

PEER REVIEW REPORT ATLANTIC WHITE MARLIN STATUS REVIEW

Peer Reviewers

Two reviewers provided comments on the draft 2007 Atlantic White Marlin Status Review:

John E. Graves, Ph.D, Professor of Marine Science,
Virginia Institute of Marine Science, College of William and Mary

NMFS Southeast Fisheries Science Center (SEFSC)

Consolidated report prepared by the following SEFSC staff:

Eric Prince
Guy Davenport
Jim Waters
Jim Bohnsack
Joe Serafy
Mauricio Ortiz

Peer Review Report #1

General:

Overall, the results in the Status Review Report reflect the recent 2006 ICCAT assessment of white marlin indicating that the stock status has improved since the 2002 status review (SR2002). While still overfished and likely still undergoing overfishing, the stock does not appear to be experiencing the severe overfishing indicated at the time of SR2002. As the results of the 2006 ICCAT assessment hinge primarily on the assumptions inherent in choosing and standardizing CPUE time series, so does the status of white marlin (*Tetrapturus albidus*) in regards to an ESA listing. It is worth noting that the 2006 assessment of white marlin was primarily a review of recent CPUE trends analysis and an update of the 2002 base model assessment with updated CPUE trends.

The quantitative basis that the BRT used to determine that *T. albidus* does not warrant ESA listing was the low probability that the stock might be reduced to 1% of its estimated carrying capacity given potential TACs or fishing mortality rates. These probabilities were obtained from projections conducted using the Bayesian Surplus Production model of McAllister, Pikitch and Babcock (2001) which is commonly used and accepted within the ICCAT scientific community. This appears to be a valid means of status determination to address the ESA section 4 (a)(1) threat regarding overutilization for commercial, recreational, scientific, or educational purposes. However, the BRT does not define or discuss what might be acceptable probabilities of decline. Also, these projections were done in 2002. The current review does not provide the updated projections applying the BST model of Babcock (Babcock, 2006), and

the updated CPUE series for 2006. It would be instructive to do the analysis with the updates and include the results in this report.

These probabilities of reduction to less than 1% of estimated carrying capacity highlight the other main ESA section 4 (a)(1) threat regarding the existing regulatory mechanisms. For many of the F or TAC values, there appear to be a rather high potential for the population to decline below 1% of K. The problem is that management measures to directly enforce either a constant F or TAC are probably lacking. Moreover, the BRT correctly interprets a TAC strategy as riskier than a constant F, though a TAC is the current management approach and a constant F would be more difficult to maintain. While fishing mortality rates are declining and may continue to do so, these would increase perhaps substantially, if the longline fishery returns to shallower sets rather than the current deep sets to target bigeye tuna.

The recent species validation of the roundscale spearfish (*T. georgii*) complicates this analysis as it is likely that all *T. georgii* have historically been misclassified as *T. albidus*. From the standpoint of the production model, if the proportion of the two species in both landings and the CPUE time series remained constant, this would likely have little effect on the observed status classification. Fishing mortality (F/F_{msy}) and biomass reference points (B/B_{msy}) will be unaffected and since there is no information to indicate that the use of a different prior distribution for the intrinsic rate of population increase (r), the Bayesian Surplus Production model results will remain essentially the same. However, if the proportion of *T. georgii* to *T. albidus* has changed over time in either landings or CPUE time series or if there are biological differences between the two species that would lead to substantially different intrinsic rates of population increase, then the production model results could be substantially affected.

Though data to indicate whether either of these two possibilities exists is lacking, it would be instructive to include some discussion or exploration of the potential implications on the status of white marlin. Mixed-species situations such as this are quite common in fisheries and there may be precedent for ESA reviews in the face of mixed fisheries and incomplete stock identification. This issue could be explored in further detail through both sensitivity analyses using various proportions in landings or CPUE time series, and through a review of similar ESA situations such as Pacific salmonids.

Some tables and figures are hard to read and could be improved for clarity. Additional references are provided at the end of these comments. These references provide additional sources of information for the report.

Specific:

Section IV: Status of the Stock

1. Page 40, para. 2: References – Change (Natal) to (Natal, RN Brazil); Change (Catalina Island) to (Catalina Island, CA, United States). Also, add references for reports from each meeting. The reference for Natal is SCRS/2005/10. All the documents mentioned in this paragraph are available at the ICCAT web page.

2. Page 40, para. 4: The correct citation requested is – SCRS/2006/12: Report of the 2006 ICCAT Billfish Stock Assessment (Madrid, May 15 to 19, 2006).

Notes on the 2006 Assessment of White Marlin

There is a need to clarify in the document itself, the following statements in Appendix 4 of detailed report under the title "*Billfish Working Group Workplan 2005-2006*":

- a) "The estimated indices of relative abundance obtained during the 2005 meeting and the estimated catches of longline and purse seine fleets will be used to monitor recent changes in stock abundance for marlins and to provide a preliminary evaluation of the success of the marlin rebuilding plan."
- b) "3. Conduct the full assessment of blue marlin and white marlin in 2006 when the information in age and growth and habitat will be available and when there will be a minimum of five extra years of data for each marlin stock. At that time there will also be five years of observations under the current management that is aiming at reducing catches of marlins from the purse seine and longline fisheries."

Point a) was accomplished and the 2006 SA revised Catch table, and several indices of abundance were updated. However, the issue regarding which standardization method was valid for billfish, particularly dealing with the 1960-1975 discontinuity was not resolved. Thus, a full assessment was not completed, and the Working Group agreed to focus on the most recent five year trends in CPUE, catch etc. and evaluated the current management plan.

During the 2006 SA, a great deal of effort was devoted to comparing indices of abundance, Analyses included overlaying them, contrasting their trends with robust correlation analysis; inferring overall trends with non-parametric methods (loess smoothers); or combining them using detailed information (instead of averaging, standardizing directly several sources of data) in the Combined index of four longline datasets (Appendix 6, detailed report). Also, some size frequency data analyses were carried out.

For the stock assessment (section 6, detailed report), the document SCRS-2006-64 basically demonstrated that the Bayesian Surplus Production Model (BSP) results are highly dependent on the CPUE index used, or the way they are 'weighted' if more than one index is used. Since the discussion of the 1960-2004 historical index was not resolved, it was agreed to evaluate the implication of the 'recent' trends of CPUE in the models adopted in 2002. Thus, during the 2006 SA the BSP was started for 1990 to 2006, using constraints that "matched" the Biomass in 1990 to that predicted in the 2002 model. Therefore, in 2006 the WG did not conduct a full assessment for white marlin. However, the WG did evaluate recent trends of CPUE on the 2002 adopted model. Again, the BSP showed that the results are highly dependent on the weighting factor used for the indices, and with the "base" case of 2002 and equal weighting, the biomass trends (fig. 13, final report) were more optimistic, (i.e. reversing the decline in the latter years, and perhaps showing a bit of an up-trend).

Thus, there were two main groups of analyses during the 2006 SA for white marlin, a) CPUE trends, which showed a relatively stable and perhaps increasing trend in 2004, but in general did not show the decline observed in 2002; and b) updating the 2002 base model, with new CPUEs (1990-2006) providing a more optimistic picture of the stock in 2006. However, notice that the two groups of analyses are not strictly connected as would be for a full assessment.

Another important piece of information was the catch table construction, particularly the split of the "unclassified billfish" and the allocation of this catch to each species. This is demonstrated under item 6.2.2 of the detailed report, where projections were carried out using the 2002 stock parameters estimates. "Landings data since 2000 (white marlin) allow test of the validity of the population benchmarks estimated in 2002 assessment". For white marlin (fig. 19-20 detailed report) it was concluded that the projections and observed catch were in agreement, indicating that the biological stock parameters estimated in 2002 are at least consistent with the recent trends of catch, and that the stock can recover under some of the current management regulations.

3. Page 42, Section B. Modeling approach...

1st paragraph needs to clarify the assessment approach of 2006.

2nd paragraph relates directly to the 2002 assessment and it should be noted that the model adopted in 2002 Assessment was again used as base model in 2006, under the approach describe in paragraph 1 (i.e. an update of the model with CPUE... etc.).

4. The runs presented in SCRS-2006-12 (Babcock, 2006) and the runs during the 2006 SA need to be distinguished and put in perspective. The implication of the 2006-12 document is that the BSP model is highly sensitive to a) the index used, or b) the weighting scheme used. However, the runs in the 2006 SA are largely based on updated CPUE series for the base case of 2002.

5. We recommend that table 12 be replaced by the results from the SA Table 13 Detailed report.

6. Section C. Results from the 2006 Assessment

Based on our comments above for Section B of the draft report, we recommend that Section C be reworked to account for the changes recommended for Section B.

- a) Provide summary of the different trend analyses of CPUEs, and present the appropriate graphs.
 - i. Fig. 10 should be the indices available
 - ii. Fig 11: We recommend replacing with Fig. 6, Appendix 6, as it was the group combined longline fisheries index base case, confidence bounds cover the results of the current Fig. 11.
 - iii. Add Fig. 9 or 10 for WHM, as it was another CPUE comparison result from section 5.2 of the detailed report.
- b) Page 46, para. 1: The results of the 2006 are again related to the approach adopted by the WG, the base case is the 2002 base case updated.
- c) Fig. 12 caption should reflect the procedure adopted to update the 2002 base model. SEFSC can provide the excel files for most of the graphs. Also, the text needs to be more specific on what Figure 12 represents.
- d) Fig. 13 is not correct as mentioned in the text. Fig. 13 is from the 2002 Assessment and it shows the observed (dots) and predicted CPUE trend in the base model, but

nothing of 2006. Also the y-axis has a different scale that that in Fig. 12. This figure could be omitted from this section.

- e) Table 13 should be replaced with WHM sections of Tables 12 & 13 of the detailed report, and if every column is included, please include a complete description of the different runs/scenarios.
- f) Page 49, Fig. 14 is not absent.
- g) Page 49, para. 2: The purpose or the context of this paragraph is unclear. This paragraph should be rewritten for clarity.

7. Section BRT Evaluation

This section should be reorganized after recommended changes are made to the stock status and results/conclusions of the 2006 assessment. There are several issues that could be better discussed individually in single paragraphs.

- a) Possible identification problems with round-scale marlin or blue marlin, and its implications for assessment.
- b) Standardization of CPUE historic series, particularly Japan/Taiwan early 60's.
- c) Page 50, para. 2: clarify that 2006 BSP assessment is not a full assessment, but an update of the 2002 model with some conditions.
- d) General results of 2006 Assessment; recent catch trends, recent CPUE trends, updating BSP 2002 model, projection of stock parameters estimated in 2002 with new catches.

Editorial:

Page	Para	Line	
8	1	last	“relatively quickly” Please indicate a timeframe.
8	4	6	“purposed” should be “purposes”.
8	4	last	“Based in...” should be “Based on...”
11	4	13	change “workshop” to “symposium”
12	2	4	change “single” to “discrete” – See Luthy (2004, page 79) for more information on spawning/nursery timing/location.
13	Fig. 1		Caption does not explain symbols
14	3	6	remove “go on to”
15	3		Add info in Luthy (2004, page 79)
16	1	4	“...a value of two for both...” Please indicate unit
17	4	10	The >100 years argument is weak. We suggest you delete.
19	4	9	Please include reason(s) for 50% decline.
20	Fig. 2		Put US landings on a second Y-axis or make Y-axis a log10 scale.
26-27	Table 2		It would be useful to provide in units of weight.
28	Table 3		Also, provide in units of numbers – confusing to reader that Tables 2 & 3 present different units.
29	2	all	Add new info in Jesien et al. (2006).
31	1	1-11	Indicate whether calcuttas are legal.
31	2	13,15	We suggest rounding the dollar values to thousands since these are approximate values.

32	Table 4		Need to indicate that these are tournament numbers in caption
32	Table 5		It would be useful to provide the numbers after expansion.
33	3	End	Recommend citing Cramer (2004), Kerstetter and Graves (2006b) here.
34	Fig 5		Fit and report parameters of trend lines to both time series.
35	35	3	See Venizelos et al (2003).
36	Table 8		See Venizelos et al (2003).
36	Table 9		Please provide explanation for zero values.
36	Table 10		Explanation for low numbers 1999-2001?
36	Table 11		Based on very small sample size – please provide 95% CIs (binomial, given 7/20 presumed dead).
38	all		What has happened to WHM catches since closures?
40	3	7	Please provide a timeframe for “recent population trends,”
41	3	all	See different (bycatch ratio) approach used by Serafy et al. (2004)
42	2	all	See different (bycatch ratio) approach used by Serafy et al. (2004)
42	6	3	Please correct the spelling for “Schaefer”.
43	4	all	replace “indexes” with “indices”
48	Table 13		Very long caption. Please consider including most of this caption as a paragraph and then provide a short caption.
48	2	5	Please indicate whether MSY a reasonable target/goal for WHM.
49	3	1	Figure 14 is missing in the text.
50	1	Mid	Serafy et al. (2004) discusses this.
50	2		replace “indexes” with “indices”
54	2	all	We recommend citing de Sylva et al. (2000).
58	2	2	Repeated verbatim in para 3 line 1: “It is hard to conceive...”

References:

- Babcock, Beth. 2006. Application of a Bayesian Surplus Production Model to Atlantic White Marlin. SCRS-2006-64, pp. 1643-1651.
- Cramer, J. 2004. Life after catch and release. *Marine Fisheries Review* 66: 27-30.
- De Sylva, D.P., W.J. Richards, T.R. Capo and J.E. Serafy. 2006. Potential effects of human activities on billfishes (Istiophoridae and Xiphiidae) in the western Atlantic. *Bulletin of Marine Science* 66: 187-198.
- Jesien, R.V., A.M. Barse, S. Smyth, E.D. Prince and J.E. Serafy. 2006. Characterization of the white marlin (*Tetrapturus albidus*) recreational fishery off Maryland and New Jersey, USA *Bulletin of Marine Science* 79: 647-658.
- Luthy, SA (2004). Billfish larvae of the Straits of Florida. Ph.D. Dissertation. University of Miami, Coral Gables, Florida. 112 pp.
- Serafy, J.E., G.A. Diaz, E.D. Prince, E.S. Orbesen and C.M. Legault. 2004. Atlantic Blue Marlin, *Makaira nigricans*, and White Marlin, *Tetrapturus albidus*, Bycatch of the Japanese Pelagic Longline Fishery, 1960-2000. *Marine Fisheries Review* 66 (2): 9-20.
- Venizelos, A., F.C. Sutter and J. Serafy. 2003. Use of minimum size regulations to achieve landings reduction targets for marlin in the Atlantic Ocean. *Marine and Freshwater Research* 54: 567-573.

Peer Review Report #2

Atlantic White Marline Status Review

General Comments:

Overall the report is well organized and written. It builds upon the 2002 Status Review and includes discussions of all the relevant papers published since that time. While ICCAT's SCRS did not undertake a full assessment of white marlin in 2006, the Status Review Report contains a variety of current population projections undertaken outside of the SCRS working group that are very useful.

In reading through the report (this reviewer) had noted a few errors and minor editorial changes, and these are detailed below (see Specific Comments). In addition, (this reviewer) has two general comments, one regarding the impact of the roundscale spearfish on the white marlin assessment, and the other directed toward the adequacy of existing management measures.

The existence of roundscale spearfish, a species with morphology similar to that of white marlin, has undoubtedly resulted in misclassification of some roundscale spearfish as white marlin. The extent of these misclassifications is not known, although in some times and areas, it appears to be fairly extensive. While the presence of a cryptic species results in a reduction in the absolute biomass of white marlin, it would only impact the assessment if the proportion of roundscale spearfish and white marlin has changed over time. It may be worth developing this point further in the report.

The efficacy of existing management measures for white marlin is difficult to determine. Clearly, there are problems with compliance to ICCAT's recommendation requiring the release of all live white marlin taken on industrial longline or purse seine gear (release of an istiophorid from a pursed net would difficult at best). However, the reduction in reported landings suggests that many fleets are releasing live billfish. Of concern, however, has been the increase in artisanal fisheries. Documenting landings of these fleets, mostly in developing nations, has been problematic. While ICCAT adopted a measure capping these landings at 2006 levels, it will be difficult to ascertain compliance. A slightly more detailed discussion of the growing artisanal fisheries would be useful.

Specific Comments:

p.11, para4, line 13. Replace "international billfish workshop" with "international billfish symposium".

p.14, para 2. There are other sources of tagging information in addition to the CTC. Jaen and Jaen (1994) *Migraciones de los Istioforidos en el Caribe* note connectivity of Venezuelan white marlin with those in Brazil and the U.S.

p. 14, para 3. The tagging durations listed for Horodysky et al. (2007) were five (n=4) or 10 (n=43) days, not five and seven. Also, the majority of these tags were high resolution tags, collecting data points every 90 sec (a point which is elaborated on further in the paragraph for two tags [Hoolihan et al. in prep]).

p.16, para 2. The 1992 and 1996 SCRS assessments considered BOTH separate north and south stocks, as well as an Atlantic-wide stock.

p. 16, last para. Graves and McDowell (2006) present data on mitochondrial DNA control region sequences, not restriction fragment length polymorphisms.

p. 17, para 4, line 7. Roundscale spearfish and white marlin differ at more than mitochondrial ND4L and ND4 sequences discussed in the Shivji et al. (2006) study. Collette et al. (2006) report sequence differences in several other mitochondrial gene regions, and importantly (to dismiss hybridization), an anonymous nuclear gene region.

p. 17, para 4, line 9. While recreational anglers may have misclassified roundscale spearfish as white marlin, this may not be the case for commercial port samplers. As the fish often come in gutted and without fins, the forward position of the vent may have resulted in misclassification as longbill spearfish.

p.18, para. 1. The genetic identity of hatchet marlin is detailed in Colette et al. (2006), as well as the inference that hatchet marlin and roundscale spearfish are conspecific.

p. 28, last para. Note that there are no management measures (ie, minimum size) for roundscale spearfish.

p.29, para 1, line 5. Due to timing of catches, it may appear that white marlin move up the coast in the spring; however, it is also possible that they move west from the central gyre. Tagging data in the fall show a movement of fish to the east (not the south) when waters cool.

p.30, para 2, last line. It is not the species that have a wide range, but the tournaments for the species have a wide range of entry fees.

p.30, para 3. Like the Big Rock, the White Marlin Open, and Pirates Cove, the Mid-Atlantic \$500,000 has had an annual payout >\$1,000,000 for several years (these all include calcuttas).

p.32, para 2. When did the RBS start requiring information from every billfish tournament? In prior years, only “selected” tournaments were asked for information. This difference in sampling obviously biases the results and should be discussed.

p.40, para 2, line 8. Change “workshop” to “symposium”.

p.40, para 4, line 2. Compilation(s) – should be plural

p.40, para 4, line 3. Change “from” to “form”

p.41, para 1, line 1. change “imputed” to “computed”

p.41, para 1, line 2. Use a lower case “w” for west African countries.

p.41, para 2, line 2. Insert “to” after SCRS

p.45, para 1, line 5. “figures” should be singular

p.45, para 1, line 8. “Indexes” should not be capitalized

p.45, para 1, line 9. Delete parents.

p.50, para 1, line 7. The citation should be Horodysky et al. (2007), not Horodysky and Graves.

p.64, para 3, line 12. Delete “to re”

p.79, para 1. The discussion of catch and release fishing should also include mention of circle hooks. Many sportfishing journals and some white marlin fishing tournaments are encouraging the use of circle hooks. Increased usage of this terminal tackle will result in a reduction of post-release mortality.

p.87, Figure 20. Was this a survey of all tournaments for each year, or were there selected tournaments in the earlier years. The mix of tournaments would affect the CPUE as some are focused on white marlin and others are not.