SCRS/1990/031

Col.Vol.Sci.Pap. ICCAT, 35 (2) : 397-404 (1991)

STANDARDIZED CATCH RATES FOR SWORDFISH (XIPHIAS GLADIUS) FROM THE U.S. LONGLINE FLEET THROUGH 1989

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SUMMARY

Swordfish catch, size and effort data collected from the U.S. longline fleet operating over a wide geographical range of the western North Atlantic Ocean were used to develop age-specific indices of abundance of North Atlantic swordfish. Standardized catch rates were estimated using the General Linear Modeling approach.

RESUME

Les données de prise, taille et effort de l'espadon recueillies sur la flottille palangrière américaine qui pêche sur de grandes étendues dans l'Atlantique nord-ouest ont servi à élaborer des indices de l'abondance spécifique de l'âge pour l'espadon nord-atlantique. Le taux standard de capture a été estimé au moyen du modèle linéaire généralisé.

RESUMEN

Con el fin de desarrollar índices de abundancia específicos de la edad, del pez espada del Atlántico norte, se emplearon datos de captura, talla y esfuerzo procedentes de la flota de palangre norteamericana que opera en una amplia zona geográfica del Atlántico noroeste. Se estimaron tasas estandarizadas de captura por medio del Modelo Lineal Generalizado.

Introduction

Information on the relative abundance of swordfish age classes is necessary to tune virtual population analyses (VPA). Data collected from the US longline fleet has been previously used to develop standardized catch per unit effort (CPUE) indices of abundance. This report documents the analytical methods applied to the available US longline fleet data through 1989 and presents age-specific, standardized CPUE indices for use in tuning swordfish VPAs. Swordfish catch, size and effort data collected from the US longline fleet operating over a wide geographical range of the western north Atlantic Ocean were used to develop age-specific indicies of abundance of north Atlantic swordfish. Standardized catch rates were estimated using the General Linear Modeling (GLM) approach.

Methods

Hoey and Bertolino (1988) described the available catch and effort data for swordfish from the US longline fishery. Hoey *et. al.* (1989) described the GLM method of analysis employed for indexing swordfish abundance from those data. The present analysis is an application of the GLM techniques to updated catch and effort data (through 1989) from the US longline fleet. Age-specific indices of abundance (ages 1, 2, 3, 4 and 5^+) are developed after ageing the swordfish catch using the ICCAT Gompertz growth model for pooled sexes in the fashion described by Nelson *et. al.* (1990).

A total of 2683 vessel trips, representing 123 different vessels from which at least two years catch and effort data were available for analysis (Table 1). As described in Hoey *et. al.* (1989) and Nelson *et. al.* (1990), the available catch and effort data were cross classified by year, calendar quarter, area of fishing, size of set, percentage of total catch comprised of swordfish, operation style, and age class. Nominal CPUE values were calculated as fish caught per thousand hooks set. Average nominal values by year and fishing area, are shown in Table 2.

Seven geographical areas of fishing were used for classification as defined in Hoey *et. al.* (1990). The areas used for classification were: Caribbean (CAR), Gulf of Mexico (GOM), Florida east coast (FEC), South Atlantic Bight (SAB), mid-Atlantic Bight (MAB), New England coastal (NEC) and northeast distant waters (NED). Four set size classifiers were used: 1, <100 hooks/set; 2, 100-299 hooks/set; 3, 300-499 hooks/set; and 4, ≥ 500 hooks/set. Set size was assumed to control for changes in gear deployment hypothesized to affect CPUE. Ten levels of the percentage of swordfish in the total catch were used (i.e. $<10\%$, 10-19%, 20-29%, ... , 80-89%, and $\geq 90\%$). The percentage swordfish classifier was assumed to control for effects on swordfish CPUE through the diversification of the US longline fleet into a mixed species fishery and associated targeting on different species.

Nominal CPUE data were normalized through the natural log transform. In GLM analysis, only non-zero nominal CPUE observations were used. Hoey *et. al.* (1989) demonstrated consistency in trend, but increased variability in estimates after incorporating the zero CPUE observations. They also found that variability in parameter estimates was affected by the magnitude of the constant added to observations necessary to incorporate the zero observations in analysis. Because the number of observations available for 1981 was small relative to other years (Table 1), analyses were conducted for the complete time series (1981-1989) and for the truncated time series (1982-1989). The models fit included main effects for year, calendar quarter, area, set size, operation style, and percentage swordfish, plus interaction terms for area*quarter and area*operation style. Standards were defined as the earliest year, and the highest classification level for all other main effects. Standardized residuals for each level of the year main effect were tested against a normal distribution null hypothesis using the Shapiro-Wilk statistic (Royston, 1982) and examined for trend.

Results and Discussion

Analysis of variance (ANOVA) results for the models fit to the CPUE data are shown in Table 3. In all cases, the resulting F-statistic was highly significant. The models fit explained between 49 and 62% of the variability in the observed data. In all cases, exclusion of the 1981 data from fitting resulted in only minor changes in F-values, mean square errors, and R^2 values.

Standardized residual distributions for the full time-series (Figure 1) show few deviations from normality across all of the age-specific analyses. However, statistically significant deviations from expectation under the normal distribution hypothesis were observed in the age 2 (years 1982, 1988, and 1989) and age 3 (years 1983, 1984, 1985, 1988) analyses, most likely resulting from some kurtosis. In these cases, the interquartile range was found to be relatively consistent (Figure 1), suggesting that although the residuals departed from normality, the distributions were reasonably symmetrical. In all cases, the residual mean was found not statistically different from 0 via a t-test at a 0.05 level.

No consistent patterns in overall residual distributions were observed. However, median values were observed to be more commonly below the mean, suggesting potential bias in the GLM parameter estimates. Bias in the parameter estimates might be expected since, in this analysis, a generalized matrix inversion is used to solve for the normal equations. However, consistent bias in the parameter estimates is not of greatest concern since the relative CPUE pattern is of primary interest in using these data in VPA calibrations. Trends in bias, however, could indicate some trend in catchability that is not controlled in the GLM analyses. To examine this question further, the weighted difference (weighted by number of observations for the year) between the within year mean and median residual by age was regressed against year to test for significant trend. Table 4 shows the resulting ANOVAs for the weighted regression models by age. None of the regressions resulted in a significant fit to the observations at the 95% confidence level. The hypothesis of no linear trend in the weighted differences could not be rejected at the 0.05 significance level via the t-test criterion. Only in the age 3 case did the results suggest marginal evidence of trend in the weighted difference. The pattern suggested is a greater underestimation of the median by the mean in the early years of the time series. This pattern suggests a greater potential for underestimating the relative abundance of age 3 fish in the early years than in the more recent years of the time series. However, for the purposes of this analysis, the null hypothesis of no trend in the weighted difference cannot be rejected on the basis of these data.

Indices of age-specific abundance, relative to the standard year, are presented in Table 5 along with their 95% confidence regions. Graphically, these data are presented in Figures 2 and 3. Exclusion of the 1981 data makes little difference in the relative patterns observed in the 1982-1989 data. Comparison of Figures 2 and 3 show that the patterns of abundance index trend by age class for 1982-1989 are parallel to 1981-1989 values. However, since the reference year changes from 1981 to 1982 in these figures, there is a scale difference, generally equal to the difference in scale between 1981 and 1982 in Figure 2. As observed in prior GLM analyses of these data, the relative CPUE values are sufficiently precise to allow discrimination of trend in the data for some ages. In general, indices for ages 1 and 2 have shown evidence of increase or stability in relative abundance since 1981 (or 1982) while indices for ages 3, 4, and 5^+ have shown evidence of varying degrees of decline. The estimated 1989 index values range from 182 - 344% (95% confidence range) of the age 1 1981 standard and range from 146 - 242% (95% confidence range) of the 1982 age 1 standard. The estimated relative abundance index for age 2 swordfish in 1989 ranges from 92 - 117% of the 1981 standard and from 121 - 176% of the 1982 standard. The estimate of the 1989 age 3 abundance index ranges from 34 - 55% of the 1981 standard and from 54 - 76% of the 1982 standard. The estimated 1989 index value for age 4 fish ranges from 32 - 54% of the 1981 standard and from 40 - 58% of the 1982 standard. Finally, the age 5^+ estimated index value for 1989 ranges from 17 - 28% of the 1981 standard and from 22 - 33% of the 1982 standard.

References

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Figure 1. Standardized residual distributions from the age-specific GLM analyses from the full time series (1981-1989). Depicted are the range (MAX, MIN), 25th and 75th percentiles (Q1, Q2), and the mean and median values. A single mark above a distribution implies a statistically significant departure from the normal expectation at the 0.05 alpha level. Two marks represent significance at the 0.01 alpha level.

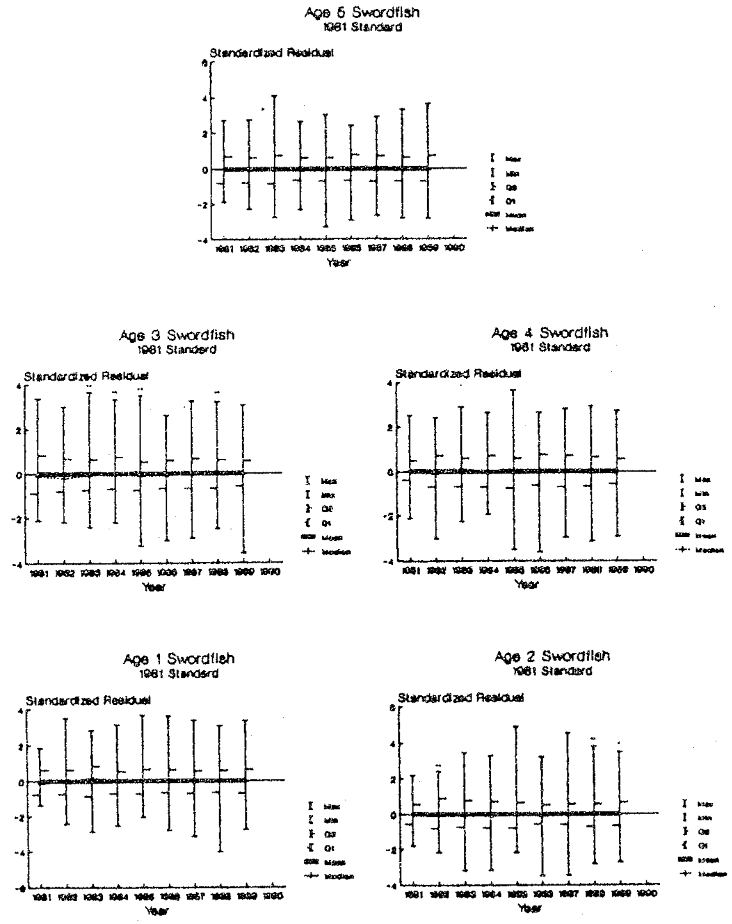

Figure 2. Annual standardized catch rates relative to the 1981 standard year. Error bars represent the 95% confidence region for the yearly parameter estimates in the arithmetic scale. No error term is estimated for the 1981 year.

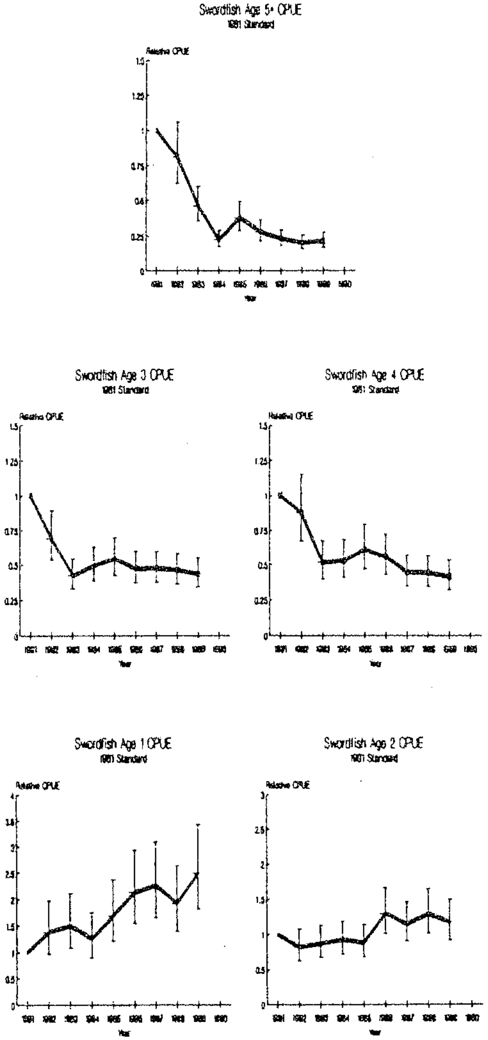

Figure 3. Annual standardized catch rates relative to the 1982 standard year. Error bars represent the 95% confidence region for the yearly parameter estimates in the arithmetic scale. No error term is estimated for the 1982 year.

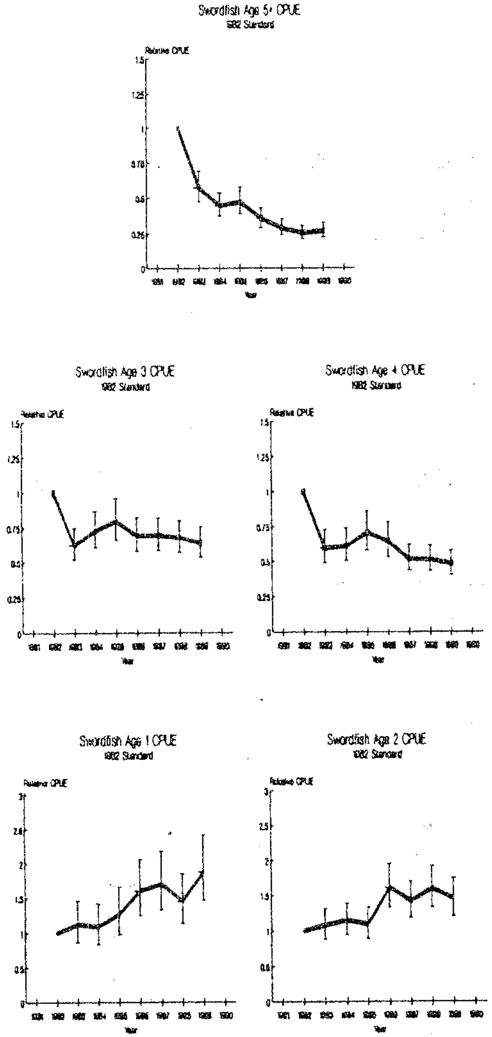

Table 1. Trip data with swordfish size, catch, and effort information available for analysis from the US longline fleet, 1981-1989.

	Year									
Area	1981	1982	1983	1984	1985	1986	1987	1988	1989	Total
CAR	0	0	0	0	9	39	88	148	63	347
GOM	0	1	7	5	34	33	75	68	78	301
FEC	26	27	26	76	62	100	278	349	208	1152
SAB	3	10	18	4	4	18	31	50	29	167
MAB	9	43	56	50	29	65	99	49	34	434
NEC	2	13	18	18	12	15	28	7	9	122
NED	3	6	9	13	19	18	27	35	30	160
Total	43	100	134	166	169	288	626	706	451	2683

Table 2. Nominal average swordfish CPUE (fish/1000 hooks) by area and age from the US Longline fishery.

Area	1981	1982	1983	1984	1985	1986	1987	1988	1989
Age 1:									
CAR	.	.	.	.	2.68	4.29	5.27	4.18	2.27
GOM	.	4.91	7.25	9.05	5.72	6.73	1.08	2.15	6.91
FEC	6.23	1.70	3.80	5.17	3.18	11.78	8.57	6.07	7.72
SAB	12.36	10.78	16.08	4.51	20.10	27.11	23.90	10.24	9.18
MAB	6.75	16.44	9.96	5.45	13.71	8.36	6.01	5.21	4.19
NEC	2.44	7.63	3.83	2.29	5.59	4.66	5.26	1.59	10.64
NED	0.06	0.17	0.51	1.44	2.71	3.82	6.95	5.51	6.59
Age 2:									
CAR	.	.	.	.	3.60	11.12	7.84	10.32	7.43
GOM	.	8.60	13.67	18.73	5.49	3.60	2.32	4.07	7.50
FEC	8.19	6.89	4.49	8.10	5.80	9.33	10.52	10.89	9.71
SAB	42.39	18.03	18.24	10.24	18.61	20.58	33.87	20.13	14.71
MAB	13.57	8.02	9.94	8.40	7.02	10.81	6.26	5.45	4.15
NEC	3.49	4.01	4.89	6.57	7.24	9.13	5.30	7.63	7.85
NED	0.59	2.08	2.34	8.38	14.72	12.51	10.56	22.58	15.62
Age 3:									
CAR	.	.	.	.	9.51	13.79	9.73	9.69	9.67
GOM	.	3.69	9.24	6.65	3.74	1.06	0.98	1.82	3.44
FEC	8.16	9.85	7.32	5.41	6.33	4.52	5.74	5.95	5.43
SAB	33.62	9.10	7.45	6.11	10.14	5.11	8.63	8.71	4.56
MAB	18.53	6.85	4.20	4.76	4.93	4.48	3.84	2.69	2.24
NEC	2.57	6.71	2.49	.6.67	7.80	5.03	4.34	4.83	3.59
NED	2.59	6.35	5.68	12.46	26.21	11.82	10.89	14.05	13.03
Age 4:									
CAR	.	.	.	.	8.47	12.79	6.29	4.80	6.12
GOM	.	1.23	5.45	3.25	1.70	0.61	0.31	1.07	1.50
FEC	4.48	7.49	3.52	2.67	2.99	1.93	2.13	2.39	2.09
SAB	5.73	5.18	2.33	2.97	3.06	1.18	2.29	2.83	1.18
MAB	7.97	4.62	2.41	2.49	2.65	1.82	1.80	1.36	1.29
NEC	1.76	5.42	2.39	4.83	4.57	3.40	2.13	2.98	2.02
NED	2.97	5.67	7.10	9.88	19.81	9.62	5.81	7.04	5.14
Age 5+:									
CAR	.	.	.	.	7.92	8.87	5.95	4.32	6.00
GOM	.	6.14	5.44	3.35	1.72	0.44	0.59	1.24	2.24
FEC	12.21	13.85	7.11	4.63	5.50	2.45	2.68	2.50	3.05
SAB	15.17	10.22	9.74	3.76	4.43	1.11	1.42	1.60	1.08
MAB	14.98	12.66	5.30	3.72	5.48	2.53	2.22	1.47	1.33
NEC	2.69	6.37	4.43	7.60	5.25	3.18	2.83	1.51	2.42
NED	4.56	6.21	9.32	11.26	16.60	9.48	7.44	6.22	4.19

Table 3. Analysis of Variance results for the general linear model fits to the US longline swordfish age-specific CPUE data. Fits to the data from 1981-1989 and from 1982-1989 were made.

Dependent Variable: Log(age1 CPUE)

a) 1981 Data Included

Source	DF	Sum of Squares	Mean Square	F Value	Pr ≥ F	R^2
Model	80	2196.8301646	27.4603771	41.60	<0.0001	0.619
Error	2047	1351.1871516	0.6600817			
Corrected Total	2127	3548.0173163				

b) 1981 Data Excluded

Source	DF	Sum of Squares	Mean Square	F Value	Pr ≥ F	R^2
Model	79	2141.9915296	27.1138168	40.97	<0.0001	0.616
Error	2018	1335.5791354	0.6618331			
Corrected Total	2097	3477.5706651				

Dependent Variable: Log(age2 CPUE)

a) 1981 Data Included

Source	DF	Sum of Squares	Mean Square	F Value	Pr ≥ F	R^2
Model	82	1357.5793409	16.5558456	36.01	<0.0001	0.546
Error	2459	1130.5459416	0.4597584			
Corrected Total	2541	2488.1252825				

b) 1981 Data Excluded

Source	DF	Sum of Squares	Mean Square	F Value	Pr ≥ F	R^2
Model	81	1326.7945540	16.3801797	35.66	<0.0001	0.544
Error	2423	1113.1257880	0.4593998			
Corrected Total	2504	2439.9203420				

Table 3. (Continued).

Dependent Variable: Log(age3 CPUE)

a) 1981 Data Included

Source	DF	Sum of Squares	Mean Square	F Value	Pr ≥ F	R^2
Model	82	1001.0764958	12.2082499	30.06	0.0001	0.513
Error	2336	948.8730720	0.4061957			
Corrected Total	2418	1949.9495677				

b) 1981 Data Excluded

Source	DF	Sum of Squares	Mean Square	F Value	Pr ≥ F	R^2
Model	81	975.62694678	12.04477712	29.90	0.0001	0.513
Error	2302	927.17227240	0.40276815			
Corrected Total	2383	1902.79921918				

Dependent Variable: Log(age4 CPUE)

a) 1981 Data Included

Source	DF	Sum of Squares	Mean Square	F Value	Pr ≥ F	R^2
Model	82	889.76091970	10.85074292	25.38	0.0001	0.507
Error	2024	865.30569019	0.42752257			
Corrected Total	2106	1755.06660989				

b) 1981 Data Excluded

Source	DF	Sum of Squares	Mean Square	F Value	Pr ≥ F	R^2
Model	80	873.57813057	10.91972663	25.41	0.0001	0.505
Error	1990	855.11202509	0.42970454			
Corrected Total	2070	1728.69015567				

Table 3. (Continued).

Dependent Variable: Log(age5 CPUE)

a) 1981 Data Included

Source	DF	Sum of Squares	Mean Square	F Value	Pr ≥ F	R^2
Model	82	987.94239479	12.04807799	25.26	0.0001	0.500
Error	2073	988.61411147	0.47690020			
Corrected Total	2155	1976.55650626				

b) 1981 Data Excluded

Source	DF	Sum of Squares	Mean Square	F Value	Pr ≥ F	R^2
Model	81	932.01554836	11.50636479	24.13	0.0001	0.490
Error	2034	970.02172230	0.47690350			
Corrected Total	2115	1902.03727066				

Table 4. Analysis of variance results for the regressions used to test for significant trend in the difference (DIF) between annual means and medians of the standardized residuals from the age-specific GLM models.

Dependent Variable: DIF (Age 1)

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.01166	0.01166	0.010	0.9240
Error	7	8.35430	1.19347		
C Total	8	8.36597			

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob ≥ |T|
INTERCEP	1	0.083758	1.05210471	0.080	0.9388
YR	1	-0.001198	0.01212027	-0.099	0.9240

Dependent Variable: DIF (Age 2)

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.05929	0.05929	0.078	0.7877
Error	7	5.29828	0.75690		
C Total	8	5.35757			

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob ≥ |T|
INTERCEP	1	0.149657	0.75961554	0.197	0.8494
YR	1	-0.002450	0.00875418	-0.280	0.7877

Dependent Variable: DIF (Age 3)

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	1.44120	1.44120	2.462	0.1606
Error	7	4.09824	0.58546		
C Total	8	5.53943			

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob ≥ |T|
INTERCEP	1	-1.123644	0.67498060	-1.665	0.1399
YR	1	0.012209	0.00778127	1.569	0.1606

Table 4. (Continued).

Dependent Variable: DIF (Age 4)

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.23791	0.23791	0.446	0.5255
Error	7	3.73081	0.53297		
C Total	8	3.96872			

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob ≥ |T|
INTERCEP	1	0.434158	0.67794223	0.640	0.5423
YR	1	-0.005224	0.00781835	-0.668	0.5255

Dependent Variable: DIF (Age 5+)

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.00190	0.00190	0.003	0.9605
Error	7	5.02545	0.71792		
C Total	8	5.02734			

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob ≥ |T|
INTERCEP	1	-0.033490	0.75250171	-0.045	0.9657
YR	1	-0.000446	0.00868616	-0.051	0.9605

Table 5. 1990 Parameter estimates for the Year main effect resulting from GLM analysis of 1990 swordfish nominal CPUEs from US Longliners, 1981-1989.

	1981 Data Included					1981 Data Excluded				
YrAge	Parm.	SE	CPUE_L	CPUE	CPUE_U	Parm.	SE	CPUE_L	CPUE	CPUE_U
19811	0.0000	.	.	1.0000	.	.	.	.	.	.
1982	0.3045	0.1831	0.9631	1.3789	1.9742	0.0000	.	.	1.0000	.
1983	0.3961	0.1730	1.0746	1.5084	2.1173	0.1046	0.1349	0.8601	1.1204	1.4595
1984	0.2135	0.1704	0.8995	1.2561	1.7542	0.0740	0.1351	0.8339	1.0867	1.4161
1985	0.5153	0.1717	1.2135	1.6990	2.3787	0.2298	0.1367	0.9716	1.2702	1.6604
1986	0.7463	0.1639	1.5504	2.1377	2.9476	0.4650	0.1281	1.2487	1.6051	2.0632
1987	0.8066	0.1604	1.6571	2.2693	3.1076	0.5270	0.1244	1.3376	1.7070	2.1783
1988	0.6428	0.1613	1.4045	1.9267	2.6431	0.3630	0.1258	1.1324	1.4491	1.8543
1989	0.9027	0.1627	1.8167	2.4991	3.4378	0.6241	0.1278	1.4649	1.8819	2.4176
19812	0.0000	.	.	1.0000	.	.	.	.	.	.
1982	-0.2098	0.1391	0.6233	0.8186	1.0752	0.0000	.	.	1.0000	.
1983	-0.1494	0.1319	0.6708	0.8688	1.1250	0.0689	0.1009	0.8836	1.0768	1.3123
1984	-0.0839	0.1288	0.7203	0.9272	1.1934	0.1340	0.0986	0.9471	1.1490	1.3939
1985	-0.1346	0.1316	0.6812	0.8817	1.1411	0.0827	0.1026	0.8930	1.0920	1.3352
1986	0.2544	0.1262	1.0151	1.3000	1.6648	0.4734	0.0966	1.3347	1.6130	1.9492
1987	0.1321	0.1226	0.9042	1.1498	1.4622	0.3487	0.0927	1.1868	1.4234	1.7070
1988	0.2480	0.1232	1.0142	1.2912	1.6439	0.4678	0.0933	1.3355	1.6034	1.9252
1989	0.1509	0.1248	0.9177	1.1720	1.4968	0.3712	0.0954	1.2078	1.4561	1.7555
19813	0.0000	.	.	1.0000	.	.	.	.	.	.
1982	-0.3753	0.1316	0.5355	0.6931	0.8970	0.0000	.	.	1.0000	.
1983	-0.8611	0.1271	0.3322	0.4261	0.5467	-0.4782	0.0928	0.5190	0.6226	0.7468
1984	-0.7078	0.1246	0.3890	0.4966	0.6339	-0.3245	0.0908	0.6075	0.7259	0.8673
1985	-0.6143	0.1270	0.4252	0.5454	0.6996	-0.2330	0.0943	0.6614	0.7957	0.9572
1986	-0.7526	0.1223	0.3735	0.4747	0.6033	-0.3705	0.0889	0.5823	0.6931	0.8251
1987	-0.7490	0.1189	0.3772	0.4762	0.6012	-0.3687	0.0850	0.5876	0.6941	0.8200
1988	-0.7769	0.1194	0.3665	0.4631	0.5852	-0.3953	0.0855	0.5716	0.6759	0.7993
1989	-0.8374	0.1209	0.3440	0.4360	0.5526	-0.4550	0.0875	0.5365	0.6369	0.7560

Table 5. Continued.

	1981 Data Included					1981 Data Excluded				
YrAge	Parm.	SE	CPUE_L	CPUE	CPUE_U	Parm.	SE	CPUE_L	CPUE	CPUE_U
19814	0.0000	.	.	1.0000	.	.	.	.	.	.
1982	-0.1379	0.1377	0.6715	0.8795	1.1520	0.0000	.	.	1.0000	.
1983	-0.6661	0.1348	0.3980	0.5184	0.6752	-0.5204	0.1020	0.4891	0.5974	0.7296
1984	-0.6437	0.1311	0.4098	0.5299	0.6851	-0.4953	0.0980	0.5053	0.6123	0.7420
1985	-0.4979	0.1342	0.4715	0.6133	0.7978	-0.3499	0.1020	0.5801	0.7084	0.8652
1986	-0.5894	0.1307	0.4330	0.5594	0.7228	-0.4410	0.0989	0.5326	0.6466	0.7849
1987	-0.8091	0.1262	0.3505	0.4488	0.5748	-0.6606	0.0932	0.4322	0.5188	0.6228
1988	-0.8214	0.1264	0.3461	0.4433	0.5680	-0.6723	0.0933	0.4271	0.5128	0.6157
1989	-0.8845	0.1285	0.3236	0.4163	0.5356	-0.7353	0.0962	0.3988	0.4816	0.5815
19815	0.0000	.	.	1.0000	.	.	.	.	.	.
1982	-0.2176	0.1371	0.6207	0.8120	1.0624	0.000	.	.	1.0000	.
1983	-0.7862	0.1341	0.3534	0.4597	0.5979	-0.559	0.0983	0.4737	0.5743	0.6964
1984	-1.5020	0.1315	0.1736	0.2246	0.2907	-0.821	0.0978	0.3650	0.4421	0.5355
1985	-0.9856	0.1352	0.2890	0.3766	0.4909	-0.759	0.1026	0.3850	0.4708	0.5756
1986	-1.2818	0.1311	0.2165	0.2799	0.3620	-1.051	0.0991	0.2892	0.3512	0.4265
1987	-1.4757	0.1263	0.1799	0.2305	0.2952	-1.246	0.0932	0.2407	0.2890	0.3469
1988	-1.6057	0.1266	0.1579	0.2024	0.2594	-1.377	0.0935	0.2110	0.2535	0.3045
1989	-1.5470	0.1289	0.1667	0.2147	0.2764	-1.317	0.0963	0.2229	0.2692	0.3251

Parm., GLM parameter estimate (log scale); SE, associated standard error of estimate; CPUE_L, CPUE_U lower and upper 95% confidence bounds for CPUE.