Southern and Eastern Scalefish and Shark Fishery
Shark Resource Assessment Group (SharkRAG)

Meeting minutes

Date: 22-23 November 2016

Freycinet Room, Hobart, Tasmania

Attendees

Name	Membership
Mr Sandy Morison	Chair
Mr Leigh Castle	Industry member
Mr Robert Curtotti	Economic member
Mr Ryan Keightley	AFMA member
Dr Brendan Kelaher	Scientific member
Dr Ian Knuckey	Scientific member
Dr Charlie Huveneers	Scientific member
Mr David Stone	Industry member
Dr Robin Thomson	Scientific member
Mr Kyri Toumazos	Industry member
Ms Anissa Lawrence	Invited participant – environment
Dr Miriana Sporcic	Invited participant – scientific (CSIRO)
Mr George Day	AFMA observer

Meeting Minutes

1   Preliminaries

1.1   Introduction and apologies

The Chair opened the meeting and welcomed participants. Members were advised that the meeting was being recorded to assist with the preparation of the draft minutes.

1.2   Adoption of Agenda

The agenda at **Attachment A** was adopted by the RAG. A number of changes were made to the order of Agenda Items during the meeting.

1.3   Declaration of interests

Members reviewed and updated the Declarations of Interest included at **Attachment B**.

The Chair asked participants to declare any interests in any Agenda Item to be considered by the RAG. Such interests were declared by:

- Leigh Castle, holder of concessions in the Southern and Eastern Scalefish and Shark Fishery (SESSF), in relation to Agenda Item 2
- David Stone, Executive Officer for Sustainable Shark Fishing Industry Assn, representing hook and gillnet industry members, in relation to Agenda Item 2
- Kyri Toumazos, holder of concessions in the SESSF, in relation to Agenda Item 2.

Each participant left the room in turn while the RAG considered their interests.

In each case, the RAG noted the conflict of interest and, recognising the participant's knowledge and valuable contribution to the discussions, agreed the member should participate in the discussion and recommendations for all Agenda Items.

1.4   Actions arising from previous meetings

The AFMA Member updated the RAG on the status of actions arising from previous meetings of SharkRAG. The updated Action Item status is included at **Attachment C**.

1.5   Acceptance of minutes from October 2016 meeting

The RAG were advised that the minutes from the October 2016 meeting would be available for comment for one more week before being finalised.

2   Recommended Biological Catch (RBC) recommendations

2.1   Gummy shark

Dr Thomson presented the 2016 gummy shark stock assessment.

The RAG discussed the impact of effort saturation, which aims to reflect the impact that the amount of gear set in an area has on catches (i.e. gear competition), on the stock assessment model. The RAG questioned the validity of effort saturation parameters given that industry members had reported different experiences to what was modelled in the three regional stock areas. The RAG considered sensitivities to determine the effect of including the effort saturation function in the base case. The RAG noted it had little effect on stock depletion estimates and that the model's fit to the data was improved with its inclusion. Accordingly, the RAG was comfortable retaining the effort saturation function in the base case.

The RAG noted that a differing availability to gear by age parameter is incorporated into model to reflect the varying ability to target gummy shark of different ages. The RAG noted that including this parameter improves fits to data. However, the RAG questioned whether in future adjusting for selectivity across the three regional stocks could better capture this characteristic.

Action item 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.

The RAG noted that some of the sensitivities in relation to density dependence had better fits to the data than the base case. Given that each of the density dependence scenarios may be plausible, the RAG discussed future work to investigate reverting to the previously used approach of averaging model outcomes from the various density dependence scenarios rather than using a base case.

Action Item 2: For the next gummy shark assessment, SharkRAG to review how density dependence is incorporated in the model including in the context of the paper 'Population biology and dynamics of the gummy harvested off southern Australia' (Walker 2010).

The RAG considered 10 year projections where catch is taken by different gear types. The RAG noted that the projection where the entire RBC in South Australia (743.8 tonnes) is taken by longline, the stock remains above target to 2026 (case 2). Further, even if longline catch in South Australia increased to the maximum historic catch (all gear) the stock would remain above target to 2021 (case 3).

The RAG also considered female spawning biomass compared to pup production for the base case model (figure 18). The RAG noted that there was a linear relationship between the two

parameters and agreed that pup production remained a better proxy for the ability of the stock to sustain itself than female spawning biomass.

The RAG noted that the first season (2017-18) RBC from the stock assessment model increased from the current RBC despite the following season's (2018-19) RBC being lower. Dr Thomson advised that this was because of a recruitment pulse, the end of which was passing though the fishery, was still available to the fishery in 2017.

The RAG considered a range of RBC scenarios from the stock assessment model, including the long term RBC and an average RBC over the next three years.

Recognising the importance of stability in Total Allowable Catch (TAC) for industry, the RAG requested Dr Punt to provide projections of stock depletion at a constant catch over three years of:

- 2052 tonnes (representing the RBC for the current TAC of 1836 tonnes)
- 1961 tonnes (the long term RBC)
- 1922 tonnes (the average of the RBC over the first three years).

The RAG agreed to meet by telephone to finalise its' RBC advice once these scenarios were available.

The RAG noted that discards have been included in the model catch series, so a weighted mean of discards should be deducted from the RBC to calculate the TAC. The RAG also noted that, while the Memorandum of Understanding with the States was currently used to determine state catches to deduct for TAC calculations, the weighted average of state catch over the four most recent years, not including Western Australian or NSW catches, is 120 tonnes.

The RAG updated the gummy shark species summary for stock assessments completed in 2016, noting that it would be finalised at the upcoming telephone conference.

2.2 School shark

The RAG considered available data on school shark, in particular the trawl standardised catch per unit of effort (CPUE) which, although is primarily operating outside of the main part of the fishery and therefore is uncertain as to how reliable it is an reliable index of abundance, shows a sustained increase. Abundance from the Fishery Independent Survey (FIS) was variable but did not give rise to concerns from the RAG.
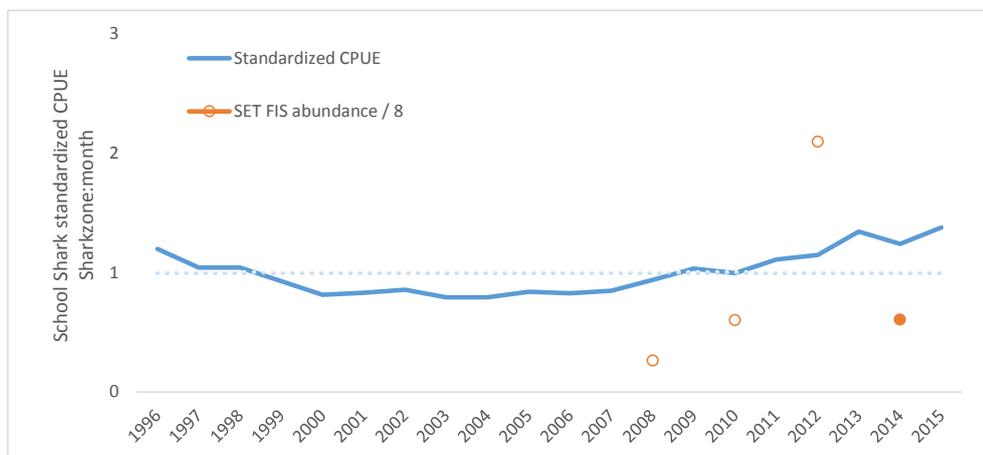
The RAG noted that the number of large shots (greater than 250 kilograms) of school shark in 2015 had decreased and catch plus discards was below the incidental bycatch TAC level:
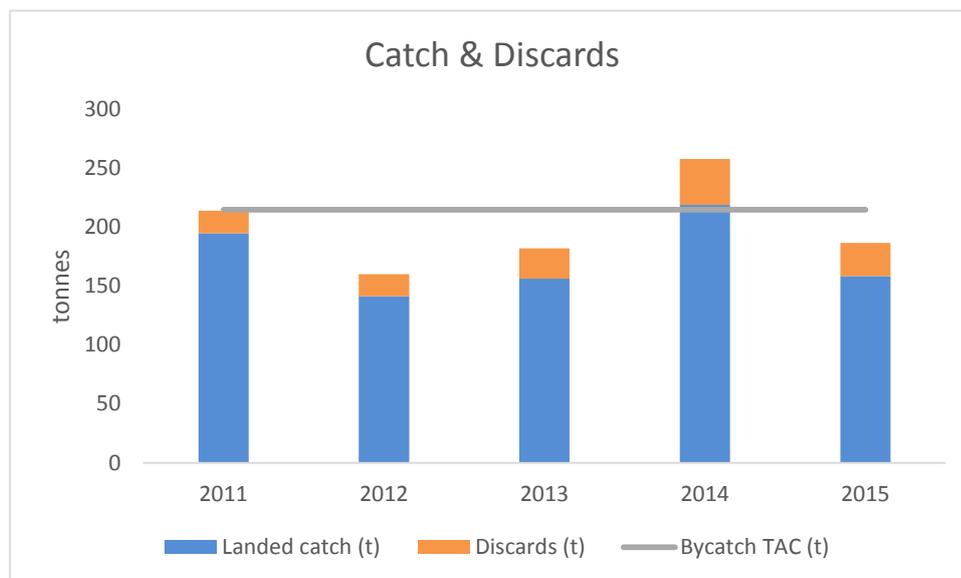
The RAG noted that all discards are assumed to be mortalities however some school shark are released alive so this is likely to over-estimate mortalities.

Action Item 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.

The RAG updated the school shark species summary for stock assessments completed in 2016 (**Attachment D**).

3   Research and data

The following members declared an interest in the Agenda Item:

- Dr Huveneers, who noted a potential interest in funding for research
- Dr Knuckey, who has various research interests in the SESSF
- Dr Thomson, who undertakes stock assessments and has a declared interest in the Close Kin Mark Recapture project for school shark
- Dr Sporcic, who undertakes stock assessments and associated work relevant to the GHAT.

Each participant left the room in turn while the RAG considered their interests.

In each case, the RAG noted the conflict of interest and, recognising the participant's research knowledge and valuable contribution to the discussions, agreed they should participate in the discussions regarding research. However, the RAG agreed that they should not participate in recommendations prioritising the various research projects.

3.1   2019-20 Annual Research Priorities

Mr Keightley sought the RAG's advice on the annual research priorities for 2018-19, in the context of the SESSF five year strategic research plan 2016-20. The RAG recommended the following priorities be included in the SESSF annual research plan 2018-19:

Project	Feasibility	Priority	Cost

Investigate obtaining length data from electronic monitoring and /or crew collected data. Consider how best to formulate the project to address cost effective collection of data.	High	High	Medium - low
Investigation of the post-release survival rates of school shark. Noting school shark survival is relevant for the close kin genetic study that is currently underway (focus on immediate and post-release morality[1]).	High	High	Low
Investigation of the post-release survival rates of gummy shark (focus on tertiary stress response[2]) caught by either gillnet or longline.	Medium	Medium	Medium
Change CPUE calculations: • from catch by shot to catch by metres of net set • to better account for zero shots.	High	High	Low

[1] Dapp, D.R., Walker, T.I., Huveneers, C. & Reina, R.D. (2016) Respiratory mode and gear type are important determinants of elasmobranch immediate and post-release mortality. *Fish and Fisheries*, 17: 507–524

[2] Acute and chronic stress response that reduce growth rates, reproductive output or investment, and resistance to disease.

The RAG noted other projects that would be worth considering again as future priorities:

- In relation to the Tier 1 assessment for gummy shark:
  - investigate how density dependence is incorporated into the stock assessment model including a review of 'Population biology and dynamics of the gummy harvested off southern Australia' (Walker 2010)
  - investigate age composition data sample design.
- Investigate undertaking Tier 5 assessments for elephant fish and sawshark.
- Identify nursery areas for school shark in South Australia for potential future conservation areas.
- Review the current science on Australian sea lion population dynamics and seek to identify significant sources of Australian sea lion mortality.

The RAG requested that AFMA ensure the Marine Mammal Working Group keep SharkRAG appraised of any updates in mitigation technology.

4 Matthew McMillan – School Shark PhD update

Mr McMillan provided an update via telephone, describing his work investigating potential school shark pupping grounds off South Australia. Techniques being applied were the investigation of vertebrae chemistry to indicate differences in pupping grounds, tagging data and surveys of potential pupping grounds.

Key findings to date include:

Differences in chemical markers between school sharks from South Australia and Bass Strait across three sampling years (higher lithium and manganese in the vertebrae from South Australia), suggesting that pupping areas for the two regional stocks are in different areas. Some sharks from both regions had similar natal signatures, suggesting dispersive and resident contingents within the fishery.

None of the eight large female sharks tagged with pop-up satellite tags off the head of the Great Australian Bight during the expected parturition period moved further east than Coffin Bay, suggesting that parturition occurred in South Australia.

The work based on vertebrae chemistry is anticipated to be published next year. Future work planned including tagging of additional large pregnant female school sharks and surveying of potential nursery areas.

5   Data needs and collection

The RAG considered the current SESSF data plan for shark species noting that the SESSF Strategic Monitoring and Assessment Research Project was close to finalising its recommendations and AFMA now had over a year of experience with electronic monitoring in the GHAT.

The RAG noted that a research proposal *'A comparison of weights recorded by operators (logbook) and weights estimated by AFMA observers against piece counts recorded by electronic monitoring in order to establish discard weight estimates from piece counts using electronic monitoring'* had been accepted and a call for the research was to be made. The RAG recognised that, given developments with monitoring trials, particularly trials to obtain lengths from electronic monitoring and/or crew collection, this research may no longer be as important. Dr Thomson offered to review the importance of this project and discuss with AFMA before a final decision is made for funding.

In relation to port collected age, length and sex data, the RAG commented that currently there is only a need for broad spatial information; the assessment scientists only need to know which of the three regional stocks the shark came from. However, finer scale data may be useful to collect for future assessments.

Given the numerous data issues for consideration, the RAG considered it appropriate for a detailed data proposal to be developed by AFMA and assessment scientists for discussion at a GHAT data workshop.

> **Action Item 4:** AFMA to prepare a paper, developed in consultation with stock assessment scientists, outlining updated data needs for the GHAT and preferred, cost effective options, to obtain the data. Following circulation of this paper, the RAG to meet for a one day workshop with any other appropriate participants.

6   Management items

6.1   Harvest Strategy Framework amendments

Mr Day sought SharkRAG advice on changing the SESSF Harvest Strategy Framework to use a weighted average of State catches when calculating TACs from RBCs.

The SESSF Harvest Strategy Framework currently provides that:

> *Other sources of mortality arising from discarded catch, catch taken by other jurisdictions (e.g. State and recreational sectors) or research catch allowance, are subtracted from the RBC to produce a Commonwealth TAC*

For the purposes of this calculation:

- the discarded catch is generally estimated for the following fishing season using a four year weighted average
- State catches are estimated as a simple average of the four most recent years.

Dr Robin Thomson has considered whether State catches would be better estimated using a weighted average as described in the paper *SESSF catches and discards for TAC purposes* (9 November 2016).

Following consideration of Dr Thomson's analysis, the RAG recommended adopting weighted averages of State catches for the purposes of calculating TACs.

6.2   Non quota species triggers

Mr Keightley sought SharkRAG advice on:

- the catch of trigger species against their upper and lower catch limits as set out in Table 1 below

- whether the triggers are still relevant and are set at appropriate levels

- what action is appropriate if a trigger is met.

Mr Keightley provided background regarding the establishment of the triggers in 2001. He noted the original rationale was that an upper reference point (equal to the maximum annual historic catch by all sectors) may indicate an increase in targeted fishing, while a lower trigger point might suggest a stock decline.These trigger points, if reached, were intended to initiate a detailed assessment of catch and other data by the relevant assessment groups to ascertain any stock implications of the catch levels.

Table 1: Upper and lower trigger limit species, including catch and discard data for 2015-16 and the 2016-17 fishing seasons.

Species	Upper limit	Lower limit	2015-16 Retained catch (t)	2015-16 Discarded catch (t)	2016-17 Retained catch (t)*	2016-17 Discarded catch (t)*
Boarfishes	25	15	11	0.3	4.2	0.2
Broadnose shark	70	20	37.1	1.6	6	0.8
Dusky/Bronze whaler	35	10	5.5	0.3	0.9	0.04
Pencil shark	1	n/a	0.01	0	0	0
Shortfin mako	5	n/a	1.4	0.2	0.4	0.05
Smooth hammerhead	10	n/a	1.1	0.1	0.2	0.002
Whiskery shark	60	n/a	11.6	0.1	1.5	0.006
Wobbegongs	5	n/a	2.6	1.9	0.2	0.2

*Data extracted on 27 September 2016.

The RAG considered the triggers and noted none of the species had exceeded their upper triggers. The RAG commented that the triggers had been developed before AFMA's Ecological Risk Assessment framework had been implemented and that this framework was now the principal tool to address sustainability concerns and identify low, medium or high risk species.

Given the role of the ERA, the RAG recommended discontinuing the triggers. The RAG noted that ERAs were planned for the SESSF in 2017-18 and recommended that any necessary management responses be developed following receipt of the ERA outcomes.

6.3   School and gummy shark size limits

The RAG postponed consideration of this item until the gummy shark stock assessment projection showing the impact using scalefish hook selectivity for all catch was available. Mr Stone commented that removing size limits could lead to targeting and increased discarding by the trawl sector.

7   Information items

7.1   Fishery status report and classification

Mr Robert Curtotti presented a summary of ABARES' processes around the annual fishery status reports. The status of fish stocks is evaluated:

- biologically against both the *Fisheries Management Act 1991* and *Commonwealth Fisheries Harvest Strategy Policy 2007*

- economically against the objective of maximising economic returns to the Australian community using indicators of trends in net economic returns, effect of management arrangements and performance of harvest strategies

- environmentally against the *Environmental Protection and Biodiversity Conservation Act 1999*, after considering ERAs and similar assessments.

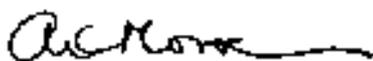## 7.2   SESSF Strategic Monitoring and Assessment Project

Dr Ian Knuckey provided an update on the SESSF Strategic Monitoring and Assessment Project (SMARP). The project team held a recent meeting to finalise key recommendations. One of the main recommendations is for AFMA to rationalise data collection, storage and dissemination to gain efficiencies and support the Fisheries Management Strategy Annual Reports. There may also be efficiencies gained through strategically planning assessments, meetings and TAC setting. The final report is anticipated to be considered by SEMAC early in 2017.

8   Other business and close of meeting

The Chair thanked participants for their attendance and for Dr Punt and Dr Thomson for their work on the gummy shark stock assessment.

Signed (Chairperson):

Date: 20/12/2016

Actions arising

Action	Agenda item	Description	Responsibility
1	2.1	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
2	2.1	For the next gummy shark assessment, SharkRAG to review how density dependence is incorporated in the model including in the context of the paper 'Population biology and dynamics of the gummy harvested off southern Australia' (Walker 2010).	CSIRO, SharkRAG
3	2.2	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
4	5	AFMA to prepare a paper, developed in consultation with stock assessment scientists, outlining updated data needs for the GHAT and preferred, cost effective options, to obtain the data. Following circulation of this paper, the RAG to meet for a one day workshop with any other appropriate participants.	AFMA

Attachments

Attachment A: SharkRAG agenda

Attachment B: Declarations of interest

Attachment C: Action item status

Attachment D School Shark species summary

Australian Government
Australian Fisheries Management Authority

Shark Resource Assessment Group (SharkRAG)
Meeting 2 2016

Agenda
22-23 November 2016 – Freycinet Room, CSIRO Hobart, TAS
Day 1, 12:00 - 17:00, Day 2, 8.30 – 12:30

1	Preliminaries		45 minutes
1.1	Welcome and apologies	Chair	
1.2	Acceptance of agenda	Chair	Action
1.3	Declarations of interest	Chair	Action
1.4	Status of actions arising	AFMA	Action
1.5	Acceptance of minutes from October 2016 meeting	All	Action
2	Recommended Biological Catch recommendations	CSIRO	3.5 hours
2.1	Gummy shark • Updated base case • RBC, MYTAC and breakout rule recommendations • Update species summary		Advice
2.2	School Shark • RBC recommendation • Update species summary		Advice
2.3	School shark rebuilding strategy annual review		Advice
3	Research and Data		1 hour
3.1	2018-19 GHAT research priorities	Mr Keightley	Advice
3.2	Data needs and collection	Mr Keightley	Discussion
4	Management items		1.5 hours
4.1	School and gummy shark size limit • Gummy shark assessment sensitivities	Mr Keightley	Discussion
4.2	Non quota species triggers • Review of triggers • Consequence of triggers	Mr Keightley	Discussion
4.3	Harvest Strategy Framework amendments	Mr Day	Advice
5	Presentations		45 minutes
5.1	ABARES presentation	Mr Curtotti	Information
5.2	Matthew McMillan – School Shark PhD update	Mr McMillan	Information
5.3	SMARP update	Dr Knuckey	Information
6	Other business and close of meeting		15 minutes
6.1	Close	EO	Information

Chair: Sandy Morison   Draft Agenda – SharkRAG 2 2016

Participant	Interest declared
Sandy Morison	Chair of South East Resource Assessment Group and Tropical Rock Lobster Working Group. Scientific member on South East Management Advisory Committee. Contracted by government departments, non-government agencies and companies for a range of fishery related matters including research and MSC assessments of AFMA managed and other fisheries (by SCS Global Service). No pecuniary or other interest.
Dr Brendan Kelaher	Scallop Resource Assessment Group Chair and Scallop Management Advisory Committee member. No other interests declared.
Dr Robin Thomson	Undertakes CSIRO stock assessments. No pecuniary interests. Declared interest in Close Kin Mark Recapture project (research investigator).
Dr Charlie Huveneers	Senior lecturer and research scientist. Potential interest in funding for research. No pecuniary interest or otherwise.
Dr Ian Knuckey	Director – Fishwell Consulting Pty Ltd Director – Olrac Australia (Electronic logbooks) Chair / Director – Australian Seafood Co-products (seafood waste utilization) Chair / Director – ASCo Fertilisers (seafood waste utilization) Chair – Victorian Rock Lobster and Giant Crab Assessment Group Agent – Olrac Australia electronic logbooks Invited scientific participant – SEMAC, SERAG **Current / Recent Projects and funding:** Principal Investigator – Fishery Independent Survey of shelf resources in the Great Australian Bight Trawl Fishery 2015 Principal Investigator – Improved understanding of economics in fisheries harvest strategies. Principal Investigator – Realising economic returns of reducing waste through utilization of bycatch in the GAB Trawl Sector of the SESSF Principal Investigator – The social drivers and implications of conducting an ecological risk assessment of both recreational and commercial fishing - a case study from Port Phillip Bay Principal Investigator – Review of Monitoring and Assessment in the SESSF Co-Investigator – Optimising processes and policy to minimise business and operational impacts of seismic surveys on the fishing industry and oil and gas industry. Co-investigator – SESSF 2016 Fishery Independent Survey Co-investigator – Bird mitigation in the SESSF trawl sector

	Researcher – Various fishing industry liaison projects for oil and gas industry
	Researcher – Review of mammal mitigation for a Seafish Tasmania pelagic trawler
	Scientific Advisor – GABIA, SETFIA, SSIA, SPF (Geelong Star), Gulf St Vincent Prawn Fishery
	Facilitator – WWF shark traceability workshop
	Facilitator – Indonesian fishery training and development
David Stone	Executive Officer for Sustainable Shark Fishing Industry Inc. Declared interests in representing hook and gillnet industry member interests and in pursuing research for dolphin acoustic mitigation technology, and has a proposal to FRDC seeking funding. SESSFRAG observer. Declared interest in RBCs.
Leigh Castle	Tasmanian shark hook, scalefish hook and tuna minor line fisher. Owns SESSF quota and vessel statutory fishing rights. Has a declared interest in shark hook interests and RBC recommendations.
Kyri Toumazos	South Australia/Bass Strait shark fisher, boats fishing with hooks and gillnets. SESSF quota holder. Southern Rock Lobster Board CEO. Declared interests in RBCs.
Ryan Keightley	AFMA member. No interest pecuniary or otherwise.
Anissa Lawrence	Independent consultant. Director of TierraMar consulting. Conservation member on SEMAC. Undertakes environmental work with Southern Shark Industry Alliance on an ad-hoc basis. Undertakes contracts for a number of Conservation NGOs, government departments, non-government agencies on a range of fishery related matters. Provides environmental advice to industry associations. No pecuniary interest. Director of OZFISH Unlimited Ltd. Executive officer of the NSW Fish Habitat Partnership. President of the SEA LIFE Trust (ANZ). Director of FISHI International.
Robert Curtotti	No interests, pecuniary or otherwise.
George Day	AFMA. Demersal and Midwater Trawl Fisheries section. No interests, pecuniary or otherwise.
Miriana Sporcic	CSIRO, Assessment scientist. A general interest in acquiring funding for research purposes. No interest, pecuniary or otherwise.

Agenda item 1.4   Actions arising

Purpose: To inform the RAG of the action taken with respect to business arising from previous SharkRAG meetings.

SharkRAG 2 2014

No	Action item	Member to action	Status
1	AFMA to ensure that catches of quota species from the SESSF Fishery Independent Survey are provided to CSIRO to include in total removals for assessment purposes.	AFMA, SESSFRAG	Ongoing – A review of the SESSF FIS was undertaken by NIWA in 2015. Recommendations from this review were considered by SMARP and SESSFRAG, and it was agreed that all FIS data can be used in assessments where applicable. These data are provided to CSIRO. AFMA data team is clarifying how to identify FIS shots from normal fishing shots.

SharkRAG OOS meeting May 2015

No	Action item	Member to action	Status
1	AFMA to arrange teleconference with SharkRAG and Mr Matthew McMillan (school shark PHD).	AFMA	In progress – Mr McMillan has agreed to provide a written and/or phone update to SharkRAG's November 2016 meeting (Agenda Item 5.2)

SharkRAG 1 2015

No	Action item	Member to action	Status
4	AFMA to review the species triggers to reflect risk ratings and the purpose of the trigger (e.g. do they trigger RAG review, assessment or management action)	AFMA	In progress - To be discussed at meeting (Agenda item 4.2)
9	AFMA to trial e-monitoring length measurement protocol as soon as possible.	AFMA	In progress - Protocol is determined, awaiting staff availability to undertake field trials. Also to be considered under Agenda Item 3.2.
16	Dr Thomson to consider alternative future age data collection protocols (including no ageing at all) for gummy shark by projecting the 2016 updated assessment model into the future under alternative data scenarios , noting the resulting uncertainly regarding stock size.	CSIRO (Dr Thomson)	Complete – CSIRO have advised this is a significant amount of work, and information in the assessment report informs requirements. To be considered under research priorities at Agenda Item 3.

SharkRAG 2 2015

No	Action item	Member to action	Status
1	AFMA to consider increasing the lower size limit of gummy shark based on Mr Pettit's comments.	Mr Keightley	In progress – RAG to consider at Agenda Item 4.1.
2	Prof Simpfendorfer to distribute the Pittwater pupping research paper to the RAG.	Prof Simpfendorfer	Complete – McAllister et al 2015 paper uploaded to 'research papers' on Govdex.
4	ABARES to present at the next SharkRAG meeting on the fishery status report and the classification process.	ABARES	In progress - to be presented at Agenda Item 5.1.
6	Dr Thomson to test multiple hypothesis for increasing hook catch of gummy shark in the next assessment.	Dr Thomson	Complete– Dr Thomson to present at meeting.

SharkRAG 1 2016

No	Action item	Member to action	Status
1	Mr Keightley to refer RAG concerns regarding the most recent Australian sea lion report to the Commonwealth Marine Mammal Working Group (CMMWG)	Mr Keightley	In progress – Mr Keightley will relay the RAG's concerns to the CMMWG at its 24 November meeting.
2	Mr Keightley to liaise with AFMA observer section and Dr Thomson to ensure close kin samples are collected by Lakes Entrance port sampler. If unsuccessful, Mr Toumazos to ensure samples are collected from the South Australian fleet if they're not already collected through the Melbourne processor.	Mr Keightley	Complete – Lakes Entrance Port sampler has been provided sampling protocols and will start collecting samples.
3	AFMA to liaise with Dr Sporcic on using catch by net length instead of catch by shot for all shark species CPUE.	Mr Keightley	In progress – The RAG agreed that catch by net length should be adopted as soon as possible for CPUE standardisations.
4	Dr Thomson to coordinate running sensitivities and projections identified by the RAG for presentation to the November SharkRAG meeting.	Dr Thomson	Complete – presented at Agenda Item 2.
5	Dr Thomson to present a plot of gummy shark female spawning biomass against pup production at the November 2016 RAG meeting.	Dr Thomson	In progress – presented at Agenda Item 2. .
6	Dr Thomson to model the effect of removing the current minimum size limit for school and gummy shark by modelling a change in selectivity for all gears (except gillnet) to match the selectivity of scalefish hook.	Dr Thomson	In progress – to be presented at the meeting.

10   School shark (Galeorhinus galeus)
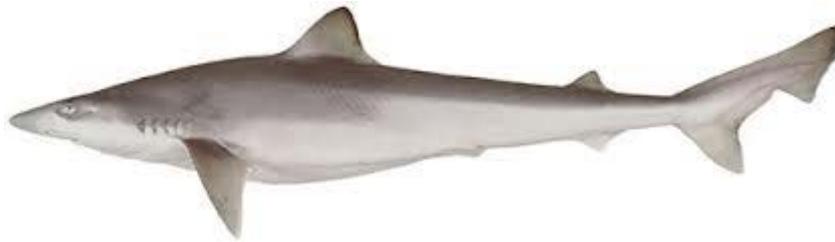
(Fisheries Research & Development Corporation, 2012)

Under a *Stock Rebuilding Strategy*.

Assessed by SharkRAG in 2009. Species summary updated in 2016.

Stock status summary	
Stock structure	The assessment model assumes that there is one well mixed stock. Tagging and genetic data shows some evidence for one well mixed stock. However, earlier data suggests there could be an east/west divide in stocks. This is supported by research documenting a collapse in the eastern part of the fishery around Tasmania and Bass Strait. After this collapse a fishery subsequently established in the west suggesting a reproductively isolated stock.
Stock status against reference points and trend	Target reference point is 48 per cent of the unfished biomass (pup production is used as a proxy for breeding biomass). Limit reference point is 20 per cent of the unfished biomass (pup production is used as a proxy for breeding biomass). In 2016 SharkRAG noted trawl standardised CPUE, although representing a small amount of catch, continues to show a sustained increase. In 2015 the RAG noted the stock was assessed at below the limit reference point. However the RAG considered that the weight of evidence supported that the stock is rebuilding and not subject to overfishing within the rebuilding time of three generation times.
ABARES most recent assessment (2015)	Biomass: Overfished	Fishing mortality: Uncertain
	GVP	% fishery GVP

GVP figures (2014 - 15 fishing season)	$1.7 million				2.5 per cent			
Recommended Biological Catch 2017-18	0 t. No targeted fishing as stock is < B_{LIM} - Commonwealth TAC recommendation is 215 t. The TAC is set at the lowest level to cover unavoidable bycatch whilst still supporting rebuilding of the stock.							
Overcatch/undercatch	0 per cent undercatch 0 per cent overcatch							

Probability of recommended biological catch (RBC) (or other levels of catch) causing a decline below limit reference _under proposed management Species that follow a HS rule that has been MSE tested will have a "very unlikely" score in this section (i.e. P<10 %)._

RBC recommendation: N/A as currently assessed at below the limit reference point.

Alternative Catch Scenarios:

Table 1. Number of years after 2008 when the school shark stock is predicted to achieve limit (B_{20}, B_{25}) or target reference points (B_{40}, B_{50}) under future catches ranging between 0 and 275t. Results are shown for the assumption that the distribution of fishing effort in the future matches that if either 2011, or 2008.

	0t	100t	125t	150t	175t	200t	225t	250t	275t
2009 Base Case – 2011 proportions									
B_{20}	23	30	32	36	40	47	58	80	-
B_{25}	30	38	42	46	51	59	71	95	-
B_{40}	45	57	62	67	74	83	97	124	-
B_{50}	50	62	67	73	80	89	104	132	-
2009 Base Case – 2008 proportions									
B_{20}	23	30	33	37	42	50	64	99	-
B_{25}	30	39	42	47	53	63	78	117	-
B_{40}	45	58	63	69	76	87	105	150	-
B_{50}	50	63	68	74	82	93	111	159	-

Assessment Year	2010	2011	2012	2013	2014	2015	2016
Tier /rollover /MYTAC	rollover	rollover	rollover	rollover	rollover	rollover	rollover
Stock Status	$<B_{LIM}$	$<B_{LIM}$	$<B_{LIM}$	$<B_{LIM}$	$<B_{LIM}$	$<B_{LIM}$	$<B_{LIM}$
Fishing season	2011/12	2012/13	2013/14	2014/15	2015/16	2016-17	2017-18
RBC	0	0	0	0	0	0	0
Agreed TAC	176	150	215	215	215	215	
Actual TAC after overs/unders	176	150	214	215	215	215	
% TAC caught	92	85	90	94	84	TBC	N/A

Tier Level & Discounts		
Tier Level	Tier 1	
Discount factor	0 per cent	
Is a multi-year TAC in place?	☐Yes (in place this season)	☒No
Is a multi-year TAC recommended? (please provide a clear indication on whether the multi-year recommendation is a RBC (e.g. based on Tier 1 model output) or TAC (e.g. a roll-over of catch))	☐Yes (recommended for future seasons) N/A	☒No
Breakout rules for multi-year TAC	N/A	
Have breakout rules been triggered?	N/A	

Assessment	
Stock indicator trends	Gillnet CPUE is not considered a reliable index of abundance as school shark are actively avoided by gillnet fishers. In 2016 SharkRAG noted that there are continuing positive signs suggesting that the school shark is rebuilding. This is based on an overall increasing trend in trawl CPUE (since

	2003). This is consistent with advice from industry that school shark, particularly juveniles, are in relatively high abundance.

Figure below. School shark standardised CPUE and FIS abundance.
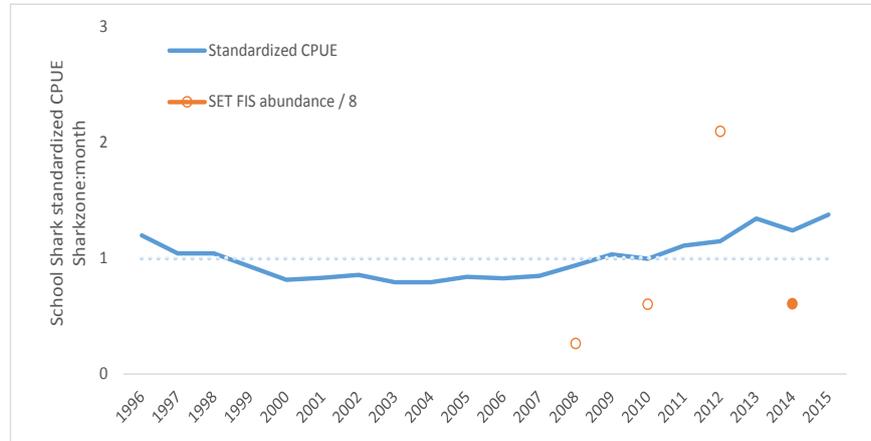
A close kin genetics project is in progress to develop alternative and independent measures of abundance for the stock. An estimate of abundance is expected by the end of 2017 with a stock assessment to follow shortly after. |
| **RAG comments** | Assessments (since 1991) have consistently estimated the school shark population to be below the limit reference point of 20 per cent of unfished levels.

The RAG noted that the number of large shots (greater than 250 kilograms) of school shark in 2015 had decreased. The RAG noted that the number of shots above 250 kilograms in 2014 was high and suggested that this be reviewed by AFMA.

While catch by boat data over the last five years did not raise specific concerns about targeting, the RAG recommended that AFMA investigate two boats that appeared in four of the five years (although this may reflect higher effort).

The RAG noted that range did not appear to be contracting and catch plus discards was below the incidental bycatch TAC level of 215 tonnes in 2015.

SharkRAG recommended school shark catches in 2016/17 be restricted to a level that covers unavoidable bycatch and discards. SharkRAG considers 215 t continues to be the best estimate of unavoidable bycatch including discards. |
| **Key model technical assumptions/parameters** | The assessment model assumes that there is one well mixed stock. |

Changes to model structure/assumptions	The stocks intrinsic rate of productivity, held fixed at 3.5 per cent since the 2006 stock assessment update, was estimated by the model during 2012, using (but not updating) the 2009 stock assessment model. The new runs of the model showed that a productivity value of 4.4 per cent is more consistent with the available data.
Significant changes to data inputs	N/A
Comments on data	The RAG had concerns that length frequency data were not currently being collected as part of the data collection programme for the GHAT with the introduction of electronic monitoring.

There are concerns in relation to gillnet CPUE data used in the model due to operators avoiding school shark. As a result, concern remains about the ability of the school shark assessment to reliably estimate the state of the stock. A close kin project is underway and is expected to provide a measure of abundance in 2017. |
| **Implications for companion species/TEPs/multi-species fisheries** | The gillnet fishery interacts with Australian sea lions in waters off South Australia. Interactions are mitigated by using trigger limits that close spatial zones for 18 months if an interaction occurs.

Dolphin interactions are managed through the GHAT Dolphin Strategy which sets performance criteria for individual operators.

To reduce targeting, gillnet operators are subject to a rule that constrains their catches of school shark to 20 per cent of their gummy shark catches. |

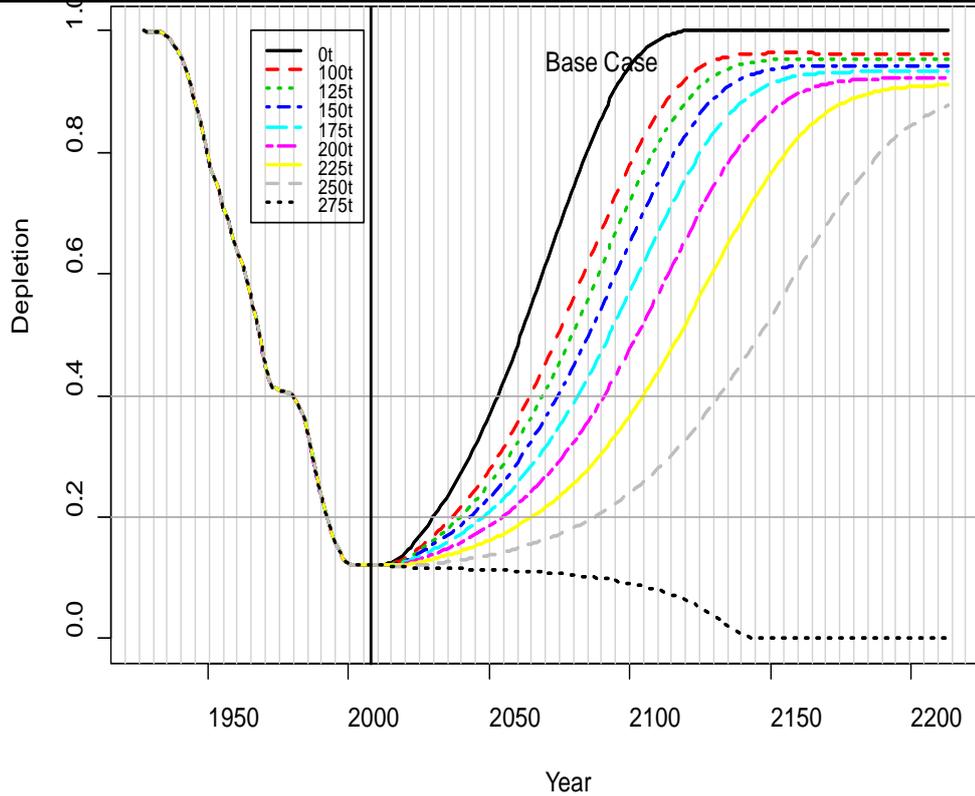| Tier 1 stock projection	
Projected biomass (include confidence intervals)

Figure 1. Projected future depletion from 2012 stock assessment re-run (pup production divided by pristine pup production) for the school shark stock for the Tier 1 2009 base case assessment model. Projections are shown for 9 future catch scenarios. Catches between 2008 (marked by a vertical line) and 2011 are the actual catches taken by the fishery. |

Research		
Research allowance	N/A ☐Included in TAC	☐In addition to TAC

Catch trends – School shark
(RBC and total catch are calendar year; TAC and Commonwealth catch are fishing season)