Updated Post-release Live-discard Mortality Rate and Range of Uncertainty Developed for Blacktip Sharks Captured in Hook and Line Recreational Fisheries for use in the SEDAR

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SUMMARY

An updated post-release live-discard mortality rate and an updated range of uncertainty were developed for blacktip sharks captured in hook and line recreational fisheries. An updated post-release live-discard mortality rate (9.7%) was obtained from new data available in the scientific literature for blacktip sharks captured in hook and line recreational fisheries in Florida (Gulf of Mexico and Atlantic coasts combined). An updated range of uncertainty in the post-release live-discard mortality rate (10% low; 19% high) was developed from new data available in the scientific literature for blacktip sharks captured in hook and line recreational fisheries (Gulf of Mexico and Atlantic coasts combined).

1. INTRODUCTION

The previous post-release live-discard mortality rate estimate for blacktip sharks captured in hook and line recreational fisheries (10%) was obtained from Atlantic sharpnose sharks in the Gulf of Mexico (Gurshin and Szedlmayer 2004; Courtney 2012; NMFS 2012, their section 2.2.2.5). Similarly, the previous post-release live-discard mortality rate range of uncertainty developed for blacktip sharks captured in hook and line recreational fisheries (5-15%) was based on ½ the Atlantic sharpnose shark estimate to 1.5 times the Atlantic sharpnose shark estimate (NMFS 2012, their section 2.2.2.5). However, the SEDAR 29 assessment panel expressed a lack of confidence in the estimate of post-release live discard mortality for blacktip sharks captured in hook and line recreational fisheries (NMFS 2012, their section 2.2.2.5).

New information is available from the scientific literature for post-release live-discard mortality rates of blacktip sharks captured in hook and line recreational fisheries in Florida (Gulf of Mexico and Atlantic coasts combined; Whitney et al. 2017). The new information available from the scientific literature was used here to develop an updated post-release live-discard mortality rate and an updated range of uncertainty for blacktip sharks captured in hook and line recreational fisheries for use in the SEDAR 29 update, as described below.

2. METHODS AND RESULTS

An updated post-release live-discard mortality rate for blacktip sharks captured in hook and line recreational fisheries (9.7%) was obtained directly from new data available in the scientific literature for blacktip sharks captured in hook and line recreational fisheries in Florida (Gulf of Mexico and Atlantic coasts combined; Whitney et al. 2017).

An updated range of uncertainty in the post-release live-discard mortality rate for blacktip sharks captured in hook and line recreational fisheries (10% base; 19% high) was developed as follows. Whitney et al. (2017) noted that their mortality rate obtained for blacktip sharks could be an underestimate because the sampling period was limited to 3 days after release; any post release mortalities that could have happened after this period would have been missed. In particular, Whitney et al. (2017) noted that 3 gut-hooked animals in their study may have been especially susceptible to delayed mortality. Consequently, combining both the gut hooked (n = 3; Whitney et al. 2017) and the observed post-release mortality (n = 3; Whitney et al. 2017) may provide a reasonable upper bound for the range of uncertainty in the post-release mortality estimate for blacktip sharks captured in hook and line recreational fisheries (6 dead out of 31 released alive = 19%). In comparison, the updated post-release live-discard mortality rate (9.7%; Whitney et al. 2017) may provide both a best estimate as well as a reasonable lower bound (10%) for the range of uncertainty in the post-release mortality estimate for blacktip sharks captured in hook and line recreational fisheries.

3. DISCUSSION

The updated post-release live-discard mortality rate for blacktip sharks captured in hook and line recreational fisheries (9.7%) and the range of uncertainty (~10%: ~19%) developed here are better justified than the previous values, because the previous values were based on a different species (Gurshin and Szedlmayer 2004; Courtney 2012; NMFS 2012, their section 2.2.2.5). The updated range of uncertainty developed here (10%; 19%) is also consistent with preliminary data available from a separate and independent study of post-release live-discard mortality rates for blacktip sharks captured in hook and line recreational fisheries along the Texas, Louisiana, and Florida coasts of the Gulf of Mexico (22% combined post-release mortality rate; Appendix B).

Additional updated information on shark at-vessel, post-release, and total-discard mortality rates is available from the scientific literature (Courtney 2013, 2014; Appendix C). However, the additional information was briefly reviewed and considered to be beyond the scope of the current SEDAR 29 update assessment because it was either not specific to the GOM blacktip shark SEDAR 29 update assessment, or would have required substantial changes to the assessment methodology, along with subsequent review, in order to be included.

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Whitney, N. M., White, C. F., Anderson, P. A., Hueter, R. E., and Skomal, G. B. 2017. The physiological stress response, postrelease behavior, and mortality of blacktip sharks (*Carcharhinus limbatus*) caught on circle and J-hooks in the Florida recreational fishery. Fishery Bulletin 115:532-543.

5. APPENDIX A: REVIEW OF WHITNEY ET AL. (2017)

5.1 Introduction

New information is available from the scientific literature for post-release live-discard mortality rates of blacktip sharks captured in hook and line recreational fisheries in Florida (Gulf of Mexico and Atlantic coasts combined; Whitney et al. 2017). The new study (Whitney et al. 2017) is briefly reviewed here.

5.2 Study Methods and Results

(Whitney et al. 2017) used acceleration data loggers (ADLs) for blacktip sharks (**n=31**) **caught on rod and reel by recreational fishermen**. Mortalities (**n=3; 9.7%**) all occurred within 2 h after release. The study area included Charlotte Harbor and surrounding waters in the Gulf of Mexico (26°47′18″N, 82°7′23″W), and off Cape Canaveral (28°19′8″N, 80°20′6″W) in the Atlantic Ocean. The fishing locations and the fishing practices at both study sites were directed by recreational charter captains to ensure methods were consistent with those commonly used in the recreational fishery.

Between September 2011 and April 2013, 31 blacktip sharks were caught and tagged with ADLs (Cape Canaveral, n=2; Charlotte Harbor, n=29). Precaudal length of the tagged sharks ranged from 92 to 132 cm (mean: 107.5 cm [SD 11.2]). Fight times lasted between 2 and 16 min (mean: 7 min [SD 3]), handling times lasted between 6 and 18 min (mean: 9.7 min [SD 2.9]). Whitney et al. (2017) noted that the recreational charter captains indicated that fight times in the study were consistent with those during their typical charters to take photographs and remove fishing gear.

5.3 Discussion

Whitney et al. (2017) noted that the resulting mortality rate for blacktip sharks could be an underestimate because the sampling period was limited to 3 days after release. For example, any post release mortalities that could have happened after this period would have been missed. In particular, the authors noted that 3 gut-hooked animals may have been especially susceptible to delayed mortality.

5.4 References

Whitney, N. M., White, C. F., Anderson, P. A., Hueter, R. E., and Skomal, G. B. 2017. The physiological stress response, postrelease behavior, and mortality of blacktip sharks (*Carcharhinus limbatus*) caught on circle and J-hooks in the Florida recreational fishery. Fishery Bulletin 115:532-543.

6. APPENDIX B: SUMMARY OF PRELIMINARY RESULTS OBTAINED FROM A SEPARATE AND INDEPENDENT POST-RELEASE SURVIVAL STUDY ON BLACKTIP SHARKS CAPTURED IN THE RECREATIONAL FISHERY IN THE GULF OF MEXICO.

6.1 Introduction

Preliminary results were obtained from a separate and independent NOAA Saltonstall-Kennedy Grant Program (SK) funded post-release survival study on blacktip sharks captured in the recreational fishery in the Gulf of Mexico (Personal Communication, June 2018, David Wells[1] and John Mohan[2]). However, the data were obtained after most analyses for the SEDAR 29 update had been completed. Consequently, the preliminary data were not able to be included directly in the SEDAR 29 update. Results from this study will be useful for the upcoming SEDAR benchmark assessment planned for Atlantic blacktip sharks in 2019. The preliminary results are summarized below.

6.2 Study Methods and Preliminary Results

All tags (N=36) were accounted for. Data from 13 of the 36 tags were not usable due to malfunction or pre-mature release. Overall recreational mortality rate along the Texas, Louisiana, and Florida coasts of the Gulf of Mexico = 22% (5 mortalities, 19 survivors: 5/23=0.217). Region specific mortality rate ranged from 0-30% as follows: 1) Texas 30% (3 mortalities, 10 survivors: 3/10=0.3); 2) Louisiana 20% (2 mortalities, 10 survivors: 2/10=0.2); and 3) Florida 0% (0 mortalities, 3 survivors: 0/3=0).

6.3 Discussion

The authors noted that differences in regional mortality could be due to: 1) fishing practices and shark handling; 2) environmental and biological (water clarity, abundance of predators); or 3) sample size bias affecting regional mortality rate estimates.

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7. APPENDIX C: ADDITIONAL UPDATED INFORMATION ON SHARK AT-VESSEL AND TOTAL-DISCARD MORTALITY RATES IS AVAILABLE FROM THE SCIENTIFIC LITERATURE BUT WAS NOT CONSIDERED FOR USE IN THE SEDAR 29 UPDATE

7.1 Summary

Additional updated information on shark at-vessel and total-discard mortality rates is available from the scientific literature, as described below. However, the additional information was briefly reviewed and considered to be beyond the scope of the current SEDAR 29 update assessment because it was either not specific to the GOM blacktip shark SEDAR 29 update assessment, or would have required substantial changes to the assessment methodology, along with subsequent review, in order to be included.

7.2 At-vessel mortality of blacktip sharks

Gulak et al. (2015) describe at-vessel mortality for blacktip sharks captured with longline gear in U.S. HMS fisheries (71%). Butcher et al. (2015) describe at-vessel mortality for blacktip sharks captured with longline gear in Australian fisheries (86% after 7 hrs and 95.5% after 14 hrs).

7.3 Meta-analysis of total-discard mortality of captured sharks

Dapp et al. (2015) note the following results from their meta-analysis:

> "…models also predicted the mean total discard mortality (combined immediate and post-release mortality) percentages of obligate ram-ventilating elasmobranchs caught in longline, gillnet and trawl gear types to be 49.8, 79.0 and 84.2%, respectively. In contrast, total discard mortality percentages of stationary-respiring species were significantly lower (longline capture mean = 7.2%, gillnet capture mean = 25.3%, trawl capture mean 41.9%)… global metaanalysis provides the first quantified demonstration of how mortality is affected by these two factors across a broad range of species. …results and approach can be applied to data-deficient elasmobranchs and fisheries to identify species that are likely to experience high rates of mortality due to respiratory mode and/or fishing methods used, so that appropriate mitigation measures can be prioritized and investigated... ."

7.4 Other literature reviews

Several new literature reviews have been conducted of total-discard mortality rates for captured sharks (Dapp et al. 2015, 2016; Ellis et al. 2016). Dapp et al. (2015) supplementary materials compile publicly available data sources on the immediate mortality percentages of 83 species and post-release mortality percentages of 40 species. Ellis et al. (2016) have similar information with more detail. A new literature review of shark bycatch estimates is available (Oliver et al. 2015). A new literature review of shark bycatch mitigation measures is available (Poisson et al. 2016).

7.5 References

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