



Australian Government

Australian Fisheries Management Authority

**Southern and Eastern Scalefish and
Shark Fishery**

**Shark Resource Assessment Group
(SharkRAG)**

SharkRAG 7 Meeting minutes

Date: 29 – 30 September 2020

Teleconference

Attendees

Name	Membership
Mr Sandy Morison	Chair
Dr Julian Morison	Economics Member
Dr Ian Knuckey	Scientific Member
Dr Charlie Huveneers	Scientific Member
Dr Robin Thomson	Scientific Member
Mr Leigh Castle	Industry Member
Mr Jamie Papas	Industry Member
Mr Craig Harris	Industry Member
Mr Kyriakos Toumazos	Industry Member
Dr Leonardo Guida	Conservation Member
Ms Natalie Couchman	AFMA Member
Mr Maxwell Bayly	Executive Officer
Ms Fiona Hill	AFMA Observer
Ms Amanda Goodspeed	AFMA Observer
Dr Miriana Sporcic	CSIRO Presenter
Dr Franzis Althaus	CSIRO Presenter
Mr Ross Bromley	Invited Participant
Mr James Woodhams	Invited Participant
Mr Simon Boag	Observer

Meeting Minutes

Day 1 – 29 September 2020

1. Preliminaries

1.1. Welcome and apologies

- 1) The Chair provided a welcome to country. The Chair opened the meeting at 12:02 PM. The Chair welcomed members, invited participants and observers and Chair noted apologies from industry member, Leigh Castle.

1.2. Adoption of Agenda

- 2) The Chair noted that due to the Microsoft Teams outage on the morning of September 29 the Agenda Items that require a decision would be addressed first. The RAG agreed that Agenda Items that are for information only will be discussed if there is enough time at the end of day 2. Items not addressed at this meeting would be postponed until the next meeting of SharkRAG.
- 3) The RAG agreed to the revised Agenda ([Attachment A](#)).

1.3. Declaration of interests

- 4) Declarations of interest were received from RAG members prior to the meeting ([Attachment B](#)). The Chair requested members and other attendees disclose Agenda Items for which they may hold a conflict of interest. The AFMA member reminded RAG attendees that declared conflicts of interest are for both perceived and actual conflicts of interest, as outlined in Section 4.1.3 of *Fisheries Administrations Paper No. 12*.
- 5) After some discussion about the nature of interests of both conservation and industry members, the following conflicts of interest were declared:
 - a) Dr Knuckey noted a potential conflict of interest for Agenda Item 10.
 - b) Industry members noted perceived conflicts of interest for Agenda Items 3.1-3.2 and 4.
 - c) The conservation member noted perceived conflicts of interest for Agenda Items 3, 4 and 5.
 - d) Invited participant Mr Bromley declared conflicts of interest with Agenda Items 6 and 9.
 - e) Mr Boag noted conflicts of interest for all Agenda Items.
- 6) It was agreed that members, invited participants and observers with declared conflicts of interest would leave the teleconference at the end of the first day to allow the remaining members to formulate recommendations.

1.4. Status of Action Items

- 7) Agenda Item 1.4 was deferred due to time constraints.

1.5. Adoption of Meeting Minutes

- 8) The RAG adopted the meeting minutes from the May 2020 meeting.

2. Recreational catch estimates of school and gummy shark

- 9) The AFMA member introduced the Agenda Item, noting SESSFRAG have previously recommended recreational catch data not be included in stock assessments for SESSF species where catches remain

constant or are not a significant component of total catches. She noted SESSFRAG referred the possible use of recreational catch data in stock assessments for shark species to SharkRAG for their advice.

- 10) Dr Franzis Althaus introduced the report *"Sharks: data extracts from recreational catch report"* which examines available sources of recreational catch data for shark species from State agencies. Dr Althaus noted that elephant fish were not included in this report.
- 11) The RAG discussed the following key points:
 - a) The RAG noted the confidence intervals around the reported recreational catches are very large.
 - b) The RAG queried if State agencies have been contacted to provide further recreational catch data.
 - i. The AFMA member noted exchange recreational data has been discussed with State agencies during Offshore Constitutional Settlement (OCS) discussions.
 - ii. The RAG suggested that the importance of accurate recreational catch data where it concerns Commonwealth managed species, should be raised as a priority with State agencies.
 - c) The RAG noted it was important to document all data considered in the course of formulating a stock assessment and explain why certain data is not included.
 - d) The RAG noted the estimate of recreational catch of school shark in South Australian waters in 2013/14 (7208 individuals retained, equating to around 53.5 tonnes) and thought that it was likely to be associated with a high degree of uncertainty.
 - e) The RAG noted the quantities of recreational gummy shark catch outlined in the report are not large enough to be influential in the outcomes of the stock assessment.
 - f) The RAG noted a lack of evidence to indicate an increasing trend of recreational catches for shark species.
 - g) The RAG discussed the availability of additional data, including data from the charter vessel sector. It was noted that the charter vessel sector in South Australia are required to maintain logbook records of catch. Dr Althaus confirmed the project only examined published recreational catch reports and did not consider the charter vessel sector. She also confirmed that State agencies were not contacted for additional data.
 - h) Industry members expressed the importance of understanding recreational catches of shark stocks.
- 12) The RAG recommended to not include recreational catch data in the upcoming gummy shark stock assessment. It was agreed that the final report should highlight the rationale for not including recreational catch data.
- 13) The RAG suggested the final gummy shark assessment report should highlight potential data sources which would benefit the stock assessment, allowing for researchers to collect data that will influence management decisions.
- 14) The RAG recommended that AFMA raise with State agencies the importance of accurate recreational catch data to inform assessment for SESSF species. The AFMA member noted challenges in a standardised process between different jurisdictions. She also noted that research into Commonwealth managed species attract fewer resources from State agencies.
- 15) The RAG requested that CSIRO formally request recreational catches from State agencies on an annual basis.

16) The RAG requested Dr Althaus compile a finalised report that includes the most recent results of Recreational catch surveys from State agencies.

Action Item 1 – Dr Thomson to highlight the rationale for not including recreational catch data in the final report of the 2020 gummy shark stock assessment.

Action Item 2 – AFMA to seek improved data sharing concerning recreational catches of Commonwealth managed shark species with State Agencies.

Action Item 3 – CSIRO to formally request recreational catch from State agencies on an annual basis.

Action Item 4 – Dr Althaus to incorporate elephantfish into the recreational catch report.

Action Item 5 – Dr Althaus to finalise the recreational catch report with the most recent available data from State agencies.

3. CPUE Standardisations

3.1. Gillnet CPUE

17) Dr Sporcic introduced the Agenda Item and associated report “*Improved Gillnet CPUE Standardisations in Australia’s GHAT Sector (data to 2018)*”. The report was previously presented to SESSFRAG at its August 2020 meeting.

18) Dr Sporcic noted the objectives of the project:

- a) Produce standardised CPUE series which incorporated net length and mesh size for catch of gummy shark, sawshark and elephant fish.
- b) Produce standardised CPUE series which incorporated net length and mesh size for zero catch shots.

19) Dr Sporcic presented the results of the report.

20) The report extends current analyses to include two additional fields from the Commonwealth logbook database in each fishery operation, namely total gillnet length (km; effort unit) and mesh size. These additional metrics have been incorporated in standardisation analyses using general linear models (GLMs) and generalised additive models (GAMs) for gummy shark (*Mustelus antarcticus*) (South Australia; Bass Strait; Tasmania), sawshark (*Pristiophorus* spp, *P. cirratus*, *P. nudipinnis* and *Pristiophoridae*) and elephant fish (*Callorhinchus milii*) over the 1997-2018 period.

General Linear Models (GLMs)

21) Dr Sporcic presented the results of the GLMs analyses, noting the following key findings:

- a) The inclusion of mesh size in standardization analyses had the least (and minimal) effect on the overall contribution to model fit and little difference in standardized indices for gummy shark, sawshark and elephant fish.
- b) The standardized Catch Per Unit of Net length (CPUN) indices closely mirrored the standardized Catch per Shot (CPS) indices spanning the 1997 to 2018 period for each of the species investigated (Tasmania gummy shark, South Australia gummy shark, Bass Strait gummy shark, sawshark, elephantfish).

- c) Comparison of standardized CPUN indices compared with standardized CPS indices for gummy shark, sawshark and elephant fish are outlined below.
 - i. Gummy shark - South Australia: Standardized CPUN indices were close to standardized CPS indices up to 2014 and below CPS since 2015. The standardized CPUN series appears to have a negative trend since 2016 and is below the long-term average in 2018.
 - ii. Gummy shark - Bass Strait: Standardized CPUN indices were less than standardized CPS indices since 2014. The standardized CPUN series was greater than standardized CPS series prior to 2001 or below the standardized CPS series from 2013. The standardized CPUN series has remained below the long-term average since 2017.
 - iii. Gummy shark - Tasmania: Standardized CPUN indices were greater than standardized CPS indices prior to 2005 and less than CPS indices since 2006.
 - iv. Sawshark: Standardized CPUN indices were greater than standardized CPS indices prior to 2005 and less than CPS indices since 2012.
 - v. Elephant fish: Standardized CPUN indices were either almost identical or greater than standardized CPS indices to 2011 and less than standardized CPS indices since 2012.

22) The RAG questioned if soak time had been factored into any analysis. Dr Sporcic confirmed soak time was not included as it was outside the scope of the project.

23) Arising from an action at the SESSFRAG meeting in August 2020, Dr Sporcic presented a plot examining the average gillnet length over time in the three gummy shark zones. The plot displayed a slight increase in gillnet length per shot over time in each of the shark zones.

Generalised Additive Models (GAMs)

24) Dr Sporcic presented the results of the GAMs analyses, noting the following key findings:

- a) The inclusion of the smoother incorporating geographical co-ordinates: $s(\text{Latitude}, \text{Longitude})$ had the greatest contribution to the overall model fit for Gummy shark in Bass Strait, sawshark and elephantfish.
- b) There were negligible overall differences in standardized indices between the three fitted GAM models with smoothers comprising geographical co-ordinates (i.e., (i) $s(\text{Longitude})$, (ii) $s(\text{Latitude}) + s(\text{Longitude})$ or (iii) $s(\text{Latitude}, \text{Longitude})$).
- c) Fitted models were consistent with the assumed distribution as depicted by GAM-diagnostic qqplots for gummy shark and sawshark.
- d) Comparison of GAM-standardized CPUN series and GLM-standardized CPUN series for gummy shark, sawshark and elephantfish are outlined below.
 - i. Gummy shark - South Australia: All three GAM-standardized CPUN series closely followed GLM-standardized CPUN series.
 - ii. Gummy shark - Bass Strait: All three GAM-standardized CPUN series closely followed GLM-standardized CPUN series.
 - iii. Gummy shark - Tasmania: All three GAM-standardized CPUN series closely followed GLM-standardized CPUN series. Greater variability between GAM and GLM-standardized series occurred when separate smoothers ($s(\text{Latitude}) + s(\text{Longitude})$) or surface were fitted.

- iv. Sawshark: All three GAM-standardized CPUN series closely followed GLM standardized CPUN series.
- v. Elephant fish: All three GAM-standardized CPUN series closely followed GLM standardized CPUN series.

25) The RAG noted the results arising from using smoothed values of longitude and latitude were not significantly different from results using the shark zones in the CPUN models.

26) Dr Sporcic noted that she was able to perform additional analyses, such as smoothing of year and month, if requested by the RAG.

Tweedie GLiMs (TGLM)

27) Dr Sporcic introduced the concept of Tweedie GLiMs, noting the main difference between the previous two analyses is the inclusion of zero catch shots.

28) Dr Sporcic presented the results of the Tweedie GLiMs analyses, noting the following key finding:

- a) Fitted models based on Maximum Likelihood Estimation (MLE) were consistent with the assumed Tweedie distribution as depicted by diagnostic qqplots for gummy shark in South Australia, Bass Strait, Tasmania and sawshark, but not for elephantfish.
- b) Comparison of TGLM-standardized CPUN series and GLM-standardized CPS series for gummy shark, sawshark and elephant fish are outlined below.
 - i. Gummy shark - South Australia: All three TGLM-standardized CPUN series overlapped standardized CPS series. Each TGLM-standardized series was greater than standardized CPS series prior to 2005 or mostly below the standardized CPS series from 2006.
 - ii. Gummy shark - Bass Strait: All three TGLM-standardized CPUN series overlapped the cyclic GLM-standardized CPS series. Each TGLM-standardized series was below the standardized CPS series from 2013.
 - iii. Gummy shark - Tasmania: Two of the three TGLM-standardized CPUN series (prespecified $p = 1.7$ and estimated via MLE) overlap each other and generally follow the GLM-standardized CPS series.
 - iv. Sawshark: Two of the three TGLM-standardized CPUN series (prespecified $p = 1.7$ and estimated via MLE) overlapped each other and generally followed the GLM-standardized CPS series.
 - v. Elephantfish: There was greater interannual variability in the TGLM standardized series compared with standardized CPS series prior to about 2001. Following that, there is reasonable correspondence with the TGLM standardized series and standardized CPS series. Dr Sporcic noted there was a deviation in catch series for this species due to high levels (50 – 75%) of zero catch shots.

29) The RAG noted there was very little difference in the results of the Tweedie GLiMs to the other models for gummy shark and sawshark, however there was deviation in the model results for elephant fish.

30) The RAG noted Dr Sporcic's recommendation to use the CPUN GLM methodology.

31) The RAG noted further analyses is required to determine if net length and catch have a linear relationship. Industry members and observers suggested that the relationship may not be linear as fishing efficiency

will peak at a certain net length and plateau thereafter. An industry observer also raised an additional concern regarding the potential inaccuracy of reported net length.

- 32) The RAG requested the examination of the influence of soak time on CPUE. Dr Sporcic noted further analyses was able to be completed, however it could not be completed this year.
- 33) Dr Thomson noted that given the CPUN and CPS series are similar and all three gummy shark zones are above the target reference point it is unlikely to have a significant effect on the RBC.
- 34) Dr Sporcic noted that the analyses only included data up until 2018, and advised that she would update the analyses for gummy shark with 2019 data for use in the Tier 1 stock assessment for gummy shark.
- 35) Dr Sporcic sought clarification as to whether the data for the Tier 4 stock assessment for sawshark using standardised CPUE for the trawl fleet should be updated with data up to 2019.. The RAG confirmed yes.
- 36) ***The RAG recommended the use of net length as an indices of effort in the GLM models, noting net length is an important factor that affects fishing efficiency as well as the concerns raised by some RAG members concerning the nature of the relationship between net length and catch.***
- 37) ***The RAG further recommended that additional work should be completed prior to the finalisation of the gummy shark assessment to determine the relationship between net length and CPUE and to determine the accuracy of reported net length.***

Action Item 6 – Dr Sporcic to investigate the potential influence of soak time (if adequate data exists) on Catch Per Unit Effort indices in time for the next gummy shark stock assessment (in 2023)

Action Item 7 – AFMA and CSIRO to discuss additional analyses needed to determine the relationship between net length and CPUE and the accuracy of net length and report back to the RAG prior to the next meeting of SharkRAG

3.2. Shark CPUE

- 38) In the interests of time, the RAG agreed that Dr Sporcic’s presentation should be limited to data relating to gummy shark.
- 39) Dr Sporcic presented the updated Catch per Shot (CPS) data relating to gummy shark to the RAG. The presentation included data up to and including 2019. Gummy shark CPS data was presented for the following fleets:
 - a) Bass Strait – Gillnet
 - b) South Australia – Gillnet
 - c) Tasmania – Gillnet
 - d) Trawl
 - e) Bottom line
- 40) The RAG noted the following trends in the presented data:
 - a) There was an increase in recorded gillnet catch of gummy Shark in 2017 relative to 2016 in South Australia and Bass Strait.

- b) There was a 54% drop in recorded gillnet catch in 2019 relative to 2018 in South Australia. Standardized CPUE in South Australia increased from 2013 to 2017 and dropped to the long-term average in 2019.
 - c) Gillnet standardized CPUE in Bass Strait is cyclic and has increased above the long-term average in 2019.
 - d) Standardized CPUE of gillnet caught gummy shark around Tasmania remained flat since 2014 and increased to the long-term average in 2016, 2017 and 2019.
- 41) The RAG noted a shift in effort to deeper waters in South Australia was seen as a result of gillnet fishers avoiding shallow waters due to risks associated with interacting with dolphins.
- 42) The RAG also noted a shift towards hook fishing methods to avoid Dolphin and Australia Sealion interactions.
- 43) The RAG discussed a relatively large increase from 2018 – 2019 in the CPS standardisation of gillnet in Tasmania. It was suggested this trend is likely due to a lack of available data for this region creating relatively unstable results.
- 44) The RAG questioned how CPUE data from the hook sector would be incorporated in the upcoming stock assessment. Dr Thomson explained hook CPUE standardisation is limited to hooks set in waters in depths of less than 200 m.
- 45) Dr Thomson noted that the data being presented does not include auto longline vessels due to a lack of data for this sector.
- 46) The RAG queried if there was scope to combine the autoline and the manual line sectors, noting similarities in gear and area fished. Industry members noted that the manual hook sector has a greater catch rate per hook than the automatic hook sector. Dr Sporcic noted CPUE standardisation for the hook sector is a catch per shot series, not a catch per hook series.
- 47) The RAG requested Dr Sporcic investigate the possibility of creating a hook fleet which combines manual and automatic longline vessels.
- 48) Dr Sporcic presented new CPUE standardisations for gummy shark caught in the trawl (SA, Bass Strait, Tas) and Danish Seine sectors, to present the CPUE data split into the three shark zones for the two fleets for the inclusion to the gummy shark assessment model. Dr Sporcic noted there was insufficient data to warrant CPUE standardisation for the Danish Seine fleet in Tasmania and South Australia. As such, Danish Seine CPUE standardisation was presented for activity in the Bass Strait only (1996 – 2019).
- 49) Dr Sporcic presented standardized-CPUE (catch per net-length) for gummy shark for the three fleets (SA, Bass Strait and Tasmania) including 2019 (i.e., update of section 3.1), as requested by SESSFRAG (data meeting, Aug. 2020) which is to be included in this year's gummy shark assessment.
- 50) The RAG discussed a significant increase between 2005 and 2008 for the CPUE of gummy shark caught by trawl method in the Bass Strait. It was discussed that the Ministerial Direction resulted in changes for the CTS in 2006-2007, specifically 700m depth closure and central Bass Strait being closed to trawling. There may have also been an increase in trawl speed in this period, as codend and wing mesh requirements were changed as a result of research which made nets a lot more efficient going through the water, could tow faster. Industry members advised it was more likely to be due to changes in quota availability, with an increase in gummy shark being retained rather than discarded. The RAG agreed the series should be split.

- 51) Dr Thomson noted the current gummy shark assessment model contains a trawl fleet which could utilise combined trawl data or trawl data split into the three shark zones. She noted there is no Danish Seine fleet in the current model and that it is too late for the inclusion of this into the current assessment. She noted the age and length data for gummy shark caught by Danish Seine methods indicate smaller and younger individuals are being captured by Danish Seine. She noted the inclusion of a Danish Seine series may provide an earlier signal regarding recruitment for future assessments.
- 52) The Chair asked Dr Thomson how the different CPUE series were weighted in the assessment. Dr Thomson advised there is equal weighting for each method's CPUE series. She noted that in other assessments for SESSF species that different methods have varying levels of weighting in the model, which is part of the 'tuning' process.
- 53) The RAG recommended the use of Catch per Unit of Net Length for the gillnet CPUE series in the upcoming gummy shark stock assessment.**
- a) The Chair also noted there may be scope for additional analysis concerning the relationship between CPUE and net length as well as accuracy of net length reporting.*
- 54) The RAG recommended the inclusion of trawl CPUE data as three separate data sets which represent the three shark zones (Tasmania, South Australia and Bass Strait).**
- a) The RAG recommended a sensitivity analyses be completed for this data series*
- 55) The RAG recommended that the Danish Seine series not be included in the upcoming stock assessment.**

Action Item 8 – Dr Sporcic to investigate a CPUE series which combines the manual longline and automatic longline fleets for the next gummy shark assessment.

Action Item 9 – Dr Thomson to split the trawl CPUE series into two series (1996 – 2005; 2008 – 2019)

Action Item 10 – Dr Thomson to include a Danish Seine fleet in the next gummy shark stock assessment (scheduled for 2023).

DAY 2 – 30 September 2020

4. Gummy shark Assessment (Tier 1)

- 56) Dr Thomson introduced the gummy shark stock assessment model. The gummy shark assessment model is an age structured assessment mode which tracks age cohorts through time. The model splits gummy shark into three distinct stocks or "shark zones" (Tasmania, Bass Strait and South Australia).
- 57) These zones are based on data holdings and the sedentary nature of gummy shark, not biological boundaries.
- 58) The RAG discussed the need to revisit biological parameters within the model, as research was done some time ago (e.g. estimate of pups per female at age). Dr Thomson noted that there is a project being developed that will examine the biological parameters included in stock assessment models for SESSF species.

- 59) Dr Thomson noted the following data was used in the 2016 Assessment:
- a) Gillnet CPUE (operation) for Bass Strait
 - b) Gillnet CPUE (operation) for South Australia
 - c) Gillnet CPUE (operation) for Tasmania
 - d) Trawl CPUE for all zones combined
 - e) Bottom line CPUE for all zones combined
- 60) The RAG noted biological parameters to be included in the base case model. Dr Thomson noted advice from the RAG to include the following data series in the 2020 assessment:
- a) Gillnet CPUE (Net Length) for Bass Strait
 - b) Gillnet CPUE (Net Length) for South Australia
 - c) Gillnet CPUE (Net Length) for Tasmania
 - d) Trawl CPUE for Bass Strait
 - e) Trawl CPUE for South Australia
 - f) Trawl CPUE for Tasmania
- 61) The RAG discussed CPUE trends for the gillnet fleet in the three shark zones. It was noted the decline in 2010 for the South Australian CPUE series is likely to be reflective of a change in fishing practises due to the Australian Sea Lion (ASL) closures, rather than a decline in stock abundance. Dr Thomson noted the model uses the gillnet time series for South Australia up to 2010 only, the year in which the ASL Strategy was implemented. She suggested an alternative index of abundance is required for the South Australian stock as, because the gillnet fishery has undergone significant changes since the introduction of gillnet closures, it is not used in the assessment post 2010. The AFMA member noted SESSFRAG had requested additional work be completed to standardise the gillnet series accounting for the ASL closures.
- 62) Dr Thomson noted that new age data was not yet included as there had been delays in receiving the data from the fish aging provider. The RAG was advised that age data would be incorporated into the assessment model in time for the next meeting of SharkRAG.
- 63) The RAG discussed the difference in estimated stock abundance for gummy shark in Bass Strait for the 2020 model and the 2016 model. In the comparative graphs there is a divergence between the models from the 1970's. Dr Thomson suggested that gear competition is likely the major driver for the difference. She suggested that gear competition should not be estimated, that it effects estimates of the past but has little influence on the model estimate of current abundance and depletion, noting that it does not fit past CPUE data as well as when it is included. The RAG requested Dr Thomson plot expected CPUE for a range of values of the effort saturation parameter to illustrate its effect on the CPUE series.
- 64) The RAG noted effort saturation has been included in the base case model previously. Dr Thomson noted the saturation value varies significantly and is not well estimated. The RAG noted difficulties of understanding the effects of this parameter. The RAG noted the parameter does not consider factors such as time and more fine scale effort saturation.

- 65) Dr Thomson suggested a discussion should be had at the next meeting of SharkRAG to discuss better methods for weighting CPUE series.
- 66) The RAG discussed how uncertainties in the estimates of the base case model should be represented. The RAG requested Dr Thomson calculate asymptotic confidence intervals from the outputs of the base case model.

Action Item 11 - Dr Thomson to plot expected CPUE for a range of values of the effort saturation parameter to illustrate its effect
Action Item 12 – SharkRAG to discuss the use of data weighting methods for the gummy shark assessment at the next meeting of SharkRAG
Action Item 13 – Dr Thomson to provide confidence intervals on the outputs from the base case model

67) The RAG recommended the following changes for the base case model:

- a) The model should use a gillnet CPUE series based on net length**
- b) The model should use three trawl CPUE series, one for each gummy shark zone ; the trawl series for Bass Strait should be split in to before 2005, and after 2008**
- c) The model should not include gillnet CPUE data in South Australia after 2010**
- d) The model should not to include Automatic Longline CPUE data in the model but include it in the report to ensure it is considered in future assessments**
- e) The model should include age data when it becomes available**
- f) The model should not include Danish Seine data**
- g) The best way to represent uncertainty with the model is via a series of sensitivities as per the last stock assessment**
 - i. A sensitivity of effort saturation for gillnets should be investigated**

68) The RAG agreed to meet before the December meeting of SharkRAG to discuss the base case model. It was noted the Executive Officer would provide dates for a half day meeting, likely to be held in late October.

69) The AFMA member agreed to consult with Fish Aging Services regarding the possibility of sectioning vertebrae on an annual basis, rather than having four years of cumulative vertebrae to avoid delayed delivery of age data in assessment years.

Action Item 14 – AFMA to modify the contract with fish aging services to allow shark vertebrae to be sectioned on an annual basis.

70) Dr Knuckey left the meeting at 11:45 AM.

5. Ecological Risk Assessment for the shark gillnet sub-fishery

- 71) Dr Sporcic and the AFMA member introduced the Agenda Item. The RAG noted a draft of the gillnet ERA was presented to SharkRAG in 2018. The RAG noted changes to the ERA methodology, resulting in updates to the ERA. Rather than applying effort homogeneously across the spatial extent of the fishery, we can now apply effort heterogeneously to better account for the spatial intensity of effort. This revised approach is considered to be more appropriate for the SESSF where effort tends to be concentrated in certain areas.
- 72) It was noted the ERA produced a risk score of a potential extreme for White Shark (*Carcharodon carcharias*). Seven other species had a risk score rating of high risk (Table 1).

Table 1. ERA risk scores for high risk species in the 2019 Ecological Risk Assessments for Shark Gillnet - X denotes high risk, red X – denotes extreme high risk

Scientific name	Common name	2019
<i>Carcharodon carcharias</i>	Great White Shark	X
<i>Thalassarche impavida</i>	Campbell albatross	X
<i>Thalassarche cauta</i>	Shy albatross	X
<i>Diomedea exulans</i>	Wandering albatross	X
<i>Halobaena caerulea</i>	Blue petrel	X
<i>Pterodroma mollis</i>	Soft-plumaged petrel	X
<i>Tursiops truncatus</i>	Common bottlenose dolphin	X
<i>Tursiops aduncus</i>	Indian Ocean bottlenose dolphin	X

- 73) The RAG discussed the updates since the RAG last considered the assessment. It was noted that five species had their risk rating reduced as a result of the change in the effort calculation. The RAG questioned the sensitivity of the assessment to this change. Dr Sporcic noted that the previous use of gridded effort may have inflated the effort footprint. She confirmed that the effort is calculated at shot level based on logbook data.
- 74) The RAG discussed the data that was input to the ERA, noting the RAG could endorse the process however may not have the expertise to comment on the data that is used in the ERA. Dr Sporcic agreed there needed to be further work to find a balance between providing all the data input to the assessment vs. a summary that the RAG finds beneficial. She suggested the data could be supplied as an appendix to the ERA report, noting it is likely to be very large.
- 75) The RAG discussed the need for research concerning dolphin populations to provide inputs for ERAs and corresponding risk scores. The AFMA member noted that research external to AFMA is used to understand the status of threatened species populations. She noted AFMA's obligation to minimise interactions with protective species in Commonwealth fishing operations.
- 76) **The RAG endorsed the gillnet ERA report as final, noting that the data should be made available as an appendix to the final report.**

6. Dates for next meeting

77) The EO requested members to provide availability for the upcoming meetings via the Doodle Poll links circulated to the RAG.

78) The Chair noted that Agenda Items that were not addressed would be moved to the next meeting of SharkRAG. These include:

Agenda Item 7. Updates from members

Agenda Item 8. Sawshark tier 4 assessment

Agenda Item 9. Independent review of school shark close kin mark recapture

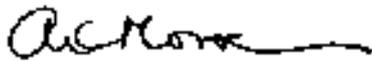
Agenda Item 10. Data needs and collection

Agenda Item 11. Research priorities

Agenda Item 12. Other business

79) The Chair closed the meeting at 12:25 pm.

Signed (Chairperson):



Alexander Morison

Date: 18 November 2020

Attachments

Attachment A: SharkRAG 7 final agenda

Attachment B: Declarations of interest

Attachment C: Status of action items

29 – 30 September 2020

Day One – 29 September 2020 12:00 PM – 4:30 PM AEDT

Agenda item	Purpose	Paper / presentation	Time (AEDT)
Acknowledgement of country		Chair	Open
1. Preliminaries			
1.1 Welcome and apologies	For information	Chair	5 mins
1.2 Adoption of agenda	For action	Chair	5 mins
1.3 Declarations of interest	For action	Chair	45 mins
1.4 Status of action items	For information	AFMA	15 mins
1.5 Adoption of meeting minutes	For discussion	AFMA	10 mins
2. Recreational catch estimates of school and gummy shark	For advice	Dr Thomson	15 mins
3. CPUE standardisations	For advice	Dr Sporcic	1 hr 30
3.1 Gillnet CPUE			
3.2 Shark CPUE			

Day 2 – 30 September 2020 9:30 – 12:30 PM AEDT

Agenda item	Purpose	Paper / presentation	Time (AEDT)
4. Gummy shark assessment (Tier 1) - Summary of most	For advice	Dr Thomson	2 hrs 30 mins

<p>recent assessment</p> <ul style="list-style-type: none"> - Overview of recent data - Preliminary stock assessment – presentation of models - RAG <p>recommendation of model and parameters for preparation of base case</p>			
<p>5. Ecological risk assessment for the shark gillnet sub-fishery</p>	For advice	Dr Sporcic	10:25 AM 45 mins
<p>13. Dates for next meeting</p>	For noting	Chair	
<p>6. Updates from members*</p>			
<p>6.1 Management update</p>	For information	AFMA	
<p>6.2 Industry update</p>	For information	Members	
<p>6.3 CSIRO Update</p>	For Information	CSIRO	
<p>7. Tier 4 data for saw shark*</p>	For Advice	CSIRO	
<p>8. CKMR Independent Review of School Shark*</p>	For information	AFMA	
<p>9. Scheduling of the next school shark assessment*</p>	For advice	AFMA / Dr Thomson	
<p>10. Data needs and collection*</p>			

10.1 Sampling regime for discard lengths to support future discard estimates	For advice	AFMA / Dr Knuckey / Dr Thomson	
10.2 GHAT Data Collection Plan	For discussion	AFMA	
10.3 Updates to the SIDaC data collection plan	For discussion	AFMA	
11. Research priorities*	For information	AFMA	
12. Other business*	For discussion	Members	

*Denotes Agenda Items which were deferred to a subsequent meeting of SharkRAG

Attachment B – Declarations of Interest

Member	Position	Interest declared
Alexander (Sandy) Morison	Chair	<p>Director of Morison Aquatic Sciences.</p> <p>Chair of SharkRAG.</p> <p>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.</p> <p>No pecuniary or other interest in the SESSF.</p>
Robin Thomson	Scientific Member	CSIRO, Assessment scientist. Acquiring funding for research purposes.
Charlie Huveneers	Scientific Member	Associate Professor and research scientist. Potential interest in funding for research. No pecuniary interest or otherwise.
Ian Knuckey	Scientific Member	<p>Director Fishwell Consulting Pty Ltd.</p> <p>Involved in SESSF and GAB Fishery Independent Survey (FIS).</p> <p>Range of research interests in relation to South East fisheries including the GHAT, GABTF, SESSF and auto-longline sector. This includes the project on using EM data for estimating discards and collecting length information.</p> <p>Agent for Olfish Electronic Logbooks</p> <p>NPF RAG Chair, Scientific member on NORMAC. Provides research advice to various industry associations: SETFIA, GABIA and SSIA.</p>
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.
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.
Jamie Papas	Industry Member	<p>Gillnet fisher and SFR holder.</p> <p>Board Director San Remo Fishermen's Co/Op</p>
Julian Morison	Economics Member	<p>Director, Kuti Co Pty Ltd – SA Pipi quota holder</p> <p>Director, BDO Advisory (SA) Pty Ltd - current contracts with SA & Qld state governments collecting fisheries economic data</p> <p>Member, SA Snapper Management Advisory Committee (PIRSA)</p> <p>Economics member, Scallop Fishery Resource Assessment Group (AFMA)</p> <p>Member, Economics Working Group (AFMA)</p> <p>Member, Human Dimensions Research subprogram (FRDC)</p>

		Principal & co-investigator on several FRDC research projects
Craig Harris	Industry Member	Gillnet fisher and SFR holder.
Leonardo Guida	Conservation Member	Conservation member and lead shark conservation campaigner for the Australian Marine Conservation Society. No pecuniary interest or otherwise.
Natalie Couchman	AFMA Member	AFMA member. No interest pecuniary or otherwise.
Max Bayly	Executive Officer	AFMA EO. No interest pecuniary or otherwise.
Ross Bromley	Invited Participant	Principal of Girella Fisheries Services Engaged by Southern Shark Industry Alliance as project manager for Shark Industry Data Collection project (SIDaC) and Blue Eye Trevalla co-management Engaged to provide advice on various SESSF MSC accreditation projects Project manager of Western Orange Roughy Data Collection project (WORDaC) Provide advice to various fisheries on EPBC Act accreditation.
James Woodhams	Invited Participant	ABARES Senior Scientist. Potential interest in funding for research projects.
Fiona Hill	Invited Participant	No interest pecuniary or otherwise
Amanda Goodspeed	Observer	No interest pecuniary or otherwise
Miriana Sporic	Invited Participant	Employed by CSIRO, Assessment scientist. Acquiring funding for research purposes
Simon Boag	Observer	Non-beneficiary Director of two fishing companies in the SESSF. Industry member on SERAG. Executive Officers to SETFIA and SPFIA. SETFIA receives funding from various bodies to complete projects. Involved in the delivery of industry training courses through East Gippsland TAFE. Undertakes contracts as an independent consultant.

Attachment C

Table 1. Status of action items arising

		• Complete/Redundant	• Underway	• Yet to start	• Need SharkRAG advice
Meeting & agenda item reference	No.	Description	Responsibility	Timeframe	Status
SharkRAG 2 2016	1	For the next gummy shark assessment, the assessment scientist to investigate estimating selectivity separately for the three regional stocks and allowing it to be flexible in form. This may allow the differing availability function to be removed from the assessment.	CSIRO Assessment Scientist	In time for the next stock assessment.	Estimations of selectivity for each separate region would require length frequency data for each fleet in each region, or 'mirroring' of selectivity patterns between some regions when insufficient data is available for separate estimation.
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	2021	AFMA is undertaking a review of the <i>School Shark (Galeorhinus galeus) Stock Rebuilding Strategy</i> in 2020-21. This will include updating information concerning latest research relevant to the species.
SharkRAG 1 2018	3	AFMA to investigate removing elephant fish as a quota species in the SESSF	AFMA	TBC	A new harvest strategy is in the process of being developed for the SESSF to take into account the 2018 <i>Commonwealth Harvest Strategy Policy</i> . This item will be considered as part of that process.
SharkRAG 2 2018	1	Dr Thomson to liaise with Dr Braccini to investigate the availability of	Dr Thomson/ Dr	TBC	Samples may be with Dr Thomson (in samples supplied from AFMA). Additional funding required to

		further vertebrate samples taken during surveys	Braccini/FAS		sort through samples.
SharkRAG 3 2018	17	Dr Thomson to liaise with Dr Koopman to get the EM data analysis code for incorporating into the existing discard estimation process.	Dr Thomson	Before SESSFRAG February 2019	CSIRO have obtained the data analysis code. This now needs to be incorporated into the discard process which is part of the SESSF contract between CSIRO and AFMA. Funding is being sought to support this work going forward.
SharkRAG 3 2018	18	AFMA to develop proposal to do cross comparisons between EM retained length and industry collected lengths for verification and cost.	Mr Macdonald	Next SESSFRAG Meeting	Proposal has been developed for funding and is currently included in the SESSF Annual Research Statement for 2021-22. There is very limited overlap between observers and EM data so the feasibility of project should be considered. The scope could be revised to look at available data sources and collection techniques (EM and industry). Estimated cost, priority/ranking and feasibility to be discussed at the meeting of SharkRAG in December 2020.
SharkRAG 3 2018	19	AFMA to provide the TAC recommendations paper and TAC calculation spreadsheet to RAG members and invited participants for information each year.	SharkRAG Executive Officer	December each year	The SESSF TAC recommendations paper is sent in late December each year. AFMA EO's will distribute this to RAG members and invited participants.
SharkRAG 4 2018	21	Refer the question of conducting biennial collection of biological data for stock assessment to SESSFRAG February 2019 data meeting.	SESSFRAG	February 2019	Considered at SESSFRAG Chairs' meeting in February 2019. For the next gummy shark stock assessment, CSIRO to undertake data exclusion to investigate the effect of biennial sampling to determine the impact of biennial data collection by removing every second year of length and age data. Results of this work to be presented at the next SharkRAG meeting.
SharkRAG 4 2018	29	Mr Macdonald to investigate the RAG suggestion that high risk species identified through ERA should go to expert reference groups (e.g. AAD,	Mr Macdonald	SharkRAG 5	To be discussed with managers / senior managers in the SESSF.

		Commonwealth Marine Mammal Working Group, IUCN shark reference group etc.) for consideration.			
SharkRAG Teleconference 2020	3	AFMA and CSIRO to prepare a summary table of assumptions that went into the original close-kin assessment model.	AFMA/CSIRO	Before October SharkRAG Meeting	Pending.
SESSFRAG Data 2019	13	Seek advice from SharkRAG to update the SIDaC data collection plan to include : <ul style="list-style-type: none"> the collection of total and partial lengths of school and gummy shark particularly any school sharks larger than 160cm total length (100cm partial length). Gummy shark over 160 TL and 100cm PAR are also important; Collection of gummy and school shark samples from automatic longline vessels. 	SharkRAG	SharkRAG Meeting	<ul style="list-style-type: none"> Dual length measurements for large school and gummy sharks were collected alongside a recent trial of automatic longline gear in the Bass Strait (FRDC project 2019-129). Further data collection has commenced under the SIDaC Program. To be considered at the December 2020 meeting of SharkRAG.
SESSFRAG Data 2019	14	AFMA to confer with Ian Knuckey and Robin Thomson to determine the sampling regime for discard lengths to support future discard estimates and, if further advice is needed, seek SharkRAG advice.	AFMA	Prior to the November 2019 SharkRAG meeting	To be considered at the meeting of SharkRAG in December 2020.
SESSFRAG Data 2019	15	SERAG and SharkRAG to consider the data for the remaining rebuilding species that were not discussed during the SESSFRAG data meeting.	SharkRAG	November 2019 SharkRAG meeting	Considered at September 2020 SharkRAG meeting.

SharkRAG 7 September 2020	1	Dr Thomson to highlight the rationale for not including recreational catch data in the final report of the 2020 gummy shark stock assessment	Dr Thomson	December 2020	Dr Thomson to provide an update at the meeting of SharkRAG in December 2020.
SharkRAG 7 September 2020	2	AFMA to incorporate recreational state catches of Commonwealth shark species into data sharing arrangements with State Agencies.	AFMA	Next data sharing meeting with State jurisdictions	AFMA to discuss with respective state agencies at next OCS meetings.
SharkRAG 7 September 2020	3	AFMA to formally request recreational catch from State agencies on an annual basis.	AFMA	Next data sharing meeting with State jurisdictions	AFMA to discuss with respective state agencies at next OCS meetings.
SharkRAG 7 September 2020	4	Dr Althaus to incorporate elephantfish into the recreational catch report	CSIRO	Prior to finalization of gummy shark assessment	Dr Althaus to provide an update out of session.
SharkRAG 7 September 2020	5	Dr Althaus to finalise the recreational catch report with the most recent available data from State agencies.	CSIRO	Prior to finalization of gummy shark assessment	Dr Althaus to provide an update out of session.
SharkRAG 7 September 2020	6	Dr Sporcic to investigate the potential influence of soak time (if adequate data exists) on Catch Per Unit Effort indices in time for the next gummy shark stock assessment (in 2023)			
SharkRAG 7 September	7	AFMA and CSIRO to discuss additional analysis needed to determine the relationship between	AFMA/CSIRO	Prior to October 2020 intersessional	To be considered under agenda item 3.

2020		net length and CPUE and the accuracy of net length and report back to the RAG prior to the next meeting of SharkRAG		meeting of SharkRAG	
SharkRAG 7 September 2020	8	Dr Sporcic to investigate a CPUE series which combines the manual longline and automatic longline fleets	Dr Sporcic	Before the next gummy shark stock assessment (2023)	Dr Sporcic to provide an update prior to the 2023 gummy shark assessment.
SharkRAG 7 September 2020	9	Dr Thomson to split the trawl CPUE series into two series (1996 – 2005; 2008 – 2019) in the upcoming base model for gummy shark	Dr Thomson	Prior to November 2020 meeting of SharkRAG	To be considered under agenda item 3.
SharkRAG 7 September 2020	10	Dr Thomson to include a Danish Seine fleet in the next gummy shark stock assessment (scheduled for 2023).	Dr Thomson	Before the next gummy shark stock assessment (2023)	Dr Thomson to provide an update prior to the 2023 gummy shark assessment.
SharkRAG 7 September 2020	11	Dr Thomson to plot expected CPUE for a range of values of the effort saturation parameter to illustrate its effect	Dr Thomson	To present at SharkRAG November 2020 meeting	To be considered under agenda item 3.
SharkRAG 7 September 2020	12	SharkRAG to discuss the use of data weighting methods for the gummy shark assessment at the next meeting of SharkRAG	SharkRAG	November 2020	To be considered under agenda item 3.
SharkRAG 7 September 2020	13	Dr Thomson to provide confidence intervals on the outputs from the base case model	AFMA / FAS	December 2020	AFMA will discuss alterations to the contract with fish aging services.
SharkRAG 7	14	AFMA to modify the contract with fish aging services to allow shark	AFMA / FAS	December	AFMA will discuss alterations to the contract with fish

September 2020		vertebrae to be sectioned on an annual basis		2020	aging services.
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