



**Australian Government**

**Australian Fisheries Management Authority**

## **Shark Resource Assessment Group (SharkRAG) Meeting 1 2021**

**Meeting minutes**

**March 11 and 12 2021**

**Teleconference**

The Chair opened the meeting at 12:40

## **Agenda item 1. Preliminaries**

### **1.1 Welcome and apologies**

1. The Chair opened the meeting with an Acknowledgement of Country and welcomed members and observers.
2. Members and participants noted the meeting was being recorded.

### **3. Membership**

Mr Sandy Morison	Chair
Robin Thomson	Scientific member
Ian Knuckey	Scientific member
Charlie Huveneers	Scientific member
Julian Morison	Economic member
Kyri Toumazos	Industry member
Jamie Papas	Industry member
Craig Harris	Industry member
Sally Weekes	AFMA member
Lou Cathro	Executive officer

### **4. Invited Participants**

Ms Fiona Hill	AFMA
Mr Ross Bromley	Southern Shark Industry Alliance (SSIA)
Mr Simon Boag	SSIA
Ms Anissa Lawrence	TierraMar

Mr Colin Simpfendorfer	JCU (Presenter)
Mr Paul Burch	CSIRO (Presenter)
Mr David Stone	Sustainable Shark Fishing Association (SSFA)
Mr Shane Dugins	SSFA

## 5. Observers

Ms Miriana Sporcic	CSIRO
Ms Natalie Couchman	AFMA
Mr Tim Emery	ABARES
Mr Tamre Sarhan	AFMA
Ms Saoirse Hannam	AFMA
Mr Matt Daniel	AFMA
Mr Aaron Puckridge	AFMA
Ms Julia McCourt	AFMA
Ms Natalie Manahan	Atlantis

## 1.2 Declarations of interest

6. The RAG members followed the conflict of interest declarations as outlined in Fisheries Administration Paper 12. Members and participants reviewed and updated the Declarations of Interest included at **Attachment A**.
7. The following conflicts of interest were declared with specific agenda items:
  - Industry Members, Mr Boag and Dr Thomson noted conflicts of interest for Agenda Item 4.
  - Mr Bromley and Mr Boag noted conflicts of interest with Agenda Items 3

The above individuals left the meeting and remaining RAG members agreed, consistent with the approach taken in previous meetings that members with conflicts of interests were welcomed to be part of discussion but not take part in the formulation of advice.

## 1.3 Adoption of agenda

8. The RAG adopted the agenda (**Attachment B**) as final.

## 1.4 Minutes of previous meeting

9. The RAG noted the final minutes of the SharkRAG meeting of December 2021 are available on the [AFMA website](#).

## 1.5 Actions arising from previous meetings

10. The RAG noted the action items from previous meetings and the updates provided by the Executive Officer at **Attachment C**.

## Agenda item 2 – Updates from Members

### 2.1 AFMA Update

11. The AFMA member provided an update on the management of the Gillnet, Hook and Trap (GHAT) sector of the Southern and Eastern Scalefish and Shark Fishery (SESSF) since the last RAG teleconference 3-4 December 2020. The RAG noted and discussed the following points:
  - a) AFMA is having ongoing discussions with South Australia regarding on the state catch of School and Gummy Shark and Commonwealth snapper catches.
  - b) AFMA's response to the 'give flake a break' campaign included the CEO providing a radio interview.

### 2.2 Industry Update

13. The RAG noted that due to good catches of gummy shark earlier in the season, a number of boats have had to stop fishing for the season given the limited quota available.

## Agenda item 3 – Review of Data Needs

14. The AFMA member presented Agenda Item 3 Review of data needs, seeking RAG advice on sampling options to address data gaps regarding commercial shark species in the GHATF to support AFMA's review of the data plan for this fishery.
15. The RAG recommendation and actions is presented in Table 1 below.
16. In addition to the items agreed in Table 1, The RAG also discussed the following related matters:
  - a) The need for improved accuracy of state data, both recreational and commercial, to input into stock assessments. The RAG noted that AFMA is working with the states to improve this, but recreational catch is not a significant issue for the stocks SharkRAG assesses.
  - b) The timing of the next GHAT economic report from ABARES noting that while this report does not directly inform management decisions, it is helpful in providing context to the operating environment of the fishery.
  - c) The ongoing need to enable recording of school shark as live discards in both e-logs and logbooks. The RAG expressed frustration that this long-standing issue had not been resolved. The RAG noted that there has been work to provide a discard code in e-logs to address this issue regarding e-logs and AFMA is looking to provide extra guidance in the next edition of paper logs.

**The RAG requested the following action items:**

- 1) ABARES to provide an update on the scheduling of the next GHAT economic report.

**Table 1. RAG recommendations and actions regarding data gaps Agenda Item 3.**

	Data Need	Species	Use	Priority rank	Data Obtained?	Current Data Tool	Potential Data Tools	Questions to consider	SharkRAG Recommendation/action
1	Discard weights	Gummy shark  School shark  Sawshark	Stock assessments  RBC-TAC calculations	High	EM on trial basis only	EM on trial basis only	Logbooks  EM  Observers  Crew based program (e.g. SIDaC)	Should discard weight estimates be extended to longline vessels, noting the small number of longline vessels in the fleet with EM fitted?	<p><b>Recommendation:</b></p> <p>a) The use of SIDaC retained lengths sampling regime for school shark and gummy shark, as a starting point sampling regime (for discard length) temporal/spatial/sample numbers/gear</p> <p>b) Subject to the level of interannual variability in discard length frequency, SharkRAG supported periodic sampling of discard length frequency where there is minimal interannual variability.</p> <p><b>Action:</b></p> <p>2) AFMA to summarise existing sources of information on discard rates for all sectors (trawl, gillnet, autolongline and manual longline) through time including interannual variability</p>
2	Discard length frequency	Gummy shark  School shark  Sawshark	Stock assessments  Length frequency conversion also applied to estimate discard weights	High	Trial basis only  Retained lengths are collected under the SIDaC program  Discard lengths from trawl are used in assessments	EM on trial basis only	EM  Observers  Crew based program (e.g. SIDaC)  Once a sampling regime has been recommended by SharkRAG, AFMA will investigate possible data tools (further details on available data tools is provided at <a href="#">Attachment B</a> ). This will include a cost	<p>Could the discard length frequency sampling regime be based upon the current SIDaC sampling regime for retained sharks (<a href="#">Attachment C</a>), or further analysis required (e.g. power analysis)? It should be noted that discard sampling numbers was/is not specified under the ISMP protocols.</p> <p>Does the data need to be collected every year or every three years? Consideration should be given to its use in</p>	

	Data Need	Species	Use	Priority rank	Data Obtained?	Current Data Tool	Potential Data Tools	Questions to consider	SharkRAG Recommendation/action
							comparison between options.	<p>assessments when answering this question.</p> <p>What strata are required, noting the SIDaC sampling regime for retained sharks uses the three gummy shark assessment strata?</p> <p>What discard sampling numbers per quarter/strata/gear are required?</p>	<p>3) AFMA to summarise existing sources of information on discard size composition for all sectors (trawl, gillnet, autolongline and manual longline) through time – including interannual variability</p> <p>4) AFMA to work with SSIA and industry to review need for EM piece counts and review EM audit rate (currently 10%)</p> <p>5) AFMA to circulate the report from the EM trawl sector trial, confidentiality permitting.</p>
3	Collection of biological samples from automatic longline vessels	Gummy shark  School shark	Stock assessments  Close kin assessment for school shark	TBA	No	N/A	EM  Observers  Crew based program (e.g. SIDaC)	<p>Should the data be included in the SIDaC data collection plan?</p> <p>If so, what sampling numbers per quarter/strata/gear are required?</p>	<p><b>Recommendation:</b></p> <p>Sample collection to support school shark close kin. In particular:</p> <p>a) Deep water (scalefish autolongline and trawl) – up to 1000 samples over three years (no more than 50 samples per shot)</p>

	Data Need	Species	Use	Priority rank	Data Obtained?	Current Data Tool	Potential Data Tools	Questions to consider	SharkRAG Recommendation/action
									<p>b) Western south Australia (GAB trawl) (to be included in expanded SIDaC regime)</p> <p>c) Western Tasmania (to be included in expanded SIDaC regime)</p> <p><b>Action:</b></p> <p>6) Dr Thomson to discuss with AFMA the specific biological parameters to be collected.</p>
4	Gummy and school shark total and partial lengths for length conversions	Gummy shark  School shark	Stock assessments  To inform length conversions: gummy and school sharks larger than 160cm total length (TL) and 100cm partial length (PAR)	TBA	Trial basis only	Trial basis only	Observers  Crew based program (e.g. SIDaC)	<p>Analysis of the data collected on a trial basis is provided at <a href="#">Attachment D</a>. CSIRO will present this at the meeting.</p> <p>What sampling numbers per quarter/strata/gear are required?</p> <p>Noting this has recently been collected with the SIDaC port sampling program, should this be incorporated into the</p>	<p><b>Recommendation:</b></p> <p>Collection of 75 samples (dual length measurements partial and total) for each species greater than 160cm total or 100cm partial as a once off collection. The data collection must be measured in accordance with ISMP sampling protocols</p>

	Data Need	Species	Use	Priority rank	Data Obtained?	Current Data Tool	Potential Data Tools	Questions to consider	SharkRAG Recommendation/action
								SIDaC data collection plan?	
5	Sawshark species identification in logbooks and EM	Sawshark (Common and Southern)	Stock assessment  Monitoring species composition	TBA	Yes  However there are concerns that logbooks and EM are not distinguishing between the two species enough	Logbooks  EM	Logbooks  EM  SIDaC	How does SharkRAG suggest identification issues could be explored?  Does SharkRAG endorse an annual report of catch composition from logbooks and EM for the SESSFRAG data meeting?	<p><b>Recommendation:</b></p> <p>Periodic sampling of sawshark species composition. This will be supported by the following action items.</p> <p><b>Actions:</b></p> <p>7) AFMA to create a comparison of EM data versus logbooks including a summary table for the RAG to consider.</p> <p>8) SIDaC to look at feasibility of including species composition in their data program</p> <p>9) AFMA to consider observer data including trawl data in the summary table for SharkRAG</p>



## Agenda item 4 – School Shark

### 4.1 Independent Review of Close Kin Mark Recapture

17. Professor Colin Simpfendorfer, Chair of the independent Expert Panel (the panel), presented the outcomes of the “Independent Expert Peer Review of the Close Kin Mark Recapture Assessment for School Shark”. The RAG was asked to consider the key findings and provide advice on future assessment needs and research priorities for school shark.
18. The expert Panel consisted of:
  - Professor Colin Simpfendorfer (Chair). An Adjunct Professor at James Cook University with a long history of research on sharks, including shark fisheries in southern Australia. He is also a previous chair of SharkRAG.
  - Professor Sean Cox. A Professor at Simon Fraser University in Canada with extensive experience in fisheries stock assessments, including those using CKMR.
  - Dr Kevin Stokes. A fisheries consultant based in New Zealand with extensive experience in fisheries stock assessments, including those using CKMR.
  - Dr Robin Waples. A Senior Scientist with the US National Marine Fisheries Service with extensive experience in population genetics and its application to estimating population size.
19. Professor Simpfendorfer highlighted the following key points:
  - a) The panel considered four documents in their review: School shark Close-Kin Mark-Recapture assessment, Review of the CKMR assessment by Patrick Cordue, CSIRO response to the Cordue review, FRDC reviews of the CKMR assessment report and CSIRO response to Review Panel questions. The panel reviewed these documents in line with the terms of reference:
    - i. ToR1. “Is there an inherent likelihood of consistent under-estimation or over-estimation of school shark abundance and productivity that would be expected to result from the (ToR1.D) biological and selectivity parameters, including their associated uncertainties and assumptions”. The Panel identified three issues regarding ToR1 and recommended work to improve the accuracy and precision of assessment outcomes:
      - *The ability to precisely and accurately age individuals included in the study* - In the current assessment, age uncertainty could cause considerable bias in the results. Inaccurate age estimates affected a number of aspects of the assessment, including significant age differences between full sib pairs. The panel recommended improved ageing techniques to increase confidence in the results.
      - *The occurrence of skip breeding (females not producing litters every year) was not explicitly dealt with in the assessment* - With the current approach, skip breeding could introduce significant bias (current biomass estimate is potentially up to 16% higher than it should be, if females produce litters every 3 years and males reproduce annually). The panel recommended that research into the periodicity with which females produce litters and how that periodicity affects sibling probabilities would assist in better incorporating skip breeding into future assessments. Further, simulation work be considered to investigate whether the potential bias from not accounting for skip breeding is reduced as more cohorts are included, and, if so, how many cohorts would be required before it fully attenuates. Information from CSIRO indicates that it is possible to account for this in the CKMR methodology, but will require some additional work. Regarding the inclusion of the lucky litter effect, the panel deemed this factor as appropriate however improved age certainty would reduce the need for its use.

- *The stock structure of school sharks caught by Australian fishers* - Knowledge of stock structure will not affect the outcomes of the assessment, but is important in the interpretation of the results and their use in making management recommendations. The panel recommended that further work to understand the historical and contemporary stock structure be undertaken to assist in setting management arrangements.
- ii. ToR2. “Based on the response to question 1, do the methods employed in the CKMR assessment provide sufficiently precise, accurate and unbiased estimates of productivity and absolute school shark abundance and trends upon which to base management advice?” The Panel concluded:
- The methods used in the CKMR assessment of school sharks are suitable for providing management advice, noting a number of areas where improvements in outcomes of the assessment could be made to reduce the bias in estimation of abundance and productivity of school shark stocks:
    - improving the accuracy and precision of age estimation, and
    - accounting for skip breeding.
  - Beyond the actual results of the assessment, further consideration also needs to be given to how the assessment results fit within the Commonwealth Harvest Strategy Policy, and how different hypotheses of stock structure might affect the interpretation of the results. The panel suggested that management strategy evaluations would help inform a possible harvest strategy incorporating CKMR abundance estimates. The panel also noted that understanding historic stock structure will be important to the interpretation of the results and management recommendations.
- iii. ToR3. “What revised or alternative methods could be used to improve the precision, accuracy and level of bias associated with the CKMR assessment? In answering this question consideration should be given to how any potential improvements should be scheduled, noting the current assessment schedule for school shark (2021)”. The Panel concluded:
- The close kin mark recapture approach to assessing school sharks is likely to be the most appropriate way to understand the status of the population and to make management recommendations into the future.
  - Precision and accuracy of the assessment results will be increased with improvements in the ability to accurately and precisely age school sharks, and by improving how the model accounts for skip breeding.
  - Work be undertaken as soon as possible and incorporated into the next assessment to address the above issues.
  - Research into the mating system and stock structures would be beneficial however a lower priority than skip breeding and reducing ageing uncertainty.

20. The RAG discussion focussed on the following points:

- a) *Aging* – The issue regarding a large number of samples, animals > 11 years old, needing to be excluded from the analysis due to ageing uncertainty and the impact of this on the assessment. The RAG agreed that resolving ageing uncertainty is a high priority.
- b) *Stock structure* – The Panel considered that it was unlikely that there is a stock that is not fished given how much school sharks move. There could be a cryptic stock but identifying such a stock is much more difficult and regardless, is likely to have little influence on the CKMR results.

The Commonwealth Fisheries Harvest Strategy Policy discusses entire stock status and where the current stock level is in relation to unfished levels. Interpreting the results of the CKMR assessment in the context of the CFHSP will consequently require significant work given the CKMR assessment does not provide an estimate of the stock in relation to  $B_0$ .

- c) *Influence of historical catches* – The CKMR assessment finds it difficult to resolve the high levels of historic catches in the 1980's and 1990's and the panel's view that extending the model back in time is of questionable use, and not necessary for management.
- d) *Sample design* – whether the samples collected for the CKMR assessment, which reflected the current fishery footprint, explains why the historical catches cannot be reconciled within the assessment. Both the Panel and CSIRO noted that the use of conditional probability as part of the methodology reduced the impact of this issue in the assessment.

The RAG noted that the sample design could be improved but that the panel had found that it did not create a significant uncertainty or bias in the results of the assessment.

The RAG noted that to improve the sampling design, samples from deeper water, western Tasmania and western South Australia as well as samples from trawlers, that would include deeper water and areas not covered by the GHaT, would be beneficial.

- e) *Skip breeding* - The RAG noted the potential upward bias in the current biomass estimates of up to 16 per cent if the female breeding interval is 3 years, or up to 7 per cent if 2 years.

The RAG noted that Dr Terry Walker had looked into breeding intervals of school shark in the 1990's and that the results could be used to address this issue relatively easily (outlined under Agenda Item 4.2 Data and Research Needs).

- f) *Review process* - The RAG noted that to alleviate industry's concern that Mr Cordue had not been directly contacted as part of the review process on the basis that the Panel had considered his report clear and not in need of clarification, an invitation for Mr Cordue to attend SharkRAG had been extended but declined. Despite this, there was still the opportunity for Mr Cordue to meet directly with the Panel should he wish to do so.
- g) SharkRAG agreed that the Panel sufficiently addressed the terms of reference and the RAG accepted the outcomes of the review.

**The RAG requested the following action items:**

- 10) SharkRAG to provide any additional comments on the panel report within two weeks of the SharkRAG March meeting.

## 4.2 School Shark Data Needs and Research Priorities

The AFMA member presented the item seeking RAG advice on research priorities to be included in the SESSF Annual Research Statement 2022-23 and data needs more broadly.

21. The RAG discussed a number of research/assessment priorities recommended by the panel to provide the best possible outcomes:

- a) Incorporation of skip breeding into the CKMR model
- The RAG noted this as a high priority according to the panel report.
  - The RAG recommended the use of Terry Walker's work regarding tagging of school shark in the 1990s to explicitly account for three year cycle in the CMKR model however also recommended exploring the sensitivity of two years and a frequency at age schedule.
- b) Reduce ageing uncertainty
- The RAG noted this as a high priority according to the panel report.
  - Dr Thomson noted she is currently looking at DNA ageing through various research projects. She will know by the end of 2021 if it is a feasible method to use instead of

vertebral ageing for the CMKR method. She noted that the DNA ageing is a more cost efficient method than vertebral aging. Dr Thomson noted that the DNA ageing work is currently being funded through ongoing projects and therefore the research priority should be revisited towards the end of 2021. Dr Thomson noted she will be talking to FAS regarding their methods influencing ageing precision and contacting the panel regarding the details of the infrared method that was suggested in the panel report.

c) Mating system

- The RAG noted this as a low priority according to the panel report.

d) Stock structure

- The RAG noted this as a lower priority according to the panel report.
- RAG noted this would help mostly with management and potentially would help understand historical catches that the CMKR model (like the previous model) can't reconcile. Dr Thomson noted she is also completing simulation work with regard to cryptic population migrations within Australia and New Zealand.

22. The RAG also discussed the issue raised by the panel regarding the use of the CKMR method which gives a measure of absolute abundance, in the context of the Commonwealth Fisheries Harvest Strategy Policy which uses measures of relative abundance. Noting that this issue will need to be resolved, the RAG recommended "Developing a Harvest Strategy for species where depletion can no longer be estimated against  $B_0$ " as a high priority, ideally using school shark as a case study.

23. The research priority recommendations from the RAG are detailed in red text in **attachment D**.

**The RAG requested the following action items:**

- 11) Dr Thomson to provide an update on the progress and viability of the DNA method of ageing to the SharkRAG October 2021 meeting.

### 4.3 Scheduling of Next School Shark Assessment

24. The AFMA member presented agenda item 4.3 "Scheduling of next school shark assessment" seeking RAG advice on the timing of the next update to the school shark assessment to inform the recommended biological catch (RBC), noting the full close kin assessment will not be updated until 2024 but that AFMA must still set the TAC for the interim fishing seasons.

25. The RAG discussed the following points:

- a) As school shark is rebuilding, the RBC is zero but that a TAC may be set to cover incidental bycatch.
- b) Updating the current assessment with one more year of catch data would not produce substantially different results to the previous assessment.
- c) The metier analysis is an option to determine the minimal take of school shark based on the current catch of gummy shark. Regarding whether the output of the metier analysis could be considered sustainable, members noted the recently updated metier analysis output regarding the incidental take of school shark was within one tonne of the TAC output from the model which essentially assessed that level of take as sustainable.
- d) Trawl CPUE was another indicator that could be used to inform the TAC.

26. The **RAG agreed** that:

- The metier analysis developed by CSIRO and trawl CPUE should be used to inform the school shark TAC for 2022.

#### **4.4 Rebuilding Strategy Review**

27. The AFMA member introduced agenda item 4.4 “Rebuilding Strategy Review”. The RAG noted the review of the Strategy was ongoing and that SharkRAG is expected to be consulted at its October 2021 meeting. There was insufficient time for the updated metier and targeting analyses to be discussed.

#### **Agenda item 5 – FRDC Project Updates**

28. Dr Ian Knuckey provided the RAG with an update of Fisheries Research and Development Corporation (FRDC) project 2018-021. “Development and evaluation of multi-species strategies in the SESSF”. Candidate strategies will be presented and discussed in June 2021. The RAG noted:

a) The project will develop and test a three candidate harvest strategies for the SESSF (with cost considerations):

1. Indicator species
2. Pretty Good Multi-species
3. Trigger species

b) Engagement for this project includes:

- A steering committee that meets semi-annually
- Meetings with AFMA managers fortnightly and AFMA commission meetings are regular
- Development of a YouTube video for broader public engagement

c) A dummy output from each of the three candidates will be produced in the next four months to test them against various management practical requirements such as TAC setting.

#### **Agenda item 6 – Other Business**

29. There was no other business

#### **Agenda item 7 – Next meeting**

30. The next meeting will be held 5-7 October 2021

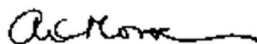
#### **Close of meeting**

31. The Chair thanked the RAG for their contribution and closed the meeting at 4pm.

**Table 2: Actions arising from SharkRAG 1 2021**

Action	Agenda item	Description	Responsibility
1	3	ABARES to provide an update on the scheduling of the next GHaT economic report	ABARES
2	3	AFMA to summarise existing sources of information on school shark and gummy shark discard rates for all sectors (trawl, gillnet, autolongline and manual longline) through time including interannual variability	AFMA
3	3	AFMA to summarise existing sources of information on school shark and gummy shark discard size composition for all sectors (trawl, gillnet, autolongline and manual longline) through time – including interannual variability	AFMA
4	3	AFMA to work with SSIA and industry to review need for EM piece counts and review EM audit rate (currently 10%)	AFMA/SSIA
5	3	AFMA to circulate the report from the EM trawl sector trial, confidentiality permitting.	AFMA
6	3	Dr Thomson to discuss with AFMA the specific school shark biological parameters to be collected from automatic longlines to support the close kin assessment.	Dr Thomson
7	3	AFMA to create a comparison of EM data versus logbook data regarding sawshark composition including a summary table for the RAG to consider.	AFMA
8	3	SIDaC to look at feasibility of including sawshark species composition in their data program	SIDaC
9	3	AFMA to consider observer data including trawl data in the sawshark summary table for SharkRAG	AFMA
10	4.1	SharkRAG to provide any additional comments on the school shark panel report within two weeks of the SharkRAG March meeting.	
11	4.2	Dr Thomson to provide an update on the progress and viability of the DNA method of ageing to the SharkRAG October 2021 meeting.	Dr Thomson

Signed (Chairperson):



Date 22 Jun 2021

## Attachment A – 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>Have undertaken work for SETFIA in 2021 reviewing a report on matters unrelated to the shark fishery.</p> <p>No pecuniary or other interest in the SESSF shark fishery.</p>
Robin Thomson	Scientific Member	<p>CSIRO, Assessment scientist. Acquiring funding for research purposes.</p> <p>PI of AFMA-CSIRO co-funded project 'Ongoing monitoring of school shark abundance and rebuilding in the SESSF using close kin mark recapture'.</p> <p>PI of AFMA-CSIRO co-funded project 'Scoping study for application of Close-Kin-Mark-Recapture to blue-eye trevalla caught in the SESSF'.</p>
Charlie Huveneers	Scientific Member	<p>Associate Professor and research scientist. Potential interest in funding for research. No pecuniary interest or otherwise.</p>
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>Principal Investigator of FRDC Project 2019-129 "Potential Transition of Shark Gillnet Boats to Longline Fishing in Bass Strait - Ecological, Cross-Sectoral, and Economic Implications". Involved in FRDC project 2018-021 "Development and evaluation of SESSF multi-species harvest strategies" and Traffic Project "Shark Product Traceability".</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>

Dr Julian Morison	Economic member	<p>Director, Kuti Co Pty Ltd – SA Pipi quota holder</p> <p>Director, BDO Advisory (SA) Pty Ltd - current contracts with SA &amp; 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> <p>Principal &amp; co-investigator on several FRDC research projects</p>
Kyri Toumazos	Industry Member	<p>South Australia/Bass Strait shark fisher, boats fishing with hooks and gillnets. SESSF quota holder. Southern Rock Lobster Board CEO. Declared interests in RBCs.</p>
Jamie Papas	Industry Member	<p>Gillnet fisher and SFR holder.</p> <p>Board Director San Remo Fishermen’s Co/Op</p>
Craig Harris	Industry Member	<p>Gillnet fisher and SFR holder.</p>
N/A	Conservation Member	
Sally Weekes	AFMA Member	<p>AFMA member, manager of the Gillnet, Hook and Trap fishery. No interest pecuniary or otherwise.</p>
Lou Cathro	Executive Officer	<p>AFMA EO. No interest pecuniary or otherwise.</p>
Ross Bromley	Invited Participant	<p>Principal of Girella Fisheries Services</p> <p>Engaged by Southern Shark Industry Alliance as project manager for Shark Industry Data Collection project (SIDaC) and Blue Eye Trevalla co-management</p> <p>Engaged to provide advice on various SESSF MSC accreditation projects</p> <p>Project manager of Western Orange Roughy Data Collection project (WORDaC)</p> <p>Provide advice to various fisheries on EPBC Act accreditation.</p>



Colin Simpfendorfer	Presenter/ Invited participant	<p>Adjunct Professor, College of Science and Engineering, James Cook University</p> <p>Adjunct Senior Researchers, Institute of Marine and Antarctic Studies, University of Tasmania</p> <p>Member of the national Threatened Species Scientific Committee</p> <p>Private consultant undertaking work on sharks and fisheries.</p> <p>Acquiring funding for research and conservation purposes.</p>
Paul Burch	Presenter/ Invited participant	<p>Employed by CSIRO, assessment scientist. Acquiring funding for research purposes. PI on data services contract.</p> <p>CSIRO representative at the Fisheries Statistics and Information Working Group (a sub-committee of the Australian Fisheries Management Forum).</p>
Simon Boag	Invited participant	<p>Non-beneficiary Director of two fishing companies in the SESSF.</p> <p>Industry member on SERAG.</p> <p>Executive Officers to SETFIA, SSIA and SPFIA.</p> <p>SETFIA receives funding from various bodies to complete projects.</p> <p>Undertakes contracts as an independent consultant.</p>
Anissa Lawrence	Invited participant	<p>Managing Director of TierraMar Ltd</p> <p>Chair of Ocean Future Fund Inc.</p> <p>Undertakes contracts and projects for a number of Conservation Non-Government Organisations, government departments, non-government agencies and the private sector on a range of fishery related matters.</p> <p>No pecuniary interest.</p> <p>Conservation member on South Australia Rock Lobster MAC</p> <p>Conservation member on GABMAC</p> <p>Conservation member on SPFRAG</p> <p>Conservation member on SEMAC</p>
David Stone	Invited participant	<p>Executive Officer for Sustainable Shark Fishing Industry Assoc. No Pecuniary interests. Declared interests in representing hook and gillnet industry member interests SESSFrag Invited participant.</p>
Shane Dugins	Invited participant	<p>Chair of the Sustainable Shark Fishery Association. Shareholder and Director of a Fishing Company that holds: Commonwealth SFRs including Shark and Scalefish SFRs, leases quota, Victorian and</p>

		Tasmanian licences and Victorian Crayfish quota. Consultation services provided to AFMA for specialist fishery knowledge.  Industry member on SEMAC
Natalie Couchman	Invited Participant	Former Gillnet Hook and Trap Fisheries manager and AFMA member for SharkRAG– no interest pecuniary or otherwise.
Fiona Hill	Invited Participant	AFMA Demersal and Midwater Senior Manager – AFMA SEMAC member – no interest pecuniary or otherwise.
Tamre Sarhan	Observer	AFMA Observer- No interest pecuniary or otherwise.
Matt Daniel	Observer	AFMA Observer- No interest pecuniary or otherwise.
Saoirse Hannam	Observer	AFMA graduate – No interest pecuniary or otherwise
Miriana Sporcic	Observer	Employed by CSIRO, Assessment scientist. Acquiring funding for research purposes
Tim Emery	Observer	Employed by ABARES.  No interest, pecuniary or otherwise.  ABARES potentially may conduct shark research in the future
Natalie Manahan	Observer	Employee of Atlantis Fisheries Consulting Group. Member of SSIA.
Aaron Puckeridge	Observer	AFMA Observer- No interest pecuniary or otherwise.
Julia McCourt	Observer	AFMA Observer- No interest pecuniary or otherwise.

## Attachment B – SharkRAG 1 March 2021 Agenda

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Day 1: 11 March 1230 - 1700

Agenda item	Purpose	Paper / presentation	Time (AEDT)	Schedule
Acknowledgement of country		Chair	5 mins	12:30-12:35
<b>1. Preliminaries</b>				
1.1. Welcome and apologies	For information	Chair	5 mins	12:35-12:40
1.2. Adoption of agenda	For action	Chair	5 mins	12:40-12:45
1.3. Declarations of interest	For action	Chair	30 mins	12:45-13:15
1.4. Adoption of Meeting Minutes	For information	AFMA	10 mins	13:15-13:25
1.5. Status of action items	For information	AFMA	10 mins	13:25-13:35
<b>2. Updates from Members</b>	For information			
2.1. AFMA Update		AFMA	10 mins	13:35-13:45
2.2. Industry Update		Industry Members	10 mins	13:45-13:55
BREAK			15 mins	13:55-14:10
<b>3. Review of Data Needs</b>	For advice	AFMA	3 hrs	14:10-17:10

**DAY 2: 12 March 0900 – 1530**

Agenda item	Purpose	Paper / presentation	Time (AEDT)	Schedule
<b>4. School Shark</b>				
4.1. Independent Review of Close Kin Mark Recapture	For advice	AFMA	2.5 hrs	9:00-11:30
BREAK			15 mins	11:30-11:45
4.2. School Shark Data Needs and Research Priorities	For advice	AFMA	1 hr	11:45-12:45
BREAK			30 mins	12:45-13:15
4.3. Scheduling of Next School Shark Assessment	For advice	AFMA	30 mins	13:15-13:45
4.4. Rebuilding Strategy Review	For advice	AFMA	30 min	13:45-14:15
<b>5. FRDC Project Updates</b>	For information	Ian Knuckey	1hr	14:15-15:15
<b>6. Other business</b>		AFMA	5 mins	15:15-15:20
<b>7. Next meeting</b>		AFMA	5 mins	15:20-15:25

## Attachment C - Action items

Complete/Redundant		Underway		Yet to start		Need further advice	
Agenda item	No.	Action	Agency/Person Responsible	Timeframe	Progress		
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.	Scheduled for discussion at the October 2021 meeting, as part of work plan for the next gummy shark assessment.		
SharkRAG 2 2016	3	The School Shark Rebuilding Strategy to be updated to reflect research showing there is some genetic connectivity between Australian and New Zealand school shark stocks.	AFMA	2019	AFMA will continue to progress the review of the <i>School Shark (Galeorhinus galeus) Stock Rebuilding Strategy</i> in 2021. This will include updating information concerning latest research relevant to the species. The review is scheduled for further discussion at the October 2021 meeting.		
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. 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 further vertebrate samples taken during surveys	Dr Thomson/ Dr Braccini/FAS	TBC	Samples are with Dr Thomson (in samples supplied from AFMA). Dr Thomson has engaged someone to undertake this process. An update will be provided to SharkRAG in late 2021.
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	Complete, CSIRO have obtained the data analysis code. This work is currently being incorporated into the SESSF data services contract between CSIRO and AFMA.
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. Scoping work on this issue will be discussed under agenda item 3.
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	Complete, species summaries relevant to the RAG are agreed at the final meeting each year, as part of the <a href="#">minutes</a> . A TAC recommendations paper, incorporating these species summaries is then provided on the AFMA website for <a href="#">consultation</a> prior to the subsequent SEMAC meeting. SharkRAG, SERAG and SEMAC advice is then provided to the Commission in making TAC decisions. Final species summaries are then provided on the AFMA website <a href="#">here</a> .
SharkRAG 4 2018	21	Refer the question of conducting biennial collection of biological data for stock	SESSFRAG	February 2019	Complete, 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

			assessment to SESSFRAG February 2019 data meeting.			data collection by removing every second year of length and age data.  Dr Punt is completing significant investigations in this space. CSIRO will provide an update when available.
	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, Commonwealth Marine Mammal Working Group, IUCN shark reference group etc.) for consideration.	Mr Macdonald	SharkRAG 5	To be discussed internally at AFMA.
	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	2021	Pending independent expert peer review of the close kin assessment for school shark.
	SESSFRAG Data 2019	13	Seek advice from SharkRAG to update the SIDaC data collection plan to include : <ul style="list-style-type: none"> <li>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;</li> </ul>	SharkRAG	SharkRAG Meeting	To be discussed under agenda item 3.

		<ul style="list-style-type: none"> <li>Collection of gummy and school shark samples from automatic longline vessels.</li> </ul>			
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 discussed under agenda item 3.
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	Complete, considered at the SharkRAG meeting in January 2020.
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	Complete, included in the draft gummy shark assessment report presented at the SharkRAG meeting 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 a CPUE series which combines the manual longline and automatic longline fleets	Dr Sporcic	Before the next gummy shark stock assessment (2023)	Scheduled for discussion at the October 2021 meeting, as part of work plan for the next gummy shark assessment.
SharkRAG 7 September 2020	7	AFMA and CSIRO to discuss additional analysis to determine the relationship between net length and CPUE before the next meeting of SharkRAG	AFMA/CSIRO	Prior to October 2020 intersessional meeting of SharkRAG	Scheduled for discussion at the October 2021 meeting, as part of work plan for the next gummy shark assessment.
SharkRAG 7 September 2020	9	Dr Thomson to split the trawl CPUE series into two series (1996 – 2005; 2008 – 2019) in	Dr Thomson	Prior to November 2020	Complete, included in the draft gummy shark assessment report presented at the SharkRAG meeting in December 2020.

			the upcoming base model for gummy shark		meeting of SharkRAG	
	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	Complete, included in the draft gummy shark assessment report presented at the SharkRAG meeting in December 2020.
	SharkRAG 7 September 2020	12	SharkRAG to determine the weighting of each method to be included in the gummy shark assessment at the next meeting of SharkRAG	SharkRAG	November 2020	Scheduled for discussion at the October 2021 meeting, as part of work plan for the next gummy shark assessment.
	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	AFMA will discuss alterations to the contract with fish aging services.
	SharkRAG 8 November 2020	1	Dr Sporcic to check if the 2009 pdiscard estimate for sawshark is from trawl only or multiple methods	Dr Sporcic	December 2020	Complete, presented at the SharkRAG meeting in December 2020.
	SharkRAG 8 November 2020	2	Dr Sporcic to check if it is possible to get discard data for trawl vessels only	AFMA	December 2020	Complete, presented at the SharkRAG meeting in December 2020.
	SharkRAG 8 November 2020	3	Dr Sporcic to include the justification for the reference period in the final Tier 4	Dr Sporcic	2021	Final report pending.

			assessment report for sawshark			
	SharkRAG 8 November 2020	4	Dr Sporcic to use the old State catch values in the upcoming Tier 4 Assessment unless the issues concerning the NSW State catch data are resolved	Dr Sporcic	2021	Complete, presented at the SharkRAG meeting in December 2020.
	SharkRAG 8 November 2020	5	CSIRO to check with NSW concerning the double count issues and report to SharkRAG	CSIRO	2021	Complete, presented at the SharkRAG meeting in December 2020.
	SharkRAG 8 November 2020	6	AFMA to examine justification for low sawshark TACs in 2009 and 2010	AFMA	SharkRAG 10	AFMA to provide an update to SharkRAG at a meeting in 2021.
	SharkRAG 8 November 2020	7	The RAG suggested that the inclusion of all shots that capture gummy shark in the CPUE series be investigated for the next gummy shark Tier 1 Assessment	CSIRO Stock Assessment Scientist	Prior to the next gummy shark Stock assessment	Scheduled for discussion at the October 2021 meeting, as part of work plan for the next gummy shark assessment.
	SharkRAG 8 November 2020	8	The RAG agreed that the next stock assessment should have a gear saturation factor that also considers the effects of longline effort	CSIRO Stock Assessment Scientist	Prior to the next gummy shark Stock assessment	Scheduled for discussion at the October 2021 meeting, as part of work plan for the next gummy shark assessment.

SharkRAG 8 November 2020	9	CSIRO to investigate why significant changes to pup depletion are occurring in the models where density dependence is affected by 0-2 and 0-4 year olds	CSIRO Stock Assessment Scientist	Prior to the next gummy shark Stock assessment	Scheduled for discussion at the October 2021 meeting, as part of work plan for the next gummy shark assessment.
SharkRAG 8 November 2020	10	SharkRAG to discuss the method of data weighting in the gummy shark Tier 1 model be examined for the next gummy shark assessment in 2023	SharkRAG	Prior to the next gummy shark Stock assessment	Scheduled for discussion at the October 2021 meeting, as part of work plan for the next gummy shark assessment.
SharkRAG 8 November 2020	11	Dr Thomson to include a Danish Seine fleet in the next gummy shark assessment in 2023	CSIRO Stock Assessment Scientist	Prior to the next gummy shark Stock assessment	Scheduled for discussion at the October 2021 meeting, as part of work plan for the next gummy shark assessment.
SharkRAG 8 November 2020	12	Dr Thomson to produce confidence intervals around the following projections for the next meeting of SharkRAG <ul style="list-style-type: none"> <li>• long term RBC</li> <li>• annual RBCs</li> <li>• 5 year average over recent RBCs</li> <li>• 3 year average over recent RBCs</li> </ul>	CSIRO Stock Assessment Scientist	December 2020	Complete, included in the draft gummy shark assessment report presented at the SharkRAG meeting in December 2020.
SharkRAG 8	13	SharkRAG to discuss future work to be completed before	SharkRAG	December 2020	Scheduled for discussion at the October 2021 meeting.

	November 2020		the next gummy shark assessment			
	SharkRAG9 December 2020	1	Dr Knuckey to provide an update on FRDC project 2018-021 Development and evaluation of multi-species strategies in the SESSF at the next SharkRAG meeting.	Dr Knuckey	March 2020	To be presented under agenda item 5.
	SharkRAG9 December 2020	2	Dr Thomson to restrict projections to 2030, noting the long term RBC will still be calculated on the 50 year projection, this will be noted in the updated report.	Dr Thomson	To be included in the updated report	Final report pending.
	SharkRAG9 December 2020	3	AFMA to consider how new entrants to the fishery can be accounted for in the gummy shark assessment.	AFMA	2021	Scheduled for discussion at the October 2021 meeting, as part of work plan for the next gummy shark assessment.
	SharkRAG9 December 2020	4	Dr Thomson to prioritise and cost the future work she proposes regarding the gummy shark assessment and provide this to the next meeting of SharkRAG.	Dr Thomson	SharkRAG March 2021	Scheduled for discussion at the October 2021 meeting.
	SharkRAG9 December 2020	5	AFMA to add to the data workshop agenda to explore ways to differentiate between Common Sawshark and	AFMA	SharkRAG March 2021	To be discussed under agenda item 3.

			Southern Sawshark in logbooks and EM.			
SharkRAG9 December 2020	7	AFMA to raise with Dr Thomson as to whether the area North of Devonport, where industry has observed an abundance of small school shark, should be captured in the sampling design for school shark.	AFMA and Dr Thomson	2021	To be discussed under agenda item 3.	
SharkRAG9 December 2020	8	AFMA to clarify the current scope of the “Developing a Close-Kin Harvest Strategy” project to determine if there have been changes made since the original scope was proposed, including whether the current project scope looks to examine a key issue with the current close kin assessment for school shark concerning the lack of an index of abundance relative to unfished biomass	AFMA	2021	Scope not submitted to FRDC, this will be developed for the upcoming FRDC research round, to reflect current research need.	
SharkRAG9 December 2020	9	AFMA to discuss with ABARES regarding project to update the 2018 analysis comparing logbook and EM records of discards.	AFMA	2021	Pending.	

SharkRAG9 December 2020	10	AFMA to produce a summary of previous, current, and planned work that relates to the "Environmental drivers for stock abundance" project.	AFMA	2021	Pending.
SharkRAG9 December 2020	11	AFMA to make a summary of all the data and reports produced through the EM program e.g. catch comparisons - in preparation for the data workshop in early 2021.	AFMA	2021	To be discussed under agenda item 3.
SharkRAG9 December 2020	12	AFMA to include the SIDaC program in the draft 2022-23 Research Statement as a project underway or completed.	AFMA	Before the 2022-23 draft Research Statement is due	

## Attachment D – School Shark Research Priorities

### Research priorities proposed to be included in the SESSF Annual Research Statement 2022-23

Cost	Management priority categories	Feasibility categories
High: >\$200,000	Essential	High
Medium: \$100,000 - \$200,000	High	Medium
Low: <\$100,000	Medium	Low
	Low	

### AFMA funding in 2022-23 - AFMA Research Committee (ARC)

Title	Objectives and component tasks	Evaluation		
		Total cost (\$) (approx. only)	Priority/ ranking	Feasibility
<b>RESEARCH UNDERWAY OR COMPLETED</b>				
Shark Industry Data Collection (SIDaC) Program – 3 year co-management contract ending 2021/22 (funded by the fishery)	Crew-based data collection program	Total project cost around \$423k (excl. GST) over three years (funded by the fishery, not ARC)	Essential	High



Fish ageing for SESSF quota species (190840) – 3 year project ending 2022/23	Undertake fish ageing for the SESSF to support stock assessments for the period 2020/21 to 2022/23.	Total project cost around \$777k over three years	Essential	High
SESSF Stock Assessment 2019-20 to 2020-22 (project 190800) – 3 year project ending in 2021/22 (31 May 2022)	Provide quantitative and qualitative species assessments in support of the five SESSFRAG assessment groups, including RBC calculations within the SESSF harvest strategy framework	Three year project (Total cost \$1.255m)  2019/20 \$50k 2020/21 \$503,575	Essential	High
Continued Close Kin Mark Recapture sampling and analysis for school shark (190841) (ending in 24/25)	Continue close kin sampling and analysis for school shark as the primary indicator of abundance for this species	Total project cost about \$300K	Essential	High
Review SESSF catch history	<p>A scoping study to establish whether it is possible to create single source of catch data for the SESSF. This process was started started by M Koopman and continued by N Klaer.</p> <p>Initial Scope</p> <p>The first step will be to establish the difference between catch data generated by Neil Klaer and the information currently used in the assessments and identify discrepancies. The use of the Fishery Assessment Reports (Smith &amp; Wayte) to cross-verify will also provide confidence in the data where the information correlates. The focus will be on Tier 1 species with other species done in a serendipitous manner. Noting some species such as school whiting and redfish may have other databases that may be more relevant than the FAR. Following this, a proposal for further work would be prepared.</p>	\$5k	High	High

NEW IDENTIFIED RESEARCH NEEDS FOR 2022-23				
Improving CPUE standardisations for sharks	Improve standardisations: <ul style="list-style-type: none"> <li>Clarify relationship between CPUE and net length</li> <li>Effects of Australian Sea Lion and other closures on CPUE</li> <li>Account for changing dynamics of fleet with new entrants.</li> </ul>	Low	High	High
Obtaining discard data and fish lengths using electronic monitoring	Investigate implementation issues, cost and solutions to adopt electronic monitoring to collect length frequency information for key commercial species on hook and gillnet vessels to support Tier 1 assessments.	Low	High	High
Environmental drivers for stock abundance	Examine environmental, and other factors (e.g. seismic testing) on stock abundance.	TBA	TBA	TBA

**FRDC funding in 2022-23 - Commonwealth Research Advisory Committee (ComRAC)**

Title	Objectives and component tasks	Evaluation		
		Total cost (\$) (approx. only)	Priority/ ranking	Feasibility
<b>RESEARCH UNDERWAY OR COMPLETED</b>				
Development and evaluation of multi-species harvest strategies in the SESSF (FRDC project 2018-021)	1. To develop and evaluate multi-species harvest strategies, including reference points and decision rules.  2. To evaluate future monitoring and assessment options identified in the SESSF Monitoring and Assessment Research Project.	\$465k	High	High

	3. To develop a process and set of design principles for multi-species harvest strategies.			
Revisiting biological parameters and information used in the assessment of Commonwealth fisheries: a reality check and work plan for future proofing (FRDC project 2019-010)	<p>1. Identify the origin of current biological information used in assessments of species (including empirical stock assessments and ecosystem modelling efforts) carried out under the Commonwealth Harvest Strategy Policy, including the pedigree of the information (provenance, age, appropriateness of methods used).</p> <p>2. Assess the implications and risks associated with using dated and borrowed information in assessments currently used for informing fisheries management, including the scale of any risks and the species for which a change in biological parameters used in assessments has the greatest impact.</p> <p>3. Identify the methods that might be applied to update priority biological parameters, including a review of the efficacy and applicability of novel methods and approaches developed in recent years.</p> <p>4. Articulate a work plan including appropriate sampling regimes required for updating priority biological parameters used in assessments for those species identified as being at most at risk.</p>	\$189K	High	High
Implementation of dynamic reference points and harvest strategies to account for environmentally-driven changes in productivity in Australian fisheries (FRDC project 2019-036)	<p>1. To review relevant international research and management approaches to account for environmentally-driven productivity change in stock assessments, reference points and harvest strategies for selected Australian fish stocks.</p> <p>2. To identify and describe circumstances and fish stocks for which dynamic reference points should or should not be used in stock assessments and harvest strategies, and develop appropriate methodology for conducting assessments using dynamic reference points.</p>	TBA	High	High

	<p>3. To identify selected candidate fish stocks showing likely environmentally-driven productivity change, conduct comparative assessments for these stocks using equilibrium and dynamic reference points, and prepare a candidate harvest strategy that includes dynamic reference points for testing in the FRDC Multi-Species Harvest Strategy project.</p> <p>4. To make recommendations on future implementation of dynamic reference points and harvest strategies for Australian fish stocks.</p> <p>5. To develop and improve methods for detecting and quantifying changes in productivity (growth and recruitment) in stock assessments, to relate these to environmental mechanisms causing productivity changes, and to evaluate data needs, including environmental indices, required to usefully detect and evaluate productivity change under various circumstances.</p> <p>6. To consider and evaluate options for effective harvest control rules, incorporating dynamic reference points, that might appropriately respond to changes in fish stock productivity, including environmentally driven trends in productivity.</p> <p>7. To identify environmental circumstances and fish stock characteristics under which it would be appropriate and advisable to move to using assessments and management approaches incorporating dynamic productivity and reference points, vs. stocks for which dynamic approaches offer no benefit compared to existing equilibrium approaches.</p> <p>8. To make recommendations on future stock assessment approaches, data requirements, harvest control rules and management approaches incorporating environmental indicators, dynamic productivity and dynamic reference points for Australian fish stocks.</p>			
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**NEW IDENTIFIED RESEARCH NEEDS FOR 2022-23**

Application of Close-Kin assessments for key and rebuilding species in the Southern and Eastern Scalefish and Shark Fishery (SESSF)	<p>A feasibility study to determine whether close-kin assessments are an option for key commercial species in the SESSF, including what a sampling design would look like and how much it would cost.</p> <p>Include blue-eye trevalla pending ARC support for blue-eye trevalla close-kin project.</p>	High (500k)	High	High
Developing a Harvest Strategy for species where depletion can no longer be estimated against B0	Investigate development of a harvest strategy for species where depletion can no longer be estimated against B0 (absolute estimate is only available), using school shark as a case study. To be informed by the multi-species harvest strategy project (MSHSP), and dynamic reference points project.	High	High	High
School shark post release survival	Investigation of the post release survival rates of school shark (focus on immediate and post- release mortality), and the application of survivability to discard estimates for this species.	Medium	High	High
Identification and monitoring of school shark pupping grounds to understand stock structure	Identify nursery areas for school shark in South Australia for potential future conservation areas. Including locations, connectivity to get better understanding of stock structure. Monitor known pupping grounds to monitor recruitment levels and stock structure.	Medium	Medium	Medium

**Research projects identified for inclusion in future research plans**

Title	Objectives and component tasks	Evaluation
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		<b>Total cost (\$ (approx. only)</b>	<b>Priority/ ranking</b>	<b>Feasibility</b>
Changes to CPUE standardisations	Develop general approaches for SESSF CPUE standardisations that deal with such issues as structural adjustment and targeting.	Low	Medium	High
Better understanding of protected species interactions and potential impacts	<ul style="list-style-type: none"> <li>• Quantitative measure of TEP interactions in the SESSF.</li> <li>• Assessment of population size for relevant species.</li> </ul>	High	Low	Medium
Changes in fishing power	Literature review/meta-analysis of changes to fishing power over time. Relates to under-caught TAC project. Commence with desktop study looking at available information. Note work already done on mesh sizes on the Danish seine fleet.	Low	Low  Being considered at implementation workshop	High
Maximising economic returns for the Australian community	<ul style="list-style-type: none"> <li>• Identify factors which impact on the profitability of individual operators and the fishery.</li> <li>• Improve market dynamics.</li> <li>• Increase efficiency of vessels.</li> </ul>	Medium	Medium  Await outcomes of under-caught TACs and multi-species harvest strategy project. If gaps remain priority might be revised.	

Identification of school shark nursery areas in South Australia	Identify nursery areas for school shark in South Australia for potential future conservation areas.  Current work: PhD student (Matt McMillan).	Low	Medium	High
Options for data poor assessments	Develop improved assessment methods for low catch and data poor species in the SESSF.	Low	Medium	High
Close Kin Mark Recapture (CKMR) for gummy shark	Consider whether the CKMR approach can be applied to gummy shark cost effectively, noting some concerns with CPUE as an index for gummy shark with ongoing avoidance of school shark.	High	Medium	High
Standardising CPUE for skipper effect using logbook skipper ID and experience in the SESSF.	To improve CPUE standardisations in the SESSF.	Low	High	High