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Catches of blue and shortfin mako sharks from U.S. West Coast recreational fisheries 1980-2010

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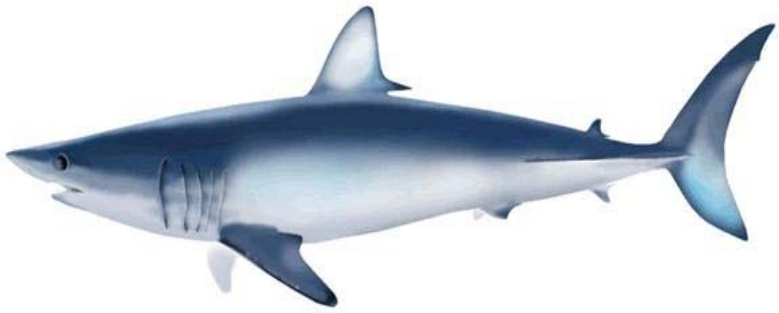

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ABSTRACT

Recreational fishing is popular in the USA, and effort is directed at many of the same species targeted in commercial fisheries. Various fishing modes contribute to both targeted and non-targeted catch of mako and blue sharks, but the predominant method used by recreational anglers is rod and reel fishing with trolling lures. Recreational fishing activity is monitored and regulated at the state-level, but surveys, data collection, and catch and effort estimation are also coordinated at the Federal-level. Surveys are conducted across many species, fishing modes, locations and times. Current estimates of blue and shortfin mako shark catch along the U.S. West Coast between 1980-2010 indicate much higher catches in the 1980s with generally declining catch levels from 1990-present. For a number of reasons, including low survey coverage for the sectors targeting sharks, there are high standard errors and relatively high interannual variability in the catch estimates that should be taken into consideration when using these data in stock assessments.

INTRODUCTION

Recreational fishing is common and popular in the USA. Effort comes from numerous modes including beach/shore-based, and privately owned or party (rental) boats. Recreational fishers catch many of the same species commercial fishers do as both target and non-target catch, including sharks. Shortfin makos are more highly prized among anglers than blue sharks for the challenge of their fights and the good quality meat. The purpose of this document is to provide recreational catch estimates of blue and mako sharks from the USA West Coast (California, Oregon and Washington) to the ISC SharkWG and to describe how the estimates are derived.

Activity is monitored and regulated at the state-level, but efforts to coordinate data collection occur at the federal-level through programs run by the National Marine Fisheries Service (NMFS). Scientific surveys of private vessels are routinely conducted via both angler intercept interviews (at public access sites at the time of fishing activity) and telephone surveys (after fishing activity). Survey observation data are then used to estimate catch and effort for the broader recreational fishing community. Charter boats (also called ‘party’ boats) often take large numbers of anglers out on trips running from several hours to several days. In California, captains of charter boats are required to keep logs of catch and effort and report them.

Methods for estimating catch from survey data for the US West Coast were reviewed by the NMFS Marine Recreational Information Program (MRIP) in 2011 and changes were suggested to reduce estimation bias. Efforts to update catch estimation algorithms within the data server are currently underway. Survey data date back to 1980, but the time-series from 2004-present are regarded as most reliable due to increased sampling and improved survey methodologies. During the 1990s, survey sampling effort was incomplete during many periods and/or for some states. Revised estimates of 2004-present data are available now, but 1980-2003 data will likely be revised later in 2012 due to ongoing implementation of the new estimation procedures.

MATERIALS AND METHODS

Catch Estimates

The Pacific State Marine Fisheries Commission manages survey data for California, Oregon and Washington. Raw survey data and estimates derived from them are archived in the 'RecFIN' database (www.recfin.org). RecFIN provides numerous data products, including survey data summaries, and catch estimates derived from survey data. RecFIN estimates were used for catch from private vessels, which along with charter vessels accounts for almost all shark catch. The California Department of Fish and Game implemented a logbook requirement for charter vessels in 1936 (Hill and Schneider 1999). Logbook data from California Department of Fish and Game are considered more reliable than RecFIN estimates for charter vessels, thus logbooks were used to tabulate reported catch for charter vessels. Data for prior to 1980 were unavailable in time to generate this report, but will be tabulated in time for the blue shark assessment. Logbook data for retained blue and mako shark catch for 1980-2010 are presented here.

Surveys of recreational boats record catch and effort, and total catches are estimated from estimates of total effort. Percent standard error (PSE), calculated from sample size and variance among samples, is provided with the estimates. For private vessels, catch estimates are available on a monthly basis 2004-present. From 1980-2003, with the exception of 1990-1992 when no surveys were conducted, survey data were reported in two-month 'waves' (Wave 1: Jan-Feb, Wave 2: Mar-Apr, Wave 3: May-Jun, Wave 4: Jul-Aug, Wave 5: Sep-Oct, Wave 6: Nov-Dec). Because the time-interval of catches for the ISC shark stock-assessments has not yet been determined, catch was estimated at both at both quarterly (three month blocks) and yearly intervals. To provide quarterly catches, the two month wave data were divided into monthly estimates. Monthly data from 2004-present were used to estimate the average proportion of catch for each month of a wave, which was subsequently used to split 1980-2003 data into monthly estimates. With all catches estimated at monthly intervals, they were then aggregated into quarters (Q1: Jan-Mar, Q2: Apr-Jun, Q3: Jul-Sep, Q4: Oct-Dec). Data from 1980 were excluded because survey data that year were considered unreliable by RecFIN data managers.

RESULTS AND DISCUSSION

Catch estimates for blue sharks were greatest and most variable during the 1980's (max=32,000 animals in 1988), declining to under 5,000 animals from 1993 (see Table 1 and Figure 1). A little more than half of the catch occurred during the third quarter. Precision of catch estimates from private vessels was highly variable (Figure 1), and sampling was lower from 1981-2003 than from 2004-2010.

Catch estimates for mako sharks were greatest and most variable during the 1980's (max=22,000 animals in 1987), declining to under 15,000 from 1995 onwards (no data from private vessels were available for 1990-1992) (see Table 2 and Figure 2). Roughly two-thirds of the catch occurred in the third quarter (Figure 2.). Precision of catch estimates was highly variable (Figure 2), and sampling was lower from 1981-2003 than from 2004-2010.

Revisions to private vessel recreational catch estimation methods by MRIP should be less biased now than prior estimates due to recent updates, and weight sampling effort more appropriately. However, their system-wide revised catch and effort estimation methods affected different species (rockfish, tunas, sharks, etc.) in different ways, so no consistent trend emerges from the revisions. Because survey sampling of private vessels was much lower (and probably biased) from 1980-2003, we recommend caution with this time-series. It is also recommended to consider PSE with catch estimates from the survey because it is a useful metric of data precision.

Acknowledgements

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REFERENCES

Hill, K. and Schneider, N. (1999). Historical logbook databases from California's commercial passenger fishing vessel (partyboat) fishery 1936-1997. Scripps Institution of Oceanography Reference Series: # 99-19.

Table 1. Blue shark catch (thousands of fish) from West Coast USA recreational fisheries 1980-2010.

year	private boat	PSE % – private boat	charter boat
1980	NA	NA	0.020
1981	2.372	41	0.101
1982	1.065	54	0.085
1983	4.203	39	0.028
1984	8.759	41	0.035
1985	17.584	34	0.020
1986	2.989	38	0.219
1987	13.924	37	0.651
1988	30.262	29	0.944
1989	2.605	47	4.475
1990	0.000	NA	2.677
1991	0.000	NA	5.802
1992	0.000	NA	1.110
1993	2.860	28	0.695
1994	1.811	54	0.501
1995	1.873	40	0.531
1996	0.776	70	0.494
1997	3.921	54	0.532
1998	0.357	71	0.182
1999	0.487	70	0.222
2000	0.012	15	0.158

2001	0.054	11	0.212
2002	0.053	12	0.015
2003	0.206	9	0.047
2004	0.263	30	0.006
2005	0.087	15	0.026
2006	0.128	15	0.025
2007	0.335	15	0.019
2008	0.074	20	0.017
2009	0.113	43	0.011
2010	0.021	25	0.140

Table 2. Mako shark catch (thousands of fish) from West Coast USA recreational fisheries 1980-2010.

year	private boat	PSE % – private boat	charter boat
1980	N/A	NA	0.008
1981	12.996	70	0.037
1982	1.473	50	0.026
1983	1.054	60	0.029
1984	2.570	51	0.062
1985	9.317	31	0.026
1986	4.774	35	0.066
1987	21.591	29	0.304
1988	14.343	38	0.132
1989	5.831	46	0.310
1990	0.000	NA	0.243
1991	0.000	NA	0.139
1992	0.000	NA	0.136
1993	3.597	25	0.308
1994	13.299	21	0.286
1995	5.311	27	0.178
1996	1.917	34	0.290
1997	4.830	29	0.375
1998	1.706	39	0.184
1999	1.082	51	0.097
2000	2.271	51	0.119

2001	5.112	37	0.242
2002	5.626	28	0.213
2003	3.875	24	0.116
2004	2.963	41	0.304
2005	1.255	18	0.162
2006	1.477	14	0.243
2007	0.709	10	0.135
2008	0.403	13	0.129
2009	0.582	10	0.051
2010	0.350	26	0.042

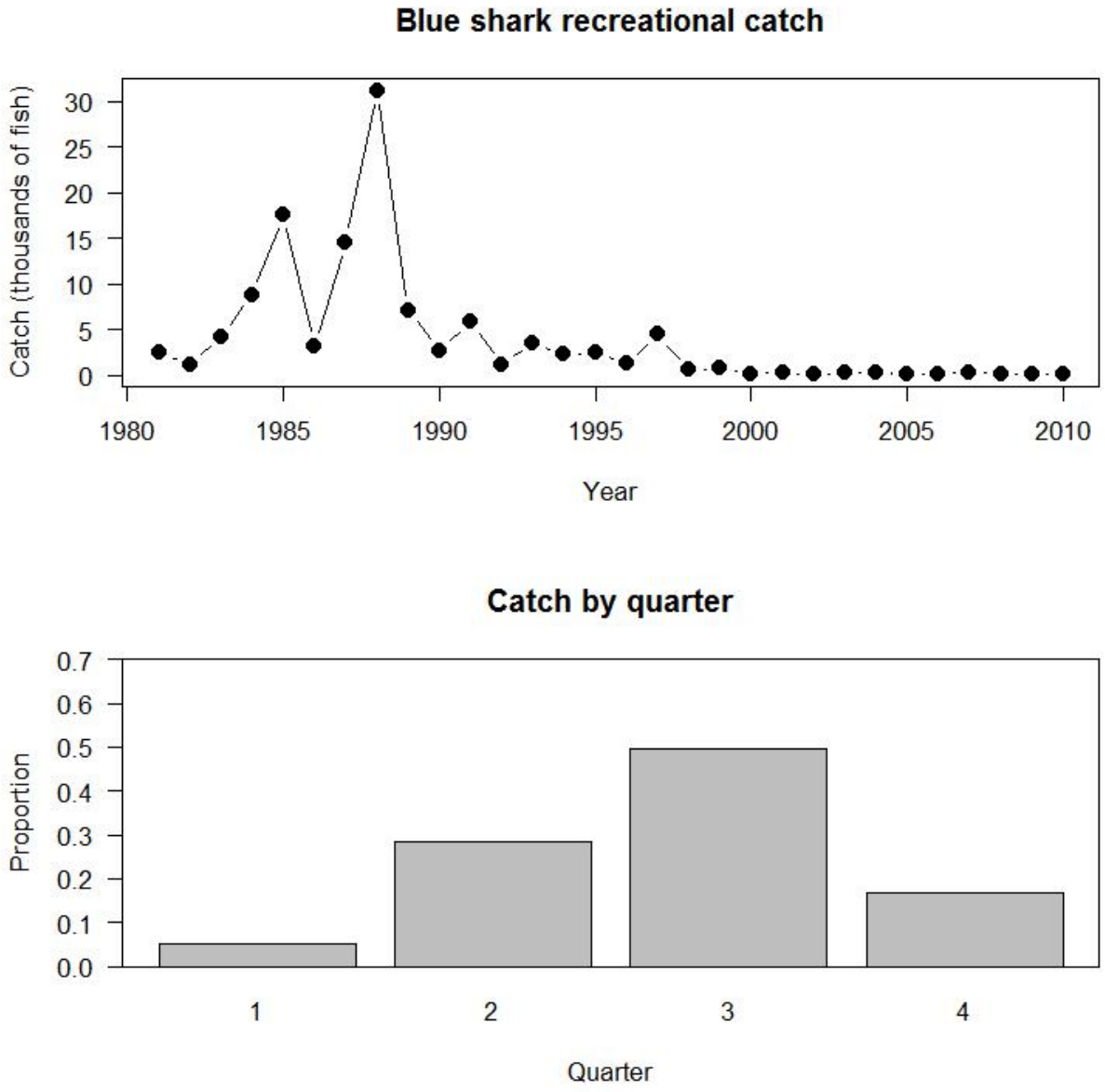

Figure 1. Blue shark catch. Top panel: combined catches of private and chartered recreational vessels. Bottom panel: quarterly catch proportions of private vessels only.

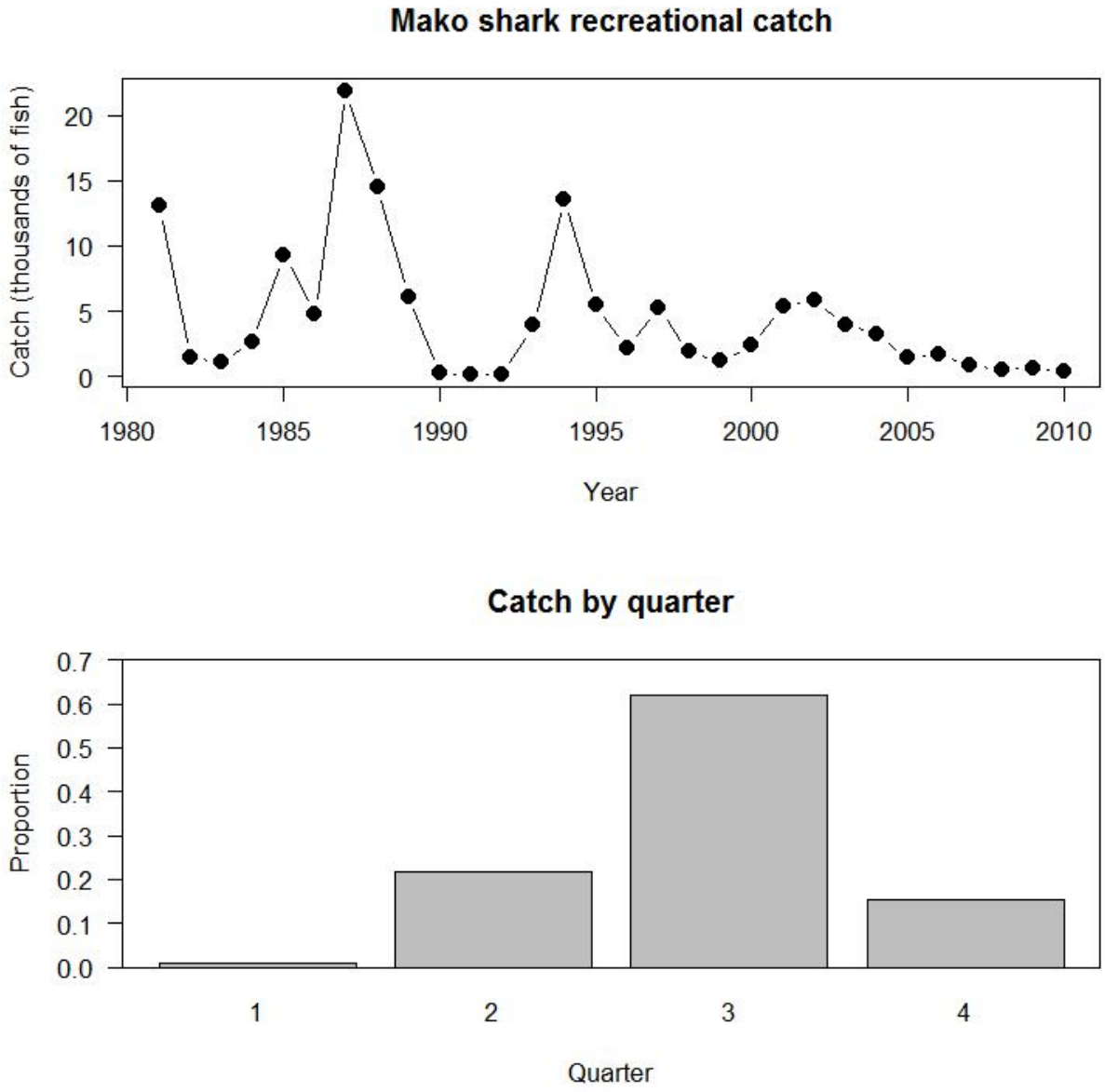

Figure 2. Mako shark catch. Top panel: combined catches of private and chartered recreational vessels. Bottom panel: quarterly catch proportions of private vessels only.