SEDAR21-DW-19

Updating the blacknose bycatch estimates in the Gulf of Mexico using the Nichols method

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Abstract:
Estimates of offshore shrimp fleet bycatch for blacknose shark are provided using procedures used in previous SEDARs (SEDAR13-DW-32, SEDAR7-DW-3 and 54).

Introduction

In 2007, Nichols (Nichols, 2007) provided estimates of blacknose bycatch from the shrimp fishery in the Gulf of Mexico (GOM). His method was designed and used for red snapper, initially. It was also used for king mackerel, greater amberjack and vermilion snapper in the GOM. The application to blacknose at SEDAR 13 was the first application to elasmobranchs, as well as the first application to such a data-poor species caught as bycatch in the shrimp fishery. The observers were not required to identify sharks to species in the shrimp fishery until 2009. Besides identification issues, the data are overdispersed, usually non-random, and too sparse for generating a time series on their own for blacknose shark. The SEAMAP data are used to supplement the sparse data, as the fishing method and gear are similar. There are known problems with this, such as the fact that Turtle Excluder Devices (TEDs) have never been used with the SEAMAP gear while the shrimp boats are required to be outfitted with a TED.

Methods

A description of the model can be found in SEDAR7-DW-3 and 54. A description of the collection procedures as well as the observer database are available in SEDAR7-DW-5. The research vessel data are described in SEDAR7-DW-1. The estimation of shrimp effort data is covered in SEDAR7-DW-24. All of the previous can

Results

The Nichols model was run with 2 chains for 16000 iterations including a 4000 iteration burn-in period. For the dispersion parameter a uniform was used (r~dunif(0.03, 3.5)), and for the variance term, a lognormal was used (tau~dlnorm(0, 3.5)). The results for both median and mean values, along with the credible interval and CVs are listed in Table 1. The contents of Table 1 are illustrated in Figure 1.

Table 1. Results of the Nichols model for blacknose bycatch in the shrimp trawl fishery. The mean and median are in numbers.

mean	2.50%	median	97.50%	CV
19140	1789	11970	77470	1.397074
20030	3000	13790	75000	1.107339
9922	1174	6971	36150	1.083451
26650	5978	19960	87830	0.955347
14720	2728	11290	46180	1.019701
122000	45860	105700	293100	0.568115
31730	8112	24930	92490	1.008509
19390	1377	11510	85010	1.393502
8916	1557	6570	30390	0.988896
11940	1877	8556	42770	1.044389
11420	1231	7460	45130	1.24606
14570	1612	8771	62730	2.024022

10990	1356	7100	43330	1.216561
13080	1356	8187	53340	1.376147
25460	2513	16120	104600	1.362529
17110	1381	10170	77370	1.510228
14580	1341	8913	61030	1.334705
31240	3817	21270	117300	1.262164
24380	2877	16290	92260	1.420837
43100	6054	28690	168000	1.219258
37080	10750	30460	102200	0.782362
14270	3656	11780	39160	0.723196
26480	6732	20560	80740	0.901813
43840	5912	30300	162600	1.089644
41940	5450	27820	167100	1.203386
63970	9311	44720	234800	1.065812
30010	603.8	13180	164500	1.963346
35480	653.3	16600	186100	1.816798
38250	812	17230	209100	1.970458
67230	1225	28830	372700	2.220735
30390	517.9	13350	153200	2.342547
79690	1719	37180	410800	1.82457
48730	1093	22520	253100	2.265545
27580	423.4	11980	152000	2.018854
25020	476.9	11040	128400	3.267386
42150	754.4	19100	213200	1.79573
36270	845.8	17820	179400	1.731734
27820	786.9	14670	128700	1.476276

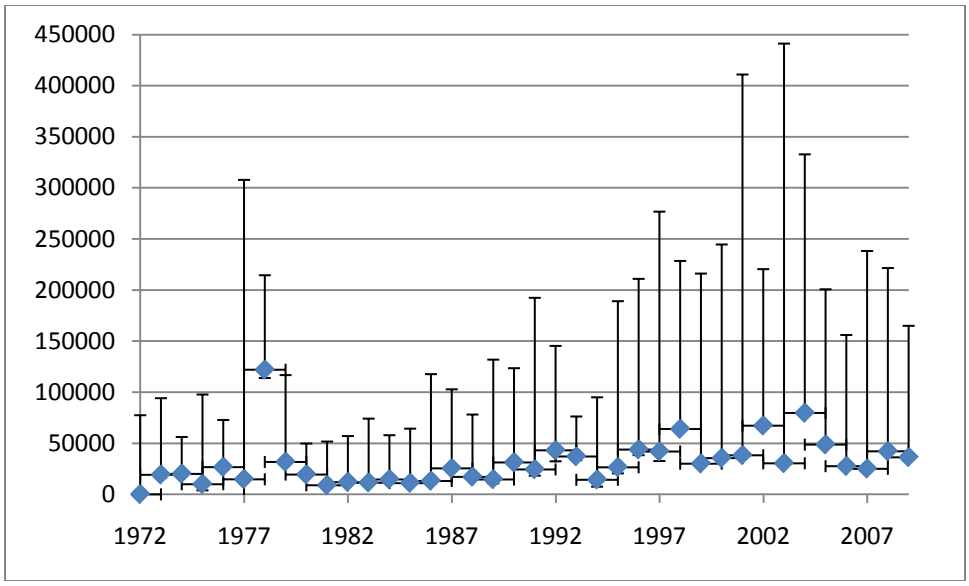

Figure 1. The means and credible intervals for the estimates of blacknose bycatch from the shrimp trawl fishery in the GOM. The results are in numbers.

Discussion

The estimates in this document differ from those in the Nichols document, and we were not able to replicate the results exactly in any of the runs we made. There are many issues that make Nichols' model results difficult to duplicate: the data set is likely slightly different due to query and sorting issues, the priors were not recorded in the SEDAR 13 document, and the model does not converge with the number of iterations that can be completed in a timely manner. According to the Raftery and Lewis convergence diagnostics, 130000 iterations would be required to ensure convergence. With the time allowed, and the documentation available, the estimates provided in this document best reflect the blacknose bycatch in the shrimp fishery using the methodology accepted at the previous blacknose assessment (SEDAR 13). The fact that a TED effect is not included is also of concern, and we hope that the problem is addressed through collaboration with the shrimp fishery on a new model.

Additionally, records were not identified to species when the protocol expected it ('Characterization protocol' as per SEDAR7-DW-5). Requiring observers to identify sharks to species is a welcome change. However, it poses significant challenges in the statistical modeling of the bycatch over the entire time series. The number of data in 2009 is an order of magnitude larger than in 2008, yet the observer coverage has not changed substantially. If that magnitude of data continues, the modeling will certainly have to be revisited, as the level of uncertainty is approaching an upper limit.

Citation Notes

Nichols, S. 2007. Bycatch of small coastal sharks in the offshore shrimp fishery. National Marine Fisheries Service, SEDAR13-DW-32, Miami, Florida. Available: www.sefsc.noaa.gov/sedar/download/SEDAR7. (June 2010). All other SEDAR documents are similarly listed on the website.

Spiegelhalter D. J., A. Thomas, N. G. Best, and D. Lunn. 2003. WinBUGS version 1.4 user manual. MRC Biostatistics Unit. (BUGS software is available (free) at www.mrc-bsu.cam.ac.uk/bugs)

All references are to previous SEDAR documents, posted on the SEFSC website: www.sefsc.noaa.gov/sedar (June 2010)