Australian Government
Australian Fisheries Management Authority

Southern and Eastern Scalefish and Shark Fishery Resource Assessment Group

(SESSFRAG)

Chairs' Meeting

Meeting minutes

Date: 27 March 2020

via teleconference

Attendees

Members	
Dr Cathy Dichmont	SESSFRAG Chair
Ms Fiona Hill	Australian Fisheries Management Authority (AFMA) Member
Dr Sarah Jennings	Economics Member
Mr Lance Lloyd	Scientific Member – Great Austalian Bight Resource Assessment Group (GABRAG) Chair
Mr Sandy Morison	Scientific Member –Shark Resource Assessment Group (SharkRAG) Chair
Dr Michael Steer	Scientific Member – South East Resource Assessment Group (SERAG) Chair (apology for Agenda Items 10 & 12)
Executive officer	
Ms Cate Coddington	AFMA
Invited Participants	
Dr Paul Burch	Commonwealth Scientific and Industrial Research Organisation (CSIRO)
Dr Jemery Day	CSIRO
Dr Ian Knuckey	Fishwell Consulting
Mr Kyne Krusic-Golub	Fish Ageing Services
Mr Andrew Penney	Pisces Australis
Dr Miriana Sporcic	CSIRO
Mr David Stone	Executive Officer, Sustainable Shark Fishing Association (SSFA)
Dr Robin Thomson	CSIRO
Dr Geoff Tuck	CSIRO
Presenters	
Mr Daniel Corrie	South East Trawl and Great Australian Bight Trawl Manager, AFMA
Ms Natalie Couchman	Gillnet Hook and Trap Manager, AFMA
Mr Tamre Sarhan	AFMA (Agenda Items 6,7 & 8)
Observers	
Dr Malcolm Haddon	CSIRO Honorary Fellow
Dr Geoff Liggins	NSW Department of Primary Industries (NSW DPI)
James Woodhams	ABARES (bar Agenda Items 10 & 12)
Apologies	
Mr Simon Boag	Executive Officer, South East Trawl Fishing Industry Association (SETFIA) and Southern Shark Industry Alliance (SSIA)
Mr Neil MacDonald	Executive Officer, Great Australian Bight Industry Association (GABIA)
Dr Veronica Silberschneider	NSW Department of Primary Industries
Ms Anna Willock	AFMA

Meeting outcomes

Meeting commencement

1. The meeting commenced at 11.50am (Australian Eastern Daylight Time (AEDT)) with: Cathy Dichmont, Fiona Hill, Sarah Jennings, Lance Lloyd, Sandy Morison, Mike Steer, David Stone, Kyne Krusic-Golub, Daniel Corrie, Natalie Couchman and Cate Coddington.

3. Declarations of interest[1]

2. After David Stone and Kyne Krusic-Golub left the meeting, the remaining participants discussed potential conflicts of interest and participation under specific agenda items, noting:
   a. Members, invited participants and observers had already provided declarations of conflicts of interest as prescribed in *Fisheries Administration Paper 12* via email or phone, prior to the commencement of the meeting or discussion of the item.
   b. further conflicts of interest were provided:
      i. Sarah Jennings' outlined potential sensitivities around agenda item 10 (research) given her role coordinating the Fisheries Research and Development Corporation's Human Dimensions Research Sub Program. However, given she does not intend to apply for research, SESSFRAG determined that there was no conflict of interest.
      ii. Michael Steer outlined potential conflict of interest with agenda items 9 and 10 that relate to research (specifically new project development).
   c. Conflicts of interest are at **Attachment 1**, and the outcomes of the deliberations with specific agenda items are outlined in **Table 1** below.
3. The remaining meeting attendees (outlined in the attendees list on page 2) joined the teleconference.

Acknowledgement of Country

4. Dr Cathy Dichmont (SESSFRAG Chair) made an acknowledgement of country.

1. Welcome & apologies

5. The Chair welcomed members and invited participants to the meeting. SESSFRAG noted apologies from Simon Boag, Neil MacDonald and Anna Willock.

2. Adoption of Agenda

6. SESSFRAG adopted the agenda, with the amendments to the order of the items as at **Attachment 2**.

3. Declarations of interest

7. The SESSFRAG Chair outlined the outcomes from deliberations regarding conflicts of interest (**Table 1**).

[1] This item was discussed prior to most attendees joining the meeting and, as such, is out of the order of the agenda. This ensured the item could be discussed fully.

Table 1 Participation in items where there are declared conflicts of interest

Agenda Item	Participants with potential conflicts of interest	Participation in the discussion	Participation in the recommendation
5. Review of total allowable catch (TAC) setting process 2020-21	Industry – David Stone	Present	Absent for any decision, noting unlikely to go to decision
6. Discard estimation methodology	Industry – David Stone	Present	Absent for any decision
7. Shark industry data collection program (SIDaC) report	Ian Knuckey	Present	Absent for any decision
9. Re-designing the SESSF Independent Survey	Research providers: CSIRO participants Andrew Penney Ian Knuckey Michael Steer (new project development) Industry – David Stone	Present	For decisions regarding the creation of a working group – present If other decisions are made – absent
10. Research statement and assessment schedule	Research providers: CSIRO participants Andrew Penney Kyne Krusic-Golub Ian Knuckey Michael Steer (new project development)	Present	Present for recommendations regarding costs and feasibility Recommendations regarding priority of research - only SESSFRAG core members (minus Michael Steer)
12. Other business – rebuilding strategy	Industry – David Stone (particularly blue warehou)	Present	N/A – unlikely to need a decision

4. Action Items

8. The action items from previous meetings were taken as read and an updated list is at **Attachment 3**.
9. A list of new action items established at this meeting are listed in **Attachment 4**.
10. SESSFRAG noted that items relevant to SharkRAG will be deferred to their next meeting, as per **Attachment 3**, with a face-to-face meeting planned in either July or August 2020 (dependent upon COVID-19 circumstances).
11. SESSFRAG noted that some items, originally intended for this meeting, were deferred to the August SESSFRAG Data meeting 2020 (as per **Attachment 3**).

5. Review of TAC setting process 2020-21

12. SESSFRAG noted the summary provided by Dan Corrie on the outcomes of the SESSF 2020-21 TAC setting process, in particular:
    a. Amendments to the SESSF Harvest Strategy Framework (the Harvest Strategy – **Attachment 5**) resulting from the SESSFRAG 2019 data meeting outcomes that enables assessments to be considered under different tiers and with slightly different parameters for consideration in setting TACs.

b. That SEMAC (which met in February 2020) recommended TACs for the SESSF 2020-21 fishing season. These recommendations were considered by the AFMA Commission at their March 2020 meeting. The TAC's have now been determined.
c. Of note is eastern school whiting[2]:
    i. Catches by NSW and the Commonwealth operators have exceeded the recommended biological catch (RBC) for the last couple of years.
    ii. An update to the assessment with recent catches, resulted in a downward revision to the 2017 biomass estimate from 47%B_0 to 36%B_0
    iii. The updated assessment estimates the biomass at the beginning of 2020 is 35%B_0.
    iv. Risk profiles for various levels of catch were considered at SERAG, and the Commission agreed to maintain the school whiting TAC at 788 t for the 2020-21 fishing season.
    v. A Fisheries Research and Development Corporation (FRDC) project, being led by Dr Karina Hall (NSW DPI) is currently underway to consider the stock structure along the east coast; it is currently assumed that there is one stock from western Victoria to southern Queensland.
    vi. AFMA will continue to work with NSW closely regarding the TACs and establishing catch sharing arrangements across the jurisdictions.

13. SESSFRAG noted the update provided by Geoff Liggins on the NSW TAC setting process:
    a. The NSW Total Allowable Fishing Committee met on 22-23 January 2020 to consider NSW TACs for stout and school whiting, tiger flathead, bluespotted flathead and silver trevally. It is expected that the TACs will be announced and gazetted in late April, prior to the NSW Ocean Trawl Fishery season commencing on 1 May 2020.
    b. Species that are being considered for secretarial determination have been lodged, including the following SESSF species: gemfish, bigeye ocean perch, blue eye trevalla, ocean perch and pink ling.
14. SESSFRAG noted the current Harvest Strategy employs a single species approach to achieving maximum economic yield (MEY), rather than multi-species approach, and the wording in the document should be updated accordingly.
15. Additional concerns were raised regarding the application of discount factors and harvest control rules for Tier 5 and ecological risk assessment (ERA) approaches:
    a. The *Guidelines for the Implementation of the Commonwealth Fisheries Harvest Strategy Policy* provide some guidance on the application of discount factors and are generally used to account for uncertainty of assessment approaches.
    b. It will be difficult to build a harvest control rule for ERA approaches because it is a risk-based approach based on weight -of-evidence.
    c. The multi-species harvest strategy project (FRDC 2018-021) may propose a way of setting TACs for a broad range of species. This will be subject to a

[2] Day Jemery (2019) School whiting (*Sillago flindersi*) projections based on CPUE updates to 2018, estimated catch to 2019 and projected catch scenarios to 2021. Technical report presented to SERAG, December 2019, Hobart, Australia

Management Strategy Evaluation (MSE) test and may not require the application of default discount factors.

d. In the interim, TACs are set on a precautionary basis for tier 5 and ERA species; these are set on either a long-term or a "current TAC" basis. For tier 5 species, it may be worth considering also assessing under tier 4, particularly if a higher TAC is suggested by tier 5.
e. Industry are concerned about unnecessarily higher discards that may result from applied discount factors.
f. Using the ERA is appropriate for species that are not assessed as high risk. However, it is not clear what the approach is if a species were to be assessed as high risk.

16. The next scheduled tier 5 assessment is blue eye trevalla for the seamounts in 2021. However, the assessment for the slope stock (currently a tier 4 scheduled for 2021) may be moved forward to 2020 as a tier 5. SEMAC have noted concerns that the discount factor is not applied to this assessment particularly given the potential conflict between CPUE and industry reports that catch rates are falling. The final decision regarding scheduling of this assessment is to be made at the August 2020 SESSFRAG Data meeting.
17. SESSFRAG agreed for a working group to be established to further develop the interim approach under the Harvest Strategy for setting TACs for tier 5 species, including harvest control rules.

Action Item 1: Sarah Jennings, Ian Knuckey, Fiona Hill
Ensure the SESSF Harvest Strategy Framework is updated to enable multispecies considerations rather just single species considerations where appropriate. Changes to the framework should ensure that the overarching high-level goal is to produce B_{MEY} for a fishery level goal and not be a full review of the framework, noting that the multi-species harvest strategy project is already undertaking this process.

Action Item 2: AFMA (Dan Corrie, Fiona Hill, Natalie Couchman), CSIRO (Geoff Tuck, Miriana Sporcic and Malcolm Haddon) and Industry (TBD)
Establish a 'Tier 5 TAC setting working group' prior to SERAG 1 to develop harvest control rules for converting Tier 5 assessment outcomes into TACs, noting Tier 5 methods may be broader than those currently specified, and these methods may need different harvest control rules.

6. Discard estimation methodology

18. SESSFRAG discussed the update provided by Paul Burch (data preparation, discard estimation methodology and allocation of observer days) and Robin Thomson (discard validity) on the work undertaken by CSIRO and reviewed by the working group—known as the Discard Estimation Working Group (DEWG) that was established to undertake work on discard estimation so far, in particular:

Data preparation for discard estimation

a. An error in the preparation of data was identified for estimating discarded catches in 2019 (and potentially prior to that year) – resulting from a misinterpretation of how observer weight data is stored in the AFMA database:
    i. When observers collect data of a species that is not discarded from a fishing shot (i.e. all landed catch of that species is retained), no

corresponding record of a zero discard is made. Therefore, these zero discards have not been used in discard estimation, which has likely led to an over-estimation of discarded catches – particularly for those species that are generally retained.

ii. It is necessary that a record of zero kilogram discarded be created for analysing discards when there is no discard of a species. As such, CSIRO will include zero kilogram discards in the 2020 data services report.

Discard estimation methodology

b. A summary of the preliminary approaches to modify the method of Bergh et al (2009)[3] to use a geometric mean instead of an arithmetic mean to estimate discarded catches in the SESSF was provided. Noting that geometric means cannot be applied to zero records.
    i. Tier 1 assessments use a different method to estimate discards, so the implications of modifying the Bergh method relate to Tier 4 and 5 assessments only.
c. The DEWG rejected two initial approaches to account for zero discard catches using both the arithmetic and geometric mean discard estimation methods; these were:
    i. excluding records with zero discards, which resulted in over-estimated discarded catches
    ii. adding a small amount (0.1 or 1 kg) to all zero discard records, which was overly sensitive to the value chosen.
d. The DEWG agreed that the zero and non-zero discard records would be modelled separately; for each method, discarded catch was estimated from the non-zero records and then the estimate was scaled by the proportion of zeros.
    i. This approach left the arithmetic mean unchanged and, while it is a somewhat ad-hoc adjustment to the geometric mean, it is consistent with the arithmetic mean.
    ii. The use of a geometric mean is further complicated as raw geometric means are biased.
e. Estimates were presented to SESSFRAG of discarded catches, total catches (discarded + retained) and histograms of observer weight data for selected SESSF species between 2003 and 2018 using the:
    i. arithmetic mean method
    ii. raw geometric mean method, and
    iii. bias corrected geometric mean method

    with confidence intervals estimated using a stratified bootstrap approach.

f. A comparison of the different approaches for determining discards showed that:
    i. raw geometric means are always lower than the mean produced from the other two methods. A justification for rejecting this method will be provided in the draft final report.

[3] Bergh, M., Knuckey, I., Gaylard, J., Martens, K., and Koopman, M. (2009). *A revised sampling regime for the Southern and Eastern Scalefish and Shark Fishery* – Final Report to AFMA.

ii. using a ‘bias corrected geometric mean’ produces similar results compared to the ‘arithmetic mean’. However, in some years the bias corrected geometric mean is much higher than the arithmetic mean.

g. The calculation of the uncertainty in the total catch (both discarded and retained catch) assumes no error for retained catch. For species with relatively low discards (e.g. flathead), uncertainty in the total catch is low, even if there is a high level of uncertainty in the discarded catch. As such, because Tier 4 and Tier 5 assessments use total catch, uncertainty in discarded catch has little impact on these assessments.
h. The proportion of zeros and the number of samples has been added into the plots for each species in the Discard report.

Allocation of observer days to reflect recent fishing effort

i. Using work undertaken by Roy Deng to determine the best approach for predicting fishing effort and allocating observer days across sampling strata, the DEWG requested a retrospective analysis comparing: (a) the most recent year’s effort, (b) five-year mean, (c) three-year mean, and (d) a weighted four-year mean (weights 8,4,2,1).
j. The most recent year’s fishing effort as a predictor of future fishing effort proved the best, followed by a weighted four-year mean. Paul Burch proposed to move to a weighted mean as it is less sensitive to changes in effort in a single year.
k. SESSFRAG agreed the use of a four-year weighted average seems a sensible approach but recommended further discussion and consideration by the DEWG.

Discard validity

l. The current validity rules for determining whether annual discard estimates for a particular species are used were refined and accepted by SESSFRAG based on work undertaken by a previous discard working group in 2018.
    i. Both of the following rules must be satisfied for an estimate to be valid: at least 5 observed shots in the strata that make up more than 50 per cent of
        a. the landed catch for a species
        b. the number of logbook reported shots that caught a species, and
    ii. The confidence interval of the coefficient variation (CV) must be less than 100 per cent.
m. The rules were tested for flathead and inshore ocean perch, which resolved that the performance of the rules is very species specific and are not always appropriate, and in some cases results in large variation when compared to estimates that use richer datasets that draw large sample size from all strata. It was recommended that more detailed investigation of each species would be needed to tailor the rules for each species individually and that a model-based approach would be a better solution to the problem than individually tailored rules. A model approach would help to solve the patchy sampling available for this fishery, and provide a way to evaluate whether a species has been sampled adequately in a given year.

19. Currently, Commonwealth discard rate estimates are applied to state catches to estimate state discards, and in some cases is applied when the state fishery is using different gear types. SESSFRAG agreed this needs improvement and suggested that

further information from the state agencies is needed to improve state discard estimates.

20. SESSFRAG agreed that:
    a. Tamre Sarhan should be included on the DEWG.
    b. the current validity rules are adequate for now, however, a model-based design may be better
    c. Paul Burch should continue investigating a model-based design.
21. SESSFRAG thanked Paul Burch, Roy Deng, Robin Thomson, and the rest of the DEWG for the work undertaken so far.

Action Item 3: Paul Burch
Paul Burch to compare the effect of both including and not including 'N/A's (no record of discarding) in the discard estimation methodology to determine the bias, and provide a summary in the next annual discard report, including the period to which the analysis applies.

Action Item 4: Paul Burch
Paul Burch to clarify whether 'N/A's are included in the method to estimate discards in Tier 1 assessments, and provide advice to SESSFRAG on the impact 'N/A's might have.

Action Item 5: Paul Burch / Discard Estimate Working Group
Determine whether assuming that there is 'no error in reporting of retained catch in logbooks' is a significant issue for estimating discards, and undertake a Chi-squared test (comparing actual vs predicted) to determine the most appropriate approach for allocating observer coverage in the SESSF; most recent year, five-year average, four-year weighted mean.

Action Item 6: Paul Burch
Paul Burch to provide an overview of discard estimates at the SESSFRAG 2020 Data meeting, with a particular focus on species with high discard rates, and species where state catches are influential (such as blue warehou).

Action Item 7: Paul Burch and David Stone
Paul Burch and David Stone to discuss how operators changing fishing methods are detected and then accounted for by changes in observer allocation.

7. SIDaC update

22. SESSFRAG noted the update provided by Natalie Couchman on the Southern Shark Industry Association's shark industry data collection program (SIDaC):
    a. The program has been running since late 2018 and includes sampling over 18 strata including for gummy shark, school shark, pink ling, blue eye trevalla and ribaldo: with a focus on gummy and school shark.
    b. In 2019, across the strata (gear and zones), 81 per cent of total biological samples have been collected, however there is variation between strata, with some targets not being met. This is particularly the case where there has been no fishing. AFMA is looking at ways to support the SIDaC program to improve sampling in Tasmania.
    c. Where possible, targets are being met or exceeded particularly for gummy shark. Work is continuing with industry to develop arrangements with individual operators.

d. Due to management arrangements under the rebuilding strategy, obtaining school shark samples is difficult and it is not cost-effective to send samplers when small catches of school shark are landed in the absence of other fish. AFMA will continue to work with the SIDaC program on this issue.

23. SESSFRAG noted the following:
    a. At their February 2020 meeting, South East Management Advisory Committee (SEMAC) agreed to the formation of a sub-group of SEMAC to review management arrangements under the school shark rebuilding strategy, including the 5:1 gummy shark:school shark rule and release of live school sharks.
    b. The school shark TAC is 90 per cent caught and increased discarding is expected towards the end of the season.
    c. Dual length measurements of school and gummy sharks are needed for the assessment for each species to ensure the appropriateness of total length conversion factors.
    d. The electronic monitoring (EM) trial for obtaining lengths needs to be progressed (an EM analyst needed to review the footage) – this is particularly critical with the upcoming gummy shark assessment.

Action Item 8: AFMA
Natalie Couchman to discuss with the SIDaC program, the collection of dual length measurements for school and gummy sharks that are longer than 160cm total length, to enable new conversion factors to be established for these larger sharks.

Action Item 9: AFMA
Natalie Couchman to discuss with CSIRO on how to progress the approach of using electronic monitoring (EM) for the collection of length frequency data for sharks – discuss out of session if urgent or at the next RAG.

Action Item 10: CSIRO
CSIRO to provide an update to SESSFRAG on their work to automate the collection of fish lengths by EM.

8. Integrated Scientific Monitoring Program (ISMP) 2019 report and plan for 2020

24. Tamre Sarhan provided an overview of the ISMP for the 2019 calendar year:
    a. Sea-day targets were met in three of the four quarters for 2019.
    b. With the exception of eastern school whiting, biological targets for Tier 1 species were met. Species targets that were not met were due to low catches (when on board or in general).
    c. Targets for the Danish seine fleet in zone 60 were not met due to bad weather and fishing plan changes. Efforts are being made to build relationships with this sector to encourage better coverage. However, if targets continue to not be met in this area, it could affect the eastern school whiting assessment.
    d. GAB trawl targets have been mostly met (95 per cent for Bight redfish, 100 per cent of deepwater flathead) noting 2019 was a port sampling year.
    e. There may be difficulties to achieving sampling targets for some species in the western area of the Commonwealth Trawl Sector (CTS), given the low catches

and the lack of a qualified port sampler or observer to gather samples in Portland.

f. The large target of 500 samples of blue eye trevalla is to support sampling requirements under the close-kin project.
g. That the current situation with COVID-19 may affect the ability to achieve targets this year.

25. SESSFRAG noted the following with regards to the report:
    a. The intention is for sampling coverage to be representative of effort, however, over and under sampling of the plan still occurs.
    b. A model-based approach to estimate discards would not have the assumption of sampling in accordance with the plan, instead month or quarter could be used in the model to account for variable sampling (as per the discard estimation methodology project).
    c. The summaries of catch, discards and length by species at the back of the report are very useful as they give an indication why targets may not have been met.
26. SESSFRAG noted the following with regards to 2020 observer plan:
    a. The plan is based on the five-year average of effort, resulting in a decrease in sea-days for zone 10 and an increase in zones 30 and 40.
    b. Biological samples will be collected in line with the SESSF data plan and for species where additional data is requested (ocean jackets, king dory, frost fish and smooth oreodory).
    c. Sampling protocols include collection of data on non-target species, for example seabird observations. It was agreed this additional data collection could be included in the plan for clarity.
    d. Biological sampling targets for non-target species need to be reviewed, and could be included as 'secondary targets' collected on an opportunistic basis.
27. SESSFRAG recommended that the collection of maturity information for key species is considered when the plan is reviewed for 2021, particularly in light of the FRDC project 2019-010 *Revisiting biological parameters and information used in the assessment of Commonwealth fisheries: a reality check and work plan for future proofing*, which is considering the effect of the changing environment on species and how any change might impact assessment frameworks.

Action Item 11: AFMA
Tamre Sarhan to investigate the internal inconsistency in the data for silver warehou (west) that is in the size range.

Action Item 12: Discard Estimate Working Group
DEWG to consider the use of a model-based system to estimate discards that would not have the assumption of data collection in accordance with annual observer plans.

9. Re-designing the SESSF independent surveys

28. Dan Corrie introduced the agenda item and SESSFRAG noted the following:
    a. The Chair of the AFMA Research Committee (ARC) wrote to Cathy Dichmont in her capacity as SESSFRAG Chair regarding the ARC's decision not to support the Fishery Independent Survey (FIS) for the SESSF Commonwealth Trawl Sector, and requested that SESSFRAG consider a more practical and cost effective alternative to meet assessment requirements for key species.

b. At its February 2020 meeting, GABRAG noted concerns regarding the utility of the GAB FIS, particularly for Bight redfish.

29. SESSFRAG discussed the SESSF FIS:
    a. There may be alternative approaches to collecting independent data, including requiring vessels to undertake survey shots in addition to commercial shots as part of commercial fishing trips as it done in other jurisdictions, for example the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) exploratory fishing research designs.
    b. The re-analysis of the FIS showed that the current survey design, coupled with an improvement to the model process, is performing well for three key species. Conducting the independent survey more frequently may improve the outcomes of the FIS; however, there would be significant cost implications that make this option unviable.
    c. Issues affecting the SESSF are likely to be broader than just the fishery impacts, such as climate-driven impacts on water temperature and plankton productivity, for example.
    d. Work undertaken to date[4] has not shown a correlation between long-term environmental changes and changes in relative biomass estimates from the SESSF FIS. However, these effects are being investigated through a multi-disciplinary approach already being undertaken with the research vessel Investigator, which collects a range of data.
30. SESSFRAG discussed the GAB FIS:
    a. The FIS is well suited to the narrow depth-band fished in the GAB and was originally conducted over two months (in February and March).
    b. The 2019 Tier 1 assessment for Bight redfish showed poor model fits to the FIS abundance estimates, and favoured the increasing commercial catch per unit effort (CPUE) indices over the decreasing FIS indices. The scientific member on GABRAG urged caution, suggesting a similar divergence in signals was seen for eastern redfish, which is now managed under a stock rebuilding strategy.
    c. Until recently, the indices were relatively consistent. SESSFRAG suggested the indices may be impacted by a temporal shift in availability for Bight redfish, which unlike deepwater flathead are only available seasonally. The reason for the divergence needs to be investigated.
    d. If there is evidence to suggest the temporal availability of Bight redfish has changed, this could be addressed through changes to the survey design, which could be achieved without impacting the time series.
31. SESSFRAG recommended two working groups to be established:
    a. A strategic SESSF FIS working group, with the membership[5], objectives and terms of reference to be determined by the SESSFRAG members[6] out-of-session, to consider:
        i. the concerns outlined in the letter from the ARC;
        ii. industry based surveys in the context of this fishery; and

[4] From work undertaken by Fishwell and discussed by SESSFRAG at the 2019 SESSFRAG Chairs' meeting, and associated workshops, see: www.afma.govcms.gov.au/sites/default/files/sessfrag_february_2019_meeting_minutes.pdf
[5] Include from CSIRO – Jemery Day, Miriana Sporcic, David Peel and Robin Thomson.
[6] Mike Steer not to participate due to potential conflicts of interest.

iii. new methods from both a stock assessment perspective and a long-term perspective.

b. A technical GABFIS working group, as requested by GABRAG, to consider:
   i. the outcomes from the GABFIS and its utility for Tier 1 assessments; and
   ii. possible changes to survey design to account for temporal shifts in availability.

Action Item 13: SESSFRAG members (bar SERAG Chair – Mike Steer)
SESSFRAG to establish a SESSF FIS working group to consider cost-effective alternatives to collecting fishery independent data. The first meeting of the working group should establish the data requirements for ongoing data collection programs, and propose possible solutions to SESSFRAG at the August SESSFRAG Data meeting 2020. SESSFRAG members to determine the membership, terms of reference and objectives of the group prior to the working group meeting.

Action Item 14: Cathy Dichmont (and AFMA)
SESSFRAG Chair to write to Brett McCallum, Chair of the ARC, outlining the RAG's approach to providing advice on cost-effective alternatives to collecting fishery independent data (see action item 13).

Action Item 15: GABRAG
GABRAG to establish a GABFIS technical working group to consider:
- the outcomes from the GABFIS and its utility for Tier 1 assessments
- possible changes to survey design to account for any temporal shifts in availability.

Information to be provided to SESSFRAG at the SESSFRAG Chairs meeting 2021.

10. 2021-22 research statements and assessment schedule

32. SESSFRAG:
    a. noted *SESSF Five Year Strategic Research Plan 2016-20* provides the framework for determining research in the SESSF and the GAB.
    b. focussed their discussion on items identified as new research under the SESSF 2021-22 Research Statement, including the assessment schedule
    c. agreed that priorities and feasibility would be assigned to the projects in both the SESSF and GAB annual research statements out-of-session.
33. SESSFRAG discussed the *SESSF Annual Research Statement 2021-22* (**Attachment 6** – updated sections are highlighted in yellow). Key points for each new identified research of 2021-22 included:

AFMA Research Committee (ARC) funded projects

Review SESSF catch history

a. The description of the scope of the project is to be reviewed to ensure that it contains the need to create a single source of catch data. The intention is to compare Neil Klaer's 'spreadsheet' with the information currently used in the assessments and identify discrepancies. The use of the Fishery Assessment Reports (FAR) to cross-verify will also provide confidence in the data where the information correlates. However, it is recognised that the catch histories in the FAR reports also are uncertain, and given their age, determining the derivation of the catch series may be difficult for some stocks.

b. Whilst it may be difficult to achieve a single verified source of catch data – as some historical information is not well documented and researchers have moved on – the feasibility was determined as high as this is a scoping study to establish the feasibility, scale and need for a larger project.

Non-extractive survey methodology for establishing eastern gemfish index of abundance

c. An earlier project showed that stereo cameras on nets are effective at sampling gemfish, including length frequencies and biomass estimates; this approach would be worth considering.
d. Whilst close kin methodology may provide a possible index of abundance, it was unclear whether the current close-kin proposal being considered by Fisheries Research and Development Corporation (FRDC) will include rebuilding species.

Action Item 16: Dan Corrie and Robin Thomson

AFMA to clarify whether the FRDC close-kin proposal (2020-21 financial year) includes rebuilding species.

Further investigation of factors (length/depth relationship) that influence length frequencies for all species and ISMP port sampling

e. The potential introduction of electronic monitoring in the trawl sector would have implications for collecting on-board biological samples under the ISMP program.
f. Initial work has been undertaken that has shown that there is a depth/length relationship for some species, which would mean port-based sampling is not appropriate. However, the relationship differs in magnitude for various species and other factors may also influence this including the fishery zone and gear type used by operators. The next stage is to determine other factors that also influence fish length. If other factors, such as time of year or gear type, influence length to a point where depth becomes less important then port sampling may be appropriate.

Analysis of Blue Grenadier acoustic survey data collected by industry in 2019 for inclusion in the 2021 Tier 1 stock assessment

g. Some factory vessels are equipped with gear that collects acoustic data. This data was collected as part of commercial fishing operations in 2019, however, the data has not been analysed. The collection of the data will likely continue in 2020.
h. Blue grenadier is due for a Tier 1 assessment in 2021. Any analysis of the acoustic survey data would need be undertaken prior to the next assessment in order for it to be incorporated.
i. The cost of doing so needs to be established, including the ability to incorporate these new data with the existing index of abundance or if a new series will be needed.

FRDC-funded Projects

Desktop study to determine herding behaviour for various SESSF species to inform future ERAs

j. The current ERA used the width of the net to calculate swept area. However, the effective swept area may be larger if trawl doors, sweeps and bridles are included, and this may have an influence on herding behaviour for different species or species groups. The next ERA is due in 2024.

34. SESSFRAG discussed the *GAB Trawl Sector Annual Research Statement 2021-22*, an updated statement is at **Attachment 7**. Key points for each new project included:

ARC projects

Shark mitigation options for GAB board trawlers to prevent capture of deepwater sharks

a. The upper slope dogfish closures in the east of the GAB overlap existing orange roughy grounds, and, in shallower areas, historical market fishing grounds.
b. GABT industry member have requested access to these closures as part of the review of the Upper Slope Dogfish Management Strategy (the Strategy).
c. At the February 2020 GABMAC meeting AFMA noted previous research on the east coast to develop a shark mitigation device, similar to a turtle exclusion device, had been trialled for the purpose of gaining access to historical royal red prawn grounds which are now closed under the Strategy.
d. A scoping trial showed positive results, but this was not progressed any further than a scoping study.
e. This research could also be included in a broader project Improving and promoting fish trawl selectivity in the SESSF and GAB (FRDC project 2019-027).

The effect of fuel prices on the Great Australian Bight Trawl Fishery Dynamics

f. SESSFRAG agreed that this project could be achieved as a low-cost desktop study, and is not something that would typically be considered by the ARC or FRDC. Instead SESSFRAG agreed to keep it on the research plan, but proposed that it be directly funded outside the normal research cycle.
g. Additionally, this project could be considered alongside other initiatives currently underway looking at the exposure/vulnerability of different fisheries to input prices.

FRDC Projects

Impacts of environmental factors and resource availability on GAB species

h. Industry are concerned with the apparent temporal shifts in deepwater flathead and Bight redfish availability and are interested in investigating the environmental drivers.
i. SESSFRAG noted:
    i. previous work undertaken by Fishwell Consulting found no correlation between availability or abundance estimates from the CTS FIS and environmental drivers.

ii. whilst temperature and depth sensors are used during the FIS (12 years of data), this is spatially and temporally sparse, and most analyses of long-term environmental changes in temperature use an extrapolation of surface temperature data.
iii. that GABRAG have an action for GABIA and AFMA to investigate installing temperature loggers on the boats to collect data while fishing, and a person from IMOS to attend the next GABRAG meeting to provide an overview of available environmental data in the GAB.

j. SESSFRAG agreed that this project could be undertaken when further information was available.

35. The stock assessment schedule was updated during the meeting and is at **Attachment 8**. Key points included:

Blue eye trevalla

a. Blue eye trevalla are currently scheduled for Tier 4 (slope) and Tier 5 (seamounts) assessments in 2021. However, recognising uncertainty in the Tier 4 stock assessment and industry concerns around low catch rates up to January 2020, SEMAC recommended SESSFRAG (in the August 2020 meeting) consider fishery indicator data and either:
   i. consider an alternative approach to assessing the slope stock in 2021 and applying a precautionary reduction to the TAC for the 2021-22 SESSF season; or
   ii. bring the assessment forward to 2020, and if the Tier 4 assessment is to be applied again, SERAG should consider application of the 15 per cent discount factor.

Eastern Gemfish

b. SESSFRAG agreed for this assessment to be postponed to 2021 due to lack of data driven by avoidance behaviours by operators and low catches. As a rebuilding species, eastern gemfish should be considered a candidate for establishing an alternative index of abundance, potentially under a close-kin approach.

Orange roughy east

c. The previous assessment was contentious with regards to which value of natural mortality (M) is used, and the preference was not to review the assessment until CSIRO had attended a Natural Mortality Workshop in Seattle in March 2020. This workshop has been postponed because of COVID-19.
d. The RAG noted concern from some invited participants regarding the risk of shifting the timing of the assessment as the assessment is highly uncertain. However the RAG members felt that on balance the risk was acceptable due to the species being long-lived and the assessment is only being delayed by a year. Despite the RAG agreeing that the risk was acceptable, one invited participant continued to disagree with any changes to the scheduling.
e. SESSFRAG agreed to delay the assessment to 2021 to ensure that M can be considered properly. If the workshop does not go ahead in 2020-21, the assessment should go ahead and advice should be sought from the relevant

experts to gain clear and objective advice regarding M, and SERAG should be involved in that process.

Redfish

f. SESSFRAG agreed to undertake the assessment in 2020 subject to SESSFRAGs review of data in August 2020.
g. SESSFRAG noted:
    i. The paucity of data arising from low catch; without new data, there is little benefit to undertaking a new Tier 1 assessment, or even updating the previous assessment.
    ii. This is an issue for most rebuilding species, and a targeted approach to collecting data or establishing alternative abundance indices is critical to inform rebuilding strategies.
    iii. Changes in the tiger flathead TAC has affected redfish catch, as such it may be possible that a companion analysis of tiger flathead and redfish could provide a basis for standardisation with respect to the CPUE (noting that industry are improving their ability to avoid catching the species).
    iv. To obtain more meaningful results, more recent data will need to be used for future assessments.

School shark

h. The assessment of this species is unlikely to be undertaken before the end of 2020 to enable a review of the previous assessment to be completed first. Currently, it is expected two reviews will be undertaken, one funded by AFMA and another by FRDC. SharkRAG will convene shortly to consider the terms of reference for the AFMA review.
i. The delay in the assessment will also enable further data collection and ageing work to be undertaken.

School whiting

j. An independent review of the Tier 1 assessment is expected to be undertaken, as recommended by SERAG, prior to the assessment later in 2020.

36. SESSFRAG expressed that scheduling of assessments are recommended by them for scientific or technical reasons only, and do not take into account financial or budgeting considerations.

Action Item 17: Ian Knuckey
Ian Knuckey to provide the report from the gemfish study which used stereo video cameras on the net to estimate abundance to the executive officer who will then distribute to SESSFRAG.

Action Item 18: AFMA/SESSFRAG
AFMA to propose the priority and feasibility of new research identified in the SESSF 2021-22 research plan and provide to SESSFRAG for consideration out-of-session.

Action Item 19: CSIRO
Check with Dr Tim Ryan whether the acoustic data collected by factory freezer vessels on the winter blue grenadier aggregation in 2019 can be calibrated to complement the

existing index of abundance, or whether it would constitute a new relative index of abundance.

Action Item 20: AFMA
AFMA to contact Matt Brodhurst of NSW DPI to explore the possibilities of incorporating the project s*hark mitigation options for GAB board trawlers to prevent capture of deepwater sharks* into the broader bycatch project he is leading (FRDC 2019-027).

Action Item 21: SERAG
The CAPAM Natural Mortality (M) workshop in Seattle has been delayed until late 2021, as such SERAG to seek advice from relevant experts on the use of M for orange roughy prior to the orange roughy eastern Tier 1 assessment, scheduled for 2021.
Include an agenda item on the SERAG #1 meeting for 2020 to discuss M, and consider the best approach to the assessment, particularly if the CAPAM workshop does not proceed.

Action Item 22: AFMA / CSIRO
AFMA to ask CSIRO for written advice on the possibility of undertaking a companion analysis between redfish and tiger flathead to provide a basis for redfish CPUE standardisation.

11. Dates for the data meeting

37. SESSFRAG agreed to hold the SESSFRAG Data 2020 meeting on 25-26 August 2020 in Hobart subject to COVID-19 circumstances.

12. Other Business

38. SESSFRAG noted that the finalisation of the five-year reviews of the orange roughy and blue warehou rebuilding strategies have been postponed until later in the year.
39. The meeting finished at 5.25pm (AEDT).

Attachments

1) Declared conflicts of interest
2) Final adopted agenda
3) Status of previous Action Items
4) Actions arising from SESSFRAG Chairs' meeting 2020
5) SESSF Harvest Strategy Framework
6) SESSF Annual Research Statement 2021-22
7) GAB Trawl Sector Annual Research Statement 2021-22
8) SESSF stock assessment schedule

Declared Conflicts of Interest

Participant	Declared interest
Members	
Dr Cathy Dichmont (Chair)	Director of Cathy Dichmont Consulting. Contracted by various state and Commonwealth agencies to undertake various reviews and consultancies not related to SESSF. No pecuniary interest in the SESSF.
Ms Fiona Hill	Employed by AFMA, Senior Manager of Demersal and Midwater Fisheries. No interest, pecuniary or otherwise.
Dr Sarah Jennings	Economics coordinator, FRDC Human Dimensions Research Subprogram Adjunct Senior Researcher, TSBE and casual employee IMAS University of Tasmania. Economics member of SERAG Economic member of SEMAC Member of AFMA EWG Independent economics consultant with occasional interest in projects of relevance to AFMA and/or Commonwealth fisheries (currently FRDC 2017-210 National fisheries and aquaculture industry social and economic contributions study: Phase 1) No pecuniary or other interest in the SESSF.
Mr Lance Lloyd	GABRAG Chair. Member of GABMAC and SESSFRAG. Board Member, AwF – Aquaculture without Frontiers (Australia) Director; Lloyd Environmental Pty Ltd. Research Fellow; Federation University Australia No pecuniary interest.
Mr Sandy Morison	Director of Morison Aquatic Sciences. Chair of SharkRAG Contracted by government departments, non-government agencies and companies for a range of fishery related matters including research and for MSC assessments of AFMA managed and other Australian and international fisheries. No pecuniary or other interest in the SESSF.
Dr Michael Steer	A/g Research Director Aquatic Sciences (Finfish Fisheries) Chair of SERAG Member of SEMAC Member of Commercial Marine Scalefish Fishery Reform Advisory Committee (SA) Member of Marine Scalefish Fishery Management Advisory Group (SA) Member of Charter Boat Management Plan Advisory Group (SA) No pecuniary interest in the SESSF.
Executive Officer	
Ms Cate Coddington	Employed by AFMA, Executive Officer of SESSFRAG. No interest, pecuniary or otherwise.
Invited Participants	
Dr Paul Burch	Employed by CSIRO, assessment scientist. Acquiring funding for research purposes. PI on data services contract.

Participant	Declared interest
Dr Jemery Day	CSIRO, assessment scientist. Acquiring funding for research purposes Scientific member of the Sub-Antarctic Resource Assessment Group (SARAG) Interests in promoting good science.
Dr Ian Knuckey	**Positions:** Director – Fishwell Consulting Pty Ltd Director – Olrac Australia (Electronic logbooks) Deputy Chair – Victorian Marine and Coastal Council Chair / Director – Australian Seafood Co-products (seafood waste) Chair – Northern Prawn Fishery Resource Assessment Group Chair – Tropical Rock Lobster Resource Assessment Group Chair – Victorian Rock Lobster and Giant Crab Assessment Group Chair – Victorian Central Zone Abalone Fisheries Resource Advisory Group Chair – Gulf of St Vincent's Prawn Fishery MAC Research Scientific Committee Scientific Member – Northern Prawn Management Advisory Committee Scientific Member – SESSF Shark Resource Assessment Group Scientific Member – SESSF Great Australian Bight Resource Assessment Group Scientific Member – Gulf of St Vincent Prawn Fishery Management Advisory Committee Scientific Member – Tropical Tuna Resource Assessment Group Scientific Member – SESSF Resource Assessment Group **Current projects:** AFMA 2020/0807 – Bass Strait Scallop Fishery Survey – 2020-22 FRDC 2017/069 – Indigenous Capacity Building FRDC 2016/116 – 5-year RD&E Plan for NT fisheries and aquaculture Traffic Project – Shark Product Traceability FRDC 2018/021 – Development and evaluation of SESSF multi-species harvest strategies FRDC 2017/014 – Informing structural reform of South Australia's Marine Scalefish Fishery NT Fisheries – Design and implementation of a tropical snapper trawl survey Sea Cucumber Ass. – Design and implementation of a sea cucumber dive survey Information to support non-detrimental finding of fisheries for Black Teatfish and White Teatfish FRDC 2019-072 – A survey to detect change in Danish Seine catch rates of Flathead and School Whiting resulting from CGG seismic exploration. FRDC 2019-129 – Potential transition of shark gillnet boats to longline fishing in Bass Strait - ecological, cross-sectoral, and economic implications Australia Bay – Information to support Wildlife Trade Operation for the Queensland Gulf of Carpentaria Developmental Fin Fish Trawl Fishery
Mr Kyne Krusic-Golub	Director at Fish Ageing Services Fish Ageing Services is contracted to undertake fish ageing for the SESSF. Kyne Krusic-Golub has no pecuniary interest within the fishery other than the potential for obtaining future funding for research or service provision.
Dr Andrew Penney	Director of Pisces Australis Pty Ltd, an Australian registered marine and coastal research and management consultancy based in Canberra. As such, I have an interest in any opportunities in this regard. Principal Investigator on FRDC Project No 2017-180: Design and implementation of an Australian National Bycatch Report: Phase 1 - Scoping Scientific Member of AFMA Tropical Rock Lobster RAG and Small Pelagic Fishery Scientific Panel Member of the AFMA ERA Technical Working Group.

Participant	Declared interest
	No shareholding and hold no positions relating to any other companies, including any fishing companies or industry associations
Dr Miriana Sporcic	Employed by CSIRO, Assessment scientist. Acquiring funding for research purposes
Mr David Stone	Executive Officer for Sustainable Shark Fishing Industry Inc. Declared interests in representing hook and gillnet industry member interests. Declared interest in RBCs
Dr Robin Thomson	Employed by CSIRO, Assessment scientist. Acquiring funding for research purposes PI on close kin projects for school shark and blue-eye trevalla
Dr Geoff Tuck	Employed by CSIRO. Involved in Stock assessments. Interest in obtaining funding for future research. Principle investigator on the SESSF stock assessment project.
Presenters	
Mr Dan Corrie	Employed by AFMA, South East Trawl, GAB, Scallop and Squid Manager. No interests, pecuniary or otherwise.
Ms Natalie Couchman	Employed by AFMA, Gillnet, Hook and Trap, High Seas and Norfolk Is Manager. No interest, pecuniary or otherwise.
Mr Tamre Sarhan	Employed by AFMA. No interest, pecuniary or otherwise.
Observers	
Dr Geoff Liggins	Cross-jurisdictional research and management interests for DPI NSW, no pecuniary interests.
Dr Malcolm Haddon	CSIRO Honorary Fellow Adjunct Professor at IMAS in the University of Tasmania Involved in two Fisheries Research and Development Corporation (FRDC) projects working on abalone. Chair of the Sub-Antarctic Resource Assessment Group No pecuniary interest in any Commonwealth or non-Commonwealth fisheries
Mr James Woodhams	Employed by ABARES. No interest, pecuniary or otherwise.

Attachment 2

Adopted Agenda

Agenda item	*Purpose*
3. Declarations of interest	For action
Acknowledgement of country	
1. Welcome and apologies	For information
2. Adoption of Agenda	For action
3. Declarations of interest	For action
4. Action Items status	For information
5. Review of TAC setting process 2020-21	For discussion
6. Discard estimation methodology	For discussion
7. SIDaC update	For information
8. Integrated Scientific Monitoring Program (ISMP) 2019 report and plan for 2020	For information
9. Re-designing the SESSF Independent Survey	For advice
10. 2021-22 Research Statement and assessment schedule	For recommendation
11. Dates for the Data 2020 meeting	For decision
12. Other business • Rebuilding strategy updates– blue warehou and orange roughy	

Status of Previous Action Items

Complete/Redundant	Underway	Need SESSF RAG advice	Not yet started

No.	Ag. Itm / Mtg Date	Action Item	Agency / Person	Timeframe	Progress as of SESSFRAG Chairs' meeting 2020
1	4 SESSFRAG Chairs' 2019	AFMA to consider adding data from NSW, Malcolm Haddon and Victoria and provide a revised blue-eye trevalla history report to SESSFRAG in August 2019.	AFMA	SESSFRAG Data meeting 2020	Pending – AFMA has considered this and information will be incorporated into the blue-eye trevalla history report in time for consideration for the next stock assessment.
4	4 SESSFRAG Chairs' 2019	AFMA to obtain and include in its database the following data sets: • Great Australian Bight (GAB) and South East Trawl Fishery Independent Surveys • crew collected data (incl. GABT and the GHAT) • historic blue warehou industry collected data	AFMA	As soon as practicable	Underway: FIS collected data – Complete – added into the database. Crew collected data – Complete – all data up to June 2019 has been entered into the database. AFMA is investigating ways on ensuring the data is directly entered as collected. SIDaC data is now in the database. Blue warehou data – Underway - AFMA to follow up.
10	9 SESSFRAG Chairs' 2019	Include the Fishery Management Strategy as an agenda item at the next SESSFRAG meeting	AFMA	SESSFRAG data meeting 2019	Underway – Drafting is underway but still in the early stages. AFMA to provide an update when this has progressed further.
11	10 SESSFRAG Chairs' 2019	NSW DPI to provide their *Multi-criteria Decision Matrix* for prioritising research and monitoring needs to AFMA. AFMA and NSW DPI to discuss further and provide an	Karina Hall – NSW DPI / George Day	SESSFRAG Chairs' meeting	Underway - NSW DPI provided the draft species prioritisation for NSW fisheries resource assessment to AFMA on 3 April 2019, when it is finalised it will be

		update to the SESSFRAG 2020 Chairs' Meeting.	– AFMA	2020	provided to SESSFRAG for discussion at the next meeting.
17	11 SESSFRAG Chairs' 2019	The Economic Working Group to assess the potential value of the dollars per unit of effort metric as an index. If there is potential, ensure it is considered as part of the FRDC *considering metrics for measuring economic efficiency and productivity in fisheries* project.	Economic Working Group / AFMA	EWG meeting April 2019	Completed –Terms of trade is regarded as a more suitable indicator than that of revenue per unit effort ($PUE) as terms of trade covers both revenue and cost side of a specific fishery. Terms of trade index data is available for CTS and GHT fisheries in the ABARES report.
21	15 SESSFRAG Chairs' 2019	AFMA and CSIRO to develop a detailed project proposal for a comparison of GHAT EM and observer data for submission to the ARC / ABARES.	AFMA and CSIRO	September 2019	Underway – SharkRAG to consider this item at their next meeting as there is very limited overlap between observers and EM data so the feasibility of project should be re-considered. Scope should be revised to look at available data sources and collection techniques (EM and industry).
24	15 SESSFRAG Chairs' 2019	Review, and include, the costs of the stock assessments in the SESSF Research Plan, to allow for an estimate of annual cost in the scheduling table.	AFMA and CSIRO	Data working group meeting	Complete - It is not appropriate to include the costs in the scheduling table of the research plan, however the costs will be provided to SESSFRAG to enable costs consideration when making recommendations.
25	15 SESSFRAG Chairs' 2019	Mr Morison to provide AFMA with the 2004 South East Fishery: Fishery Assessment Report for conversion into a datasheet.	Mr Morison	As soon as practicable	Complete – Mr Morison provided this and it was provided to SESSFRAG in May 2019. Conversion to a datasheet dependent on if the project *Review SESSF catch history* goes ahead.
26	15 SESSFRAG Chairs' 2019	Data exclusion to investigate the effect of biennial sampling to be undertaken during the next gummy shark assessment to determine the impact of biennial data collection by removing every second year of length and age data.	CSIRO – Robin Thomson	During the gummy shark assessment in 2020	Pending – awaiting assessment
1	4 SESSFRAG Data 2019	AFMA to provide a copy of Malcolm Haddon's CPUE standardisation report (FRDC 2012/201: '*Improve catch rate standardizations to account for changing in targeting*') to SESSFRAG.	AFMA	As soon as practicable	Complete – provided on 21 November 2019
2	4 SESSFRAG Data 2019	Include an agenda item on CPUE standardisation at the Chairs' meeting 2020, include a presentation from Malcolm Haddon, noting that much of his work has already been implemented. Presentation to focus on clear guidelines on what can be implemented rather than instigate further CPUE analysis.	AFMA	SESSFRAG Chairs' meeting 2020	Pending – deferred to the SESSFRAG data meeting
3	6	Simon Boag to provide the Terms of Reference (ToR) for	Simon Boag /	As soon as	Complete

	SESSFRAG Data 2019	the review of the school shark stock assessment to AFMA (Cate Coddington) who will circulate them to SESSFRAG. Chairs to determine if the ToRs should be circulated to their members.	AFMA	practicable	
4	6 SESSFRAG Data 2019	AFMA to seek advice from the EWG about which KPIs are being adopted and what data are to be collected and presented. Following this, add an information item to the 2020 SESSFRAG Chairs' meeting agenda regarding economic KPIs.	AFMA / Sarah Jennings	SESSFRAG Chairs' meeting 2020	Pending - Paper to be provided to the next EWG, date to be confirmed
5	7 SESSFRAG Data 2019	The bSAFE2 results and updated methodology to be taken to the individual SESSF resource assessment groups for consideration	SERAG / SharkRAG / GABRAG	Next relevant RAG meeting	Underway Complete – SERAG and GABRAG have considered the results Pending – SharkRAG will consider at their next meeting
6	7 SESSFRAG Data 2019	SERAG to review the downgrading of risk scores for whitefin swellshark from high risk (bSAFE) to low risk (bSAFE2) noting it was recently added to the IUCN red list as a critically endangered species	SERAG	October 2019 SERAG meeting	Complete – SERAG were comfortable with the downgraded risk under bSAFE2 for whitefin swellshark as it reflects the risk in Australia. The RAG was comfortable as there are sufficient management measures in place; such that closures and low effort represent little risk to the species
7	7 SESSFRAG Data 2019	Consider a review, possibly desktop study, to be included in the SESSF research plan to determine which species, or species classes, are subject to herding behaviour and how this could be incorporated into the next ERA assessments to account for trawl sweeps and boards	AFMA	As soon as practicable	Complete – added into the research plan and the priority will be considered annually, the next ERA is due in 2024.
8	8 SESSFRAG Data 2019	AFMA to further develop the questions in the annual ERA trigger checklist to ensure they are not overly restrictive and inform discussion about the need to undertake a reassessment of the ERA. The updated checklist to be provided to the 2020 SESSFRAG Chairs' meeting	AFMA	SESSFRAG Chairs' meeting 2020	Pending – deferred to the SESSFRAG data meeting
9	9a SESSFRAG Data 2019	A standing item to be included on individual SESSF RAG agendas to consider the reason for any differences between RAG recommendations and Commission TAC determinations.	SERAG / GABRAG / SharkRAG	SERAG / GABRAG / SharkRAG meetings that follow the March	Complete - EOs notified and a standing item will be included on the agendas

				Commission meetings (i.e. that determine SESSF TACs)	
10	11 SESSFRAG Data 2019	Kyne Krusic-Golub and Geoff Tuck to check how the FIS length/age data was incorporated into the last bight redfish assessment by Malcolm Haddon.	Kyne Krusic-Golub and Geoff Tuck	As soon as practicable	Complete – age length data was incorporated in the bight redfish assessment and discussed at GABRAG and GABMAC.
11	11 SESSFRAG Data 2019	Kyne Krusic-Golub and Robin Thomson to develop an ageing plan for 2019-20, particularly with respect to tier 1 species, including pink ling and gummy shark, recognising time and budgeting constraints.	Kyne Krusic-Golub and Robin Thomson	As soon as practicable	Complete - All the major species have been identified and ranked by priority for ageing. The final numbers of samples and the number of species that can be aged during 2019-20 will be dependent on the number of shark vertebrae selected for ageing.
12	12 SESSFRAG Data 2019	AFMA to work with the e-log providers to enable the skipper to identify the e-log shot number and provide it to the SIDaC port-sampler.	AFMA	As soon as practicable	Underway – AFMA is setting up a process to provide this data to the SIDaC Program Manager via email.
13	12 SESSFRAG Data 2019	Seek advice from SERAG/SharkRAG to update the SIDaC data collection plan to include: • tissue samples of blue eye trevalla for CSIRO close-kin work along with otoliths for ageing by FAS (SERAG). • 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 (SharkRAG) • collection of gummy and school shark samples from automatic longline vessels (SharkRAG).	AFMA / SSIA	October 2019 SERAG meeting / November 2019 SharkRAG meeting	Underway SERAG item – Complete SharkRAG items - Pending - to be considered at the next SharkRAG meeting
14	13 SESSFRAG Data 2019	Paul Burch and Roy Deng to consider including “zeros” into the histograms of observed discards for each species in the discard report.	CSIRO	As soon as practicable	Complete – zeros were included in the updated ISMP discard report provided to SERAG#2
15	13 SESSFRAG Data 2019	Include squid, latchet and ocean jacket, as well as frostfish and king dory, in future SESSF catch and discard for TAC purposes reports.	CSIRO	Before the next catch and discard	Underway - requires a reasonably large amount of pre-processing of the discard data and is not practical to do this year. Those additional species will be

				report	included in the Catch and ISMP Discard reports for the SESSFRAG Data Meeting in August 2020
16	13 SESSFRAG Data 2019	Dan Corrie and CSIRO to consider the need for including species catch composition information in future catch and discard reports or as a separate report, noting potential requirements under the MSHS approach.	AFMA / CSIRO	Prior the SESSFRAG Chairs' meeting 2020	Underway – Species catch composition information can be included as a new report or included in one of the existing reports. This will be discussed during the next data contract development.
17	13 SESSFRAG Data 2019	To ensure logbook data used to estimate deepwater shark discard rates are appropriate: • Paul Burch and Roy Deng to double check the deepwater shark discard rate estimates and CVs. • Shijie Zhou to ensure the deepwater shark strata definitions are correct.	CSIRO	As soon as practicable / prior to the deepwater shark assessment	Underway – the deepwater shark strata and discard estimates will be reviewed for the August SESSFRAG data meeting.
18	13 SESSFRAG Data 2019	Establish a discard estimate working group to consider improvements to the current discard calculation method —an agenda item to be included on the SERAG (October) and then SESSFRAG (March). The working group to: • consider more stringent criteria, including CVs, for determining when a discard rate is accepted/rejected. Consider rejecting estimates when three or less shots are observed in a stratum • resolve whether a model-based approach should be used to estimate discard rates into the future given the lower observer coverage across the fishery.	Robin Thomson, Ian Knuckey, George Day, Mike Steer, Paul Burch and Roy Deng (Dan Corrie)	SERAG (October 2019) SESSFRAG (March 2020)	Underway – Paul Burch provided an update on the work undertaken to date during Agenda Item 6.
19	13 SESSFRAG Data 2019	CSIRO to include total tonnage of discards in the discard distribution maps in future discard reports.	CSIRO	Prior to the SESSFRAG Data meeting 2020	Pending –this will be added to the 2020 discard report
20	14 SESSFRAG Data 2019	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	Pending - Will be taken to next SharkRAG.

21	14 SESSFRAG Data 2019	Evaluate options for collecting on-board length data for retained and discarded sharks, noting the preference for non-lethal sampling techniques.	Simon Boag / AFMA (Brodie)	SESSFRAG Chairs' meeting 2020	Redundant – relates to action item 20.
22	15 SESSFRAG Data 2019	Paul Burch to confirm that the deepwater flathead assessment uses data from zone 80 only. Geoff Tuck to perform a sensitivity in the assessment to adding the catches from zone 50.	CSIRO	As soon as practicable / prior to the deepwater flathead assessment	Complete - the last Deepwater flathead assessment only used catches reported against the quota in the GAB (which is just from zone 80).
23	15 SESSFRAG Data 2019	Ensure that length and age information from the GAB Danish vessel is collected (ISMP and crew collected) to ensure that Danish seine can be treated as a separate fleet in future deepwater flathead stock assessments (noting this method accounts for about 10 per cent of the catch and has been increasing).	AFMA / GABRAG	As soon as practicable	Underway – this was discussed at the GABRAG January 2020 meeting. There is an action item for AFMA and GABIA to speak to the operator about collecting data in the future.
24	15 SESSFRAG Data 2019	As part of the work required under action item 18, consider whether the 2017 discard rate for mirror dory east (2% and CV of 52%) should be used instead of the 2018 estimate (12% and CV of 188%).	Discard estimate working group	October 2019	Complete – the group agreed to use the 2017 estimate – the CV of 188 is too big and the 2017 was more reliable.
25	15 SESSFRAG Data 2019	For the 2019 flathead assessment, CSIRO to undertake a sensitivity test to include/exclude tiger flathead catches in the western zones. CPUE standardisation and current base case to remain the same.	CSIRO	SESSFRAG Chairs' meeting 2020	Complete – CSIRO have undertaken a sensitivity test, the outcomes were presented at the September 2019 SERAG meeting.
26	15 SESSFRAG Data 2019	For tier 5 species – including deepwater shark west – an annual effort over time plot to be included in the report enable the fishing trend to be considered. The effort plot is to be compared with a plot of CPUE in the CPUE standardisation report.	CSIRO	for the 2020 SESSFRAG data meeting	Pending – CSIRO considering this as part of the 2020 standardisation report.
27	15 SESSFRAG Data 2019	Tamre Sarhan to check observer data relating to anomalously large overall size for John dory in 2018.	AFMA	As soon as practicable	Complete – It is likely that the length classes for John Dory are skewed to the larger size for 2018 as there were no samples were taken in zone 10 (this zone has smaller fish).
28	15 SESSFRAG Data 2019	Simon Boag to provide Cate Coddington with the details of the sunken vessel that sank in the royal red prawn fishing grounds approximately 18 months ago for incorporation into the SESSF history document.	Simon Boag / AFMA	November 2019	Complete – history document updated and uploaded to the website.

29	15 SESSFRAG Data 2019	Cathy Dichmont, as Chair on behalf of the RAG, to send a strong letter to the AFMA Commission highlighting the issue of increasing catch of school whiting by NSW. Noting that the issue is relevant for other shared stocks, the letter should focus on catch and cost sharing arrangements, the impact on Commonwealth SFR holders, and the potential impact on the stock of exceeding the RBC. George Day and Dan Corrie to provide a draft for the Chair to consider: members to be provided with a copy.	Cathy Dichmont (Chair)	November 2019 Commission meeting	Redundant - AFMA has given due consideration to this issue and continues to work with NSW on catch sharing arrangements.
30	15 SESSFRAG Data 2019	AFMA to write to Natalie Moltschaniwskyj at NSW DPI regarding involvement in the Tier 4 stock assessment for silver trevally. It is likely that Ash Fowler (NSW DPI) will also be interested in being involved.	AFMA	November 2019	Pending – this action will be raised during broader discussions with NSW.
31	15 SESSFRAG Data 2019	SERAG to consider including a non-extractive (e.g. open trawl net with underwater camera) survey in the 2021-22 SESSF research statement to establish an index of abundance for eastern gemfish.	SERAG	December 2019 SERAG meeting	Complete - SERAG agreed to include in the SESSF 2021-22 research plan but prioritisation and consideration of costs was deferred to SESSFRAG Chair's meeting 2020 - (these items were discussed Agenda Item 10 however the consideration of costs, priority and feasibility were deferred to be considered to out-of-session).
32	15 SESSFRAG Data 2019	SERAG to discuss options for undertaking a stock assessment of eastern gemfish in 2021 using outcomes from potential survey results.	SERAG	December 2019 SERAG meeting	Complete - SERAG noted that there seems to be some indication of stock rebuilding but not enough data for assessment, agreed to keep a watching brief for next 12 months. Could be an opportunity to develop a research plan or support a desktop study to develop index of abundance.
33	15 SESSFRAG Data 2019	SERAG and SharkRAG to consider the data for the remaining rebuilding species that were not discussed during the SESSFRAG data meeting.	SERAG / SharkRAG	October & December 2019 SERAG meetings / November 2019 SharkRAG meeting	Underway Complete – SERAG considered the data for blue warehou and redfish at their meetings in October and December. Pending – SharkRAG – will consider the relevant data needed at their next meeting. Noting that a SEMAC subgroup will convene to discuss effective management arrangements in place under the strategy and a review of the stock assessment.

34	15 SESSFRAG Data 2019	Dan Corrie to check that vessels with suspicious minimum and maximum depth records are accurately recording depth and not using default records in e-log software.	AFMA	As soon as practicable	Complete – operator is looking into the issue.
35	16 SESSFRAG Data 2019	Kyne Krusic-Golub to: • contact Rudy Kloser/CSIRO to determine the number of orange roughy otoliths collected during the AOS survey and • provide the SESSFRAG details on ISMP collected orange roughy samples.	Fish Ageing Services	As soon as practicable	Complete - 839 samples were collected during the AOS survey. These were migrated to FAS for preparation and ageing. Count of Otolith / Column Labels Row Labels / Paddies / St Helens / (blank) / Grand Total N 824 846 1670 Y 391 448 839 (blank) Grand Total 1215 1294 2509
36	16 SESSFRAG Data 2019	Robin Thomson to finalise the cost of her school shark close kin update, accounting for the 500 aged samples per annum that is already funded by AFMA.	CSIRO	As soon as practicable	Complete
37	16 SESSFRAG Data 2019	SERAG to consider including whether species size-depth relationship applies to all areas, seasons, gears and/or combinations of those in the 2020-21-22 research plan, and if port sampling can be used for any of those factors.	SERAG	December 2019 SERAG meeting	Complete - discussed at SERAG 2, priority setting of research priorities was deferred to SESSFRAG Chair's meeting 2020.
38	17 SESSFRAG Data 2019	AFMA to undertake out-of-session work on the monitoring and data collection scenario options and provide to SEMAC, ensuring; • consultation with SESSFRAG prior to providing to the SEMAC • Consideration of the relative advantages and disadvantages of monitoring and data collection methods • Refinement of the *relative advantages and disadvantages of monitoring and data collection methods* table to capture the collective benefits across methods and a matrix of supplementary and complementary factors. • potential creation of a Venn diagram to illustrate the connections between the methods.	AFMA / SESSFRAG / SEMAC	February 2020 SEMAC meeting	For discussion This item might be appropriately be marked as redundant as cost savings are considered by AFMA on an annual basis. Additionally SESSFRAG have stated that financial or budgeting considerations are not taken into account in scheduling consideration only scientific or technical reasons are considered.
39	17 SESSFRAG Data 2019	AFMA to investigate the potential of achieving cost saving from activities including: extending the scheduling of certain assessments, sharing costs of assessments with other jurisdictions, implementing the CSIRO tables within the Data warehouse, lessening cost recovery from	AFMA	SESSFRAG Chairs' meeting 2020	For discussion This item might be appropriately be marked as redundant as cost savings are considered by AFMA on an annual basis. Additionally SESSFRAG have stated that financial or budgeting considerations are

		industry and changing the scheduling of observers.			not taken into account in scheduling consideration only scientific or technical reasons are considered.
40	18 SESSFRAG Data 2019	SESSFRAG to discuss chapters from *incorporating the effect of marine spatial closure in risk assessments and fisheries stock assessments* not covered by the presentation at SESSFRAG Data meeting 2019, including Miriana Sporcic to present the chapter about the *simulation study on the effect of CPUE resource standardisation with and without marine closures*.	SESSFRAG / Miriana Sporcic	SESSFRAG Chairs' meeting 2020	Underway - deferred to SESSFRAG data meeting
41	19 SESSFRAG Data 2019	SharkRAG to consider the value of undertaking the school shark survivability project.	SharkRAG	November 2019 SharkRAG meeting	Redundant – captured under action item 8, it was ranked as high priority.
42	19 SESSFRAG Data 2019	AFMA to update the logbooks to include 'live' status of released school sharks	AFMA	As soon as practicable	Underway – this action is being undertaken as part of the AFMA Agency Data Collection (which was presented to SEMAC). Updates to e-log software is currently underway and includes the ability to record life status for all species discarded. This is currently available for line fishing methods and is continuing to be rolled out for other fishing methods throughout 2020 (gillnet currently expected July 2020).
43	20 SESSFRAG Data 2019	AFMA to redraft Section 1.4 '*Publication of final assessments*' of the TAC setting process guidelines in relation to access to data and control files held by assessment providers and provide the updated section to SESSFRAG to consider.	AFMA	As soon as practicable	Complete – undertaken during the SESSFRAG Data meeting 2019.
44	20 SESSFRAG Data 2019	George Day and Cathy Dichmont to discuss the content of the flow diagrams in the draft TAC setting guidelines. The information contained in the flow diagrams to be included in the Harvest Strategy Framework, and taken back to SESSFRAG for consideration.	AFMA	As soon as practicable	Complete

Attachment 4

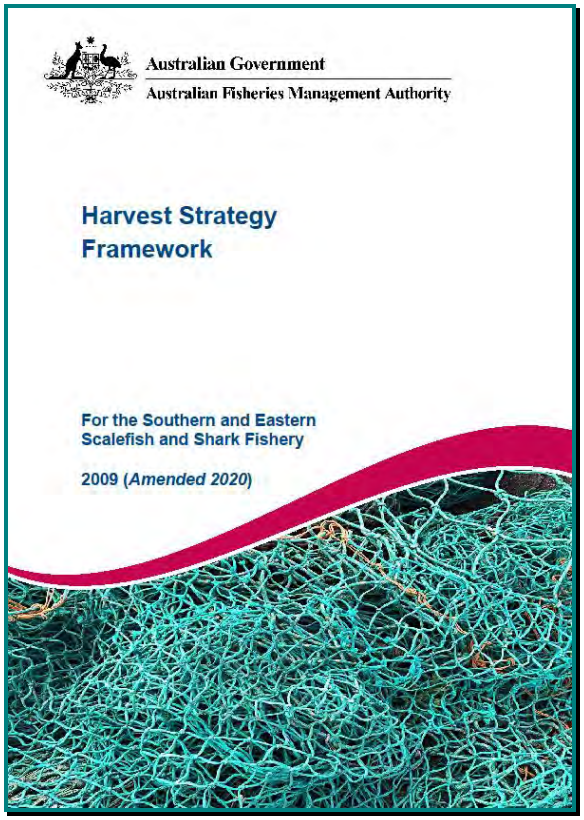
Actions arising from SESSFRAG Chairs' meeting 2020

No.	Ag Itm / Meeting	Action Item	Agency / Person	Timeframe
1	5 SESSFRAG Chairs' 2020	Ensure the SESSF Harvest Strategy Framework is updated to enable multispecies considerations rather just single species considerations where appropriate. Changes to the framework should ensure that the overarching high-level goal is to produce B_{MEY} for a fishery level goal and not be a full review of the framework, noting that the multi-species harvest strategy project is already undertaking this process.	Sarah Jennings, Ian Knuckey, Fiona Hill	
2	5 SESSFRAG Chairs' 2020	Establish a 'Tier 5 TAC setting working group' prior to SERAG 1 to develop harvest control rules for converting Tier 5 assessment outcomes into TACs, noting Tier 5 methods may be broader than those currently specified, and these methods may need different harvest control rules.	AFMA (Dan Corrie, Fiona Hill, Natalie Couchman), CSIRO (Geoff Tuck, Miriana Sporcic and Malcolm Haddon) and Industry (TBD)	
3	6 SESSFRAG Chairs' 2020	Paul Burch to compare the effect of both including and not including 'N/A's (no record of discarding) in the discard estimation methodology to determine the bias, and provide a summary in the next annual discard report, including the period to which the analysis applies.	Paul Burch	
4	6 SESSFRAG Chairs' 2020	Paul Burch to clarify whether 'N/A's are included in the method to estimate discards in Tier 1 assessments, and provide advice to SESSFRAG on the impact 'N/A's might have.	Paul Burch	
5	6 SESSFRAG Chairs' 2020	Determine whether assuming that there is 'no error in reporting of retained catch in logbooks' is a significant issue for estimating discards, and undertake a Chi-squared test (comparing actual vs predicted) to determine the most appropriate approach for allocating observer coverage in the SESSF; most recent year, five-year average, four-year weighted mean.	Paul Burch / Discard Estimate Working Group	
6	6 SESSFRAG Chairs' 2020	Paul Burch to provide an overview of discard estimates at the SESSFRAG 2020 Data meeting, with a particular focus on species with high discard rates, and species where state catches are influential (such as blue warehou).	Paul Burch	
7	6 SESSFRAG Chairs' 2020	Paul Burch and David Stone to discuss how operators changing fishing methods are detected and then accounted for by changes in observer allocation.	Paul Burch and David Stone	

No.	Ag Itm / Meeting	Action Item	Agency / Person	Timeframe
8	7 SESSFRAG Chairs' 2020	Natalie Couchman to discuss with the SIDaC program, the collection of dual length measurements for school and gummy sharks that are longer than 160cm total length, to enable new conversion factors to be established for these larger sharks.	AFMA	
9	7 SESSFRAG Chairs' 2020	Natalie Couchman to discuss with CSIRO on how to progress the approach of using electronic monitoring (EM) for the collection of length frequency data for sharks – discuss out of session if urgent or at the next RAG.	AFMA	
10	7 SESSFRAG Chairs' 2020	CSIRO to provide an update to SESSFRAG on their work to automate the collection of fish lengths by EM.	CSIRO	
11	8 SESSFRAG Chairs' 2020	Tamre Sarhan to investigate the internal inconsistency in the data for silver warehou (west) that is in the size range.	AFMA	
12	8 SESSFRAG Chairs' 2020	DEWG to consider the use of a model-based system to estimate discards that would not have the assumption of data collection in accordance with annual observer plans.	Discard Estimate Working Group	
13	9 SESSFRAG Chairs' 2020	SESSFRAG to establish a SESSF FIS working group to consider cost-effective alternatives to collecting fishery independent data. The first meeting of the working group should establish the data requirements for ongoing data collection programs, and propose possible solutions to SESSFRAG at the August SESSFRAG Data meeting 2020. SESSFRAG members to determine the membership, terms of reference and objectives of the group prior to the working group meeting.	SESSFRAG members (bar SERAG Chair – Mike Steer)	
14	9 SESSFRAG Chairs' 2020	SESSFRAG Chair to write to Brett McCallum, Chair of the ARC, outlining the RAG's approach to providing advice on cost-effective alternatives to collecting fishery independent data (see action item 13).	Cathy Dichmont (and AFMA)	
15	9 SESSFRAG Chairs' 2020	GABRAG to establish a GABFIS technical working group to consider: • the outcomes from the GABFIS and its utility for Tier 1 assessments • possible changes to survey design to account for any temporal shifts in availability. Information to be provided to SESSFRAG at the SESSFRAG Chairs meeting 2021.	GABRAG	
16	10 SESSFRAG Chairs' 2020	AFMA to clarify whether the FRDC close-kin proposal (2020-21 financial year) includes rebuilding species.	Dan Corrie and Robin Thomson	

No.	Ag Itm / Meeting	Action Item	Agency / Person	Timeframe
17	10 SESSFRAG Chairs' 2020	Ian Knuckey to provide the report from the gemfish study, which used stereo video cameras on the net to estimate abundance to the executive officer who will then distribute to SESSFRAG.	Ian Knuckey	
18	10 SESSFRAG Chairs' 2020	AFMA to propose the priority and feasibility of new research identified in the SESSF 2021-22 research plan and provide to SESSFRAG for consideration out-of-session.	SESSFRAG	
19	10 SESSFRAG Chairs' 2020	Check with Dr Tim Ryan whether the acoustic data collected by factory freezer vessels on the winter blue grenadier aggregation in 2019 can be calibrated to complement the existing index of abundance, or whether it would constitute a new relative index of abundance.	AFMA/CSIRO	
20	10 SESSFRAG Chairs' 2020	AFMA to contact Matt Brodhurst of NSW DPI to explore the possibilities of incorporating the project s*hark mitigation options for GAB board trawlers to prevent capture of deepwater sharks* into the broader bycatch project he is leading (FRDC 2019-027).	AFMA	
21	10 SESSFRAG Chairs' 2020	The CAPAM Natural Mortality (M) workshop in Seattle has been delayed until late 2021, as such SERAG to seek advice from relevant experts on the use of M for orange roughy prior to the orange roughy eastern Tier 1 assessment, scheduled for 2021. Include an agenda item on the SERAG #1 meeting for 2020 to discuss M, and consider the best approach to the assessment, particularly if the CAPAM workshop does not proceed.	SERAG	
22	10 SESSFRAG Chairs' 2020	AFMA to ask CSIRO for written advice regarding on the possibility of undertaking a companion analysis between redfish and tiger flathead to provide a basis for redfish CPUE standardisation.	AFMA / CSIRO	

SESSF Harvest Strategy Framework



Australian Government

Australian Fisheries Management Authority

Harvest Strategy Framework

For the Southern and Eastern Scalefish and Shark Fishery

2009 (*Amended 2020*)

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Version	Updates	Author	Date
Version 1.1 to 1.2	Drafting the Harvest Strategy Framework into template	Sharon Koh, Steve Auld	22 September 2009
Version 1.3	Redraft following outcomes of SESSFRAG meeting February 2011	Sharon Koh	July 2011
Version 2	Updates to web links and accessibility changes. Integration of GAB section, multi-year TACs, consistent application of discards and discount factor guidance. Removal of CPUE multiplier. Research needs, now included in the strategic research plan and the annual research plan, have been removed.	George Day	February 2014
Version 3	Providing for alternative TACs to those produced by the Tier 1 harvest control rule in defined circumstances. Removal of the small change limiting rule. Clarification of how to apply the discount factor. Documenting the limit placed on the Tier 3 harvest control rule multiplier as recommended by SESSFRAG in March 2013. Specifying the approach for setting TACs when the Recommended Biological Catch is 0. To provide guidance on ‘step down’ and ‘step up’ TACs.	George Day	February 2015
Version 4	Providing for alternative assessment methods in defined circumstances.	George Day	March 2017

Version	Updates	Author	Date
	Adopting a weighted average of state catch rather than a simple average for the purposes of TAC calculation.		
Version 5	Apply a weighted average of state catches to gummy shark as is the case for other SESSF species. Clarification of treatment of discards and state catch in Tier 4 assessments and RBC calculations. Review of GABT triggers at Appendix A.	George Day	March 2019
Version 6	To incorporate SESSFRAG agreed approaches into the SESSF Harvest Strategy Framework. Largely, the revisions will enable species assessments to be transitioned between tiers or where the current assessment tier does not work. In particular, where: • species have high discards • CPUE does not index biomass • tier 1 assessments are rejected, and TACs may be rolled over (subject to sustainability concerns) • regime shift/productivity change needs to be considered for some species.	Cate Coddington	March 2020

Table 1: Harvest Strategy Summary Table

Tier level (Species vary)	Reference Point/ Trigger Point	Reference Point function*	Information requirements to monitor Reference Point	Control Rule	Research priorities
Tier 1	B_{20}	Limit	Catch, effort, discards, age, length, relative abundance, biomass information from: - Logbook and catch landing records - ISMP - FIS	<B_{20}: No targeted fishing; rebuilding strategy will be developed	ISMP FIS
	B_{35}	HCR inflection	Same as above	<B_{35}: TACs are set at levels that allow stocks to rebuild to target levels	Same as above
	B_{48}	Target	Same as above	<B_{48}: Rebuild stocks towards B_{48} >B_{48}: At or above target, fish at F_{48}.	Same as above
Tier 3	F_{20}	Limit	Catch, discards, age, length information from:	<F_{20}: No targeted fishing, rebuilding	ISMP

Tier level (Species vary)	Reference Point/ Trigger Point	Reference Point function*	Information requirements to monitor Reference Point	Control Rule	Research priorities
			- Logbook and catch landing records - ISMP	strategy will be developed	
	F_{40}	MSY proxy	Same as above	<F_{40}: TACs are set at levels that allow stocks to rebuild to target levels	Same as above
	F_{48}	Target	Same as above	<F_{48}: Rebuild stocks towards F_{48} >F_{48}: At or above target, fish at F_{48}.	Same as above
Tier 4	$CPUE_{20}$	Limit	Catch, effort, discards information from: - Logbook and catch landing records - ISMP	<$CPUE_{20}$: No targeted fishing, rebuilding strategy will be developed	ISMP

Tier level (Species vary)	Reference Point/ Trigger Point	Reference Point function*	Information requirements to monitor Reference Point	Control Rule	Research priorities
	$CPUE_{40}$	MSY proxy	Same as above	<$CPUE_{40}$: TACs are set at levels that allow stocks to rebuild to target levels	Same as above
	$CPUE_{48}$	Target	Same as above	<$CPUE_{48}$: Rebuild stocks towards $CPUE_{48}$ >$CPUE_{48}$: At or above target, fish at F_{48}.	Same as above
Tier 3	5%	Discount Factor (metarule)	Same as for Tier 3 – applies for assessments which are more uncertain	Reduces the TAC derived from the RBC – applied on an individual species basis[1]	

[1] SESSFRAG 4-5 March 2014 recommended guidance for the Commission for when the Tier 3 and Tier 4 discount factors are not applied - see below at section 6.4.1.

Tier level (Species vary)	Reference Point/ Trigger Point	Reference Point function*	Information requirements to monitor Reference Point	Control Rule	Research priorities
Tier 4	15%	Discount Factor (metarule)	Same as for Tier 4 – applies for assessments which are more uncertain	Reduces the TAC derived from the RBC applied on an individual species basis.	
All Tier levels	50%	Large Change Limiting rule (metarule)	Same as above	TACs between fishing seasons to change by no more than 50% where this will not pose a significant risk to stock status.	

N.B. The Harvest Strategy Policy allows alternative reference points to the recommended defaults - B_{MEY}, B_{MSY}, B_{LIM} - to be used where they better pursue the objectives of the Policy.

Glossary

Types of reference points

Reference Point	Description
Metarule	a rule that describes how the RBCs obtained from an assessment should be adjusted in calculating a recommended TAC
Target	relates to a target reference point as per the Harvest Strategy Policy. May be expressed in terms of biomass, fishing mortality or CPUE
Limit	relates to a limit reference point as per the Harvest Strategy Policy. Fishing stops at this reference point. May be expressed in terms of biomass, fishing mortality or CPUE
MSY	maximum sustainable yield
MEY	maximum economic yield
Override	under exceptional circumstances, enables adjustment to a recommended TAC where certain conditions are met; e.g. to take advantage of a “boom” period of highly variable species, or to impose additional restrictions when stocks are thought to under threat.
Inflection point	the reference point below which TACs are adjusted to allow stocks to rebuild to target levels. Also known as a breakpoint

Notation

Notation	Description
B	spawning biomass level
B_{CUR}	the current spawning biomass level
B_0	the unfished spawning biomass (determined from an appropriate reference point)

Notation	Description
B_x	the biomass level representing x% of the unfished spawning biomass B_0
F	fishing mortality rate
F_{CUR}	the current fishing mortality rate
F_x	the fishing mortality rate which would achieve a spawning biomass level of B_x
M	the natural stock mortality rate
$CPUE_x$	catch per unit effort which would achieve a spawning biomass level of B_x

Other acronyms

Acronym	Description
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
CDR	Catch Disposal Record
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CPUE	Catch per unit of effort
ERA	Ecological Risk Assessment
FIS	Fishery Independent Survey
GAB	Great Australian Bight
GABMAC	Great Australian Bight Management Advisory Committee
GABTS	Great Australian Bight Trawl Sector
GHAT	Gillnet, Hook and Trap
HSP	Commonwealth Fisheries Harvest Strategy Policy 2007

Acronym	Description
HSF	Harvest Strategy Framework
HCR	Harvest Control Rule
ISMP	Independent Scientific Monitoring Program
MAC	Management Advisory Committee
MSE	Management Strategy Evaluation
RAG	Resource Assessment Group
RBC	Recommended Biological Catch
SEMAC	South East Management Advisory Committee
SESSF	Southern and Eastern Scalefish and Shark Fishery
TAC	Total Allowable Catch
TEP	Threatened, Endangered and Protected

1 Overview of the SESSF harvest strategy

1.1 The Harvest Strategy Policy

The objective of the *Commonwealth Fisheries Harvest Strategy Policy 2007* (HSP) is the sustainable and profitable use of Australia's Commonwealth fisheries in perpetuity through the implementation of harvest strategies that maintain key commercial stocks at ecologically sustainable levels, and within this context, maximise the economic returns to the Australian community.

To meet this objective, harvest strategies are designed to pursue an exploitation rate that keeps fish stocks at a level required to produce maximum economic yield (MEY) and ensure stocks remain above a limit biomass level (B_{LIM}) at least 90% of the time. Alternative reference points may be adopted for some stocks to better pursue the objective of maximising economic returns across the fishery as a whole.

The HSP provides for the use of proxy settings for reference points to cater for different levels of information available and unique fishery circumstances. This balance between prescription and flexibility will encourage the development of innovative and cost-effective strategies to meet key policy objectives. Proxies must ensure stock conservation and economic performance as envisaged by the HSP. Such proxies, including those that exceed these minimum standards, must be clearly justified.

With a harvest strategy in place, fishery managers and industry are able to operate with greater confidence, management decisions are more transparent, and there are fewer unanticipated outcomes necessitating hasty management responses.

Further detail on how to use harvest strategies is provided in the Guidelines to the Harvest Strategy Policy (*Guidelines for the implementation of the Commonwealth Fisheries Harvest Strategy Policy 2007*). The harvest strategy policy has been revised and a second edition was released in 2019.

1.2 The SESSF Harvest Strategy Framework

The SESSF Harvest Strategy Framework (HSF) sets out the management actions necessary to achieve defined biological and economic objectives, and describes the indicators used for monitoring the condition of stocks, the types of assessments conducted and the rules applied to determine the recommended total allowable catches.

The HSF was developed in 2005. Since that time, it has been reviewed in line with the HSP which was developed to help give effect to the requirements of the Ministerial Direction (2005). A new harvest strategy is in the process of being developed for the SESSF to take into account the 2018 *Commonwealth Harvest Strategy Policy*. Until the new harvest strategy has been developed, this framework will continue to be implemented (with revisions).

The HSF uses a tiered approach designed to apply different types of assessments and cater for different amount of data available for different stocks. The HSF adopts increased levels of precaution that correspond to increasing levels of uncertainty about stock status, in order to reduce the level of risk associated with uncertainty. In this approach, each stock is assessed using one of three types of assessment depending on the amount and type of information available to assess stock status, where Tier 1 represents the highest quality of information available (i.e. a robust integrated quantitative stock assessment). The previous Tier 2 analysis, which applied to species and/or stocks which have a less robust quantitative assessment, is no longer being used but remains for future use.

Each Tier has its own harvest control rule (HCR) that is used to determine a recommended biological catch (RBC). The RBCs provide the best scientific advice on what the total fishing mortality (landings from all sectors plus discards) should be for each species/stock. For all Tier levels, once the RBC is determined from the results of the assessment and the application of the relevant HCR, a recommended total allowable catch (TAC) is calculated based on the TAC setting rules described in section 6.4.

The HCRs for the three tier levels differ depending on the types of indicators used. For Tier 1, the HCR is based on the following reference points:

- *The limit biomass* B_{LIM} – represents the spawning biomass level below which the risk to the stock is unacceptably high and the stock is defined as “overfished”. The default B_{LIM} proxy is B_{20} = 20% of the unfished spawning biomass.
- *The* B_{MSY} – represents the spawning biomass level which would result in a maximum sustainable yield (MSY), which is the point at which additional fishing effort is most likely to decrease the total catch and any profit. The default B_{MSY} proxy is B_{40} = 40% of the unfished spawning biomass.
- *The target biomass* B_{TARG} – represents the spawning biomass level which would result in a MEY, which is the point at which the sustainable catch or effort level for the fishery maximises profits. B_{TARG} is generally equal to B_{MEY}, for which the default proxy is approximated by $1.2*B_{MSY}$. If the default B_{MSY} proxy is used, this results in B_{48} = 48% of the unfished spawning biomass.

Tier 3, Tier 4 and Tier 5 assessments use other indicators (relating to fishing mortality, catch rates and catches respectively) and reference points, which are taken as proxies for the biomass reference points for Tier 1. The HCRs for each tier level are outlined below.

Under some circumstances, an assessment tier or approach that has previously been used for determining a species/stock RBC is no longer appropriate and options are provided below as to possible alternative actions. These circumstances include:

- that Catch per Unit of Effort (CPUE) is no longer an index of abundance (1.2.3);
- the data available does not enable an acceptable assessment (6.4.11);
- productivity shifts (6.4.10); and
- where species are no longer targeted (by-product) and have high discards (6.4.2).

1.2.1 Tier 1

A Tier 1 stock assessment uses an integrated biological and statistical approach that combines a wide variety of data inputs, generally including CPUE, other abundance indices and size and age composition. The Tier 1 harvest control rule applies to species and/or stocks where there is a robust quantitative assessment that provides estimates of current biomass levels, and where estimates or appropriate proxies are available for B_{LIM}, B_{TARG} and F_{TARG}. The default targets and limits are set to comply with the HSP. The RBC is calculated by applying target fishing levels determined from the harvest control rule to the current biomass, to calculate the total catch (including discards) in the next year, using the agreed base case assessment model.

In some circumstances, a different TAC to that produced by the Tier 1 HCR may be set - refer to section 6.4.7.

1.2.2 Tier 3

A Tier 3 stock assessment uses information available on the age structure of annual catches and annual total catch weight, as well as knowledge of basic biological parameters, e.g. natural mortality, length at age, weight at length, fecundity at age and selectivity at age. The estimation of current fishing mortality is made using all this information. The catch control rule uses the ratio of the target exploitation rate to the actual exploitation rate as a multiplier on the current average catch to determine the RBC.

Limit and target reference points, which may be estimated using a yield-per-recruit analysis, are applied to the fishing mortality and are comparable to the limit and target reference points used in the Tier 1 harvest control rule. The period over which average current catch is estimated is chosen to match the period to which the estimated fishing mortality applies. The estimate of fishing mortality is limited to not less than 0.1 of natural mortality.

1.2.3 Tier 4

The Tier 4 assessment is based entirely on catch and CPUE.

The Tier 4 analysis determines an RBC by selecting CPUE reference points that are taken as proxies for the estimated B_{LIM} and B_{TARG}. This is done by assuming that the CPUE is proportional to stock abundance, an assumption that is made in most SESSF assessments. If the stock was at unexploited equilibrium at the start of fishing, then the initial CPUE level at the start of the time series would correspond to the unexploited biomass or B0, and the other reference points are the appropriate fractions of this (e.g. 20% for B_{20}). For most SESSF stocks there is not a full CPUE time series back to the start of fishing, so it is necessary to choose a reference period from the data series that we do have where we think we can make a reasonable estimate of the level of depletion of the stock. Most SESSF species are considered to be fully exploited by 1986, so a reference period against which current rates are compared is chosen around this time when CPUE levels and catches were

relatively stable. The default period is 1986-1995, but other periods are used for some species and fisheries which were not fully developed in 1986.

It is then assumed that during the reference period the stock was at the level that will provide maximum economic yield, i.e. the CPUE corresponds to B_{MEY} (which as a default is assumed to be B_{48}). This is why, for these stocks, the Tier 4 rule uses the average CPUE in the reference period as a CPUE target, and the average catch in that period as a catch target.

Where CPUE does not index the biomass of the stock a tier 5 assessment method should be undertaken.

1.2.4 Alternative assessment methods

Alternative assessment methods, including tier 5 or a weight-of-evidence / risk-based, approach may be adopted in certain circumstances as outlined in paragraph 6.3.4 below.

1.3 Alignment of the HSF with the HSP

The HSF meets the requirements of the HSP by applying a precautionary approach, standards for reference points, and measures to be implemented in accordance with the reference points as specified in the HSP. These are reflected in the use of a tiered approach to control rules, and decreases in exploitation rates as the stock size decreases below a target reference point or as uncertainty about stock status increases. The HSF involves the use of MEY as a target, a biomass limit reference point to trigger no further targeted fishing, and the proxies B_{LIM} = 20% of B_0, B_{MSY} = 40% of B_0, and B_{MEY} = 1.2B_{MSY}. The HSF also requires rebuilding strategies for stocks below B_{LIM}, and TACs are set an appropriate level to rebuild stocks to B_{MSY} or B_{MEY} in line with the HSP.

For multi-species fisheries, the HSP requires MEY to be applied to the fishery as a whole and optimized across all species in the fishery, so that some secondary species may be fished at levels that will result in their biomass remaining below B_{MEY}. The SESSF will continue to move towards applying MEY at a whole-fishery level, but the way that this can be best achieved may develop over time.

1.4 Governance

The status of fish stocks in the SESSF, and how they are tracking against the HSF, is reported to the RAGs, MACs and AFMA Commission as part of the yearly TAC Setting process (see section 6.1). Stock assessments for each quota species, produced by the RAGs each year, include consideration of the catch rates for each quota species in the current and previous fishing years, how catches compare to the TAC, where the stock status indicators sit in relation to the reference points, and a RBC for the upcoming fishing year. The TACs are determined by the AFMA Commission on the basis of the RBCs and advice from the RAGs, MACs, and AFMA Management.

2 Background to the SESSF

An overview of the fishery can be found in the latest SESSF Management Arrangements booklet, which is available on the AFMA website at: https://www.afma.gov.au/fisheries-services/fisheries-management-plans

The booklet includes:

- the geographical distribution of the fishery, closures and fishing seasons
- value of the fishery and management arrangements
- historical and current trends in catch and effort.

3 Key commercial species or stocks and ERA priority

Harvest Strategies are in place for all 34 species subject to quota (including target and non-target species) in the SESSF. An Ecological Risk Assessment at the SAFE level was first conducted for the SESSF in 2007. This assessment was updated in 2012 to include distribution and effort data from 2007-2010 in the fishery.

4 Objectives of the SESSF Harvest Strategy

4.1 Biological

- To maintain stocks at (on average), or return to, a target biomass point B_{TARG} or equivalent proxy (e.g. F_{TARG} or $CPUE_{TARG}$) equal to the stock size that aims to maximise net economic returns for the fishery as a whole.
- To maintain stocks above the limit biomass level, or an appropriate proxy, at least 90% of the time.
- A reduced level of fishing if a stock is below B_{TARG} but above B_{LIM} (or an appropriate proxy).
- To implement rebuilding strategies, no-targeting and incidental bycatch TACs if a stock moves below B_{LIM} (or an appropriate proxy).
- To ensure the sustainability of fisheries resources, including consideration of the individual fishery circumstances and individual species or stock characteristics, when developing a management approach.

4.2 Socio-economic

- To maintain stocks at (on average), or return to, a target biomass point B_{TARG} equal to the stock size that aims to maximise net economic returns for the fishery as a whole.
- To maximise the profitability of the fishing industry and the net economic returns to the Australian community.
- To minimise costs to the fishing industry, including consideration of the impacts on the industry of large or small changes in TACs and the appropriateness of multi-year TACs.

4.3 Ecosystem

To be consistent with the principles of ecologically sustainable development, including the conservation of biological diversity, and the adoption of a precautionary risk approach.

5 Monitoring

The biological and economic conditions in the fishery are monitored by the following three methods:

5.1 Logbooks and catch records

AFMA requires fishers to record catch and effort information in logbooks at sea, and in catch disposal records (CDRs) which record the actual landed catch at port. CDRs are considered more accurate than logbook records.

The following data is recorded for each fishing operation: the port and date of departure and return; gear type and fishing method; number of fish kept and discarded; and resultant catch including what is included in the weight (e.g. trunked, gutted, filleted, whole). Further information on logbooks and CDRs is available at: www.afma.gov.au/fisheries-services/logbooks-and-catch-disposal

5.2 The Integrated Scientific Monitoring Program (ISMP)

A key component of the ISMP is the sampling and recording of catches at ports and on board fishing vessels using fishery-independent observers. The purpose of the ISMP is to provide reliable, verified and accurate information on the fishing catch, effort and practice of a wide range of vessels operating inside and, periodically, outside the Australian Fishing Zone.

Biological and environmental data are collected on: catch composition including size and weight; amount and type of incidental catch; number of fish kept and discarded; fate of target and non-target species; interactions with TEP species; and fishing effort. Further information

on the Observer program is available at: www.afma.gov.au/fisheries-services/observer-services

5.3 Fishery Independent Surveys (FIS)

The FIS is an industry-based fishery-independent resource survey which provides a time-series of relative abundance indices for key target species. A FIS has been conducted for Deepwater Flathead and Bight Redfish in the GABTS since 2005, and for key target species in the SESSF since 2008.

Biological and environmental data are collected such as: target species; catch rate (kg/shot); fishing method; and fishing depth. Information which provides a relative abundance index of other main byproduct and incidental catch species is also obtained.

10.4 Data Availability

The ability to meet the objectives of the HSF relies on obtaining the required data in time for stock assessments to be carried out.

Future information and ongoing monitoring requirements are identified through regular reporting from the above monitoring programs, and regular meetings of RAGs which are responsible for overseeing and managing the stock assessment process under the HSF.

11 Reference points and decision rules

11.1 TAC setting process

The data used for input into the stock assessment process are collected by the ISMP, AFMA logbooks and CDRs and FISs. Otoliths from the biological sampling are provided to a private contractor for ageing. All sampling and age data are provided to stock assessment scientists for analysis or reporting. The analyses are then discussed by RAGs, which produce final stock assessment reports for quota species in the SESSF during October and November each year.

The stock assessment reports provide recommended biological catch (RBC) amounts for each quota species. Each stock is assessed under the appropriate Tier level as advised by the RAGs and SESSFRAG.

In mid-December, AFMA produces a position paper with recommended TACs for quota species for the upcoming fishing season, based on the stock assessments and RAG advice. The paper is distributed to interested parties and undergoes a public comment period. For some GAB species, TAC recommendations are conducted according to a pre-agreed set of decision rules, which are associated with the FIS or CPUE and incorporated into the TAC-setting cycle.

In early February, a SEMAC TAC Setting meeting is held where TAC recommendations are made. The GABMAC also provides advice on TAC recommendations.

The outcomes of RAGs, SEMAC and GABMAC, together with the AFMA position paper and any public comments received, are then sent to the AFMA Commission to determine TACs for the upcoming fishing season in mid-February. In determining the TACs, the AFMA Commission may provide AFMA with direction in instances where there is concern that current management strategies for depleted or at risk stocks may not meet the objectives of the HSP in a timely manner. The TACs for Bight Redfish and Deepwater flathead are set using the decision rules outlined in section 6.5 under co-management arrangements with the Great Australian Bight Fishing Industry Association.

11.2 Overfishing and reference points

A stock is defined as subject to overfishing if the current fishing mortality rate (also known as exploitation rate) exceeds the limit reference point F_{LIM} for a particular biomass value (see Figure 1). F_{LIM} is the fishing mortality rate that would result in a spawning biomass of B_{LIM} (the default proxy for which is B_{20}). The stock is defined as overfished if stock levels are below B_{LIM}. B_{LIM} is the point below which there will be no further targeted fishing for that species, and a stock rebuilding strategy will be developed. Refer to section 6.4.8 regarding the setting of incidental bycatch TACs.

The recommended maximum fishing mortality rate for Tiers 3 and 4 is F_{MSY} (the default proxy for which is F_{40}). This represents the fishing mortality rate that would cause the spawning biomass to decline to its maximum sustainable biomass B_{MSY} (the default proxy for which is B_{40}). The breakpoint, or HCR inflection point, in the overfishing line in Figure 1 occurs at a biomass corresponding to B_{MSY}. If $B<B_{MSY}$ or $F>F_{MSY}$, the TACs should be reduced to limit fishing effort and the fishing mortality rate. For Tier 1, the recommended maximum fishing mortality rate and HCR inflection point occurs at a proxy of F_{35} (see Table 1 and section 6.3).

The target fishing mortality rate F_{TARG} represents the fishing mortality rate that would result in a spawning biomass of B_{TARG} (equal to B_{MEY}). The default value for F_{TARG} is F_{48}, the value of *F* corresponding to a B_{TARG} of B_{48}. Alternative reference points may be adopted for some stocks to better pursue the objective of maximising economic returns across the fishery as a whole.

The guidelines to the HSP provide that in multi-species fisheries 'MEY applies to the fishery as a whole and is optimized across all species in the fishery. As a result some secondary species (e.g. lower value species) may be fished at levels that will result in their biomass remaining below their target biomass reference point (i.e. B_{MEY}). In such circumstances, the estimated biomass of these secondary species must be maintained above their limit reference point, B_{LIM}. Consideration should also be given to:

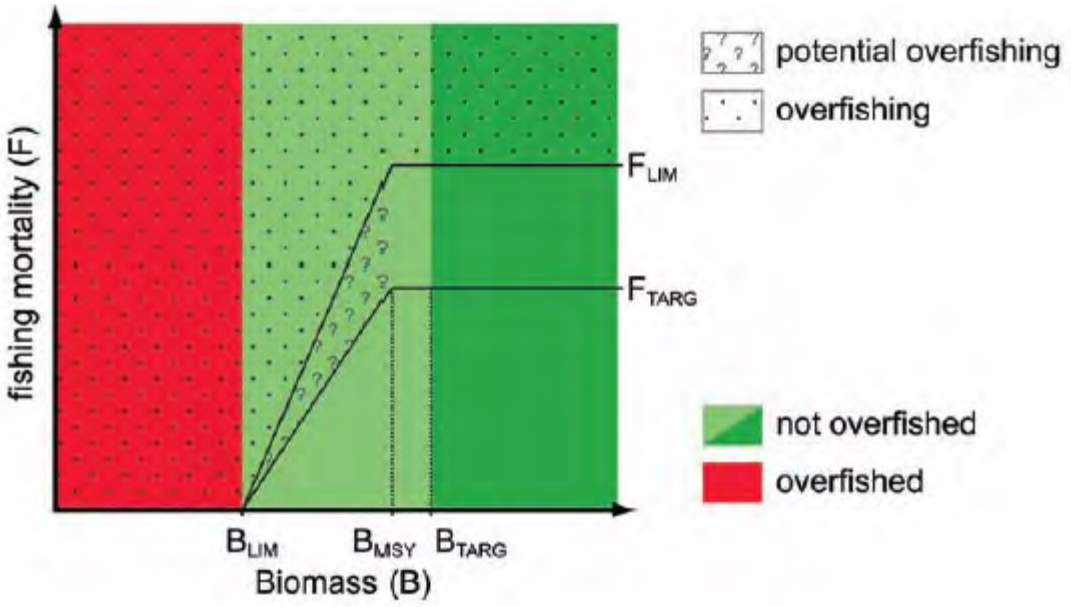
- demonstrating that economic modelling and other advice clearly supports such action

- o no cost-effective, alternative management options (eg gear modification or spatial management are available)
- o the associated ecosystem risks have been considered in full.'

Consideration should also be given to whether the quota species is targeted, its contribution to the value of the fishery, any sustainability concerns and the level of quota latency for that species.

For computational purposes, the target and limit reference points are calculated via a "spawning biomass per recruit" analysis (Reference plus Appendix to be provided). While F_{LIM} is fixed, F_{TARG} will decrease as uncertainty about the assessment increases.

Figure 1. Schematic representation of a harvest control rule; showing key reference points (Source: ABARES Fishery Status Report 2007).



11.3 Determining RBCs using harvest control rules (HCRs)

11.3.1 Tier 1

The Tier 1 HCR applies to species and/or stocks where there is a robust quantitative assessment that provides estimates of current biomass levels (B_{CUR}) and where estimates are available for B_{35}, B_{20} and F_{48}. The formula for calculating F_{TARG} is as follows:

F_{TARG}	Biomass level
$F_{TARG} = F_{48}$	where $B_{CUR} > B_{35}$
$F_{TARG} = F_{48} * (B_{CUR}/B_{20} - 1)$	where $B_{35} > B_{CUR} > B_{20}$

$F_{TARG} = 0$ where $B_{CUR} < B_{20}$

The RBC is calculated by applying F_{TARG} to the current biomass B_{CUR} to calculate the total catch (including discards) in the next year, using the agreed base case assessment model:

$RBC = Catch[F_{TARG} \rightarrow B_{CUR}]$

At Tier 1, $B_{LIM} = B_{20}$, the maximum value for $F_{TARG} = F_{48}$ and the breakpoint in the HCR occurs at B_{35}. Alternative reference points may be adopted for some stocks to better pursue the objective of maximising economic returns across the fishery as a whole.

11.3.2 Tier 3

The Tier 3 HCR applies to species and/or stocks that do not have a quantitative stock assessment, but where estimates of fishing mortality and other biological information are available.

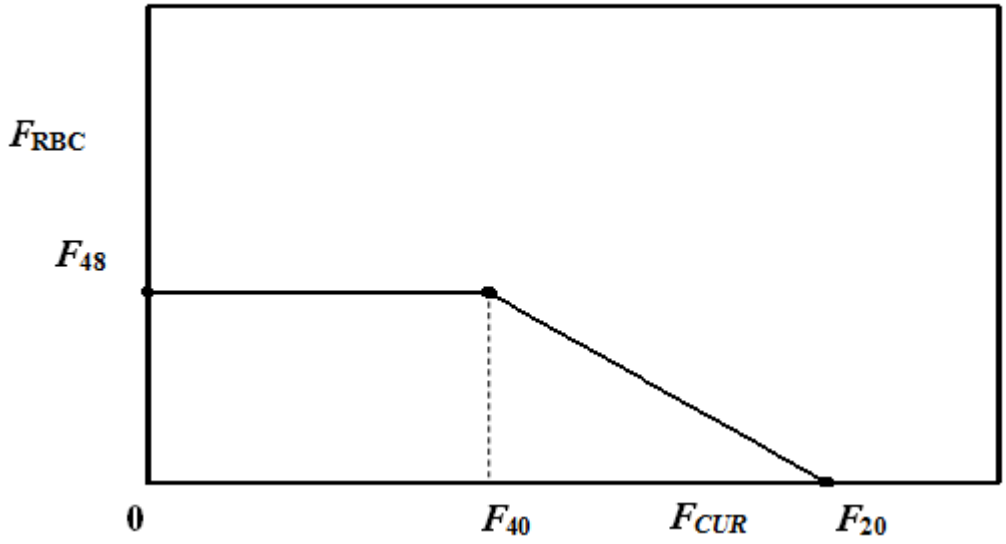
Yield per recruit calculations are used to calculate *F* values that will reduce the spawning biomass to 20% (F_{20}), 40% (F_{40}) and 48% (F_{48}) of the unexploited level. The relationship given in Figure 2 is then used to assign a value for F_{RBC} using F_{CUR}. This relationship has properties similar to the Tier 1 harvest control rule, with the default proxies of F_{20} as the limit and F_{48} as the target fishing mortality rate.

The following formula, which adjusts the current catch C_{CUR} according to the ratio of the intended and current exploitation rates, is then used to calculate the recommended biological catch C_{RBC}:

$$C_{RBC} = \frac{(1 - e^{-F_{RBC}})}{(1 - e^{-F_{CUR}})} C_{CUR}$$

where F_{CUR} is the estimated current fishing mortality, and F_{RBC} is the selected *F* for the recommended biological catch from the control rule. The estimate of fishing mortality is limited to be no less than 0.1 of natural mortality.

Figure 2. Method for selecting F_{RBC} based on F_{48} target and estimated F_{CUR}



11.3.3 Tier 4

The Tier 4 HCR applies to species and/or stocks where there is no reliable information available on either the current biomass or current exploitation rate. It is assumed that there is information available on current catch levels and trends in catch rates.

The Tier 4 control rule is of the form:

$$RBC = C * \max\left(0, \frac{\overline{CPUE} - CPUE_{\lim}}{CPUE_{t\,\arg} - CPUE_{\lim}}\right)$$

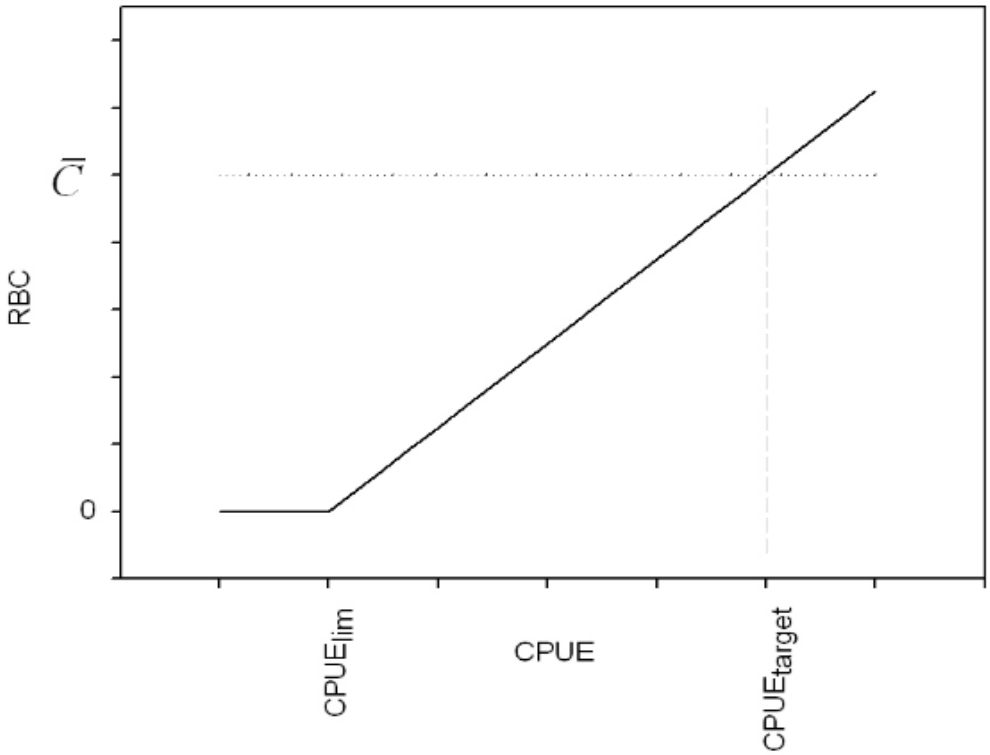
where:

$CPUE_{targ}$	is the target catch per unit effort (CPUE) for the species
$CPUE_{lim}$	is the limit CPUE for the species
$\overline{CPUE}$	is the average CPUE over the most recent *m* years
C^*	is a catch target derived from a historical period that has been identified as a desirable target in terms of CPUE, catches and status of the fishery

The form of the rule is shown in Figure 3. Because this linear form can result in large catches at high CPUE levels which could deplete the stock very quickly, a maximum catch level C_{max}

is imposed when the CPUE is above the target level, and the multiplier is set to zero when the CPUE is below the limit.

Figure 3. Graphical representation of the Tier 4 harvest control rule. $\overline{C}$ is the average catch over the most recent *m* years.



11.3.4 Alternative assessment methods

The RAG may make RBC recommendations based on alternative assessment methods where it considers the method:

- is more appropriate for a quota species than the assessment method outlined for Tier 1, Tier 3 or Tier 4
- meets the intent of the HSP.

In such circumstances, the RAG should provide advice on any discount factor to be applied and the expected reliability of any associated harvest control rule.

A variety of 'Tier 5' or weight-of-evidence approaches have been used to inform TAC setting, which include catch-MSY, age-structured stock reduction analysis, and risk assessment approaches in different circumstances, such as where CPUE does not index the biomass of the stock.

11.4 Determining TACs from RBCs

The following metarules are applied to the RBCs that are derived from the application of the Harvest Control Rules. The metarules for discount factors, state catch, discards, research catch allowance and the large change limiting rule are applied in the order below. The other metarules may be applied in the circumstances described. On the basis of the RBCs, TACs may be reduced to support stock recovery and prevent stocks from becoming overfished in the future. Note that the TACs for Bight Redfish and Deepwater flathead are set using the decision rules outlined in section 6.5 (GABTS decision rules) under co-management arrangements with the Great Australian Bight Fishing Industry Association.

11.4.1 Discount Factor

Consistent with the HSP, which establishes a more precautionary approach to harvest control rules for species for which assessments are more uncertain, it is considered appropriate to apply a discount factor to the RBCs derived from Tier 3 and 4 assessments. The discount factors to be applied are 5% for Tier 3 and 15% for Tier 4. These values take account of the relative uncertainties in the assessments and reference points at each of these Tier levels.

The application of the rule can be shown as follows:

Tier 3: $$RBC_{DISC} = RBC\left(1 - \frac{5}{100}\right)$$

Tier 4: $$RBC_{DISC} = RBC\left(1 - \frac{15}{100}\right)$$

The application of the discount factor is to be determined on an individual species basis but will be applied unless RAGs advise that alternative equivalent precautionary measures are in place. At its meeting on 4-5 March 2014, SESSFRAG recommended to the AFMA Commission that a discount factor should apply unless: equivalent or additional precaution is provided by other measures, such as but not limited to:

- spatial closures
- market controls.

11.4.2 State catch, discards and research catch allowance

When other sources of mortality arising from discarded catch, or catch taken by other jurisdictions (e.g. state and recreational sectors) or research catch allowance are included in assessments, they are subtracted from the RBC to produce a Commonwealth TAC.

The quantity of discards to be deducted should be based on the best available data whether this is derived from observers, logbooks verified by electronic monitoring or other sources.

The discarded catch and state catch are generally estimated for the following fishing season using a four year weighted average. Estimates are weighted in the ratio of 8:4:2:1 for the most recent four years, with most weight given to the most recent year.

For Tier 4 assessments, if discards or state catches are included in the reference period catches, *C*,* they should be deducted from the RBC to calculate the TAC (see section 6.3.3. above).

When estimating state catch, the impact of management changes in state fisheries (e.g. new spatial closures) are to be considered to forecast the state catch in the following year.

Where appropriate, the methods used to estimate future discards and state catches may be varied if an alternative method is expected to provide a more reliable estimate. This may be appropriate if there are management changes in state fisheries.

To ensure consistency between the RBCs derived through stock assessment models and the resultant TAC, where a stock assessment model is used to estimate a future discard rate, this estimate should be used in determining the TAC.

Research catch allowance is deducted from the RBC as determined by the Commission in accordance with AFMA's *Research Catch and Effort Allowance Policy 2007.*

Species that have high discards (by-product species) should be assessed using a risk-based methodology. TAC setting should be based on the existing TAC (since the TAC is not controlling catch), subject to sustainability concerns and the consideration of whether the TAC is restricting catches of that or other species. Annual monitoring should be undertaken of available fishery indicators on a weight of evidence basis, including SAFE assessments, where available. If fishing mortality needs to be constrained, management measures other than output controls should be considered by SEMAC and AFMA.

11.4.3 Latest CPUE Multiplier Rule

This rule is no longer applied.

11.4.4 Large Change Limiting Rule

This rule is designed to limit large changes (up or down) in the TACs from year to year. It is applied last in the sequence of rules and compares the recommended TAC derived after applying the first three rules, with the actual TAC for the previous fishing year.

To limit excessive changes from season to season in the TACs, an override may be applied for some species in setting TACs for the next fishing season, such that the TACs will not change up or down by more than 50% from the previous fishing season where this will not pose a significant risk to stock status. For multi-year TACs, the large change limiting rule may be applied for each year of the period until the RBC is achieved.

11.4.5 Multi-year TACs

Multi-year TACs are to be applied for all Tier 1, Tier 3 and Tier 4 species where suitable. In determining whether a multi-year TAC applies, the following criteria should be considered:

- if the current biomass (B_{CUR}) is higher than the maximum sustainable yield (B_{MSY}) OR if B_{CUR} is below B_{MSY} but higher than the biomass limit (B_{LIM}) and B_{CUR} does not show a decreasing trend over a time period relevant for that species
- if fishable biomass (Tier 1) or a proxy (Tier 3 and Tier 4) can be predicted at an acceptable precision for the multiyear TAC period
- if the fishery is expected to be stable in terms of the level, method and spatial distribution of effort for the multi-year TAC period.

For Tier 1 species, multi-year TACs should be set using Tier 1 assessment projections and probability estimates after considering break out rules.

Multi-year TACs for Tier 3 and Tier 4 species are to be determined on a per species basis by the individual RAGs. Breakout rules for multi-year TACs are to be applied as appropriate to identify fundamental changes from the understanding of the stock at the time of the assessment. Break out rules are to be set having regard to any one or more of the following:

- changes in CPUE (from logbooks and FISs). The CPUE method should be the same as used in the last assessment, either standardized or unstandardised and, if standardised, using the same standardisation parameters as used in the assessment
- changes to economic factors
- changes in total fishing mortality (from total catches, discards, catches in other fisheries or jurisdictions)
- changes in size and age compositions
- interactions with TEP species, for example where a quota species is listed as conservation dependent under the *Environment Protection and Biodiversity Conservation Act 1999* or where catches of a quota species impact TEP species (eg companion species)
- changes to companion species TACs
- changes to abundance indexes derived from FISs.

In setting a multi-year TAC, the multi-year RBC is applied for each year in the period, with updated state catches, discards and research catch allowance to be deducted annually for the purposes of determining the TAC.

11.4.6 Step up or step down TACs

A different TAC to that produced by applying the HCR and the meta-rules above may be adopted in limited circumstances. This may occur where there is a step up or step down in the TAC to achieve the RBC over a number of years. A step up or step down TAC may be set to reduce the economic impact of a significant change in RBC and allow fishers time to adjust their operations where the:

- TAC best pursues AFMA's objectives and the objectives of the HSP
- RAG provides advice on the biological risk to the stock of adopting a step up or step down TAC.

11.4.7 Setting a TAC outside the Tier 1 Harvest Control Rule

In some circumstances it may be appropriate to set a TAC different to that produced by the Tier 1 HCR, for example, where the Tier 1 HCR produces a TAC below the incidental bycatch of the species. A TAC different to that produced by the Tier 1 HCR may be set where the:

- stock is estimated to be above B_{LIM} but below B_{TARG}
- probability of the stock being below B_{LIM}, both at the date of the assessment and in future years, is assessed to meet the HSP objective of ensuring that the stock stays above B_{LIM} at least 90% of the time (i.e. less than a 1 in 10 year risk that stocks will fall below B_{LIM})
- relevant RAG considers that the time that the stock is estimated to take to rebuild to B_{TARG} under the proposed TAC is appropriate given the HSP and biology of the stock.

11.4.8 Incidental bycatch TACs where the RBC is zero

Where the RBC is zero, an incidental bycatch TAC may be set after considering:

- the impact of incidental catches on rebuilding of the stock
- non-targeted catch based on:
    - landed catch
    - logbook discards
    - ISMP estimates of discards
- RAG or MAC advice on whether the incidental bycatch TAC should be adjusted to account for any inefficiency in the quota market for that stock
- RAG or MAC advice on their understanding of the level of targeting and the ability of operators to avoid catching the stock
- whether other management arrangements (including those in the relevant Rebuilding Strategy) have been, or are proposed to be, implemented to prevent targeting.

11.4.9 Other provisions

Other provisions in addition to those above may be considered, including:

- agreed transition rules for TAC setting in the next fishing year, where harvest strategy rules have been revised
- companion species TACs (rules still to be determined).

Table 6 shows the current or suggested Tier levels for species/stocks in the SESSF.

Table 6. Suggested Tier Levels for SESSF species and stocks (2011)

Species/stocks	Tier level	Comments
Alfonsino	3	Was assessed as Tier 4 in 2007, then as Tier 3 in 2008 with the availability of ageing data
Blue Eye Trevalla	4	
Blue Grenadier	1	
Blue Warehou	4	
Tiger Flathead	1	For the 2013 assessment, Shelf RAG agreed that the default RBC for tiger flathead is calculated under the 20:35:40 strategy
Eastern Gemfish	1	
Western Gemfish	1	
Jackass Morwong	1	The 20:35:48 harvest control rule was applied in the 2008 assessment
John Dory	3	The first formal assessment was undertaken in 2008
Mirror Dory	3	
Ocean Perch	4	Potentially 3, if additional information on growth and age composition is available
Pink Ling	1	
Redfish	3	Formal quantitative assessments have been conducted in the past, however, have too many uncertainties.
Royal Red Prawn	4	Potentially 3, if size information is available to reflect different growth rates of male and female
School Whiting	1	
Silver Trevally	4	
Spotted (Silver) Warehou	1	
Orange Roughy east	1	
Orange Roughy south	1	
Orange Roughy west	1	
Orange Roughy Cascade	1	
Bight Redfish	1	
Deepwater Flathead	1	

Species/stocks	Tier level	Comments
School Shark	1	
Gummy Shark	1	
Elephant Fish	4	
Saw Shark	4	
Ribaldo	4	
Smooth Oreo	4	
Other Oreo	4	
Deepwater sharks	4	

11.4.10 Variability, regime shift and climate change

Until the new SESSF harvest strategy is developed if there is evidence of a productivity change, recent recruitment scenarios should be used to set TACs (rather than average recruitment), as recommended by the RAG[2].

11.4.11 Setting a TAC where Tier 1 assessments have been rejected

For species without an accepted assessment, the TAC should be set using the existing TAC, subject to sustainability concerns. For future assessments, the assessor will present the RBCs for three years with longer-term projected RBCs used if the assessment is not run at the end of the MYTAC period (applied retrospectively to assessments if possible). Consideration should be given to collecting more data, dropping the tier of the assessment, or considering alternative assessment approaches for future use while ensuring that agreed approaches for considering new assessment methodologies is followed.

11.5 GABTS Decision Rules

The GABTS operates under a different set of decision rules to the other sectors of the SESSF. These separate arrangements have been agreed to under co-management arrangements. The FIS and the collection of age and frequency data as well as the monitoring of catch and effort information obtained will be analysed and presented to the RAG each year prior to the date at which a decision on the TAC for the next year is made.

- When the FIS has been conducted in two consecutive years, the catch rates from the first leg of the survey will be the indicator of abundance used to make any adjustment to the default TAC.
- In a year when the FIS has not been conducted in two consecutive years, the standardised commercial catch rate for the period July to February inclusive is the indicator of abundance used to make any adjustment to the default TAC.

[2] Unless a regime shift has been identified.

- If there is a change of ≥20% to the indicator of abundance, a 10% (increase or decrease) to the default TAC will occur.
- If the RAG is concerned with any indicators over the period between stock assessments (length frequency distributions, standardised commercial catch rates, age distributions etc.), then it can decide to undertake a full assessment in that year.
- Multi-year TACs have been agreed to using the same rules outlined in section 6.4.5.

The GABTS has a development strategy for species not currently under a TAC, with actions occurring at specified catch triggers (**Appendix 1**). This strategy is designed to improve the data collected and the knowledge of these species as catch increases.

- The initial catch triggers (set at 400 t for blue grenadier and gemfish, and 100 t for pink ling, blue-eye trevalla, ribaldo and hapuku) require data collection and analysis, and the development of an assessment plan.
- Exceeding the second trigger level requires that fishing for that species cease.
- The third trigger level applies to total catches across the three most recent years and requires a formal stock assessment.

11.6 Evaluation of reference points and decision rules

The HSF expresses the objectives of the Harvest Strategy in the form of quantifiable reference points based on the HSP. These reference points are used to guide management decisions, which are pre-agreed actions linked directly to the status of the fishery relative to those reference points.

The reference points and harvest control rules have been tested and refined through a management strategy evaluation (MSE) project conducted by CSIRO during 2006 and 2007. The MSE evaluated the choice of targets and thresholds for all Tier levels of the HSF. A key result of the project was improvements to the Tier 3 and Tier 4 rules, which now have well defined target harvest levels analogous to those used in the Tier 1 assessments for the major commercial species, recognising that Tier 3 and Tier 4 assessments are based on less information than Tier 1.

A copy of the final report “Evaluation of new harvest strategies for SESSF species” is available at:

http://www.afma.gov.au/wp-content/uploads/2010/06/HSE-AFMA-Report-June20091.pdf.

Currently, climate change is not explicitly considered in the HS. However, changes in the status, composition and population dynamics of the stock is reflected in the data collected – for example, age and length frequencies, catch and effort, stock recruitment, mortality and biomass data and trends.

Both biological and economic targets have been explicitly considered in developing the reference points and decision rules. However, while biological indicators and parameters have been included, economic indicators and parameters are still under development.

Evidence that the decision rules will maintain or move the stock to the biomass targets (or equivalent proxy) within a reasonable timeframe, and that the HSF will ensure that the stocks stay above the limit biomass level (or equivalent proxy) at least 90% of the time, have been provided by MSE testing.

For stocks below B_{LIM}, rebuilding strategies have been implemented in accordance with the HS. The strategies outline measures for rebuilding the stocks to above B_{LIM} (or equivalent proxy), and then additional measures to rebuild the stocks to B_{TARG} (or equivalent proxy) and monitor and maintain the stocks at the target level. The rebuilding strategies include an objective to ensure that the stocks stay above the limit biomass level (or equivalent proxy) at least 90% of the time.

12 Review

Under certain circumstances, it may be necessary to amend harvest strategies between reviews. These circumstances may arise if:

- there is new information that substantially changes the status of a fishery, leading to improved estimates of indicators relative to reference points; or
- drivers external to management of the fishery increase the risk to fish stock/s; or
- it is clear the strategy is not working effectively and the intent of the HSP is not being met.

Further explanation can be found in section 15 of the HSP Guidelines. The consultative and technical processes for amending harvest strategies are set out in the HSP Guidelines in section 2.5.

The SESSF Harvest Strategy Framework underwent a management strategy evaluation (MSE) by CSIRO in 2006-2007. The project identified problems with the initial implementation of the HSF, developed improvements to the TAC setting procedures, and then tested these using the MSE approach. A MSE procedure was developed and used to test each Tier rule of the HSF.

A final report on the outcomes of the MSE was produced in 2009, entitled “Evaluation of new harvest strategies for SESSF species”. Key outcomes of the project were:

- a discussion paper with nine recommendations for modifications to the HSF
- demonstration that the HSF is consistent with, and meets the requirements of, the Commonwealth Harvest Strategy Policy
- demonstration that the Tier 1 rule achieves its aims for a range of species with differing life histories
- improvements to the Tier 3 and Tier 4 harvest control rules. The revised rules were presented to and approved by the RAGs during 2008, and applied (where appropriate) to setting the RBCs for 2009
- an evaluation of proposed rules for changing the TAC in response to the most recent year’s CPUE.

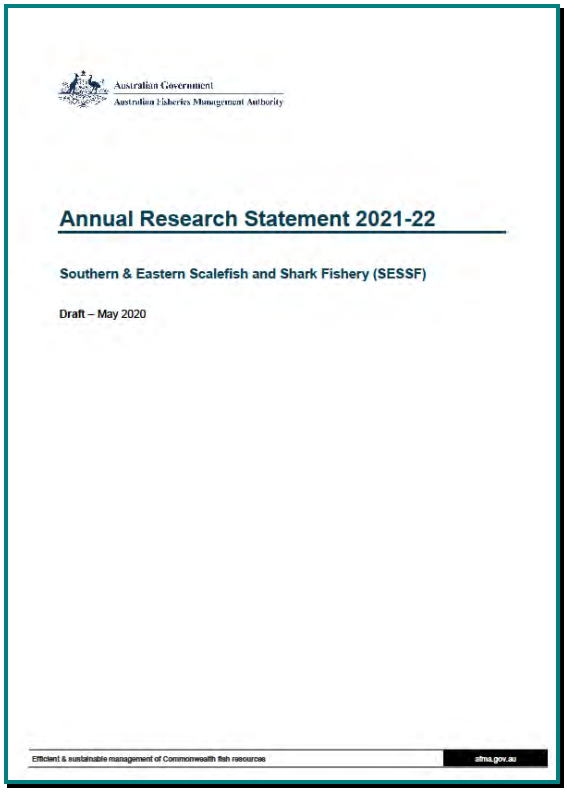
The MSE testing framework developed in the project is available for further testing of any future proposed revisions to elements of the HSF.

13 Appendix

Table 8.1 GABTS Trigger limits

SPECIES	TRIGGER TO COLLECT BIOLOGICAL DATA	TRIGGER FOR ANALYSIS OF BIOLOGICAL DATA (INC. AGEING OF OTOLITHS)	CEASE FISHING FOR THAT SPECIES	COMMENCE STOCK ASSESSMENT
Gemfish	Currently collected	400t	500t/year	1000t/3 years
Blue Grenadier	Currently collected	400t	500t/year cease fishing. If a spawning aggregation is found, trigger an acoustic survey (500t) and operator collects 100 whole fish.	1000t/3 years
Ling	Currently collected	100t	250t	250t
Blue-eye Trevalla	Currently collected	100t	250t	–
Ribaldo	Currently collected	100t	250t	–
Hapuka	Currently collected	100t	250t	–
Gulper sharks		–	Code of practice by industry to not target these species in addition to area closure.	–
Deepwater sharks (Black/Brier)		–	Code of practice by industry to not target these species in addition to area closure.	–
Chinamen Leatherjacket		–	Management measures on Bight Redfish and Deepwater Flathead influence catch.	–
Angel Shark		–	Management measures on Bight Redfish and Deepwater Flathead influence catch.	–
Jackass Morwong		–	Management measures on Bight Redfish and Deepwater Flathead influence catch.	–

SESSF Annual Research Statement 2021-22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Annual Research Statement 2021-22

Southern & Eastern Scalefish and Shark Fishery (SESSF)

Draft – May 2020

Efficient & sustainable management of Commonwealth fish resources

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Note: also included in the research statement are updates since the meeting arising from out of session consideration by SESSFRAG as per Action Item 18

Australian Government
Australian Fisheries Management Authority

Annual Research Statement 2021-22

Southern & Eastern Scalefish and Shark Fishery (SESSF)

Draft – May 2020

Southern and Eastern Scalefish and Shark Fishery Annual Research Statement for 2021-22

This Southern and Eastern Scalefish and Shark Fishery (SESSF) Annual Research Statement was developed by AFMA, in consultation with the SESSF Resource Assessment Group (SESSFRAG), South East Resource Assessment Group (SERAG) and the South East Management Advisory Committee (SEMAC). It identifies areas of high priority research for both AFMA and potential FRDC funding in 2021-22 and will be presented to the AFMA Research Committee (ARC) for consideration as part of the 2021-22 funding round.

AFMA funding in 2021-22 - AFMA Research Committee (ARC)

Title	Objectives and component tasks	Evaluation		
		Total cost ($) (approx. only)	Priority/ ranking	Feasibility
RESEARCH UNDERWAY OR COMPLETED				
Integrated Scientific Monitoring Program (ISMP) (*funded by the fishery*)	AFMA observer program, logbooks	$600k (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

Title	Objectives and component tasks	Evaluation		
		Total cost ($) (approx. only)	Priority/ ranking	Feasibility
		2021/22 $701,667		
GHAT CPUE calculation methodology (project 170826)	Currently CPUE for gillnet-caught species is calculated on a kilogram per shot basis. Given the change to net length restrictions, the RAG has identified a strong need to change gillnet CPUE calculations: from catch by shot to catch by metres of net set to better account for zero shots.	$60,715k 2018/19 – delayed, due for completion in May 2020	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
Blue-eye Close-Kin Scoping Study (190842)	A scoping study to assess close-kin as a risk assessment approach for blue-eye trevalla.	Two year project, total cost of $37K	High	High
SESSF species stock structure desktop review (190848)	To better reflect stock structure and assist reducing complex management arrangements particularly during the progression of the regionalisation of quota SFRs. Commence the study with pink ling, the study could be broadened to anything that could have an east/west split including; blue warehou, jackass morwong, ocean perch and mirror dory.	$43K	High	High

Title	Objectives and component tasks	Evaluation		
		Total cost ($) (approx. only)	Priority/ ranking	Feasibility
NEW IDENTIFIED RESEARCH NEEDS FOR 2021-22				
Review SESSF catch history	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. *Initial Scope* 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 & 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.	$5k	High	High
Examination of data acquired through electronic monitoring, logbooks and industry.	Since the introduction of electronic monitoring (EM) in the Gillnet, Hook and Trap Sector and the change in data collection techniques there is a need to review and compare the data acquired through the various sources, with a particular focus on discard estimates and catch composition. A comparison of effort (net length) might also be feasible by comparing logbook data to EM footage (using net rotations to estimate length).	To be discussed at the next SharkRAG meeting (Scheduled August 2020).		
Non-extractive survey methodology for establishing Eastern Gemfish index of abundance	Alternative approaches to establishing an index of abundance, including a targeted fishing survey during the winter spawning aggregation. An earlier project showed that stereo cameras on nets are effective at sampling gemfish, including length frequencies and biomass estimates (pending outcome of the close kin	High	High (pending FRDC project)	High

Title	Objectives and component tasks	Evaluation		
		Total cost ($) (approx. only)	**Priority/ ranking**	**Feasibility**
	project below – *Application of close-kin assessments for key and rebuilding species in the SESSF*))			
Further investigation of factors (length/depth relationship) that influence length frequencies for all species and ISMP port sampling	Initial work undertaken has shown there is a depth/length relationship for nearly all species, which would mean port-based sampling is not appropriate. However, the relationship differs in magnitude for various species and other factors may ameliorate this (including the fishery zone and gear type used by operators). A more in depth investigation is required. The potential introduction of electronic monitoring in the trawl sector and the need to rationalise collection of length frequencies under the ISMP program would have implications for collecting on-board biological samples. The next stage is to determine: • whether there are other species, ports, and gears (or combinations of these) for which port sampling is appropriate. • how large the depth effect needs to be in order to influence the assessment? A subset of 4-5 SESSF species could be selected to investigate whether port-based sampling for lengths is appropriate. Generalised Additive Models will be used to investigate the relationship between fish length and the explanatory factors: Gear, Depth, Region and Month. Interactions between those factors will be explored to determine if there are combinations that are not significant as drivers of length i.e. there might be a gear type, such as Danish Seine, that does not span a wide range of depths and that can therefore reliably be sampled in port. The question of how large the depth effect needs to be to influence the assessment would be answered by running a tier 1 assessment model using deliberately biased input data to guage the impact on the proposed RBC.	(**low**/medium)	High (critical to sampling program)	High

Title	Objectives and component tasks	Evaluation		
		Total cost ($) (approx. only)	Priority/ ranking	Feasibility
Analysis of Blue Grenadier acoustic survey data collected by industry in 2019 for inclusion in the 2021 Tier 1 stock assessment	Acoustic data was collected from the factory freezer vessel that fished Blue Grenadier in 2019. Some factory vessels are equipped with gear that collects acoustic data. This data was collected as part of commercial fishing operations in 2019, however, the data has not been analysed. The collection of the data will likely continue in 2020. Whilst the current stock status is estimated to be well above target, continued collection and analysis of survey points is worthwhile. There have not been any new survey points for some years and, as they are influential in the model, additional evidence to support the current healthy stock status would be valuable. Blue grenadier is due for a Tier 1 assessment in 2021. Any analysis of the data would need be undertaken prior to the next assessment in order for it to be incorporated. The cost needs to be established, which includes consideration of whether the new data will fit in the existing index of abundance or if a new series will be needed.	Low	Medium - subject to outcome of the 2021 stock assessment (biomass estimate & and degree of uncertainty) and fishing activity over the 3 year MYTAC. Could be needed for the 2024 assessment.	High

Cost

- High: >$200,000
- Medium: $100,000 - $200,000
- Low: <$100,000

Management priority categories

- Essential
- High
- Medium
- Low

Feasibility categories

- High
- Medium
- Low

FRDC funding in 2021-22 - Commonwealth Research Advisory Committee (ComRAC)

Title	Objectives and component tasks	Evaluation		
		Total cost (approx. only)	Priority/ ranking	Feasibility
APPROVED RESEARCH (UNDERWAY OR RECENTLY COMPLETED)				
Development and evaluation of multispecies 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. 3. To develop a process and set of design principles for multi-species harvest strategies.	$464,973 Commenced October 2018 and is due to finish in October 2020	High	High
An updated understanding of Eastern School Whiting stock structure and improved stock assessment for cross jurisdictional management **(FRDC project 2019-030)**	Determining the stock structure of eastern school whiting stock and better understanding the species composition mix between eastern school whiting and stout whiting. Recommendations for approaching assessment(s) based on the outcomes of stock structure work.	$420,285 3 year project commencing in Sept 2019 and ending in May 2022	High	High
Revisiting biological paramaters andinformation used in the assessment of Commonwealth fisheries: a reality check and workplan for future proofing. (**FRDC project 2019-010**)	Update species biology information for selected key SESSF species for use in assessments.	$189K	High	High

Title	Objectives and component tasks	Evaluation		
		Total cost (approx. only)	Priority/ ranking	Feasibility
Improving and promoting fish trawl selectivity in the SESSF and GABTS (**FRDC project 2019-027**)	Quantify the performance of discard and bycatch reduction strategies in the GABT Sector and SET Sector. Recommendations for reducing discards and increasing NER and boat level profits in the trawl fisheries.	High ($776,376 total SESSF and GAB)	High	High
RESEARCH BEING CONSIDERED BY FRDC FOR 2020-21				
Investigate options for use of dynamic reference points for SESSF species	Investigate options for assessments and status reporting against dynamic reference points for SESSF stocks that appear to demonstrate long term productivity changes, including implications for harvest strategies.	Low	High	High
Research to support the Upper Slope Dogfish Management Strategy	Undertake an initial baseline survey, which will underpin a long-term monitoring plan to measure the relative abundance and recovery of Harrisson's Dogfish and Southern Dogfish. The survey is to be conducted in accordance with 'Option 1A with DeepBRUVS 'identified in the report Research to support the upper slope dogfish management strategy: Options for monitoring the recovery of Southern Dogfish and Harrisson's Dogfish (Williams et al. 2018)	High $470,000	High	High/Medium
Application of Close-Kin assessments for key species in the SESSF	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. Include blue-eye trevalla pending ARC support for blue-eye trevalla close-kin project.	Medium/ High	High	High

Title	Objectives and component tasks	Evaluation		
		Total cost (approx. only)	Priority/ ranking	Feasibility
School shark and gummy shark post release survival	Investigation of the post-release survival rates of gummy shark (focus on tertiary stress response) and school shark (focus on immediate and post-release mortality), and the application of survivability to discard estimates for these species.	Medium	High	High
NEW IDENTIFIED RESEARCH FOR 2021-22				
Close kin sampling of school shark pupping grounds to understand stock structure.	Including locations, connectivity to get better understanding of stock structure. (SharkRAG needs to consider this). Noting that the stock assessment review should be completed first, as it may be found that broader sampling may be needed (or inversely there are enough samples).	Medium	High	Medium

Research projects identified for inclusion in future research plans

Title	Objectives and component tasks	Evaluation		
		Total cost (approx. only)	**Priority/ ranking**	**Feasibility**
Desktop study to determine herding behaviour for various SESSF species to inform future ERA assessments	The current ERA methodology calculates 'swept area' by using the width of the net, but does not include the sweeps, bridles or doors. However, the effective swept area may be larger if trawl doors, sweeps and bridles are included, and this may have an influence on herding behaviour for different species or species groups. The next ERA is due in 2024 for trawl fisheries of the SESSF.	Low	High (done as part of 2022/23)	High
Developing a Close-Kin Harvest Strategy	Investigate development of a close-kin harvest strategy as part of the Multi-Species Harvest Strategy Project (MSHSP, FRDC2019/021). Determine which species it should be applied to and what the management costs would be. The MSHSP will investigate a broad range of proposals that include various aspects of a multi-species harvest strategy, however the development of a close-kin harvest strategy approach will require additional funding and resources.	TBC	High (subject to advice from MSHSP)	High
Obtaining 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	Medium Subject to data plan and implementation of EM	High
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	• Quantitative measure of TEP interactions in the SESSF • Assessment of population size for relevant species	High	Low	Med

Title	Objectives and component tasks	Evaluation		
		Total cost (approx. only)	**Priority/ ranking**	**Feasibility**
interactions and potential impacts				
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	• Identify factors which impact on the profitability of individual operators and the fishery. • Improve market dynamics. • Increase efficiency of vessels.	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

Title	Objectives and component tasks	Evaluation		
		Total cost (approx. only)	**Priority/ ranking**	**Feasibility**
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
Examination of data acquired through electronic monitoring, logbooks and on board observers (CTS)	Since the introduction of electronic monitoring (EM) in the Gillnet, Hook and Trap Sector, and more recently as part of the trial of EM in the Commonwealth Trawl Sector there has been overlap of data collected by onboard observers, EM coverage and logbooks. At its 2018 Data Meeting, SESSFRAG prioritised the need to review and compare the data acquired through the various sources, with a particular focus on discard estimates and catch composition.	Medium	Low Pending outcomes of CTS trial	High
Stock assessments for identified species in Table 1 below (subject to changes identified by the relevant resource assessment group and agreed by AFMA) in the SESSF in 2023 (using data to 2022) and 2024 (using data to 2023)	The annual assessment presents fishery statistics and catch at size/age data and synthesises existing stock assessment information for the key target species of the SESSF. This is a requirement of the SESSF Harvest Strategy.	High	Essential	High

Title	Objectives and component tasks	Evaluation		
		Total cost (approx. only)	Priority/ ranking	Feasibility
Fish ageing for SESSF quota species 3 year project ending 2025/26	Undertake fish ageing for the SESSF to support stock assessments for the period 2023/24 to 2025/26.	Total project cost around $777k over three years	Essential	High

SESSF stock assessments schedule

Species	MYTAC in 2019-20 season[1]	Last assessed	2019	2020	2021	2022	2023	2024	AFMA management comment
Alfonsino	6th year of 3-year MYTAC	2013							SESSFRAG advice to stop using Tier 3 as little new data is available due to a lack of fishing. Future assessment subject to periodic review (SESSFRAG 2019 recommended to commission – delay the next assessment until 2020 due to low catches and lack of data)
Bight redfish	1st year of 5-year MYTAC	2019	1					**1**	GABMAC raised concerns about uncertainty in the model and recent biomass estimates form the FIS – however the TAC is largely undercaught.
Blue eye trevalla	2nd year of 3-year MYTAC	2018		5*	4 slope 5 S/M			**TBC**	Currently Tier 4 for slope and Tier 5 for seamounts in 2021. Trigger to be implemented for the seamounts with no more than 54 t to be taken in any fishing year. * SEMAC request to consider tier 5 assessment for both stocks in 2020, subject to SESSFRAG review. CKMR being investigated.
Blue grenadier	2nd year of 3-year MYTAC	2018			1			**1**	Under-caught and above target. As this is a very consistent stock, the stock assessment could be delayed a year (and perhaps thereafter undertaken every four years rather than three)
Blue warehou	N/A (rebuilding species)	2013							Schedule subject to annual review of fishery indicators
Deepwater flathead	1st year of 3-year MYTAC	2019	1			1			
Deepwater shark east	2nd year of 3-year MYTAC	2018 (T4)			5			**5**	SERAG will discuss this year how to set an RBC in preparation for the 2021 assessment.

[1] For some MYTAC scheduling, assumption that decisions of the Commission will be consistent with AFMA management advice

Species	MYTAC in 2019-20 season[1]	Last assessed	2019	2020	2021	2022	2023	2024	AFMA management comment
Deepwater shark west	2nd year of 3-year MYTAC	2018 (T4)			5			**5**	SERAG will discuss this year how to set an RBC in preparation for the 2021 assessment.
Elephant fish	Single year TAC	2020 (SAFE)		SAFE			SAFE		Assessed using SAFE in Jan 2020. 1st of 3-Year MYTAC in 2020-21.
Flathead	1st year of 3-year MYTAC	2019	1			1			
Gemfish - east	N/A (rebuilding species)	2009			1			**1**	Schedule subject to annual review of fishery indicators. SERAG - recognised the difficulties in undertaking the scheduled assessment in 2020 given the paucity of data. The RAG recommended investigating options for establishing an alternative index of abundance, given the issues with CPUE. SESSFRAG agreed to delay the assessment given the lack of data available as fishers are not targeting and there is a low catch of this stock.
Gemfish - west	1st year of 3-year MYTAC	2019	4			4			Moved to a Tier 4 for the CTS component of the stock. Stock structure research has revealed evidence of genetically different populations between the east and west (no gene flow), with a mixing of the two stocks in western Bass Strait through to Portland
Gummy shark	4th year of 3-year MYTAC	2016		1			1		The original schedule for assessment in 2019 was delayed to 2020. There was concern of insufficient new data to run an updated assessment in 2019. All three assessed stocks remain above target, with no evidence that stocks were ever below the management target.
Jackass morwong	2nd year of 3-year MYTAC	2018			1			**1**	
John dory	3rd year of 3-year MYTAC	2017		4					
Mirror dory	Single year TAC	2019	4	4	4	4	4	4	Annual assessment given the cyclical nature of stock abundance
Ocean perch	3rd year of 3-year MYTAC	2017		4			4		
Orange roughy - south	N/A (rebuilding species)	2000							The Pedra Branca portion of the orange roughy was assessed as part of the eastern stock.
Orange roughy - east	3rd year of a 3 year MYTAC	2017			1			1	SESSFRAG agreed to delay the assessment by a year to enable further consideration of natural mortality. Acoustic survey abundance estimates (2013.2016 and 2019) support the model predicted biomass estimates.
Orange roughy - west	N/A (rebuilding species)	2002							Limited effort, bycatch TAC
Orange roughy - Cascade Plateau	N/A (rebuilding species)	2009							Limited data
Orange roughy - Albany & Esperence	N/A (rebuilding species)	N/A							Limited effort, bycatch TAC

Species	MYTAC in 2019-20 season[1]	Last assessed	2019	2020	2021	2022	2023	2024	AFMA management comment
Oreo smooth - cascade	Long term TAC (catch dependent)	2010							Limited data
Oreo smooth - other	Single year TAC	2019	SAFE	SAFE	SAFE	SAFE	SAFE	SAFE	
Oreo basket	3rd year of a 3 year MYTAC	2017		4			4		
Pink ling	2nd year of a 3 year MYTAC	2018			1			**1**	
Redfish	N/A (rebuilding species)	2017		1			1		Avoidance behaviour by operators and low catches may mean that CPUE is becoming less informative as an index of abundance. Redfish may be assessed in 2020 subject to data availability, the available data will be assessed at the August SESSFRAG data 2020 meeting.
Ribaldo	3rd year of a 3 year MYTAC	2017		4			4		
Royal red prawn	3rd year of a 3 year MYTAC	2017		4			4		
Saw shark	3rd year of a 3 year MYTAC	2017		4			4		
School shark	N/A (rebuilding species)	2018			1				Scheduled for 2021, pending outcomes of independent peer review of close-kin mark recapture assessment. Further consideration required by SharkRAG regarding available data and timing for next assessment.
School whiting	3rd year[t] of a 3 year MYTAC	2017 2019 update		1			1		Catches of school whiting have exceeded the RBC over the last two seasons. SERAG – recommended an external review of the school whiting Tier 1 assessment prior to the assessment being undertaken in late 2020. Discussions with NSW are ongoing regarding NSW providing CPUE data to CSIRO to use in the 2020 assessment.
Silver trevally	3rd year of a 3 year MYTAC	2017		4			4		
Silver warehou	2nd year of 3 year MYTAC	2018			1			**1**	
			2019	2020	2021	2022	2023	2024	

Attachment 7

GAB Trawl Sector Annual Research Statement 2021-22

Note: also included in the research statement are updates since the meeting arising from out of session consideration by SESSFRAG as per Action Item 18

Australian Government

Australian Fisheries Management Authority

Annual Research Statement 2021-22

Great Australian Bight Trawl Sector

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Great Australian Bight Trawl Sector Annual Research Statement for 2021-22

The Great Australian Bight Trawl Sector (GABTS) Annual Research Plan is developed by AFMA, in consultation with the Great Australian Bight Resource Assessment Group (GABRAG) and the Great Australian Bight Management Advisory Committee (GABMAC). In developing the Plan consideration is given to the broader Southern and Eastern Scalefish and Shark Five Year Strategic Research Plan (SESSF Research Plan 2015-2020).

AFMA funding in 2021-22 (AFMA Research Committee; ARC)

Title	Objectives and component tasks	Evaluation		
		Total cost ($) (approx. only)[1]	Priority/ rank[2]	Feasibility[3]
CURRENT				
GABT Fishery Independent Survey	GABRAG proposed to postpone April 2020 survey to April 2021. Conduct a winter survey which will provide further points in the times-series of fishery independent survey (FIS) indices of abundance. The resulting FIS data series will be included in stock assessments of target species and time series analysis of major by-product and by-catch species. The FIS also provides time series information on the spatial and temporal distribution of a large number of non-commercial fish species and a platform from which biological information (length, sex, maturity, age etc) can be collected in a systematic way from these species.	Medium Cost subject to review of vessel charter costs.	Essential	High

[1] Cost:- High: >$200,000 / Medium: $100,000 - $200,000 / Low: <$100,000
[2] Management priority categories: Essential / High / Medium / Low
[3] Feasibility categories: High / Medium / Low

Title	Objectives and component tasks	Evaluation		
		Total cost ($) (approx. only)[1]	Priority/ rank[2]	Feasibility[3]
Fish ageing for SESSF quota species (included in SESSF research statement)	Undertake fish ageing for the SESSF to support stock assessments for the period 2020/21 to 2022/23.	Low Total cost approx $262k p/a for SESSF. GABT proportion based on 2 speices	Essential	High
NEW IDENTIFIED RESEARCH FOR 2021-22				
Shark mitigation options for GAB board trawlers to prevent capture of deepwater sharks	Investigate options for mitigating capture of deepwater sharks by board trawl vessels, with a view to gaining access to grounds currently closed under the Upper-slope Dogfish management Strategy. The upper slope dogfish closures in the east of the GAB overlap existing orange roughy grounds, and, in shallower areas, which are historical market fishing grounds. GABT industry members have requested access to these closures as part of the review of the Upper Slope Dogfish Management Strategy (the Strategy). Previous research on the east coast to develop a shark mitigation device, similar to a turtle exclusion device, had been trialled for the purpose of gaining access to historical royal red prawn grounds (which remain closed). The trial showed positive results, but was not progressed any further than a scoping study. Progression of this work is dependent on whether this can be considered as part of the FRDC project *Improving and promoting fish trawl selectivity in the SESSF and GAB* (***FRDC* 2019-027**).	Low / Medium (consider co-management approach to reduce costs)	High	High

Title	Objectives and component tasks	Evaluation		
		Total cost ($) (approx. only)[1]	Priority/ rank[2]	Feasibility[3]
The effect of fuel prices on the Great Australian Bight Trawl Fishery Dynamics	Identifying fuel/ operating costs as a risk factor in commercial success, and the adaptive strategies of industry to manage fuel/operational cost increases. This project will examine when the GABT (or other sector) is at risk of becoming unviable because of rising costs in one variable, which may lead to a demand for government intervention through subsidies. The future of fishing fleet operations also depends on adaptive strategies including, for example, modern equipment and techniques, innovation, change management etc. Depending on the data that could be made available, the research could also include both a historical sketch, fuel price scenarios, and adaptive strategy scenarios (reporting on the structural strength or weakness of the fleet). This project could be achieved as a low-cost desktop study, and is not something that would typically be considered by the ARC or FRDC. SESSF RAG agreed to keep it on the research plan, but proposed that it be directly funded outside the normal research cycle. Additionally, ComRAC have a priority to Identify barriers and opportunities for increased productivity from Commonwealth fisheries, which could also be related to this project.	Low	High	High

FRDC funding in 2021-22 (Commonwealth Research Advisory Committee; ComRAC)

Title	Objectives and component tasks	Evaluation		
		Total cost (approx. only)	Priority/rank	Feasibility
RESEARCH UNDERWAY				
Multi-species fisheries: harvest strategy implications of maximising economic yield and implementation options for Commonwealth fisheries, with a focus on the Southern and Eastern Scalefish and Shark Fishery (SESSF)	Undertake research with the objectives: 1) Consolidation of background information and experience on (i) application of MEY in multispecies fisheries, (ii) the identified SESSF multispecies sub-fisheries and the biological and technical interactions within them, and (iii) the preferred future monitoring and assessment option(s) that have been identified by SESSF Monitoring and Assessment Review Project (SMARP). 2) Develop and quantitatively test options for a fishery-wide harvest strategy, including reference points and decision rules that can applied to the appropriate sub-fisheries and achieve MEY outcomes for the fishery as a whole. 3) Integrate the outputs from 2 and 1 (iii) above to produce a complete tested draft revision of the SESSF Harvest Strategy 4) Conduct a cost-benefit analysis for implementation of a new draft SESSF Harvest Strategy, drawing on SMARP project analyses and recommendations.	High Costs to be determined.	High Included in November 2018 call for research	High
Improving and promoting fish trawl selectivity in the SESSF and GABTS (**FRDC project 2019-027**)	Quantify the performance of discard and bycatch reduction strategies in the GABT Sector and SET Sector. Recommendations for reducing discards and increasing NER and boat level profits in the trawl fisheries.	High ($776,376 total SESSF and GAB)	High Included in November 2018 call for research	High

Title	Objectives and component tasks	Evaluation		
		Total cost (approx. only)	Priority/rank	Feasibility
NEW IDENTIFIED RESEARCH FOR 2021-22				
Impacts of environmental factors and resource availability on GAB species.	Industry are concerned with the apparent temporal shifts in deepwater flathead and Bight redfish availability. Investigate the impacts of environmental factors and resource availability on the abundance and distribution of these GAB species. Collection of environmental data (e.g. temperature at depth) for inclusion in future stock assessments for Bight redfish and deepwater flathead. Previous work undertaken by Fishwell Consulting found no correlation between availability or abundance estimates from the CTS FIS and environmental drivers. Whilst temperature and depth sensors are used during the FIS (12 years of data), this is spatially and temporally sparse. Additionally, most analyses of long-term environmental changes in temperature use an extrapolation of surface temperature data. GABIA and AFMA will investigate installing temperature loggers on the boats to collect data while fishing. A person from IMOS to attend the next GABRAG meeting to provide an overview of available environmental data in the GAB. SESSFRAG agreed that this project could be undertaken when further information was available.	Medium	High (subject to GABRAG meeting later in 2020)	High

SESSF stock assessments schedule

Species	MYTAC in 2019-20 season	Last assessed	2019	2020	2021	2022	2023	2024	AFMA management comment
Alfonsino	6th year of 3-year MYTAC	2013							SESSFRAG advice to stop using Tier 3 as little new data is available due to a lack of fishing. Future assessment subject to periodic review (SESSFRAG 2019 recommended to commission – delay the next assessment until 2020 due to low catches and lack of data)
Bight redfish	1st year of 5-year MYTAC	2019	1					**1**	GABMAC raised concerns about uncertainty in the model and recent biomass estimates form the FIS – however the TAC is largely undercaught.
Blue eye trevalla	2nd year of 3-year MYTAC	2018		5*	4 slope 5 S/M			**TBC**	Currently Tier 4 for slope and Tier 5 for seamounts in 2021. Trigger to be implemented for the seamounts with no more than 54 t to be taken in any fishing year. * SEMAC request to consider tier 5 assessment for both stocks in 2020, subject to SESSFRAG review. CKMR being investigated.
Blue grenadier	2nd year of 3-year MYTAC	2018			1			**1**	Under-caught and above target. As this is a very consistent stock, the stock assessment could be delayed a year (and perhaps thereafter undertaken every four years rather than three)
Blue warehou	N/A (rebuilding species)	2013							Schedule subject to annual review of fishery indicators
Deepwater flathead	1st year of 3-year MYTAC	2019	1			1			
Deepwater shark east	2nd year of 3-year MYTAC	2018 (T4)			5			**5**	SERAG will discuss this year how to set an RBC in preparation for the 2021 assessment.
Deepwater shark west	2nd year of 3-year MYTAC	2018 (T4)			5			**5**	SERAG will discuss this year how to set an RBC in preparation for the 2021 assessment.
Elephant fish	Single year TAC	2020 (SAFE)		SAFE			SAFE		Assessed using SAFE in Jan 2020.
Flathead	1st year of 3-year MYTAC	2019	1			1			
Gemfish - east	N/A (rebuilding species)	2009			1			**1**	Schedule subject to annual review of fishery indicators. SERAG - recognised the difficulties in undertaking the scheduled assessment in 2020 given the paucity of data. The RAG recommended investigating options for establishing an alternative index of abundance, given the issues with CPUE. SESSFRAG agreed to delay the assessment given the lack of data available as fishers are not targeting and there is a low catch of this stock.

Species	MYTAC in 2019-20 season	Last assessed	2019	2020	2021	2022	2023	2024	AFMA management comment
Gemfish - west	1st year of 3-year MYTAC	2019	4			4			Moved to a Tier 4 for the CTS component of the stock. Stock structure research has revealed evidence of genetically different populations between the east and west (no gene flow), with a mixing of the two stocks in western Bass Strait through to Portland
Gummy shark	4th year of 3-year MYTAC	2016		1			1		The original schedule for assessment in 2019 was delayed to 2020. There was concern of insufficient new data to run an updated assessment in 2019. All three assessed stocks remain above target, with no evidence that stocks were ever below the management target.
Jackass morwong	2nd year of 3-year MYTAC	2018			1			**1**	
John dory	3rd year of 3-year MYTAC	2017		4					
Mirror dory	Single year TAC	2019	4	4	4	4	4	4	Annual assessment given the cyclical nature of stock abundance
Ocean perch	3rd year of 3-year MYTAC	2017		4			4		
Orange roughy - south	N/A (rebuilding species)	2000							The Pedra Branca portion of the orange roughy was assessed as part of the eastern stock.
Orange roughy - east	3rd year of a 3 year MYTAC	2017			1			1	SESSFRAG agreed to delay the assessment by a year to enable further consideration of natural mortality. Acoustic survey abundance estimates (2013.2016 and 2019) support the model predicted biomass estimates.
Orange roughy - west	N/A (rebuilding species)	2002							Limited effort, bycatch TAC
Orange roughy - Cascade Plateau	N/A (rebuilding species)	2009							Limited data
Orange roughy - Albany & Esperence	N/A (rebuilding species)	N/A							Limited effort, bycatch TAC
Oreo smooth - cascade	Long term TAC (catch dependent)	2010							Limited data
Oreo smooth - other	Single year TAC	2019	SAFE	SAFE	SAFE	SAFE	SAFE	SAFE	
Oreo basket	3rd year of a 3 year MYTAC	2017		4			4		
Pink ling	2nd year of a 3 year MYTAC	2018			1			**1**	
Redfish	N/A (rebuilding species)	2017		1			1		Avoidance behaviour by operators and low catches may mean that CPUE is becoming less informative as an index of abundance. Redfish may be assessed in 2020 subject to data availability, the available data will be assessed at the August SESSFRAG data 2020 meeting.
Ribaldo	3rd year of a 3 year MYTAC	2017		4			4		

Species	MYTAC in 2019-20 season	Last assessed	2019	2020	2021	2022	2023	2024	AFMA management comment
Royal red prawn	3rd year of a 3 year MYTAC	2017		4			4		
Saw shark	3rd year of a 3 year MYTAC	2017		4			4		
School shark	N/A (rebuilding species)	2018			1				Scheduled for 2021, pending outcomes of independent peer review of close-kin mark recapture assessment. Further consideration required by SharkRAG regarding available data and timing for next assessment.
School whiting	3rd year[t] of a 3 year MYTAC	2017 2019 update		1			1		Catches of school whiting have exceeded the RBC over the last two seasons. SERAG – recommended an external review of the school whiting Tier 1 assessment prior to the assessment being undertaken in late 2020. Discussions with NSW are ongoing regarding NSW providing CPUE data to CSIRO to use in the 2020 assessment.
Silver trevally	3rd year of a 3 year MYTAC	2017		4			4		
Silver warehou	2nd year of 3 year MYTAC	2018			1			**1**	
			2019	2020	2021	2022	2023	2024	

Attachment 8

SESSF stock assessment schedule

Species	MYTAC in 2019-20 season[7]	Last assessed	2019	2020	2021	2022	2023	2024	AFMA management comment
Alfonsino	6th year of 3-year MYTAC	2013							SESSFRAG advice to stop using Tier 3 as little new data is available due to a lack of fishing. Future assessment subject to periodic review (SESSFRAG 2019 recommended to commission – delay the next assessment until 2020 due to low catches and lack of data)
Bight redfish	1st year of 5-year MYTAC	2019	1					**1**	GABMAC raised concerns about uncertainty in the model and recent biomass estimates form the FIS – however the TAC is largely undercaught.
Blue eye trevalla	2nd year of 3-year MYTAC	2018		5*	4 slope 5 S/M			**TBC**	Currently Tier 4 for slope and Tier 5 for seamounts in 2021. Trigger to be implemented for the seamounts with no more than 54 t to be taken in any fishing year. * SEMAC request to consider tier 5 assessment for both stocks in 2020, subject to SESSFRAG review. CKMR being investigated.
Blue grenadier	2nd year of 3-year MYTAC	2018			1			**1**	Under-caught and above target. As this is a very consistent stock, the stock assessment could be delayed a year (and perhaps thereafter undertaken every four years rather than three)
Blue warehou	N/A (rebuilding species)	2013							Schedule subject to annual review of fishery indicators
Deepwater flathead	1st year of 3-year MYTAC	2019	1			1			
Deepwater shark east	2nd year of 3-year MYTAC	2018 (T4)			5			**5**	SERAG will discuss this year how to set an RBC in preparation for the 2021 assessment.
Deepwater shark west	2nd year of 3-year MYTAC	2018 (T4)			5			**5**	SERAG will discuss this year how to set an RBC in preparation for the 2021 assessment.

[7] For some MYTAC scheduling, assumption that decisions of the Commission will be consistent with AFMA management advice

Species	MYTAC in 2019-20 season[7]	Last assessed	2019	2020	2021	2022	2023	2024	AFMA management comment
Elephant fish	Single year TAC	2020 (SAFE)		SAFE			SAFE		Assessed using SAFE in Jan 2020.
Flathead	1st year of 3-year MYTAC	2019	1			1			
Gemfish - east	N/A (rebuilding species)	2009			1			**1**	Schedule subject to annual review of fishery indicators. SERAG - recognised the difficulties in undertaking the scheduled assessment in 2020 given the paucity of data. The RAG recommended investigating options for establishing an alternative index of abundance, given the issues with CPUE. SESSFRAG agreed to delay the assessment given the lack of data available as fishers are not targeting and there is a low catch of this stock.
Gemfish - west	1st year of 3-year MYTAC	2019	4			4			Moved to a Tier 4 for the CTS component of the stock. Stock structure research has revealed evidence of genetically different populations between the east and west (no gene flow), with a mixing of the two stocks in western Bass Strait through to Portland
Gummy shark	4th year of 3-year MYTAC	2016		1			1		The original schedule for assessment in 2019 was delayed to 2020. There was concern of insufficient new data to run an updated assessment in 2019. All three assessed stocks remain above target, with no evidence that stocks were ever below the management target.
Jackass morwong	2nd year of 3-year MYTAC	2018			1			**1**	
John dory	3rd year of 3-year MYTAC	2017		4					
Mirror dory	Single year TAC	2019	4	4	4	4	4	4	Annual assessment given the cyclical nature of stock abundance
Ocean perch	3rd year of 3-year MYTAC	2017		4			4		
Orange roughy - south	N/A (rebuilding species)	2000							The Pedra Branca portion of the orange roughy was assessed as part of the eastern stock.
Orange roughy - east	3rd year of a 3 year MYTAC	2017			1			1	SESSFRAG agreed to delay the assessment by a year to enable further consideration of natural mortality. Acoustic survey abundance estimates (2013.2016 and 2019) support the model predicted biomass estimates.
Orange roughy - west	N/A (rebuilding species)	2002							Limited effort, bycatch TAC
Orange roughy - Cascade Plateau	N/A (rebuilding species)	2009							Limited data
Orange roughy - Albany & Esperence	N/A (rebuilding species)	N/A							Limited effort, bycatch TAC
Oreo smooth - cascade	Long term TAC (catch dependent)	2010							Limited data

Species	MYTAC in 2019-20 season[7]	Last assessed	2019	2020	2021	2022	2023	2024	AFMA management comment
Oreo smooth - other	Single year TAC	2019	SAFE	SAFE	SAFE	SAFE	SAFE	SAFE	
Oreo basket	3rd year of a 3 year MYTAC	2017		4			4		
Pink ling	2nd year of a 3 year MYTAC	2018			1			**1**	
Redfish	N/A (rebuilding species)	2017		1			1		Avoidance behaviour by operators and low catches may mean that CPUE is becoming less informative as an index of abundance. Redfish may be assessed in 2020 subject to data availability, the available data will be assessed at the August SESSFRAG data 2020 meeting.
Ribaldo	3rd year of a 3 year MYTAC	2017		4			4		
Royal red prawn	3rd year of a 3 year MYTAC	2017		4			4		
Saw shark	3rd year of a 3 year MYTAC	2017		4			4		
School shark	N/A (rebuilding species)	2018			1				Scheduled for 2021, pending outcomes of independent peer review of close-kin mark recapture assessment. Further consideration required by SharkRAG regarding available data and timing for next assessment.
School whiting	3rd year[t] of a 3 year MYTAC	2017 2019 update		1			1		Catches of school whiting have exceeded the RBC over the last two seasons. SERAG – recommended an external review of the school whiting Tier 1 assessment prior to the assessment being undertaken in late 2020. Discussions with NSW are ongoing regarding NSW providing CPUE data to CSIRO to use in the 2020 assessment.
Silver trevally	3rd year of a 3 year MYTAC	2017		4			4		
Silver warehou	2nd year of 3 year MYTAC	2018			1			**1**	
			2019	2020	2021	2022	2023	2024	