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CATCH RATES OF PELAGIC SHARKS FROM THE NORTHWESTERN ATLANTIC, GULF OF MEXICO, AND CARIBBEAN

by

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SUMMARY

Catch rate information for pelagic sharks from the northwestern Atlantic, Gulf of Mexico, and Caribbean is summarized. Available CPUE time series include commercial data from mandatory logbooks, weighout records from longline vessels, and observer reports from Japanese vessels that operated within the U.S. EEZ. Recreational data from the Large Pelagic Survey (LPS) were also available for the eastern U.S. coast from Virginia to Massachusetts. GLM-standardized time series were available for pelagic sharks combined, and mako, blue, thresher, and oceanic whitetip sharks. In general, there appears to be a rapid decline in catch rates from the mid to the late 80's, followed by stabilization and even some increase in the 90's. Analysis of catch rate trends revealed that seven of the eleven series had negative slopes.

RÉSUMÉ

Le présent document récapitule l'information sur le taux de capture des requins pélagiques de l'Atlantique nord-ouest, du golfe du Mexique et de la mer des Caraïbes. Les séries temporelles de CPUE qui sont disponibles comprennent des extraits de carnets de pêche obligatoires, des registres de déchargement des palangriers et des rapports dobservateurs en ce qui concerne les bateaux japonais qui ont pêché dans la ZEE américaine. Des données sur la pêche sportive, obtenues dans le cadre de la Large Pelagic Survey (LPS) étaient également disponibles pour la côte est des Etats-Unis, de la Virginie au Massachusetts. Des séries temporelles standardisées par GLM étaient disponibles pour les requins pélagiques combinés, ainsi que pour les requins-taupes, le requin peau bleue, les requins-renards et le requin océanique. En général, il semble s'être produit une baisse rapide du taux de capture du milieu à la fin des années 80, suivie d'une stabilisation, et même de quelque augmentation pendant les années 90. L'analyse des tendances du taux de capture a révélé que 7 des 11 séries montraient une pente négative.

RESUMEN

Se resume la información sobre tasas de captura de tiburones pelágicos del Atlántico noroeste, Golfo de México y Caribe. Las series temporales de CPUE disponibles incluyen datos comerciales de los cuadernos de pesca obligatorios, registros de peso de los palangreros e informes de observadores de barcos japoneses que faenaron dentro de la ZEE de Estados Unidos. También se disponía de datos de pesca deportiva de Large Pelagic Survey (LPS) de la costa oriental de Estados Unidos, desde Virginia a Massachusetts. Las series temporales estandarizadas con GLM estaban disponibles para los tiburones pelágicos combinados, y marrajo, tintorera, pez zorro y tiburones oceánicos. En general parece haberse producido un rápido declive en las tasas de captura desde mediados hasta finales de los años 80, seguido de una estabilización e incluso de cierto incremento en los 90. El análisis de las tendencias en las tasas de captura reveló que siete de las once series presentaban un coeficiente angular negativo.

Introduction

Sharks included in the U.S. pelagic shark management unit are generally trans-oceanic species that are harvested or caught as bycatch in the North Atlantic Ocean by fishers from several nations. Assessment of these pelagic shark resources thus will likely require a multinational approach. In this document catch rate information from commercial and recreational sources for pelagic sharks from the U.S. east and Gulf of Mexico coasts and Caribbean is summarized. Time series were available for pelagic sharks as a group and for the blue shark (Prionace glauca), makos (Isurus spp.), threshers (Alopias spp.), and the oceanic whitetip shark (Carcharhinus longimanus).

Materials and Methods

Catch rate indices reported herein were previously standardized by various authors for effects thought to influence catch rates but not related to abundance through GLM procedures (Brown 1998, Cramer 1998; NMFS 1998). Time series from commercial sources include the Large Pelagic Logbook (LPL), which is based on mandatory reports from longline and bottom longline vessels, and is available for the period 1986-1997; trip weighout records from longline vessels, available for 1985-1993; and observer reports from Japanese vessels that operated within the U.S. EEZ between 1978 and 1988. Recreational data are from the Large Pelagic Survey (LPS), which collects catch rate information on rod and reel and handline fisheries off the coast of the eastern U.S. from Virginia trough Massachusetts, and were available for 1986-1997.

Catch rate indices were all expressed as relative catch rates by dividing each yearly GLM-standardized catch rate value by the mean value across years. This allows comparison of various series on a common scale. The eleven available series also were examined for evidence of trends by fitting linear regressions to the relative CPUE series. Each annual CPUE value was weighted by the inverse of the precision of the value, in this case the coefficient of variation.

Results and Discussion

The CPUE series for pelagic shark species combined (Fig. 1) shows no clear trend. The LPL series for blue sharks shows a decline from the mid 80's to 1988, followed by an increase in 1989 and a fairly flat trend from 1990 on, whereas the LPS series is stable in the late 80's and increases in the 90's, showing a clear peak in 1996. The Japanese observer series shows declining trends for blue

sharks from the late 70's to early 80's and from the mid to the late 80's, after which no more data were available. Two of the four series available for mako sharks show a declining trend and two no clear trend in catch rates. The LPL series shows a generally decreasing trend and seems to have stabilized after a rapid decrease from 1986 to 1988. The Japanese observer series also shows a rapid decrease in the late 70's to early 80's after which it appears to stabilize. The series obtained from the weighout records and the LPS series show no clear trends. Thresher shark catch rates from the two series available are highly variable, fluctuating with no appreciable trend. An additional time series (not shown here) from the LPL for the oceanic whitetip shark shows an increasing trend from 1992 to 1997.

Analysis of catch rate trends in the eleven series examined (Table 1) reveals that seven have negative slopes, of which four are significant (2 significant at the 5% probability level and 2 at the 1% level), and four have positives slopes, of which two are significant (1 at the 10% level and 1 at the 1% level). Two out of the three series for blue sharks exhibited significant negative slopes and one had a significantly positive slope. For mako sharks, three of the four series exhibited negative slopes, two of which were significant, whereas the fourth series had a positive, but non-significant slope. One of the two series for thresher sharks was negative and the other was positive; the only series available for the oceanic whitetip had a slightly significant positive slope. The largest annual rates of decrease and increase from these indices corresponded to mako sharks (16% decrease in the Japanese observer index) and to the blue shark (19% increase in the LPS index), respectively.

Literature Cited

Brown, C. A. 1998. Standardized catch rates of four shark species in the Virginia-Massachusetts (U.S.) rod and reel fishery. 1986-1997. Document SB-IV-5 presented at the Shark Evaluation Workshop, Panama City, Florida, 22-26 June 1998.

Cramer, J. 1998. Large pelagic logbook catch rates for sharks. Document SB-IV-11 presented at the Shark Evaluation Workshop, Panama City, Florida, 22-26 June 1998.

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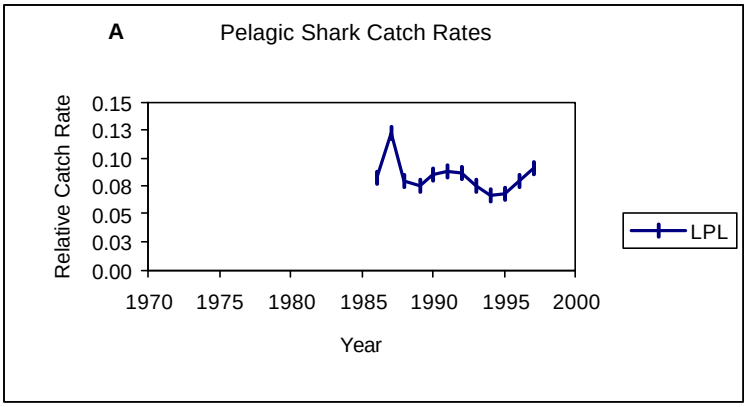
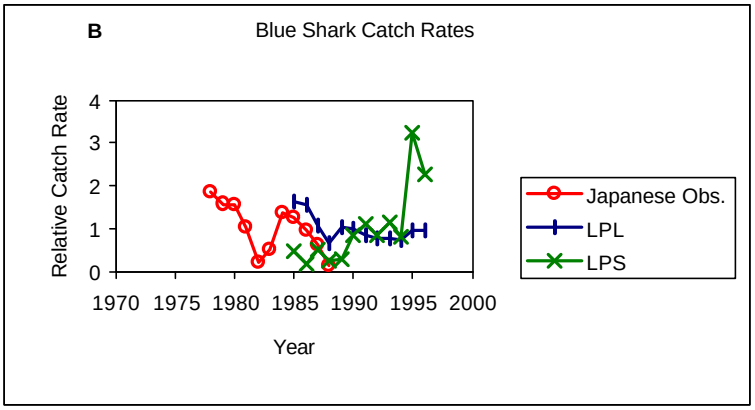
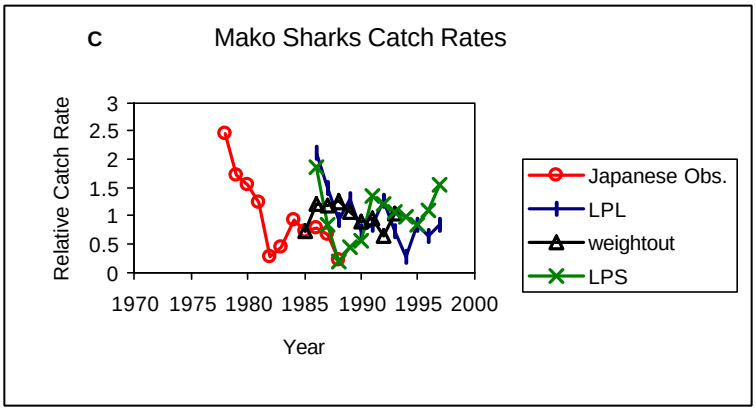
Table 1. Trends in catch rates of pelagic sharks. Slopes and standard errors (SE) of the slopes were obtained from weighted linear regressions of relative catch rates on year. Slopes significantly different from 0 are denoted as ˙(10% level), * (5% level), ** (1% level).

Series	N	Years	Slope	SE
Pelagic sharks				
LPL	12	1986-1997	-0.0016	0.0012
Blue shark				
Japanese observer	11	1978-1988	-0.1150*	0.0440
LPL	12	1986-1997	-0.0536*	0.0205
LPS	12	1986-1997	0.1954**	0.0503
Mako sharks				
Japanese observer	11	1978-1988	-0.1654**	0.0418
LPL	12	1986-1997	-0.0953**	0.0300
Weighout	9	1985-1993	-0.0208	0.0285
LPS	12	1986-1997	0.0261	0.0403
Thresher sharks				
LPL	12	1986-1997	-0.0591	0.0399
Weighout	9	1985-1993	0.0494	0.1291
Oceanic whitetip				
LPL	12	1986-1997	0.0621˙	0.0227







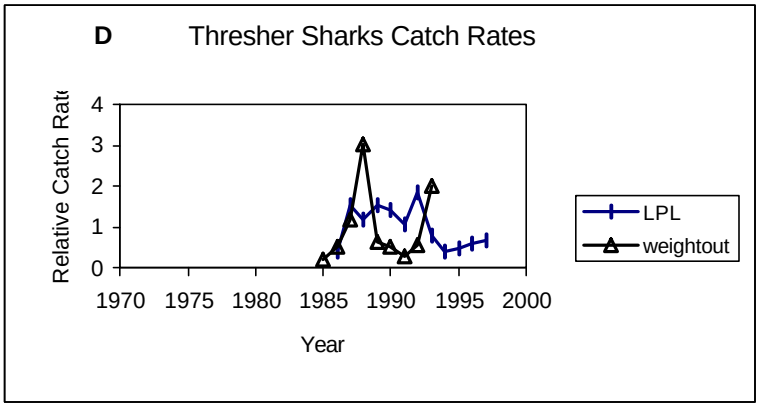


Figure 1. Standardized catch rates of pelagic shark species from several sources: (a) pelagic sharks as a group; (b) blue shark; (c) mako sharks; and (d) thresher sharks.