Shark Resource Assessment Group (SharkRAG)

Meeting 2 2022

Meeting minutes

October 18 and 19 2022

Agenda item 1. Preliminaries

1.1 Welcome and apologies

1. The Chair opened the meeting at 1310 hrs with an Acknowledgement of Country and welcomed members and observers.

2. Members and participants noted that the meeting was being recorded for the purposes of taking minutes.

3. Attendees	Membership
Mr. Sandy Morison	Chair
Mr. Roshan Hanamseth	Executive Officer
Dr. Lara Ainley	AFMA member
Dr. Robin Thomson	Scientific member
Dr. Andrew Penney	Scientific member
Mr. Kyriakos Toumazos	Industry member
Mr. Jamie Papas	Industry member
Mr. Craig Harris	Industry member
Mr. Leigh Castle	Industry member
Ms. Anissa Lawrence	Environment/Conservation member
Dr. Julian Morison	Economic member
Apologies	**Membership**
Dr. Charlie Huveneers	Scientific member

Presenters	Organisation
Dr. Miriana Sporcic	CSIRO
Dr. Paul Burch	CSIRO
Invited attendees	**Organisation**
Mr. James Woodhams	ABARES
Mr. Ross Bromley	Southern Shark Industry Association

Presenters	Organisation
Observers	**Organisation**
Mr. Dan Corrie	AFMA
Dr. Nastaran Mazloumi	AFMA
Ms. Michelle Henriksen	AFMA
Mr. Kurt Davis	ABARES

1.2 Declarations of interest

4. The Chair invited SharkRAG members to discuss attendee declarations of interest.

5. SharkRAG members followed the declarations of interest procedure as outlined in Fisheries Administration Paper 12, updating the table included at Attachment A.

6. The following conflicts of interest were declared with specific agenda items:

   a. Dr Penney noted a conflict of interest for agenda item 4. Evaluation of gillnet efficiency in the Southeast shark fishery.

   b. Dr Thomson noted a conflict of interest for agenda item 7.1. Proposed work to improve gummy shark stock assessment.

   c. The Chair noted that industry members will have conflicts of interest for agenda item 7.2. gummy shark RBC advice and 8.3. school shark RBC advice.

   d. The Chair noted that industry members will have conflicts of interest for agenda item 8.1. school shark live release rule.

   e. Dr Thomson, Dr Morison, Dr Sporcic and Dr Penney noted conflicts of interest for agenda item 10. 2023-24 Research priorities and SESSF annual research statement.

   f. Mr Woodhams noted potential conflict of interest for ABARES with agenda item 5. EM Review rate in the GHAT.

7. The Chair noted that the above individuals will leave the meeting to discuss the approach for the respective agenda items. SharkRAG members agreed, consistent with the approach taken in previous meetings, that members with conflicts of interests were welcomed to be part of discussion but not take part in the formulation of advice.

1.3 Adoption of agenda

8. SharkRAG adopted the draft agenda (Attachment B) as final.

1.4 Minutes of previous meeting

9. SharkRAG noted that the minutes of the SharkRAG meeting of July 2022 are available on the [AFMA website](#).

1.5 Actions arising from previous meetings

10. SharkRAG noted the action items from previous meetings and the updates provided by the AFMA member at Attachment C.

Agenda item 2. Fishery Updates

2.1 AFMA Update

11. The AFMA member provided an update on the management of the gillnet, hook and trap (GHAT) sector of the southern and eastern scalefish and shark fishery (SESSF).

12. The AFMA member noted that the current call for research was distributed through AFMA's RAG and MAC committees and all are encouraged to distribute further where relevant. AFMA is seeking submissions of full proposals by Monday 31 October 2022 to research.secretary@afma.gov.au. The call and application form are included in the attachment at Agenda Item 10.

13. At their meeting in April 2022, SESSFRAG agreed to postpone the tier 4 assessment for sawshark to 2024 in order to re-direct available funding to high priority research. There were no other changes to the assessment schedule relative to GHAT species. In 2023 a tier 1 assessment for gummy shark and a weight of evidence approach for an elephantfish assessment will be conducted. In 2024 a tier 1 (CKMR) assessment for school shark will be conducted.

14. The AFMA member provided updates on the data transformation project and AMFA's commitment to resolving these issues effectively.

15. The AFMA member provided relevant updates on the progress of the Gillnet Dolphin Mitigation Strategy review.

16. The AFMA member provided a reminder on the implementation of recent changes to management for elogs which are now mandatory for all fishers; and for the use of feather kits on autolongline vessels.

2.2 Industry Update

17. The industry member, Mr Toumazos updated SharkRAG, noting the following key points:
    a. In South Australia, the fishing activity has been extremely good over the last 12 months.
    b. In South Australia, the fishing activity has been focused into smaller areas and the western South Australian waters are experiencing the least fishing activity.

c. There may be an increase in the selectivity for smaller sized fish (for some fishers) due to market and economic drivers.

2.3 Scientific Update

18. The scientific member, Dr Thomson, provided an update on the School Shark CKMR project at Agenda item 7.

2.4 Economic Update

19. The economic member, Dr Morison, updated SharkRAG, noting the following key points:
    a. ABARES will release their Fishery Status Report later this month (October) that will include some economic details on the fisheries. Most recent estimates of net economic return (NER) for the GHTS have been positive.
    b. There are financial concerns within the fishery due to higher fuel prices and labour costs which is putting downward pressure on NER.
    c. The senate enquiry on Individual Transferable Quota (ITQ) management should be completed soon with the final report due to be released at the end of November.

Agenda item 3. CPUE Standardisation

20. The AFMA member introduced the agenda item and noted that this was for general discussion only and not to provide advice on CPUE standardisation issues.

21. Dr Sporcic provided a presentation to SharkRAG on the process and methodologies of CPUE standardisation for selected shark species, noting the following key points:
    a. The aim of the CPUE standardisation is to standardise commonwealth logbook catch-per-unit effort (CPUE) data for the purpose of providing a time series of relative abundance.
    b. CPUE can be affected by many factors such as time of day, month/season, year, environment, changes in gear, changes in vessel efficiencies, etc. that are unrelated to abundance.

22. SharkRAG discussed the following points:
    a. There is a relationship between CPUE and gillnet length where [for gummy shark] the efficiency (catch) decreases as gillnet length increases (Penney 2000) i.e., the relationship between net length and catch per unit net length is non-linear. This was discussed further at agenda item 4.
    b. The avoidance of school shark may reduce gummy shark catch rates, and:
        i. The school shark CPUE could be used as an explanatory variable in the gummy shark CPUE.

ii. There is a strong inverse relationship between CPUE for pink ling and blue eye trevalla, and there may be a similar relationship for school shark and gummy shark. However, the best way to deal with any such relationship should be considered carefully index and landed catches might not accurately reflect actual catches because of discard rates for school shark.

c. There is likely to be some effect of fishing power (i.e., improved technology can increase CPUE independently of changes in stock abundance) on CPUE, however the RAG heard that the extent of technology on shark boats is still very basic (relative to lobster and prawn industry vessels). Echo-sounders are of little help because sharks lack swim bladders and so it is not expected that any impact would be large. The adoption of GPS in the mid-1970s has increased the accuracy and precision of effort data. The CPUE time series for gummy shark could be separated from 1966-1974 and from 1974- 1980s to distinguish this change in technology. The Chair noted that further work is needed before the RAG could decide on how best to account for changes in fishing power in the CPUE series.

d. The conservation member Ms. Lawrence noted that changes in gear types such as different number of hooks in a manual longline vessel compared to an auto longline vessel on each line may also impact CPUE. The industry member Mr. Toumazos confirmed that the lengths of line (between hooks) in these vessels are comparable while the spacing between the hooks are different. For auto longline vessels, the spacing between the hooks is smaller and not every hook is baited.

e. The Chair noted that gear saturation is included in the use of CPUE in the stock assessment, but Dr. Thomson noted that this was included in the stock assessment with the intention of accounting for the effect of the number of vessels on the fishing grounds.

f. After discussion on the issue of discards, the Chair summarised that the inclusion of discard data should be part of the data used in the CPUE standardisation, noting that while the recent congruence analysis suggested that logbook discard data for the main shark species was reasonably accurate, it still needs to be verified to maintain a level of trust in the data.

Agenda item 4. Evaluation of gillnet efficiency in the southeast shark fishery

23. Dr Penney presented their evaluation of gillnet efficiency (catch) in the southeast shark fishery, noting the following key points:

a. Calculation and standardisation of CPUE for gummy shark in the southeast shark gillnet fishery recently changed from calculating catch/set to calculating catch/km.net to account for a steady increase in the average gillnet length used in the fishery over 1999 – 2020.

b. The objective of this work was to evaluate the reliability of net length data recorded in logbooks; and determine the relationship between increased net length and declining gillnet efficiency in terms of catch of gummy shark.

c. Gear efficiency refers to saturation of a given piece of passive fishing gear (gillnets or longlines) with fish, such that catch rates decrease with increasing soak time. Given the purpose of evaluating the effect of increasing net length in the Gummy Shark fishery, and to avoid confusion with the more usual use of the term 'gear saturation', the term 'gear efficiency' is used here when evaluating the effects of increasing net length.

d. Three shark gillnet fishing zones were defined for the purpose of geospatial analysis in this study, defined by lines of longitude from the coast southwards to the EEZ boundary. Zones are named for the SESSF zone within which most of the gillnet fishing effort occurred but extends across multiple SESSF zones.

e. The effect of net length on nominal CPUE indices suggest that GLM exploratory analyses indicate that standardisation of CPUE in kg/km.net for the Gummy Shark gillnet fishery should include vessel, longitude, net length, and perhaps month if there are incomplete years in the data set.

f. There are substantial differences in the amount of effort and catch, and some differences in average net length used, in the three defined zones.

g. Influences of factors such as vessel, longitude and net length on CPUE standardisations were assessed.

h. In conclusion, other than detecting and removing extreme outliers, there is no way of determining from logbook data whether the reported net lengths are accurate, although they do appear to be plausible. Reported net lengths seem to be appropriate to use to calculate CPUE in kg/km.net.

24. SharkRAG discussed the presentation and noted the following key points:

a. Dr. Sporcic noted that statisticians recommend the use of catch as the response variable rather than CPUE, with effort included in the standardization as an offset. To use CPUE as the response variable with effort as an explanatory variable is to model effort as a function of itself. Dr Sporcic also noted that the zones used in the gillnet efficiency work differ from the zones used in the stock assessment.

b. Dr. Thomson suggested that sensitivity analyses could be conducted, using the gummy shark stock assessment, to explore the effect of alternative ways of incorporating gillnet efficiency.

c. Mr. Toumazos noted that in South Australia there was only one vessel fishing using gillnets and that this affects the CPUE assessments as there were only longline vessels fishing in eastern South Australia. Dr. Thomson suggested that the longline CPUE series for South Australia could be split into two different series for east and west stocks.

25. Dr. Sporcic and Dr. Thomson noted a conflict of interest and stepped out of the meeting for the recommendations.

26. SharkRAG recommended that:
    a. Net length and longitude within each zone should be included in the CPUE standardisation model for the next gummy shark assessment.
    b. There is more work to improve shark CPUE standardisation (e.g., fishing power) which could be included in the scope of a future research priority.
    c. Action item: Sensitivity analyses and base case scenarios incorporating gillnet efficiency to be presented to SharkRAG in 2023 for the gummy shark stock.

27. The Chair suggested that in future engagement with industry AFMA could emphasise the importance of more accuracy in their reporting of net length i.e., length of net actually deployed as opposed to length of net carried on the vessel but not necessarily deployed.

Agenda Item 5. EM Review Rate in the GHAT

28. The AFMA member introduced the agenda item, the EM review rate in the GHAT, noting the following key points:
    a. In November 2021, AFMA received a proposal from industry to reduce the standard EM review rate from 10% to 5% for gillnet vessels.
    b. The proposal was based on the results of a recent analysis by ABARES which showed a high level of congruence for key species between logbook and EM data, conducted in 2021 and 2022.
    c. The analysis found that:
        i. generally, for the gillnet sector, there was a high level of congruence for key target species.
        ii. Congruence was moderate for retained by-product and low for discarded by-product; and congruence was variable for protected species.
        iii. There was noticeable inter-vessel variability in the congruence.
    d. The results of the congruence analysis, and the variability of these results, have highlighted a number of gaps for reporting and management at both the fishery and boat levels. ABARES have provided a number of recommendations to improve data collection, support better analyses, and implement clear objectives and performance criteria.
    e. At this meeting of SharkRAG, AFMA supported the industry proposal and proposed a reduction to the EM review rate for gillnet vessels in the GHAT from 10% to 5%. The reduction will be considered as a trial and can be used to inform the influence of reduced EM review rates on reporting accuracy for Commonwealth fisheries.

29. SharkRAG discussed EM in the GHAT, the results of the congruence analysis and the proposal to reduce the EM review rate, noting the following key points:
    a. Mr. Woodhams noted that the review rate was not the focus of the ABARES congruence work, but that if asked, ABARES could potentially look at the possible implications of a

reduction in the review rate. In a separate conversation, prior to the RAG, ABARES confirmed that there was likely to be enough data to undertake a congruence analyses for school and gummy shark with 5% review rate. However, data availability (at a review rate of 10%) was already a problem for less frequently observed species.

b. Mr. Toumazos suggested that a reduction in the review rate would likely still detect systematic misreporting and fisher behaviour but may result in an increase of compliance events with a, targeted approach of the 5% in areas of hotspots of TEP species and vessels specific to fisher behaviour. This was supported by Ms. Lawrence and they also included that the ABARES report recommendations be implemented.

c. Mr. Woodhams suggested the implementation of the recommendations in the ABARES report would likely result in the development of evaluation framework, that in turn would help AFMA to improve the process of data acquisition.

d. Dr. Penney suggested that based on work conducted in the SPF and RFMOs, the observer coverage needs to be at least 30% of review rate to capture rare events. Dr. Penney also suggested that fisheries managers in Canada use a vessel-based approach with a reduction in review rates, where congruence between data sets meets predefined thresholds.

e. Logbooks are the primary source of data used for stock assessments and SharkRAG considered that a reduction in the review rate may lead to some behavioural changes that could reduce the accuracy of logbook data, compounded by a reduction in the ability to detect such a change.

f. The ability to detect and collect data on interactions with protected species remains a primary concern.

30. Industry members Mr. Harris and Mr. Toumazos noted a conflict of interest and stepped out of the meeting.

31. SharkRAG recommended that:

a. The recommendations from the ABARES report should be pursued to improve the accuracy of logbook data, prior to a reduction in the review rate.

b. Known vessel-level variability could be used to support more targeted, risk-based compliance and regular feedback and education for operators to improve reporting and to detect unreliable logbook data for stock assessments.

c. Relevant to the ABARES recommendation regarding tolerance levels for logbook reporting, SharkRAG supported the development of a framework with performance criteria, under which the reliability of logbook data could be measured at the fishery and individual boat level to support a review of EM review rates.

d. The outcomes of a trial reduction in the GHAT, from 10% to 5%, will inform a broader review of EM across other fisheries, including thresholds and performance indicators.

Agenda item 6.1: 2022 Catch and Discard reports (data to 2021)

32. Dr. Burch (CSIRO) presented the catch and discard reports, noting some changes and anomalies throughout the dataset this year. The following key points were highlighted:

   a. In 2021 SharkRAG approved the use of logbook discards for gummy shark and school shark for GHAT vessels; and these have been included in the calculations of total discard rate and the four-year weighted average.

   b. There are still some discrepancies between CSIRO and AFMA's estimates of logbook discards.

   c. At its 2022 Data Meeting, SESSFRAG noted that the estimated trawl sector discards of gummy Shark in 2020 were much lower than the recent average and requested that the estimate be checked prior to its use in providing management advice.

      i. SharkRAG may wish to reject the gummy shark discard estimates due to limited coverage, replacing this with the 29.7% rate from the previous year, however it was noted that this isn't likely to have much impact.

33. SharkRAG discussed the following key points:

   a. The industry member Mr. Toumazos noted that the catch is mainly driven by quota availability while Mr. Corrie suggested that this is not the case as per the data.

   b. There appears a seasonal pattern in discard estimates and observer coverage for gummy sharks and not school sharks and the RAG noted concern that a seasonality factor may be appropriate for gummy shark which is not currently applied in the validity criteria for the discard estimates.

34. SharkRAG recommended the following key points

   a. Adding the seasonality factor to the list of the validity criteria for gummy shark.

   b. Action item: SharkRAG recommended the use of the estimated discard rate in 2019 of 29.7% for gummy shark in 2020 and accepted the estimates presented for school shark.

   c. Action item: Include a seasonality factor for gummy shark in the list of discard estimate validity criteria.

Agenda item 6.2: 2022 CPUE time series (data to 2021)

35. Dr. Sporcic presented the 2022 CPUE time series, noting the following key points:

   a. There was a 54% drop in recorded gillnet catch in 2019 relative 2018 (i.e., from 141 t to 65 t) in South Australia.

   b. The 2020 catch was almost the same as the 2019 catch (i.e., 65 t in 2019 and 66 t in 2020).

   c. The 2021 catch (59 t; from seven vessels) was the lowest in the series (i.e., since 1997).

   d. The average recorded catch of gummy Shark caught by gillnets in South Australia was 490 t over the 1997 – 2011 period. This contrasts the average catch of 100 t in the last 10 years

(2012 – 2021), and an average of 63 t in the last three years (2019-2021). These decreases in average catch correspond with fewer vessels fishing across the years analysed.

    e. CPUE time series trends were presented for gummy shark gillnetting and trawl in the Bass Strait, Tasmania and South Australia.

    f. CPUE time series were presented for gummy shark for Danish seine vessels in Bass Strait and Victoria and for school shark in the trawl sector.

36. SharkRAG discussed the following key points:

    a. Mr. Toumazos noted that the trend in catch rates in South Australia could be linked to fisher behaviour rather than gummy shark abundance.

    b. The movement of gillnet effort out of South Australia and switching to hooks may have impacts on the CPUE which could be considered in the next gummy shark stock assessment.

Agenda item 6.3: 2022 Metier analysis (data to 2021)

37. Dr. Burch presented the 2022 Metier analysis.

38. The objectives of the analyses were:

    a. To quantify the unavoidable bycatch of school shark, identify non-bycatch retention of school shark, and explore ways to reduce non-bycatch retention of school shark.

    b. To identify which species are caught together and seek to quantify the impacts of modifying TACs for companion species on rebuilding stocks; and

    c. To identify characteristics associated with individual rebuilding species catches to inform on management avoidance.

39. Dr. Burch noted that the proposed trawl closures on the east coast of Australia will result in changes to fishing patterns in the Commonwealth Trawl Sector that would likely invalidate any bycatch estimates of trawl caught species for 2023.

40. Dr. Burch noted the following changes to the metier analysis in 2022:

    a. Logbook reported discards of school shark by GHAT vessels are included in the metier analysis and estimates of both the retained and discarded school Shark catch are provided.

    b. SharkRAG had previously agreed to reject the 2020 gummy shark trawl discard estimates.

41. SharkRAG discussed the following key points:

    a. Action item: Dr. Burch to compare the metier analysis catches with the reported landed catches.

    b. Mr. Corrie noted that there was a big difference for the school shark bycatch estimates presented this year compared to the previous year. The Chair noted that the current estimates were a more conservative approach.

c. Mr. Woodhams suggested including CSIRO's report listing recreational catches for the key shark species survey data. However, Dr. Burch commented that this data was incompatible with the other data included and could not be included.

42. SharkRAG recommended the following key points:

a. SharkRAG noted that the two approaches (metier analysis and Dr. Thomson's proportional method) used to estimate the unavoidable catch of school shark resulted in different estimates and that further discussion was recommended before deciding on a preferred approach. AFMA agreed to arrange an additional SharkRAG meeting in 2022 to resolve this agenda item.

b. Action item: Dr. Burch to update the 2022 metier analysis and present to SharkRAG at the next meeting.

Agenda item 7.1 Gummy Shark Work Plan

43. Dr. Thomson presented the following update on the gummy shark work plan:

a. Written code that implements Likelihood profiles for all model parameters,

b. Written code that performs Retrospective Analyses and calculates the Mohn's rho statistic,

c. Explored and plotted the port collected observed length data and provides advice on which data might be incorporated into future gummy shark assessments,

d. Explored and plotted data available to support the possible addition of a Danish seine fleet to future assessments, and adapted the gummy shark AD Model Builder code to allow an additional fleet,

e. Explored the statistical model fit using higher plus groups than the existing 10 years, and recommended that a new plus group of 20 years be used,

f. Begun exploring the alternative density dependence scenarios and recommended further work (to be done before Sept 2023 under the existing contract)

g. Begun work on implementing 'Francis weights' for the composition data so that model tuning can be performed for the 2023 assessment.

44. SharkRAG recommended an action item: Dr. Thomson to investigate the sensitivities for dealing with CPUE in South Australia. For this Dr. Thomson would chop the SA gillnet series (5 years ago) to plot the data, versus the model estimate (with and without it).

Agenda item 7.2 Gummy Shark RBC Advice

43. The AFMA member introduced the agenda item and noted that in 2020, SharkRAG provided recommended biological catch (RBC) advice for the following three years. That advice follows.

a. The approach was supported by the AFMA Commission in March 2021 where the TAC "steps-down" gradually over three years.

b. The RBC recommended for the 2022-23 fishing season (the 2nd year of the MYTAC) was 1,727 t which, after accounting for other discounts, prescribed to a provisional TAC of 1,560 t.

c. In March 2022 the AFMA Commission determined a gummy shark TAC for the 2022-23 fishing season that maintain the existing harvest levels with a gummy shark TAC of 1,672 t rather than follow the MYTAC's "step-down" approach and deviating from previous RBC advice.

44. SharkRAG discuss the agenda item and noted:

a. that they have given their scientific advice which was the step-down MYTAC approach and found it problematic to provide any additional advice on this without updating the model.

b. that they were not in a position to update their advice without considerable work and would provide robust scientific advice for next year.

c. that the point of conducting a MYTAC approach is to be efficient each year without having to update the model each year and that the decision of maintaining the TAC was not in the spirit of the harvest strategy.

45. SharkRAG advised that their previous advice remains valid and that catches in excess of the advice would carry some level of increased risk to the stock.

Agenda item 8.1. School Shark Live Release Rule

46. The AFMA member presented the agenda item on the school shark live release rule, noting the following key points:

a. Currently, for the school shark stock assessment and management decision making processes, 100% mortality of all discarded school shark is assumed despite the live release requirement. Industry have long-held concerns with this requirement, arguing that there is little value in releasing live school sharks if all are assumed dead in decision making processes. This is why the issue has been bubbling away for years.

b. School shark are currently assessed as overfished in the SESSF and is listed as a conservation-dependent species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

c. Consistent with the requirements of the *Commonwealth Fisheries Harvest Strategy Policy 2007* (HSP) and the EPBC Act, school shark is managed under the school Shark Stock Rebuilding Strategy 2015 (the Strategy) to promote the recovery of the stock.

d. the live release rule is one of several measures implemented under the Strategy to promote recovery of school shark and prevent targeting, including the 20 per cent school shark to gummy shark catch ratio which means an operator cannot catch an amount of school shark that exceeds 20 per cent of their gummy shark quota holdings.

e. AFMA are seeking SharkRAG advice on the management and sustainability implications of either the following options:

    a. accounting for a level of discard survivability in the stock assessment and TAC setting process.

    b. removing the requirement to release live school shark; or

    c. maintaining the status quo arrangements and mortality assumptions in the stock assessment.

45. SharkRAG discussed the school shark live release rule:

a. SharkRAG considered the available information regarding the current level of discarding and possible survival rates by gear type and agreed there would-be little impact on the overall rate of recovery if either option (a) or (b) were to be implemented. SharkRAG also noted the current stock assessment, which uses the Close-Kin Mark-Recapture (CKMR) approach, does not provide a relative index of abundance so it is difficult to understand whether the current rate of recovery is consistent with rebuilding timeframes under the HSP.

b. Dr. Thomson noted that CSIRO made a summary report of available post-capture survival rates for school and gummy shark back in 2015 for reference.

c. There are many variables that determine the survivability of school sharks such as haul length, soak time, time of day etc.

46. Mr. Toumazos noted a conflict of interest and left the meeting.

47. SharkRAG made the following recommendations:

a. If option (a) were implemented, there is some information available to estimate a level of survivability which could then be incorporated in the stock assessment. While the level of fishing mortality assumed in the stock assessment may be reduced, it is not clear how this would impact the model outputs, and subsequent bycatch TAC setting process.

b. If option (b) were to be implemented, the approach for estimating total fishing mortality in the stock assessment would not change – the combination of retained and discarded catch, with all discards considered as mortalities. While the modelled recovery would not change under option (b), the actual recovery may be slightly slower due to the small increase in the true mortality.

c. The extent to which removing the rule would influence discarding is unclear because it will be influenced by quota availability and possible changes to avoidance behaviour. However, given the reliability of logbook data in the GHAT demonstrated by the ABARES congruence analyses, SharkRAG expects that the total mortality could continue to be accurately estimated and accounted for in future assessments and bycatch TAC setting processes.

d. If the requirement to release live school shark were maintained, including the assumed 100% mortality in the stock assessment (option c) total mortality would continue to be overestimated, however this is consistent with the precautionary principle outlined in the Fisheries Management Act 1991 (FMA) and would promote recovery of the stock.

e. SharkRAG also noted the stress and economic implications for industry of releasing live school shark (that could otherwise be retained at $10-15/kg), when they are all assumed to be dead in the subsequent decision-making processes. This is the major source of angst to industry, so it needs to be acknowledged.

Agenda Item 8.2 Review of School Shark Rebuilding Strategy

48. The AFMA member introduced the agenda item on the review of school shark rebuilding strategy, noting the following points:

   a. AFMA reviews the performance of the Strategy annually as well as undertaking a more fulsome review every five years.

   b. To ensure the objectives of the Strategy are met, management can be revised as appropriate. The outcomes of these reviews are reported to the Department of Agriculture, Water and the Environment (DAWR) to meet EBPC Act requirements.

   c. AFMA undertakes an assessment of the performance of the Strategy.

49. Additionally, at Agenda Item 6, CSIRO has provided updated CPUE data that is used as an indicator of school shark biomass, as well as an updated bycatch and targeting analysis to examine whether targeted fishing is occurring.

50. SharkRAG discussed the agenda item and noted the following:

   a. SharkRAG is not in a position to update their advice until they get an updated CKMR stock assessment.

   b. The school shark trawl CPUE continued to show a positive trend which was not an assessment but only an indicator that could be referred to. In addition, the DS CPUE is going up to according to the scientific member Dr. Thomson.

   c. SharkRAG requested a check on the latest CPUE trawl data series and an apparent outlier data point in 2021. This was cross checked by Dr. Sporcic and found to be a hook vessel and not a trawl vessel, thereby not affecting the trawl CPUE series. However, this issue needs to be resolved for the hook sector.

Agenda item 8.3 School Shark RBC Advice

51. The AFMA member introduced the topic providing relevant background information for SharkRAG to discuss and provide the advice., noting the following points:

   a. In 2020, SharkRAG provided RBC advice that the total allowable catch (TAC) for gummy shark be determined as a multi-year TAC (MYTAC).

b. The bycatch TAC for school shark recommended for the 2022-23 fishing season was 225 t, accounting for the proposed reduction in the gummy shark TAC.

c. In March 2022 the TAC for the 2022-23 fishing season determined for school shark was 250 t, noting that this equated to a best estimate of true bycatch under the higher gummy shark TAC.

52. SharkRAG discussed and noted:

a. that the state recreational catches are not accounted for in the commonwealth TAC and that needs to be addressed, particularly for school shark where there is a low bycatch TAC.

b. Action Item: SharkRAG recommended that they are not in a position to provide updated advice on the bycatch TAC for school shark and that the metier analysis needs to be revisited as there are still some questions that need to be addressed in the next SharkRAG.

53. Dr. Thomson provided an update on the CKMR assessment model:

a. Of the 3,000 samples from Mr. Bromley, 1,000 samples have been processed for DNA and 2,000 samples have been collected and will have DNA extracted early to mid-next year. DNA sequencing for all 3,000 samples will be performed once all DNA extraction has been done.

b. Work is underway working on epigenetic aging (i.e., using the DNA to give an estimate of age which is a better method than the vertebrae aging).

c. Bomb radiocarbon aging will be used to obtain ages that will be used to calibrate the epigenetic ageing results. However, if this method is unsuccessful then an infrared approach will be used to provide ages that are better than those from traditional vertebral reads.

a. SharkRAG noted that they are on track for their updated school shark assessment in 2024.

Agenda item 9 SESSF Data Plan 2021-2023

54. The AFMA member presented the SESSF data plan 2021-2023 which outlines the data that is needed to support fishery management decisions and assessments in the SESSF for commercial, bycatch and protected species.

55. The Data Plan focuses mainly on the resolution of data required in logbooks and catch disposal records, sampling targets under the Integrated Scientific Monitoring Program (ISMP) and industry sampling programs (e.g., SIDAC); and fishery independent data collected under various research programs.

56. The Data Plan is updated annually based on advice from SESSFRAG, SERAG and SharkRAG to address data gaps and refine sampling targets across the fishery that are typically identified during assessments or after reviewing fishery indicator data as well as reporting throughout the year.

57. The Data Plan was most recently discussed at the SESSFRAG Data Meeting in August 2022. Several key data actions were discussed relating to the gillnet hook and trap (GHAT) sector, including:

a. CSIRO/SharkRAG 2023 to review logbook data to see if there are any boat-level trends in reporting behaviour that would undermine the outcomes of the ABARES congruence analysis.

b. ABARES to examine the reported weights in logbooks in conjunction with EM piece counts in order to see whether any obvious mismatches occur e.g., zero logbook weight report versus non-zero EM piece count weight.

c. AFMA to investigate discrepancies in logbook and CDR data for Bight redfish, deep-water sharks, school shark and eastern school whiting in recent years and report back to the relevant RAGs in 2022.

d. Combine all Automatic-longline gear codes and apply the appropriate DayNight (DN) adjustment for species CPUE standardisations by merging ALL codes when we calculate the average shot duration which is used to fill in missing end times when calculating whether shots occurred during the day, night or a mixture of the two

e. AFMA to prioritise linking the SIDAC data to logbooks in the AFMA database as it is required for the 2023 gummy shark stock assessment and the school shark CKMR work in 2023 as well as 2024.

f. AFMA to seek advice from SharkRAG on any updates required to the Data Plan, including adjusting biological sampling targets for gummy shark and school shark to better reflect recent fishing effort, to continue to meet the fishery's data needs.

58. SharkRAG discussed and noted the following:

a. The proposed gummy shark yearly sampling targets for length and vertebrae collection are okay.

b. The proposed school shark yearly sampling targets for length and vertebrae collection are okay.

c. Eastern Tasmania is not included as a collection zone for school shark yearly sampling but that this is not influential.

d. The onboard port sampling program will continue.

e. AFMA are working on resolving the SIDAC data linking issues.

f. There was a research priority that was sent to COMRAC with a scope to include recreational catches that was addressed at the ETBF.

g. The RAG also discussed improving data on historical fishing behaviour for gummy shark, particularly in South Australia, as a possible research priority.

Agenda item 10: Research Priorities

59. The AFMA member presented the research priorities.

60. SharkRAG noted and discussed the following:

a. The national survey of recreational anglers is underway but there is still a need to identify the information gaps with regard to recreational catch of key SESSF species and where gaps are identified, improve data for these species.

b. The issue of fishing power such as communicating with fishers and changes in fishing practices need to be addressed at some stage.

c. The scientific members noted a conflict of interest and left the meeting.

d. SharkRAG set priorities to the research priorities within attachment D.

e. SharkRAG noted the economic data collection project requires some discussion with ABARES about the data that is collected and its frequency, along with the use of administrative data and use of licensing data. Action item for Dr. Julian Morison to facilitate this discussion with ABARES (Robert Curtotti and James Woodhams) and Dr. Thomson to characterise the work involved, the scope of the project, methods and objectives.

Agenda item 11. Other business

61. SharkRAG noted that Dr. Beth Fulton's work on climate change adaptation and stock indicators species will be a standing agenda item at next year's SharkRAG meeting.

62. SharkRAG noted that there was no other business to discuss.

Agenda item 12. Next meeting

63. There will be a virtual SharkRAG meeting on 2 December 2022.

64. The following SharkRAG meeting will be a face-to-face option in Melbourne. The EO will conduct a doodle poll to lock in dates with two meetings at the end of the year 2023.

Close of meeting

65. The Chair thanked SharkRAG, the AFMA member and the EO for their contribution and closed the meeting at 1715 hrs.

October 2022

Attachment A

Member	Position	Interest declared
Alexander (Sandy) Morison	Chair	Director of Morison Aquatic Sciences. Chair of SharkRAG. Contracted by government departments, non-government agencies and companies for a range of fishery related matters including research and for MSC assessments of AFMA managed and other Australian and international fisheries. Have undertaken work for SETFIA in 2021 reviewing a report on matters unrelated to the shark fishery. No pecuniary or other interest in the SESSF shark fishery.
Robin Thomson	Scientific Member	CSIRO, Assessment scientist. Acquiring funding for research purposes. PI of AFMA-CSIRO co-funded project 'Ongoing monitoring of school shark abundance and rebuilding in the SESSF using close kin mark recapture'. Co-investigator on FRDC project to develop harvest strategies for CKMR assessments for school shark and scalefish.
Andrey Penney	Scientific Member	Scientific member on GAB RAG Scientific member on Finfish RAG
Charlie Huveneers	Scientific Member	Associate Professor and research scientist. Potential interest in funding for research. No pecuniary interest or otherwise.
Julian Morison	Economic member	Director, Kuti Co Pty Ltd – SA Pipi quota holder Economic Member, SA Marine Scalefish Fishery Management Advisory Committee (PIRSA) Economic member, Scallop RAG and Scallop MAC (AFMA) Member, Economics Working Group (AFMA) Member, Human Dimensions Research subprogram (FRDC) Deputy Economic Member, Total Allowable Fishing Committee (NSW DPI)
Kyri Toumazos	Industry Member	South Australia/Bass Strait shark fisher, boats fishing with hooks and gillnets. SESSF quota holder. Southern Rock Lobster Board CEO. Declared interests in RBCs.
Leigh Castle	Industry Member	Tasmanian shark hook, scalefish hook and tuna minor line fisher. Owns SESSF quota and vessel statutory fishing rights. Has a declared interest in shark hook interests and RBC recommendations
Craig Harris	Industry Member	Gillnet fisher and SFR holder.
Jamie Papas	Industry Member	Gillnet fisher and SFR holder. Board Director San Remo Fishermen's Co/Op
Anissa Lawrence	Conservation Member	Director of TierraMar Ltd, Independent consultant TierraMar Consulting Pty Ltd Undertakes contracts for a number of Conservation Non-Government Organisations, government departments, non-government agencies and the private sector on a range of fishery related matters. No pecuniary interest.

		Conservation member on South Australia Rock Lobster MAC Conservation member on GABMAC Conservation member on SPFRAG Director and Chair of Ocean Future Fund Inc
Lara Ainley	AFMA Member	AFMA member, Manager of the Gillnet, Hook and Trap fishery. No interest pecuniary or otherwise.
Roshan Hanamseth	Executive Officer	AFMA EO. No interest pecuniary or otherwise.
Paul Burch	Presenter/Observer	Employed by CSIRO. No interest, pecuniary or otherwise.
Miriana Sporcic	Presenter/Observer	Employed by CSIRO. No interest, pecuniary or otherwise.
Ross Bromley	Invited participant	Employed by SSIA. No interest, pecuniary or otherwise.
James Woodhams	Invited participant	Employed by ABARES. Interest in the EM Review rate.
Kurt Davis	observer	Employed by ABARES. Interest in the EM Review rate.
Dan Corrie	Observer	Employed by AFMA. No interest pecuniary or otherwise.
Michelle Henriksen	observer	Employed by AFMA. No interest pecuniary or otherwise.
Nastaran Mazloumi	Observer	Employed by AFMA. No interest pecuniary or otherwise.

Attachment B

Agenda

Time: 18/10/2022- 12:00-17:15

19/10/2022- 09:00- 16:05

Location: Radisson on Flagstaff Gardens, 380 William Street Melbourne, VIC 3000

Chair Name: Sandy Morison

Attendees	Membership
Sandy Morison	Chair
Roshan Hanamseth	Executive Officer
Lara Ainley	AFMA member
Robin Thomson	Scientific member
Andrew Penney	Scientific member
Kyriakos Toumazos	Industry member
Jamie Papas	Industry member
Craig Harris	Industry member
Leigh Castle	Industry member
Anissa Lawrence	Environment/Conservation member
Julian Morison	Economic member
Apologies	**Membership**
Charlie Huveneers	Scientific member

Presenters	Organisation
Miriana Sporcic	CSIRO
Paul Burch	CSIRO
Invited attendees	**Organisation**
James Woodhams	ABARES
Ross Bromley	Southern Shark Industry Association
Kurt Davis	ABARES

Presenters	Organisation
Observers	**Organisation**
Dan Corrie	AFMA
Nastaran Mazloumi	AFMA

DAY 1 - 18/10/2022 - 12:00 - 17:15

Approximate time	Item	Purpose	Lead presenter
12:00 (60 min)	**Lunch**		
13:00 (60 min)	**Agenda item 1. Preliminaries**		
	1.1 Welcome and apologies	For action	Chair
	1.2 Declaration of interests	For action	Chair
	1.3 Adoption of agenda	For action	Chair
	1.4 Minutes from previous meeting	For noting	Chair
	1.5 Actions arising from previous meetings	For noting	EO
14:00 (30 min)	**Agenda item 2. Fishery updates**		
	2.1 AFMA	For noting	AFMA member
	2.2 Industry	For noting	Industry members
	2.3 Scientific	For noting	Scientific members
	2.4 Economic	For noting	Economic Member
14:30 (30 min)	**Agenda item 3. CPUE standardisation**	For information	Miriana Sporcic
15:00 (15 min)	**Afternoon Tea**		

Approximate time	Item	Purpose	Lead presenter
15:15 (60 min)	**Agenda item 4. Evaluation of gillnet efficiency in the southeast shark fishery**	For advice	Andrew Penney
16:15 (60 min)	**Agenda Item 5. EM Review Rate in the GHAT**	For advice	AFMA member

DAY 2 - 19/10/2022 – 09:00 - 16:05

Approximate time	Item	Purpose	Lead presenter
09:00 (45 min)	**Agenda item 6. Review of recent data:** **6.1** 2022 Catch and discard reports **6.2** 2022 CPUE results **6.3** 2022 Metier analysis	For discussion	Paul Burch, Miriana Sporcic
09:45 (60 min)	**Agenda item 7. Gummy shark:** **7.1** Updates to model development **7.2** RBC advice	For advice	AFMA member, Robin Thomson
10:45 (15 min)	**Morning tea**		
11:00 (120 min)	**Agenda item 8. School shark:** **8.1** Live release rule **8.2** Review of the rebuilding strategy **8.3** RBC advice	For advice	AFMA member, Robin Thomson
13:00 (60 min)	**Lunch**		
14:00 (30 min)	**Agenda item 9. SESSF data plan**	For advice	AFMA member

Approximate time	Item	Purpose	Lead presenter
14:30 (45min)	**Agenda item 10. Research priorities**	For advice	AFMA member
15:15 (15 min)	**Afternoon Tea**		
15:30 (30 min)	**Agenda item 11. Other business**	For noting	Chair
16:00 (5 min)	**Agenda item 12. Next meeting**	For noting	Chair
16:05	**Close**		

Attachment C

Table 1: The progress of actions from previous meetings

Complete/Redundant	Underway	Yet to start	Need further advice

Agenda item	N	Action	Agency/Person Responsible	Timeframe	Progress
SharkRAG 1 2022	1	Present the results of the CPUE and net length work at the next meeting – Robin asked for Miriana to be present	Andrew Penney		These results will be presented at agenda item 4 of this meeting. Complete.
SharkRAG 1 2022	1	AFMA and ABARES to discuss the EM congruence analysis with Miriana to determine if there are any findings that would contribute to the CPUE standardisations work.	AFMA		Send ABARES report to Miriana.
SharkRAG 1 2022	5	The next gummy shark assessment to include a sensitivity that considers a proportion of the catch from BS coming from line gear, using the apparent selectivity from the BS trial.	CSIRO (Dr Thomson)		
SharkRAG 2 2021	5	AFMA to liaise with CSIRO (Dr Burch) to include a summary of previous SharkRAG advice regarding historical catches be	AFMA		Catch histories for school and gummy shark have been considered in a CSIRO project.

			included into a paper they are working on that captures historical decisions.			The results are expected to be presented to the 2023 SESSFRAG Chair's meeting.
	SharkRAG 2 2021	7	CSIRO to include the logbook reported discards for school shark in the metier analysis for SharkRAG consideration in October 2022	CSIRO (Dr Burch)		These results will be presented at agenda item 6 of this meeting. Complete.
	SharkRAG 2 2021	9	AFMA to prepare a paper regarding options for accounting for discards for the October SharkRAG meeting	AFMA		Yet to start
	SharkRAG 1 2021	8	SIDaC to look at feasibility of including sawshark species composition in their data program			Subject to outcomes of SharkRAG1 action item 7 "AFMA to create a comparison of EM data versus logbook data regarding sawshark composition including a summary table for the RAG to consider."
		9	AFMA to consider observer data including trawl data in the sawshark summary table for SharkRAG – related to SharkRAG1 2021 action item 7			Underway- Not complete, related to SharkRAG1 2021 action item 7.

SharkRAG 2 2016	3	The school Shark Rebuilding Strategy to be updated to reflect research showing there is some genetic connectivity between Australian and New Zealand school shark stocks.	AFMA	2019	Underway- The review of the School Shark (*Galeorhinus galeus*) Stock Rebuilding Strategy is underway and will include updating information concerning latest research relevant to the species.
SharkRAG 7 September 2020	1	SharkRAG to determine the weighting of each method (CPUE series) to be included in the gummy shark assessment at the next meeting of SharkRAG	SharkRAG	November 2020	Underway- Included in the gummy Shark work plan to be discussed under Agenda Item 7.
SharkRAG 7 September 2020	1	AFMA to modify the contract with fish aging services to allow shark vertebrae to be sectioned on an annual basis	AFMA/FAS	December 2020	Underway- AFMA will discuss alterations to the contract with fish aging services.

Table 2: The progress of actions from SESSFRAG August 2022 relevant to SharkRAG

SESSFRAG August 2022		AFMA to seek advice from SharkRAG on adjusting biological sampling targets for gummy shark and school shark to better reflect recent fishing effort.	AFMA		
SESSFRAG August 2022		CSIRO/SharkRAG 2023 to review logbook data to see if there are any boat-level trends in reporting behaviour that would undermine the outcomes of the ABARES congruence analysis	CSIRO		