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CIE Reviewer's Independent Report on SEDAR 21
2011 assessment of U.S. South Atlantic Blacknose,
Gulf of Mexico Blacknose, Sandbar, and Dusky Sharks.

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Prepared for

Center for Independent Experts

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Annapolis, Maryland
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Executive Summary

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The Stock Assessment Review Workshop (RW) met in Annapolis, Maryland, from Monday, April 18, through Friday, April 22, 2011, to review the assessments of highly migratory blacknose (*Carcharhinus acronotus*), sandbar (*Carcharhinus plumbeus*) and dusky (*Carcharhinus obscurus*) sharks.

The Review Panel (RP) was composed of three scientists affiliated with the Center for Independent Experts: Dr. Jamie Gibson, Dr. Shelton Harley and Dr. Neil Klaer. The Review Meeting was chaired by Dr. Larry Massey from NMFS SEFC. Dr Julie Neer from SEDAR oversaw meeting proceedings, and representatives of the assessment team (AT) from NMFS SEFC/ASFC presented their results, answered questions and responded to requests from the RP.

On March 22 documents from the data workshop (DW) and assessment workshop (AW) were made available to the RP via a secure FTP server. Assessment process reports were made available by 5 April. During the meeting, all documents were available electronically via the same FTP site, and notes and presentations were uploaded as they became available.

The meeting format included presentations mixed with questions and open discussion. The RP participated in the review of each term of reference. The meeting was open to the public and public comments were also accepted.

Findings by term of reference

1. Evaluate the adequacy, appropriateness, and application of data used in the assessment.
   - The input data and methods used to process them for inclusion in the assessment were generally adequate and appropriate.
   - There is potential for improvement in the method used to set rankings of abundance indices by the DW, and use of those by the assessments.
2. Evaluate the adequacy, appropriateness, and application of methods used to assess the stock.
   - The analytical approaches used to assess the shark stocks were sufficient to provide an acceptable basis for management advice for blacknose northwest Atlantic (NWAT), sandbar and dusky sharks.
   - The inability of the assessment model to fit apparent trends in abundance indices for blacknose Gulf of Mexico (GOM) shark resulted in the rejection of that assessment by the RP.
3. Recommend appropriate estimates of stock abundance, biomass, and exploitation.
   - The analytical approach was appropriate and provides an acceptable basis for management advice.
4. Evaluate the methods used to estimate population benchmarks and stock status (e.g., MSY, Fmsy, Bmsy, MSST, MFMT, or their proxies); recommend appropriate management benchmarks, provide estimated values for management benchmarks, and declare stock status, consistent with the stock status determination criteria, benchmark, and biological reference points in the

Consolidated HMS FMP, proposed FMPs and Amendments, other ongoing or proposed management programs, and National Standards.

- The analytical approach was appropriate and provides an acceptable basis for management advice.
- Assessment base cases were unable to be identified by the AT and the RP, so central values for population benchmarks and stock status were not available. The RP chose a set of sensitivity analyses that encompassed a range of productivity and historical catch scenarios so that a plausible range could be provided for benchmarks and status indicators.
- Generally, the assessments were able to provide robust indications of whether the stocks were overfished (all were), and whether overfishing was currently occurring (yes for blacknose NWAT and dusky sharks, no for most scenarios for sandbar shark).
- Simulation testing should be used to compare among alternative assessment model structures, and to test the robustness of harvest strategies to uncertainty. Implementation of a MSE framework for the shark stocks would achieve these goals.

5. Evaluate the adequacy, appropriateness, and application of the methods used to project future population status, rebuilding timeframe, and generation time; recommend appropriate estimates of future stock condition (e.g., exploitation, abundance, biomass).
- The projection approach used for dusky shark was appropriate and provides an acceptable basis for management advice.
- The approach used for blacknose and sandbar sharks did not project uncertainty in the assessed current state of the stock, so was rejected by the RP. The AT undertook to continue work on more appropriate projections soon after the RW.

6. Evaluate the adequacy, appropriateness, and application of methods used to characterize the uncertainty in estimated parameters. Provide measures of uncertainty for estimated parameters. Ensure that the implications of uncertainty in technical conclusions are clearly stated.
- Within-model uncertainty in estimated parameters was estimated from the Hessian matrix, using assumptions of normality of error distributions, and the resulting CV values were reported. A superior method for characterizing within-model uncertainty and demonstrating model convergence is using MCMC.
- As the AT and RP were unable to choose specific base-case assessments that could be used for management advice, between-model uncertainty in stock productivity and biomass scale was carried into the management advice for the shark assessments, and results presented as plausible ranges rather than central values.

7. Ensure that stock assessment results are clearly and accurately presented in the Stock Assessment Report and that reported results are consistent with Review Panel recommendations. If there are differences between the AW and RW due to reviewer's requests for changes and/or additional model runs, etc., describe those reasons and results.
- This TOR was partially fulfilled. A set of standard diagnostics should be presented for the base case and sensitivity analyses.

- Developing national standards in stock assessment reporting should be implemented.

8. Evaluate the SEDAR Process as applied to the reviewed assessments and identify any Terms of Reference that were inadequately addressed by the Data or Assessment Workshops.
    - The SEDAR process of data workshop, assessment workshop and review workshop for these highly migratory shark species was effective.
    - There was limited opportunity for the examination of the assessments by a wider group of assessment scientists while the assessment was being developed, particularly at the AW. A process that allows experienced assessment scientists from within the US to attend AWs and offer advice to the ATs may be useful.
    - An improved process for dealing with submitted written views that pertain to summary/consensus views in the DW and AW reports should be implemented.

9. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted. Clearly denote research and monitoring needs that could improve the reliability of future assessments. Recommend an appropriate interval for the next assessment, and whether a benchmark or update assessment is warranted.
    - A detailed list of research priorities were developed and listed in the summary report.

10. Prepare a Peer Review Summary summarizing the RP's evaluation of the stock assessment and addressing each Term of Reference. Develop a list of tasks to be completed following the workshop. Complete and submit the Summary Report within 3 weeks of workshop conclusion.
    - Completed.

1 Introduction

1.1 Background

The Stock Assessment Review Workshop (RW) met in Annapolis, Maryland, from Monday, April 18, through Friday, April 22, 2011, to review the assessments of highly migratory blacknose (*Carcharhinus acronotus*), sandbar (*Carcharhinus plumbeus*) and dusky (*Carcharhinus obscurus*) sharks.

The Review Panel (RP) was composed of three scientists affiliated with the Center for Independent Experts: Dr. Jamie Gibson, Dr. Shelton Harley and Dr. Neil Klaer. The Review Meeting was chaired by Dr. Larry Massey from NMFS SEFC. Dr Julie Neer from SEDAR oversaw meeting proceedings, and representatives of the assessment team (AT) from NMFS SEFC/ASFC presented their results, answered questions and responded to requests from the RP.

On March 22 documents from the data workshop (DW) and assessment workshop (AW) were made available to the RP via a secure FTP server. Assessment process reports were made available by 5 April. During the meeting, all documents were available electronically via the same FTP site, and notes and presentations were uploaded as they became available.

The meeting format included presentations mixed with questions and open discussion. The RP participated in the review of each term of reference. The meeting was open to the public and public comments were also accepted.

1.2 Review Activities

A brief description of presentations, RP requests and responses are given in the summary report. Activities of the reviewers were shared during the meeting. An aim of the RP was to produce a first draft of the summary report during the meeting. It was decided to produce a single report covering all of the assessments rather than separate reports, because it was expected that much of the text would be in common. Initial drafting of the report against the Terms of Reference (TORs) was divided among the reviewers and I drafted the text for TOR3 on abundance, biomass and exploitation estimates, TOR4 on population benchmarks and stock status, and TOR7 on presentation of assessment results. A timetable was developed during the meeting for the production of the final summary report by May 12th.

2 Review of blacknose, sandbar and dusky shark assessments

2.1 Terms of reference

The RP considered the assessments in light of the terms of reference provided as follows:

1. Evaluate the adequacy, appropriateness, and application of data used in the assessment.
2. Evaluate the adequacy, appropriateness, and application of methods used to assess the stock.
3. Recommend appropriate estimates of stock abundance, biomass, and exploitation.
4. Evaluate the methods used to estimate population benchmarks and stock status(e.g., MSY, Fmsy, Bmsy, MSST, MFMT, or their proxies); recommend appropriate management benchmarks, provide estimated values for management benchmarks, and declare stock status, consistent with the stock status determination criteria, benchmark, and biological reference points in the Consolidated HMS FMP, proposed FMPs and Amendments, other ongoing or proposed management programs, and National Standards.
5. Evaluate the adequacy, appropriateness, and application of the methods used to project future population status, rebuilding timeframe, and generation time; recommend appropriate estimates of future stock condition (e.g., exploitation, abundance, biomass).
6. Evaluate the adequacy, appropriateness, and application of methods used to characterize the uncertainty in estimated parameters. Provide measures of uncertainty for estimated parameters. Ensure that the implications of uncertainty in technical conclusions are clearly stated.
7. Ensure that stock assessment results are clearly and accurately presented in the Stock Assessment Report and that reported results are consistent with Review Panel recommendations. If there are differences between the AW and RW due to reviewer's requests for changes and/or additional model runs, etc., describe those reasons and results.
8. Evaluate the SEDAR Process as applied to the reviewed assessments and identify any Terms of Reference that were inadequately addressed by the Data or Assessment Workshops.
9. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted. Clearly denote research and monitoring needs that could improve the reliability of future assessments. Recommend an appropriate interval for the next assessment, and whether a benchmark or update assessment is warranted.
10. Prepare a Peer Review Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference. Provide a list of tasks that were not completed, who is responsible for completing each task, and when each task will be completed. Complete and submit the Final Summary Report within 3 weeks of workshop conclusion.

2.2 Findings by term of reference

2.2.1 TOR1 Evaluate the adequacy, appropriateness, and application of data used in the assessment.

The input data and methods used to process them for inclusion in the assessment were generally adequate and appropriate. I agree with points made in the summary report on unit stocks, life history parameters, abundance indices and landings and removals, and provide some additional comment below.

Abundance indices

The DW provided objective evaluations of abundance indices via a standardized checklist that examines data sources, standardization methods, model diagnostics and results. Additionally, the DW provided an overall relative ranking for each index with the objective of indicating the relative usefulness of the index as an indicator of abundance. Provision of objective guidance on the relative weighting of indices by the DW for consideration by the AW and assessment team (AT) is commendable.

The AT used the ranking advice to select preferred combinations of indices for use in base case assessments, but the ranking values were only explicitly used in sensitivity analyses. It was generally considered that additional work was required to improve the objectivity of the rankings. As the indices were ranked by the DW, and the DW included workers who developed or maintained some of those indices, there was potential for non-independence in the index evaluation. This is a difficult problem because the people working on particular indices are most expert for evaluation purposes. There is potential for a small project, which perhaps includes a sociological perspective, to examine this problem and suggest means for improving the objectivity of the abundance index ranking process at the DW.

The checklist used by the DW to examine each index gives a good indication of the completeness of index analysis and documentation. It may be possible to also include numerical evaluation (e.g. scale 1-10) of major factors used to determine rankings – e.g. length of series, spatial coverage, fishery dependence, stock specificity etc.

Blacknose shark stock area name

Working papers for the DW variously describe the region where the eastern US stock of blacknose occurs (other than the Gulf of Mexico (GOM)) as US South Atlantic, South Atlantic Bight, western North Atlantic, or northwest Atlantic. I find the descriptions that include south Atlantic the most confusing, as from an international perspective the south Atlantic region is in the southern hemisphere. I understand that these are US domestic stock assessments, and that the regions most need to make sense to local fishery managers and fishers. However, for my own sense of clarity I'll refer to that stock as the northwest Atlantic (NWAT).

2.2.2 TOR2 Evaluate the adequacy, appropriateness, and application of methods used to assess the stock.

The analytical approaches used to assess the shark stocks were sufficient to provide an acceptable basis for management advice for blacknose NWAT, sandbar and dusky sharks. The inability of the assessment model to fit apparent trends in abundance indices for blacknose GOM shark resulted in the rejection of that assessment by the RP. I agree with the comments and recommendations in the summary report.

Variants of an age-structured production model (ASPM) were used: a state-space age-structured model (SPASM) for the two blacknose and the sandbar stocks, and an age-structured catch-free production model (ASCFM) for dusky shark.

Both variants had been previously used to assess shark stocks and these species specifically, so were parameterized to accept life history information peculiar to sharks, particularly in relation to pup production, density dependence and survival.

The SPASM model has the ability to effectively estimate catch deviations which is particularly useful for the stocks here that have uncertain catch histories. Advantage of this feature was only taken for blacknose shark because of high relative weight (and almost perfect fit) to catch data in the sandbar shark assessment. A considerably simpler model framework that only fitted to abundance indices could have been used for sandbar shark.

Several additional capabilities of recent standard integrated age-structured assessments (e.g. stock synthesis) could ideally be applied particularly to the assessments of blacknose and sandbar sharks:

1. Estimation of recruitment deviations allows a model greater freedom to fit consistent patterns in abundance indices that can not be explained simply with fishery removals. Examination of alternative sensitivity analyses during the RW showed a fundamental inconsistency between trends in abundance indices and historical catches for blacknose GOM that could potentially be better explained by patterns in annual recruitment.

2. Selectivity can be modeled as a length rather than an age-based process. In addition, any length composition data that were used to determine the current fishery selectivities external to the model can be brought in, allowing the assessment model to estimate selectivity in an integrated fashion, accounting for growth and selectivity interactions.

3. Any available age and/or length composition data can be used and fitted to directly by the assessment model, although it is recognized that age/length-composition data are not widely available for these particular shark species.

4. Particularly in the case of stock synthesis, a large amount of diagnostic information is produced automatically by the model, and R scripts convert the diagnostic output into a form suitable for adding to the assessment documentation.

The AT has indicated that they have been working on migrating the shark assessments to stock synthesis. Continuation of this work should be encouraged.

The ASCFM was appropriate for application to the assessment of dusky shark and provides a useful approach when historical catch levels are unknown.

2.2.3 TOR3 Recommend appropriate estimates of stock abundance, biomass, and exploitation.

The analytical approach was appropriate and provides an acceptable basis for management advice for blacknose NWAT, sandbar and dusky sharks. I agree with the comments and recommendations in the summary report.

2.2.4 TOR4 Evaluate the methods used to estimate population benchmarks and stock status (e.g., MSY, Fmsy, Bmsy, MSST, MFMT, or their proxies); recommend appropriate management benchmarks, provide estimated values for management benchmarks, and declare stock status, consistent with the stock status determination criteria, benchmark, and biological reference points in the Consolidated HMS FMP, proposed FMPs and Amendments, other ongoing or proposed management programs, and National Standards.

The analytical approach was appropriate and provides an acceptable basis for management advice. I agree with the comments and recommendations in the summary report.

Assessment base cases could not be identified by the AT and the RP, so central values for population benchmarks and stock status were not available. The RP chose a set of sensitivity analyses that encompassed a range of productivity and historical catch scenarios so that a plausible range could be provided for benchmarks and status indicators. Generally, the assessments were able to provide robust indications of whether the stocks were overfished (all were), and whether overfishing was currently occurring (yes for blacknose NWAT and dusky sharks, no for most scenarios for sandbar shark).

Simulation testing

Simulation testing can be used to verify assessments models, compare alternative assessment model structures, and to test the robustness of harvest control rules implemented by management. An often used framework for such testing is Management Strategy Evaluation (MSE). Although the implementation of a MSE system requires a fairly large resource commitment initially, once the system has been developed the ongoing maintenance can be minimal. While management benchmarks applied to these shark stocks generally comply with those used in many other US fisheries, generic systems may not always work well in specific circumstances. There

could be a considerable advantage in building a system to test the robustness of the current harvest strategy to the major uncertainties in the assessments.

2.2.5 TOR5 Evaluate the adequacy, appropriateness, and application of the methods used to project future population status, rebuilding timeframe, and generation time; recommend appropriate estimates of future stock condition (e.g., exploitation, abundance, biomass).

The projection approach used for dusky shark was appropriate and provides an acceptable basis for management advice. The approach used for blacknose and sandbar sharks did not project uncertainty in the assessed current state of the stock, so was rejected by the RP. The AT undertook to continue work on more appropriate projections soon after the RW. I agree with the comments and recommendations in the summary report.

2.2.6 TOR6 Evaluate the adequacy, appropriateness, and application of methods used to characterize the uncertainty in estimated parameters. Provide measures of uncertainty for estimated parameters. Ensure that the implications of uncertainty in technical conclusions are clearly stated.

Within-model uncertainty in estimated parameters was estimated from the Hessian matrix, using assumptions of normality of error distributions, and the resulting CV values were reported. A superior method for characterizing within-model uncertainty and demonstrating model convergence is using MCMC. The ability to invert the Hessian and report CV values was also used by the AT as evidence of model convergence. Additional tests are required to ensure that a model that has finished and provided a Hessian that can be inverted has actually converged, and has not, for example, finished at a local rather than a global minimum.

This within-model uncertainty was also propagated into projections for dusky shark. However, between-model uncertainty is normally greater in magnitude. Plausible alternative models are often used to better estimate the true uncertainty in the assessment results. As the AT and RP were unable to choose a specific base-case that could be used for management advice, the uncertainty in stock productivity and biomass scale (due to uncertain historical catch levels) was carried into the management advice for the shark assessments, and results presented as plausible ranges rather than central values.

2.2.7 TOR7. Ensure that stock assessment results are clearly and accurately presented in the Stock Assessment Report and that reported results are consistent with Review Panel recommendations. If there are differences between the AW and RW due to reviewer's requests for changes and/or additional model runs, etc., describe those reasons and results.

This TOR was partially fulfilled, and I agree with the recommendations in the summary report. A set of standard diagnostics should be presented for the base case and

sensitivity analyses. Developing national standards in stock assessment reporting should be implemented.

2.2.8 TOR8 Evaluate the SEDAR Process as applied to the reviewed assessments and identify any Terms of Reference that were inadequately addressed by the Data or Assessment Workshops.

I found the SEDAR process of data workshop, assessment workshop and review workshop for these highly migratory shark species to be effective. The review meeting was attended by assessment scientists, managers and SEDAR representatives. Stakeholder representatives were invited but did not attend the proceedings. The TORs of the data and assessment workshops were adequately addressed.

A difficulty with the current SEDAR process is that critical review occurs at the end of the DW, AW, RW process when there is little time to implement the advice, at least within the current assessment cycle. Over time, such a process will be successful, but the response is slow, because major recommendations from the review may not be implemented until the next full assessment. A response to this by SEDAR has been to install reviewers lower in the process – for the current assessments a reviewer was present at the DW, and another completed a pre-RW desktop review of the assessments. The advice from these earlier reviews has been valuable, and this does work towards a solution to the problem. However, the AT indicated that there was limited opportunity for the examination of the assessments by a wider group of assessment scientists while the assessment was being developed. I believe that a process that allows experienced assessment scientists from within the US to attend AWs and offer advice to the ATs may be useful. This could be achieved, for example, by SEDAR providing a list at the start of the year of AWs that are planned, and call for assessment scientist volunteers who may wish to participate in those workshops. Such a process would be advantageous both to the participating volunteers (in gaining more varied stock assessment experience), and also the AW (in improved technical advice). Experimental use of webinars that partly address this function have already been undertaken, but there seems to be an advantage in having a physical presence for more detailed technical discussions.

Although industry members were not present at the RW, an email containing statements that a fisher representative would like to have made at the RW was sent to the RP. While many of the issues raised were relevant and were dealt with during the RW, it was difficult for the RP to directly respond because many of the issues had been previously brought to the DW and AW and formed part of those considerations. As the reviewers were not present for these earlier discussions, the status of the comments in relation to the consensus view was difficult for the reviewers to determine. I understand the need for transparency of the RW proceedings. Perhaps submitted written views that pertain to summary/consensus views in the DW and AW reports should also be accompanied by some form of comparably detailed discussion by members of the DW/AW – either also in writing, or during the RW.

2.2.9 TOR9 Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted. Clearly denote research and monitoring needs that could improve the reliability of future assessments. Recommend an appropriate interval for the next assessment, and whether a benchmark or update assessment is warranted.

A considerable list of research recommendations was developed by the RP that appears in the summary report and I agree with those recommendations.

2.2.10 TOR10 10. Prepare a Peer Review Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference. Provide a list of tasks that were not completed, who is responsible for completing each task, and when each task will be completed. Complete and submit the Final Summary Report within 3 weeks of workshop conclusion.

Completed.

Appendix 1: Bibliography of materials provided for review

SEDAR 21
HMS Sandbar, Dusky, and Blacknose Sharks
Workshop Document List

Document #	Title	Authors	Working Group
Documents Prepared for the Data Workshop			
SEDAR21-DW-01	Standardized catch rates of sandbar and blacknose shark from a fishery independent survey in northwest Florida, 1996-2009.	John Carlson and Dana Bethea	Indices
SEDAR21-DW-02	Standardized catch rates of sandbar, dusky and blacknose sharks from the Commercial Shark Fishery Longline Observer Program, 1994-2009	John Carlson, Loraine Hale, Alexia Morgan and George Burgess	Indices
SEDAR21-DW-03	Standardized Catch Rates of Blacknose Shark from the Southeast Shark Drift Gillnet Fishery: 1993-2009	John Carlson and Michelle Passerotti	Indices
SEDAR21-DW-04	Standardized Catch Rates of Blacknose Shark from the Southeast Sink Gillnet Fishery: 2005-2009	John Carlson and Michelle Passerotti	Indices
SEDAR21-DW-05	The effect of turtle excluder devices (TEDS) on the bycatch of small coastal sharks in the Gulf of Mexico Peneid shrimp fishery	S.W. Raborn, K.I. Andrews, B.J. Gallaway, J.G. Cole, and W.J. Gazey	Catch Statistics
SEDAR21-DW-06	Reproduction of the sandbar shark *Carcharhinus plumbeus* in the U.S. Atlantic Ocean and Gulf of Mexico	Baremore, I.E. and L.F. Hale	Life History
SEDAR21-DW-07	Description of data sources used to quantify shark catches in commercial and recreational fisheries in the U.S. Atlantic Ocean and Gulf of Mexico	Baremore, I.E., Balchowski, H., Matter, V, Cortes, E.	Catch Statistics
SEDAR21-DW-08	Standardized catch rates for dusky and sandbar sharks from the US pelagic longline logbook and observer programs using generalized linear mixed models.	Enric Cortés	Indices
SEDAR21-DW-09	Updated catches	Enric Cortés	Catch Statistics
SEDAR21-DW-10	Large and Small Coastal Sharks Collected Under the Exempted Fishing Program Managed by the Highly Migratory Species Management Division	Jackie Wilson	Catch Statistics
SEDAR21-DW-11	Abundance series from the MRFSS	Beth Babcock	Indices

	data set		
SEDAR21-DW-12	Catches of Sandbar Shark from the Southeast US Gillnet Fishery: 1999-2009	Michelle S. Passerotti and John K. Carlson	Catch Statistics
SEDAR21-DW-13	Errata Sheet for 'CATCH AND BYCATCH IN THE SHARK GILLNET FISHERY: 2005-2006', NOAA Technical Memorandum NMFS-SEFSC-552	Michelle S. Passerotti and John K. Carlson	Catch Statistics
SEDAR21-DW-14	Data Update to Illegal Shark Fishing off the coast of Texas by Mexican Lanchas	Karyl Brewster-Geisz, Steve Durkee, and Patrick Barelli	Catch Statistics
SEDAR21-DW-15	An update of blacknose shark bycatch estimates taken by the Gulf of Mexico penaeid shrimp fishery from 1972 to 2009	W.J. Gazey and K. Andrews	Catch Statistics
SEDAR21-DW-16	A Negative Binomial Loglinear Model with Application for the Estimation of Bycatch of Blacknose Shark in the Gulf of Mexico Penaeid Shrimp Fishery	W.J. Gazey, K. Andrews, and B.J. Gallaway	Catch Statistics
SEDAR21-DW-17	Life history parameters for the sandbar shark in the Northwest Atlantic and Eastern Gulf of Mexico	Romine and Musick	Life History
SEDAR21-DW-18	Standardized catch rates of sandbar sharks and dusky sharks in the VIMS Longline Survey: 1975-2009	Romine, Parsons, Grubbs, Musick, and Sutton	Indices
SEDAR21-DW-19	Updating the blacknose bycatch estimates in the Gulf of Mexico using the Nichols method	Katie Andrews	Catch Statistics
SEDAR21-DW-20	Tag and recapture data for blacknose, *Carcharhinus acronotus*, sandbar, *C. plumbeus*, and dusky shark, *C. obscurus*, as kept in the NOAA Fisheries Southeast Fisheries Science Center Elasmobranch Tagging Management System, 1999-2009	D. Bethea and Carlson, J.K.	Life History
SEDAR21-DW-21	Age and growth of the sandbar shark, *Carcharhinus plumbeus*, in the Gulf of Mexico and southern Atlantic Ocean.	L. Hale and I. Baremore	Life History
SEDAR21-DW-22	Catch and bycatch in the bottom longline observer program from 2005 to 2009	Hale, L.F., S.J.B. Gulak, and J.K. Carlson	Catch Statistics
SEDAR21-DW-23	Identification and evaluation of shark bycatch in Georgia's commercial shrimp trawl fishery with implications for management	C. N. Belcher and C. A. Jennings	Catch Statistics
SEDAR21-DW-24	Increases in maximum observed age	Bryan S. Frazier,	Life History

	of blacknose sharks, *Carcharhinus acronotus*, based on three long term recaptures from the Western North Atlantic	William Driggers, and Christian Jones	
SEDAR21-DW-25	Catch rates and size distribution of blacknose shark *Carcharhinus acronotus* in the northern Gulf of Mexico, 2006-2009	J. M. Drymon, S.P. Powers, J. Dindo and G.W. Ingram	Indices
SEDAR21-DW-26	Reproductive cycle of sandbar sharks in the northwestern Atlantic Ocean and Gulf of Mexico	Andrew Piercy	Life History
SEDAR21-DW-27	Standardized catch rates for juvenile sandbar sharks caught during NMFS COASTSPAN longline surveys in Delaware Bay	Camilla T. McCandless	Indices
SEDAR21-DW-28	Standardized catch rates for sandbar and dusky sharks caught during the NEFSC coastal shark bottom longline survey	Camilla T. McCandless and Lisa J. Natanson	Indices
SEDAR21-DW-29	Standardized catch rates for sandbar and blacknose sharks caught during the Georgia COASTSPAN and GADNR red drum longline surveys	Camilla T. McCandless and Carolyn N. Belcher	Indices
SEDAR21-DW-30	Standardized catch rates for sandbar and blacknose sharks caught during the South Carolina COASTSPAN and SCDNR red drum surveys	Camilla T. McCandless and Bryan Frazier	Indices
SEDAR21-DW-31	Standardized catch rates of sandbar and dusky sharks from historical exploratory longline surveys conducted by the NMFS Sandy Hook, NJ and Narragansett, RI Labs	Camilla T. McCandless and John J. Hoey	Indices
SEDAR21-DW-32	Standardized catch rates of dusky and sandbar sharks observed in the gillnet fishery by the Northeast Fisheries Observer Program	NOT RECEIVED	Indices
SEDAR21-DW-33	Standardized catch rates for blacknose, dusky and sandbar sharks caught during a UNC longline survey conducted between 1972 and 2009 in Onslow Bay, NC	Frank J. Schwartz, Camilla T. McCandless, and John J. Hoey	Indices
SEDAR21-DW-34	Sandbar and blacknose shark occurrence in standardized longline, drumline, and gill net surveys in southwest Florida coastal waters of the Gulf of Mexico	Robert Hueter, John Morris, and John Tyminski	Indices
SEDAR21-DW-35	Atlantic Commercial Landings of blacknose, dusky, sandbar, unclassified, small coastal, and requiem sharks provided by the	Christopher Hayes	Catch Statistics

	Atlantic Coastal Cooperative Statistics Program (ACCSP)		
SEDAR21-DW-36	Life history and population structure of blacknose sharks, *Carcharhinus acronotus*, in the western North Atlantic Ocean	William B. Driggers III, John K. Carlson, Bryan Frazier, G. Walter Ingram Jr., Joseph M. Quattro, James A. Sulikowski and Glenn F. Ulrich	Life History
SEDAR21-DW-37	Movements and environmental preferences of dusky sharks, *Carcharhinus obscurus*, in the northern Gulf of Mexico	Eric Hoffmayer, James Franks, William Driggers, and Mark Grace	Life History
SEDAR21-DW-38	Preliminary Mark/Recapture Data for the Sandbar Shark (*Carcharhinus plumbeus*), Dusky Shark (*C. obscurus*), and Blacknose Shark (*C. acronotus*) in the Western North Atlantic	Nancy E. Kohler and Patricia A. Turner	Life History
SEDAR21-DW-39	Catch rates, distribution and size composition of blacknose, sandbar and dusky sharks collected during NOAA Fisheries Bottom Longline Surveys from the U.S. Gulf of Mexico and U.S. Atlantic Ocean	Walter Ingram	Indices
SEDAR21-DW-40	Standardized catch rates of the blacknose shark (*Carcharhinus acronotus*) from the United States south Atlantic gillnet fishery, 1998-2009	Kristin Erickson and Kevin McCarthy	Indices
SEDAR21-DW-41	Index of Abundance of Sandbar Shark (*Carcharinus plumbeus*) in the Southeast Region, 1992-2007, From United States Commercial Fisheries Longline Vessels	Heather Balchowsky and Kevin McCarthy	Indices
SEDAR21-DW-42	Examination of commercial bottom longline data for the construction of indices of abundance of dusky shark in the Gulf of Mexico and US South Atlantic	Kevin McCarthy	Indices
SEDAR21-DW-43	Indices of abundance for blacknose shark from the SEAMAP trawl survey	Walter Ingram	Indices
SEDAR21-DW-44	Standardized catch rates of sandbar sharks (*Carcharhinus plumbeus*) and dusky sharks (*Carcharhinus obscurus)* from the large pelagic rod and reel survey 1986-2009	John F. Walter and Craig Brown	Indices

SEDAR21-DW-45	A note on the number of pups for two blacknose sharks (*Carcharhinus acronotus*) from the Gulf of Mexico	David Stiller	Life History
SEDAR21-DW-46	Mote LL index	Walter Ingram	Indices

Documents Prepared for the Assessment Process

SEDAR21-AP-01	Hierarchical analysis of blacknose, sandbar, and dusky shark CPUE indices	Paul Conn
SEDAR21-AP-02	Computer code for the SEDAR 21 age-structured catch-free model for dusky sharks	Sustainable Fisheries Branch – NMFS Beaufort Lab
SEDAR21-AP-03	SEDAR 21 Sandbar Shark pre-review assessment process report	SEDAR 21 Assessment Process Panel
SEDAR21-AP-04	SEDAR 21 Dusky Shark pre-review assessment process report	SEDAR 21 Assessment Process Panel
SEDAR21-AP-05	SEDAR 21 Atlantic Blacknose Shark pre-review assessment process report	SEDAR 21 Assessment Process Panel
SEDAR21-AP-06	SEDAR 21 Gulf of Mexico Blacknose Shark pre-review assessment process report	SEDAR 21 Assessment Process Panel

Documents Prepared for the Review Workshop

SEDAR21-RW-01	Computer code for the SEDAR 21 age-structured production model for sandbar sharks	Sustainable Fisheries Branch – NMFS Panama City Lab
SEDAR 21-RW-02	Computer code for the SEDAR 21 age-structured production model for blacknose sharks	Sustainable Fisheries Branch – NMFS Beaufort Lab

Final Stock Assessment Reports

SEDAR21-SAR1	Sandbar Shark	
SEDAR21-SAR2	Dusky Shark	
SEDAR21-SAR3	Gulf of Mexico Blacknose Shark	
SEDAR21-SAR4	Atlantic Blacknose Shark	

Reference Documents

SEDAR21-RD01	SEDAR 11 (LCS) Final Stock Assessment Report	SEDAR 11 Panels
SEDAR21-RD02	SEDAR 13 (SCS) Final Stock Assessment Report	SEDAR 13 Panels
SEDAR21-RD03	Stock assessment of dusky shark in the U.S. Atlantic and Gulf of Mexico	E. Cortés, E. Brooks, P. Apostolaki, and C.A. Brown
SEDAR21-RD04	Report to Directed Shark Fisheries, Inc. on the 2006 SEDAR 11 Assessment for Sandbar Shark	Frank Hester and Mark Maunder
SEDAR21-RD05	Use of a Fishery-Independent Trawl Survey to Evaluate Distribution Patterns of Subadult Sharks in Georgia	Carolyn Belcher and Cecil Jennings
SEDAR21-RD06	Demographic analyses of the dusky	Jason G. Romine & John A. Musick

	shark, *Carcharhinus obscurus*, in the Northwest Atlantic incorporating hooking mortality estimates and revised reproductive parameters	& George H. Burgess
SEDAR21-RD07	Observations on the reproductive cycles of some viviparous North American sharks	José I. Castro
SEDAR21-RD08	Sustainability of elasmobranchs caught as bycatch in a tropical prawn (shrimp) trawl fishery	Ilona C. Stobutzki, Margaret J. Miller, Don S. Heales, David T. Brewer
SEDAR21-RD09	Age and growth estimates for the dusky shark, *Carcharhinus obscurus,* in the western North Atlantic Ocean	Lisa J. Natanson, John G. Casey and Nancy E. Kohler
SEDAR21-RD10	Reproductive cycle of the blacknose shark *Carcharhinus acronotus* in the Gulf of Mexico	J. A. Sulikowski, W. B. Driggers III, T. S. Ford, R. K. Boonstra and J. K. Carlson
SEDAR21-RD11	A preliminary estimate of age and growth of the dusky shark Carcharhinus obscurus from the south-west Indian Ocean, with comparison to the western north Atlantic population	L.J. Natanson and N.E. Kohler
SEDAR21-RD12	Bycatch and discard mortality in commercially caught blue sharks *Prionace glauca* assessed using archival satellite pop-up tags	Steven E. Campana, Warren Joyce, Michael J. Manning
SEDAR21-RD13	Short-term survival and movements of Atlantic sharpnose sharks captured by hook-and-line in the north-east Gulf of Mexico	C. W. D. Gurshin and S. T. Szedlmayer
SEDAR21-RD14	Plasma catecholamine levels as indicators of the post-release survivorship of juvenile pelagic sharks caught on experimental drift longlines in the Southern California Bight	Barbara V. Hight, David Holts, Jeffrey B. Graham, Brian P. Kennedy, Valerie Taylor, Chugey A. Sepulveda, Diego Bernal, Darlene RamonB, Randall Rasmussen and N. Chin Lai
SEDAR21-RD15	The physiological response to capture and handling stress in the Atlantic sharpnose shark, *Rhizoprionodon terraenovae*	Eric R. Hoffmayer & Glenn R. Parsons
SEDAR21-RD16	The estimated short-term discard mortality of a trawled elasmobranch, the spiny dogfish (*Squalus acanthias*)	John W. Mandelman & Marianne A. Farrington
SEDAR21-RD17	At-vessel fishing mortality for six species of sharks caught in the northwest Atlantic and Gulf of Mexico	Alexia Morgan and George H. Burgess
SEDAR21-RD18	Evaluating the physiological and physical consequences of capture on post-release survivorship in large pelagic fishes	G.B. Skomal
SEDAR21-RD19	The Physiological Response of Port	L. H. Frick, R. D. Reina, and T. I.

	Jackson Sharks and Australian Swellsharks to Sedation, Gill-Net Capture, and Repeated Sampling in Captivity	Walker
SEDAR21-RD20	Serological Changes Associated with Gill-Net Capture and Restraint in Three Species of Sharks	C. Manire, R. Hueter, E. Hull and R. Spieler
SEDAR21-RD21	Differential sensitivity to capture stress assessed by blood acid–base status in five carcharhinid sharks	John W. Mandelman & Gregory B. Skomal
SEDAR21-RD22	Review of information on cryptic mortality and the survival of sharks and rays released by recreational fishers	Kevin McLoughlin and Georgina Eliason
SEDAR21-RD23	Pathological and physiological effects of stress during capture and transport in the juvenile dusky shark, *Carcharhinus obscurus*	G. Cliff and G.D. Thurman
SEDAR21-RD24	Pop-off satellite archival tags to chronicle the survival and movements of blue sharks following release from longline gear	Michael Musyl and Richard Brill
SEDAR21-RD25	Evaluation of bycatch in the North Carolina Spanish and king mackerel sinknet fishery with emphasis on sharks during October and November 1998 and 2000 including historical data from 1996-1997	Chris Jensen and Glen Hopkins
SEDAR21-RD26		
SEDAR21-RD27		

Appendix 2: A copy of the CIE Statement of Work

Attachment A: Statement of Work for Dr. Neil Klaer

External Independent Peer Review by the Center for Independent Experts

SEDAR 21 Highly Migratory Species (HMS) Sandbar, Dusky, and Blacknose sharks Review Workshop

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from www.ciereviews.org.

Project Description: SEDAR 21 will be a compilation of data, a benchmark assessment of the stock, and an assessment review for conducted for HMS Sandbar, Dusky, and Blacknose sharks. The review workshop provides an independent peer review of SEDAR stock assessments. The term review is applied broadly, as the review panel may request additional analyses, error corrections and sensitivity runs of the assessment models provided by the assessment workshop panel. The review panel is ultimately responsible for ensuring that the best possible assessment is provided through the SEDAR process. The stocks assessed through SEDAR 21 are within the jurisdiction of the Highly Migratory Species Division of NOAA Fisheries and the states of Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, Virginia, Maryland, Delaware, Pennsylvania, New Jersey, New York, Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The tentative agenda of the panel review meeting is attached in **Annex 3**.

Requirements for CIE Reviewers: Three CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. CIE reviewers shall have expertise, working knowledge, and recent experience in stock assessment, statistics, fisheries science, and marine biology sufficient to complete the primary task of reviewing the technical details of the methods used for the assessment. Each CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein.

Location of Peer Review: Each CIE reviewer shall conduct an independent peer review during the panel review meeting scheduled in Annapolis, MD during 18-22 April 2011.

Statement of Tasks: Each CIE reviewers shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering Committee, the CIE shall provide the CIE reviewer information (full name, title, affiliation, country, address, email) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE reviewers with the background documents, reports, foreign national security clearance, and other information concerning pertinent meeting arrangements. The NMFS Project Contact is also responsible for providing the Chair a copy of the SoW in advance of the panel review meeting. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Foreign National Security Clearance: When CIE reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for CIE reviewers who are non-US citizens. For this reason, the CIE reviewers shall provide requested information (e.g., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, and home country) to the NMFS Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations available at the Deemed Exports NAO website: http://deemedexports.noaa.gov/sponsor.html).

Pre-review Background Documents: Two weeks before the peer review, the NMFS Project Contact will send (by electronic mail or make available at an FTP site) to the CIE reviewers the necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE Lead Coordinator on where to send documents. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review.

Panel Review Meeting: Each CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs, and shall not serve in any other role unless specified herein. **Modifications to the SoW and ToRs can not be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.** Each CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the ToRs as specified herein. The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). The NMFS Project Contact is responsible for ensuring that the Chair understands the contractual role of the CIE reviewers as specified herein. The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the SoW. Each CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. Each CIE reviewer shall complete the independent peer review addressing each ToR as described in Annex 2.

Other Tasks – Contribution to Summary Report: Each CIE reviewer may assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review. Each CIE reviewer is not required to reach a consensus, and should provide a brief summary of the reviewer's views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

Specific Tasks for CIE Reviewers: The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review.
2) Participate during the panel review meeting in Savannah, Georgia during 18-22 April 2011.
3) In Annapolis, Maryland during 18-22 April 2011 as specified herein, conduct an independent peer review in accordance with the ToRs (**Annex 2**).
4) No later than 6 May 2011, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Mr. Manoj Shivlani, CIE Lead Coordinator, via email to shivlanim@bellsouth.net, and CIE Regional Coordinator, via email to David Sampson david.sampson@oregonstate.edu. Each CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in **Annex 2**.

Schedule of Milestones and Deliverables: CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

21 March 2011	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
4 April 2011	NMFS Project Contact sends the CIE Reviewers the pre-review documents
18-22 April 2011	Each reviewer participates and conducts an independent peer review during the panel review meeting
6 May 2011	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
20 May 2011	CIE submits CIE independent peer review reports to the COTR
27 May 2011	The COTR distributes the final CIE reports to the NMFS Project Contact and regional Center Director

Modifications to the Statement of Work: Requests to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on substitutions. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not be changed once the peer review has begun.

Acceptance of Deliverables: Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (CIE independent peer review reports) to the COTR (William Michaels, via William.Michaels@noaa.gov).

Applicable Performance Standards: The contract is successfully completed when the COTR provides final approval of the contract deliverables. The acceptance of the contract deliverables shall be based on three performance standards:
(1) each CIE report shall completed with the format and content in accordance with **Annex 1**,
(2) each CIE report shall address each ToR as specified in **Annex 2**,
(3) the CIE reports shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

Distribution of Approved Deliverables: Upon acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COTR. The COTR will distribute the CIE reports to the NMFS Project Contact and Center Director.

Support Personnel:

William Michaels, Program Manager, COTR
NMFS Office of Science and Technology
1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
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Manoj Shivlani, CIE Lead Coordinator
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shivlanim@bellsouth.net   Phone: 305-383-4229

Roger W. Peretti, Executive Vice President
Northern Taiga Ventures, Inc. (NTVI)
22375 Broderick Drive, Suite 215, Sterling, VA 20166
RPerretti@ntvifederal.com   Phone: 571-223-7717

Key Personnel:

NMFS Project Contact:

Julie A Neer, SEDAR Coordinator

4055 Faber Place Drive, Suite 201, North Charleston, SC 29405

Julie.neer@safmc.net   Phone: 843-571-4366

Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether the science reviewed is the best scientific information available.

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR in which the weaknesses and strengths are described, and Conclusions and Recommendations in accordance with the ToRs.

   a. Reviewers should describe in their own words the review activities completed during the panel review meeting, including providing a brief summary of findings, of the science, conclusions, and recommendations.

   b. Reviewers should discuss their independent views on each ToR even if these were consistent with those of other panelists, and especially where there were divergent views.

   c. Reviewers should elaborate on any points raised in the Summary Report that they feel might require further clarification.

   d. Reviewers shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.

   e. The CIE independent report shall be a stand-alone document for others to understand the weaknesses and strengths of the science reviewed, regardless of whether or not they read the summary report. The CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the summary report.

3. The reviewer report shall include the following appendices:

   Appendix 1: Bibliography of materials provided for review
   Appendix 2: A copy of the CIE Statement of Work
   Appendix 3: Panel Membership or other pertinent information from the panel review meeting.

Annex 2: Tentative Terms of Reference for the Peer Review

**SEDAR 21 Highly Migratory Species (HMS) Sandbar, Dusky, and Blacknose sharks
Review Workshop**

1. Evaluate the adequacy, appropriateness, and application of data used in the assessment.

2. Evaluate the adequacy, appropriateness, and application of methods used to assess the stock.

3. Recommend appropriate estimates of stock abundance, biomass, and exploitation.

4. Evaluate the methods used to estimate population benchmarks and stock status(*e.g., MSY, Fmsy, Bmsy, MSST, MFMT, or their proxies*); recommend appropriate management benchmarks, provide estimated values for management benchmarks, and declare stock status, consistent with the stock status determination criteria, benchmark, and biological reference points in the Consolidated HMS FMP, proposed FMPs and Amendments, other ongoing or proposed management programs, and National Standards.

5. Evaluate the adequacy, appropriateness, and application of the methods used to project future population status, rebuilding timeframe, and generation time; recommend appropriate estimates of future stock condition (e.g., exploitation, abundance, biomass).

6. Evaluate the adequacy, appropriateness, and application of methods used to characterize the uncertainty in estimated parameters. Provide measures of uncertainty for estimated parameters. Ensure that the implications of uncertainty in technical conclusions are clearly stated.

7. Ensure that stock assessment results are clearly and accurately presented in the Stock Assessment Report and that reported results are consistent with Review Panel recommendations. If there are differences between the AW and RW due to reviewer's requests for changes and/or additional model runs, etc., describe those reasons and results.

8. Evaluate the SEDAR Process as applied to the reviewed assessments and identify any Terms of Reference that were inadequately addressed by the Data or Assessment Workshops.

9. Consider the research recommendations provided by the Data and Assessment workshops and make any additional recommendations or prioritizations warranted. Clearly denote research and monitoring needs that could improve the reliability of future assessments. Recommend an appropriate interval for the next assessment, and whether a benchmark or update assessment is warranted.

10. Prepare a Peer Review Summary summarizing the Panel's evaluation of the stock assessment and addressing each Term of Reference. Provide a list of tasks that were not completed, who is responsible for completing each task, and when each task will be completed. Complete and submit the Final Summary Report within 3 weeks of workshop conclusion.

The review panel may request additional sensitivity analyses, evaluation of alternative assumptions, and correction of errors identified in the assessments provided by the assessment workshop panel; the review panel may not request a new assessment. Additional details regarding the latitude given the review panel to deviate from assessments provided by the assessment workshop panel are provided in the *SEDAR Guidelines* and the *SEDAR Review Panel Overview and Instructions*.

** The panel shall ensure that corrected estimates are provided by addenda to the assessment report in the event corrections are made in the assessment, alternative model configurations are recommended, or additional analyses are prepared as a result of review panel findings regarding the TORs above.**

Annex 3: Tentative Agenda

SEDAR 21 Highly Migratory Species (HMS) Sandbar, Dusky, and Blacknose sharks
Review Workshop
Annapolis, Maryland April 18-22, 2011

Monday

1:00 p.m.	**Convene**	
1:00 – 1:30	**Introductions and Opening Remarks**	**Coordinator**
	- Agenda Review, TOR, Task Assignments	
1:30 – 3:30	**Assessment Presentation**	**TBD**
3:30 – 4:00	**Break**	
4:00 – 5:00	**Continue Presentation/Discussion**	**Chair**
5:00 p.m. - 6:00 p.m.	**Panel Work Session**	**Chair**

Tuesday

8:30 a.m. – 11:30 a.m.	**Assessment Presentation**	**Chair**
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 3:30 p.m.	**Panel Discussion**	**TBD**
	- *Assessment Data & Methods*	
	- Identify additional analyses, sensitivities, corrections	
3:30 p.m. – 3:45 p.m.	**Break**	
3:45 p.m. – 5:00 p.m.	**Panel Discussion**	**Chair**
	- Continue deliberations	
	- Review additional analyses	
5:00 p.m. - 6:00 p.m.	**Panel Work Session**	**Chair**

*Tuesday Goals***:** Initial presentations completed, sensitivities and modifications identified.

Wednesday

8:30 a.m. – 11:30 a.m.	**Panel Discussion**	**Chair**
	- Review additional analyses, sensitivities	
	- Consensus recommendations and comments	
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 3:30 p.m.	**Panel Discussion**	**TBD**
3:30 p.m. – 3:45 p.m.	**Break**	
3:45 p.m. – 5:00 p.m.	**Panel Discussion**	**Chair**
5:00 p.m. - 6:00 p.m.	**Panel Work Session**	**Chair**

Wednesday Goals: Final sensitivities identified, Preferred models selected, Projection approaches approved, Summary report drafts begun

Thursday

8:30 a.m. – 11:30 a.m.	**Panel Discussion**	**Chair**
	- Final sensitivities reviewed.	
	- Projections reviewed.	
11:30 a.m. – 1:00 p.m.	**Lunch Break**	
1:00 p.m. – 3:30 p.m.	**Panel Discussion or Work Session**	**Chair**
3:30 p.m. - 3:45 p.m.	**Break**	
3:45 p.m. - 6:00 p.m.	**Panel Work Session**	**Chair**
	- Review Consensus Reports	

Thursday Goals: Complete assessment work and discussions. Final results available. Draft Summary Report reviewed.

Friday

8:30 a.m. – 12:00 p.m.	**Panel Work Session**	**Chair**
12:00 p.m.	**ADJOURN**	

Appendix 3: List of participants

Workshop Panel
Larry Massey, Chair .... NMFS SEFSC
Jamie Gibson .... CIE Reviewer
Neil Klaer .... CIE Reviewer
Shelton Harley .... CIE Reviewer

Analytic Representation
Enric Cortés ....NMFS SEFSC Panama City
Kate Andrews .... NMFS SEFSC Beaufort
Paul Conn .... NMFS AFSC

Rapporteur
Ivy Baremore ....NMFS SEFSC Panama City

HMS Representation
Karyl Brewster-Geisz .... NMFS

Observers
....SERO
....SERO

Staff
Julie Neer.. SEDAR
Tyree Davis ....NMFS Miami