Northwest Atlantic Dusky Shark Status Review Report: ID264

Peer Review Comments

We solicited review of the Status Review Report: Northwest Atlantic Dusky Shark (*Carcharhinus obscurus)* from four potential reviewers. Three people agreed to be reviewers and also provided reviews. Reviewer comments are compiled below from comments on drafts of the manuscript and are not in the order of the reviewer identification list below.

Reviewers (listed alphabetically):

Dr. Elizabeth Babcock
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Miami, FL

Dr. Dean Grubbs
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Associate Director of Research
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St. Teresa, FL

Dr. Gregory Skomal
Program Manager; Senior Marine Fisheries Biologist
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New Bedford, MA

<u>Reviewer Responses to Terms of Reference Questions (in random order)</u>

<u>Status Review of the NWA Dusky Shark</u>

Evaluate the adequacy, appropriateness and application of data used in the Status Review document.

1. In general, does the Status Review include and cite the best scientific and commercial information available on the species, its biology, stock structure, habitats, threats, and risks of extinction?
2. Are the scientific conclusions factually supported, sound, and logical?
3. Where available, are opposing scientific studies or theories acknowledged and discussed?
4. Are uncertainties assessed and clearly stated?

Reviewer #1 replied "Yes" to all questions above.

Reviewer #2 comments:

The assessment team conducted a thorough review of the published and gray literature concerning dusky sharks. The best available and most current data concerning dusky shark biology, systematics and stock structure, habitat use, landings and bycatch history. The conclusions drawn are scientifically sound and supported by the data.

The team used all appropriate fishery-dependent and fishery-independent datasets that are available for examining trends in relative abundance dating back prior to the development beginning of the directed shark fishery that was largely responsible for the population decline in the Northwest Atlantic. Nearly all data sets analyzed through 2009 for the most recent stock assessment suggest the population has been stabilized or increasing since the early 1990's. The one exception was the University of North Carolina fishery-independent longline survey. The trend line for this survey suggested a dramatic decline through 2006; however, this survey has often been an outlier in assessments for multiple shark species. The UNC survey is a long time series but is extremely limited geographically, only includes two fixed stations. This leads to fluctuations in relative abundance between years that are entirely inconsistent with shark life histories and suggests this survey does a poor job of tracking abundance of highly migratory taxa. Nevertheless, analysis of data from this survey through 2012 conducted for this status review, suggest the relative abundance of dusky sharks has been increasing since 2006. The only other fishery-independent data sets that are appropriate for tracking large coastal shark trends, longline surveys conducted by the Virginia Institute of Marine Science and the NMFS Northeast Fisheries Science Center, suggest the population has been increasing since the species was prohibited from retention in 1999.

The trend in the ratio of fishing mortality to the fishing mortality at maximum sustainable yield is also headed in toward recovery. Prior to the prohibited listing for dusky sharks, extreme overfishing was occurring. The level of overfishing has rapidly declined since and though the data suggest overfishing is still occurring, if the trend holds, overfishing of dusky sharks should end in a few years. Not surprisingly, the trend in spawning stock biomass (SSB) is not positive. Given the long maturity schedule, the reversal of the SSB trend will require at least 20 years following reversal of population decline. The population appears to have been increasing for at least 15 years as fishing mortality declined; the spawning stock biomass is expected to begin rebounding within the coming decade.

The 2011 stock assessment team used 15 scenarios to estimate the stock status in 2009. Most scenarios suggested the stock was still overfished and overfishing was still occurring in spite of a decade of prohibition. Given that dusky sharks have among the latest maturity and longest gestations of any large coastal shark, this lag in response to prohibition is expected. A number of scenarios were used in projecting recovery probability and these also suggested recovery would take decades unless fishing mortality was completely eliminated (an unrealistic goal). Nevertheless, even considering the uncertainty, the scenarios suggest the population will continue to make a very slow recovery. And again, the fishery independent datasets suggest the abundance is increasing steadily. Most of this increase is likely limited to younger age classes and it will require two decades for these to be recruited to the reproductive population.

<u>Assessment of Extinction Risk for the NWA Dusky Shark</u>

Evaluate the findings made in the Assessment of Extinction Risk.

1. Are the methods used for the Extinction Risk Analysis valid and appropriate?
2. Are the results and conclusions of the Extinction Risk Analysis supported by the information presented?
3. Are uncertainties assessed and clearly stated?

Reviewer #1 replied "Yes" to all questions above.

Reviewer #2 comments:

As stated by the status review team, there are no objective or quantitative methods for determining extinction risk. They used a relatively complex risk matrix approach that has been used for estimating extinction risk of a wide range of taxa and is established in the conservation biology literature. The conclusions of the team that there is a low risk of extinction currently and in the foreseeable future. These conclusions are appropriate. The dusky shark is a nearly globally distributed coastal species in temperate to subtropical seas. Though dusky shark life history traits render them highly susceptible to overfishing, there is no evidence that they are at risk of global extinction.

Data from large-scale mark-recapture programs suggest the northwest Atlantic population does fit the criteria as a distinct population segment (DPS). This stock suffered a large decline in the 1980's and early 1990's and has been of major conservation and management concern. Recovery has been very slow relative to other large coastal shark species in the region, due to very slow life history traits. However, the data from the stock assessments for this DPS, including relative abundance indices and catch data, suggest the population has been increasing since listing as a prohibited species in the U.S. in 1999 and total catch has decreased dramatically. Management measures currently in place are working and the stock is slowly recovering. Therefore, the determination that there is low risk of extinction is well supported.

In short, I find the review is detailed and robust. It is supported be the best available science and the conclusions are well-founded.

Reviewer #3 comments:

The status review and risk assessment are thorough and detailed, and include all of the recent data and scientific literature that I am aware of. The only serious flaw is that the analysis failed to adequately consider the implications of potential mortality to dusky sharks in the recreational fishery and in the Mexican fishery. Other than that, the conclusions are well justified by the data and analyses presented. The status of dusky sharks is uncertain, but the document deals with the uncertainty in a fair and reasonable way.

Because the possibility of mortality in the recreational fisheries was not specifically included in the risk assessment, I'm not sure the risk assessment adequately addressed the risk caused by "Overutilization for commercial, recreational, scientific, or educational purposes (p. 52)." The only risks addressed in this category are bycatch and the shark fin trade. The discussion of

bycatch refers to the results of the projections from the assessment, which is based on abundance trend data that are influenced by all sources of mortality. So, the conclusion from the assessment that the population is likely to recover if mortality rates are slightly below Fcurrent is probably correct. However, the statement that commercial bycatch is the major source of mortality is not supported by the data. For the risk assessment, all potential sources mortality should be specifically addressed.

<u>Comments on specific sections in the Report</u>

Throughout document, reviewers made minor editorial changes (to sentence structure, word choice, etc.) and also included additional (or revised) citations for some of the information presented in the document.

The substantial reviewer edits/comments are shown in italics below.

<u>Genetics</u>

"Whether or not these two species have the ability to interbreed (i.e. timing and location of opposite sexes ever co-occur during mating season), or if they would produce viable offspring is unknown"

Doesn't this work also question the existence of two separate species (i.e. whether or not these are two separate species).(Reviewer #1)

<u>Recreational Fisheries</u>

The report under-emphasizes the effect of the recreational fishery on dusky sharks. According to Figure 7, estimated mortality due to recreational fisheries is roughly comparable in magnitude to the commercial discards in recent years. The section on recreational fisheries on page 8 discusses trends in dusky shark catches from the LPS, but in fact the data referred to is the trend in CPUE, including live releases (Figure 2). This section should discuss the magnitude of the recreational catches, and how uncertain the catch estimates are. Similarly, the section on "Overutilization for commercial, recreational, scientific, or educational purposes" should include some discussion of the recreational fishery. Finally, in the section on "Effectiveness of regulations," on page 41, where there is a discussion of bycatch mortality in the commercial fishery, there should also be a few sentences on recreational live-release mortality.

The recreational total mortality estimate is extremely uncertain, and it is possible that the actual mortality is much higher than the estimate, for several reasons. First, the estimate is based on a relatively small sample of anglers, so there is a lot of sampling error. Secondly, the estimate is made on the assumption that the survival rate of released dusky sharks is 6%. If this number is too low, then the actual mortality could be higher. Live releases in the recreational fishery have been as high as 18,000 dusky sharks in recent years (SEDAR 21). Finally, dusky sharks are hard to identify, and there are over a million unidentified carcharhinids released by the recreational fishery every year (SEDAR 21-DW11, Figure 1). If even a few percent of these unidentified carcharhinids are dusky sharks (which seems likely), with a mortality rate of 6%, the recreational fishery could be killing thousands of dusky sharks. (Reviewer #3)

Mexican Fisheries

The document also fails to mention the possibility of mortality to NWA dusky sharks in the Mexican fishery. There is movement of dusky sharks between U.S. and Mexican waters of the Gulf of Mexico (Figure 16). At one time, dusky sharks were a substantial proportion of the large shark catch in Mexican waters of the Gulf (Bonfil 1997. Fisheries Research 29:101). I don't know of any more recent estimates. I also don't know whether there are any regulations protecting dusky sharks in Mexico. If there are not, then the Mexican fishery may be an important source of mortality. (Reviewer #3)

Assessment Data

UNC LL: "Data analyzed from 1972 to 2009 reveal a declining trend in abundance for dusky sharks from the mid 1970s to the mid 1990s followed by a more stable trend into the 2000s (Figure 5, Schwartz et al. 2010)."

Slightly misleading because this "more stable trend" appears to be associated with several years of 0 catches. (Reviewer #1)

Analysis of the ESA Section 4.A.1 Factors

In the section on "Analysis of the ESA Section 4.A.1 Factors", all of the factors are discussed in detail except the factor "Overutilization for commercial, recreational, scientific, or educational purposes". The overutilization section should be expanded to discuss the sources of mortality from fisheries and their implications. Much of this information is included below in the section on "effects of regulations", but it would make more sense here. (Reviewer #3)

At-vessel and post-release mortality

The paragraph on the top of page 35 on discard mortality is confusing. It seems to be saying that total mortality of released sharks after 3 hours soak time is 96%, and also that the total survival for released sharks after 3 hours soak time is 58%. Is the second number referring only to sharks that are released in good condition? (Reviewer #3)

Competition and Predation

"Owing to their large size at birth of about 1 m, it is also unlikely that newborn and juvenile dusky sharks have major predators that would regulate population size." This is a very strong statement, with no data to back it up. (Reviewer #3)

Inadequacy of existing regulatory mechanisms

Should mention the regulations (if any) in the Mexican fishery. (Reviewer #3)

Stock Assessment Projections

The section on the projections from the stock assessment is informative, but it could be improved if it also discussed the probability of the stock falling below some critical level. From the Fcurrent projection in Figure 23, it looks like there is a substantial probability of the population continuing to decline. It isn't worth re-doing the projections, but if it is possible to calculate,

from the existing model outputs, the probability of the population falling below say 5% of unfished abundance, that would provide some information about the risk of extinction. The probability of the stock continuing to decline would also be useful. (Reviewer #3)

Figures

Figure 3 - A better version of this graph is needed. As presented, lines are missing and most symbols look the same (open diamond). Figure 12 is an excellent example. (Reviewer #1)

Figure 5- This figure could be improved upon as well (Reviewer #1)

Figure 6 – Another poor figure (Reviewer #1)

Figure 21. Clarify how hook time can be longer than soak time. (Reviewer #3)