Shark Resource Assessment Group (SharkRAG)

Meeting 1 2023

Meeting minutes

October 10 and 11 2023

Agenda item 1. Preliminaries

1.1 Welcome and apologies

1. The Chair opened the meeting at 1304 hrs with an Acknowledgement of Country and welcomed members, invited participants and observers.

2. Attendees noted that the meeting was being recorded for the purposes of taking minutes.

Attendees	Membership
Mr. Sandy Morison	Chair
Ms. Michelle Henriksen	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
Ms. Anissa Lawrence	Conservation member
Dr. Julian Morison	Economic member
Dr. Charlie Huveneers	Scientific member
Apologies	**Membership**
Mr. Ross Bromley	SSIA[1]
Mr. Leigh Castle	Industry member
Invited Participants	**Organisation**
Dr. Miriana Sporcic	CSIRO[2]
Dr. Nick Hill	CSIRO
Observers	**Organisation**
Mr. James Woodhams	ABARES[3]
Mr. Kurt Davis	ABARES

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[1] Southern Shark Industry Association
[2] Commonwealth Scientific and Industrial Research Organisation
[3] Australian Bureau of Agriculture and Economics Research

Mr. Dan Corrie	AFMA
Ms. Anna Willock	AFMA

1.2 Declarations of interest

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

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

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

   a. For all industry representatives for Agenda Item 5.0 gummy shark assessment.

   b. For all direct and potential research providers (e.g., scientific members, CSIRO, ABARES) for Agenda Item 6.0 SESSF data plan.

6. SharkRAG members agreed, consistent with the approach taken in previous meetings, that attendees with conflicts of interests were welcomed to be part of discussion but not take part in the formulation of advice or decisions.

1.3 Adoption of agenda

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

1.4 Minutes of previous meeting

8. SharkRAG noted that the minutes of the SharkRAG meeting of December 2022 are available on the AFMA website.

1.5 Actions arising from previous meetings

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

10. SharkRAG noted that a number of actions have now been completed and others to be discussed within upcoming agenda items during this meeting.

11. Dr Robin Thomson noted for Action item 8 and 9 from SharkRAG 1 2021 "*SIDaC to look at feasibility of including sawshark species composition in their data program, and AFMA to consider observer data including trawl data in the sawshark summary table for SharkRAG*", the importance of establishing whether the discard rates are the same for the sawshark species as SIDaC only operates on landed catches.

Agenda item 2. Fishery Updates

2.1 AFMA Update

SharkRAG noted and discussed:

12. The AFMA member provided an update on the management of the gillnet, hook and trap (GHAT) fishery, highlighting:

    a. Staff updates have occurred within the Demersal and midwater team, with the addition of Michelle Henriksen as a Senior Management Officer.

    b. The AFMA Commission maintained a gummy shark TAC of 1,672 t for the 2023-24 season, considering a proposal from SSIA to shift catch out of the Bass Strait (BS) zone; and regular monitoring by AFMA on gummy shark catch broken down by zone and month.

    c. The AFMA Commission determined a school shark TAC of 225 t, 25 t less than recommended by SharkRAG and the South East Management Advisory Committee (SEMAC); based on concerns and risk of school shark exceeding the model estimated mortality threshold.

    d. The use of feather kits for all line boats in the GHAT sector is mandatory and all statutory fishing right (SFR) holders should have received the kits prior to the beginning of the season.

    e. Key outcomes of the SESSFRAG data meeting, 30-31 August 2023 included:

        i. An interim stock assessment schedule while the multi-species harvest strategy (MSHS) project is underway. Only critical assessments will be conducted in 2024 and 2025 with the assessment schedule resetting from 2026 onwards. RAGS will continue to assess incoming data during the non-assessment years.

        ii. The inclusion of a category of trigger species. Elephantfish and sawshark have been included as trigger species, with a trigger limit of a catch total of 75% of the TAC. An assessment will only occur if a trigger limit is reached. SharkRAG continue to consider the incoming species data on an annual basis.

13. SharkRAG noted from Industry that elephant fish is incidental catch and effort will be cyclical based on the catch of target species.

14. SharkRAG discussed the need to better understand the steps that will be taken when a trigger limit is reached and an assessment is conducted, noting:

    a. AFMA should ensure any trigger limits set for a trigger species is consistent amongst stocks and that the steps AFMA and the relevant RAGS will need to take once a trigger limit is breached is documented and understood.

b. Estimates of discards for elephantfish and sawshark remain uncertain and variable; and catches against a trigger relative to the TAC may indicate changes in availability or reporting rather than sustainability for these species. This highlighted the importance for industry ensuring the accurate reporting of discards to provide more robust discard estimates.

c. Actions following a trigger breach could include a re-analysis or comparison of the stock by CPUE standardisations between various gear types.

d. A 6-year time buffer if an assessment is not triggered could produce additional risk.

e. A multi-indicator trigger could provide a more robust trigger limit for species assessed on CPUE rather than catch percentage of TAC.

15. SharkRAG raised concerns regarding the purpose of collecting information such as CPUE standardisation if no assessment is triggered.

SharkRAG actions and recommendations:

16. SharkRAG supported the 75% trigger limit set for elephantfish and sawshark, noting the concerns surrounding the level of certainty placed on the trigger limit, the justification and consistency of triggers set across species; and the procedure following a trigger breach.

17. SharkRAG recommended the use of a multi-indicator trigger that considers both nominal CPUE and catch and emphasized the importance of improving catch, discard, and CPUE data to support management decisions.

> *Action item 1:* AFMA to consider how to improve discard data reporting and the potential options industry can undertake to improve better discard reporting.

2.2 Industry Update

SharkRAG noted and discussed:

18. Industry members updated SharkRAG on the following key points:
    a. Catches of gummy shark are relatively stable this season.
    b. School shark avoidance is becoming increasingly difficult with a noticeable increase of school shark catches, particularly in South Australia (SA) and in the BS.
    c. Ongoing issues such as crew availability and costs of fuel continue to be felt across the fishery. Industry raised concerns surrounding the possibly conflicting management following the reduction of the school shark TAC and the shifting of effort out of the BS, as shifting effort towards the west could lead to more school shark being caught.

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Emerging octopus trapping fisheries were noted as possibly impacting the abundance of gummy shark due to prey effects. There are established octopus fisheries in SA and Tasmania (TAS), with a potential new fleet coming through Victorian (VIC) waters.

> **Action item 2:** AFMA to seek further advice from CSIRO (for example Dr. Beth Fulton) to provide insight on the relationship between octopus and gummy shark populations, to better understand the potential impact of an incoming octopus fishery through VIC (along with established octopus fisheries in SA and TAS) on the GHAT.

2.3 Scientific Update

SharkRAG noted and discussed:

19. Scientific members provided an update to SharkRAG on the following key points:
20. an update on the school shark CKMR project by Dr Robin Thomson (CSIRO) will be provided at SharkRAG 2, December 2023.
21. Western Australia is conducting a review on their shark sector based on changes to the fishery.
22. Dr. Andrew Penney, provided an update on work contracted by AFMA in 2020, highlighting there is an efficiency effect using the gillnet method in CPUE standardisation.

2.4 Economic Update

SharkRAG noted and discussed:

23. The economic member updated SharkRAG on the following key points:
24. ABARES have developed an economic performance index which has aligned well with previous estimates of net economic returns (NER) within the eastern tuna and billfish fishery and could be developed in the shark fishery using CPUE, catch, and other key economic variables such as crew costs and fuel.
25. This information helps provide context on the performance of the fishery.
26. Industry noted more information and variables are needed to consider providing a clearer picture of the fishery as fuel costs and crew availability is variable year to year.

2.5 Conservation Update

SharkRAG noted and discussed:

27. The conservation member updated SharkRAG on the following key points:

28. The Australian Marine Conservation Society (AMCS), the Human Society International (HSI), and the Worldwide Wildlife Fund (WWF) are working on research related to endemic shark species.

29. A number of shark and ray species are currently sitting with the threated species committee for listing under the Environmental Protection and Biodiversity Act 1999 (EPBC). The minister has 90 days to respond to the recommendations.

30. NGOs are pushing for zero retention for endemic species such as whitefin swellshark which have good survivability from longline, however, less is known for other species post release.

31. There is a focus on spatial management in the SESSF with recommendations identified including
    a. An increase in observer coverage to increase sex and lengths.
    b. Expanding the upper slope dogfish management plan to include additional species.
    a. Improving the coordination between the Commonwealth and New South Wales.
    b. Cities listing of species including bronze whalers.

Agenda item 3. Recent history and catch and discard data for sharks

SharkRAG noted and discussed:

32. The AFMA member introduced the agenda item and noted the provided information was for general discussion only.
    a. SharkRAG noted recent retained and discarded catch and discard data of gummy shark, school shark, elephantfish, and sawshark noting the current season (2023-24) is ongoing.
    b. While 2022-23 retained catch of school shark is greater than the TAC set the year before, there was no associated reduction in the discarded amount. Suggesting the assumption of TAC driving discards may not be occurring.
    c. Total mortality of school shark in 2022-23 season, exceeded the model predicted mortality threshold from the close kin outputs, noting it is a threshold at 3%.
    d. Gummy shark in the BS in the current season is tracking below the catch recorded at same time in the previous season as shown in the shark-o-meter reports provided to SSIA monthly.

33. Industry asked if weather is incorporated into the catch and discard reporting. Last year's cold front was noted to produce the best times for good catches. If the weather is unfavourable over many months, the catch will be impacted.
    a. AFMA highlighted that the monthly data would pick up the higher catches, but no information is currently available to tease out the finer weather information.
    b. Climate information is increasingly being provided to the relevant RAGs as a standing agenda item to support decision making.

c. Industry were encouraged to cooperate with Ian Knuckeys ships of opportunity program to build up a picture of bottom temperatures over time across areas, which will provide valuable information on how climate is impacting catches.

d. Industry have access to historical data of when bigger catches occur and the climate environment they were in and what cycle.

34. The shift of catch out of BS trade-off between balancing gummy shark catches with the likelihood of school shark catches was noted.

35. The catch and discard summaries by AFMA were well received by SharkRAG.

36. SharkRAG questioned what drove school shark to exceed the model predicted total mortality threshold from the CKMR results. AFMA note the discards appear to be consistent across the SESSF seasons, however, there was no decrease in discards which was expected following an increase in the TAC to cover the unavoidable bycatch of school shark when targeting gummy shark. There remains some uncertainty around what is driving the catch exceeding the 3% rebuilding threshold.

37. ABARES noted there were additional sources of mortality that are not included in the estimate of total mortality provided by AFMA, including state discards and recreational harvest.

38. SharkRAG cannot be sure that rebuilding will occur at the rates projected using CKMR assessment (e.g., the projection assuming a 3% rebuild rate), due to the level of uncertainty associated with these projections.

> **Action item 3:** AFMA to include the percentage of gummy and school catches and discards by zone to the data summary, and to improve the presentation of the catch and discard proportions.

Agenda item 4. 2023 standardised CPUE for sharks

39. Dr. Miriana Sporcic (CSIRO) provided a presentation to SharkRAG on the process and methodologies of CPUE standardisation for selected shark species, noting the following key points:

40. Gummy shark gillnet:

a. Lowest number of vessels in the series across South Australia (SA), Bass Strait (BS) and Tasmania (TAS) zones.

b. SA catches occur mostly in central SA with 74.1 t recorded catch in 2022. CPUE series is cyclical, increasing since 2021 reaching the long-term average.

c. BS recorded 777.8 t of catch mostly out of eastern BS. CPUE is cyclical exceeding the long-term average since 2020 but has been declining.

d. TAS recorded 60 t of catch in 2022, mostly from eastern TAS. CPUE series is noisy comparable to previous years and exceeded the long-term average in 2022.

41. Gummy shark trawl:

a. Lowest number of vessels in the series across all areas combined with 25 vessels.

    b. Total catch of 72.6 t in 2022 which is the lowest in the series mostly from central SA and western SA. Depth range caught by trawl was recorded down to 500m. The CPUE series is trending upwards and is above the long-term average for all areas combined.

    a. BS recorded 13 t of catch in 2022, mostly from eastern BS followed by west BS. CPUE series is steadily increasing since 2019 and exceeding the long-term average.

    b. TAS recorded 9.7 t in catch in 2022. Depth distribution is constrained to less than 150m annually. CPUE series has been increasing since 2021 and has exceeded the long-term average.

42. Gummy shark bottom line:

    a. Catch in 2022 has declined to 232.5 t, compared to 405.5 t recorded in 2019, mostly out of central SA and eastern BS. The CPUE Series is noisy and above the long-term average in the most recent estimate.

43. Gummy shark danish seine:

    a. BS and VIC, combined, recorded 28 t of catch in 2022 with 17 vessels. Catches were mostly out of eastern and western BS zones. The CPUE series has been increasing steadily since 2014 and has been above the long-term average since, with the highest in the series recorded in 2022. Depth distribution is less than 150 m with a mean of 70 m. Comparable catches recorded over 1,000 observations each year.

    b. SharkRAG noted trawl does not target gummy shark and industry may not be directly improving their gear for catching gummy shark.

44. School shark trawl:

    a. Lowest number of vessels in the series, however the highest catch was recorded at 31.7 t in 2022, mostly coming from western TAS. The depth distribution extends to 600 m. CPUE series has been increasing, highest in the series shown in 2022.

    b. Industry noted there has been trouble avoiding school shark when locating gummy shark.

    c. ABARES noted the low level of school shark catch taken by trawl and therefore the small amount of data included in trawl CPUE.

Sharkrag discussion and recommendations:

45. Scientific member, Dr. Andrew Penney, noted the CPUE series from the gear efficiency standardisations correlates with the Southern Oscillation Index (SOI), excluding data in 2011 and 2012. SharkRAG noted further work completed by Andrew Penney on standardising for gear efficiency in the shark gillnet fishery.

    a. Net length less than 4km reduces the efficiency of catch.

    b. Results (using logbook data) represent, unstandardised steep cpue, catch per km brings down cpue series comparatively.

c. Industry noted some boats using longer net length can be limited to one crew member, which is economically inefficient due to a reduced portion of the catch being looked after.

d. CSIRO have been funded to address these results and are due to be seen in 2024.

46. Industry noted cyclical catch alongside dry and wet seasons, across various locations in the bass strait.

47. The Industry member, Kyriakos Toumazos, raised a concern on the consequence of CPUE gear saturation for the gillnet fishery. Eastern BS is noted to experience a considerable amount of effort and high competition within the fishery for 6-inch gillnets. When Danish seine and trawl fleets enter the fishery in eastern BS, and having a CPUE time series indicating an increase, there is a gillnet saturation impacting the CPUE and therefore the estimated gummy shark abundance.

48. Danish seine and trawl selectivity is lower than the gillnet fishery, and if the proposed negative interactions between the Danish seine, trawl, and gillnet CPUE is occurring, there would be an expected increase in the line fishery saturation. The effort saturation parameter in the model does not pick up the differences and determines the CPUE as a single value per stock.

49. SharkRAG noted the importance of understanding how the model reconciles the different trends.

50. SharkRAG recommended breaking down the trawl cpue series regionally, noting the natural movement of school shark compared to gummy shark (which are more sedentary).

Action item 4: AFMA to seek advice from GABRAG to provide insight into Trawl gummy SA shift in depth distribution extending deeper

Action item 5: CSIRO to confirm if Blue Grenadier factory vessels are included in the school shark trawl CPUE series.

Agenda Item 5. Gummy shark assessment

The AFMA member introduced the agenda item and SharkRAG noted the presentation by Dr. Nick Hill (CSIRO) on the preliminary base case gummy shark stock assessment. SharkRAG noted the following key points:

51. The model updated from 2020-2023, including the following:

a. Updates to the input data.

b. Annual length frequencies for shallow line has been included.

c. Conditional age-at-length included from 2015-2022 and corrections completed to the data.

d. The plus age group was extended from 10 years to 20 years.

e. Alternate SA gillnet CPUE time series was explored and included in the assessment.

f. Port length data investigated (not included in model runs)

g. Danish seine data investigated (not included in model runs)

h. New growth curve tested

52. All gummy stocks (BS, SA and TAS) were estimated to be at or above the target reference point (TRP). BS is at 50% (depletion estimate) and stable, SA is at 63% and increasing, and TAS is at 69% and stable. The model was stable, presenting similar results to 2020.

53. The main input data indicated a slight decline in gummy shark catches from 2020. Total catch in 2022 was 1,576.4 t for all zones, with most of the catch coming out of the BS zone (1,047 t). SA recorded 412.5 t and TAS recorded 116.3 t of catch in 2022. The 6-inch gillnet fishery dominates the catch coming from the BS, with more variable gear methods being used in SA and TAS.

54. The mean 2011-2015 discard rate was re-calculated. A slight change in the historical discard rate was observed during each run of the model, meaning the historical time series goes up or down based on the discard rate being used. CSIRO suggest that SharkRAG select a fixed value, to maintain a constant time series through time. SharkRAG supported an average discard rate of 4.9 (percent of the catch), selected from an average value from the discard rates from 2001-2010.

55. CPUE for gillnet is similar to the 2020 indices and is stable across each of the three zones BS, SA, and TAS. CPUE series for non-gillnet methods is similar to the 2020 indices and is stable and increasing.

56. The CPUE for trawl gear is standardised separately for BS, SA, and TAS. The BS trawl series is broken from at 2008reflecting buybacks and management changes. All three stocks present increasing and stable CPUE series. The 2023 gummy update differs from the 2020 assessment in that the SA gillnet time series is broken at 1995 to reflect changed fishing efficiency.

57. SIDaC sampling has improved the numbers of samples available from the important shallow line fleet in SA. There are ongoing samples being collected from the gillnet fishery in BS. Some size related discards are apparent in the historical discard data for gummy shark, but it is believed that operators are mostly discarding fish due to damage. No current onboard observer data is available to examine that hypothesis. There is no data available from which to estimate discard rates for gummy shark historically; logbook reported discards are used for 2015 onwards.

58. Most length frequency samples are coming out of the BS.

59. Lengths from port collection present good samples from gillnet in the BS, with more Danish seine samples coming in compared to the onboard samples. Due to the shift to SIDaC sampling, the data ends in 2018 and does not run through to 2023 meaning port data is not collected going forward. A large proportion of samples are from BS gillnet and sampling of SA and TAS is more patchy. Port data are not currently used in the assessment.

60. The port and onboard length frequencies for gillnet lengths are reasonably close matches for BS, TAS but not for SA. Industry member, Kyriakos Toumazos, noted that if port sampling is sampling catch that is coming from areas where there is predominately smaller fish, then it will differ from onboard sampling, which is generally considered more representative of the fishery. CSIRO note it may not be worth the effort of Integrating the port-collected data into the assessment model.

61. The length discrepancies for port versus onboard sampling is only present for gillnet and is not seen for other methods. CSIRO suggest for the next model update, to complete sensitivities to incorporate port sampling data for the shallow line and trawl fleets, if SharkRAG think that it is worth putting effort into incorporating these data, noting that there is no ongoing collection.

62. Gillnet and shallow line fleets encounter larger gummy shark compared to the deep line and trawl fleets, with danish seine fleets catching smaller sharks. Shallow line and gillnet do not catch fish smaller than 65cm (the current minimum size bin used). To include Danish seine data into the model, in order to obtain earlier information on yar class strength, would require a change to the software to allow a smaller minimum size class. There is a potential pre-recruitment index from the danish seine fleet and value in capturing smaller fish into the model, although the danish seine fleet holds a small proportion of catch, recorded at 27.9 t in 2022 in the BS with less in SA and TAS.

63. Age samples are consistent for gillnet in the BS, with samples out of SA and TAS being patchy. Recent shallow line samples from SA have been collected. Relatively few samples are available for TAS.

64. Conditional age at length data show females grow larger and live longer compared to males which is considered in the model. The fixed growth used in the model does not seem to fit to data for females (fitting the fixed growth curve), with the model underestimating female age at larger sizes. CSIRO created a new growth curve for both females and males by means of a naïve fitting of a growth curve to age and length data, ignoring the impact of selectivity, and ran the model with the updated recent growth data for females (since 2010).

65. Scientific member, Dr. Charlie Huveneers, recommended double checking the sample size and the size range, as the estimated parameters of the growth function can vary substantially depending on the data available at the extremes, such as for juveniles. Size at birth could be fixed in the growth model as a way of testing the influence of these data on the change in the growth curve.

66. Partial length to total length correction fixed for the 2023 data has little effect to the model.

67. The model has the same structure as other tier 1s (an age structured integrated analysis model), but with some parameters shared between stocks (BS, TAS, SA) i.e., natural mortality, density dependence, and selectivity parameters. Taking gear saturation out of the model changes what the model thinks was happening in the 1980s and 1990s, when effort was at its greatest. The estimated stock status in the most recent year is not impacted when gear saturation is not estimated, and neither are the estimates of B0.

68. For bridging, the following points were included starting at the 2020 base case model:
    a. Input updated data to 2019 including catches, lengths, CPUE, and age-at-length.
    b. Input 2023 data (extending model to 2022) including catches, lengths, CPUE and age-at-length.
    c. Increase plus age group from 10 to 20 years.
    d. Alternate SA gillent CPUE timeseries (1988-2009).

e. Alternate SA gillnet CPUE timeseries (1988-1995, 1996-2009).

f. New growth curve tested.

g. Alternate density dependence assumptions.

69. The results of the model was noted as the following:

a. The re-processed 2019 data presents very little effect on pup depletion and biomass relative to virgin biomass across the three zones. The shift from operation based CPUE time series to the inclusion of net length had little impact on the model indicating the data going into the model is consistent.

b. The updated 2022 data presented very little change in the model with pup depletion at target for BS and above target for SA and TAS. Three additional runs were included along with the 2019 base case concluding 1) Bridge 15, plus age group 20, 2) Bridge 16, SA gillnet 1988-2009, and 3) Bridge 17, SA gillnet 1984-1995 and 1996-2009 reflecting the introduction of sound plotters into the fishery.

c. Bridge 15 shows little difference when extending the plus group age to 20 years.

d. Bridge 16 and 17 shows no impact on pup depletion. Alternate SA gillnet time series started from 1988 rather than 1984 and was split in two reflecting the change of fishery dynamics. There was minor impact on the BS and TAS stocks.

e. CSIRO suggest using Bridge 17 as the base case – that model splits the SA CPUE for gillnets into two time series rather than a single one, providing a better fit.

f. The TAS trawl CPUE is not well fitted, and the model was noted to use equal weights for all CPUE time series.

g. Length fits for females show relatively good fits to the model, with very little difference between models.

h. The model fits growth better for males, noting there are less males observed over 10 years old and over 140 cm.

i. New growth curves re-run under the model deviates for females. The original male growth fit better to the male data compared to the new data. Further investigation is required to see how the new growth would influence the model. The new growth curves are not affecting depletion calculations prior to 1980, only seeing an impact from 2000 onwards.

j. Recent recruitment is above average and presents a cyclical pattern across the three stocks with an upward trend for SA, Beth Fulton's work suggested that climate change might be mildly beneficial to gummy shark stocks, with the Bonny upwelling increasing under climate projections.

k. The new growth curve results in the model estimating implausibly high natural mortality (0.3). The gummy shark model has consistently estimate natural mortality around 0.15-0.18 but for the two new runs in bridge 18 and 19 the mortality goes up to 0.3, which is biologically unrealistic.

SharkRAG discussion and recommendations:

70. SharkRAG supported using an average discard rate of 4.9 % for historical catches.

71. CSIRO suggest for the next model update, to complete sensitivities incorporating port sampling data for the shallow line and trawl fleet but SharkRAG was unsure that this work was worth the effort.

72. All gear methods are currently weighted equally. SharkRAG recommended down-weighting the trawl series as a sensitivity to observe if there is a difference in the fit to the CPUE.

73. More investigation is needed on a potential way to estimate growth, such as considering selectivity of gear outside of the model, and the apparent change in the growth for females.

74. SharkRAG supported the proposal by CSIRO to not include the saturation parameters in base case but retain a sensitivity that estimates them in the model for future assessment model updates (the 2023 update, however, will use bridge 17 which does include gear saturation).

75. SharkRAG noted concerns surrounding the old growth curve not fitting the conditional length at age data, indicating females are growing slower and reaching smaller sizes.

76. The increase in CPUE in SA in the late 1990s is due to the shift of the fishery to a gummy shark targeted fishery. SharkRAG support splitting the series to reflect this change in the fishery and note the justification of increased CPUE was due to fleet changes rather than the introduction of colour sounders. Industry clarified the sounders are useful to avoid problems rather than a tool to enhance catch.

77. Depletion estimates drop by 10-15% when comparing the new growth estimates to the original model outputs which remains at or above the TRP.

78. The selectivity of gill nets means that slower growing individuals will still be caught in gillnets after faster growing individuals have grown beyond the selectivity gauntlet and are no longer represented in the gillnet data. Data from the shallow line would be required to better understand growth in females. Industry, AFMA and CSIRO to work on expanding sample collection in the data plan to increase sample collection from line gear.

79. SharkRAG endorsed splitting the SA series into two series rather than a single series. Splitting the series accounts for the changes in fishing dynamics providing a better index of abundance.

80. SharkRAG recommended progressing with bridge 17 as the base case model for calculating the RBC, both for a 5-year projection period (2024 to 2028) and for the long-term average RBC, for further advice at SharkRAG 2. CSIRO to provide a list of projections for SharkRAG to approve out of session, and fixed catch projections based on maintaining the TAC.

> *Action item 6:* CSIRO to try to understand why the port-collected length data appear biased
>
> *Action item 7:* CSIRO to do further investigation on a potential way to estimate growth considering selectivity of gear inside the model

> ***Action item 8:*** CSIRO to down-weight the trawl series to see if there is a difference in the fit of CPUE as a sensitivity.
>
> ***Action item 9:*** Industry, AFMA and CSIRO to work on expanding sample collection from SA and TAS shallow line fleets in the data plan. SharkRAG to discuss under the SESSF data plan agenda item at SharkRAG 2023.
>
> ***Action item 10:*** AFMA to attempt to project where the catch of gummy shark would be at the end of the 2023-24 SESSF season.

Agenda item 6. SESSF data plan

81.   This item will be discussed at SharkRAG 2 2023, with a recommendation to improve SIDaC sampling of the line sector of gummy shark and ensure sampling targets are achieved.

Agenda item 7. Other business

82.   SharkRAG supported the change to the discard report in that non-trawl strata will be removed from the estimation so that the estimated discard rate represents the trawl sector only. Logbook reported discards for the GHAT sector will be shown, by ISMP stratum, in the tables in the Discard report.

Agenda item 12. Next meeting

83.   The following SharkRAG meeting will be a face-to-face option on the 4 December 2023.

Close of meeting

84.   The Chair thanked SharkRAG, the AFMA member and the EO for their contribution and closed the meeting at 12:45 hrs.

October 2023

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. 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'. PI of the AFMA-funded project 2022/0806: "CKMR assessment design for selected key and rebuilding species in the SESSF and development of a CKMR tool for bycatch stocks". Co-investigator on FRDC project to develop harvest strategies for CKMR assessments for school shark and scalefish.
Andrey Penney	Scientific Member	Scientific member on SERAG, GABRAG, SharkRAG, SPFRAG, TRLRAG and Finfish RAG. Fisheries research and management consultant and has provided services to AFMA on a number of topics, including evaluating gear efficiency in the shark gillnet fishery. PI on FRDC project investigating use of dynamic reference point and harvest strategies for management of Commonwealth fisheries.
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 Director, BDO Advisory (SA) Pty Ltd - current contracts with SA & Qld state governments collecting fisheries economic data

		Member, SA Snapper Management Advisory Committee (PIRSA) Economics member, Scallop Fishery Resource Assessment Group (AFMA) Member, Economics Working Group (AFMA) Member, Human Dimensions Research subprogram (FRDC) Principal & co-investigator on several FRDC research projects
Kyri Toumazos	Industry Member	Chief Executive Officer (South Australian Northern Zone Rock Lobster Fishermen's Association Inc.); Director of Southern Sea Eagles Pty Ltd; Director of Southern Fisheries Pty Ltd; Director Health Balance Pharmacies Pty Ltd; Member South Australian Boating Facility Board; Member of Shark Resource Assessment Group (AFMA); Member of South East Management Advisory Committee; Member of AMSA Regional Safety Committee; Director Southern Shark Industry Alliance; Director PACK Investments Pty Ltd; Director Cruickshank's Corner Developments Pty Ltd; Director Cruickshank's Corner Commercial Pty Ltd; Director Seafood Industry Australia;
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, registered charity. 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 SPFRAG Conservation member on SEMAC Conservation member on South Australia Rock Lobster MAC and RSC Conservation member on Spencer Gulf Prawn RSC 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.
Michelle Henriksen	Executive Officer	AFMA EO. No interest pecuniary or otherwise.
Miriana Sporcic	Invited Participant	Employed by CSIRO. CSIRO, Fisheries scientist. Acquiring funding for research purposes. No interest, pecuniary or otherwise.
Nick Hill	Invited Participant	Employed by CSIRO. No interest, pecuniary or otherwise.
Ross Bromley	Invited participant	Principle of Girella Fisheries Services. Engaged by SSIA as SIDaC manager. Engaged by SETFIA as western orange roughy project manager. Member of Victorian Rock Lobster RAG. EO of Eastrock. Client representative of various MSC Certificates (none are shark sp.). No interest, pecuniary or otherwise.
James Woodhams	Observer	Employed by ABARES. No interest, pecuniary or otherwise.
Kurt Davis	Observer	Employed by ABARES. No interest, pecuniary or otherwise.
Dan Corrie	Observer	Employed by AFMA. No interest pecuniary or otherwise.

Attachment B

Agenda

Location: Holiday Inn – Melbourne Airport
Chair Name: Sandy Morison

Day 1: 10/10/2023 12:00 to 16:45

Time	Item	Purpose	Presenter
12:00	*Lunch – 60 mins*		
13:00	**1. Preliminaries** 1.1 Acknowledgement of Country, welcome and apologies Declarations of interest 1.2 Adoption of Agenda 1.3 Minutes from previous meetings 1.4 Actions arising from previous meeting	For information	Chair/Michelle Henriksen (60 min)
14:00	**2. Fishery updates** 2.1. AFMA 2.2. Industry 2.3. Scientific 2.4. Economic 2.5. Conservation	For noting	Members of each group (30 min)
14:30	*Afternoon Tea–15 min*		
14:45	**3. Recent history and catch and discard data for sharks**	For information	AFMA (60 min)
15:45	**4. 2023 standardized CPUE for sharks**	For information	Miriana Sporcic (60 min)
16:45	*End of Day 1*		

Day 2: 11/10/2023 09:00 to 12:00

Time	Item	Purpose	Presenter
09:00	**5. Gummy shark assessment**	For discussion	Nick Hill (120 min)
11:00	*Morning Tea–15 min*		
11:15	**6. SESSF data plan**	For advice	AFMA (30 min)
11:45	**7. Other businesses** 7.1. Discard estimate advice	For advice	Chair/members (15 min)
12:00	*Lunch – 60 mins*		
13:00	*End of Day 2*		

Attachment C

Table 1: The progress of actions from previous meetings

Complete/Redundant		Underway		Need further advice		Not yet started	

Agenda item	No.	Action	Agency/Person Responsible	Timeframe	Progress
SharkRAG 3 2022	2	ABARES, CSIRO and AFMA to discuss the issue of logbook recorded discard data not matching across the AFMA, CSIRO and ABARES summaries. Although the ABARES data does match now, it's for CSIRO to investigate the errors.	ABARES, CSIRO and AFMA	Ongoing	Noting there are other discussions occurring between agencies about data issues and data sharing. AFMA are seeking advice from SharkRAG regarding the specific discrepancy to resolve.
SharkRAG 7 September 2020	13	AFMA to modify the contract with fish aging services to allow shark vertebrae to be sectioned on an annual basis	AFMA/FAS	December 2020	Completed. FAS have completed the required ageing of shark vertebrae for the 2023 gummy shark assessment. AFMA will incorporate the reminder in the stock assessment schedule that shark vertebrae ageing should be planned a year in advance of

					the assessment to ensure that data is ready in time.
SharkRAG 2 2022	4	Sensitivity analyses and base case scenarios incorporating gillnet efficiency to be presented to SharkRAG in 2023 for the gummy shark stock.	CSIRO (Dr Thomson)	SharkRAG 2023	The incorporation of gillnet efficiency is included in the research project "*Improving CPUE Standardisation for Sharks*" which commences in the 2023-24 financial year. Results of this research won't be available for the 2023 gummy shark stock assessment. AFMA are seeking advice on when SharkRAG would like to see the results of this work.
SharkRAG 2 2022	6.1	Include a seasonality factor for gummy shark in the list of discard estimate validity criteria.	CSIRO	SharkRAG 2023	After discussion with CSIRO, it is decided that this is not impactful. Need to be checked with SharkRAG meeting 1 in 2023
SharkRAG 2 2022	6.3	Dr. Burch to compare the metier analysis catches with the reported landed catches.	CSIRO (Dr Burch)	Ongoing	Completed. SharkRAG recommended that the metier analysis be undertaken every 3 or 5 years as the approach was considered to be a more robust scientific assessment and it would be good practice to check outputs

					of the 'logbook' approach with the outputs from the metier-based approach on a semi-regular basis.
SharkRAG 2 2022	6.3	Dr. Burch to update the 2022 metier analysis and present to SharkRAG at the next meeting.	CSIRO (Dr Burch)		Completed. Presented at SharkRAG 3 2022
SharkRAG 2 2022	7.1	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).	CSIRO (Dr Thomson)	SharkRAG 2023	Completed. This has been included in the sensitivity analyses for the 2023 gummy shark assessment to be discussed at agenda item 5.0.
SharkRAG 2 2022	10	Dr. Julian Morison to facilitate the economic data collection discussion with ABARES (Robert Curtotti and James Woodhams) and Dr. Thomson to characterise the work involved, the scope of the project, methods and objectives.	Julian Morison	Ongoing	Julian Morison has facilitated discussions with ABARES and will provide an update at agenda item 2. ABARES have developed an "economic performance index" which has aligned well with previous estimates of NER within the Eastern Tuna and Billfish Fishery. A historical economic performance could be compiled for the

					GHAT shark fishery using catch, price, CPUE, and key costs such as fuel and crew etc.
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 2023	Completed. This has been included in the sensitivity analyses for the 2023 gummy shark assessment to be discussed at agenda item 5.0.
SharkRAG 2 2021	5	AFMA to liaise with CSIRO (Dr Burch) to include a summary of previous SharkRAG advice regarding historical catches be included into a paper they are working on that capture's historical decisions.	AFMA	SESSFRAG Chair's 2024	The catch histories project is progressing and includes the consideration of school and gummy shark catch histories. The project has been delayed and results are expected to be presented to the 2024 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)	SharkRAG 2023	Completed. Outcomes of the metier analysis and comparisons were presented to SharkRAG 3 in December 2022.

SharkRAG 1 2021	8	SIDaC to look at feasibility of including sawshark species composition in their data program	AFMA and SIDaC	Ongoing	"AFMA to create a comparison of EM data versus logbook data regarding sawshark composition including a summary table for the RAG to consider."
					Still some work to be done to deal with issue-
					Action item- should be checking data ISMP.
	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	AFMA	Ongoing	The review of the School Shark (*Galeorhinus galeus*) Stock Rebuilding Strategy is underway and will be updated pending the next CKMR assessment in 2024. The

		connectivity between Australian and New Zealand school shark stocks.			updated strategy will include information concerning latest research relevant to the genetic connectivity between Australian and New Zealand school shark stocks. Update: while there is some migration between stocks, there is no established genetic connectivity, and these are considered as separate stocks.
SharkRAG 7 September 2020	12	SharkRAG to determine the weighting of each method (CPUE series) to be included in the gummy shark assessment at the next meeting of SharkRAG	CSIRO	SharkRAG 2023	Completed. Weighting of the CPUE series has been included in the gummy shark assessment to be discussed at agenda item 5.0.

Table 2: Actions and recommendations from SharkRAG 1 2023.

Action Item		Actions/recommendations
1	2	AFMA to consider how to improve discard data reporting and the potential options industry can undertake to improve better discard reporting.
2	2	AFMA to seek further advice from CSIRO (for example Dr. Beth Fulton) to provide insight on the relationship between octopus and gummy shark populations, to better understand the potential impact of an incoming octopus fishery through VIC (along with established octopus fisheries in SA and TAS) on the GHAT.
3	3	AFMA to include the percentage of gummy and school catches and discards by zone to the data summary, and to improve the presentation of the catch and discard proportions.
4	4	AFMA to seek advice from GABRAG to provide insight into Trawl gummy SA shift in depth distribution extending deeper
5	4	CSIRO to confirm if the blue grenadier factory vessels are included in the CPUE data. CSIRO to re-run cpue for trawl broken down regionally.
6	5	CSIRO to follow up how the partial versus total partial length data was converted during data processing
7	5	CSIRO to do more investigation on a potential way to estimate growth considering selectivity of gear outside of the model
8	5	SharkRAG recommended progressing with bridge 17 as base case model for RBC over a 5-year period (2024 to 2028) and long-term average RBC advice at SharkRAG 2. CSIRO to apply a discount factor and sensitivities with the projections, plus growth and scenarios changing behaviour of the fleet. CSIRO will provide a list of projections for SharkRAG to approve out of session, and fixed catch projections based on maintaining the TAC.
9	5	CSIRO to down-weight the trawl series to see if there is a difference in the fit of CPUE as a sensitivity.

Action Item		Actions/recommendations
10	5	Industry, AFMA and CSIRO to work on expanding sample collection from SA and TAS shallow line fleets in the data plan, such as increased as and length samples and tag recapture data. SharkRAG to discuss under the SESSF data plan agenda item at SharkRAG 2023.