Documentation for the North Carolina Division of Marine Fisheries catch rate series (NC#)

Originally presented as part of the
Report of the Shark Evaluation Workshop Appendix
1994

North Carolina Division of Marine Fisheries Data

North Carolina, Division of Marine Fisheries, conducted a fishery dependent survey of directed shark longline trips from March 1988 through April 1992. The survey data have 53 observations (trips) and consist of total weight (kg), number of sharks, total fin weight (kg), days fished, number of sets, number of hooks, miles per set, soak time, location, depth, and discard information. Data were collected from 6 vessels. These data are presented at the end of this report.

A General Linear Model Procedure was performed upon the data testing for year, wave (2 month periods), miles per set, and hooks per mile of longline set. CPUE was computed either as kg or number of fish per 10,000 hook hours. One observation (trip) was omitted due to inconsistent gear and methods used in fishing. Results of these analyses are presented at the end of this Appendix. The indices resulting were believed to represent the large coastal shark complex fished by these vessels. For the index based on kg, the estimated mean catch rate in 1989 was greater than in other years. For the index based on number of fish, the 1989 value was again higher than subsequent years; in addition, the 1988 value was higher than 1990-1992. In this analysis, there appeared some tendency for an increase in the number of fish caught per unit effort over the last years of the time period (1990-92), although the catch rate values were not statistically different from one another. A result similar to this (constant biomass/effort and increasing numbers/effort) could be consistent with a tendency to land more small sharks in 1992 compared to 1990.

- From [redacted]
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Shark Bowl 1, the NC data
Nominal average CPUE (numbers/1000 hooks)

YEAR	AVE_CPU	OBS_CPU	SE_CPU
88	772.62	2	144.048
89	841.55	3	199.587
90	602.57	11	83.188
91	1089.27	16	302.330
92	824.19	8	241.358

Shark Bowl 1, the NC data
GLM on catches +1, NC Shark Numbers

Dependent Variable: LCPUE
Frequency: SETS

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	15.35266029	1.39569639	6.10	0.0001
Error	126	28.84754643	0.22894878		
Corrected Total	137	44.20020671			

R-Square	C.V.	Root MSE	LCPUE Mean
0.347344	7.629597	0.478486	6.27144466

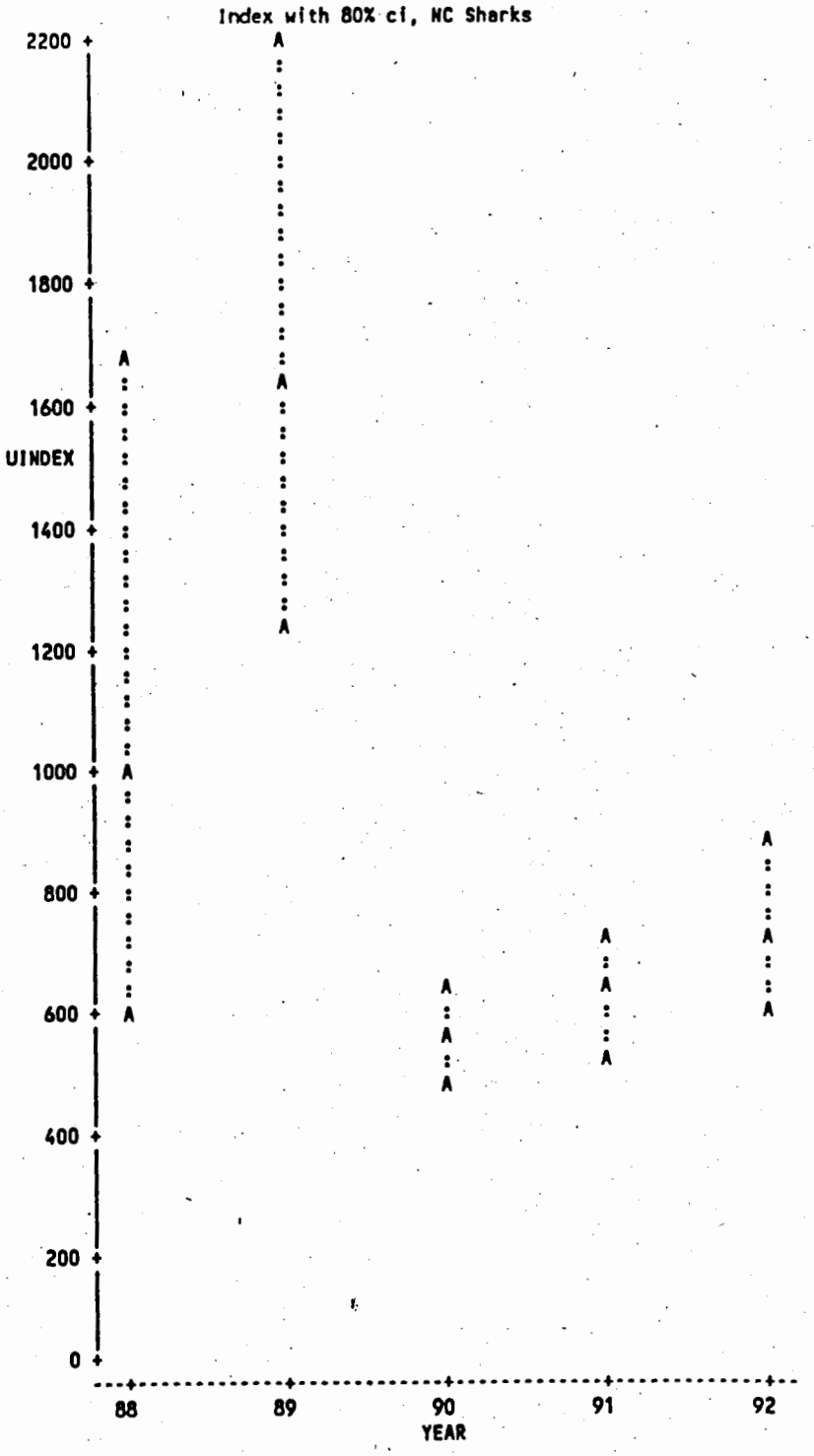
Source	DF	Type III SS	Mean Square	F Value	Pr > F
YEAR	4	7.23596124	1.80899031	7.90	0.0001
WAVE	5	7.48514500	1.49702900	6.54	0.0001
MPS	1	0.02876154	0.02876154	0.13	0.7236
MPM	1	1.48976492	1.48976492	6.51	0.0119

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		7.185225571 B	16.23	0.0001	0.44260657
YEAR	88	0.407325764 B	0.79	0.4337	0.51867418
	89	0.830944647 B	3.53	0.0006	0.23524854
	90	-0.278578770 B	-1.61	0.1091	0.17263459
	91	-0.149914622 B	-1.11	0.2709	0.13557104
	92	0.000000000 B	.	.	.
WAVE	1	-0.141071127 B	-0.99	0.3260	0.14305564
	2	-0.430776093 B	-3.43	0.0008	0.12556543
	3	-0.357570940 B	-2.00	0.0472	0.17841066
	4	-0.883071500 B	-4.53	0.0001	0.19492085
	5	1.072646845 B	1.46	0.1458	0.73296622
	6	0.000000000 B	.	.	.
MPS		-0.010881055	-0.35	0.7236	0.03069970
MPM		-0.003797520	-2.55	0.0119	0.00148871

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.

Index and variance calculations - NC Sharks

OBS	LCPUE	UC_CPU	INDEX	VAR_CP	CV
1	6.89110	982.48	999.10	177750.80	0.42199
2	7.31472	1501.25	1637.36	144540.73	0.23219
3	6.20520	494.32	549.10	5713.98	0.13766
4	6.33386	562.33	625.52	6324.66	0.12714
5	6.48377	653.44	721.60	15781.62	0.17409



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Shark Bowl 1, the NC data
Nominal average CPUE (kg/1000 hooks)

YEAR	AVE_CPU	OBS_CPU	SE_CPU
88	908.47	2	250.387
89	1031.40	3	312.238
90	864.06	13	131.134
91	1715.67	16	446.894
92	1037.14	17	210.444

Shark Bowl 1, the NC data
GLM on catches +1, NC Shark Weight

Dependent Variable: LCPUE
Frequency: SETS

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	16.45349491	1.49577226	4.40	0.0001
Error	167	56.80765485	0.34016560		
Corrected Total	178	73.26114976			

R-Square	C.V.	Root MSE	LCPUE Mean
0.224587	8.857615	0.583237	6.58458512

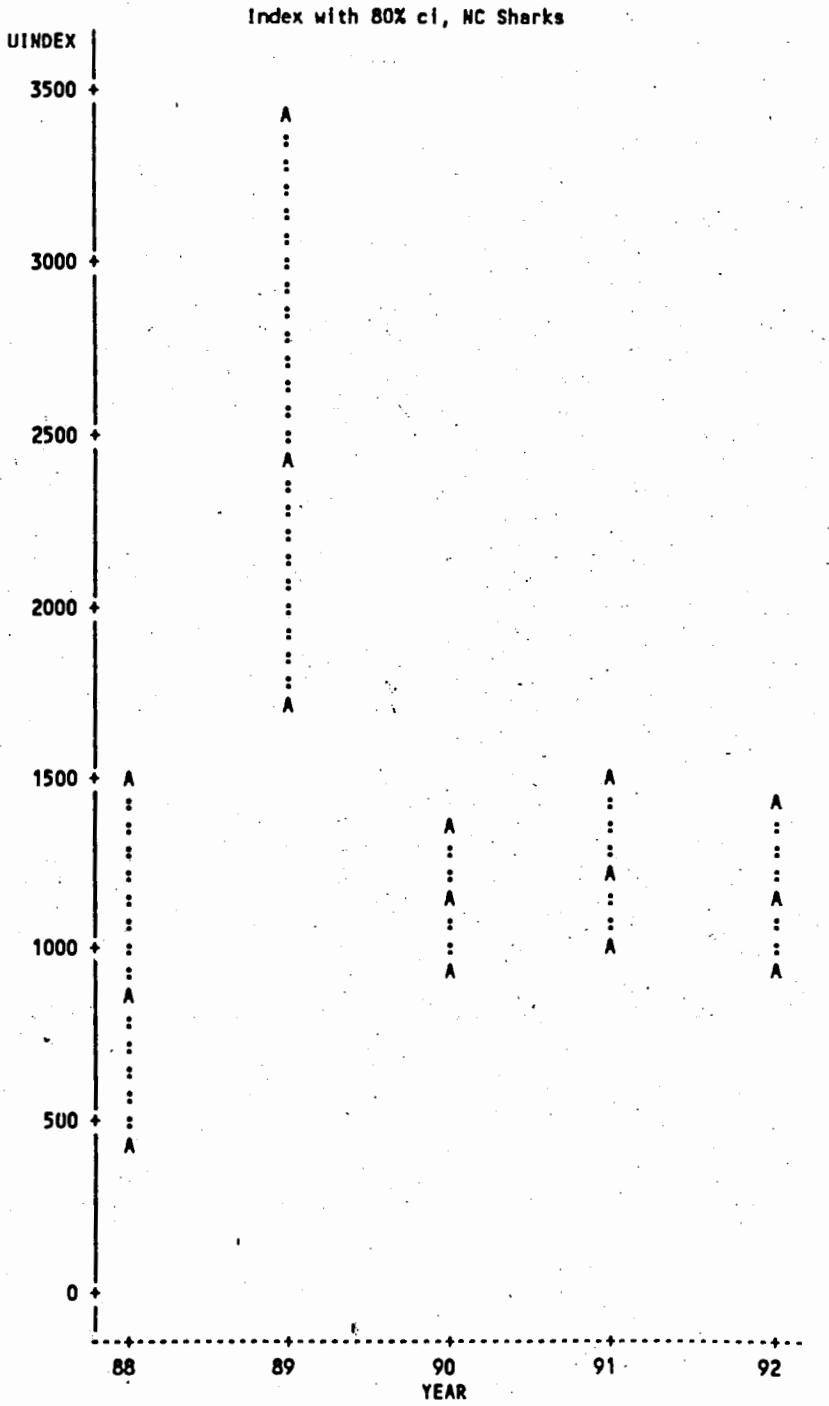
Source	DF	Type III SS	Mean Square	F Value	Pr > F
YEAR	4	3.75992970	0.93998242	2.76	0.0293
WAVE	5	8.26622560	1.65324512	4.86	0.0004
MPS	1	0.31131957	0.31131957	0.92	0.3401
MPM	1	1.40752791	1.40752791	4.14	0.0435

Parameter		Estimate	T for H0: Parameter=0	Pr > |T|	Std Error of Estimate
INTERCEPT		7.139058997 B	19.66	0.0001	0.36308517
YEAR	88	-0.196340635 B	-0.32	0.7522	0.62083489
	89	0.751110793 B	2.99	0.0033	0.25154269
	90	-0.036947522 B	-0.27	0.7851	0.13526706
	91	0.035172364 B	0.28	0.7802	0.12582491
	92	0.000000000 B	.	.	.
WAVE	1	-0.617005875 B	-3.78	0.0002	0.16326822
	2	-0.445104449 B	-3.03	0.0028	0.14694078
	3	-0.322963911 B	-1.65	0.1006	0.19560930
	4	-0.645043269 B	-2.77	0.0062	0.23270982
	5	2.071635704 B	2.36	0.0195	0.87827775
	6	0.000000000 B	.	.	.
MPS		0.026411026	0.96	0.3401	0.02760751
MPM		-0.003385733	-2.03	0.0435	0.00166444

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.

Index and variance calculations - NC Sharks

OBS	LCPUE	UC_CPU	INDEX	VAR_CP	CV
1	6.70796	817.90	837.85	178468.94	0.50421
2	7.65541	2111.04	2398.68	467104.19	0.28493
3	6.86735	959.40	1121.99	33940.91	0.16420
4	6.93947	1031.23	1207.04	36766.64	0.15886
5	6.90430	995.55	1163.71	37731.15	0.16692



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