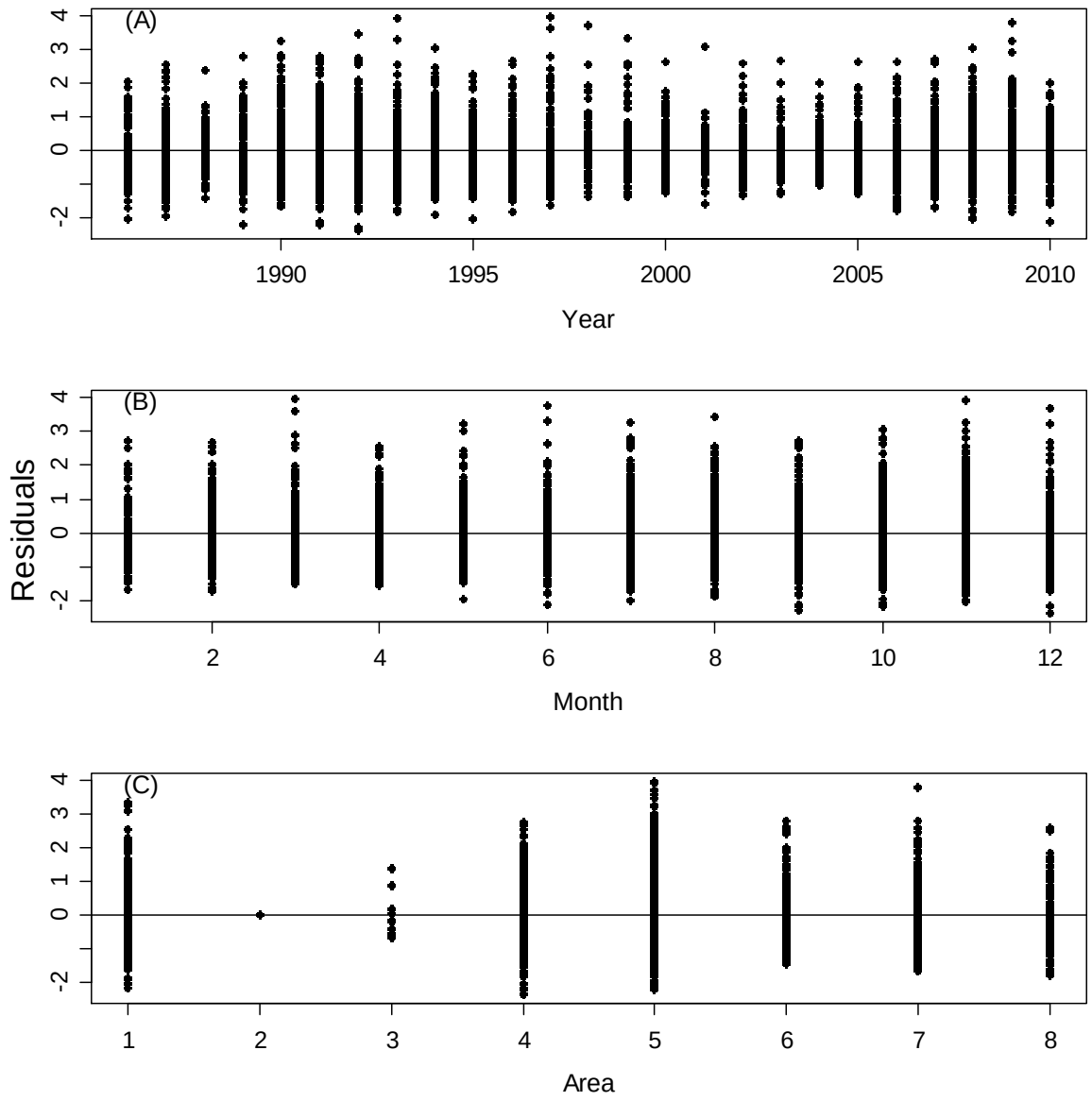


Figure 10. CPUE residuals by explanatory variable for Spanish mackerel from the headboat survey.

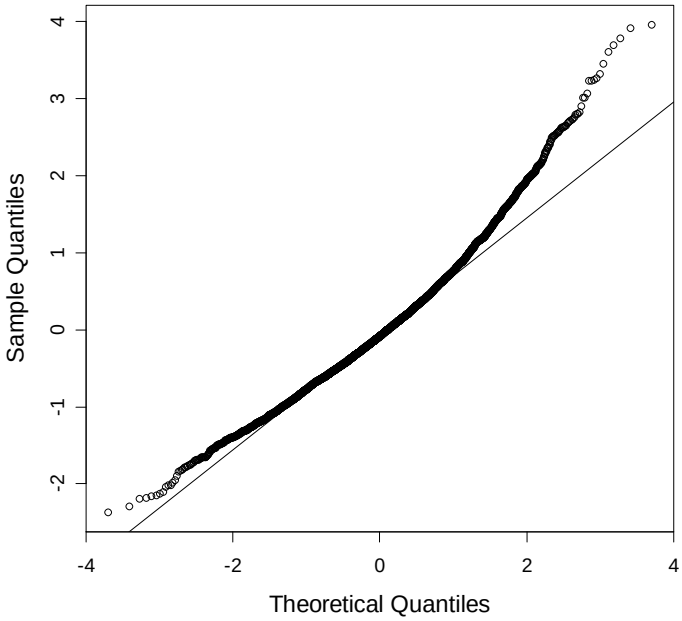


Figure 11. Q-Q plot of CPUE for Spanish mackerel in the GOM for the Headboat Survey.

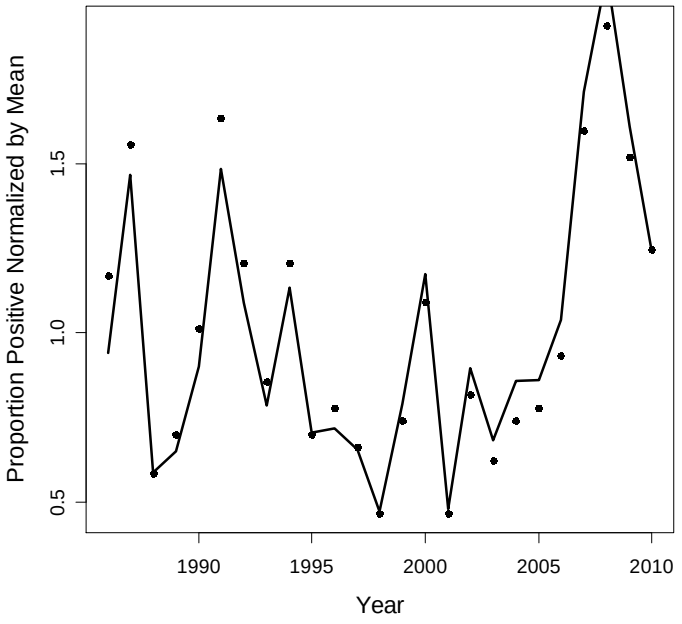


Figure 12. Observed proportion of trips catching Spanish mackerel (black points) and the binomial model fit (blue line) to the data normalized by the mean for the Headboat Survey.

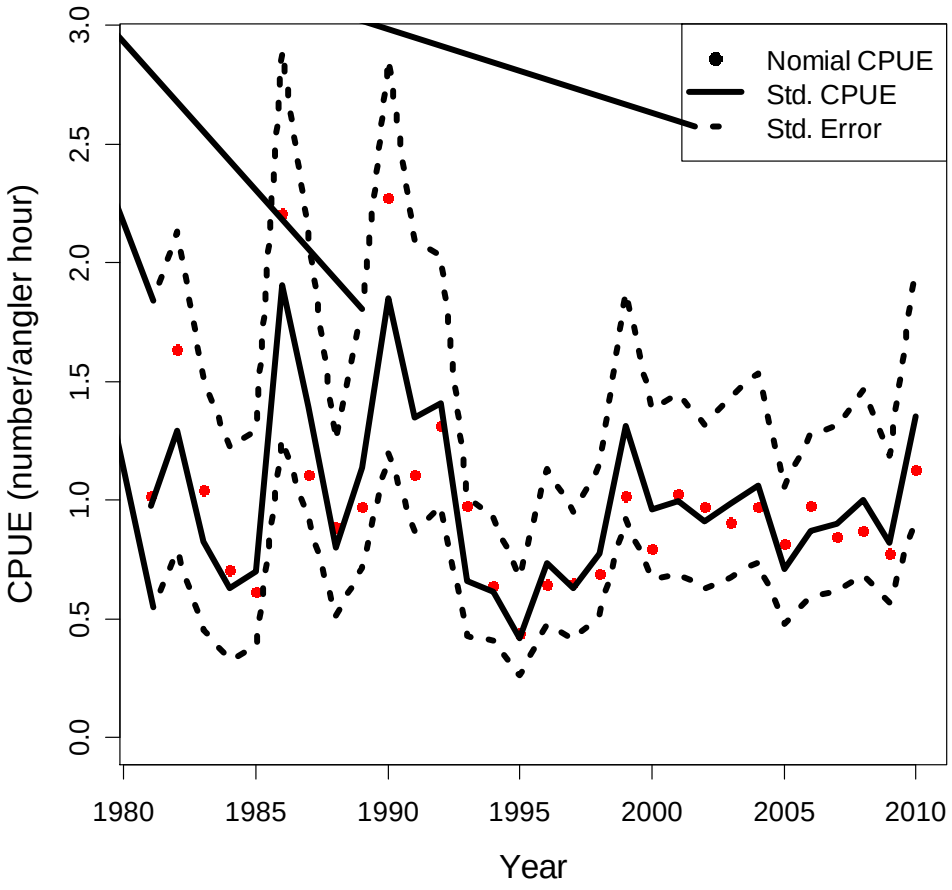


Figure 13. Nominal (observed) and standardized CPUE and the 95% confidence intervals for Spanish mackerel from MRFSS in the GOM. CPUE values were normalized by the mean.

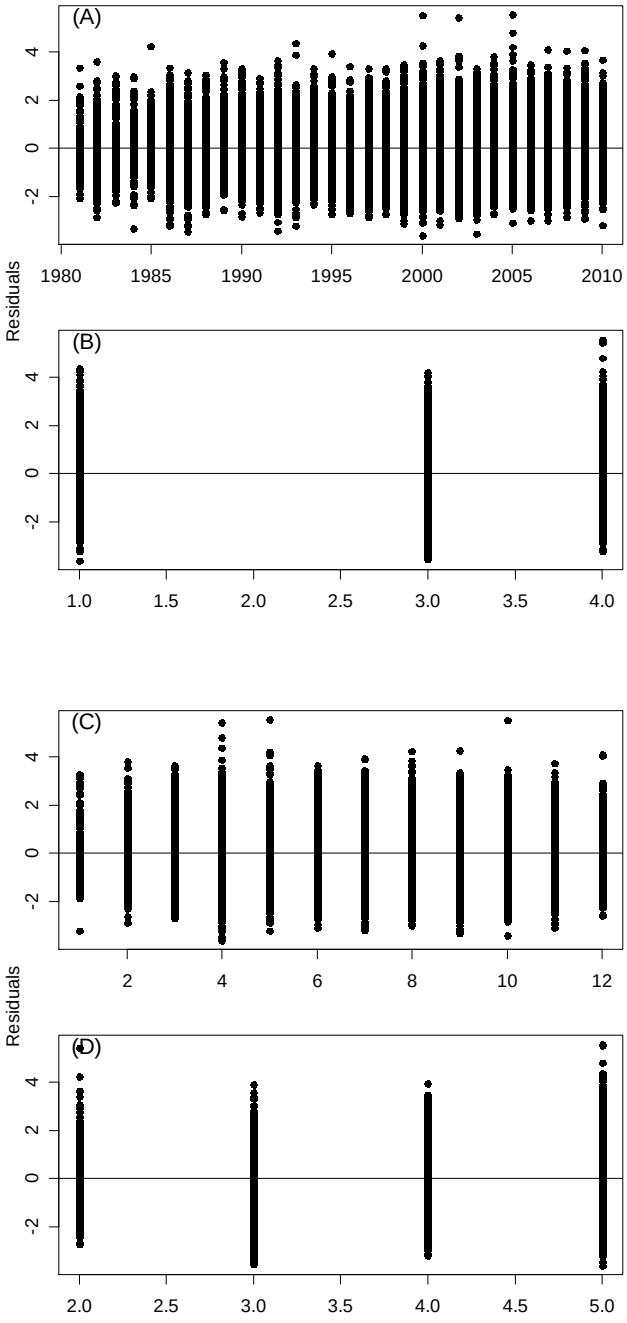


Figure 14. CPUE residuals by explanatory variable for Spanish mackerel from MRFSS.

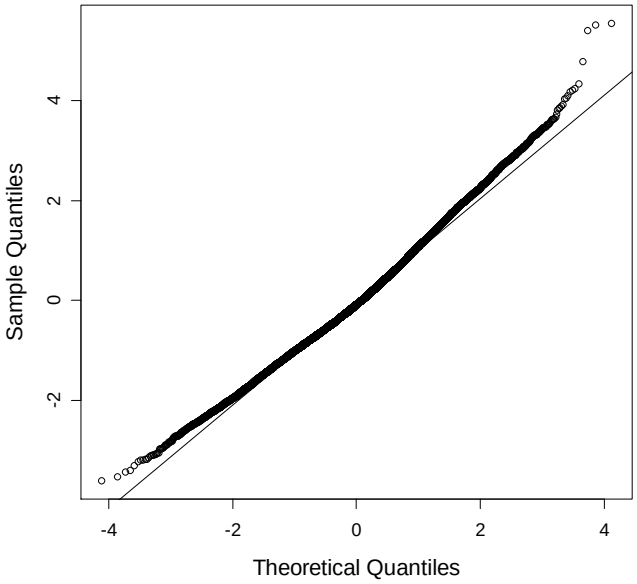


Figure 15. Q-Q plot of CPUE for Spanish mackerel in the GOM MRFSS Survey.

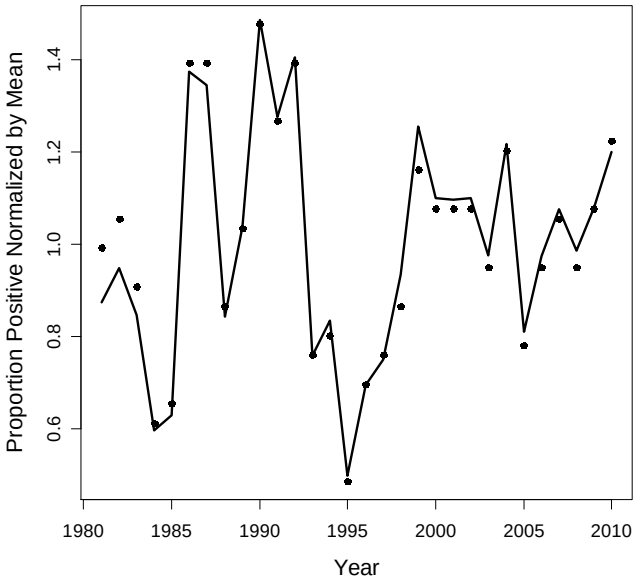


Figure 16. Observed proportion of trips catching Spanish mackerel (black points) and the binomial model fit (line) to the data normalized by the mean for MRFSS.