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UPDATED LANDED CATCH RATE INFORMATION FOR SHARKS FROM US FLEET LONGLINE TRIP WEIGHOUT DATA RECORDS

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SUMMARY

Preliminary landed catch rate indices for three shark species in the pelagic shark category are constructed form landings records files obtained from vessels active in the U.S. pelagic longline fleet.

RÉSUMÉ

Les indices provisoires des taux de captures débarquées de trois espèces de requins pélagiques ont été élaborés à partir des relevés de débarquement des bateaux actifs dans la flottille palangrière pélagique des Etats-Unis.

RESUMEN

Se establecen índices preliminares de tasas de captura desembarcada para tres especies de tiburones en la categoría de tiburones pelágicos a partir de ficheros de registros obtenidos de barcos activos en la flota de palangre pelágico de Estados Unidos.

Introduction

The purpose of this paper is to update landed CPUE for several species of sharks landed by the US pelagic longline fleet targetting swordfish and tunas in the Atlantic Ocean. Preliminary analyses of these data were presented in Scott (1994) for the period 1983-1992. This paper provides an update to the Scott (1994) analysis by including one additional year of data into the analysis (effort information is not yet available for 1993 catches). Trip-specific landings data, which documents the weight of individual fish landed by these vessels for the period 1983-1993 were collected and maintained at the SEFSC. This data base is used to construct standardized CPUE indices for swordfish and other large pelagic species targetted by the fleet (see Scott *et.al.* 1993). Although several species of sharks have been caught and landed by these vessels, only a few were considered of sufficient size and/or and value to be consistently recorded by individual weight on trip tickets from this period. These sharks include mako (*Isurus oxyrinchus* and *I. paucus*, combined), and thresher (*Alopias vulpinus*). Although porbeagle (*Lamna nasus*) appear on the weight receipts, they appear too infrequently to be considered for additional analysis.

Materials and Methods

The large pelagic carcass weight file with records of catch and effort (hooks fished) for the period 1983-1993 was use for analysis. These data were cross-classified by year, calendar quarter, and fishing area (Caribbean, Gulf of Mexico, Florida East Coast, South Atlantic Bight, Mid-Atlantic Bight, Northeast Coastal, and Northeast Distant (Grand Banks); see Scott *et.al.* 1993). In the general linear models used for standardizing CPUE, swordfish and tuna catch rates were included as covariates to control for targeting effects.

The approach described by Lo *et.al.* (1992) in which the log-transformed landed catch rates (without any constant added) and the proportion of observations (trips) for which there was a landed catch were modelled separately to produce an index as:

$$\hat{I}=\hat{C}*\hat{S}=[\Psi_C e^{\beta_C}]\,[\Psi_S e^{\beta_S-1}],$$

where $\hat{I}$ represents the estimated annual index value, C, the annual standardized positive catch rate, and S the annual standardized proportion of trips within an analytical stratum for which there was success in landing sharks of the species of concern. Following Lo *et.al.* (1992), a value of 1 was added to the observed S values to permit inclusion of 0 values in modelling the log-transformed observations. In the above equation, β_C and β_S, represent the log-scale, standardized GLM estimates of marginal mean (LSMEAN) CPUE and proportion of trips fished on which pelagic sharks were landed, and Ψ_C and Ψ_S, the log-transformation bias adjustments for β_C and β_S, respectively. Variance in $\hat{I}$ was estimated via the delta method (Seber 1982). The appropriate equations for estimating this variance and calculating the log-transformation bias adjustment terms are provided in Lo *et.al.* (1992) and are not repeated herein. Porch and Scott (1993) have demonstrated for simulated data that the Lo method can produce more precise and accurate indices, with respect the underlying population characteristics than some other approaches (such as the +1 transform), at least for a data set characterized by a high proportion of 0 CPUE.

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Model results for this approach are shown in the attached tables and figures. It must be noted that, over the time series, the proportion of sharks caught and kept for sale by these vessels is not controlled for in analysis. Thus at least some part of the patterning observed could relate to a varying fraction of sharks kept and landed for sale.

References

Lo, N.C., L.D. Jacobson, and J.L. Squire. 1992. Indices of relative abundance from fish spotter data based on delta-lognormal models. Can. J. Fish. Aquat. Sci. 49:2515-2526.

Porch, C.E. and G.P. Scott. 1993. A numerical evaluation of GLM methods for estimating indices of abundance from west Atlantic bluefin tuna catch per trip data when a high proportion of the trips are unsuccessful. ICCAT Working Document SCRS/93/75.

Seber, G.A.F. 1982. The estimation of animal abundance and related parameters. Oxford University Press, New York, NY, 654 pp.

Table 1. Annual sum of numbers per trip, weight per trip, and average CPUE (pounds/1000 hooks).

YR	N Obs	Variable	N	Sum	Mean	%CV
83	166	MAK	166	256.0000000	1.5421687	208.9444281
		WMAK	166	14978.00	90.2289157	228.2193042
		WM	166	8049.79	48.4927012	215.6809713
		THR	166	4.0000000	0.0240964	784.9317969
		WTHR	166	423.0000000	2.5481928	959.1421079
		WT	166	206.2452381	1.2424412	964.8093575
		POB	166	0	0	.
		WPOB	166	0	0	.
		WP	166	0	0	.
		WTS	166	0	0	.
		WWTS	166	0	0	.
		WW	166	0	0	.
84	178	MAK	178	349.0000000	1.9606742	253.1554480
		WMAK	178	22085.00	124.0730337	248.1731373
		WM	178	7855.12	44.1298871	265.2667144
		THR	178	18.0000000	0.1011236	721.3394576
		WTHR	178	2716.00	15.2584270	716.7940697
		WT	178	1193.19	6.7033340	658.9341965
		POB	178	2.0000000	0.0112360	1334.17
		WPOB	178	207.0000000	1.1629213	1334.17
		WP	178	9.2000000	0.0516854	1334.17
		WTS	178	0	0	.
		WWTS	178	0	0	.
		WW	178	0	0	.
85	186	MAK	186	501.0000000	2.6935484	265.3630588
		WMAK	186	25600.00	137.6344086	232.5170168
		WM	186	9625.76	51.7514062	183.6386730
		THR	186	3.0000000	0.0161290	783.1330010
		WTHR	186	377.0000000	2.0268817	787.4278882
		WT	186	211.5845588	1.1375514	793.4179149
		POB	186	1.0000000	0.0053763	1363.82
		WPOB	186	282.0000000	1.5161290	1363.82
		WP	186	10.8461538	0.0583127	1363.82
		WTS	186	1.0000000	0.0053763	1363.82
		WWTS	186	40.0000000	0.2150538	1363.82
		WW	186	33.3333333	0.1792115	1363.82
86	347	MAK	347	741.0000000	2.1354467	214.1023637
		WMAK	347	46804.00	134.8818444	201.8056636
		WM	347	20661.65	59.5436600	211.9624497
		THR	347	13.0000000	0.0374640	583.1236380
		WTHR	347	1802.00	5.1930836	627.1201766
		WT	347	845.3658829	2.4362129	685.8174843
		POB	347	3.0000000	0.0086455	1862.79
		WPOB	347	268.0000000	0.7723343	1862.79
		WP	347	99.2592593	0.2860497	1862.79
		WTS	347	5.0000000	0.0144092	1535.05
		WWTS	347	348.0000000	1.0028818	1690.10
		WW	347	60.6349206	0.1747404	1565.75

Table 1. (continued)

YR	N Obs	Variable	N	Sum	Mean	%CV
87	842	MAK	842	1448.00	1.7197150	251.1946111
		WMAK	842	95346.00	113.2375297	231.4010114
		WM	842	34868.68	41.4117287	229.4631783
		THR	842	102.0000000	0.1211401	733.2995384
		WTHR	842	11598.00	13.7743468	764.3696017
		WT	842	4588.15	5.4491120	678.2346197
		POB	842	6.0000000	0.0071259	1673.32
		WPOB	842	684.0000000	0.8123515	1481.23
		WP	842	544.7982040	0.6470287	2018.00
		WTS	842	0	0	.
		WWTS	842	0	0	.
		WW	842	0	0	.
88	1152	MAK	1152	2421.00	2.1015625	334.3178961
		WMAK	1152	154124.00	133.7881944	288.9520379
		WM	1152	41121.63	35.6958586	244.9499254
		THR	1152	223.0000000	0.1935764	670.2982229
		WTHR	1152	27966.00	24.2760417	702.4757393
		WT	1152	14577.71	12.6542629	704.1034159
		POB	1152	0	0	.
		WPOB	1152	0	0	.
		WP	1152	0	0	.
		WTS	1152	0	0	.
		WWTS	1152	0	0	.
		WW	1152	0	0	.
89	896	MAK	896	2975.00	3.3203125	398.2766335
		WMAK	896	157070.00	175.3013393	298.6839100
		WM	896	34156.97	38.1216137	223.2432500
		THR	896	58.0000000	0.0647321	1215.68
		WTHR	896	6538.00	7.2968750	1188.14
		WT	896	2598.83	2.9004828	860.9558763
		POB	896	6.0000000	0.0066964	2115.42
		WPOB	896	587.0000000	0.6551339	2130.02
		WP	896	137.1969697	0.1531216	2194.43
		WTS	896	0	0	.
		WWTS	896	0	0	.
		WW	896	0	0	.
90	923	MAK	923	1974.00	2.1386782	331.3452555
		WMAK	923	119505.00	129.4745395	297.2334115
		WM	923	31566.98	34.2004163	242.6770779
		THR	923	35.0000000	0.0379198	784.8866362
		WTHR	923	4944.00	5.3564464	908.7689019
		WT	923	2057.48	2.2291230	792.7895290
		POB	923	4.0000000	0.0043337	1858.76
		WPOB	923	512.0000000	0.5547129	1785.94
		WP	923	107.5730787	0.1165472	1946.82
		WTS	923	2.0000000	0.0021668	3038.09
		WWTS	923	220.0000000	0.2383532	3038.09
		WW	923	191.3043478	0.2072636	3038.09
91	1377	MAK	1377	2085.00	1.5141612	334.8484644
		WMAK	1377	155638.00	113.0268700	296.7596732
		WM	1377	62328.05	45.2636555	847.4384939
		THR	1377	37.0000000	0.0268700	897.3952403
		WTHR	1377	4106.00	2.9818446	828.3851525
		WT	1377	2640.36	1.9174713	1022.05
		POB	1377	38.0000000	0.0275962	3050.23
		WPOB	1377	2950.00	2.1423384	3073.82
		WP	1377	1400.36	1.0169649	2453.49
		WTS	1377	4.0000000	0.0029049	3710.80
		WWTS	1377	232.0000000	0.1684822	3710.80
		WW	1377	134.4927536	0.0976708	3710.80
92	2935	MAK	2935	2927.00	0.9972743	461.7270870
		WMAK	2935	207508.00	70.7011925	381.4278246
		WM	2935	61709.97	21.0255435	404.6046036
		THR	2935	104.0000000	0.0354344	843.8322633
		WTHR	2935	10394.00	3.5413969	820.0215488
		WT	2935	8522.57	2.9037721	1166.50
		POB	2935	22.0000000	0.0074957	1936.75
		WPOB	2935	1110.00	0.3781942	2179.51
		WP	2935	193.5320821	0.0659394	2212.43
		WTS	2935	28.0000000	0.0095400	1833.14
		WWTS	2935	1898.00	0.6466780	2046.04
		WW	2935	4371.69	1.4895031	2026.70
93	2109	MAK	2109	3273.00	1.5519203	384.0865680
		WMAK	2109	249643.00	118.3703177	357.2869010
		WM	2109	68532.49	32.4952537	320.1912687
		THR	2109	244.0000000	0.1156946	597.0365216
		WTHR	2109	30089.00	14.2669512	627.0591368
		WT	2109	15753.18	7.4695042	814.2433625
		POB	2109	484.0000000	0.2294927	2622.60
		WPOB	2109	44340.00	21.0241821	2479.01
		WP	2109	20872.92	9.8970679	3337.50
		WTS	2109	116.0000000	0.0550024	1062.27
		WWTS	2109	7568.00	3.5884305	1181.47
		WW	2109	16033.70	7.6025107	1547.50

Notes: Variables are MAK - number of mako sharks
WMAK - weight of mako sharks
WM - weight of mako/1000 hooks
THR - number of thresher sharks
WTHR - weight of thresher sharks
WT - weight of thresher sharks/1000 hooks
POB - number of porbeagle
WPOB - weight of porbeagle
WP - weight of porbeagle/1000 hooks
WTS - number of white tip sharks
WWTS - weight of white tip sharks
WW - weight of white tip sharks/1000 hooks

General Linear Models Procedure

Dependent Variable: POS

Source	DF	Sum of Squares	F Value	Pr > F
Model	18	8.38012742	27.80	0.0001
Error	216	3.61711917		
Corrected Total	234	11.99724659		

R-Square	C.V.	POS Mean
0.698504	41.63395	0.31081853

Source	DF	Type III SS	F Value	Pr > F
YR	9	0.89172608	5.92	0.0001
AREA	6	7.60863696	75.73	0.0001
QTR	3	0.08005345	1.59	0.1919

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		0.48602085500 B	13.28	0.0001	0.03658670
YR	83	-.0023753861 B	-0.06	0.9540	0.04110117
	84	-.0155819581 B	-0.41	0.6856	0.03843269
	85	0.1387098308 B	3.67	0.0003	0.03777647
	86	0.1271531387 B	3.50	0.0006	0.03636800
	87	0.1319117063 B	3.67	0.0003	0.03596816
	88	0.1568926362 B	4.41	0.0001	0.03557558
	89	0.1402455142 B	3.90	0.0001	0.03596816
	90	0.0955579324 B	2.69	0.0078	0.03557558
	91	0.1234099203 B	3.43	0.0007	0.03594247
	92	0.0000000000 B	.	.	.
AREA	1	-.3734805227 B	-10.51	0.0001	0.03554565
	2	-.4238333520 B	-12.59	0.0001	0.03366178
	3	-.4638710276 B	-14.06	0.0001	0.03299180
	4	-.3788440422 B	-11.29	0.0001	0.03356037
	5	-.0721507923 B	-2.19	0.0293	0.03288435
	6	-.0549499623 B	-1.61	0.1090	0.03414343
	7	0.0000000000 B	.	.	.
QTR	1	0.0230149332 B	0.89	0.3767	0.02597997
	2	-.0095177026 B	-0.42	0.6781	0.02290031
	3	-.0328810419 B	-1.45	0.1485	0.02267678
	4	0.0000000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

Dependent Variable: LWMAK

Source	DF	Sum of Squares	F Value	Pr > F
Model	20	400.90695018	21.46	0.0001
Error	2498	2333.47751638		
Corrected Total	2518	2734.38446655		

R-Square	C.V.	LWMAK Mean
0.146617	22.60910	4.27486488

Source	DF	Type III SS	F Value	Pr > F
YR	9	20.62356159	2.45	0.0088
AREA	6	211.28109227	37.70	0.0001
QTR	3	72.73935513	25.96	0.0001
SWOCR	1	61.82442310	66.18	0.0001
TUNCR	1	27.34525812	29.27	0.0001

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		4.174783405 B	53.83	0.0	0.07755163
YR	83	0.062701156 B	0.47	0.6390	0.13366174
	84	-0.189254570 B	-1.39	0.1649	0.13623331
	85	0.027270479 B	0.21	0.8321	0.12859866
	86	0.216807802 B	2.15	0.0320	0.10103362
	87	0.099028621 B	1.24	0.2154	0.07991863
	88	0.004094881 B	0.05	0.9576	0.07709420
	89	-0.009028858 B	-0.12	0.9081	0.07818141
	90	-0.140038444 B	-1.81	0.0705	0.07739304
	91	-0.107661861 B	-1.57	0.1168	0.06862656
	92	0.000000000 B	.	.	.
AREA	1	-0.906197473 B	-9.58	0.0001	0.09459879
	2	-0.732089895 B	-8.77	0.0001	0.08350529
	3	-0.211271649 B	-2.61	0.0091	0.08091526
	4	-0.145882350 B	-1.34	0.1793	0.10859726
	5	-0.014710628 B	-0.21	0.8338	0.07009807
	6	-0.339160476 B	-4.05	0.0001	0.08376520
	7	0.000000000 B	.	.	.
QTR	1	0.500562205 B	7.77	0.0001	0.06444104
	2	0.198646569 B	3.42	0.0006	0.05807568
	3	-0.042317512 B	-0.83	0.4083	0.05117195
	4	0.000000000 B	.	.	.
SWOCR		0.009291424	8.14	0.0001	0.00114211
TUNCR		0.006253170	5.41	0.0001	0.00115575

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique

CORRELATION ANALYSIS

2 'VAR' Variables: PPOS CPUE
Simple Statistics

Variable	N	Mean	Std Dev	Median	Minimum	Maximum
PPOS	10	0.3781	0.0912	0.4253	0.2381	0.4710
CPUE	10	70.4841	8.5039	70.2724	58.4232	87.3096

Kendall Tau b Correlation Coefficients / Prob > |R| under Ho: Rho=0 / N = 10

	PPOS	CPUE
PPOS	1.00000	0.20000
	0.0	0.4208

YR	CPUE	PPOS	BC_CPU	GC	BC_POS	GP	INDEX	SE_I	CV_I
83	75.1520	0.25469	117.860	1.58066	0.26388	1.00787	31.1013	7.04604	0.22655
84	58.4232	0.23810	91.713	1.58244	0.24744	1.00798	22.6932	4.42275	0.19489
85	72.4585	0.44461	114.025	1.58438	0.45558	1.00800	51.9476	7.69815	0.14819
86	87.3096	0.42794	138.247	1.58928	0.43893	1.00805	60.6809	7.47340	0.12316
87	77.4721	0.43473	123.104	1.59209	0.44582	1.00807	54.8816	5.80173	0.10571
88	70.4302	0.47100	111.995	1.59266	0.48241	1.00808	54.0276	5.25197	0.09721
89	69.5271	0.44674	110.511	1.59232	0.45792	1.00807	50.6046	5.21797	0.10311
90	60.9870	0.38349	96.946	1.59239	0.39422	1.00808	38.2179	4.14987	0.10858
91	62.9670	0.42258	100.178	1.59307	0.43358	1.00807	43.4352	4.38507	0.10096
92	70.1146	0.25739	111.582	1.59329	0.26717	1.00809	29.8118	3.83564	0.12866

Plot of UINDEX*YR. Legend: A = 1 obs, B = 2 obs, etc.
Plot of INDEX*YR. Legend: A = 1 obs, B = 2 obs, etc.
Plot of LINDEX*YR. Legend: A = 1 obs, B = 2 obs, etc.

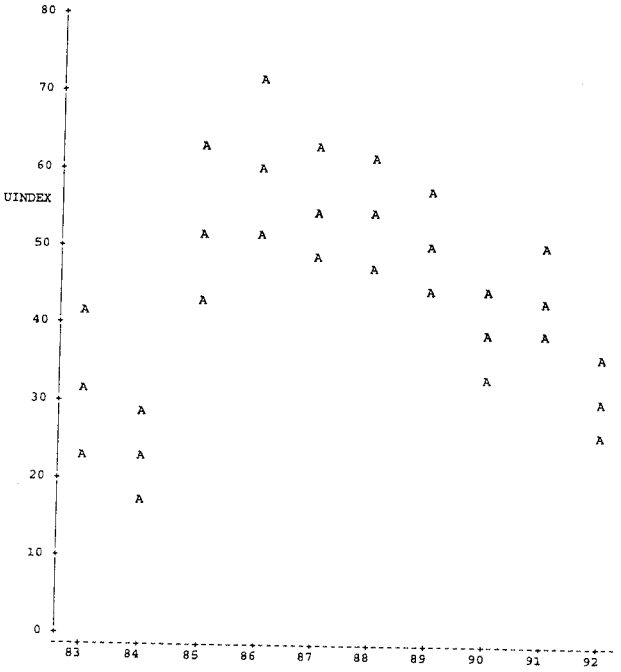

Figure 1. Mako shark, standardized landed CPUE with 80% CI range.

Shark Bowl I - Shark weight, longline 8
GLM on proportion positives, Thresher
8:12 Thursday, March 3, 1994

General Linear Models Procedure

Dependent Variable: POS

Source	DF	Sum of Squares	F Value	Pr > F
Model	18	0.26364626	3.63	0.0001
Error	216	0.87140852		
Corrected Total	234	1.13505479		

R-Square	C.V.	POS Mean
0.232276	201.6178	0.03150324

Source	DF	Type III SS	F Value	Pr > F
YR	9	0.07607748	2.10	0.0311
AREA	6	0.15584634	6.44	0.0001
QTR	3	0.03289614	2.72	0.0456

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		0.0031476250 B	0.18	0.8610	0.01795779
YR	83	0.0016088605 B	0.08	0.9365	0.02017361
	84	-.0051937112 B	-0.28	0.7833	0.01886385
	85	-.0094745659 B	-0.51	0.6099	0.01854176
	86	0.0292340969 B	1.64	0.1029	0.01785044
	87	0.0369569882 B	2.09	0.0375	0.01765418
	88	0.0445252599 B	2.55	0.0115	0.01746150
	89	0.0187792502 B	1.06	0.2886	0.01765418
	90	0.0031037296 B	0.18	0.8591	0.01746150
	91	0.0015312824 B	0.09	0.9309	0.01764158
	92	0.0000000000 B	.	.	.
AREA	1	-.0157524693 B	-0.90	0.3676	0.01744681
	2	0.0161817828 B	0.98	0.3285	0.01652215
	3	-.0086032182 B	-0.53	0.5958	0.01619429
	4	0.0007976376 B	0.05	0.9614	0.01647238
	5	0.0647153032 B	4.01	0.0001	0.01614057
	6	0.0062212240 B	0.37	0.7108	0.01675856
	7	0.0000000000 B	.	.	.
QTR	1	0.0258247793 B	2.03	0.0441	0.01275170
	2	0.0089748127 B	0.80	0.4255	0.01124012
	3	-.0098890695 B	-0.89	0.3753	0.01113040
	4	0.0000000000 B	.	.	.

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

Shark Bowl I - Shark weight, longline 13
GLM on positive catches, Thresher weight
8:12 Thursday, March 3, 1994

General Linear Models Procedure

Dependent Variable: LWTHR

Source	DF	Sum of Squares	F Value	Pr > F
Model	20	90.94011161	4.19	0.0001
Error	240	260.60174326		
Corrected Total	260	351.54185487		

R-Square	C.V.	LWTHR Mean
0.258689	24.19435	4.30694243

Source	DF	Type III SS	F Value	Pr > F
YR	9	12.03108046	1.23	0.2765
AREA	6	48.98448474	7.52	0.0001
QTR	3	9.56295309	2.94	0.0341
SWOCR	1	2.88633625	2.66	0.1043
TUNCR	1	11.51749774	10.61	0.0013

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		2.3355527544 B	5.19	0.0001	0.45034634
YR	83	-0.8327643088 B	-1.23	0.2203	0.67760567
	84	0.1082304483 B	0.22	0.8263	0.49270760
	85	0.1149030077 B	0.17	0.8626	0.66298112
	86	-0.2566008830 B	-0.69	0.4916	0.37253016
	87	-0.3952870830 B	-1.62	0.1071	0.24436809
	88	0.0992009290 B	0.42	0.6733	0.23498049
	89	-0.2372230590 B	-0.86	0.3910	0.27604983
	90	-0.2924487780 B	-1.04	0.2978	0.28025063
	91	-0.4533441750 B	-1.71	0.0888	0.26534692
	92	0.0000000000 B	.	.	.
AREA	1	0.8032541680 B	1.51	0.1336	0.53360312
	2	1.2290251190 B	2.78	0.0059	0.44262149
	3	2.1064221300 B	4.69	0.0001	0.44906803
	4	1.9548290070 B	4.13	0.0001	0.47336731
	5	1.7527545650 B	4.08	0.0001	0.42985163
	6	0.7061264810 B	1.08	0.2807	0.65311185
	7	0.0000000000 B	.	.	.
QTR	1	0.3587606790 B	1.82	0.0699	0.19705070
	2	0.4944887190 B	2.52	0.0125	0.19639215
	3	0.5517816910 B	2.57	0.0106	0.21430900
	4	0.0000000000 B	.	.	.
SWOCR		0.0089335310	1.63	0.1043	0.00547940
TUNCR		0.0101337180	3.26	0.0013	0.00311152

NOTE: The X'X matrix has been found to be singular and a generalized inverse was used to solve the normal equations. Estimates followed by the letter 'B' are biased, and are not unique estimators of the parameters.

CORRELATION ANALYSIS

2 'VAR' Variables: PPOS CPUE

Simple Statistics

Variable	N	Mean	Std Dev	Median	Minimum	Maximum
PPOS	10	0.0313	0.0196	0.0211	0.00912	0.0651
CPUE	10	57.9539	17.6089	52.3214	34.1952	88.0162

Kendall Tau b Correlation Coefficients / Prob > |R| under Ho: Rho=0 / N = 10

	PPOS	CPUE
PPOS	1.00000 0.0	-0.20000 0.4208

Shark Bowl I - Shark weight, longline 19
Compute Index Values using Lo Method
8:12 Thursday, March 3, 1994

YR	CPUE	PPOS	BC_CPU	GC	BC_POS
83	34.1952	0.020399	39.198	1.40396	0.022195
84	79.9097	0.013454	110.159	1.53970	0.015291
85	88.0162	0.009120	101.386	1.40765	0.010960
86	52.5151	0.048935	80.790	1.62636	0.050874
87	44.1644	0.057062	72.785	1.68321	0.059024
88	72.1477	0.065089	119.783	1.68940	0.067073
89	52.1276	0.038021	84.597	1.67033	0.039947
90	49.2998	0.021873	80.096	1.67124	0.023776
91	41.9170	0.020270	68.283	1.67346	0.022165
92	65.2461	0.018703	108.616	1.69167	0.020607

GP	INDEX	SE_I	CV_I
1.00189	0.87000	0.76949	0.88447
1.00192	1.68447	1.73216	1.02831
1.00192	1.11117	1.51454	1.36301
1.00193	4.11008	1.71779	0.41795
1.00194	4.29610	1.31290	0.30560
1.00194	8.03423	2.19535	0.27325
1.00194	3.37944	1.36600	0.40421
1.00194	1.90439	1.09811	0.57662
1.00194	1.51346	0.93423	0.61728
1.00194	2.23826	1.39950	0.62526

Shark Bowl I - Shark weight, longline 20
Thresher CPUE, 80% CI
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Plot of UINDEX*YR. Legend: A = 1 obs, B = 2 obs, etc.
Plot of INDEX*YR. Legend: A = 1 obs, B = 2 obs, etc.
Plot of LINDEX*YR. Legend: A = 1 obs, B = 2 obs, etc.

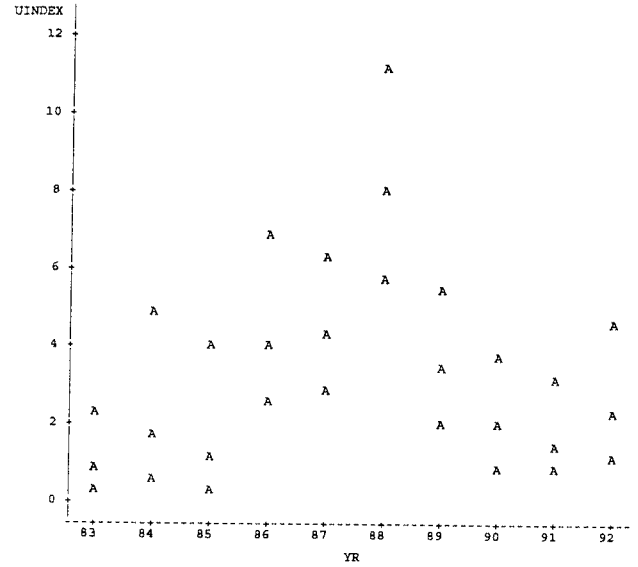

Figure 2. Thresher shark standardized, landed CPUE with 80% CI.