



Australian Government

Australian Fisheries Management Authority

South East Resource Assessment Group (SERAG) Meeting 3 2021

Meeting minutes

29 November – 1 December 2021

Microsoft Teams Meeting

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Meeting 3 – 29 November – 1 December 2021

Agenda

Day 1: 29 November 2021

Time (AEDT): 13:30 – 17:00

Location: Microsoft Teams meeting

Chair Name: Dr Paul McShane

Time	Item	Purpose	Lead presenter
13:30 30 mins	1. Preliminaries		
	1.1 Welcome and apologies	For action	Chair
	1.2 Declarations of interest	For action	Chair
	1.3 Adoption of agenda	For action	Chair
	1.4 Minutes from previous meeting	For noting	Chair
	1.5 Actions arising from previous meetings	For noting	Aaron Puckeridge (AFMA)
14:00 1.5 hours	2. Rebuilding Species annual reviews Blue Warehou Annual review (Inc. targeting & companion sp.) Discussion TAC advice Orange Roughy Annual review Discussion TAC advice (South, West)	For discussion	Daniel Corrie (AFMA) Paul Burch (CSIRO)
15:30 1.5 hours	3. Blue-eye trevalla Tier 4 and 5 assessments	For advice	Miriana Sporcic (CSIRO)
17:00	<i>End of Day 1</i>		

Day 2: 30 November 2021

Time (AEDT): 9:00–17:30

Location: Microsoft Teams meeting

Time	Item	Purpose	Lead presenter
9:00 30 mins	Agenda item 4. Oreo smooth (other) Weight of evidence – TAC advice	For advice	Daniel Corrie (AFMA)

Time	Item	Purpose	Lead presenter
9:30 1 hour	Agenda item 5. WORRP update Update and discussion RCA recommendation	For advice	Simon Boag (SETFIA)
10:30	<i>15 min break</i>		
10:45 1.5 hours	Agenda item 6. Blue Grenadier Presentation of Tier 1 final assessment Discussion RBC advice	For advice	Geoff Tuck (CSIRO)
12:15	<i>Lunch – 30 min break</i>		
12:45 1.5 hours	Agenda item 7. Orange roughy (East) Presentation of Tier 1 final assessment Discussion RBC advice	For advice	Paul Burch (CSIRO)
14:15	<i>15 min break</i>		
14:30 1.5 hours	Agenda item 8. Jackass Morwong Presentation of Tier 1 final assessment (East) Discussion RBC Advice	For noting	Jemery Day (CSIRO)
16:00 1.5 hours	Agenda item 9. Hagfish Research plan Arrangements for 2022–23 season	For advice	Sally Weekes (AFMA)
17:30	<i>End of Day 2</i>		

Day 3: 1 December 2021

Time (AEDT): 9:00–16:45

Location: Microsoft Teams meeting

Time	Item	Purpose	Lead presenter
09:00	Agenda Item 10. Pink Ling	For advice	Patrick Cordue (ISL)

Time	Item	Purpose	Lead presenter
1.5 hours	Presentation of Tier 1 final assessment Discussion RBC advice		
10:30	<i>15 min break</i>		
10:45 1.5 hours	Agenda item 11. Silver Warehou Presentation of Tier 1 final assessment Discussion RBC advice	For advice	Pia Bessell-Browne (CSIRO)
12:15	<i>Lunch – 30 min break</i>		
12:45 1 hour	Agenda Item 12. Rebuilding species TAC advice Metier analysis TAC advice (redfish, gemfish (east), blue warehou)	For advice	Paul Burch (CSIRO) Daniel Corrie (AFMA)
13:45 2.5 hours	Agenda item 13. SESSF Research Priorities 2022–23 Identification of research priorities	For advice	Daniel Corrie (AFMA)
15:00	<i>15 min break</i>		
15:15 2.5 hours	Agenda item 13. SESSF Research Priorities 2022–23 (continued) Identification of research priorities	For advice	Daniel Corrie (AFMA)
16:30 15 mins	Other business and action items review	For advice	Chair
16:45	<i>Meeting close</i>		

The Chair opened the meeting at 13:30.

1 Agenda item 1 – Preliminaries

1.1 Welcome and apologies

1. Dr Paul McShane (the Chair) welcomed attendees to the meeting and made an Acknowledgement of Country paying our respects to this country’s First People and Traditional Custodians of the land throughout Australia. Acknowledging Australia’s Traditional Custodians of Country and recognising their continued connection to land, waters and community. Paying our respects to them and their cultures and to Elders past present and emerging.
2. The SERAG (the RAG) members noted the Acknowledgement of Country, that the meeting was being recorded and commenced proceedings.
3. The RAG noted that some attendees were absent for some of the meeting days as described in [Table 1](#).

Table 1. A list of SERAG members and other attendees.

Members	Position
Dr Paul McShane	Chair
Dr Ian Knuckey ¹	Scientific member
Dr Geoff Tuck	Scientific member
Mr Andrew Penney	Scientific member
Mr James Woodhams ²	Scientific member
Dr Sarah Jennings	Scientific (Economics) member
Mr Simon Boag	Industry member
Mr John Jarvis ³	Industry member
Mr Daniel Hogan ⁴	Industry member
Mr Ross Winstanley ⁵	Recreational member
Mr Daniel Corrie	AFMA member
Executive Officer	Organisation
Mr Aaron Puckeridge	AFMA
Invited Participants	Organisation
Dr Paul Burch	CSIRO ⁶
Dr Miriana Sporcic	CSIRO
Dr Pia Bessell-Browne	CSIRO
Dr Robin Thomson	CSIRO
Dr Jemery Day	CSIRO

¹ Not present on day 1

² Not present on day 1

³ Only present on day 1

⁴ Not present on day 3

⁵ Not present on day 1

⁶ [Commonwealth Scientific and Industrial Research Organisation](#)

Mr Chad Lunow ⁷	DAFF ⁸
Mr Patrick Cordue ⁹	Innovative Solutions Ltd
Dr Geoff Liggins	NSW DPI ¹⁰
Ms Frances Seaborn	DNRET ¹¹
Mr Nicholas Hill	CSIRO
Ms Toni Cannard	CSIRO
Dr Kevin Stokes	Stokes.net.nz.Ltd
Mr Christopher Spurrier ¹²	Hagfish Australia Pty Ltd
Mr Dennis Brown ¹³	Hagfish Australia Pty Ltd
Dr Caroline Sutton	CSIRO
Dr Douglas Ferrell ¹⁴	Fisheries science advisor to Hagfish Australia
Observers	Organisation
Mr Les Scott ¹⁵	Peter and Una Fishing Co
Dr Daniel Wright	ABARES ¹⁶
Dr Tim Emery	ABARES
Dr Krystle Keller	ABARES
Dr Sandra Curin Osorio	CSIRO
AFMA Attendees	Role
Ms Sally Weekes	AFMA, GHaT ¹⁷ manager
Ms Fiona Hill	AFMA, Demersal Section Senior Manager
Ms Kate Martin	AFMA
Ms Heather Johnston ¹⁸	AFMA

1.2 Declarations of interest

4. The RAG members followed the conflict of interest declarations as outlined in [Fisheries Administration Paper 12](#). Members and participants reviewed and updated the Declarations of Interest included at [Attachment A](#).
5. The RAG decided that when management advice was being determined, any member with declared conflicts of interest ([Table 2](#)) would leave the meeting but remain present during the discussions.

⁷ Only present for [agenda item 3](#)

⁸ [Department of Agriculture and Fisheries](#)

⁹ Only present for [agenda items 7](#) and [10](#)

¹⁰ [NSW Department of Primary Industries](#)

¹¹ [Department of Natural Resources and Environment Tasmania](#)

¹² Only present for [agenda item 9](#)

¹³ Only present for [agenda item 9](#)

¹⁴ Only present for [agenda item 9](#)

¹⁵ Only present for agenda items [3](#), [6](#) and [10](#)

¹⁶ [Australian Bureau of Agricultural and Resource Economics and Sciences](#)

¹⁷ Gillnet, Hook and Trap

¹⁸ Only present for [agenda item 10](#)

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

Agenda Item	Potential conflicts of interest	Discussion Participation	Recommendation Participation
3. Blue-eye trevalla tier 4 and 5 assessments	Mr Simon Boag Mr Daniel Hogan Mr John Jarvis Mr Les Scott	Present	Absent
4. Oreo smooth (other)	Mr Simon Boag Mr Daniel Hogan	Present	Absent
5. WORRP update	Mr Simon Boag Mr Daniel Hogan	Present	Absent
6. Blue grenadier	Mr Simon Boag Mr Les Scott Mr Daniel Hogan	Present	Absent
7. Orange roughy (east)	Mr Simon Boag Mr Daniel Hogan	Present	Absent
8. Jackass morwong	Mr Simon Boag Mr Daniel Hogan	Present	Absent
9. Hagfish	Mr Denis Brown Mr Christopher Spurrier	Present	Absent
10. Pink ling	Mr Simon Boag Mr Les Scott	Present	Absent
11. Silver warehou	Mr Simon Boag	Present	Absent
12. Rebuilding species TAC ¹⁹ advice	Mr Simon Boag	Present	Absent
13. SESSF research priorities 2022-23	Mr Simon Boag Dr Paul Burch Dr Geoff Tuck Dr Jemery Day Dr Miriana Sporcic Dr Pia Bessell-Browne Dr Robin Thomson Ms Toni Cannard Dr Caroline Sutton	Present	Absent

1.3 Adoption of agenda

6. The RAG adopted the [agenda](#) as final.

1.4 Minutes of previous meeting

7. The RAG noted the final minutes of the SERAG meeting 2 of 19–20 October 2021 are being finalised and will be published on the [AFMA website](#).

1.5 Actions arising from previous meetings

8. The RAG noted the action items from previous meetings and the updates provided by the Executive Officer at [Attachment B](#). Specifically, the RAG discussed the following action items:
- [Action item 6](#) – *Dr Paul Burch (CSIRO) and the orange roughy steering committee to produce a document outlining assessment options, including data requirements and metrics, for orange roughy stocks, with a view to demonstrating recovery.* This document will be presented at the SESSFRAG²⁰ data meeting in August 2022. This action item will be closed.

¹⁹ Total Allowable Catch

²⁰ [Southern and Eastern Scalefish and Shark Resource Assessment Group](#)

- [Action item 10](#) – AFMA to undertake a risk assessment to explore the risk associated with increasing the smooth oreo (other) TAC to 135 t. This will occur after the 2020 assessment period. Smooth oreo (*Pseudocyttus maculatus*) (other) are not commonly being caught in western roughy zone, contrary to what was expected. Only 1.5 t has been caught in the western zone between the 2019–20 and 2020–21 SESSF²¹ seasons and none in the 2021–22 season. This action item is to be closed as this is no longer a sustainability concern.
- [Action item 12](#) – AFMA to ensure that the SIDAC²² data collection includes total and partial lengths of school and gummy shark including school sharks larger than 160 cm, and tissue samples of Blue-eye trevalla for CSIRO’s close-kin work and for ageing: (a) Start collecting 20 samples from approximately 20% of the shots, and (b) The SSIA co-management contract needs to be finalised and this action item incorporated into the SIDAC Data Plan. The total and partial length component is now incorporated into the SIDaC contract and the SESSF data plan and are waiting on the outcomes of the current blue-eye trevalla (*Hyperoglyphe antarctica*) close kin mark-recapture research program. This action item is ongoing and will remain open.
- AFMA to investigate CDR data for redfish catches in the west - how it is reported as either Bight Redfish or redfish, and correct errors. This action item has been closed and combined with [action item 17](#).
- [Action item 21](#) – CSIRO, AFMA, and Mr Patrick Cordue to discuss and decide on what diagnostics should be provided/produced as outputs for stock assessments going forward, and for pink ling CPUE in particular. Mr Patrick Cordue will present the final pink ling (*Genypterus blacodes*) stock assessment at this meeting.

Agenda item 2 – Rebuilding species annual reviews

9. The RAG noted the annual reviews of the blue warehou (*Seriolella brama*) and orange roughy (*Hoplostethus atlanticus*) rebuilding strategies and that they had been asked to provide advice on whether the strategies were appropriate and if any revisions were needed.
10. The RAG noted the following background:
 - The rebuilding strategies for both blue warehou and orange roughy were recently subject to a comprehensive 5-year review. These have been completed and submitted to the [Threatened Species Scientific Committee](#). AFMA expect the final strategies to be published in early 2022.
 - Recent trends in relevant data such as catch, effort, and CPUE²³ across metrics such as depth, vessel, and gear were presented to the RAG to investigate any evidence of targeting behaviour or changes in fishing operations that may lead to greater catches of these recovering stocks.
 - A Metier analysis was presented to the RAG, identifying which gears and fleets encounter these stocks most.
 - RBC²⁴ advice had been provided for various orange roughy stocks in previous SERAG meetings (the Cascade Plateau and East Coast Deepwater Trawl stocks in September 2021 and the eastern stock in October 2021).
11. The RAG noted the following key points regarding the orange roughy rebuilding strategy:
 - Major changes to the orange roughy rebuilding strategy as part of the five-year review include:
 - updated guidance on the annual review process;

²¹ Southern and Eastern Scalefish and Shark Fishery

²² Shark Industry Data Collection

²³ Catch per Unit Effort

²⁴ Recommended Biological Catch

- a detailed review of the [Orange Roughy Research Plan for the GABTF](#)²⁵ and WORRP²⁶; and
- guidance on how data is collected.
- The Stock status was presented for each of the 5 orange roughy stocks along with recent trends in catch, effort and other relevant data to identify any evidence of targeting and increased mortality.
- The RAG noted that catches are below the bycatch TACs.
- The RAG discussed the current scientific data collection program for the eastern zone orange roughy and whether the current targets of 3,000 otoliths and 6,000 lengths were required.

12. The RAG noted the following key points regarding the blue warehou rebuilding strategy:

- Major changes to the blue warehou rebuilding strategy as part of the 5-year review include:
 - an updated annual review process including a formal targeting analysis;
 - removing the requirement for industry to report catches greater than 250 kg;
 - considering alternate options for an index of abundance; and
 - considering ecosystem shifts that may lead to the non-recovery of stocks and the implications for recovery timeframes.
- It was noted that stock status is not well known but that there is no evidence of stock recovery. There are also concerns as to whether mortality is low enough to allow for stock recovery.
- The RAG was presented with recent trends in catch and effort to explore if there was any evidence of targeting and increased mortality.
- It was noted that blue warehou catch is below the TAC triggers in both the eastern and western zones.
- Dr Paul Burch presented the metier analysis for blue warehou and predicted 2022 catches at 11.4 t (with 2,400 t of flathead catch) given the recent trends in the metiers that encounter blue warehou. It was noted that this is only an estimate and is dependent on the assumptions made in the metier analysis.

13. The RAG made the following key points:

- The RAG discussed the accuracy of the metier analysis given the variability of catches, effort and targeting through time.
- It was noted that the tiger flathead (*Platycephalus richardsoni*) metiers were the most influential, given that they encounter several recovering stocks including jackass morwong (*Nemadactylus macropterus*).
- Dr Paul Burch was asked to explore alternative tiger flathead catch scenarios for 2022 within the metier analysis to determine the effect on rebuilding species, particularly jackass morwong and John dory (*Zeus faber*). This included catches at the 2021 catch level, 2,200 t and 2,400 t to be presented on day 3 of this meeting.
- Ms Frances Seaborn noted that recent Tasmanian state catches of blue warehou have been approximately 1 t per year.

2.1 Actions and recommendations for agenda item 2

Action item 1: Mr Daniel Corrie, Dr Paul Burch, and Dr Tim Ryan of AFMA and CSIRO to meet prior to the ISMP²⁷ working group meeting (15 Dec 2021) to clarify the eastern orange roughy biological data collection program.

²⁵ Great Australian Bight Trawl Fishery

²⁶ [Western Orange Roughy Research Plan](#)

²⁷ Integrated Scientific Monitoring Program

Recommendations:

- The RAG endorsed the current rebuilding strategies and suggested no revisions. The metier and bycatch analysis does not identify any cause for concern in the predicted 2022 target species catches, therefore, the RAG recommends the current incidental bycatch TACs be maintained for the 2022–23 SESSF fishing season. This includes 60 t for orange roughy west, 31 t for orange roughy south, and 50 t for blue warehou. The RAG also supported ongoing efforts to improve data collection.

Agenda item 3 – Blue-eye trevalla tier 4 and 5 assessments

14. The RAG noted the updated tier 4 (slope stock) and tier 5 (seamount stock) stock assessments of blue-eye trevalla and that they had been asked to provide advice on RBC values and how to account for orca depredation. Details on the two stock assessments, the RAG's comments on data and the assessment outputs, and the RAG's recommendations are provided at ([Attachment D](#)).

15. The RAG made the following key points:

- The range of estimates produced by the tier 5 stock assessment are not confidence intervals or bounds, but each are equally likely scenarios.
- The RAG should be pragmatic with the number of scenarios and options presented to SEMAC²⁸ to decide on an RBC.
- The RAG should explore options of how to support an alternative to the tier 5 stock assessment.
- The discount factor was previously not applied because of the level of protection thought to be provided by closures, and that orca depredation resulted in a more conservative CPUE series.
- Considering a continued decline in CPUE despite some level of protection afforded by closures, and ongoing changes to data inputs, SERAG agreed that further work is required to understand the impact of orca depredation on catch rates, and whether closures are affording a level of protection that sufficiently offsets applying a discount factor.
- CSIRO attendees noted that orca depredation results in cryptic mortality.
- Industry attendees noted that AFMA logbooks do not allow for orca depredation to be recorded, although some operators record depredation in personal records.
- The RAG supported that GHaT logbooks should be updated so that orca depredation can be recorded. This may allow for detailed analysis of orca depredation.

3.1 Actions and recommendations for agenda item 3

Recommendations:

- The RAG recommended a 3-year MYTAC²⁹ of 36 t with no more than 54 t to be caught in any one year for the seamount blue-eye trevalla stock, noting the outputs of previous stock assessments and the tier 5 stock assessment. The RAG agreed that the current TAC is within the range of RBCs produced when an HCR³⁰ is applied to the outputs of the tier 5 stock assessment and that there was no basis for revising the previous TAC advice of 36 t. The RAG recommended that no discount factor was required given the precautionary nature of the tier 5 stock assessment.
- The RAG recommended a 3-year MYTAC of 349.23 t for the slope stock based on the tier 4 assessment, with a 15 per cent discount factor to be applied. The discount factor was considered prudent due to uncertainty in the current stock assessment given recent updates to the CPUE series, long-term impacts of climate change and the effect of orca depredation.

²⁸ [South East Management Advisory Committee](#)

²⁹ Multi Year Total Allowable Catch

³⁰ Harvest Control Rule

- The RAG recommended that AFMA update logbooks to allow for operators to record whale sightings and orca depredation events.

Agenda item 4 – Oreo smooth (other)

16. The RAG noted the agenda item and that an updated RBC recommendation for smooth oreo (other) was needed for the 2022–23 SESSF fishing season. Details on smooth oreo (other) and the RAG’s comments and recommendations are provided in the species summary at [Attachment E](#).
17. The RAG made the following key points:
 - Previous RAG minutes suggested that new evidence would be required to increase the TAC.
 - [FishPath](#), a fisheries management decision support tool, could be used to identify viable stock assessment and HCR advice.
 - It was noted that AFMA and the RAG should be more formal with the indicators it records and uses when determining stock status and management advice, particularly for data-limited stocks.

4.1 Actions and recommendations of agenda item 4

Recommendations:

- The RAG recommended continuing the 90 t TAC for smooth oreo (other) for the 2022–23 SESSF fishing season. The RAG also noted that greater data collection is needed to reinforce management decisions. This is needed if TACs were to be increased in the future.

Agenda item 5 – WORRP update

18. The RAG noted the update on the WORRP 2020–2022 and that they were being asked to recommend an RCA³¹ for the 2022–23 SESSF season.
 - The WORRP is currently in its second year with fishing and data collection underway. Some data has been collected to date, with the program 3 months into the 6-month season (fishing started in August 2021 and concludes in January 2022).
 - The research catch allowance for the last two years has been 200 t with a 100 t catch trigger in place for each zone.
 - An overview of the data collected, catch from each zone, bycatch and observer coverage was presented to the RAG. For this season, 4,500 lengths have been recorded, and 2,155 otoliths collected. This is relative to a target of 6,000 length and 3,000 otoliths. It is expected that these targets will be met at the end of the season.
 - Most trawl shots have occurred in the northern zone. To date, orange roughy catches are lower than last year with a total of 102.2 t caught. Most orange roughy has been caught in the central zone (between -38.30° S and -40.30° S), with 54 t caught, 42 t has been caught in the northern zone (north of -38.30° S) and 6 t has been caught in the southern zone (south of -40.30° S).
 - AFMA observers have been deployed on 6 trips and observed 29 shots in 2021. Observed trips covered approximately 12 per cent of shots and approximately 6 per cent of the total catch of orange roughy. Observers reported that one shortfin mako was interacted with while fishing for orange roughy.
 - In the observer catch composition data, brier sharks (*Deania calcea*) were the most common bycatch species this year, with 10.9 t observed (7.9 t retained and 3 t discarded). This was high in comparison to the 6.2 t of orange roughy caught (5.3 t retained and 0.8 t discarded).

³¹ Research Catch Allowance

19. The RAG made the following key points:

- Industry attendees noted that no discrete spawning aggregations had been found, with orange roughly distributed throughout the grounds. This is consistent with the first year of WORRP fishing (2020–21) and industry’s understanding of the western stock.
- In 2020, fishing under the WORRP spanned from May to November. Given lower catches in 2021, industry have requested a 1 May start date for 2022.
- The RAG noted that collecting data over the same period each year would help isolate the effect of season when trying to estimate stock status.
- It was noted that gulper sharks had not been recorded by observers or in logbooks. There is a non-retention rule for gulper sharks. Species identification is known to be difficult, so it is possible these have been caught but not recorded correctly. There has been no fishing in the closure.

5.1 Actions and recommendations of agenda item 5

Recommendations:

- The RAG endorsed continuing the WORRP with an RCA of 200 t and catch trigger of 100 t for each zone for the 2022–23 SESSF season. The fishing season start date can be flexible, but the RAG supported industry's request to start on the 1st of May 2022. The RAG recommended that current otolith and length targets are maintained.

Agenda item 6 – Blue grenadier

20. The RAG noted the updated stock assessment of blue grenadier (*Macruronus novaezelandiae*) and that they needed to provide RBC advice for the 2022–23 SESSF fishing season. Details on the 2021 tier 1 stock assessment, the RAG’s comments on data and assessment outputs, and the RAG’s recommendations are provided in the species summary at [Attachment F](#).

21. The RAG made the following key points:

- Industry attendees concurred with the high estimate of blue grenadier biomass, noting that there has been record shots of blue grenadier caught, and large numbers of recruits are being encountered along Australia’s east coast.
- Given the high RBC and uncertainty in the assessment, the RAG recommended updating the assessment in 2022 to include the acoustic data collected in 2019, 2020 and 2021 which should decrease uncertainty in final year stock status and potentially reduce the retrospective patterns in the model.
- While uncertain, none of the bounds around the estimate of biomass are less than 100 per cent B_0 ³².
- While the RBC is 23,773 t, the large change limiting rule will constrain the increase in TAC, which may not be caught due to fleet capacity.
- The RAG agreed that an acoustic survey in 2022 is a priority, noting the acoustic biomass estimate from the 2022 survey would not be available until 2023. Acoustic data was collected in 2019, 2020 and 2021 and will be evaluated for use as an input to the 2022 assessment.

6.1 Actions and recommendations of agenda item 6

Action item 2: AFMA to communicate with Fish Ageing Services to age blue grenadier otoliths for 2022 to provide a line of evidence of stock status for the RAG and SEMAC to help make RBC and TAC recommendations in 2022.

³² Virgin Biomass

Recommendations:

- Given high estimates of biomass for blue grenadier, but also associated high uncertainty in those estimates, the RAG recommended a 1-year RBC of 23,773 t, noting that an updated stock assessment will be completed in 2022. The RAG also noted that the large change limiting rule will constrain the TAC for the 2022-23 fishing season.

Agenda item 7 – Orange roughy (east)

22. The RAG noted the updated tier 1 stock assessment of orange roughy (east) and that they needed to provide RBC advice for the 2022–23 SESSF fishing season. Details on the 2021 tier 1 stock assessment, the RAG’s comments on data and assessment outputs, and the RAG’s recommendations are provided in the species summary at [Attachment G](#).

23. The RAG made the following key points:

- The 2017 eastern orange roughy assessment used a M^{33} value of 0.04. For the 2021 assessment, M was estimated in the model to be 0.0393 which resulted in a lower RBC (from the MPD³⁴).
- The RAG and the orange roughy working group recommended that an MCMC³⁵ be undertaken to characterise uncertainty in the model.
- The status from the median of the MCMC was lower than the MPD estimate. The working group recommended that the MCMC analysis (that estimates the width parameter of the logistic selectivity function) should be retained and used to provide advice in setting RBCs, not the MPD.
- The resulting RBC for 2022 is 633 t, approximately half the 2021 RBC produced by the 2017 model. Given the impact to TACs, the orange roughy working group requested that constant catch projections be provided to understand the risk associated with setting TACs higher than the RBC. Constant catch projections to 950 t were provided, risk profiles higher than this were not provided to the RAG.
- The RAG considered the constant catch table, and noted there was little additional risk associated with catches up to 950 t.

7.1 Actions and recommendations of agenda item 7

Recommendations:

24. The RAG recommended a three-year MYTAC for orange roughy east using the outputs of the MCMC analysis. If a TAC greater than the RBC of 737 t (using the HCR) were to be set in the east, the constant catch scenarios and associated risk profiles should be used as basis for determining the TAC.

25. The orange roughy Pedra Branca area three-year MYTAC will constitute 7 per cent of this RBC apportioned to the eastern zone.

26. The RAG recommended maintaining the current 100 per cent undercatch provisions.

Agenda item 8 – Jackass morwong

27. The RAG noted the updated tier 1 stock assessment for eastern jackass morwong and that they needed to provide RBC advice for the 2022–23 SESSF fishing season. Details on the 2021 tier 1 stock

³³ Natural mortality

³⁴ Maximum Posterior Density

³⁵ Markov Chain Monte Carlo

assessment, the RAG's comments on data and assessment outputs, and the RAG's recommendations are provided in the species summary at [Attachment H](#).

28. The RAG made the following key points:

- The jackass morwong assessment included a productivity shift in 1988 to account for an extended period of below average recruitment. There appears to be a continued reduction in recruitment since the productivity shift was implemented. As such, the base case for the current assessment used low recruitment projections.
- Industry attendees agreed with the overall outcomes of the tier 1 stock assessment, agreeing that jackass morwong abundance is at a historic low.
- The RAG noted that biomass estimates shifted from 30 per cent B_0 in 2018 to 22 per cent B_0 in 2021 when using average recruitment projections and dropped further to 15 per cent B_0 in the final base case when incorporating low recruitment projections. The RAG questioned what was driving such large changes in the model's estimate of stock status and why such this change has occurred between stock assessments.
- Retrospective analyses show evidence of model misspecification. While the trends were improved when moving from average to low recruitment projections, this change did not fix the patterns to within acceptable limits. The estimated value of virgin biomass revised downwards as each year of recent data is added to the model, as are recruitment deviations.
- There appears to have been a steady decline in productivity since around 1990, suggesting the 'stepped' shift in productivity accepted in 2011 was inappropriate. Using dynamic B_0 is one way to incorporate a gradual decline in productivity rather than a productivity shift step function which is currently used in the assessment. Results using a dynamic B_0 , suggest stock status first drops below B_{48} ³⁶ in the late 1960s and is just above the limit reference point in 2020. Under static B_0 , without a productivity shift, the stock status dropped below the target in 2003 and has been below the limit reference point since 2013.
- The [Commonwealth Fisheries Harvest Strategy Policy](#) requires a stock to be rebuilt to the limit reference point within T_{MIN} ³⁷, or up to 2 times T_{MIN} after assessing the trade-off between costs and benefits of alternative recovery trajectories.
- It was noted that the model projected jackass morwong to recover above the limit reference point in 5 years if zero catch is taken, but if 100 t is taken the stock would not recover above the limit reference point until after 2040.
- The RAG noted that a rebuilding strategy will need to be developed. Under this strategy, industry cannot target jackass morwong and there needs to be 75 per cent probability that the stock is above the limit reference point to be considered recovered.
- Based on the metier analysis, the unavoidable bycatch of jackass morwong in 2022 is 118 t, which is too high to allow the stock to recover. The main metier that encounters jackass morwong is trawl caught tiger flathead.
- It was suggested that the RAG needs to reflect on historical advice provided for jackass morwong, including how the estimates of biomass and RBCs have changed so dramatically. The RAG suggested an independent review of key SESSF stock assessments to ensure this does not happen for other species.

8.1 Actions and recommendations of agenda item 8

Recommendations:

³⁶ 48 per cent of Virgin Biomass

³⁷ The minimum time that would be taken to rebuild in the absence of any commercial fishing

- The RAG recommended that the 223 t RBC for western jackass morwong be rolled over, noting there is very little catch and the global TAC will be constrained to reduce catches of eastern jackass morwong.
- The RAG recommended an RBC of 0 t for eastern jackass morwong, noting that the updated stock assessment considers the stock to be below the limit reference point. Noting the estimated recovery timeframe under different levels of catch, the RAG recommended restricting total mortality to 50 t. Noting the outcomes of the metier analysis, unavoidable bycatch is expected to be 118 t in 2022.

Agenda item 9 – Hagfish

29. The RAG noted the agenda item and that they were to provide advice on hagfish (*Eptatretus cirrhatus*) fishing management arrangements for the 2022–23 SESSF fishing season.
- The hagfish fishery (a component of the GHaT sector of the SESSF) is still developing and its data is poor. One vessel operates in the fishery.
 - Little is known about hagfish biology and their capacity to sustain fishing pressure.
 - Management arrangements currently include a TAC of 80 t, which AFMA considers to be precautionary, 10 per cent observer coverage, and a minimum escape hole size of 16 mm. These management arrangements were all implemented in the 2021–22 SESSF season.
 - Dr Douglas Ferrell, a consultant for Hagfish Australia, presented a review of the hagfish fishery and recommended potential data sources to monitor the fishery.
 - Given that hagfish are difficult to handle, weight may be easier for observers to measure than length.
 - The RAG identified CPUE as the most important performance indicator to monitor. The RAG noted that CPUE should be monitored with caution because hagfish catches could be hyper stable.
 - Hagfish operators set multiple strings of connected traps. The way trap sets are currently recorded does not capture the spatial information needed to monitor hagfish fishing and support the RAG’s and AFMA’s decision making. AFMA attendees noted that they had identified issues with the current logbooks, and they were revising them to allow for better data collection.
30. The RAG made the following key points:
- Given that the fishery is developing, there is likely to be a skipper effect. Skipper details should be recorded in the logbooks going forward.
 - The RAG supported a precautionary management approach and reiterated that it is of interest to the operators to facilitate greater data collection to allow for growth in the fishery.
 - The RAG noted that they believe Hagfish to be long-lived, slow growing, and have a high standing biomass and therefore may not be able to sustain heavy fishing.
 - The RAG inquired if there was evidence of hagfish aggregating in certain depths, temperatures, or other variables. The RAG suggested that hagfish populations may coincide with trawl grounds with discards likely providing a food source for hagfish.
31. The RAG discussed ongoing experiments with the hagfish trap escape hole sizes:
- Since the start of the fishery, 10 mm escape holes have been used on hagfish traps. On 1 May 2021, a minimum escape hole size of 16 mm and a requirement to trial 18 mm escape holes were introduced. Industry have since received a scientific permit to trial a range of escape hole sizes, from 6–18 mm.
 - The RAG noted that traps of both the old (12 mm) and new (greater than 12 mm) escape hole sizes need to be set on the same string of traps to allow a comparison. Additional sampling is

required as part of these gear selectivity trials, as escape hole selectivity may be density dependent.

9.1 Actions and recommendations of agenda item 9

Recommendations:

- The RAG endorsed continuing the current hagfish management arrangements, including an RBC of 80 t and 10 per cent observer coverage for the 2022–23 SESSF fishing season. The RAG also supported improved logbook data collection and overlapping different trap escape hole sizes on individual strings of traps for data time series purposes.

Agenda item 10 – Pink ling

32. The RAG noted the updated tier 1 stock assessment for pink ling and that they needed to provide RBC advice for the 2022–23 SESSF fishing season. Details on the 2021 tier 1 stock assessment, the RAG’s comments on data and assessment outputs and the RAG’s recommendations are provided in the species summary at [Attachment I](#).

- The RAG inquired about the differences in the selectivity curve observed between the port and observer data, noting there seemed to be an issue of sampling with the selectivity curve being heavily dome shaped.
- The RAG discussed pink ling discard patterns and it was noted that the removal of trip limits for SETFIA³⁸ Commitment Group Boats in the east has substantially decreased discards.
- The RAG noted the recovery timeframes for pink ling (east) and suggested that an RBC above 550 t should not be recommended to allow for a quicker recovery.

10.1 Actions and recommendations of agenda item 10

Recommendations:

- The RAG recommended a 3-year MYTAC using an average RBC of 457 t in the east and 1,193 t in the west based on the outputs of the MCMC analysis in the tier 1 stock assessment. If a TAC greater than the RBC were to be set in the east, the constant catch scenarios and associated risk profiles should be used as basis for determining the TAC.

Agenda item 11 – Silver warehou

33. The RAG noted the updated tier 1 stock assessment of silver warehou (*Seriolella punctata*) and that they needed to provide RBC advice for the 2022–23 SESSF fishing season. Details on the 2021 tier 1 stock assessment, the RAG’s comments on data and assessment outputs and the RAG’s recommendations are provided in the species summary at [Attachment J](#).

- There is uncertainty in the recent discard estimates which have increased by 80 per cent. There has also been low observer coverage to confirm discard patterns. Comments from industry would be helpful to validate these patterns.
- Mr Simon Boag noted that the RAG should be wary of giving too much weight to the comments of single operators regarding fleetwide discard trends.
- The RAG noted that silver warehou are a bycatch for freezer boats targeting the blue grenadier spawning aggregation and the question was raised whether freezer boats would be contributing to silver warehou discards, or if they would retain all silver warehou to be processed as fish meal. Mr Simon Boag confirmed that the freezer boats cannot mill silver warehou, large fish are retained and sold while small fish are discarded. While this explains

³⁸ [South East Trawl Fishing Industry Association](#)

discards in the west trawl fleet, it does not explain the dramatic increase in discards in the east trawl fleet.

11.1 Actions and recommendations of agenda item 11

Recommendations:

- The RAG recommended a 3-year MYTAC for silver warehou of no greater than 350 t to allow the stock to continue to recover towards B_{Targ} ³⁹. The RAG provided a risk table to SEMAC and the AFMA Commission to help inform the risk and rebuilding timeframes when deciding a TAC. The RBC recommended by the HCR was not recommended by the RAG as the HCR assumes average recruitment and the model uses low recruitment projections.

Agenda item 12 – Rebuilding species TAC advice

34. The RAG noted the agenda item and that they were being requested to provide advice on bycatch TACs for rebuilding species using the metier analysis to help inform decision making.

35. The metier analysis was presented, detailing recent trends in catch and effort by depth, vessel and area to identify any evidence of targeting or changes in behaviour. Flathead is a key companion species for John dory, jackass morwong and redfish. The analyses assumed a tiger flathead catch of 2400 t, however catches are not expected to be this high.

- The following bycatches were estimated based on catches from key metiers:
 - John dory – 66 t;
 - jackass morwong – 118 t;
 - redfish (*Centroberyx affinis*) – 27 t;
 - eastern gemfish (*Rexea solandri*) – 88 t; and
 - school shark (*Galeorhinus galeus*) – 149 t.

36. The RAG made the following key points:

- If a bycatch TAC is set below the level of unavoidable bycatch, there will likely be greater discards, rather than less overall mortality.
- The metier analysis can also be explored incorporating RBC outputs from stock assessments.
- Managers need to balance the trade-off of maximising the recovery potential of rebuilding species while minimising the impact to industry.
- Reducing the TAC for a key companion species, such as flathead, is not expected to yield a 1:1 reduction in bycatch because of the number of metiers that contribute to overall catch. For example, much of the catch of John dory is taken by otter trawl in ISMP zones 20 and 60, whereas a reduction to the flathead TAC would be spread across the fishery and gear types.

12.1 Actions and recommendations of agenda item 12

Recommendations:

- The RAG recommended bycatch TACs that allows for incidental catches without promoting discarding or compromising rebuilding. These will be considered by SEMAC on a species-by-species basis, based on the outputs of the métier analyses, rebuilding strategy reviews and stock assessment projections, where available.

³⁹ Biomass Target

Agenda item 13 – SESSF research priorities 2022–23

37. The RAG noted the agenda item and that AFMA was requesting the RAG’s feedback on research proposals received in response to AFMA’s call for research for 2022–23. Research proposals were assessed on their relevance to identified priorities, clarity of objectives and benefits, likelihood that the outputs will be adopted, value for money, consultation, and data sharing.
- Proposal 1 – ISMP data services for 2022. The RAG stepped through the scoring criteria for this priority and scored it a 2 (maximum) across all criteria. The RAG supported this proposal.
 - Proposal 2 – blue grenadier acoustic survey 2022. The RAG stepped through the scoring criteria for this priority and scored it a 2 (maximum) across all criteria except cost effectiveness. The RAG was not certain if costs of this research had increased over time. The RAG supported this proposal.
 - Proposal 3 – Orange roughy (Cascade) acoustic survey 2022. The RAG stepped through the scoring criteria for this priority and scored it a 2 (maximum) across all criteria except cost effectiveness. The RAG was not certain if costs of this research had increased over time. It was also not certain if the acoustic survey data would be incorporated into future stock assessments. The RAG supported this proposal.
 - Proposal 4 – stock assessments for targeted species in 2022–23. The RAG stepped through the scoring criteria for this priority and was found to score 2 (maximum) across all criteria. The RAG noted that the cost effectiveness criterion was not relevant to this item as the cost changes depending on the species being assessed. The RAG supported this proposal.
38. The RAG was also asked to identify research priorities for the 2023-24 financial year. The RAG made the following key points:
- Mr Simon Boag noted that industry may not be as willing to support future orange roughy (east) acoustic surveys given the results of the 2021 stock assessment. As the value of a fishery declines, the proportionate cost of research increases.
 - Industry is also unlikely to support a retrospective review of stock assessments, as research with a future focus would be more beneficial for the fishery. It may be more appropriate for the FRDC⁴⁰ to fund an independent review of stock assessment approaches, rather than a species-specific approach within the SESSF.
 - The RAG agreed that funding could be sourced from elsewhere but reinforced that an independent review of decision-making and stock assessment advice should be undertaken and should be an immediate priority.

13.1 Actions and recommendations of agenda item 13

Recommendations:

- The RAG made the following recommendations regarding research priorities and their inclusion in the 2023–24 SESSF research statement:
 - The ISMP data services 2023 was supported.
 - The orange roughy acoustic survey 2023 was supported.
 - The blue grenadier acoustic survey 2023 was supported.
 - The upcoming SESSF stock assessment work was supported.
 - Fish ageing for SESSF quota species was supported.
 - A desktop study of herding behaviour for the otter trawl ERA⁴¹ was not supported.
 - Standardising CPUE for skipper effect was not supported.

⁴⁰ [Fisheries Research and Development Corporation](#)

⁴¹ Ecological Risk Assessment

- The RAG recommended including an independent review of key SESSF stock assessments as a high research priority. The source of funding will need to be considered.

Other business and action items review

39. Ms Sally Weekes noted that there will be incidental catch of some quota species in mid-2022 as a part of the upper slope dogfish monitoring program. This catch will be covered under RCA and will be incorporated in the TAC setting process for 2023–2024 SESSF season.
- This was noted by the RAG and no concerns were raised.
40. Dr Geoff Liggins noted that CSIRO tier 1 stock assessments presented at this meeting used a logistic selectivity curve for trawl gear, while Mr Patrick Cordue used a dome shaped selectivity curve for the pink ling tier 1 stock assessment and enquired the logic behind this.
- CSIRO clarified that dome shaped selectivity is applied when it is believed that larger individuals would be excluded from the catch because of their swim speed or other reasons. Large pink ling are believed to be rare in trawl catches therefore a dome shaped selectivity curve is appropriate.

Close of meeting

41. The Chair thanked the RAG for their contribution and closed the meeting at 14:10.

Attachment A – Register of interest

Member	Declaration
Dr Paul McShane (Chairperson)	Chair of SERAG and a member of SEMAC and SESSFRAG. No pecuniary interest in the SESSF. Principal of Global Marine Resource Management Pty Ltd. Adjunct Professor (Fisheries and Aquaculture) College of Science and Engineering, James Cook University.
Mr Daniel Corrie	Employed by AFMA as the Manager of the Commonwealth Trawl sectors. No pecuniary or other interest in the SESSF.
Dr Sarah Jennings	Economics member on SERAG, SESSFRAG and SEMAC. Economics coordinator, FRDC Human Dimensions Research Subprogram. Member of AFMA Economics Working Group. Adjunct Senior Researcher, TSBE ⁴² , University of Tasmania. Casual employee, IMAS, University of Tasmania. Independent economics consultant. No pecuniary or other interest.
Dr Geoff Tuck	Employed by CSIRO and involved in stock assessments. Interest in obtaining funding for future research. Principal investigator on SESSF stock assessment project.
Mr Andrew Penney	Director of Pisces Australis Pty Ltd, an Australian registered marine/coastal research and management consultancy based in Canberra - interests in any opportunities in this regard. Currently Principal Investigator on FRDC Projects Nos 2017-180: Design and implementation of an Australian National Bycatch Report: Phase 1 – Scoping; and 2019-036: Implementation of dynamic reference points and harvest strategies to account for environmentally-driven changes in productivity in Australian fisheries. Independent scientific member on the AFMA Southeast RAG, the Tropical Rock Lobster RAG and the Small Pelagic Fishery RAG. Member of the AFMA ERA Technical Working Group. Deputy Scientific Member on the New South Wales Fisheries Total Allowable Fishing Committee Sep 2020 to Sep 2023. No shareholding and hold no positions relating to any other companies, including any fishing companies or industry associations.
Dr Ian Knuckey	Positions: Director – Fishwell Consulting Pty Ltd Director – Olrac Australia (Electronic logbooks) Deputy Chair – Victorian Marine and Coastal Council 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

⁴² [Tasmanian School of Business and Economics](#)

	<p>Scientific Member – Gulf of St Vincent’s Prawn Fishery Management Advisory Committee</p> <p>Scientific Member – Tropical Tuna Resource Assessment Group</p> <p>Scientific Member – SESSF Resource Assessment Group</p> <p>Current projects:</p> <p>FRDC 2019-027 Improving and promoting fish-trawl selectivity in the SESSF and GABT⁴³ sector</p> <p>FRDC 2019-072 A survey to detect change in Danish Seine catch rates of Flathead and School Whiting resulting from CGG seismic exploration.</p> <p>FRDC 2019-129 Potential transition of shark gillnet boats to longline fishing in Bass Strait - ecological, cross-sectoral, and economic implications</p> <p>FRDC 2017-069 Indigenous Capacity Building</p> <p>FRDC 2016-116 5-year RD&E⁴⁴ Plan for NT fisheries and aquaculture</p> <p>FRDC 2018-021 Development and evaluation of SESSF multi-species harvest strategies</p> <p>FRDC 2017-014 Informing structural reform of South Australia's Marine Scalefish Fishery</p> <p>AFMA 2020/0807 Bass Strait Scallop Fishery Survey – 2020-22</p> <p>Traffic Project Shark Product Traceability</p> <p>NT Fisheries Design and implementation of a tropical snapper trawl survey</p> <p>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</p> <p>Australia Bay Information to support Wildlife Trade Operation for the Queensland Gulf of Carpentaria Developmental Fin Fish Trawl Fishery</p> <p>Tas. Abalone Scientific Advisor for Tasmanian Abalone Council Ltd</p> <p>PEMSEA⁴⁵ Developing EAFM⁴⁶ Plan of Red Snapper for Arafura and Timor Seas Region</p>
Mr James Woodhams	<p>Employed by ABARES.</p> <p>ABARES has a minor financial stake in the project ‘2019-036: Implementation of dynamic reference points and harvest strategies to account for environmentally-driven changes in productivity in Australian fisheries.</p> <p>Mr Woodhams has non-financial roles on the steering committee for the Multi species harvest strategy project led by CSIRO, the Reviewing biological parameters project led by CSIRO and Alternate indicators for the SESSF Working Group (reports to SESSFrag).</p>
Mr Ross Winstanley	<p>No pecuniary interest in SESSF however declares he has a brother-in-law that holds a Victorian Inshore Trawl Licence.</p>
Mr Daniel Hogan	<p>Owner operator of trawler Zeehaan out of Portland, Vic. Commonwealth Trawl Sector boat and quota SFR⁴⁷ holder.</p>
Mr John Jarvis	<p>Commonwealth Trawl Sector boat and quota SFR holder.</p> <p>Member of SETFIA.</p> <p>Worked with NSW Primary Industry Minister for Comfish.</p>

⁴³ Great Australian Bight Trawl

⁴⁴ Research Development and Extension

⁴⁵ Partnerships in Environmental Management for the Seas of East Asia

⁴⁶ Ecosystem Approach for Fisheries Management

⁴⁷ Statutory Fishing Right

Mr Simon Boag	<p>Runs a fisheries consulting firm Atlantis Fisheries Consulting Group. Clients include associations such as SETFIA, SSIA⁴⁸, SPFIA⁴⁹ but also other private clients. SSIA was engaged by AFMA to collect biological data in the shark fishery.</p> <p>Non-beneficiary Director of two fishing companies in the SSSF one of which is a significant quota owner.</p> <p>Industry member on SERAG and SEMAC.</p> <p>Member (Chair) of STAG⁵⁰.</p>
EO Mr Aaron Puckeridge	Employed by AFMA. Executive Officer of SERAG. No interest in SSSF, pecuniary or otherwise.

Invited Participants	Declaration
Dr Robin Thomson	CSIRO assessment scientist. Acquiring funding for research purposes. PI ⁵¹ for close kin project for school shark. PI on close kin scoping study for blue-eye trevalla.
Dr Miriana Sporcic	CSIRO, Assessment scientist. Acquiring funding for research purposes.
Dr Jemery Day	CSIRO Assessment scientist. Acquiring funding for research purposes. Scientific member of SARAG ⁵² .
Dr Paul Burch	CSIRO Assessment Scientist. Acquiring funding for research purposes. CSIRO representative on the Fisheries Statistics and Information Working Group. PI on the data services contract.
Dr Pia Bessell-Browne	CSIRO Assessment scientist. Acquiring funding for research purposes.
Dr Geoff Liggins	NSW DPI, Fisheries scientist. Involvement in NSW resource assessments. Potential interest in the acquisition of funding for research/assessment purposes concerning cross-jurisdictional stocks.
Mr Nick Hill	IMAS UTAS/CSIRO, Fisheries scientist. Potential interest in the acquisition of funding for research/assessment purposes concerning cross-jurisdictional stocks.
Ms Frances Seaborn	DNRET Senior Fisheries Management Officer. No interest, pecuniary or otherwise.
Dr Kevin Stokes	Director of Stokes.net.nz Ltd. Member of the Orange Roughy Natural Mortality Working Group. No interest pecuniary or otherwise.
Dr Caroline Sutton	Employed by CSIRO. Acquiring funding for research purposes.
Ms Toni Cannard	CSIRO Coastal Ecologist. Acquiring funding for research purposes.
Dr Douglas Ferrell	Director of Oceanwatch Australia, a marine NRM charity. Sole trader providing NRM advisory services.

⁴⁸ [Southern Shark Industry Alliance](#)

⁴⁹ Small Pelagic Fishery Industry Association

⁵⁰ Seine and Trawl Advisory Group

⁵¹ Principal Investigator

⁵² [Sub-Antarctic Resource Assessment Group](#)

Mr Patrick Cordue	Principle Scientist at Innovative Solutions Ltd. No interest, pecuniary or otherwise.
Ms Veronica Silberschneider	NSW DPI Senior Fisheries Manager. Representative of state jurisdiction/potential competing interests regarding research priorities and management actions affecting NSW fisheries. No pecuniary interests.
Mr Denis Brown	NSW and Commonwealth SFR and permit holder. Consultant and business associate of Hagfish Australia Pty Ltd.
Mr Christopher Spurrier	Owner of Hagfish Australia and the Norwest Pearl. Commonwealth Trap Fishing permit holder.
Mr Chad Lunow	Fisheries Manager, Management and Reform DAFF QLD No interest pecuniary or otherwise.

Observers	Declaration
Dr Tim Emery	Employed by ABARES. No current interest pecuniary or otherwise. Any potential future interest in research funding will be declared as necessary.
Dr Krystle Keller	Employed by ABARES. No current interest pecuniary or otherwise. Any potential future interest in research funding will be declared as necessary.
Dr Daniel Wright	Employed by ABARES. No current interest, pecuniary or otherwise. Any potential future interest in research funding will be declared as necessary.
Mr Les Scott	CEO Peter and Una Fishing Co Pty Ltd which holds various fishing rights and operates a longline vessel in the GHAT fishery/Coral Sea and High Seas fishery. Pecuniary interests are limited to the extent of being an employee of the company. Neither myself, nor the company I represent, are aware of or are involved in litigation with AFMA.
Dr Sandra Curin Osorio	Employed by CSIRO. Acquiring funding for research purposes.

AFMA Attendees	Declaration
Ms Fiona Hill	Employed by AFMA, Senior Manager of the Demersal and Midwater Fisheries. No interest, pecuniary or otherwise.
Ms Sally Weekes	Employed by AFMA as the manager of the Gillnet Hook and Trap sector. No interest, pecuniary or otherwise.
Ms Heather Johnston	Employed by AFMA. No interest, pecuniary or otherwise.
Ms Kate Martin	Employed by AFMA. No interest, pecuniary or otherwise.

Attachment B – Action items

Complete/Redundant

Underway

Yet to start

Needs further advice

	Meeting and Agenda Item	No.	Description	Responsibility	Timeframe	Status
	2020.12 Agenda Item 2	1	AFMA to investigate the peak of 24 cm fish in the 2018 trawl onboard length data for school whiting.	AFMA	By SESSFRAG Data Meeting (August 2021)	<p>Following SERAG 1 September 2021, AFMA and CSIRO restarted conversation on this action item. Mr Tamre Sarhan (AFMA) provided CSIRO with the raw observer data, identifying that the peak in 24 cm fish was caused by a single trawl shot of large fish and there is no indication that there were measuring errors. It was noted that there was an inconsistency in the number of fish measured between the original data provided to CSIRO, and the updated data Mr Tamre Sarhan provided.</p> <p>This item will remain open, however if the issue cannot be resolved, then all trawl length data for 2018 (179 LFs) will need to be excluded because there are insufficient samples for that year.</p>
	2020.12 Agenda Item 2	2	SESSFRAG to consider updating the 'TAC setting and assessment guidelines' document to include priorities for undertaking sensitivities, likelihood profiles, retrospectives etc. by SESSFRAG 2021 Data meeting.	AFMA (refer to SESSFRAG)	By SESSFRAG Data Meeting (August 2021)	<p>The document was revised at SESSFRAG in August 2021 to incorporate guidance on timing for provision of data.</p> <p>Guidance on including sensitivities, retrospectives, likelihood profiles etc has not yet been considered.</p> <p>This will be postponed until the SESSFRAG Chair's meeting in March 2022.</p>

	2020.12 Agenda Item 3	3	<p>Daniel Corrie (AFMA) and Dr. Michael Steer (Chair), to draft a letter to the AFMA Commission for its March 2021 meeting on behalf of SERAG (and to be endorsed by SERAG) expressing its concern around:</p> <ul style="list-style-type: none"> - the difficulty of disentangling environmental changes, recruitment failure and fishing mortality as reasons for several depleted stocks failure to rebuild. - the increasing number of SESSF quota species assessed as declining. 	Mike Steer and Dan Corrie	By March 2021	A letter was submitted as part of the TAC recommendations paper in March 2021. AFMA will provide a letter once the Commission has responded.
	2020.12 Agenda Item 6	4	Dr Miriana Sporcic (CSIRO) to work in collaboration with Geoffrey Liggins (NSW DPI) to develop a preliminary historical catch time series for offshore ocean perch. It should be noted that the early-period catch history may require further validation before an agreed series can be reached.	Miriana Sporcic (CSIRO) and Geoff Liggins (NSW DPI)	By next Tier 4 assessment (2023)	This will be progressed during 2022. Keep open until completed.
	2020.12 Agenda Item 7	5	AFMA to provide the evidence base for orca depredation being used to exclude the use of discount factors in blue-eye trevalla tier 4 stock assessments.	AFMA	By SESSFrag Data Meeting (August 2021)	This was discussed under agenda item 3 at SERAG 3 2021. The RAG recommended a 15 per cent discount factor be applied to the RBC and for AFMA logbooks to be updated to better capture orca depredation.
	2020.11 Agenda Item 6	6	Dr Paul Burch (CSIRO) and the orange roughy steering committee to produce a document outlining assessment options, including data requirements and metrics, for orange roughy stocks, with a view to demonstrating recovery.	CSIRO (Paul Burch)	By August 2021	<p>SERAG and GABRAG supported including a 'non-eastern orange roughy assessment options' project in the CSIRO workplan for 2021-22.</p> <p>This agenda item will be closed, noting the work is underway and it will be presented at the SESSFrag data meeting in August 2022.</p>

2020.10 Agenda item 1.4	7	AFMA to invite a representative from the Department of Agriculture, Water and Environment (DAWE) to SERAG#1 2021 to inform and discuss the process of delisting a conservation dependent species.	AFMA (Dan Corrie)	By SESSFRAG or SERAG 2021	A DAWE representative did not attend SERAG in 2021. This will be considered for future SERAG meetings. This action item will be closed.
2020.10 Agenda item 2	8	AFMA to compare logbook discard records of deepwater flathead and bight redfish in the GABT against observer records to determine their accuracy.	AFMA	By SESSFRAG Data meeting (Aug 2021)	This work has not started and will be scheduled for 2022.
2020.10 Agenda item 5	9	Mr Daniel Corrie (AFMA) and Simon Boag (SETFIA) to engage with industry regarding identification issues between oxeye and spikey oreo to improve logbook records	AFMA (Mr Daniel Corrie) and Mr Simon Boag (SETFIA)	As soon as possible	AFMA have had initial discussions with operators. AFMA and SETFIA will consider developing a Communications package to distribute to broader industry. AFMA will maintain this action item until there is confidence the issue has been resolved.
2020.10 Agenda item 6	10	AFMA to undertake a risk assessment to explore the risk associated with increasing the smooth oreo (other) TAC to 135 t. This will occur after the 2020 assessment period.	AFMA	By SERAG 2021	This was discussed under agenda item 4 at SERAG 3 2021. Smooth oreo (other) catches have not increased with fishing under the WORRP. There is no evidence to suggest that the TAC should be increased, and the TAC is not constraining western orange roughy catches.

2019.12 Agenda item 7	11	AFMA to ensure the revised pre-1998 ISMP dataset is captured into the AFMA database and Dr Koopman's code corrections are stored and the old data rebadged appropriately.	AFMA	Early 2022	A meeting was held between AFMA's trawl and data teams, CSIRO and Dr Matt Koopman in October 2021. Dr Koopman has provided AFMA's data team with an updated pre-1998 ISMP data set to be integrated into AFMA's database. AFMA aims to complete this by early 2022.
2019.11 (Action items review)	12	AFMA to ensure that the SIDAC data collection includes total and partial lengths of school and gummy shark including school sharks larger than 160cm, and tissue samples of Blue-eye trevalla for CSIRO's close-kin work and for ageing: (a) Start collecting 20 samples from approximately 20% of the shots, and (b) The SSIA co-management contract needs to be finalised and this action item incorporated into the SIDAC Data Plan.	AFMA (GHAT manager)	As soon as possible	Shark samples – completed – considered by SharkRAG ⁵³ in March 2021, included in the SESSF data plan that will inform the 2021 SIDaC contract. Blue-eye sample collection underway – sample collection is pending the outcomes of AFMA project 190842, <i>Scoping study for application of Close Kin Mark Recapture to blue-eye trevalla caught in the SESSF</i> . This project will produce a sampling design for the collection of blue-eye trevalla samples to support a close kin assessment. Project will be completed by end of August 2021, the outcomes of which will inform sample design and be incorporated into the SIDaC program.
2019.11 Agenda item 3	13	AFMA to investigate logbook records of catches of 'Black Trevally' (also called Black Snotty) from the last 2 years and verify with skippers whether species recorded on CDRs is Blue Warehou. If so, AFMA will correct data records and correct recording practices.	AFMA	By SERAG #2, Dec 2019	AFMA have confirmed the species is blue warehou. The skippers have been informed and will record future catches as blue warehou. AFMA are yet to update the database – and will update SERAG once done. Keep item open until records are corrected.

⁵³ [Shark Resource Assessment Group](#)

	2021.09 Agenda item 4.1	14	AFMA to capture historical RAG advice and the basis for setting the 150 t TAC for Cascade smooth oreo in species summary reports.	AFMA	As soon as possible	Not yet started.
	2021.09 Agenda item 4	15	AFMA to confirm that Cascade orange roughy otolith ageing is present in the FAS workplan.	AFMA	As soon as possible	Not yet started.
	2021.09 Agenda item 6	16	AFMA to interrogate data of those vessels that have increased redfish catch in recent years in collaboration with Paul Burch (CSIRO). This could include developing a statistic or a plot that captures vessels returning to locations of high Redfish bycatch.	AFMA	As soon as possible	Not yet started.
	2021.09 Agenda item 6	17	AFMA to investigate recent redfish catch records as the eastern redfish targeting analysis appears to incorporate GABT Bight redfish catches.	AFMA	As soon as possible	<p>AFMA proposed to amend as follows: AFMA to investigate recent redfish catch records and observer data to clarify:</p> <ol style="list-style-type: none"> a. whether the eastern redfish targeting analysis has mistakenly incorporate GABT Bight redfish catches; and b. the composition of eastern redfish and Bight redfish catches in the western part of the CTS

2021.09 Agenda item 7	18	AFMA to compile a report detailing the history and decision making used to set previous catch triggers and TACs for the non-quota species of ECDWT for SERAG 2022.	AFMA	SERAG 2022	Not yet started.
2021.09 Agenda item 8	19	Paul Burch (CSIRO) to produce a background paper that discusses the implications of over/undercatch provisions on orange roughy (east) and will explore their incorporation into the current stock assessment and their impacts on upcoming Recommended Biological Catch (RBC) advice.	Paul Burch (CSIRO)	SERAG 2 2021	SERAG considered overcatch/undercatch provisions at its September 2021 meeting. Dr Paul Burch included overcatch/undercatch provisions in the final tier 1 base case being presented at the November 2021 SERAG meeting (see agenda item 7). This is accounted for in the RBC recommendations being provided to SEMAC.
2021.09 Agenda item 9	20	AFMA and CSIRO to produce a background paper summarising the outputs of the 2010 eastern gemfish stock assessment, including how the model considers discards and how this informs current management advice relative to the status of eastern gemfish.	AFMA and CSIRO	As soon as possible	Not yet completed.
2021.09 Agenda item 10	21	CSIRO, AFMA, and Mr Patrick Cordue to discuss and decide on what diagnostics should be provided/produced as outputs for stock assessments going forward, and for pink ling CPUE.	AFMA, CSIRO and Patrick Cordue	SERAG 3 2021	This was discussed with Mr Cordue and the final pink ling tier 1 stock assessment was presented at SERAG 3 November 2021 (see agenda item 10).

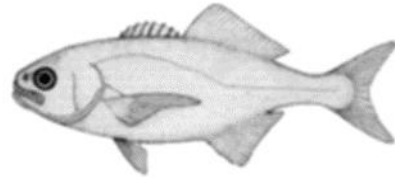
2021.09 Agenda item 10	22	Mr Daniel Corrie (AFMA) to talk with Patrick Cordue to discuss catch projections based on MCMC outcomes for both high and low natural mortality (M) scenarios. Also, to incorporate monthly length sample summaries.	AFMA and Patrick Cordue	SERAG 3 2021	The final pink ling tier 1 stock assessment was presented at SERAG 3 November 2021 (see agenda item 10).
2021.09 Agenda item 12	23	Ms Fiona Hill (AFMA) to produce a paper outlining a research priority for a pilot study on effort creep in the SESSF to be presented at SERAG 3.	Fiona Hill (AFMA)	SERAG 3 2021	This was provided to the RAG in the SERAG 3 background papers.
2021.10 Agenda item 2	24	Dr Jemery Day (CSIRO) to model low recruitment scenarios of eastern jackass morwong using the mean recruitment value of the most recent 10 years to be presented at SERAG 3.	Jemery Day (CSIRO)	SERAG 3 2021	Dr Day presented the final basecase, including low recruitment projections, at SERAG 3 November 2021 (see agenda item 8).
2021.10 Agenda item 2	25	Dr Jemery Day (CSIRO) To incorporate recovery timelines consistent with the requirement of the Harvest Strategy Policy into model scenarios for the eastern jackass morwong stock assessment. Also aim to incorporate MCMC analysis if time permits.	Jemery Day (CSIRO)	As soon as possible	Dr Day presented the final basecase, including recovery timelines, at SERAG 3 November 2021 (see agenda item 8).

	2021.10 Agenda item	26	AFMA to clarify when the overcatch provisions for eastern orange roughy changed from 0% to 10% as management advice.	AFMA	As soon as possible	AFMA clarified in the meeting that overcatch provisions have been set at 10% since the eastern orange roughy fishery re-opened in 2015.
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Attachment C – Action items arising from the meeting

No.	Agenda Item / Meeting Date	Action Item	Agency / Person	Timeframe
1	Agenda item 2 – November 2021	Mr Daniel Corrie, Dr Paul Burch, and Dr Tim Ryan of AFMA and CSIRO to meet prior to the ISMP working group meeting (15th Dec 2021) to clarify the eastern orange roughy biological data collection program.	AFMA and CSIRO	December 2021
2	Agenda item 6 – November 2021	AFMA to communicate with Fish Ageing Services to age blue grenadier otoliths for 2022 to provide a line of evidence of stock status for the RAG and MAC to help make TAC recommendations in 2022.	AFMA	Early 2022

Attachment D – Blue-eye trevalla species summary



(*Hyperoglyphe antarctica*)

ABARES (2012): Line drawing – FAO

Species summary					
Common names	Bluenose, big-eye, blue-eye, blue-eye cod, bluenose warehou, deep sea trevalla, sea trevally				
Stock assessment	Tier 4 assessment for slope stock were considered by SERAG in 2020 and 2021. Catch-Maximum Sustainable Yield (MSY) and age-structured stock reduction analyses for the seamount stock were considered by SERAG in 2018 and 2021.				
Stock structure	<p>Blue-eye trevalla is managed as a single stock in the SSSF.</p> <p>Variation in age and growth, otolith chemistry and potential larval dispersal, indicate there is likely to be one stock on the continental slope (from which most of the catch is taken) which is separate from the stock(s) found on the east coast seamounts.</p> <p>Fish on the seamounts are assumed to be reproductively isolated from the slope stock. Potential stock structure among the seamounts is not clear.</p> <p>Separate RBCs were determined for the slope and seamount stocks for the first time in 2018, however - a single, combined TAC continues to be set for blue-eye trevalla.</p>				
SLOPE Stock status against reference points (C_{Lim}/C_{Targ})	Tier	Year	CPUE _{Recent}	CPUE _{Target}	CPUE _{Limit}
	4	2021	0.901	1.2287	0.512
	4	2020	0.7656	1.2321	0.5134
	4	2018	0.9994	1.2288	0.512
SEAMOUNT Stock status against reference points (%B ₀)	Tier	Year	Stock status	Target	Limit
	5	2021	33*		
	5	2018	33*	48	20
<p>No assessment prior to 2018.</p> <p>*Current depletion for the seamount stock was estimated to be about 0.33B₀ although the uncertainty about that value is extreme. SERAG (November 2021) considered the available data and agreed there was no basis on which to revise the outputs of the 2018 catch-MSY analysis.</p>					
Stock trend and other indicators See CPUE Report	<p>Total blue-eye trevalla catches have declined from 652 t in 2004 to 223 t in 2020.</p> <p><u>Slope</u></p> <p>Overall, standardised CPUE has decreased since 2014, despite an increase in 2018 relative to the previous year. The 2020 assessment, which was brought forward one year due to</p>				

See Data Summary	<p>concerns regarding decreasing CPUE, suggested the CPUE index in 2020 was very close to the limit reference point (i.e., 0.53 vs 0.51), and the last time it was last above the target occurred in 2014 (see Sporcic 2020a⁵⁴). The assessment was updated again in 2021 to closely monitor relative standardized CPUE. The 2021 assessment, which incorporates a revised catch history time series and standardised CPUE that includes SESSF zones 83 to 84 in the Great Australian Bight (GAB), resulted in a higher more recent four-year average standardized CPUE compared with the corresponding average standardized CPUE from the previous assessment, although still an overall downward trend since 2014 (Sporcic, 2021⁵⁵).</p> <p><u>Seamount</u></p> <p>Catch from the seamounts has been less than 40 t for the past three years.</p> <p>A weight of evidence based on the use of data-limits methods ('Tier 5') approach is used to assess the seamount stock using two data-limited methods, Catch-MSY and an age structured Stock Reduction Analysis.</p> <p>While strongly driven by assumptions, the 2018 catch-MSY analysis generated an MSY of about 45-50 t with associated depletion estimate of which the median was 33%B₀ but that ranged from below the limit to above the target reference point. Constant catches of 40 t lead to the mean and median depletion estimate remaining stable, lower catch would allow the median stock status to approach the proxy target of 48%B₀ provided the stock is not already at a sufficiently low level to prevent rebuilding under those catches. The age-structured stock reduction analysis suggested that stock status would be relatively stable under a catch of 25 t for low productivity scenarios or 48 t for high productivity scenarios.</p> <p>SERAG (November 2021) considered the available data and agreed there was no basis on which to revise the outputs of the 2018 catch-MSY analysis.</p>			
Multi-Year TAC	Year of MYTAC (2021-22)		Has the MYTAC advice been revised?	
	Single year TAC		N/A	
Catch and TAC (t)	SESSF fishing year	Agreed TAC	TAC after unders/overs	Cth Retained Catch
	2021-22	241	283	-
	2020-21	448	493	225
	2019-20	458	499	217
	2018-19	462	502	377
Economics (Primary)	Financial Year	Species GVP (\$m)	Fishery GVP (\$m)	% Fishery GVP
	2019-20	2.21	51.34	4.30

⁵⁴ Sporcic, M (2020a). Tier 4 Assessments for selected SESSF Species (data to 2019). Technical paper presented to the SERAG, Dec 9-10, 2020. CSIRO Oceans and Atmosphere, Hobart

⁵⁵ Sporcic, M. (2021). Tier 4 Assessment for Blue-eye Trevalla (*Hyperoglyphe antarctica*) slope (data to 2020). Technical report presented at the SERAG, MS Teams meeting 29 November – 1 December 2021. CSIRO Oceans and Atmosphere, Hobart. 16 p.

Commonwealth Trawl and Scalefish Hook	2018-19	4.65	49.47	9.40
	2017-18	2.94	41.86	7.02
ABARES Status (2021 Report)	Fishing Mortality: Not subject to overfishing		Biomass: Not overfished	
Assessment summary				
Key model technical assumptions/ parameters	<p>The Tier 4 assessment assumes there is a linear relationship between standardized CPUE and exploitable biomass, and that the character of the estimated CPUE has not changed significantly since the reference period to the end of the most recent year.</p> <p>Both assessments assume that biomass was unfished prior to 1985 (when fishing started).</p> <p><u>Slope</u></p> <p>In September 2015, SlopeRAG agreed to use a revised catch per hook CPUE in the Tier 4 assessment in place of the previously used catch per record/day. SlopeRAG considered the updated analysis to better reflect CPUE in the early part of the fishery.</p> <p><u>Seamount</u></p> <p><i>Catch-MSY</i></p> <p>The catch-MSY assessment is a data-poor approach which makes assumptions about unfished biomass as well as a range of other assumptions around carrying capacity, intrinsic growth, maximum harvest rate, and current stock status, and requires a time series of known catches that have not been impacted by management.</p> <p><i>Age-structured stock reduction analysis</i></p> <p>Noting that not all seamounts would be fished in a given year, the model has assumed that harvest rates do not exceed 50 per cent in a single year. This adds constraints to the analysis and assumes that there must have been at least twice the biomass relative to what was caught in any year. Known biological parameters (length at age, length at maturity, weight at length) are used and plausible ranges are assumed for steepness, natural mortality, unfished stock size and current stock status.</p>			
Significant changes to data inputs	<p><u>Slope</u></p> <p>The CPUE series was updated in 2021 to include catch and effort from SESSF zones 20 to 85 (Sporcic 2021a⁵⁶) when previously only SESSF zones 20 to 50 were used (Sporcic, 2020b⁵⁷). A comparison of zone 20-50 and 20-85 standardised CPUE series can be found in Sporcic</p>			

⁵⁶ Sporcic, M. (2021a). Update Part 2: Statistical CPUE (catch-per-hook) Standardizations for Blue-eye Trevalla (Auto-line and Drop-line) in the SESSF (data to 2020). CSIRO, Hobart. Technical report presented at SERAG meeting 29 November to 1 December 2021. 26 p.

⁵⁷ Sporcic, M. (2020b). Update: Draft Statistical CPUE (catch-per-hook) Standardizations for Blue-eye Trevalla (Auto-line and Drop-line) in the SESSF (data to 2019). Technical paper presented at SESSFrag 25-26 August 2020. CSIRO, Oceans and Atmosphere, Hobart. 26p.

	<p>2021a (see also Sporcic 2021b⁵⁸ for the z2050 series). The 2021 Tier 4 assessment also used a revised catch-history time series (see Sporcic and Day, 2021⁵⁹).</p> <p><u>Seamount</u></p> <p>The 2021 update to both data-poor methods included catches from the Tasmantid seamounts plus the Lord Howe Rise whereas the 2018 assessment did not include the Lord Howe Rise.</p>
<p>Data and RAG comments</p>	<p><u>Slope</u></p> <p>In 2020 and 2021, revised NSW annual catches were provided from 1986 onwards, noting the assessment used catches from only 1997 onwards. There remains some uncertainty in the early catch series with regards to state catches which need to be resolved.</p> <p>Early records of high discards are likely from trawl. There are no significant recent discards and as such are not included in the Tier 4 assessment.</p> <p>SERAG supported the modifications to logbooks to require longline operators to routinely report the presence of orcas and evidence of depredation, to allow for this issue to be accounted for in future assessments.</p> <p><u>Seamount</u></p> <p>Catch data were provided by NSW fisheries and the Commonwealth logbooks. Discard rates are negligibly low. SERAG agreed that data should be collected to move this stock out of the Tier 5 assessment method, noting that the Close Kin Mark Recapture scoping project currently underway may provide a reasonable avenue to do this.</p>
<p>Stock assessment information and RAG comments</p>	<p><u>Slope</u></p> <p>The CPUE analysis assumes there is mixing throughout the stock, however the stock is understood to be broadly distributed but localised.</p> <p>A downward trend is apparent in the standardized CPUE series that includes the GAB (z2085) over the 2018-2020 period (Sporcic 2021a). Since 2016, standardized z2085 CPUE indices are greater than the z2050 CPUE indices. All analyses have limited numbers of observations and hence are relatively uncertain (Sporcic 2021a).</p> <p>The 2021 Tier 4 assessment resulted in an RBC of 349.32 t (Sporcic, 2021), a 54 per cent increase from the 2020 RBC of 227.03 (Sporcic, 2020a). The 2020 estimate of standardised CPUE (0.7865) is above the limit reference point (0.512).</p> <p>While standardized CPUE indices that include logbook catch and effort information from the GAB are greater than the corresponding indices that exclude this information over the last five years (see Figure 10; Sporcic 2021a), SERAG noted that overall CPUE continues to decline, particularly on the east coast. One Industry member attributed the ongoing decline in the east to Orca depredation which is not being accounted for in the CPUE standardization.</p> <p><u>Seamount</u></p> <p><i>Catch-MSY Analysis (2021)</i></p>

⁵⁸ Sporcic, M. (2021b). Update Part 1: Statistical CPUE (catch-per-hook) Standardisations for Blue-eye Trevalla (Auto-line and Drop-line) in the SESSF (data to 2020). CSIRO, Hobart. Technical report presented at SERAG meeting 29 November to 1 December 2021.

⁵⁹ Sporcic, M., Day J. (2021). Draft catch history time series for selected Tier 4 SESSF species (data to 2020). Prepared for SERAG meeting 28-29 September 2021. 19p

	<p>Without an index of relative abundance, results can only be presented for a wide range of possible parameter values and these include current stock status. The 2018 Tier 5 assumed initial stock status of $50%B_0 - 97.5%B_0$ and current status of $5%B_0 - 50%B_0$. The 2021 work also presented alternative assumptions of $80%B_0 - 100%B_0$ initial and $5%B_0 - 100%B_0$ current stock status.</p> <p>For all other assessments, SERAG would typically use parameter set that has greatest support from the data (the maximum likelihood estimate) in generating RBC advice, however data-poor methods are not fitted to data and there is no Maximum Likelihood Estimate (MLE) estimate. All possible results therefore have equal weight of evidence. Dr Haddon suggested treating the median as a summary rather than the 'best estimate' of stock status.</p> <p>While highly uncertain, the catch-MSY analysis generates an MSY of about 45-60 t but note that MSY is a sustainable level of catch only if stock status is above BMSY (50% for the C-MSY model).</p> <p><i>Age-structured stock reduction analysis (2021)</i></p> <p>SERAG (November 2021) considered more recent catch data and supported including catches from the Lord Howe rise, which were not included in the 2018 assessment. Including this additional catch in the Catch-MSY resulted in a lower range of estimated depletion, with 4% and 27% falling below the limit reference point for the two alternative selectivity curve scenarios.</p> <p>The assumptions made by the 2018 modelling work were varied: an alternative selectivity curve that allows capture of younger fish was used, and initial and current depletion ranges were altered. An alternative growth curve was also used, but this had little influence on the results. A Tier 1 like HCR was used to calculate an RBC for every biomass trajectory calculated (across the ranges of assumed parameter values, stock status, and maximum harvest rates) and the resulting RBC estimates were plotted as histograms for alternative catch time series, and for each assumed selectivity curve. RBCs ranged from zero to almost 200t with several histograms showing peaks in the 50-100t range.</p> <p>While several plots also showed large numbers of zero RBCs, especially for the selectivity curve that takes younger fish, an annual catch in the range of 30-40 t appears likely to be sustainable, even conservative. SERAG agreed the current TAC of 36 is within the range of RBCs produced when a HCR is applied to the outputs of the SRA and that there was no basis for revising the previous TAC advice.</p> <p>Because trevalla seem likely to suffer from localised depletion, it was advised that catches be spread across seamounts rather than concentrated in a small area.</p>
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<p>Projected biomass (Tier 5)</p>	<p>The Tier 5 assessment suggested that constant catches of 36 t would maintain stock stability or slow stock changes.</p>
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Species specific research and priorities

Blue-eye close-kin scoping study (funded)

Blue-eye trevalla is one of the few target species not assessed at a Tier 1 level. A close kin study could help to determine population characteristics and provide more certainty to the advice underpinning management. The proposed study will provide a sample design and costing for a sampling study.

RAG Recommendations

SERAG (November 2021) recommended a three-year MYTAC combining the RBC of 349 t from the 2021 Tier 4 assessment for the slope stock and the RBC of 36 t from the 2021 Tier 5 assessment of the seamount stock, and that the discount factor be applied to the Slope Tier 4 RBC.

SERAG also supported the modifications to logbooks to require logline operators to routinely report the presence or orcas and evidence of depredation, to allow for this issue to be taken into account in future assessments.

	Year	RBC (t): Slope	RBC (t): Seamount	Is a MYTAC recommended?
Recommended Biological Catch (t)	2022	349	36	Yes SERAG recommended a 3-year MYTAC combining the RBC from the seamount and slope stocks - 385 t
	2021	227	36	
	2020	449	36	
Discount factor (t)	52 (applied to Tier 4 RBC)	<p>SERAG (November 2021) supported the application of the 15 per cent discount factor to the Tier 4 slope stock RBC. The discount factor was previously not applied because of the level of protection thought to be provided by closures, and that orca depredation resulted in a more conservative CPUE series. However, at its recent meeting, in light of a continued decline in CPUE despite some level of protection afforded by closures, and ongoing changes to data inputs, SERAG agreed that further work is required to understand the impact of orca depredation on catch rates, and whether closures are affording a level of protection that sufficiently offsets the application of a discount factor.</p> <p>Regarding the seamount stock, in comparing the outcomes of the SRA to the current TAC, SERAG considered that the current TAC is "adequately precautionary", in effect amounting to implementing an appropriate discount factor</p>		
State catch (t)	12.3	Mostly NSW.		
Discards (t)	N/A	Estimates of discards are considered to be low, 8.2 t, and are not used in assessment. As such, they are not deducted from the RBC.		
Recreational catch (t)	N/A	There are no records of recreational catch.		
Research Catch Allowance (t)	N/A	There has been no specific research catch allocated.		
Provisional TAC under the Harvest Strategy		321 t		

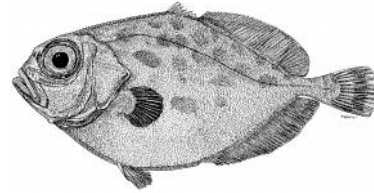
AFMA Advice

AFMA Management supports a three year MYTAC combining the RBC of 349 t from the 2021 Tier 4 assessment for the slope stock and the RBC of 36 t from the 2021 Tier 5 assessment of the seamount stock, and that the discount factor of 15 per cent be applied to the Slope Tier 4 RBC.

AFMA Management also supports modifications to logbooks to require longline operators to routinely report the presence of orcas and evidence of depredation, to allow for this issue to be taken into account in future assessments.

Attachment E – Smooth oreo (other) species summary

(*Pseudocyttus maculatus*)



Species summary					
Common names	Smooth dory, Smooth oreo, spotted dory, St. Pierre				
Stock assessment	Last considered by SERAG in 2020 using a weight of evidence approach.				
Stock structure	Little is known about the stock structure of smooth oreodory. For assessment and management purposes they are treated as a single unit of stock through the SESSF excluding the Cascade Plateau and South Tasman Rise.				
Stock status against reference points (F_{Cur}/F_{MSY})	Tier	Year	F_{Current}	F_{MSY}	F_{Limit}
	Weight of evidence approach	2020	F < F _{MSY}	F _{MSY} = 0.16	F _{LIM} = 0.23
	Weight of evidence approach	2019	F < F _{MSY}		
	Tier 5	2015	N/A 90 t TAC maintains stock >35%B ₀		
Stock trend and other indicators	Catches have increased in recent years, as the TAC and targeting of eastern and Pedra Branca orange roughy stocks have increased. 85-90 per cent of the TAC has been caught over the last two fishing years.				
Multi-Year TAC	Year of MYTAC (2021-22)			Has the MYTAC advice been revised?	
	Single year TAC			N/A	
Catch and TAC (t)	SESSF fishing year	Agreed TAC	TAC after unders/overs	Cth Retained Catch	
	2021-22	90	103	-	
	2020-21	135	144	47	
	2019-20	90	97	76	
	2018-19	90	99	81	
Economics	Financial Year	Species GVP (\$m)	Fishery GVP (\$m)	% Fishery GVP	

(Byproduct) Commonwealth Trawl and Scalefish Hook	2019-20	0.13	51.34	0.25
	2018-19	0.33	49.47	0.67
	2017-18	0.14	41.86	0.33
ABARES Status (2021 report)	Fishing Mortality: Not subject to overfishing		Biomass: Not overfished	

Assessment summary

Key model technical assumptions/ parameters	<p>The Sustainability Assessment of Fishing Effects (SAFE) provides an absolute measure of risk of overfishing by estimating fishing mortality rates, relative to fishing mortality rate reference points (based on life history parameters). To measure fishing mortality, SAFE estimates:</p> <ul style="list-style-type: none"> - Spatial overlap between species distribution and fishing effort distribution - Catchability resulting from the probability of encountering the gear and size-dependent selectivity - Post capture mortality <p>Fishing mortality is the fraction of overlap between fished area and the species distribution, adjusted by catchability and post-capture mortality.</p> <p>Uncertainty around the estimated fishing mortality is estimated by including variances in encounterability, selectivity, survival rate and fishing effort between years.</p> <p>Assumes that:</p> <ul style="list-style-type: none"> - Fisheries are impacting local stocks (within the jurisdictional area of the fishery) - There are no local effects from repeat trawls at the same location (i.e. populations rapidly mix between fished and unfished areas) - Mean fish density does not vary between fished and non-fished area within their distributional range.
Significant changes to data inputs	N/A – advice based on weight of evidence approach.
Data and RAG comments	SERAG (October 2019) noted the need to develop a data collection plan, with the intent to undertaking a future quantitative stock assessment.
Stock assessment information and RAG comments	<p>SESSFRAG (August 2019) recommended assessing smooth oreo (other) as a weight of evidence approach recognising issues with the previous Tier 5 assessment, specifically that a key underlying assumption of the methodology – that catch is an indicator of abundance – is undermined because catch has been affected by the closure and then reopening of orange roughy fishing grounds.</p> <p>The 2019 Commonwealth Trawl Ecological Risk Assessment assessed smooth oreo (other) as ‘low risk’ which means the instantaneous fishing mortality rate (F) for the period of the assessment (2012-2016) was less than the F that corresponds to the maximum sustainable fishing mortality (MSM) at B_{MSM}, similar to the target species MSY.</p> <p>Considering the outcomes of the ERA and recent catches, SERAG (October 2019) recommended rolling over the 90 t TAC for a single year, and reviewing catches 2020.</p> <p>Noting the potential for smooth oreo (other) to become a choke species given the increase to the Pedra Branca orange roughy TAC, SEMAC (February 2020) recommended setting the</p>

	<p>smooth oreo (other) TAC at 135 t for the 2020-21 fishing year, subject to a trigger at 70 t, at which point SERAG advice would be sought regarding catches up to the 135 t TAC. If SERAG did not support exceeding the existing 90 t TAC, AFMA would explore options for closing the Pedra Branca area once 90 t was caught.</p> <p>SERAG (October 2020) noted there was no increase in catch of smooth oreo (other) during the 2020-21 fishing year. In the absence of any new data to support an increase to the TAC, SERAG recommended setting the 2021-22 TAC at the previous level of 90 t. SERAG agreed to consider future increases to the TAC if additional information became available to support it.</p> <p>SERAG (November 2021) considered the application of a more considered weight of evidence approach to include indicators such as length, area fished and ERA results to support a future TAC setting process if the 90 t TAC were to be caught. This information should be included in the 2022 SERAG papers.</p> <p>SERAG recommended maintaining the 90 t TAC for the 2022-23 fishing year.</p>
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Species specific research and priorities

There is no species-specific research currently underway or identified as future priorities.

RAG Recommendations

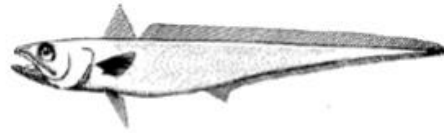
SERAG (November 2021) noted that no new information was available to change its advice provided at SERAG ([October 2020](#)), and recommended a TAC of 90 t for the 2022-23 fishing year, a single year TAC.

	Year	RBC (t)	Is a MYTAC Recommended?
Recommended Biological Catch (t)	2022	90	No
	2021	90	
	2020	90	
Discount factor (%)	N/A	A discount factor is not applied as the TAC is set based on a weight of evidence approach.	
State catch (t)	N/A	There are no estimates of State catch.	
Discards (t)	N/A	There are no estimates of discards.	
Recreational catch (t)	N/A	There are no estimates of recreational catch.	
Research Catch Allowance (t)	N/A	There has been no specific research catch allocated.	
Provisional TAC under the Harvest Strategy			

AFMA Advice

AFMA Management recommends a TAC of 90 t for the 2022-23 fishing year, a single year TAC, with undercatch and overcatch provisions set at 10 per cent, and a determined amount of 2 t.

Attachment F – Blue grenadier species summary



ABARES (2012) Line drawing - Rosalind Poole

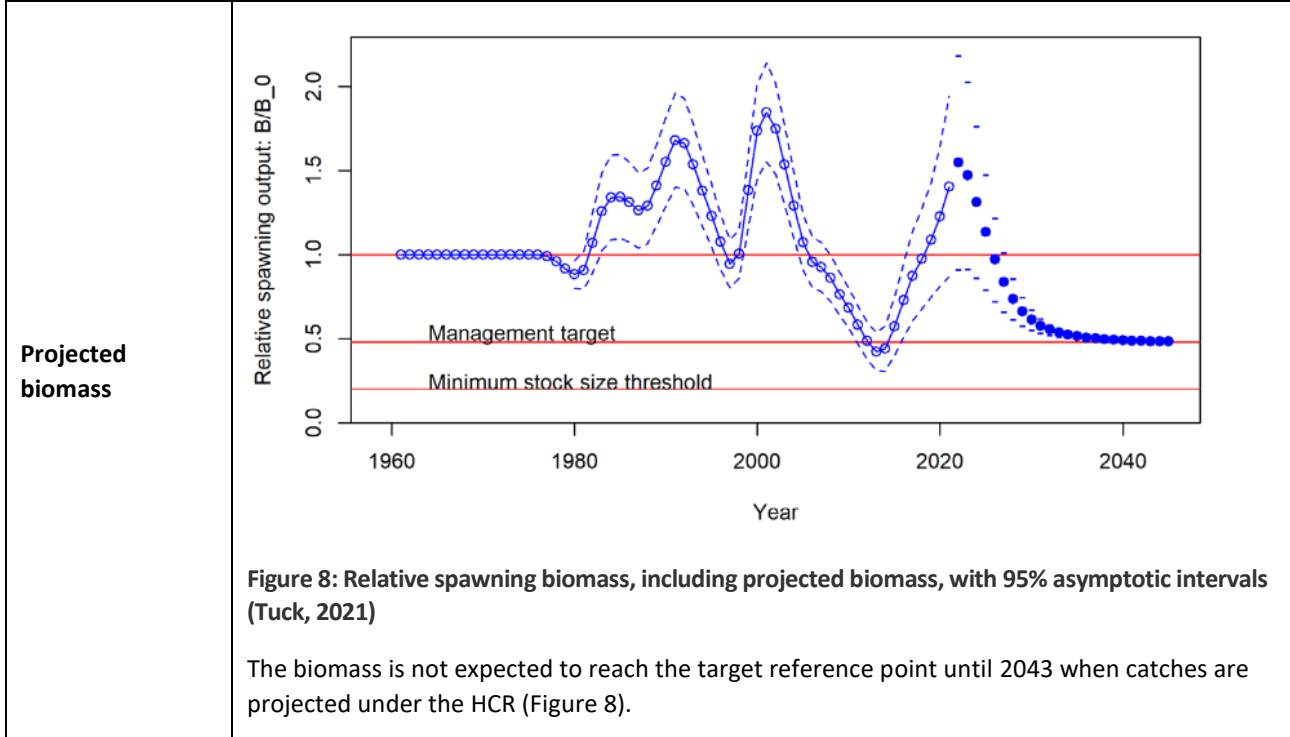
Macruronus novaezelandiae

Species summary						
Common names	Hoki, blue hake, whiptail					
Stock assessment	Tier 1 Species - last assessed by SERAG in 2021.					
Stock structure	Blue grenadier is assessed as one stock, however there is some evidence of separate stocks occurring across the SESSF. There are two defined sub-fisheries, the spawning fishery dominated by catches off western Tasmania and the widely spread catches of the non-spawning fishery.					
Stock status against reference points (%B₀ in year +1)	Tier	Year	Biomass (from assessment year)	Biomass (revised in most recent assessment)	Target	Limit
	1	2021	155	155	48	20
	1	2018	122	109		
	1	2013	94	44		
Stock trend and other indicators	The biomass has increased since the mid-2000s, driven by above average recruitment. Under the revised base case assessment, virgin female biomass is estimated to be 155%B ₀ in 2022, compared to 122%B ₀ for 2019 in the 2018 stock assessment.					
Multi-Year TAC	Year of MYTAC (2021-22)				Has the MYTAC advice been revised?	
	3 rd of three year				N/A – Assessment updated in 2021	
Catch and TAC (t)	SESSF fishing year	Agreed TAC		TAC after unders/overs	Cth Retained Catch	
	2021-22	12,183		13,040	-	
	2020-21	12,183		13,316	11,891	
	2019-20	12,183		11,964	7,044	
	2018-19	8,810		9,636	1,809	
Economics	Financial Year	Species GVP (\$m)		Fishery GVP (\$m)	% Fishery GVP	

(Primary) Commonwealth Trawl and Scalefish Hook	2019-20	12.47	51.34	24.29
	2018-19	4.55	49.47	9.20
	2017-18	2.80	41.86	6.69
ABARES Status (2021 Report)	Fishing Mortality: Not subject to overfishing		Biomass: Not overfished	
Assessment summary				
Key model technical assumptions/ parameters	<p>2 sex model, age-structured</p> <p>Steepness (h) is fixed at 0.75</p> <p>Recruits estimated between 1974 and 2017</p> <p>Maturity: 50% female maturity at 63.7 cm</p> <p>The base case estimates natural mortality for females to be $M_f = 0.23$ and males $M_m = 0.24$</p>			
Significant changes to data inputs	<p>CTS FIS non-spawning abundance index is no longer included in the base case as it was not believed to be indexing blue grenadier non-spawning abundance. The base case now estimates both female and male natural mortality, and not just female natural mortality.</p>			
Data and RAG comments	<p>There has been a large increase in catch from the spawning aggregation since the factory freezer boats commenced fishing in 2019.</p> <p>Acoustic data was collected from the spawning aggregation during the 2019-20, 2020-21 and 2021-22 fishing years, however this data was not available to be used as an index of abundance for the 2021 assessment.</p>			
Stock assessment information and RAG comments	<p>SERAG (November 2020) considered the potential impacts of catching a large proportion of the TAC from the spawning aggregation and noted the following:</p> <ul style="list-style-type: none"> - The model projections assume that the full RBC is caught, and there are different selectivity functions for the spawning fleet and the wet boat fleet, which accounts for a large proportion of the TAC potentially being taken from the spawning aggregation. - SERAG was not concerned that catching a large proportion of the TAC from the spawning aggregation would have any long-term impacts on sustainability. <p>SERAG (October 2021) considered the updated Tier 1 stock assessment and recommended adopting the proposed base case and estimating M for both sexes.</p> <p>There has been consistent high recruitment since 2010, and adding an additional three years of data improved fits to the recent CPUE increase when additional recruitment were included.</p> <p>There are good fits to age and length and discard data, and while fits to non-spawning CPUE is poor, it has improved in recent years and follows the recent increasing trend.</p> <p>The biomass has increased since the mid-2000s, driven by above average recruitment. Under the revised base case assessment, virgin female biomass is estimated to be 155%B₀ in 2022, compared to 122%B₀ for 2019 in the 2018 stock assessment, with a 2022 RBC of 23,777 t and a three year average of 21,365 t. Discards are estimated to be 245 t and need to be deducted from the RBC to produce the TAC.</p> <p>Retrospective patterns suggest an over-optimistic estimation of biomass, and there is considerable uncertainty around the estimate of fishing mortality (F), virgin stock biomass and</p>			

relative biomass, with likelihood profiles of B_{2022} suggesting a range of $80\%B_0$ to $170\%B_0$. All sensitivities to the base case model estimate stock status to be above $135\%B_0$.

Given the uncertainty in the assessment, SERAG (November 2021) recommended updating the assessment in 2022 to include the acoustic data collected in 2019, 2020 and 2021 which should decrease uncertainty in final year stock status and potentially reduce the retrospective patterns in the model.



Species specific research and priorities

An acoustic survey is scheduled for 2022, and the stock assessment is scheduled to be updated in late 2022 to include acoustic data collected in 2020 and 2021.

RAG Recommendations

Given high estimates of absolute and relative spawning abundance, but also associated high uncertainty in those estimates, SERAG (November 2021) recommended a single year RBC of 23,773 t and recommended updating the stock assessment in 2022. The large change limiting rule will constrain the TAC for the 2022-23 fishing year.

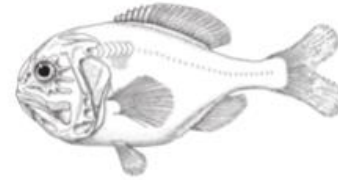
	Year	RBC (t)	Is a MYTAC Recommended?
Recommended Biological Catch (t)	2024	18,712	No SERAG (2021) recommended updating the assessment in 2022.
	2023	21,605	
	2022	23,777	
	3-year average	21,365	
Discount factor (t)	N/A	A discount factor was not applied, however the large change limiting rule will limit the TAC in 2022-23.	

State catch (t)	N/A	There are no estimates of State catches since 2013, and none greater than 0.6 t since 2000.
Discards (t)	245	Model estimated discards in 2022.
Recreational catch (t)	N/A	There are no estimates of recreational catch.
Research Catch Allowance (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		18,275 t – large change limiting rule applied.

AFMA Advice

AFMA Management supports a single year TAC of 18,275 t, after application of the large change limiting rule to the 2021-22 TAC, and updating the stock assessment in 2022 to include acoustic data collected in 2019, 2020 and 2021.

Attachment G – Orange roughy eastern zone species summary



ABARES (2012): Line Drawing – Rosalind Poole

Hoplostethus atlanticus

Species summary						
Common names	Slimehead, deep sea perch, red roughy, orange ruff					
Stock assessment	Tier 1 Species - last assessed by SERAG in 2021.					
Stock structure	<p>Based on the existing data and fishery dynamics, multiple regional stocks of orange roughy are assumed and the fishery is managed and assessed as a number of discrete regional stocks.</p> <p>Recent genetic studies indicate little genetic diversity between all South East Australian stocks. However, they may be demographically separate.</p> <p>For assessment purposes the eastern stock (primarily St. Helens Hill and St. Patricks Head) is assumed to also include catches taken from the Pedra Branca area in the Southern Zone.</p>					
Stock status against reference points (%B₀ in year +1)	Tier	Year	Biomass (from assessment year)	Biomass (revised in most recent assessment)	Target	Limit
	1	2021	30	30	48	20
	1	2017	33	26		
	1	2014	26	22		
Stock trend and other indicators	<p>Stock status: The most recent assessment (2021) indicates that the stock is above the limit reference point, and is estimated to be at 30% of unfished biomass (B₀) in 2021, and projected to be at 30%B₀ at the beginning of 2022 (Burch et al, 2021⁶⁰).</p> <p>Biomass trend: the 2021 stock assessment indicates that biomass is continuing to increase, however revisions to the model have resulted in an overall downward revision to the estimate of relative biomass – see ‘Biomass revised in most recent assessment’ above.</p> <p>Recent acoustic surveys (1999, 2006, 2010, 2012, 2013, 2016 and 2019) undertaken at St. Helen’s Hill and St. Patricks’ Head have estimated an increase in abundance, which supports the estimated increase in abundance from the Tier 1 stock assessments.</p>					

⁶⁰ Burch P, Curin Osorio S and Bessell-Browne P (2021). Eastern zone Orange Roughy (*Hoplostethus atlanticus*) stock assessment based on data up to 2020. Revised after the South East Resource Assessment Group meeting 29 November – 1 December 2021. CSIRO Oceans and Atmosphere and Institute for Marine and Antarctic Studies, University of Tasmania.

Multi-Year TAC	Year of MYTAC (2021-22)		Has the MYTAC advice been revised?	
		4 th of 3-year		N/A – assessment updated in 2021
Catch and TAC (t)	SESSF fishing year	Agreed TAC	TAC after unders/overs	Cth Retained Catch
	2021-22	1,277	1,569	-
	2020-21	1,276	1,628	1319
	2019-20	900	976	619
	2018-19	689	966	856
Economics (Primary) Commonwealth Trawl and Scalefish Hook	Financial Year	Species GVP (\$m)	Fishery GVP (\$m)	% Fishery GVP
	2019-20	5.01	51.34	8.74
	2018-19	7.15	49.47	14.45
	2017-18	2.30	41.86	5.49
ABARES Status (2021 report)	Fishing Mortality: Not subject to overfishing		Biomass: Not overfished	
Assessment summary				
Key model technical assumptions/ parameters	<p>The model assumptions include the single stock structure hypothesis; Eastern Zone spawning roughly and Pedra Branca non-spawning roughly.</p> <p>The biomass is assumed to have been unfished at the start of 1979.</p> <p>Plus group age was set at 120 years.</p> <p>Recruitment deviations (1905-1986)</p> <p>Natural mortality (M) estimated at 0.0393</p> <p>Steepness fixed at 0.75</p> <p>Recruitment variability fixed at 0.7</p>			
Significant changes to data inputs	Age data and acoustic biomass data from the 2019 eastern survey were included in the 2021 assessment.			
Data and RAG comments	The 2017 eastern orange roughy assessment used natural mortality of 0.04. For the 2021 assessment, M was estimated in the model to be 0.0393.			
Stock assessment information and RAG comments	<p><u>2021</u></p> <p><u>Estimating M</u> – The 2017 Eastern Zone Orange Roughy assessment highlighted the model was highly sensitive to the fixed value of natural mortality (M) used in the assessment. For the 2021 assessment CSIRO was asked to develop a process to account for uncertainty in M.</p> <p>A working group recommended estimate M using an informative prior developed from New Zealand Orange Roughy stocks.</p> <p>Age data was re-processed to provide models with 80, 100 and 120 age classes, and the ageing error for the model with 120 age-classes was used for assessments with 100 and 120 age classes.</p>			

Natural mortality was estimated using the log-normal informative prior for 80, 100 and 120 age-classes.

The number of age classes in the model was influential on the estimated value of M, with MPD estimates ranging from M=0.0344 for 80 classes, M=0.0373 (95%CI: 0.0326 – 0.0454) for 100 age classes and M=0.0386 (95%CI: 0.0331 – 0.0452) for 120 age classes. There was little information in the analyses to separate the models with 100 and 120 age classes - SERAG recommended the model with 120 age classes be adopted as the base case.

Likelihood profiles for natural mortality show a conflict between age data, which prefers a higher estimate of M (~0.038), and the acoustic index data, which prefers a lower M (~.025). The likelihood profile on M was consistent with the estimated value of M.

MCMC analysis

SERAG (November 2021) requested using 12.5% and 87.5% quantiles of the estimated value of natural mortality from MCMC analysis as sensitivities to the base-case. The MPD estimates of current stock status (SSB₀/SSB₂₀₂₂) for the low (M=0.0358) and high (M=0.0432) natural mortality scenarios are 29.7% and 37.0% respectively, compared with the MPD estimate from the base-case of 32.4%.

The status from the median of the MCMC was lower than the MPD estimate, and the selectivity width parameter was quite uncertain. The working group recommended that the MCMC analysis that estimates the width parameter of the logistic selectivity function should be retained and used to provide advice in setting RBCs, not the MPD.

The MCMC model estimates stock status in 2021 to be 30%B₀ and produces a 2022 RBC of 681 t, or a three year average of 737 t. The working group also requested several constant catch projections to understand the uncertainty in future stock status (See ‘projected biomass’).

Undercatch

A sensitivity to the base case (not the MCMC) was undertaken to understand the impact of allowing 100% undercatch from the 2021-22 fishing year to be caught in the 2022-23 fishing year – the biomass in 2022 is expected to be 32.32%B₀ if undercatch is fully caught, compared to 32.46%B₀ if it were not caught. SERAG were supportive of the current undercatch provisions to remain in place, noting there is very little impact on the estimate of relative biomass.

	Catch Scenario	SSB 2024	SSB 2031	Status 2024	Status 2031	Prob<LRP 2024	Prob <LRP 2031
Projected biomass Estimated female spawning stock biomass (SSB), stock status and the probability of being below the limit reference point in 2024 and 2031	HCR	12,269	12,831	0.3162	0.3295	<0.001	<0.001
	550	12,378	13,609	0.3165	0.3481	<0.001	<0.001
	650	12,325	13,364	0.3152	0.3419	<0.001	<0.001
	737	12,279	13,149	0.3139	0.3363	<0.001	<0.001
	850	12,215	12,887	0.3129	0.3294	0.001	0.001
	950	12,123	12,583	0.3115	0.3230	0.003	0.002

Species specific research and priorities

Orange roughy acoustic survey 2023 - This research has been identified as a priority and will provide an acoustic based biomass estimate for orange roughy (Eastern) for the 2023-24 fishing year. It also includes the collection of biological samples including length, weight, sex, spawning stage and otolith extraction.

AFMA commenced a five-year review of the Orange Roughy Rebuilding Strategy in November 2019, and sought public comment on the revised Orange Roughy Rebuilding Strategy from 15 January to 12 February, 2021. AFMA are currently finalising the revised Orange Roughy Rebuilding Strategy with a view to having it published in 2022.

RAG Recommendations

SERAG recommended a 3 year MYTAC for orange roughy east using the outputs of the MCMC analysis. If a TAC greater than the HCR RBC were to be set in the east, the constant catch scenarios and associated risk profiles should be used as basis for determining the TAC.

The orange roughy Pedra Branca area 3 year MYTAC will constitute 7 per cent of this RBC apportioned to the eastern zone.

SERAG recommended maintaining the current undercatch provisions.

	Year	RBC (t)	Is a MYTAC Recommended?
Recommended Biological Catch (t)	2025	772 (93% of 830)	Yes. (93% of the Eastern Zone Tier 1 stock assessment, with 7% apportioned to the Pedra Branca area of the Southern Zone.)
	2024	734 (93% of 789)	
	2023	688 (93% of 740)	
	2022	633 (93% of 681)	
Discount factor (t)	N/A	Discount factors are not applied to Tier 1 assessments.	
State catch (t)	N/A	There are no estimates of State catches.	
Discards (t)	10.7	Estimated discards (four year weighted average 2017-2020).	
Recreational catch (t)	N/A	There are no known recreational catches for orange roughy.	
Research Catch Allowance (t)	N/A	There has been no specific research catch allocated.	
Provisional TAC under the Harvest Strategy	674 t – using three year average RBC		

AFMA Advice

AFMA Management supports SERAG advice that the MCMC analysis should be used for the basis of determining a TAC for the 2022-23 fishing year. AFMA will consider the risk associated with TACs based on constant catch scenarios and will seek SEMAC advice in February 2022.

Attachment H – Jackass morwong species summary



Nemadactylus macropterus

Species summary					
Common names	Sea bream, jackass fish, perch, silver perch, squeaker perch, deepsea perch, mowie.				
Stock assessment	Tier 1 Species (East), weight of evidence (West) - last assessed by SERAG in 2021.				
Stock structure	For assessment purposes it is assumed there are separate stocks of jackass morwong in the Eastern and Western Zones.				
West Stock status against reference points (%B ₀ in year +1)	Tier	Year	Biomass	Target	Limit
	1	2018	68	48	20
	1	2015	69		
	1	2011	67		
East Stock status against reference points (%B ⁶¹ in year +1)	Tier	Year	Biomass	Target	Limit
	1	2021	15	48	20
	1	2018	35		
	1	2015	37		
Stock trend and other indicators	<p>West</p> <p>The 2018 assessment estimated that the stock status was below the target reference point between 2006 and 2014 and had increased to 68%B₀ in 2019. This is slightly lower than the 2016 estimated biomass of 69%B₀ from the 2015 assessment. There was insufficient catch and data to support a revised stock assessment in 2021 (see stock assessment summary below). CPUE has declined since the 2018 stock assessment was completed, and has been below the long-term average since 2007.</p> <p>East</p> <p>The estimated 2019 biomass from the 2018 stock assessment was 39% of the 1988 equilibrium spawning biomass. The 2021 assessment (the 'low recruitment' base case), estimates the status in 2020 was 14%, increasing to approximately 15% in 2022. See 'Stock assessment information and RAG comments' for further information.</p>				
Multi-Year TAC	Year of MYTAC (2021-22)			Has the MYTAC advice been revised?	

⁶¹ Of the 1988 unfished equilibrium biomass

	3 rd of three year		N/A – Assessment updated in 2021	
Catch and TAC (t)	SESSF fishing year	Agreed TAC	TAC after unders/overs	Cth Retained Catch
	2021-22	463	507	-
	2020-21	468	514	98
	2019-20	469	515	109
	2018-19	505	556	186
Economics (Secondary) Commonwealth Trawl and Scalefish Hook	Financial Year	Species GVP (\$m)	Fishery GVP (\$m)	% Fishery GVP
	2019-20	0.20	51.34	0.39
	2018-19	0.64	49.47	1.29
	2017-18	0.45	41.86	1.08
ABARES Status (2021 report)	Fishing Mortality: Not subject to overfishing		Biomass: Not overfished	
Assessment summary				
Key model technical assumptions/ parameters	<p>West (2018)</p> <p>Single sex model and single stock in Zones 40 and 50</p> <p>One fleet: trawl</p> <p>Natural mortality (M) fixed at 0.15 (agreed by SERAG)</p> <p>Recruitment is estimated from 1989 to 2012</p> <p>East (2021)</p> <p>Single sex model and single stock in Zones 10, 20 and 30</p> <p>Six fleets: eastern trawl (Zones 10 and 20), Danish seine, Tasmanian trawl (Zone 30), steam trawl (1915-1961), early Danish seine (1929-1967), Mixed (DS + trawl) (1968-1985).</p> <p>Natural mortality fixed at 0.15 (agreed by SERAG)</p> <p>Recruitment is estimated from 1945 to 2015.</p>			
Significant changes to data inputs	There were no significant changes to data inputs from the 2018 assessment.			
Data and RAG comments	<p>A western stock assessment was not conducted in 2021 due to limited data, poor data quality, concerns about the adequacy of the CPUE series to index the stock abundance and repeated concerns about the inability of previous western stock assessments to fit to the CPUE series.</p> <p>There has been an increase in discarding in the eastern trawl fleet in 2019 and 2020.</p>			

<p>Stock assessment information and RAG comments</p>	<p><u>West</u></p> <p>The 2015 tier 1 assessment (Tuck et al, 2015⁶²) estimated a 2016 spawning stock biomass of 69%B₀. The 2018 assessment estimated the biomass had fallen below the target reference point between 2006 and 2014, increasing to a 2019 spawning stock biomass of 68%B₀.</p> <p>The initial western stock assessments were considered “preliminary” and then later classified as “increasingly uncertain” with concerns expressed about limited sampling effort, unrepresentative sampling, conflict between different data sources (highlighting potential unrepresentative sampling), very low catches and problematic retrospective patterns (Day et al, 2021⁶³).</p> <p>The results should be treated with considerable caution due to the limited data quality and quantity.</p> <p>SERAG (October 2021) noted there were no concerns in the few available indicator data, and on the basis that there had been very little recent catch, there was no reason to deviate from the previous management advice.</p> <p><u>East</u></p> <p>Bridging from 2018 assessment: estimates of absolute and relative spawning biomass in the early part of the time series were revised downwards, especially during the step where recruitment deviations were extended from 2015 to 2018, and the projected increase in biomass from 2015-2019 in the 2018 assessment now shows a flat to declining trend in the same time period.</p> <p>Recruitment has been below the long-term average since 2004. There has been a downward revision to the recruitment estimates from the 2018 assessment for the period 1998-2012, and the recruitment deviations in 2013 and 2014 are the lowest on record.</p> <p>The 2018 assessment estimated biomass trajectory has an increase at the end of the series, which has been revised down in the 2021 assessment. The fit to the CPUE at the end of the series in the 2021 assessment is better than it was in the 2018 assessment.</p> <p>SERAG agreed to project low recruitment (from 2016 onwards) in the base case (a ‘low recruitment base case’), on the basis that recruitment has been below average for the last 12 years in which it was estimated (2004-2015), and that projections should be based on a low recruitment scenario using the mean recruitment deviation of the most recent 10 years (2006-2015).</p> <p>Retrospective analyses show the estimated value of virgin biomass declines as each year of recent data is added to the model, as do recruitment deviations. There appears to have been a steady decline in productivity since around 1990, suggesting the ‘stepped’ shift in productivity accepted in 2011 was inappropriate. Under a dynamic B₀, stock status first drops below B₄₈ in the late 60’s and is just above the limit reference point in 2020. Under static B₀, the stock status dropped below the target in 2003 and has been below the limit reference point since 2013.</p> <p>Under the ‘low recruitment’ base case, the time series of relative spawning biomass has shifted lower in recent years with a minimum stock status of 14% in 2020, which was projected to be 36% from the 2018 assessment, however this was based on average</p>
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⁶² Tuck, G.N. (ed.) (2016). Stock Assessment for the Southern and Eastern Scalefish and Shark Fishery 2015. Part 1. Australian Fisheries Management Authority and CSIRO Oceans and Atmosphere, Hobart. 245p

⁶³ Day, J., Bessell-Browne, P., and Curin-Osorio, S. (2021). Eastern Jackass Morwong (*Nemadactylus macropterus*) stock assessment based on data up to. For discussion at SERAG, November 2021.

	<p>recruitment, which has proven to be optimistic. The stock is estimated to be 15% in 2022. See projected rebuild timeframes under 'projected biomass' below.</p> <p>SERAG considered a companion species analysis which investigated the link between target species catch and the associated level of unavoidable bycatch of recovering species, incorporating a range of factors such as area, depth fished and gear type – also known as metiers. Using logbook data from 2019 and 2020, and expected 2022-23 TACs for the main companion species (mostly flathead), the estimated unavoidable bycatch of eastern jackass morwong for 2022 ranged between 100 - 118 t, depending on assumed catches of flathead.</p>
Projected biomass	<p>West</p> <p>The 2018 tier 1 assessment projected the stock to reach 48%B₀ by 2045 assuming average recruitment.</p> <p>East</p> <p>Under the low recruitment base case, the eastern stock is projected to rebuild to the limit reference point by 2026 under the HCR catch of 0 t, however it is not expected to recover to the target reference point at any point if the low recruitment base case is projected forward – the model estimates stock status will plateau at 26.5% from around 2049.</p> <p>Fixed annual catch scenarios were explored to provide estimates of rebuilding timeframes to the limit reference points (20%).</p> <ul style="list-style-type: none"> - Catches up to 50 t allow the stock to rebuild to rebuild by 2028 - Catches up to 100 t allow the stock to rebuild by 2049 - The stock status continues to decline with catches up to 150 t, and will be fully depleted by around 2057.

Species specific research and priorities

Jackass morwong have been identified as a candidate for application of CKMR assessment approaches.

RAG Recommendations

SERAG (November 2021) recommended that the western jackass morwong RBC of 223 t (3-year average from the 2018 stock assessment) be maintained for the 2022-23 fishing year.

The eastern stock is assessed to be below the limit reference point, and SERAG recommended a 0 t RBC, consistent with the requirements of the SESSF Harvest Strategy. Noting the requirement in the *Commonwealth Harvest Strategy Policy* to rebuild a stock to the limit reference point within T_{MIN}, or up to 2xT_{MIN} after assessing the trade-off between costs and benefits of alternative recovery trajectories, SERAG recommended restricting total mortality to 50 t.

Recovery projections are based on landed catches of 50 t with discards estimated to be 2.5 t in addition to landed catch. This is consistent with the requirement under the HSP to rebuild the stock to the limit reference point within ten years (2xT_{MIN}).

	Year	RBC (t): East	RBC (t): West	RBC (t): Total	Is a MYTAC Recommended?
Recommended Biological Catch (t)	2024	0	-	-	No The eastern stock is assessed as overfished, and as such jackass morwong will be subject to a global
	2023	0	-	-	
	2022	0	-	-	

	3-year average	0	223 ⁶⁴	-	bycatch TAC which must be reviewed annually.
Discount factor (t)	N/A	SERAG did not recommend applying a discount factor on the basis that an incidental bycatch TAC in the east will require a global TAC well below the western RBC.			
State catch (t)	East = 8.3 West = 0.6	Four-year weighted average - mostly NSW catches. These are not deducted from the Commonwealth bycatch TAC but should be considered as a source of total mortality.			
Discards (t)	N/A	Modelled discards in the east depend on the level of catch permitted under an incidental bycatch TAC. Discards in 2022 are estimated to be 2.5 t under an incidental bycatch TAC of 50t (total mortality of 52.5 t), and 5.2 t under 100 t (total mortality of 105.2 t).			
Recreational catch (t)	N/A	A recreational survey in 2000 estimated that a total of 294 t of jackass morwong was caught across NSW, Victoria, Tasmania, SA and WA. A survey in 2013 estimated Tasmanian catches of 18 t. There have been no additional surveys and recreational catches are not considered in the assessment.			
Research Catch Allowance (t)	N/A				
Provisional TAC under the Harvest Strategy		0 t – Incidental bycatch TAC to be considered.			
AFMA Advice					
<p>Implementing a bycatch TAC for jackass morwong will not be sufficient as a stand-alone measure to reduce total mortality to 50 t in the east, as jackass morwong are incidentally caught using trawl methods on the east coast (zone 10, 20, 30 and 60) when targeting other species, mainly flathead.</p> <p>The estimate of unavoidable bycatch in 2022 is currently double that which is expected to allow the stock to recover to the limit reference point within the timeframe required under the HSP. AFMA management will need to consider other measures, such as gear restrictions, closures, move-on provisions and reductions to companion species TACs (flathead) to constrain total mortality of jackass morwong in the east.</p>					

⁶⁴ RBC from 2018 Tier 1 assessment

Attachment I – Pink ling species summary



Genypterus blacodes

Species summary					
Common names	Pink cusk-eel, kingclip, golden ling, ling, Australian rock-ling				
Stock assessment	Tier 1 Species - last assessed by SERAG in 2021				
Stock structure	<p>Pink ling are assessed as separate stocks east and west of Longitude 147° East.</p> <p>Genetic variation between eastern and western pink ling has not been found, however, there are differences in size and age structure, growth and catch rates between the Eastern and Western Zones. These differences suggest there is little mixing of pink ling between the zones, and that fishing in one area will have limited impact on fish in the other area.</p>				
East Stock status against reference points (%B₀ in year +1)	Tier	Year	Biomass	Target	Limit
	1	2021	34	48	20
	1	2018	30		
	1	2015	30		
West Stock status against reference points (%B₀ in year +1)	Tier	Year	Biomass	Target	Limit
	1	2021	91	48	20
	1	2018	84		
	1	2015	73		
Stock trend and other indicators	<p>East</p> <p>Biomass continues to increase and stock status is estimated to be between the limit and target reference points for the base model and sensitivities</p> <p>West</p> <p>Biomass has continued increasing above the management target.</p>				
Multi-Year TAC	Year of MYTAC (2021-22)			Has the MYTAC advice been revised?	
	3 rd of three year			N/A – Assessment updated in 2021	
Catch and TAC (t)	SESSF fishing year	Agreed TAC	TAC after unders/overs	Cth Retained Catch	

	2021-22	1,121	1,229	-
	2020-21	1,310	1,436	910
	2019-20	1,288	1,378	833
	2018-19	1,117	1,203	952
Economics (Primary)	Financial Year	Species GVP (\$m)	Fishery GVP (\$m)	% Fishery GVP
Commonwealth Trawl and Scalefish Hook	2019-20	6.37	51.34	12.41
	2018-19	6.38	49.47	12.90
	2017-18	5.05	41.86	12.06
ABARES Status (2021 report)	Fishing Mortality: Not subject to overfishing		Biomass: Not overfished	
Assessment summary				
Key model technical assumptions/ parameters	<p>Single area, two sex, age-structured (east and west)</p> <p>Von Bertalanffy growth, single natural mortality (M)</p> <p>Fixed maturity and steepness ($h=0.75$)</p> <p>SSB: female only, mid-year</p> <p>Two fisheries: trawl, non-trawl</p> <p>Time-blocked selectivity for trawl</p> <p>Boat effects in CPUE standardisation time-blocked for most boats (1986-1999, 2000-2006, 2007-2020) to account for effects of structural adjustment and halving in the number of boats from 2006 to 2007.</p> <p>Estimate parameters: B_0, growth, recruitments strengths, natural mortality, and selectivity.</p> <p>Data weighting followed Francis (except age-length not fully down-weighted).</p> <p>A full Bayesian estimation was undertaken; Mode of the posterior distribution (MPD) runs for diagnostics followed by Markov Chain Monte Carlo (MCMC) runs for estimates.</p>			
Significant changes to data inputs	The 2021 assessment was an update of the 2018 assessment with no significant changes to data inputs other than addition of new data (catch, CPUE, length and age frequencies).			
Data and RAG comments	<p>Changes to the trip limits in the east since 2013 make it difficult to resolve the standardised CPUE and estimates of discards.</p> <p>ISMP data was used to estimate stock and fishing method specific landing multipliers (m) by year (west) and by trip limit periods and year for the east.</p> <p>Catch histories were revised for 2016 to 2018 (compared to the 2018 assessment) and catches for 2019 and 2020 were added, with catches in 2020 assumed to be the same in 2021.</p> <p>East (as in 2018), multiply estimated landing for each trawl record by the appropriate landings multiplier to get an estimate catch for each trawl.</p> <p>There is a strong depth effect on length frequency for trawl, so port sampled length frequencies were not used in the east.</p>			
Stock assessment	<u>West</u>			

<p>information and RAG comments</p>	<p>A comparison of trawl CPUE series across the last four stock assessments shows a similar trend, with western CPUE trending upwards.</p> <p>Western MPD runs estimate relative biomass ranging from 78%B₀ to 93%B₀ based on the addition of data since the 2018 stock assessment. Estimates of relative spawning biomass are highly dependent on values of M, and range 71%B₀ to 95%B₀ under high (0.26) and low (0.2) values of M.</p> <p>Model fits to trawl CPUE are good in the later part of the time series. Model fits to FIS and trawl length frequencies are also good, but less so for the FIS indices.</p> <p>There is a 'spike' in fish around 90-95cm in 2018 which the model cannot fit.</p> <p>The likelihood profile for B₀ showed little conflict between the data sets with the MPD estimate at 5910 t and little support for values below 4000 t.</p> <p>The likelihood profile for M showed little conflict between the data sets with most information coming from age data. This provides a good basis for estimating M in the model (the MPD estimate was 0.22 and the MCMC estimate was 0.23).</p> <p>East</p> <p>A comparison of trawl CPUE series across the last four stock assessments shows a similar trend, with eastern CPUE trending upwards.</p> <p>Adding a latitude effect to the CPUE series depresses the series, driven by lower catch rates in the northern latitudes – there has been a southerly shift in the eastern trawl catches over time.</p> <p>MPD estimates are primarily presented for diagnostic purposes, whereas the results of the MCMC runs are used as a basis for management advice. Eastern MPD runs estimate relative biomass ranging from 29%B₀ to 33%B₀ based on the addition of data since the 2018 stock assessment with fixed value of M (0.23). Estimates of relative spawning biomass are highly dependent on values of M, and range 22%B₀ to 36%B₀ under high (0.26) and low (0.2) values of M.</p> <p>Model fits to the eastern trawl CPUE, length frequencies and Fishery Independent Survey Indices (5 years) are very good.</p> <p>The likelihood profile for B₀ shows good agreement between the data sets and provides a well-defined MPD estimate of 5890 t. However, the likelihood profile for M shows a confusing picture where age data favour high estimates of M and are opposed by length frequency data. This profile does not support the estimation of M in the base model.</p> <p>SERAG (September 2021) supported the proposed base case models and recommended that the eastern model use a value of M fixed at the estimate from the Western base case MCMC model.</p> <p>The MCMC estimates the 2021 eastern stock biomass at 34%B₀ with a 2022 RBC of 410 t and the western stock is estimated to be 91%B₀ with a 2022 RBC of 1300 t (Figure 13). The table below provides the likelihood of being below 20%B₀, or 30%B₀ or being at or above 48%B₀ in 2024 and 2031 under constant catch scenarios in the east.</p> <table border="1" data-bbox="368 1473 1241 1892"> <thead> <tr> <th>Catch (t)</th> <th>E(B₂₄) (%B₀)</th> <th>E(B₃₁) (%B₀)</th> <th>P(SS₂₄ < 0.2)</th> <th>P(SS₃₁ < 0.2)</th> <th>P(SS₂₄ < 0.3)</th> <th>P(SS₃₁ < 0.3)</th> <th>P(SS₂₄ ≥ 0.48)</th> <th>P(SS₃₁ ≥ 0.48)</th> </tr> </thead> <tbody> <tr><td>0</td><td>47</td><td>75</td><td>0.00</td><td>0.00</td><td>0.01</td><td>0.00</td><td>0.41</td><td>1.00</td></tr> <tr><td>400</td><td>40</td><td>51</td><td>0.00</td><td>0.00</td><td>0.12</td><td>0.03</td><td>0.17</td><td>0.56</td></tr> <tr><td>475</td><td>39</td><td>46</td><td>0.00</td><td>0.01</td><td>0.15</td><td>0.07</td><td>0.14</td><td>0.43</td></tr> <tr><td>500</td><td>38</td><td>45</td><td>0.01</td><td>0.01</td><td>0.18</td><td>0.10</td><td>0.12</td><td>0.36</td></tr> <tr><td>550</td><td>37</td><td>42</td><td>0.01</td><td>0.02</td><td>0.20</td><td>0.15</td><td>0.11</td><td>0.28</td></tr> <tr><td>600</td><td>36</td><td>38</td><td>0.01</td><td>0.05</td><td>0.25</td><td>0.24</td><td>0.09</td><td>0.20</td></tr> <tr><td>650</td><td>36</td><td>36</td><td>0.02</td><td>0.08</td><td>0.28</td><td>0.34</td><td>0.09</td><td>0.14</td></tr> <tr><td>700</td><td>34</td><td>32</td><td>0.03</td><td>0.16</td><td>0.33</td><td>0.46</td><td>0.07</td><td>0.10</td></tr> <tr><td>750</td><td>34</td><td>29</td><td>0.04</td><td>0.23</td><td>0.37</td><td>0.55</td><td>0.07</td><td>0.06</td></tr> </tbody> </table>	Catch (t)	E(B ₂₄) (%B ₀)	E(B ₃₁) (%B ₀)	P(SS ₂₄ < 0.2)	P(SS ₃₁ < 0.2)	P(SS ₂₄ < 0.3)	P(SS ₃₁ < 0.3)	P(SS ₂₄ ≥ 0.48)	P(SS ₃₁ ≥ 0.48)	0	47	75	0.00	0.00	0.01	0.00	0.41	1.00	400	40	51	0.00	0.00	0.12	0.03	0.17	0.56	475	39	46	0.00	0.01	0.15	0.07	0.14	0.43	500	38	45	0.01	0.01	0.18	0.10	0.12	0.36	550	37	42	0.01	0.02	0.20	0.15	0.11	0.28	600	36	38	0.01	0.05	0.25	0.24	0.09	0.20	650	36	36	0.02	0.08	0.28	0.34	0.09	0.14	700	34	32	0.03	0.16	0.33	0.46	0.07	0.10	750	34	29	0.04	0.23	0.37	0.55	0.07	0.06
Catch (t)	E(B ₂₄) (%B ₀)	E(B ₃₁) (%B ₀)	P(SS ₂₄ < 0.2)	P(SS ₃₁ < 0.2)	P(SS ₂₄ < 0.3)	P(SS ₃₁ < 0.3)	P(SS ₂₄ ≥ 0.48)	P(SS ₃₁ ≥ 0.48)																																																																																			
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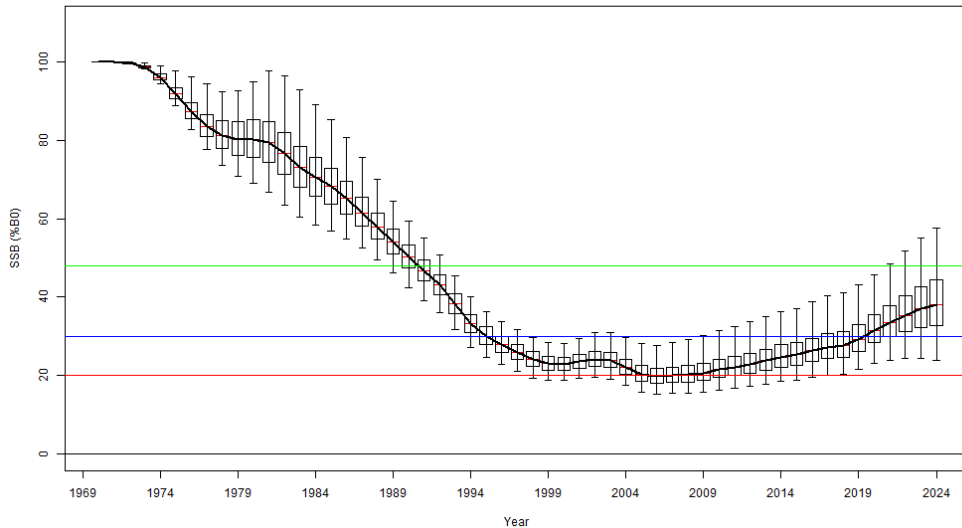


Figure 13: MCMC projected eastern biomass under the HCR RBC

West:

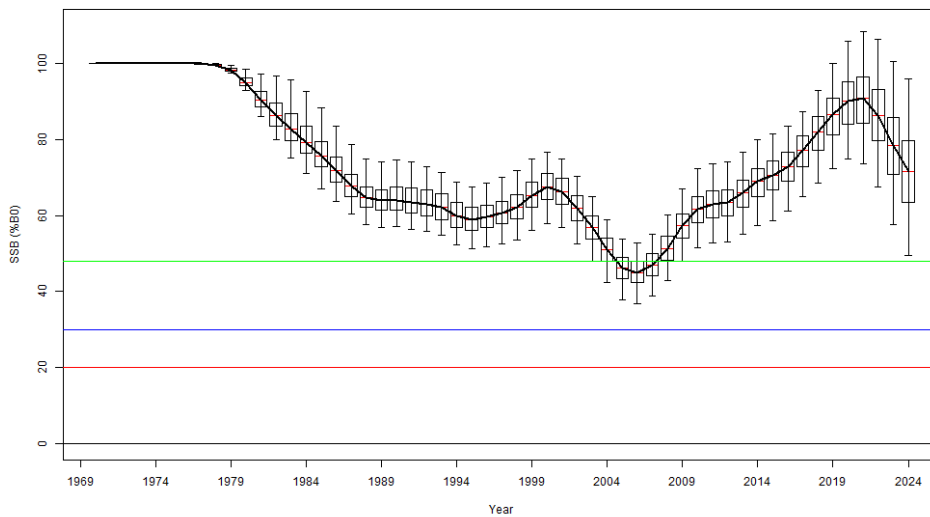


Figure 14: MCMC projected western biomass under the HCR RBC

Species specific research and priorities

There is no species-specific research currently underway or identified as future priorities.

RAG Recommendations

SERAG (November 2021) recommended a 3-year MYTAC with RBCs for the east and west stocks based on the outputs of the MCMC analysis. If a TAC greater than the RBC were to be set in the east, the constant catch scenarios and associated risk profiles should be used as basis for determining the TAC.

Recommended Biological Catch (t)	Year	RBC (t): East	RBC (t): West	Combined (t)	Is a MYTAC Recommended?

	2024	490	1,090	1,580	Yes. 3-year MYTAC using average east (457 t) and west (1,193 t) RBCs from the 2021 assessment.
	2023	470	1,190	1,660	
	2022	410	1,300	1,710	
	Long term yield	570	730	1,300	
Discount factor (t)	N/A	A discount factor is not applied.			
State catch (t)	East = 54.4 West = 0.4 Combined = 54.8	The majority of State catches were recorded in NSW (east) and TAS (west), and are deducted from the RBC.			
Discards (t)	East = 20.2 West = 6.4 Combined = 26.8	Discards are not modelled in the Tier 1 assessment – weighted average discards are deducted from the RBC.			
Recreational catch (t)	N/A	There are reports of increasing recreational catch of this species, but catches are not estimated and unlikely to be significant.			
Research Catch Allowance (t)	N/A	There has been no specific research catch allocated.			
Provisional TAC under the Harvest Strategy	East: 382 t West: 1,186 t Combined: 1,568 t * Eastern notional catch limit will be considered using constant catch scenarios				
AFMA Advice					
AFMA Management accepts SERAG advice that the MCMC analysis should be used for the basis of determining a TAC for the 2022-23 fishing year. Within the global TAC of 1,568 t (provisional TAC under the harvest strategy) AFMA will consider the risk associated with notional catch limits in the east based on constant catch scenarios and will seek SEMAC advice in February 2022.					

Attachment J – Silver warehou species summary



ABARES (2012): Line drawing – FAO

Seriolella punctata

Species summary					
Common names	Spotted warehou, spotted trevally, spotted trevalla, snotty nose trevally, trevally, mackerel trevalla				
Stock assessment	Tier 1 Species - last assessed by SERAG in 2021				
Stock structure	Considered to be a single stock in the SESSF.				
Stock status against reference points (%B₀ in year +1)	Tier	Year	Biomass	Target	Limit
	1	2021	29	48	20
	1	2018	31		
1	2015	40			
Stock trend and other indicators	<p>The 2021 assessment estimates that the projected 2022 spawning stock biomass will be 29%B₀ (projected assuming 2020 catches in 2021, compared to 31%B₀ at the start of 2019 from the 2018 assessment (Burch et al, 2018⁶⁵). Moving to the model with low recruitment projections as the base case (see below) for this assessment has been the main driver of this downward revision of stock status (Bessell-Browne & Day, 2021⁶⁶).</p> <p>The 2021 assessment suggests that spawning stock biomass was as low as 21% in 2016. The increase in estimated stock status since the 2018 assessment is likely due to slight increases in standardised catch rates and increasing recruitment combined with low catches (Bessell-Browne & Day, 2021).</p> <p>Standardised CPUE has declined in the east since 1994, and has been below average since 2000. Standardized CPUE in the west has declined since 2005, and since 2008 has been below the long-term average (Sporcic, 2021c⁶⁷).</p>				
Multi-Year TAC	Year of MYTAC (2021-22)		Has the MYTAC advice been revised?		
	3 rd of 3-year		N/A – Assessment updated in 2021		
Catch and TAC (t)	SESSF fishing year	Agreed TAC	TAC after unders/overs	Cth Retained Catch	

⁶⁵ Burch, P., Day, J., Castillo-Jordán, C., Osorio, S.C., (2018). Silver Warehou (*Seriolella punctata*) stock assessment based on data up to 2017. Report for the Australian Fisheries Management Authority. CSIRO Oceans and Atmosphere.

⁶⁶ Bessell-Browne, P. and Day, J. (2021). Silver Warehou (*Seriolella punctata*) stock assessment based on data up to 2020. Technical paper presented to the SERAG, 29 November-1 December 2021, Hobart, Tasmania

⁶⁷ Sporcic, M (2021c). Statistical CPUE Standardisations for selected SESSF species (data to 2020). Technical report prepared for the SERAG (MS Teams Video) Meeting 1, 28-29 September 2021.

	2021-22	450	487	-
	2020-21	450	490	289
	2019-20	450	505	307
Economics (Primary) Commonwealth Trawl and Scalefish Hook	Financial Year	Species GVP (\$m)	Fishery GVP (\$m)	% Fishery GVP
	2019-20	0.40	86.00	0.47
	2018-19	0.37	49.47	0.75
	2017-18	0.57	41.86	1.36
ABARES Status (2021 report)	Fishing Mortality: Not subject to overfishing		Biomass: Not overfished	
Assessment summary				
Key model technical assumptions/ parameters	<p>Single stock model with two fleets, one in the east and one in the west</p> <p>Von Bertalanffy growth curve estimated for one sex including both males and females</p> <p>Natural mortality fixed at 0.3</p> <p>Stock recruitment steepness fixed at 0.75</p> <p>The initial value of the parameter determining the magnitude of process error in annual recruitment is set to 0.7</p> <p>Selectivity estimated for both fleets</p> <p>Retention estimated for both fleets, with a time block included in 2002, with all sizes discarded earlier and sized based discarding after this time. In the east trawl fleet an additional retention time block is included in 2018 to allow the model to fit increased discard estimates between 2018 and 2020</p> <p>The age observation plus group is modelled to be 23 years</p> <p>The length-weight relationship is fixed based on previously determined estimates ($a = 0.0000065 \text{ g}^{-1} \text{ cm}$, $b = 3.27$)</p> <p>Female length at 50% maturity is assumed to be 37 cm</p>			
Significant changes to data inputs	There have been no significant changes to data inputs			
Data and RAG comments	<p>There has been a large increase in discard estimates in the east trawl fleet between 2018 and 2020.</p> <p>There were only five onboard retained length frequencies collected in the east in 2020, compared to 541 in 2019.</p>			
Stock assessment information and RAG comments	<p>Recruitment has been below the long-term average since 2004. Only one additional recruitment deviation was estimated from the previous assessment rather than the usual three (removing a known retrospective pattern in estimation). This had no impact in the estimation of stock status.</p> <p>An extra time-block on retention from 2018 onwards for the east trawl fleet was also included to allow the model to fit the dramatic increase in discard estimates. This improved the model fits to discard estimates and CPUE in the east trawl fleet.</p>			

The jump up of stock status at the end of the series, which uses assumed catches in 2021 based on those in 2020 was discussed by SEAG. This projected estimate is not constrained by data inputs, most notably CPUE, and may be an overoptimistic representation of recovery.

On the basis that recruitment has been below average since 2004, SERAG recommended adopting a 'low recruitment' base case to use the average of recruitment deviations from 2011-2015 from 2016 onwards. SERAG requested fixed catch projections under the low recruitment scenario and fixed catch projections using the RBC produced from the HCR, and a range of lower catches.

The 2021 base case stock assessment estimates that the 2022 spawning stock biomass will be 29% of virgin stock biomass (projected assuming 2020 catches in 2021 under low recruitment scenario) and a 2022 RBC of 587 t (Figure 20).

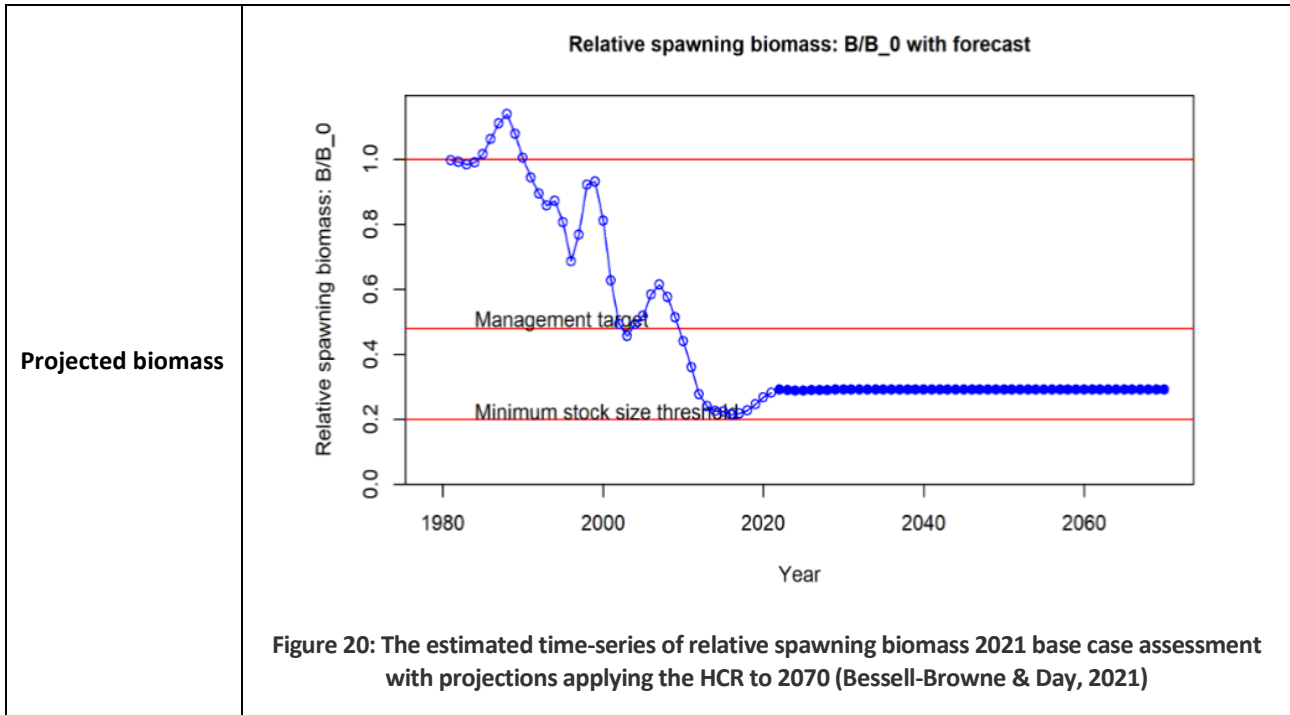
Retrospective analyses under the low recruitment scenario have alleviated concerning patterns observed in previous assessments and in the model with average recruitment projections.

Application of the HCR catches estimate that there is no increase in stock status towards the target reference point ($48\%B_0$) and stock status remains at $29\%B_0$. Projected stock status under constant catch scenarios and the low recruitment scenario are provided below.

SERAG noted silver warehou are not a targeted species, and that a reduction to the TAC alone is not likely to constrain total mortality. The TAC is currently set at 450 t, of which 289 t and 307 t was caught in the 2020-21 and 2019-20 fishing year, respectively.

Constant catch scenarios developed using low recruitment projections (average recruitment over the last five years).

Retained catch scenario (t)	Mean discards (t)	2022 (% B_0)	2023 (% B_0)	2024 (% B_0)	2025 (% B_0)	2026 (% B_0)
0	0	29	31	34	36	37
250	59	29	30	31	32	33
350	85	29	30	30	31	31
450	110	29	29	29	29	29
2022 RBC	118	29	29	29	29	29



Species specific research and priorities

There is no species-specific research currently underway or identified as future priorities.

RAG Recommendations

SERAG recommended setting the TAC for the 2022-23 fishing year on the basis of the fixed catch scenarios outlined above, while understanding the risk associated with stock status and time taken to rebuild towards the target.

	Year	RBC (t)	Is a MYTAC Recommended?
Recommended Biological Catch (t)	2024	575	Yes. 3-year MYTAC using the 'low recruitment' constant catch scenario, noting the RBCs from the HCR (left) will not result in any rebuilding to the TRP and estimate stock status will remain at 29%B ₀ .
	2023	580	
	2022	587	
	3-Year Average	581	
Discount factor (t)	N/A	Discount factors are not applied to Tier 1 assessments.	
State catch (t)	0.01	State catches are very low and are not deducted from the RBC because a TAC based on constant catch is recommended.	
Discards (t)	75.5	Modelled discards from the 2021 stock assessment.	
Recreational catch (t)	N/A	There are no estimates of recreational catch.	
Research Catch Allowance (t)	N/A	There has been no specific research catch allocated.	

Provisional TAC under the Harvest Strategy	506 t - calculated using the three year average HCR RBC and modelled discards from the 2021 assessment. However, SERAG recommended setting the TAC based on fixed catch projection, and not the RBC produced by the HCR.
AFMA Advice	
AFMA Management accepts SERAG advice that the 2022-23 TAC should be based on the fixed catch projections, and not the RBC produced by the HCR. AFMA will consider the risk associated with TACs based on fixed catch projections and will seek SEMAC advice in February 2022.	