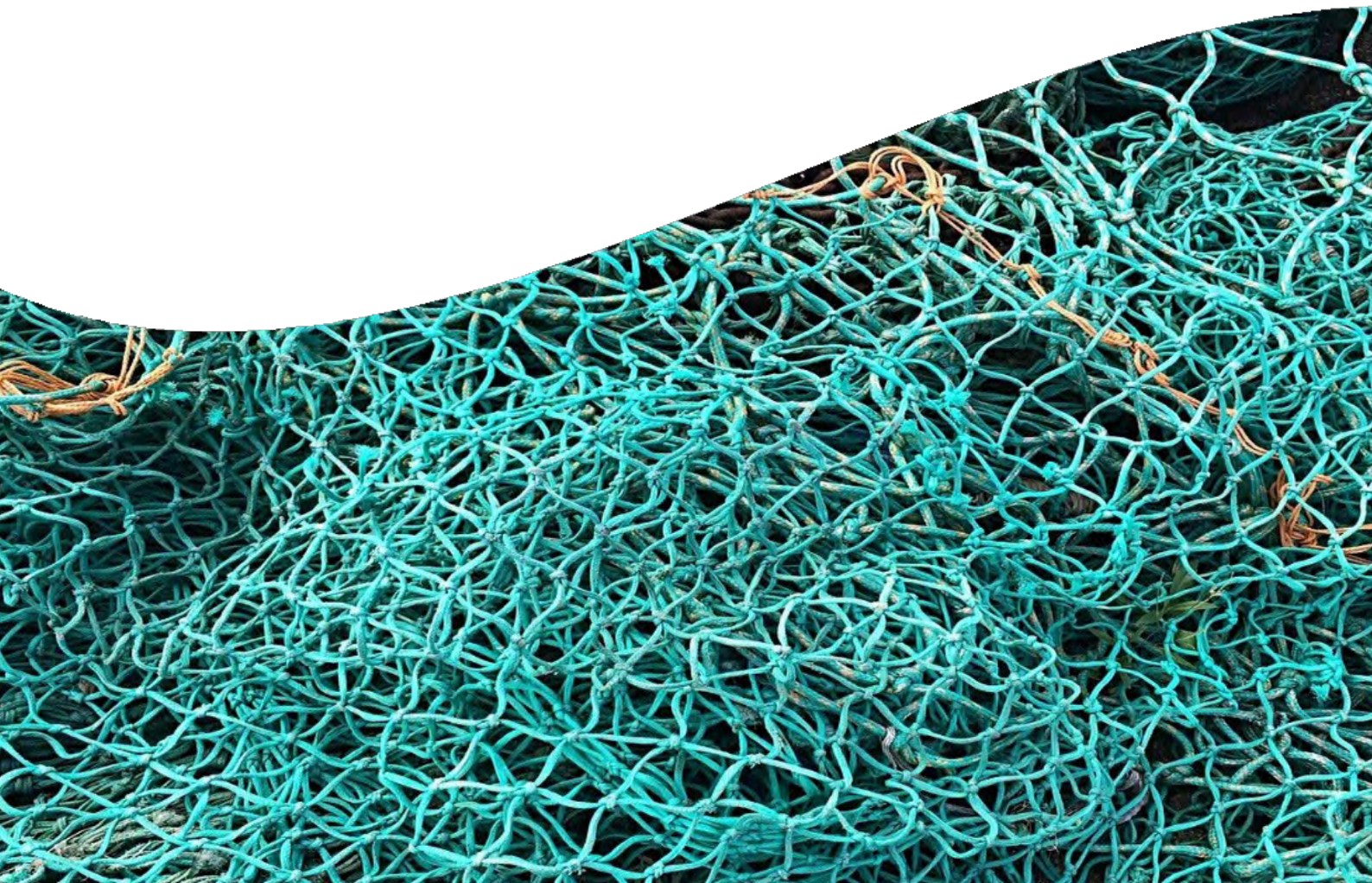
Australian Government

Australian Fisheries Management Authority

Southern and Eastern Scalefish and Shark Fishery (SESSF)

Species Summaries 2024



Contents

Summary of Total Allowable Catch (TAC)

Species	2023–24 agreed TAC (t)	2024–25 agreed TAC (t) AFMA recommendation	Change in TAC from 2023–24 (t)
Alfonsino	1,017	1,017	0
Bight redfish	959	959	0
Blue eye trevalla	238	263	+25
Blue grenadier	17,084	17,084	0
Blue warehou	30	30	0
Deepwater flathead	1,238	1,209	-29
Deepwater shark (eastern)	24	24	0
Deepwater shark (western)	235	327	+92
Elephant fish	114	114	0
Flathead	2,333	2,333	0
Gemfish (eastern)	100	100	0
Gemfish (western)	180	180	0
Gummy shark	1,672	TBC	TBC
Jackass morwong	50	50	0
John dory	60	60	
Mirror dory	121	240	+119
Ocean perch	318	318	0
Orange roughy (Albany and Esperance)	50	50	0
Orange roughy (Cascade)	397	397	0
Orange roughy (Eastern)	975	879	-96
Orange roughy (Southern) including Pedra Branca	105 (74 Pedra Branca, 31 incidental)	98 (67 Pedra Branca, 31 incidental)	-7

Species	2023–24 agreed TAC (t)	2024–25 agreed TAC (t) AFMA recommendation	Change in TAC from 2023–24 (t)
Orange roughy (Western)	60	60	0
Oreo, basket	137	137	0
Pink ling	1,565	1,533	-32
Redfish	30	30	0
Ribaldo	393	393	0
Royal red prawn	628	628	0
Sawshark	525	525	0
School shark	225	TBC	TBC
School whiting	914	914	0
Silver trevally	25	TBC	TBC
Silver warehou	350	350	0
Smooth oreo dory (Cascade)	150	150	0
Smooth oreo dory (other)	90	90	0
Non-quota Species			
Boarfish	200	200	0
Orange roughy (ECDWT)	50	50	0
Hagfish	80	80	0

Purpose

These species summaries provide information on quota and non-quota species assessed by the various Resource Assessment Groups (RAGs) for the Southern and Eastern Scalefish and Shark Fishery (SESSF) including the Great Australian Bight RAG (GABRAG), South East RAG (SERAG) and SharkRAG.

The summaries contain basic information on stock status, catch trends, assessment details, Recommended Biological Catch (RBC) recommendations from the relevant RAG, Total Allowable Catch (TAC) advice from the relevant Management Advisory Committee (MAC) and AFMA TAC advice for the 2024-25 SESSF fishing year, 1 May 2024 to 31 April 2025.

The summaries are designed to be a quick reference and should be read in conjunction with relevant RAG and MAC minutes and the applicable species stock assessments – links to the relevant documents are provided throughout where available.

The SESSF Harvest Strategy Framework 2009 (the SESSF Harvest Strategy) provides the basis for TAC calculations. Other relevant considerations are included in this paper.

TAC considerations

Ecological considerations

Fishery Harvest Strategy (commercial & byproduct)

A new SESSF Harvest Strategy is currently being developed. This follows the introduction of the *Commonwealth Fisheries Harvest Strategy Policy 2009* (HSP) and in response to significant changes in the fishery since the current Harvest Strategy was implemented in 2009 including:

- structural adjustment reducing the number of boats in the fishery
- changing fisher behaviour with fewer species being targeted
- greater use of multi-year TACs (MYTAC), and
- environmental change.

The Fisheries Research and Development Corporation (FRDC) Project 'Development and evaluation of multi-species harvest strategies in the SESSF' (MSHS) (FRDC 2018-021) commenced in 2019 and aims to develop and evaluate multi-species harvest strategies, including reference points and decision rules, and evaluate monitoring and assessment options. This project is expected to be completed in early 2024 and will complement work currently underway at AFMA to transition the fishery to a new harvest strategy.

A phased approach will be required to transition from the current operating environment (stock assessments, data collection, monitoring etc.) to the new operating environment required to support a revised harvest strategy. In the interim, the SESSF will continue to operate under the current SESSF Harvest Strategy with transitional arrangement incorporated on an as needs basis.

At its August 2023 data meeting, the SESSFRAG Resource Assessment Group (SESSFRAG) supported two key changes:

- The introduction of a 'trigger species' group in the SESSF Harvest Strategy to simplify the TAC setting process for species where risk to the stock is considered low, and

- Recasting the stock assessment and data processing schedule to redirect resources towards more strategic research priorities.

Further details are provided in the discussion paper – SESSF Harvest Strategy Transitional Arrangements.

While the trigger species approach has not been formally adopted in the SESSF Harvest Strategy, the approach has been used to recommend TACs for trigger species for the 2024-25 fishing season. AFMA will seek advice from the South East Management Advisory Committee and AFMA Commission in February and March 2024, respectively, and update the harvest strategy accordingly.

Ecological Risk Assessment results (bycatch & protected species)

Ecological Risk Assessments (ERAs) were undertaken between 2019 and 2021 for the sectors of the SESSF identified below and were supported by the South East Management Advisory Committee (SEMAC) and Great Australian Bight MAC (GABMAC). The reports for the following sectors are available on the AFMA website:

- Commonwealth Trawl Sector (CTS) otter board fleet
- CTS Danish seine fleet
- Great Australian Bight Trawl Sector (GABTS)
- Gillnet Hook and Trap Sector (GHATS) Shark Gillnet fleet
- Gillnet Hook and Trap Sector (GHATS) Auto Longline fleet
- Gillnet Hook and Trap Sector (GHATS) Manual Longline fleet

Other relevant considerations

Climate change

Information on the sensitivity of each species to climate change has been included in the summaries in a row titled “Climate Sensitivity”. The information presented for each species draws upon three types of assessments conducted by CSIRO:

1. Atlantis ecosystem modelling of the effect of climate on key species in the SESSF fishery, as reported in ‘Elizabeth A Fulton, Nastaran Mazloumi, Aaron Puckeridge, Roshan Hanamseth, Modelling perspective on the climate footprint in south east Australian marine waters and its fisheries, *ICES Journal of Marine Science*, 2023; https://doi.org/10.1093/icesjms/fsad185’

2. Preliminary biomass trajectories from species distribution models and various ecosystem models as reported in Summary of Commonwealth Fishery Climate Sensitivity (Appendix to ‘Fulton, E.A. et al (2021) Guidance on Adaptation of Commonwealth Fisheries management to climate change. CSIRO Report for FRDC. Hobart.’) These preliminary projections utilise quantitative models, similar to a level 3 ERA.

3. Climate sensitivity assessments following the method of Pecl. et al (2014) models as reported in Summary of Commonwealth Fishery Climate Sensitivity. This assessment is based purely on life history characteristics and could be considered an “information poor” assessment.

These assessments represent cascading levels of sophistication, with the Atlantis ecosystem model (point 1 above) representing the most sophisticated analyses and providing the most robust results, while the climate sensitivity assessment (point 3) is the least sophisticated. In the species summaries, the most robust results available for each species are included in the “Climate Sensitivity” row.

Non-recovering species

The prevalence of non-rebuilding stocks in the SESSF is strongly suggestive that the various versions of the SESSF Harvest Strategy used are not as robust to uncertainties as we thought. The single species Management Strategy Evaluation (MSE) that have been relied on to test the effectiveness of the various harvest control rules have apparently failed to capture the full effects of fishing and/or the impacts of other processes (including, but not limited to climate change) that have been important determinants of stock trajectories.

Discussions at RAG meetings so far have focussed on fishing mortality and climate change as the cause/solution for non-recovering stocks. While these are the obvious and significant drivers, what might be missing is an appreciation of the changes in ecosystem properties that might also be impeding recovery. For example, within the trophic structure of the ecosystem, these stressors might have non- intuitive ramifications such as release/increase of depredation or competition that leads to non-recovery of a species. The stressors or drivers might be anthropogenic or “natural” causes – e.g., directly from extraction, climate change, rebuilding of higher trophic level predators to pre-exploitation levels (e.g., fur seals and whales) but now within a changed environment as a result of not only climate change, but also coastal development, aquaculture, and associated activities.

Taking a broader cumulative ecosystem approach may explain the non-recovery of some species, and perhaps an acceptance of non-recovery or permanent change in state. To this end, ecosystem models are being produced which might allow exploration of various factors, including teasing apart the environmental factors from fishery driven factors, and determine which are most influential on stock dynamics. However, these are not used directly to inform the TAC setting process under the current SESSF Harvest Strategy.

Economic considerations

Reports on Gross Value Production (GVP) for the SESSF are available in the Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES) annual status reports (Patterson, et al, 2023).

Social considerations

In November 2017, a new objective was introduced in the *Fisheries Management Act 1991* requiring AFMA to have regard to the interests of commercial, recreational, and Indigenous fishers and ensure these interests are taken into account.

Commonwealth fisheries are a shared resource that provide a range of benefits to the Australian community. With many groups accessing Commonwealth fisheries, sharing these resources fairly has been a priority for the Government and Australian fishers for many years. To address this priority, the Commonwealth Fisheries Resource Sharing Framework (the Framework) was released in 2020. The Framework outlines the Government's approach to sharing fisheries resources across commercial, recreational, and Indigenous fishing sectors and between the Commonwealth, the States and the Northern Territory. The Framework provides a principles-based approach to creating resource sharing arrangements to manage access and allocation issues in Commonwealth fisheries. No resource sharing arrangements have yet been developed that impact the SESSF sectors.

Commercial fishers' interests

SESSF operators have raised concerns about resource sharing and access rights between sectors, jurisdictions and between other user proponents and are concerned with the potential impact on Commonwealth TAC's.

The concerns raised are in relation to:

1. The take of key Commonwealth managed species including gummy shark and school shark in South Australia (SA) and eastern school whiting in New South Wales (NSW):

   AFMA is working with SA to strengthen measures to ensure the catches of shark remain within SA's agreed allocation. AFMA has also worked closely with NSW to develop complementary management arrangements for shared stocks, including participating in meetings held by the NSW Department of Primary Industries (DPI) in relation to developing harvest strategies for relevant fisheries, including the NSW Trawl Whiting Sector. The NSW Trawl Whiting Harvest Strategy was published in May 2022 and is the first harvest strategy for the Trawl Whiting Fishery to be developed for NSW.

2. Increasing competition for access and use of marine space is threatening to 'squeeze' Commonwealth fishing businesses out of well established, productive fishing grounds as well as constrain industry's ability to adapt its operations to account for environmental variability caused by climate change.

   Key competing pressures are the emerging offshore renewable energy footprint, petroleum acreage releases, seismic surveys (to detect fossil fuel reserves), and the prospect of increased protection within existing Commonwealth marine parks or an expansion of parks and/or fishing closures. AFMA is increasing engagement with proponent processes to provide data, advise of important fishing areas and propose modifications to proposals to mitigate fishery impacts. Additionally, AFMA is contributing to a range of research through the Blue Economy CRC, FRDC and the Department of Climate Change, Energy, the Environment and Water (DCCEEW) to explore marine spatial planning and better account for all users of the marine environment needs.

Recreational fishers' interests

Recreational fishing members on SEMAC and SERAG contribute recreational fishing knowledge and expertise to committee deliberations, including the catch-setting processes.

The SESSF Harvest Strategy provides for recreational catches to be deducted from the RBC to produce a TAC, where recreational catches are known and included in the assessment.

Recreational catch information is listed in the relevant species summary below. Estimates for most species are currently uncertain and not available consistently through time. For species in this category, recreational catches have not been incorporated into the assessment and TAC calculations. Where reliable data is available, such as recreational survey information, it may be considered by the relevant RAG as a line of evidence when recommending RBCs and TACs and / or incorporated into the assessment.

There is a paucity of recreational catch data, particularly for recreationally important species such as gummy shark, school shark, blue-eye trevalla, and silver trevally. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) continues to liaise with each of the state agencies to obtain all available state data and emphasise the need for regular and ongoing surveys to obtain reliable data to inform assessments and management decisions. A research priority was included in the FRDC November call for research titled "Quantifying Indigenous and recreational (including charter) catch of key commercial species in the Southern Eastern Scalefish and Shark Fishery: A workshop approach". Research applications are due by 16 February 2024. Once submitted, the FRDC will assess each application as well as seeking an external review by end users and/or technical experts in some instances.

Indigenous fishers' interests

AFMA is in the process of establishing how best to consider Indigenous fishers' interests and ensure that they are considered appropriately. In 2012, the Fisheries Research and Development Corporation (FRDC) established an Indigenous Reference Group (IRG) to assist in working towards a Fisheries Research, Development and Extension (RD&E) plan for indigenous Australians.

In February 2020, the *Integrating indigenous fishing: extending adoption pathways to policy and management project* (FRDC 2019-168) commenced, which will identify impediments and opportunities for Indigenous engagement and adoption of IRG project outputs across fisheries management jurisdictions in Australia.

As at the date of this paper, no Indigenous fishers' interests have been identified that would impact on SESSF TACs for the 2024–25 fishing year.

Intersection with State and International fisheries

Where State catches are included in an assessment, estimates of State catches for the upcoming fishing year are deducted from the RBC to produce a Commonwealth TAC. Future State catches are estimated using a four-year weighted average of catches reported by the relevant State fisheries agency. However, the impact of management changes in State fisheries can be considered in forecasting the State catch in the upcoming fishing year.

In 2019, a NSW TAC was introduced for a range of species. Many of these species are also subject to a Commonwealth TAC[1]. When accounting for total mortality of a species in the stock assessment and then calculating the Commonwealth TAC, the key consideration is actual catches, not the NSW TAC. For this reason, the four-year weighted average for NSW catches is considered when making Commonwealth TAC recommendations in this paper for species where NSW State catches are deducted.

No developments in fisheries on the high seas or other countries' exclusive economic zones have impacted on these Commonwealth TAC recommendations.

Key fishery projects and developments relating to TACs

A number of research projects relevant to stock assessments and the TAC setting process are underway, many of which are interlinked and at various stages of completion. A summary of the relevant projects is provided below.

The Fisheries Research and Development Corporation (FRDC) Project Development and evaluation of multi-species harvest strategies in the SESSF (FRDC 2018-021) commenced in 2019 and aims to develop and evaluate multi-species harvest strategies, including reference points and decision rules, and evaluate monitoring and assessment options identified in the SESSF Monitoring and Assessment Research Project (SMARP).

As this project is nearing completion, the first stage to operationalise the MSHS is to recast the existing stock assessment and data analysis schedule to free up resources that can be redirected to higher priority monitoring and research. Key operational components of the MSHS framework will include:

- The introduction of a 'trigger species' category for 10 low risk or under caught species/stocks. TAC's are maintained until catches exceed 75 per cent of the TAC[2], or six years have passed, at which point an updated assessment and/or adjustments to the TAC are considered.
- For 2024 and 2025, postpone three Tier 1 stock assessments, cancel five Tier 4 and two Tier 1 stock assessments, and cancel data processing, CPUE standardisations and discard estimation in 2025.
- From 2026, establish either two- or four-year multi-year TAC's and only update logbook data processing, CPUE standardisations and data summary reports biennially. Discard estimates will be updated every four years, rather than annually.

Understanding factors influencing under-caught TACs, declining catch rates and failure to recover for many species in the SESSF (FRDC 2016-146) made a number of recommendations including incorporating the potential impacts of climate change on species abundance into assessments and developing an approach to determine if there has been a productivity change in a species. These issues are being further considered as part of the development of a new Harvest Strategy and a number of other initiatives.

[1] This includes the following species relevant to the SESSF: big eye ocean perch, blue eye trevalla, gemfish, hapuku, pink ling, blue spotted flathead, eastern school whiting and stout whiting (combined), silver trevally and tiger flathead.

[2] Or a lower number agreed by the relevant RAG.

Implementation of dynamic reference points and harvest strategies to account for environmentally-driven changes in productivity in Australian fisheries (FRDC 2019-036). This project is considering the use of dynamic reference points and will make recommendations on future stock assessment approaches, data requirements, harvest control rules and management approaches incorporating environmental indicators and dynamic productivity and dynamic reference points. The project uses four SESSF stocks[3] as the main case studies covering a variety of different recruitment patterns and historical trends in dynamic B_0.

Development and evaluation of multi-species harvest strategies in the SESSF (FRDC 2018-021. - refer to 'Fishery Harvest Strategy (commercial & byproduct)' under Ecological Considerations.

Revisiting biological parameters and information used in the assessment of Commonwealth fisheries: a reality check and work plan for future proofing (FRDC 2019-010) aimed to identify the origin of current biological information used in assessments, assess the implications and risks associated with using dated and borrowed information in assessments, and identify the methods that might be applied to update priority biological parameters. The Final Report was published in December 2022.

Biological parameters for stock assessments in South Eastern Australia – an information and capacity uplift follows on from the previous project and aims to develop a series of projects that directly address priority areas for updating biological parameters for target species in the SESSF.

Climate Adaptation Program

AFMA has been undertaking a range of activities, including workshops with fisheries managers, fishery stakeholders and experts to discuss climate impacts on key fisheries and potential adaptation options. The 'Adaptation of fisheries management to climate change handbook', developed by CSIRO and AFMA, is being used as the framework for these discussions. A range of communications products are also being developed and rolled out, including updates to the AFMA website and factsheets on Climate impacts south-east Australian fisheries.

Climate and Ecosystem Status Report for the SESSF

AFMA has contracted CSIRO to prepare Climate and Ecosystem Status Reports for key fisheries to support discussions on climate and environmental variables that may influence the fishery. This report incorporates readily accessible indicators and forecasts of environmental variables relevant to the SESSF and is to be used as contextual information in the RAGs consideration of stock assessments and TACs. The information in the report is general and preliminary in nature, to support discussion and feedback on relevant indicators. It is intended that these reports will be refined over time, based on RAG and MAC feedback, and building upon relevant research as it becomes available. The current SESSF Climate and Ecosystem Report can be found here.

Taking climate change into account in TACs

The incorporation of climate impacts into management advice will evolve over time as improvements are made to our understanding, methods, and decision frameworks. AFMA is currently developing a "Climate Risk Framework" to determine if and how climate sensitivity

[3] Redfish, jackass morwong east, silver warehou and blue grenadier

can be incorporated into assessments and TAC/E decisions, which will be accompanied by guidance for application by RAGs and MACs. This concept was discussed during a workshop held with a range of experts in October 2023, including scientists, industry, and managers in other jurisdictions utilising similar approaches, and a draft Framework will be trialled in 2024. Until this mechanism is finalised, the AFMA Commission is expecting that the information available on climate impacts is considered in a qualitative and contextual way when providing management advice.

Explanation of RBC and TAC calculations

RBC and TAC recommendations

For the purpose of scheduling stock assessments and setting TACs, SESSF species are categorised into one of three groups based on current stock status (or estimate of fishing mortality - F), percentage of TAC caught, and whether they are a commercial species likely to be nominated as indicators or non-indicators under a revised multi-species harvest strategy (MSHS)[4].

Each year, SESSFRAG identifies species belonging to one of the categories and provides advice regarding TACs, including timeframes and assessment options.

Trigger Species[5]

Trigger species are those that meet the following criteria:

- Stock status is estimated to be above the target reference point (TRP), or F<FMSY, and
- TAC is less than 75% caught, and
- Flagged as a non-indicator species under MSHS approach.

TACs are maintained for trigger species, subject to a 6-year threshold since the last stock assessment, at which point the relevant RAG will review available fishery indicator data and provide advice about stock assessment options and TACs for the following 6-year period.

MYTAC species

MYTAC species are those that meet the following criteria:

- Stock status is estimated to be between the limit reference point (LRP) and target reference point (TRP), or
- TAC is more than 75% caught, or
- Flagged as a commercial indicator species under a MSHS approach.

[4] Multi-species Harvest Strategy (MSHS) approach – see FRDC Project Report and SESSF Harvest Strategy Transitional Arrangements.
[5] While trigger species are yet to be formally adopted in the SESSF Harvest Strategy, the approach has been used to set TACs for the 2024-25 fishing season.

The way in which the RBCs and TACs are applied depends on the assessment tier and length of the MYTAC period, as follows:

- **Tier 1**: The RBC is based on modelled-projections from the most recent stock assessment, as either single-year or multi-year RBCs, for the year following the stock assessment through to the end of the recommended MYTAC period, if a MYTAC is recommended, or until the next scheduled assessment.
- **Tier 4**: The RBC is recommended based on the single-year RBC from the most recent stock assessment, for the following year through to the end of the recommended MYTAC period, if a MYTAC is recommended, or until the next scheduled assessment.
- **Tier 5 and 'weight-of-evidence' approach**: RBCs are based on the outputs of the 'preferred' Tier 5 methods identified using the FishPath tool. If harvest control rules cannot be specified using this approach, a weight-of-evidence approach may be used without an RBC being recommended. TACs are recommended either as single-year TACs or MYTACs.

TACs are then calculated by applying discount factors to the RBC (where required) and deducting all other known sources of mortality as follows:

- **Discount factors -** the SESSF Harvest Strategy provides for application of a 15 per cent discount factor to RBCs derived from Tier 4 assessments, however exceptions may be considered where demonstrable alternative equivalent precautionary measures are in place. Detail relevant to the application of the discount factor is included in each of the individual species summaries below.
- **Discards, State and recreational catch and research catch allowances (RCAs)** - When other sources of mortality arising from discarded catch, catch taken by States, recreational or an RCA are included in an assessment, they are subtracted from the RBC to produce a Commonwealth TAC.

Depleted Species

Depleted species are those that have a biomass estimated to be below the limit reference point (LRP). A single-year bycatch is recommended each year in accordance with the relevant Rebuilding Strategy.

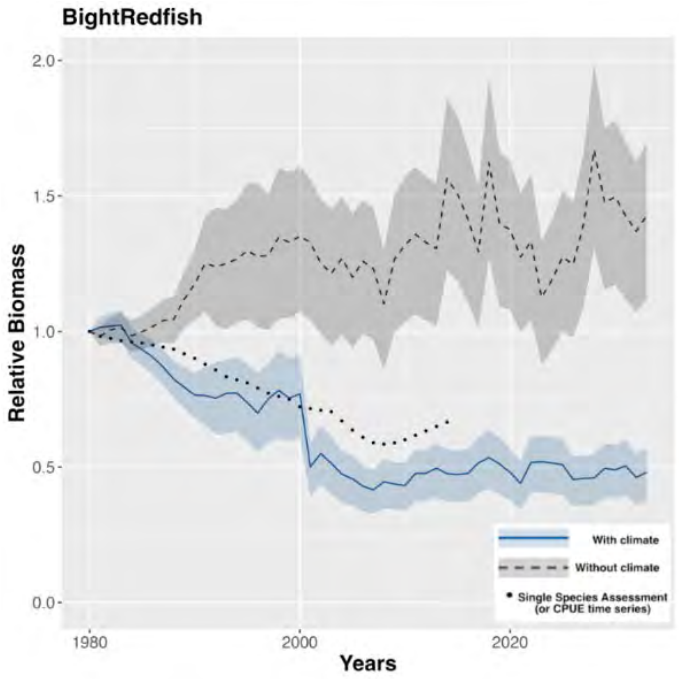
Great Australian Bight Species

Bight Redfish

Centroberyx gerrardi

<table>
<tr><th colspan="7">Species Summary</th></tr>
<tr><td>Stock Assessment</td><td colspan="6">Tier 1 Species – last assessed by GABRAG in 2022</td></tr>
<tr><td>Stock Structure</td><td colspan="6">Assessed as a single stock.</td></tr>
<tr><td rowspan="4">Stock status against reference points %B₀ in year +1)</td><td>Tier</td><td>Assessment Year</td><td>Biomass (from assessment year)</td><td>Biomass (revised in most recent assessment)</td><td>Target</td><td>Limit</td></tr>
<tr><td>1</td><td>2022</td><td>66</td><td>66</td><td rowspan="3">41</td><td rowspan="3">20</td></tr>
<tr><td>1</td><td>2019</td><td>64</td><td>64</td></tr>
<tr><td>1</td><td>2015</td><td>62</td><td>60</td></tr>
<tr><td>Stock trend and other indicators</td><td colspan="6">Modelling suggests a slow decline in spawning biomass, consistent with the fish-down of a developing fishery to near the target in 2009. Annual catches peaked in the mid-2000s, before declining to 200-300 t p.a. which has resulted in a steady increase of the stock to an estimated biomass of 67% B0 at the start of 2023-24. Depletion of the stock occurred more rapidly in the mid-2000s, when substantial fishing effort occurred, but the stock has never fallen below the Maximum Economic Yield (MEY) biomass target.

Annual standardised CPUE trend is flat since 1992 and oscillating above and below average and this is despite major changes in the distribution of the log(CPUE) from 2012–2022. The number of vessels involved in the fishery are now low (< 10 since 2006), so the interpretation of CPUE should also consider which vessels are fishing and where (Sporcic, 2022).</td></tr>
<tr><td rowspan="2">Species Category
MYTAC</td><td colspan="6">TAC setting approach</td></tr>
<tr><td colspan="6">The current season (2023–24) is the 1st year of a 4-year MYTAC.
The next assessment is scheduled for 2026.</td></tr>
<tr><td rowspan="4">Catch and TAC (t)</td><td colspan="2">SESSF season</td><td>Agreed TAC</td><td>TAC after unders/overs</td><td colspan="2">Commonwealth Retained Catch</td></tr>
<tr><td colspan="2">2023-24</td><td>959</td><td>1048</td><td colspan="2">-</td></tr>
<tr><td colspan="2">2022-23</td><td>890</td><td>979</td><td colspan="2">215</td></tr>
<tr><td colspan="2">2021-22</td><td>893</td><td>982</td><td colspan="2">215</td></tr>
</table>

	Financial Year	Species GVP ($m)	Fishery GVP ($m)	% Fishery GVP
Economics (Primary) Great Australian Bight Trawl	2021-22	0.94	9.45	9.95
	2020-21	1.08	10.64	10.15
	2019-20	0.93	10.76	8.64
2023 ABARES Status	**Fishing mortality: Not subject to overfishing**		**Biomass: Not overfished**	
Climate Sensitivity **High**	 Atlantis modelling suggests that climate change has a major influence on the biomass of Bight Redfish and is contributing to a much lower biomass than would have occurred otherwise.			

Assessment summary	
Key Model technical assumptions/ parameters	Single stock (Zone 80). Two sex model. One fleet: Trawl (separated for different sources of length data – ISMP, Industry, GAB-FIS). Selectivity is allowed to vary between the GAB-FIS and the trawl fleet. Discards are minimal and not included in the assessment. Natural morality rate (M): estimated at 0.1049 (well estimated, range 0.091-0.107). Recruitment deviations: estimated (1960-61 – 2007-08).
Significant Changes to data inputs	The catches from South Australia were aggregated by financial year. The catch series was revised to include catches from southern Western Australia (535 t total). Male and female Bight Redfish were assumed to have different growth parameters including growth coefficient, asymptotic length, and length at age-0.
Assessment results and RAG comments	GABRAG (Dec 2022) noted the following from Curin-Osorio & Burch (2022): The likelihood profile for natural mortality indicates that *M* is quite well estimated and similar to the 2019 assessment. The age data are most influential, with the index (higher mortality) and length data (lower mortality) showing some conflict. The estimated range (95% CI) is from 0.091 to 0.107 which is slightly lower than the 2019 assessment. The likelihood profile for steepness of the Beverton Holt stock recruitment relationship (h) suggests it is poorly estimated, flat, and uninformative. The likelihood profile shows h cannot be estimated and is therefore fixed at h=0.75 in the base case. The model is unable to fit the recent GAB-FIS indices and the recent trawl CPUE estimates between 2016-17 and 2021-22. Fits to length data are good and the length frequency data is relatively stable from year to year. The results from sensitivities were most sensitive to M and halve weighting on the GAB-FIS. • Changing weighting on length and age data resulted in small changes to stock status estimates. • Doubling and halving weighting on the GAB-FIS index resulted in large changes to total likelihood estimates but had minimal impact on stock status (65% and 68% of B0). • All model sensitivities estimate the stock status to be at or above the target reference point of 41% • The estimates of recruitment deviations have not varied to any substantial extent and show a fluctuating pattern about the mean. Since 1998-99 recruitment has been at or above the long- term average. • GABRAG noted the following: • The model has consistently shown poor fits to commercial CPUE and the GAB-FIS index.

	This is likely associated with the longevity of this species and modelled population dynamics are unable to reflect the more rapid changes observed in the CPUE and GAB- FIS indices. These are unlikely to be of concern as the stock is estimated to be well above the target reference point. • Future work is needed to understand why the recent GAB-FIS and commercial CPUE indices are at odds with the stock assessment. • GABRAG noted the importance of investigating the inverse relationship between availability of deepwater flathead and Bight Redfish to the fishery. • At its 17 October 2023 meeting, GABRAG noted the potential impacts of climate change on Bight Redfish (as suggested by the Atlantis model) as well as the fact the TAC has been significantly under caught for many years. Reasons for this undercatch include that: - Fleet size is small (generally four or fewer vessels) - Catches of Bight Redfish are seasonal and are of lower unit value compared to Deepwater Flathead - Some operators work under a self-imposed trip limits to avoid flooding the market with Bight Redfish and reducing the price, and - Deepwater Flathead is the key targeted species in the GAB as it holds its value even when a lot of fish enter the market. GAB operators tend to fish their quota for Deepwater Flathead before they target other species. Given the above factors, GABRAG recommended that the RBC of 994 t for Bight Redfish be maintained and that the MYTAC period be extended into a 4th year to align with the new stock assessment schedule for the SESSF. The 2022 base case assessment estimated the unexploited female spawning stock biomass (B_0) to be 4,535 t, compared to 4,019 in the 2019 assessment. Average estimated length for females was 42.54 cm and for males was 38.98 cm. The length at one year old for females was estimated at 19.66 cm and males at 19.87 cm. The growth rate is estimated to be 0.07 for females and 0.08 for males. Spawning biomass declined from 2005-06 until 2009-10. From 2010-11 until 2021-22 there has been a reduction of fishing mortality with an increase in biomass to well above the target level. Fishing pressure was above the target from 2005-06 to 2008-09, however has since dropped below the target level over the last 13 years. Under the 20:35:41 harvest control rule, the 2023-24 RBC is 1,056 t, with a 3-year average of 994 t and a long-term yield of 595 t per annum. The projected 2023-24 spawning stock biomass is estimated to be 67% SSB_0 (Figure 20 from Curin-Osorio & Burch (2022), compared with 68% in the 2022 preliminary base case and 64% for 2020-21 in the 2019 assessment.

RAG Recommendations

Despite being on a MYTAC, GABRAG (Oct 2023) considered the impacts of climate change on Bight Redfish but found no compelling evidence to deviate from the current RBC (three-year average) of 994 t. At the same meeting, GABRAG recommended that the MYTAC period be extended to a fourth year to align with the new stock assessment schedule for the SESSF.

	Year	RBC (t)	Is a MYTAC Recommended?
RBC (t)	2025-26	934	Yes GABRAG (Oct 2023) recommended extending the MYTAC period from three to four years.
	2024-25	993	
	2023-24	1,056	
	3-year average	994	
Discount Factor (t)	N/A	Discount factors are not applied to Tier 1 assessments.	
State catches (t)	34.71	Estimates are from SA and southern WA state catches.	
Discards (t)	N/A	Estimates of discards are considered low and are not deducted from the RBC.	
Recreational Catch (t)	N/A	Estimates of recreational catch available for SA, 19 t in 2014, and Western Australia (WA), 13.3 t in 2008. Recreational catches are not included in the assessment and are not deducted from the RBC.	
RCA (t)	N/A	There has been no specific research catch allocated.	
Provisional TAC under the Harvest Strategy		959 t	

AFMA Advice

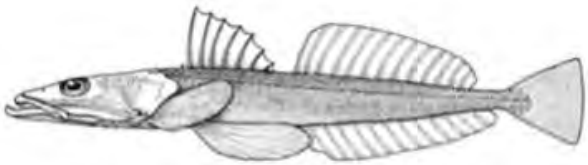
AFMA Management recommends a TAC of 959 t for Bight Redfish during the 2024–25 season, the second year of a 4-year MYTAC, with overcatch and undercatch provisions set at 10 per cent, and a determined amount of 2 t.

MAC Recommendations			
Commercial fishers' interest	The Great Australian Bight Trawl Sector received Marine Stewardship Council (MSC) certification for the harvest of Deepwater Flathead, Bight Redfish, and Gummy Shark in August 2023. This certificate expires in August 2028.		
Species specific management (target, companion, and bycatch)	There are no identified implications for target, companion, and bycatch species. The MAC supported the extension of the MYTAC period to a 4th year to align with the new stock assessment schedule.		
MAC advice and any dissenting views	There were no dissenting views.		
Undercatch (%)	**Overcatch (%)**	**Determined amount (t)**	**TAC (t)**
10	10	2	959

Final agreed TAC				
All sections below have been intentionally left blank				
2023-24 agreed TAC (t)	**2024-25 recommended TAC (t)**	**Overcatch and undercatch (%)**	**Determined amount (t)**	**Change in TAC (t)**

Deepwater Flathead

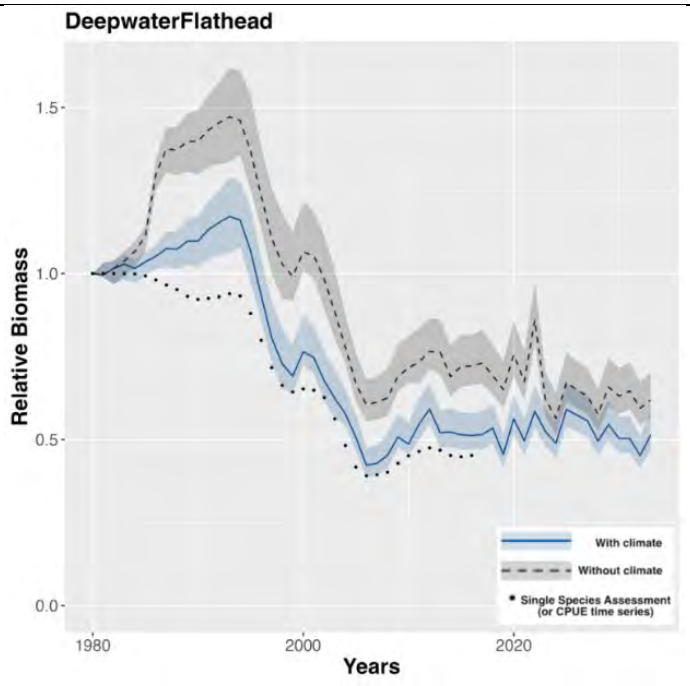
Neoplatycephalus conatus



Species Summary

Stock Assessment	Tier 1 Species - last assessed by GABRAG in November 2023.					
Stock Structure	Assessed as a single stock.					
Stock status against reference points $\%B_0$ in year +1)	**Tier**	**Assessment Year**	**Biomass (from assessment year)**	**Biomass (revised in most recent assessment)**	**Target**	**Limit**
	1	2023	44	44	43	20
	1	2019	45	45		
	1	2016	45	34		
Stock trend and other indicators	Estimated spawning biomass has decreased since the last assessment (in 2019) and is now just above the target of 43% Annual standardised CPUE showed large cyclical peaks in the mid-1990s and early 2000s but has shown much less variation since 2005. There was a gradual decline in standardised CPUE from 2010 to 2018 and a progressive increase since that time. Standardised CPUE in 2022 was just below the long-term average (Sporcic, 2023).					
Species Category MYTAC	**TAC setting approach**					
	The current season (2023–24) is the 4th year of a 3-year MYTAC The next assessment will be conducted in either 2026 or 2027 (TBC).					
Catch and TAC (t)	**SESSF season**		**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**	
	2023-24		1,238	1,357	-	
	2022-23		1,238	1,362	676	
	2021-22		1,238	1,362	701	
Economics (Primary) Great Australian Bight Trawl	**Financial Year**		**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**	
	2021-22		5.50	9.45	58.20	
	2020-21		5.92	10.64	55.64	
	2019-20		6.52	10.76	60.59	
ABARES Status (2023 report)	**Fishing mortality: Not subject to overfishing**			**Biomass: Not overfished**		

Climate Sensitivity
Medium



Atlantis modelling suggests that climate change has a moderate influence on the biomass of Deepwater Flathead and is contributing to a lower biomass than would have occurred otherwise.

Assessment summary

Key Model technical assumptions/ parameters

Description	Parameter		
Years	y	1988/89 – 2022/23	
Recruitment Deviates	r	estimated 1980 - 2016	
Fleets		Trawl and DS	
Abundance indices		GABFIS, Trawl CPUE	
Discards		negligible, not fitted	
Age classes	a	0 – 29 years	
Sex ratio	p_s	0.5 (1:1)	
Natural mortality	M	estimated (male and female equivalent)	
Steepness	h	0.75	
Recruitment variation	σ_r	0.7	
Female maturity		40 cm (TL)	
		Female	Male
Growth	L_{max}	fitted	fitted
	K	fitted	fitted
	L_{min}	fitted	fitted
	CV young	fitted	fitted
	CV old	fitted	fixed
Length-weight (based on standard length)	f_1	0.002 cm (TL)/gm	0.002
	f_2	3.332	3.339

Significant Changes to data inputs

GABRAG reviewed the preliminary base case for the Tier 1 assessment of Deepwater Flathead in October 2023 and accepted the inclusion of Danish seine as a separate fleet in the assessment model, noting that the likelihood profiles and retrospectives are not likely to be very different.

Assessment results and RAG comments	The assessment projected that Spawning Stock Biomass (SSB) at the start of the 2024–25 season will be 44% of virgin stock biomass. This concurs with the SSB estimates from the three previous Deepwater Flathead assessments (in 2013, 2016 and 2019) which have ranged from 44–45% of virgin stock biomass. The 2024–25 RBC for Deepwater Flathead under the 20:35:43 harvest control rule is 1,220 t. The average RBC over the four-year period 2024–25 to 2027–28 is 1,209 t. The long-term RBC is 1,199 t. While reviewing the preliminary base case, GABRAG noticed that the estimated recruitment deviations were below the long-term average in 8 of the 10 years up to the point where they are fixed in the model (i.e., from 2017 onwards). GABRAG requested that a sensitivity be conducted using the average of the estimated recruitment deviations from 2007–2016 (hereafter referred to as the 'recent 10-year average recruitment') applied from 2017 onwards. Fixed catch scenarios were then projected under the recent 10-year average recruitment scenario, with values chosen between current catches and the 2024 RBC. GABRAG reviewed these projections when it met again on 22 November 2023 and noted that fixed catches of approximately 940 t will maintain the stock near the target of 43% of virgin spawning biomass under the recent 10-year average recruitment scenario. Fixed catches of 1070 t and 1200 t were predicted to reduce the relative spawning biomass over time, but it would take 20 years of constant catches of 1200 t (under the recent 10-year average recruitment scenario) to reduce SSB below 30% of virgin stock biomass The RAG notes that using projections with most recent biological parameters, including recruitment, is considered best practice globally, but ultimately accepted the finalised base case and associated 4-year average RBC value of 1,209 t. The decision to adopt this RBC value was not unanimous, with one member suggesting that the RBC be set at 940 t on the basis that recent recruitment appears to be below average and that the TAC is not currently constraining catches (which have averaged around 560 t over the last decade). GABRAG highlighted the importance of the MYTAC working group in monitoring catches and indicator data and suggested that any future catches in excess of 1000 t should trigger consideration of an early stock assessment. Given the abovementioned concerns regarding apparent below average recruitment of Deepwater Flathead (between 2007 and 2016), GABRAG recommended a MYTAC period of three years and that the next stock assessment for this species (currently scheduled for 2028) be brought forward to either 2026 (ideally) or 2027. The RAG deferred the decision regarding the timing of the next Deepwater Flathead assessment to SESSFRAG. The 40-year projection depends on the RBC being caught each year, which GABRAG noted was unlikely due to the low number of boats operating in the fishery (Figure 10 from Tuck, Bessel-Browne and Burch, 2023).

RAG Recommendations

GABRAG (November 2023) recommended an RBC of 1,209 t for Deepwater Flathead during the 2024–25 season, under a 3-year MYTAC. GABRAG also recommended scheduling the next Deepwater Flathead stock assessment for 2026 (and no later than 2027) and deferred the decision on the timing of the assessment to SESSFRAG.

	Year	RBC (t)	Is a MYTAC Recommended?
RBC (t)	2027	1,200	Yes. GABRAG recommended a 3-year MYTAC using 4-year average of 1,209 t.
	2026	1,204	
	2025	1,211	
	2024	1,220	
	4-year average	1,209	
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)	N/A	Discards are considered low and are not included in the RBC.	
Recreational Catch (t)	N/A	There are no estimates of recreational catch.	
RCA (t)	N/A	There has been no specific research catch allocated.	
Provisional TAC under the Harvest Strategy		1,209 t	

AFMA Advice

AFMA Management recommends a TAC of 1,209 t for Deepwater Flathead during the 2024-25 season, the first of a 3-year MYTAC, with overcatch/under catch provisions of 10% and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	The Great Australian Bight Trawl Sector received Marine Stewardship Council (MSC) certification for the harvest of Deepwater Flathead, Bight Redfish, and Gummy Shark in August 2023. This certificate expires in August 2028.
Species specific management (target, companion, and bycatch)	The MAC recommended a 3-year MYTAC for Deepwater Flathead as well as a 1000 t catch trigger to initiate consideration of an earlier stock assessment for this species.
MAC advice and any dissenting views	**2024-25 TAC recommendation** 1,209 t as the first year of a 3-year MYTAC with overcatch/under catch provisions of 10% and a determined amount of 2 t.

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)
10	10	2	1,209

Final agreed TAC

All sections below have been intentionally left blank

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

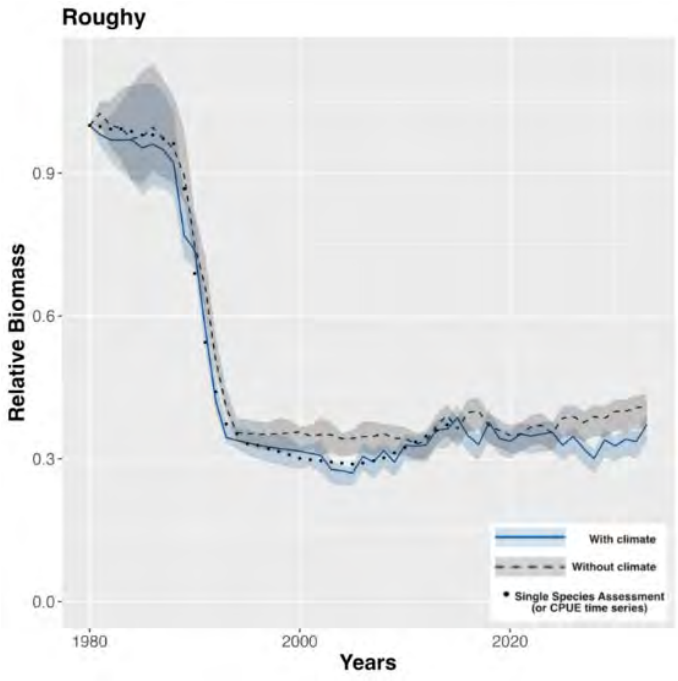
Orange Roughy Albany and Esperance

ABARES (2012): Line Drawing – Rosalind Poole

Hoplostethus atlanticus

Species Summary

Stock Assessment	No quantitative assessment undertaken to date.					
Stock Structure	The stock structure of Orange Roughy in the AFZ remains unresolved. Multiple regional stocks of Orange Roughy are assumed. Orange Roughy in the GAB is managed as a non-target, bycatch only species.					
Stock status against reference points (%B_0)	**Tier**	**Assessment Year**	**Biomass (from assessment year)**	**Biomass (revised in most recent assessment)**	**Target**	**Limit**
	-	-	-	-	-	-
Stock trend and other indicators	In 2006, the SESSF (including the GAB and excluding the Cascade Plateau) was closed to targeted Orange Roughy fishing, due to stocks being below the limit reference point. Biomass was uncertain but predicted to be below 20%B_0 based on depletion of other Orange Roughy stocks.					
Species Category Depleted	**TAC setting approach**					
	Annual bycatch TAC set in accordance with the Orange Roughy Rebuilding Strategy.					
Catch and TAC (t)	**SESSF season**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**		
	2023-24	50	50	-		
	2022-23	50	50	0		
	2021-22	50	50	0		
Economics (Primary) Great Australian Bight Trawl	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**		
	2021-22	0.18	9.46	0.02		
	2020-21	0.002	10.64	0.01		
	2019-20	-	8.48	-		
ABARES Status (2023 report)	**Fishing mortality: Not subject to overfishing**		**Biomass: Uncertain**			

Climate Sensitivity **Low**	 Atlantis modelling suggests that climate change has a minor influence on the biomass of Orange Roughy. Depletion by fishing in the 1980s-1990s affected the species much more strongly than any climate related shifts.

Assessment summary

Key Model technical assumptions/ parameters	N/A
Significant Changes to data inputs	N/A
Assessment results and RAG comments	No quantitative stock assessment has been conducted for Orange Roughy in the GAB (including in the Albany and Esperance Quota Zones), as the available data are spatially and temporally dispersed, with no recent surveys or representative catch-trend data available to determine stock abundance. Albany and Esperance Orange Roughy are subject to an incidental bycatch TAC, implemented under the Orange Roughy Rebuilding Strategy.

RAG Recommendations

GABRAG (October 2023) recommended an annual incidental bycatch TAC of 50 t for Orange Roughy Albany and Esperance during the 2024-25 season. At the same meeting it also supported the continuation of the 200 t RCA for Orange Roughy in the Great Australian Bight noting that no new evidence has been presented to warrant changing the RCA allocated under the GABT Orange Roughy Research Plan.

RBC (t)	0 t	The RBC is set at zero for all depleted species.
Discount Factor (t)	N/A	Discount factors are not applied to the incidental bycatch TAC
State catch (t)	N/A	There are no estimates of State catches.
Discards (t)	N/A	There are no estimates of discards.

Recreational Catch (t)	N/A	There are no known recreational catches for Orange Roughy.
RCA (t)	200	Research catch allocated under the GABT Orange Roughy Research Plan.
Provisional TAC under the Harvest Strategy		50 t - incidental bycatch TAC

AFMA Advice

AFMA recommends an incidental bycatch TAC of 50 t for Orange Roughy Albany and Esperance during the 2024-25 season, with no under or overcatch provisions, and a determined amount of 2 t.

AFMA also recommends a 200 t RCA for Orange Roughy Albany and Esperance during the 2024-25 season, whereby an additional 200 t RCA may be issued within this season if at least 150 t of Orange Roughy is caught in one or two of the more accessible Orange Roughy Management Zones. The additional 200 t RCA would only apply to those remaining zones where minimal research fishing has occurred.

MAC Recommendations

Commercial fishers' interest	Four scientific permits were issued during the 2023–24 fishing year to fish under the GABT Orange Roughy Research Plan.
Species specific management (target, companion, and bycatch)	This species is managed under the Orange Roughly Rebuilding Strategy 2022.
MAC advice and any dissenting views	GABMAC recommends an incidental bycatch TAC of 50 t for Orange Roughy Albany and Esperance during the 2024-25 season, with no under or overcatch provisions, and a determined amount of 2 t. GABMAC also recommends a 200 t RCA for Orange Roughy with provisions for an additional 200 t to be granted subject to achieving a 150 t catch trigger (as described in the AFMA advice). There were no dissenting views.

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)
0	0	2	50 t

Final agreed TAC

All sections below have been intentionally left blank

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Shark Species

Gummy Shark

Mustelus antarcticus

Fisheries Research & Development Corporation (2012)

Species Summary						
Stock Assessment	Tier 1 species – last assessed by SharkRAG in December 2023.					
Stock Structure	Gummy shark is endemic to southern Australia. It is considered a single genetic stock across the SESSF extending from Bunbury in WA to Jervis Bay in NSW. The single genetic stock is assessed as 3 separate stub stocks within broad regions on the continental shelf of Bass Strait, Tasmania, and SA.					
<u>Bass Strait</u> Stock status against reference points $\%B_0$ in year +1)	**Tier**	**Assessment Year**	**Biomass (from assessment year)**	**Biomass (revised in most recent assessment)**	**Target**	**Limit**
	1	2023	50	50	48	20
	1	2020	48	47		
	1	2016	59	49		
<u>Tas</u> Stock status against reference points $\%B_0$ in year +1)	**Tier**	**Assessment Year**	**Biomass (from assessment year)**	**Biomass (revised in most recent assessment)**	**Target**	**Limit**
	1	2023	69	69	48	20
	1	2020	68	69		
	1	2016	83	67		
<u>SA</u> Stock status against reference points $\%B_0$ in year +1)	**Tier**	**Assessment Year**	**Biomass (from assessment year)**	**Biomass (revised in most recent assessment)**	**Target**	**Limit**
	1	2023	63	63	48	20
	1	2020	67	66		
	1	2016	69	61		
Stock trend and other indicators	<u>Spawning biomass</u>					

<table>
<tr><td></td><td>Pup production is used as a proxy for spawning biomass; this is the number of pups, on average, expected to be produced each year by the stock's mature females. Pup depletion is the pup production in any year compared the unfished pup production and is the value used in the harvest control rule.

Estimated pup production shows an increasing trend in recent years in SA and, while it has been steady in Bass Strait and Tasmania, it is now increasing in these areas. The 2023 preliminary base case model indicates pup depletion is well above the 48% target reference point in SA and Tasmania according to the base case model (63% and 69% respectively). For the Bass Strait, the base case model estimates depletion to be just above the target (50%). Pup depletion is above the 20% limit reference point for all stocks and all sensitivity models.

See Sporcic (2023b) for standardised CPUE trends.</td></tr>
<tr><td>Species Category
MYTAC</td><td>TAC setting approach
The current season (2023–24) is the3rd year of a 3-year MYTAC.
The next assessment is scheduled for 2026.</td></tr>
<tr><td>Catch and TAC (t)</td><td>
<table>
<tr><th>SESSF Fishing Year</th><th>Agreed TAC</th><th>TAC after unders/overs</th><th>Commonwealth Retained Catch</th></tr>
<tr><td>2023-24</td><td>1,672</td><td>1,771</td><td>-</td></tr>
<tr><td>2022-23</td><td>1,672</td><td>1,666</td><td>1,535</td></tr>
<tr><td>2021-22</td><td>1,672</td><td>1,647</td><td>1,651</td></tr>
</table>
</td></tr>
<tr><td>Economics (Primary) Gillnet, Hook and Trap</td><td>
<table>
<tr><th>Financial Year</th><th>Species GVP ($m)</th><th>Fishery GVP ($m)</th><th>% Fishery GVP</th></tr>
<tr><td>2021-22</td><td>18.41</td><td>21.06</td><td>87.42</td></tr>
<tr><td>2020-21</td><td>22.25</td><td>24.84</td><td>89.57</td></tr>
<tr><td>2019-20</td><td>17.60</td><td>19.67</td><td>89.48</td></tr>
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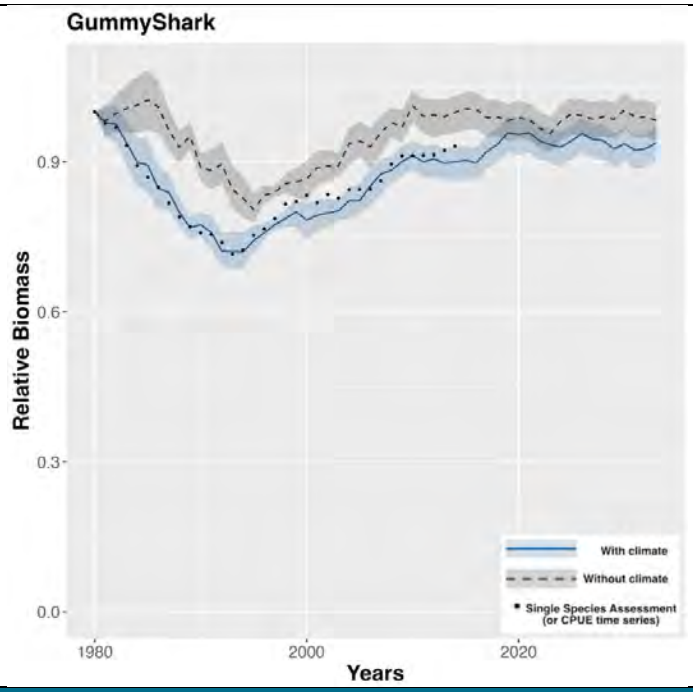
</td></tr>
<tr><td>ABARES Status (2023 report)</td><td>Fishing Mortality: Not subject to overfishing</td><td>Biomass: Not overfished</td></tr>
<tr><td>Climate Sensitivity
Low</td><td colspan="2">Atlantis modelling indicates that climate change does not have an influence on the stock abundance.</td></tr>
</table>



Assessment summary

Key Model technical assumptions/ parameters

Stock Assumptions:

- Models three stocks (BS, SA and TAS), each with its own recruitment series and CPUE power parameter, but with shared adult natural mortality parameter, gear selectivity's, and productivity/density dependence.
- Models sexes separately with fixed sex-specific growth rates, but shared adult natural mortality parameter.
- Catch data for 1927 to 2022 for each stock and gear
- Stock specific standardised gillnet CPUE data where effort is reported net length (for combined mesh sizes) for BS (1976-2022), SA (split into 1984-1995 and 1996-2009 – series ends at 2009 because of management changes to protect Australian Sea Lions), and TAS (1990-2022)
- Standardised trawl CPUE for BS (split into 1996-2005, and 2008-2022 to recognize the effect of management changes from 2005), SA (1996-2022) and TAS (1996-2022).
- Shallow (<183m) line standardised CPUE for all stocks combined (bottom line CPUE from Sporcic, 2023, using data for 0-200m).
- Uses stock, sex, and gear specific age composition data from 1986-2008 for 6-inch and 7-inch gillnet with a plus group of 10 years.
- Conditional age-at-length data for 1995-2022, plus a group of 20 years.
- Uses stock, sex, and gear specific length frequency data from 1974-2022.
- Tag-recapture data for releases between 1952-2004.
- Estimates effort saturation for each stock
- Does not estimate selectivity for gillnet. Does estimated logistic selectivity for trawl, shallow line, and deep line.
- Estimates adult natural mortality for all stocks combined.
- Does not use Danish seine fleet
- Does not use port length data (apart for SIDaC combined with ISMP onboard observer data).

	• Use both the age and length measurements from shark whose vertebrae were samples where both are available, and only use age data where length data is unavailable. **Number of fleets:** 7 fleets (6, 6.5, 7, 8-inch gillnets, trawl, shallow and deep line). **Natural Mortality:** 0.18 **Stock recruitment:** Above average recruitment for SA and BS stocks in recent years. Tasmania is also above average but is more recent and less pronounced. Recruitment deviations are at or near maximum estimated values for all stocks**.**
Significant Changes to data inputs	Changes to the base case model in 2023 from the 2020 base case model: • Updated input data (e.g., catch, CPUE, length, age-at-length) from 2020 up to and including 2022 which greatly increased the number of annual length frequencies for shallow line. • Corrections made to data processing that impact data to 2019, including several corrections for condition age-at-length, which had only minor impact on model results, • Extended the plus age group in the model from 10 to 20 with improved model fits to the conditional age-at-length data, • the SA gillnet CPUE time series was split at 1995 into two sections for 1984-1995 and 1996-2009 to reflect improvements in fishing efficiency possibly due to the introduction of colour sounders or a switch in targeting away from school shark towards gummy shark – this improved model fit.
Assessment results and RAG comments	**Model Fits:** Generally, fits for the various parameters in the model are solid. However, the data did not fit well to the female growth curve as it is mis-specified with the model underestimating the ages of females at larger sizes. Sensitivities were tested that applied different growth curves but were not successful. Acknowledging the uncertainty, as the estimates of productivity are well above the LRP the RAG were comfortable with the outcomes of the assessment. In addition, the RAG recommended that there is work undertaken to expand the sample collection from SA and Tasmania, and to undertake work to improve the female growth curve before the next assessment. **Discards:** 4.9% discard rate **Stock Status:** The base model has the stock status above the target reference point for the three areas (BS, TAS and SA). **RBC outputs:** Unusually, despite the stock status remaining above target levels, the three-year average gummy shark RBC option (at 1,733 t) is lower than the long-term RBC (at 1,755 t). **Sensitivity testing:** The model is stable, with all sensitivity tests being relatively similar and above the target reference point of 48%. Only two sensitivities for the Bass Strait area (using updated growth figures for both sexes and updated for only females) were below the target reference point.

RAG Recommendations

SharkRAG (Dec 2023) were comfortable with all of the options for the RBC given the outcomes for both the base case and the sensitivity tests, and recommended that either the Annual RBCs or the 3-year average RBC be used to determine a TAC.

RBC option	Bass Strait	SA	Tasmania	Total
Annual	2024 – 1,026 t 2025 – 971 t 2026 – 956 t	2024 – 597 t 2025 – 548 t 2026 – 525 t	2024 – 208 t 2025 – 189 t 2026 – 179 t	2024 – 1,831 t 2025 – 1,708 t 2026 – 1,660 t
3-year average	984 t	557 t	192 t	1,733 t

	Year	RBC (t)	Is a MYTAC Recommended?
RBC (t)	2026	Annual – 1,660 t 3-year – 1,733 t	Yes, 3-year MYTAC using one of the options provided above.
	2025	Annual – 1,708 t 3-year – 1,733 t	
	2024	Annual – 1,831 t 3-year – 1,733 t	
Discount Factor (t)	N/A	Discount factors are not applied to Tier 1 assessments.	
State catch (t)	79.6	The 2019-2022 weighted average of State catches is to be deducted from the RBC, excluding NSW. Previously the State allocations agreed under the shark memorandum of understanding with SA, and Victoria have been deducted from the RBC. However, SharkRAG (2018) recommended deducting the weighted average State catch from the RBC, as is the case for other SESSF species. There is no allocation for Tasmania, rather, catches are limited in Tasmania through bycatch trip limits. NSW catches are not included in the assessment.	
Discards (t)	57.7	A weighted average of discards is deducted from the RBC, based on the last 4 years of annual discard estimates (derived from logbooks for gillnet and hook methods and Berg method for trawl).	
Recreational Catch (t)	N/A	Estimates of recreational catches are available from South Australia in 2001 and 2008 but are considered uncertain and as such are not included in the assessment or deducted from the RBC.	
RCA (t)	N/A	There has been no specific research catch allocated.	
Provisional TAC under the Harvest Strategy		1,595.7 t (3-year average RBC less state catch and weighted average discard) / 1693.7 t (annual RBC of 1,831 t for 2024)	

AFMA Advice

TBC

MAC Recommendations	
Commercial fishers' interest	The Great Australian Bight Trawl Sector received Marine Stewardship Council (MSC) certification for the harvest of Deepwater Flathead, Bight Redfish, and Gummy Shark in August 2023. This certificate expires in August 2028.
Species specific management (target, companion, and bycatch)	*All sections below have been intentionally left blank*
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2022-23 agreed TAC (t)	2023-24 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

School Shark

Galerhinus galeus

Fisheries Research & Development Corporation (2012)

Species Summary

<table>
<tr><td>Stock Assessment</td><td colspan="5">Tier 1 species – last assessed by SharkRAG in 2018 (CKMR assessment model)</td></tr>
<tr><td>Stock Structure</td><td colspan="5">Tagging and genetic data suggests a relatively well mixed stock with some evidence for localisation of stocks, or reproductively isolated sub-stocks.</td></tr>
<tr><td rowspan="4">Stock status against reference points %B_0 in year +1)</td><td>Tier</td><td>Assessment Year</td><td>Biomass</td><td>Target</td><td>Limit</td></tr>
<tr><td>1</td><td>2018</td><td>50 000 mature individuals in 2000 and increasing at ~ 3% p.a. Status unknown relative to B_0</td><td rowspan="3">48</td><td rowspan="3">20</td></tr>
<tr><td>1</td><td>2016</td><td><20</td></tr>
<tr><td>1</td><td>2012</td><td><20</td></tr>
<tr><td>Stock trend and other indicators</td><td colspan="5">The CKMR assessment model provides an estimate of current absolute abundance with trends back to 2000. It does not provide an estimate of depletion relative to B_0. The CKMR model indicates that the stock had recovered slightly during the period from 2000 to 2017 although the CV on trend is so large that it also allows for a declining scenario.

Gillnet CPUE is not considered a reliable index of abundance as School Shark are actively avoided by gillnet fishers. Although representing only a small proportion of total catch, the trawl CPUE shows an increasing trend since 2003. In 2016, SharkRAG noted that this is a positive sign suggesting that School Shark is rebuilding. This is consistent with advice from industry that School Shark, particularly juveniles, are in relatively high abundance. Interpretation of the trawl CPUE is complicated by a lack of available quota for trawl operators.

Trawl annual standardised CPUE has been above the long-term average since 2013. There was a slight decrease in standardization CPUE in 2020 relative to 2019, an increase in 2021 relative to the previous year, and has increased since then (Sporcic, 2023b).</td></tr>
<tr><td rowspan="2">Species Category
Depleted</td><td colspan="5">TAC setting approach</td></tr>
<tr><td colspan="5">Annual bycatch TAC set in accordance with the School Shark Rebuilding Strategy.</td></tr>
<tr><td>Catch and TAC (t)</td><td colspan="2">SESSF Fishing Year</td><td>Agreed TAC</td><td>TAC after unders/ overs</td><td>Commonwealth Retained Catch</td></tr>
</table>

	2023-24	225	225	-
	2022-23	250	250	234
	2021-22	194	194	192
Economics (Secondary) **Gillnet, Hook and Trap**	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**
	2021-22	2.06	21.06	9.78
	2020-21	1.96	24.84	7.89
	2019-20	1.53	19.67	7.78
ABARES Status (2023 report)	**Fishing Mortality: Subject to overfishing**		**Biomass: Overfished**	
Climate Sensitivity **Medium**	Preliminary projections indicate a decline of up to 20% in abundance through to 2040, with high confidence, due to climate sensitivity.			
Assessment summary				
Key Model technical assumptions/ parameters	The CKMR assessment model assumes there is one well mixed stock.			
Significant Changes to data inputs	The Shark Industry Data Collection (SIDaC) program continues to collect kin samples as a key input to the CKMR assessment.			
Assessment results and RAG comments	Assessments (since 1991) have consistently estimated the school shark population to be below the limit reference point of 20 per cent of unfished levels. The objective of the current rebuilding strategy is to rebuild the stock to B20 in 66 years since it was first implemented in 2009. In October 2018, SharkRAG accepted the new CKMR assessment. The CKMR assessment model provides an estimate of current absolute abundance with trend back to 2000. It does not provide an estimate of depletion from B0. SharkRAG noted high confidence in the absolute estimate of abundance produced by the model, but lower confidence in the estimate of trend but that confidence in the trend will improve with additional data. SharkRAG also discussed that if the school shark population is increasing, the likely increased rate of incidental catch should be taken into account when setting future incidental catch allowances. While the results were accepted, the CKMR assessment only provided projected TACs for three years (to the 2021-22 fishing year). As such, in the absence of an update to the CKMR assessment, setting the TAC has applied a different, but largely consistent, methodology since that sets and incidental bycatch TAC to minimise the total mortality of school shark: accounting for the minimum unavoidable catch, including the associated discards, as well as reflecting the estimated 3 per cent p.a.			

rate of increase in the population from the CKMR assessment over two years.

The RAG recommended incidental bycatch TAC was formulated using C * (1 + 0.03)) * (1 + 0.03) - (D*0.885):

- C is the 4-year weighted average of the annual total catch (landings plus 0.885*discards), D is the expected future discard, calculated as 0.885 times the 4 year weighted average of past discards
- The total Commonwealth removals expected during the 2024 season (C * (1 + 0.03)) * (1 + 0.03)) is lower than 296t, which is the level derived from the CKMR assessment that allows 3 per cent population increase.

The incidental bycatch TAC of 215 t is based on:

- not including state catches. In the case of overfished species, the intent of the Commonwealth TAC is to prevent targeted fishing and constrain catches to the unavoidable bycatch level when targeting other species.
- the expected fishing effort for gummy shark (the main determinant of school shark catch). Relatively small changes to the gummy shark TAC are not expected to result in material changes in effort and therefore the incidental catch of school shark, hence the gummy shark multiplier is 1.
- the live release school shark survival rate of 11.5% was applied (88.5% mortality). This rate was based on Braccini et al (2012).

The table below steps out the three different options considered in developing the bycatch TAC, the difference between them being whether no state catch, some state catch (South Australia, Tas, Vic) or all state catch is included in the calculation. Total catch = is the 4-year weighted average of the annual total catch (landings plus 0.885*discards; Gummy TAC = proportional change in TAC; popn increase = multiplier that accounts for 3 % annual increase; forecast removal is Total catch x Gummy TAC change x popn increase; CKMR for 2024 is the total mortality in 2024 that would still support a 3 % population increase; capped removals is tonnage used to derive the respective TAC; forecast state removals is the tonnage expected to be take during the year that is either ignored (in the case of the 'No States') or accounted for in the TAC calculation; discard average is the expected discards in 2024. Units are in kg.

	No States	Incl States (no WA)	Incl States & WA
Total catch	**254,372**	**283,877**	**313,224**
Gummy TAC change	1	1	1
Popn increase	1.0609	1.0609	1.0609
Forecast removal	**269,863**	**301,165**	**332,300**
CKMR for 2024	296,000	296,000	296,000
Capped removals	**269,863**	**296,000**	**296,000**
Forecast State removals		31,302	62,437
Discard average (88.5%)	55,177	55,177	55,177
Comm TAC	**214,686**	**209,521**	**178,387**

	Some members expressed concerns regarding the underlying assumptions and inputs to this approach for calculating the bycatch TAC and as such and a more fulsome discussion has been flagged moving forward until an updated CKMR assessment is available. Concerns included not accounting for state catches and the basis for the 11.5% survival rate of live released school shark (the rate is based solely on gillnet methods and half the estimate is based on a semi-quantitative method).

RAG Recommendations

For the 2024-25 SESSF season, SharkRAG pragmatically recommended a 215 t school shark incidental bycatch TAC as it is consistent with 1) how the TAC has been set for the last two years and 2) the intent of the providing for the unavoidable bycatch of the gummy shark fishery, noting further discussion on the approach is required moving forward.

RBC (t)	0 t	The RBC is set at zero for all depleted species
Discount Factor (t)	N/A	Discount factors are not applied to bycatch TACs.
State catch (t)	62.3	This figure includes States under the gummy and school shark OCS arrangement (which excludes WA) landed 29.1t.
Discards (t)	55.2 t	88.5% of Commonwealth discard 4-year average (assuming an 11.5% survival rate)
Recreational Catch (t)	N/A	Recreational catch estimates are uncertain. Recreational catch is not included in the assessment and not deducted from the RBC.
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		215 t – incidental bycatch TAC

AFMA Advice

TBC– AFMA is considering the potential implications of the significant increase in state catch.

MAC Recommendations			
Commercial fishers' interest	*All sections below have been intentionally left blank*		
Species specific management (target, companion, and bycatch)			
MAC advice and any dissenting views			
Undercatch (%)	**Overcatch (%)**	**Determined amount (t)**	**TAC (t)**

Final agreed TAC				
2023-24 agreed TAC (t)	**2024-25 recommended TAC (t)**	**Overcatch and undercatch (%)**	**Determined amount (t)**	**Change in TAC (t)**

Saw Shark

Pristiophorus spp.

CSIRO national Fish Collection (2009)

Species Summary

Stock Assessment	Tier 4 species – last assessed by SharkRAG in 2020. Saw shark has been categorised as a trigger species.
Stock Structure	Sawshark (comprising of *P. cirratus*, *P. nudipinnis*, *P.* spp and Pristiophoridae) are currently assessed as a single stock. Two endemic species of sawshark occur off southern Australia, but their distributions have not been described precisely. Common sawshark (*P. cirratus*) is reported to range from Jurien Bay in WA to Coffs Harbour in NSW, including Tasmania, at depths of 100-630 m (Australian museum). Southern sawshark (*P. nudipinnis*) is reported to range from the western region of the GAB to eastern Gippsland in Victoria, including Tasmania, to depths of 70 m (Last and Stevens 1994). Little is known of stock structure or movement rates.

Stock status against reference points $\%B_0$ in year +1)

Tier	Assessment Year	$CPUE_{Recent}$	$CPUE_{Target}$	$CPUE_{Limit}$
4	2020	0.9476	0.7293	0.3646
4	2017	0.9443	0.7236	0.3618
4	2013	1.0050	0.8740	0.3497

Stock trend and other indicators	Trawl CPUE is increasing towards the long-term average and has been used for the Tier 4 assessment. The assessment also includes discard estimates and State catches. The distribution of effort at depth has remained stable throughout the time series. The length frequency distribution has remained stable throughout the time series. Trawl annual standardised CPUE has increased, reached the long-term average over the 2017-2019 period, decreased in 2020, and increased to above the long-term average in 2021, based on 95% confidence intervals (Sporcic, 2022b). Gillnet annual standardised CPUE has been below the long-term average since 2009, with minor increases over the 2015-2016 and 2018-22 periods (Sporcic, 2023b). Danish seine annual standardised CPUE has increased, reached the long-term average over the 2017-2019 period, decreased below average in 2020, and maintained above the long-term average since 2021 (Sporcic, 2023b).
Species Category Trigger species	**TAC setting approach** A review of available data and assessment options is scheduled for 2026, in accordance with the 6-year threshold, or if 395 t (i.e., 75% of the TAC) is landed, whichever occurs first.

Catch and TAC (t)	**SESSF Fishing Year**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**
	2023-24	525	573	-
	2022-23	519	564	141
	2021-22	509	547	147
Economics (Secondary) **Gillnet, Hook and Trap**	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**
	2021-22	0.49	21.06	2.33
	2020-21	0.56	24.84	2.25
	2019-20	0.48	19.67	2.44
ABARES Status (2023 report)	**Fishing Mortality: Not subject to overfishing**		**Biomass: Not overfished**	
Climate Sensitivity **Medium**	These species were assessed to have a high sensitivity to climate change using an information poor assessment based on life history characteristics. Climate sensitivity ranking is considered medium given low confidence in the assessment.			

Assessment summary

Key Model technical assumptions/ parameters	The 2020 Tier 4 assessment used the standardised trawl CPUE series as a key input (Sporcic, 2020). Landings data between 1995 and 2001 were sourced solely from GABTS logbook data. Since 2002, data has been sourced from CDRs. It was noted the reference period (2002 – 2008) for the 2020 assessment used CDR data. The Tier 4 assessment assumed there is a linear relationship between catch rates and exploitable biomass, and that the character of the estimated catch rates has not changed significantly since the reference period to the end of the most recent year.
Significant Changes to data inputs	In addition to the inclusion of new data for 2016-2020, SharkRAG (November 2020) recommended, consistent with the approach adopted by SERAG for other Tier 4 assessments, the following changes to data inputs to the assessment: • an updated catch series incorporated part of a revised NSW annual catch. There are issues of (i) double reporting of Commonwealth catch and NSW catch and (ii) misreporting of Commonwealth catch as NSW catch before about 1998 which needs to be resolved. However, revised NSW annual catch post 1998 are not subject to the above (double and misreporting) issues and was therefore used in this assessment (i.e. in the reference period 2002-08); • $P_{Discard}$ values were estimated for years where no data exists, inclusive of the reference period (2002-2008). These $P_{Discard}$ values were estimated by calculating the average value for years where data exists. The average $P_{Discard}$ value did not include values which were forward filled from previous years (i.e. 2010, 2015 and 2019).

Assessment results and RAG comments	SESSFRAG (August 2020) noted there is a lack of availability of port or length data, however there is some data from trawlers and Danish seine, and gillnet boats in 2017 and 2018. SharkRAG (December 2020) noted, that the standardised trawl CPUE which is used in a Tier 4 assessment has been increasing towards the long-term average and is above the target reference point (CPUE Report, Sporcic, 2020). The RBC for sawshark was calculated to be 653.4 t, an increase of 135 t from the previous RBC (2017). This increase was mostly attributable to the inclusion of annual discard estimates within the reference period (2002-08), which was not included in the previous Tier 4 assessment. Noting that the assessment covers two species, SharkRAG requested that AFMA monitor species composition over the coming seasons to be able to respond to any potential changes which would have implications for the assessment. AFMA is considering how to approach this task, including using the use of logbooks and EM to differentiate between common sawshark and southern sawshark.

RAG Recommendations

SharkRAG (December 2023) recommended maintaining the previous RBC as the species has now moved into being a trigger species.

SESSFRAG (August 2023) adopted the use of a Trigger Species category. Species in this category must satisfy a number of criteria, with catch monitored annually. The TAC is maintained until a specified trigger is breached, or six years elapse from the last assessment (whichever occurs first), at which point a new assessment is considered.

The recommended long-term TAC for Sawshark is 525 t, with TAC review of triggers of 395 t annual catch or 6 years elapsed since the last assessment (i.e. 2020 + 6 = 2026).

RBC (t)	653.4	Long-term RBC to be used until the next assessment.
Discount Factor (t)	98	SharkRAG (December 2020) recommended applying the default Tier 4 discount factor of 15 per cent.
State catch (t)	6.8	2019-2022 weighted average
Discards (t)	18.5	2019-2022 weighted average.
Recreational Catch (t)	N/A	Recreational catch estimates are uncertain. Recreational catch is not included in the assessment and not deducted from the RBC.
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		525 t – in accordance with trigger species advice.

AFMA Advice

AFMA Management recommends a TAC of 525 t for sawshark for the 2024-25 fishing season, including overcatch and undercatch provisions of 10 per cent, and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Elephant Fish

Callorhinchus milii

Ken Graham DPI Fisheries (1984)

Species Summary

Stock Assessment	Last considered by SharkRAG in 2020 using a weight of evidence approach. Species is now managed as a trigger species.				
Stock Structure	Little is known about stock structure from an assessment and management perspective. Their biology suggests some potential for regional management of stocks. However, it is currently assessed as a single stock.				
Stock status against reference points $\%B_0$ in year +1)	**Tier**	**Assessment Year**	**$CPUE_{Recent}$**	**$CPUE/F_{Target}$**	**$CPUE/F_{Limit}$**
	Weight of evidence	2020	$F<F_{MSY}$	F_{MSY} = 0.13	F_{LIM} = 0.19
	4	2018	0.8656	0.844	0.422
	4	2015	1.0257	0.9750	0.3901
Stock trend and other indicators	Annual standardised CPUE using gillnet has remained below the long-term average since 2014, with a slight increase in 2018 (relative to 2017) followed by a decrease in 2019 and minimal changes since then (Sporcic, 2023b).				
Species Category Trigger Species	**TAC setting approach**				
	A review of available data and assessment options is scheduled for 2026, in accordance with the 6-year threshold, or if 86 t (75% of TAC) is landed, whichever occurs first.				

Catch and TAC (t)	**SESSF Fishing Year**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**
	2023-24	114	124	-
	2022-23	114	125	43
	2021-22	114	124	38

Economics (Byproduct) Gillnet, Hook and Trap	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**
	2021-22	0.09	21.06	0.43
	2020-21	0.07	24.84	0.28
	2019-20	0.06	19.67	0.31

ABARES Status (2023 report)	Fishing Mortality: Uncertain	Biomass: Uncertain
Climate Sensitivity **Medium**	Climate sensitivity is medium given low confidence in the assessment. These species were assessed to be highly sensitive to climate change using an information poor assessment based on life history characteristics. Preliminary projections indicate (with low confidence) a 30% decline in abundance through to 2040.	
Assessment summary		
Key Model technical assumptions/ parameters	N/A - Tier 4 Model no longer used.	
Significant Changes to data inputs	N/A - Tier 4 Model no longer used.	
Assessment results and RAG comments	At its February 2018 meeting, SharkRAG considered that neither Tier 4 assessment presented (including or excluding discards) were suitable for providing RBC advice. SharkRAG rejected the assessments because of concerns about the: • lack of a recent and reference period discard information, and how discard rates are estimated • ability to factor discarding appropriately into CPUE, and • uncertain estimates of recreational catch, which are a significant proportion of either RBC. SharkRAG felt that in the application of either Tier 4 method, a prohibitively low TAC would be driven by the assumptions about discards and recreational catch, whereas the CPUE itself suggests that stocks are stable at or above target levels. At its October 2018 meeting, SharkRAG was asked to provide 2019-20 RBC advice for elephant fish. SharkRAG deferred updating the 2017 Tier 4 assessment until the SESSF TWG had provided advice on species identified as 'difficult to assess'. Recognising issues with the Tier 4 assessment, SESSFRAG (August 2019) recommended setting the 2020-21 TAC for elephant fish using a weight of evidence approach, including recent catches and the outcomes of the most recent Ecological Risk Assessment (ERA). Considering the outcomes of the most recent ERA, SharkRAG (January 2020) recommended a 3-year MYTAC of 114 t. At its January 2020 meeting, SharkRAG noted the "low risk" status of elephant fish from the ERA for the shark gillnet sub-fishery 2012-2016. However, SharkRAG expressed concerns regarding their ability to make a justified recommendation based on limited data other than the ERA results for the species.	
RAG Recommendations		
SESSFRAG (August 2023) adopted the use of a Trigger Species category. Species in this category must satisfy a number of criteria, with catch will be monitored annually. The TAC is maintained until a		

specified trigger is breached, or six years elapse from the last assessment (whichever occurs first), at which point a new assessment is considered.

The recommended long-term TAC for elephantfish is 144 t, with a TAC review trigger of 86 t, or 6 years elapsed since the last assessment (i.e. 2020 + 6 = 2026).

RBC	114t	Long-term RBC to be used until the next assessment.
Discount Factor (t)	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	The weighted average state catches are estimated to be 2.6 t. These are considered as part of the weight of evidence approach but are not deducted from the RBC.
Discards (t)	N/A	Discards are considered to be high, 87.5 t. These are considered as part of the weight of evidence approach but are not deducted from the RBC.
Recreational Catch (t)	N/A	The only estimates of recreational catch are 45 t for Victoria in 2008. These are considered as part of the weight of evidence approach but are not deducted from the TAC.
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		114 t – in accordance with trigger species advice

AFMA Advice

AFMA management recommends a TAC of 114 t for Elephantfish for the 2024-25 season, including overcatch and undercatch provisions of 10 per cent, and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Deepwater Species

ABARES (2012): Line Drawing – Rosalind Poole

Orange Roughy Eastern Zone

Hoplostethus atlanticus

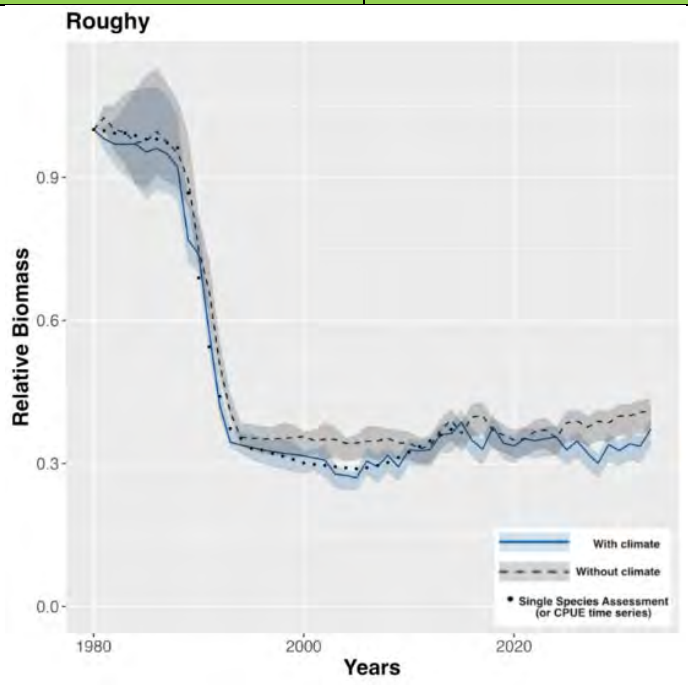
Species Summary

Stock Assessment	Tier 1 Species- Last assessed by SERAG in 2021
Stock Structure	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. Recent genetic studies indicate little genetic diversity between all South East Australian stocks. However, they may be demographically separate. 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.

Stock status against reference points $\%B_0$ in year +1)

Tier	Assessment 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	24		

Stock trend and other indicators	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, 2021). 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. 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.
Species Category MYTAC	**TAC setting approach** The current season (2023–24) is the 2nd year of 3-year MYTAC. The next assessment is scheduled for 2025.

Catch and TAC (t)	**SESSF season**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**
	2023-24	975	995	-
	2022-23	1,074	1,187	1162
	2021-22	1,277	1,569	1,453
Economics (Primary) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**
	2021-22	8.95	80.00	11.19
	2020-21	9.27	64.00	14.48
	2019-20	5.01	51.34	8.74
ABARES Status (2023 report)	**Fishing mortality: Not subject to overfishing**		**Biomass: Not overfished**	
Climate Sensitivity **Low**	 Atlantis modelling suggests that climate change has a minor influence on the biomass of Orange Roughy. Depletion by fishing in the 1980s-1990s affected the species much more strongly than any climate related shifts.			

Assessment summary

Key Model technical assumptions/parameters	The model assumptions include the single stock structure hypothesis; Eastern Zone spawning roughy and Pedra Branca non-spawning roughy. The biomass is assumed to have been unfished at the start of 1979. Plus group age was set at 120 years. Recruitment deviations (1905-1986) Natural mortality (M) estimated at 0.0393 Steepness fixed at 0.75 Recruitment variability fixed at 0.7

Significant Changes to data inputs	Age data and acoustic biomass data from the 2019 eastern survey were included in the 2021 assessment.
Assessment results 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. 2021 Estimating M – 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*. A working group recommended estimate *M* using an informative prior developed from New Zealand Orange Roughy stocks. 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. 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 (Nov 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 (SSB_0/SSB_{2022}) 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%B_0 and produces a 2022 RBC of 681 t, or a 3-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%B_0 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.

SERAG recommended a 3-year MYTAC for orange roughy east using 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. The orange roughy Pedra Branca area 3-year MYTAC will constitute 7 per cent of this RBC apportioned to the eastern zone.

Projected Biomass

Estimated female spawning stock biomass (SSB), stock status and the probability of being below the limit reference point in 2024 and 2031 under different fixed catch scenarios and the industry proposal (Ind. Prop.) of 1,166 t in 2022, 1,055 t in 2023 and 950 t per year thereafter.

Catch Scenario	SSB 2024	SSB 2031	Status 2024	Status 2031	Prob<LRP 2024	Prob<LRP 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
Ind. Prop.	12,041	12,504	0.3093	0.3208	0.004	0.002

RAG Recommendations

SERAG (Nov 2023) noted that the AOS for the Orange Roughy Eastern Zone was postponed from 2023 to 2024, meaning that the next assessment for this stock will now be conducted in 2025. The RAG stressed the importance of ensuring that the AOS proceeds in 2024.

SERAG (Nov 2023) recommended to continue following the previously agreed step down (based on the industry proposal that was accepted by the Commission) for the Orange Roughy Eastern Zone and utilise an RBC of 950 t during the 2024–25 season.

	Year	RBC (t)	Is a MYTAC Recommended?
RBC (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)	5.1	Estimated discards (four-year weighted average 2019-2022).	
Recreational Catch (t)	N/A	There are no known recreational catches for Orange Roughy.	
RCA (t)	N/A	There has been no specific research catch allocated.	
Provisional TAC under the Harvest Strategy		729 t noting the TAC based on constant catch projection is 879 t.	

AFMA Advice

AFMA management recommends at TAC of 879 t for the Orange Roughy Eastern Zone during the 2024–25 season (i.e. 93% of the 2024 constant catch projection of 950 t, minus discards), as the 3rd year of a 3-year step-down MYTAC.

AFMA management also recommends an undercatch provision of 100 per cent, an overcatch provision of 10 per cent, and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

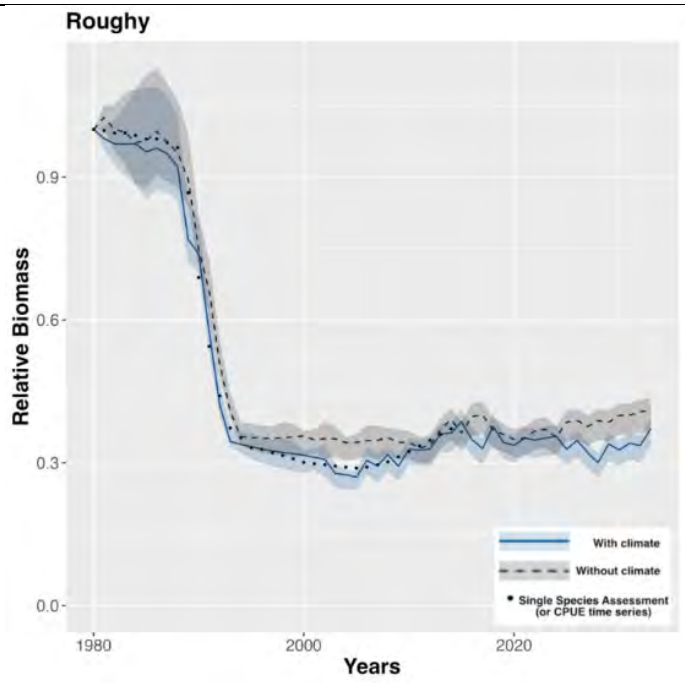
Orange Roughy Cascade Plateau

Hoplostethus atlanticus

ABARES (2012): Line Drawing – Rosalind Poole

Species Summary

Stock Assessment	Tier 1 Species - last assessed by DeepRAG in 2009.				
Stock Structure	The stock structure of Orange Roughy in the AFZ remains unresolved. Based on the existing data fishery dynamics multiple regional stocks of Orange Roughy are assumed. The Cascade Plateau, however, holds Orange Roughy with distinct morphometrics, parasite populations, size, and age composition, and which also have a distinct spawning time from other adjacent stocks. For assessment and management purposes they are regarded as a separate stock.				
Stock status against reference points $\%B_0$ in year +1)	**Tier**	**Assessment Year**	**Biomass (from assessment year)**	**Target**	**Limit**
	1	2009	64	48	20
	2	2006	73		
	2	2005	30-60		
Stock trend and other indicators	There are no recent data to assess the biomass trend. Catches have remained below the RBC since the last assessment and the stock likely remains above the target reference point.				
Species Category MYTAC	**TAC setting approach**				
	Orange Roughy Cascade Plateau is categorised as a MYTAC species but is currently subject to an annual TAC, having not been assessed since 2009. The next assessment is scheduled for 2025.				
Catch and TAC (t)	**SESSF season**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**	
	2023-24	397	437	-	
	2022-23	397	447	16	
	2021-22	500	550	266	
Economics (Primary) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**	
	2021-22	Not Available	80.00	Not Available	
	2020-21	Not Available	64.00	Not Available	
	2019-20	Not Available	51.34	Not Available	
ABARES Status (2023 report)	**Fishing mortality: Not subject to overfishing**		**Biomass: Not overfished**		

Climate Sensitivity **Low**	 Atlantis modelling suggests that climate change has a minor influence on the biomass of Orange Roughy. Depletion by fishing in the 1980s-1990s affected the species much more strongly than any climate related shifts.
Assessment summary	
Key Model technical assumptions/ parameters	N/A
Significant Changes to data inputs	N/A
Assessment results and RAG comments	The first quantitative stock assessment of the Cascade Plateau orange roughy population was produced in 2004 (Wayte, 2004). The 2004 assessment used catch records, biological data collected over the previous 6 years, and the 2003 acoustic biomass estimate. The 2004 stock assessment estimated the orange roughy biomass at Cascade Plateau to be between 7,000 and 18,700 t and the long-term sustainable catch to be 300-400 t. In 2006, the assessment was again updated, using the acoustic biomass estimate from the 2005 winter spawning aggregation which was about three times larger than previous estimates. The 2006 assessment estimated the stock to be about 20,000 t and the current biomass as 72-73% of the unfished biomass (B0) approximately 20% higher than the target reference point and 12% higher than the target under the Conservation Program. At the DeepRAG meeting in 2009, DeepRAG requested a re-run of the assessment using an alternative 2005 acoustic biomass estimate of 18,400 t, instead of the 31,600 t estimate used in the 2006 assessment. Using these data the assessment estimated a female spawning stock status of 64%B0, and produced an RBC of 492 t under the 20:35:48 harvest control rule, or a long term RBC of 397 t.

	There were low levels of fishing on the Cascade Plateau (<1% of TAC caught) during 2011 and 2012. An update to the assessment was due for 2012 but this was deferred due to the lack of new data and a higher priority being assigned to other species. SERAG (November 2022) A hull-mounted acoustic survey was completed for orange roughy (Cascade Plateau) in 2021 and 2022. A towed body acoustic optical survey (AOS) was identified as a research priority to support a potential stock assessment in 2024. However, the unpredictable nature of the aggregation on the Cascade Plateau, evident through the lack of catch in 2022, means there is a risk that an AOS will not provide useful data. SESSFRAG considered a CSIRO paper in April 2023 discussing alternative assessment approaches that may be useful for Cascade roughy as well as comparisons of fish-length/otolith weight ratios. A data limited assessment approach is being progressed with a preliminary assessment to be considered in 2024, in preparation for delivery of a final assessment in 2025. SERAG (Sep 2023) noted that the assessment will be updated in 2025 and that there was nothing in the updated age data to suggest the need to deviate from the current TAC.

RAG Recommendations

SERAG (Sep 2023) considered updated age information and noted:

- A likely fish down effect prior to 2008 with a reduction in older age classes in the samples.
- Eastern stocks differ from Western stocks in terms of stock structure.

SERAG recommended maintaining the 397 t TAC for 2023-24 on the basis that it promotes data collection and that there was nothing in the updated age data to suggest the need to deviate from the current TAC. The RAG however did urge caution about setting the TAC for another year without further information.

	Year	RBC (t)	Is a MYTAC Recommended?
RBC (t)	2024	397	No. TAC reviewed every year.
	2023	397	
	2022	397	
Discount Factor (t)	N/A	Discount factors are not applied to Tier 1 assessments.	
State catch (t)	N/A	There are no State catches.	
Discards (t)	N/A	There are no estimates of discards.	
Recreational Catch (t)	N/A	There are no known recreational catches for Orange Roughy.	
RCA (t)	N/A	There has been no specific research catch allocated.	
		397 t	

Provisional TAC under the Harvest Strategy	

AFMA Advice

AFMA Management recommends a TAC of 397 t for the 2024–25 season (a single year TAC) with undercatch and overcatch provisions set at 10 per cent, and a determined amount of 2 t.

MAC Recommendations

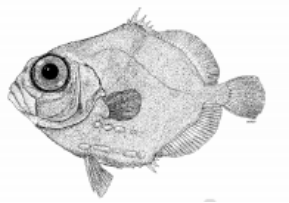
Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Oreo basket



Species Summary

Species	Black oreodory (*Allocyttus niger*), spikey oreodory (*Neocyttus rhomboidalis*), warty oreodory (*Allocyttus verrucosus*) and other *Neocyttus spp*.
Stock Assessment	Tier 4 Species – last assessed by SERAG in 2020
Stock Structure	Little is known about the stock structure of the oreo species in this basket quota. They are bentho-pelagic species that are caught mainly below 600 m. For assessment and management purposes they are treated as a single unit of stock through the SESSF.

Stock status against reference points (CTarg/CLim)

Tier	Assessment Year	$CPUE_{Recent}$	$CPUE_{Target}$	$CPUE_{Limit}$
4	2020	0.3986	0.4855	0.2023
4	2017	0.4297	0.4743	0.1976
4	2013	0.4076	0.464	0.1856

Stock trend and other indicators

Catches have been variable through time with spikes in 1992 and elevated catches from 1995–2001 after which catches declined and have remained relatively low since the 700 m closure in 2007 but have increased to a mean of 111 t from 2013 – 2022. The majority of the catch occurred in OR zones 30, 20 and 50 (Sporcic, 2023a).

After an initial period of great volatility between 1986 - 1994, standardised CPUE has been essentially flat and stable since 2000. For another analysis that uses a shorter time series, i.e., between 1995 – 2021, the standardised CPUE has been essentially flat and mostly below average over the 2002 – 2019 period. There have been increases to the long-term average since 2020. The differences between this years' and last years' standardised series can be mostly attributed to a change in the number of vessels analysed. A vessel's distinguishing symbol which was originally categorized as two different vessels, has been re-categorised as the same vessel in this years' analysis (Sporcic, 2023a).

Species Category
MYTAC

TAC setting approach

The current season (2023–24) is the 3rd year of 3-year MYTAC

The next assessment is scheduled for 2024.

Catch and TAC (t)

SESSF season	Agreed TAC	TAC after unders/overs	Commonwealth Retained Catch
2023-24	137	149	-
2022-23	137	150	78
2021-22	139	157	111

Economics (Byproduct) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**
	2021-22	1.00	80.00	1.25
	2020-21	0.40	64.00	0.67
	2019-20	0.66	51.34	1.29
ABARES Status (2023 report)	**Fishing mortality: Uncertain**		**Biomass: Uncertain**	
Climate Sensitivity Uncertain	There is currently no available information regarding climate change sensitivity for mixed oreos.			

Assessment summary

Key Model technical assumptions/ parameters	The Tier 4 assessment assumes there is a linear relationship between catch rates and exploitable biomass, and that the character of the estimated catch rates has not changed significantly since the reference period to the end of the most recent year
Significant Changes to data inputs	The average of existing discard estimates were used to backfill earlier years' estimates. Revised NSW annual catch were provided from 1992 onwards.
Assessment results and RAG comments	It has become apparent that spikey oreodory are being reported as 'oxeye' in logbooks. For the purpose of the Tier 4 assessment, logbook records of oxeye are assumed to be spikey oreodory. Most catches are from Zones 10 and 20. Estimated discards for 2021 were 196 t, resulting in a 4-year weighted average of 128.4 t. Once deducted from the RBC, the resulting TAC is approximately 42 t. Including discard estimates from 1986-2006 in the updated assessment has resulted in an increase in CTarg. There was a decrease in the RBC to 170.2 t from the 2020 assessment compared to 256.5 t from the 2017 assessment. This was driven by an increase in CTarg and a decrease in the four-year average CPUE (Sporcic, 2020a).

RAG Recommendations

SERAG (Dec 2020) recommended a 3-year MYTAC using the RBC of 170.2 t from the 2020 Tier 4 assessment.

AFMA sought advice from SERAG in January 2023 regarding potential over-estimation of oreo discards given the broad depth range of the strata from which the discards were extrapolated. AFMA provided SERAG with recent catch and discard maps for flathead and oreos which showed a clear depth delineation between the two groups of fishes. On this basis SERAG were comfortable with maintaining the TAC for the 2023–24 season.

AFMA provided updated catch and discard maps for flathead and oreos to SESSFRAG in August 2023 and the RAG recommended that the 2023–24 TAC be maintained for the 2024–25 season (as the 4th year of a 3-year MYTAC).

RBC (t)	**Year**	**RBC (t)**	**Is a MYTAC Recommended?**

	2023	170.2	Yes. 3-year MYTAC using the RBC from the 2020 Tier 4 assessment.
	2022	170.2	
	2021	170.2	
Discount Factor (t)	N/A	SERAG (December 2020) recommended not applying the discount factor due to 40 per cent of the oreo fishery being protected by deepwater closures.	
State catch (t)	N/A	There are no estimates of State catch.	
Discards (t)	145.3	Four-year weighted averaged (2019-2022). See 'Data and RAG comments' above regarding discard estimates.	
Recreational Catch (t)	N/A	There are no known recreational catches as oreo are a deepwater species and are not targeted by recreational fishers.	
RCA (t)	N/A	There has been no specific research catch allocated.	
Provisional TAC under the Harvest Strategy		N/A – unreliable estimates of discards do not allow for calculation of a provisional TAC. See 'Data and RAG comments' above regarding discard estimates that will influence the TAC calculations.	

AFMA Advice

AFMA management recommends a TAC of 137 t for the Oreo basket during 2024–25 season, as the 4th year of a 3-year MYTAC with undercatch and overcatch provisions set at 10 per cent and a determined amount of 2 t.

MAC Recommendations

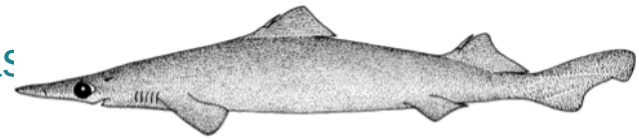
Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Deepwater Shark basket- Eas



Species Summary

Stock Assessment	Last assessed by SERAG in 2022 using weight of evidence. Due to postponement of the 2023 Dynamic Tier 4, 2023 RBC advice was based upon the 2018 Tier 4 assessment.				
Stock Structure	Little is known about the stock structure of Deepwater Sharks. They are bentho-pelagic species that have been sampled in oceanic environments over the abyssal plains and are distributed widely across ocean basins and along the middle and lower continental shelves. The eastern management area extends south from NSW, clockwise around Tasmania to approximately 42ºS on its western coast, including to the centre of Bass Strait to 146º22'E.				
Stock status against reference points (C_{Lim}/C_{Targ})	**Tier**	**Assessment Year**	**$CPUE_{Recent}$**	**$CPUE_{Target}$**	**$CPUE_{Limit}$**
	Weight of Evidence	2023 2022 2021	SERAG considered available indicator data in 2023, 2022 and 2021 and noted that there were no immediate risks to stock sustainability.		
	4	2018	0.5332	1.1592	0.4830
Stock trend and other indicators	Catches for eastern Deepwater Sharks with closures declined steadily from 1996 to a low in 2007 when the 700 m closure was introduced. Since the borders of this closure were modified in 2009 (and 2016) catches have increased again to reach an average of 35 t per annum (i.e., since 2016) with fewer vessels contributing significantly to this fishery relative to the 1990's. The 50 t catch in 2019 was the highest recorded since 2006 (i.e., for the period after 2005). Nevertheless, fishing appears to be consistent and the standardised CPUE trend has been essentially low and flat since 2010 (Sporcic, 2023a). Standardised CPUE in the open area exhibits a relatively flat and mostly below average trend since 2010 (Sporcic, 2023a).				
Species Category MYTAC	**TAC setting approach**				
	The deepwater shark basket (east) is currently managed through a single-year TAC. A Dynamic Tier 4 assessment is under development, the results of which are scheduled to be reviewed in 2024, which may allow for a MYTAC to be set in future.				
Catch and TAC (t)	**SESSF season**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**	
	2023-24	24	26	-	
	2022-23	24	26	11	
	2021-22	24	26	17	
Economics (Secondary)	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**	

Commonwealth Trawl and Scalefish Hook	2021-22	Not Available	80.00	Not Available
	2020-21	Not Available	64.00	Not Available
	2019-20	Not Available	51.34	Not Available
ABARES Status (2023 report)	**Fishing mortality: Uncertain**		**Biomass: Uncertain**	
Climate Sensitivity Uncertain	There is currently no available information regarding climate change sensitivity of Deepwater Sharks.			

Assessment summary

Key Model technical assumptions/ parameters	The Tier 4 assessment assumes there is a linear relationship between catch rates and exploitable biomass, and that the character of the estimated catch rates has not changed significantly since the reference period to the end of the most recent year. This is a basket of species, hence a key assumption is that the combined species CPUE at least broadly reflects the trends in CPUE for all the contributing species. Approximately 80% of the catch is *Deania calcea* (brier shark). The assessment is based on open areas of the fishery only. The catch rates used in the analysis are based on log-transformed catches rather than log-transformed catch/effort. This was a SERAG decision relating to how the sharks are fished.
Significant Changes to data inputs	N/A
Assessment results and RAG comments	SERAG (November 2018) accepted the results of the Tier 4 assessment and the 2019 RBC of 10 t. However, given that deepwater sharks are typically considered as bycatch, a reduction in the TAC would likely lead to discarding, with implications for the CPUE series. The RAG therefore recommended that the TAC be set the current catch level at the time, that is 24 t., noting that there would be minimal risk associated with maintaining current catch levels. This TAC has been applied since the 2019–20 season, initially as a 3-year MYTAC and then as a single-year TAC. Fishery indicators were reviewed by SERAG (Nov 2022) noting the following: • Catches are low relative to past but increasing. • Commercial CPUE is increasing. • Lengths (*D. calceus*) not showing a trend and large females are still present. • Research surveys not showing trend, (except in a past survey Kapala on the upper shelf). • Species composition is variable but not alarming (Thomson et al. 2022). Thomson et al. 2022 found any quantitative assessment, up to an including a Tier 1-style age-structured assessment model could be applied, albeit with unavoidable uncertainty regarding catches and catch-per-unit-effort (CPUE), particularly during 1985–1996 as well as likely unrepresentativeness of length composition data due to spatial population structure. A Tier 4 assessment is a possibility for Deania spp., with the new 'dynamic Tier 4' (if MSE testing shows it to be reliable) likely to be an improvement on the traditional Tier 4 because it will estimate depletion during the reference period. It also identified further work that might be done to refine the

	estimated catch and CPUE time series, as well as to better understand the spatial structuring of the population through characterisation of habitat preferences by Deania calceus. Better understanding of habitat would improve understanding of the level of protection provided by the spatial closures. Declining catches between 1997 and 2000, and a significant reduction in FRV Kapala survey catch rate for Deania spp. (in 200–605 m depth off New South Wales, NSW) caused concern in the past, but current indicators of stock health (rising catches and catch rates, noisy but stable length frequencies) show no cause for concern in recent years (but do not provide a measure of Deania spp. abundance on the NSW upper slope, specifically) (Thomson et al. 2022). SERAG (Nov 2022) supported the recommendations from Thomson et al. (2022) to continue with a tier 4 assessment in 2023, however noted there are several caveats and data gaps to overcome. SERAG (Nov 2023) recommended that Dynamic Tier 4 assessments continue to be pursued for both Deepwater stocks in 2024 but that additional work is required before this method is accepted: • That the Dynamic Tier 4 use all available catch history, noting that the 'Catch History Project' will be presented to SESSFRAG Chairs meeting in April 2024, and the new catch histories created for both Deepwater Shark baskets will be available for use in the 2024 assessments. • The need to resolve the reference period target which is currently 0.40 (an MSY target) to the MEY target of 0.48 as traditionally used in the Standard Tier 4 and repeat an MSE.

RAG Recommendations

SERAG (Nov 2023) deferred basing its RBC advice on the Dynamic Tier 4 assessment for Deepwater Shark (East) and recommended using 2018 Tier 4 Assessment RBC of 10 t as an interim step until the work outlined above can be completed.

SERAG (Nov 2023) noted that large deepwater (>700 m) closures now cover grounds that account for 54% of the historical Deepwater Shark catch, and this is used as the basis for not applying a discount factor. These spatial closures limit the risk to the stock if a TAC is set above the RBC.

RBC (t)	10 t	RBC maintained since the 2018 assessment.
Discount Factor (t)	N/A	SERAG recommended not applying a discount factor given the protection afforded to the stock by closures.
State catch (t)	0.4	A small amount of deepwater shark is caught in NSW waters.
Discards (t)	N/A	There are no reliable estimates of discards for the eastern species basket.
Recreational Catch (t)	N/A	There are no estimates of recreational catch.
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		24 t – to limit discarding when incidentally caught.

AFMA Advice

AFMA management recommends a single-year TAC of 24 t for the deepwater shark east basket during the 2024–25 season, with undercatch and overcatch provisions set at 10 per cent and a determined amount of 2 t.

MAC Recommendations

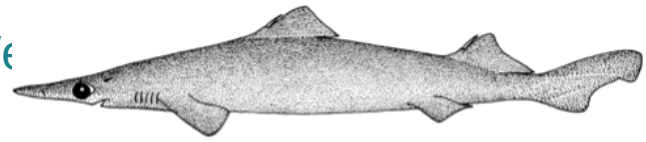
Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Deepwater Shark basket- We



Species Summary

Stock Assessment	Tier 4 Species - last assessed by SERAG in 2023.				
Stock Structure	Little is known about the stock structure of deepwater sharks. They are bentho-pelagic species that have been sampled in oceanic environments over the abyssal plains and are distributed widely across ocean basins and along the middle and lower continental shelves. The western management area extends from the Tasmanian west coast Latitude 42º S (approximately Strahan), around to WA.				
Stock status against reference points (C_{Lim}/C_{Targ})	**Tier**	**Assessment Year**	**$CPUE_{Recent}$**	**$CPUE_{Target}$**	**$CPUE_{Limit}$**
	4	2023	0.9272	0.6157	0.2565
	Weight of Evidence	2022	SERAG re-considered available indicator data and noted there were no immediate risks to stock sustainability. A Tier 4 assessment will be completed for Deania spp. In 2023.		
	Weight of Evidence	2021	SERAG considered available indicator data and noted there were no immediate risks to stock sustainability.		
Stock trend and other indicators	Catches of western Deepwater Sharks with closures decreased from a high in 1997 and 1998 to a low in 2007 after the introduction of the 700 m closure, picking up again after the modifications in 2009 and 2016, with a mean of ~91 t over the last five years. The 108 t catch in 2020 was the highest recorded since 2005 (i.e., for the period after 2004). Standardised CPUE of western Deepwater Sharks in open areas has been approximately cyclic since about 2007 with lows over 2012-2014 period, and since then, there has been an overall increasing trend reaching the long-term average in 2018 and between 2020-2022, based on 95% confidence intervals. The taxonomic group code 37020904 was included in this years' standardizations for western Deepwater Sharks. As such, there were no discernible differences between this years' and last years' standardised CPUE series (Sporcic, 2023a).				
Species Category MYTAC	**TAC setting approach**				
	The deepwater shark west basket is currently managed through an annual TAC determined through a weight of evidence approach. The 2018 Tier 4 assessment was updated in 2023 and a 3-MYTAC, starting in 2024–25, has been recommended. The three-year MYTAC may be updated prior to 2026, subject to delivery of a Dynamic Tier 4 assessment that is being developed and will be considered by SERAG in 2024.				

Catch and TAC (t)	**SESSF season**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**
	2023-24	235	252	-
	2022-23	235	258	85
	2021-22	235	250	81
Economics (Secondary) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**
	2021-22	Not Available	80.00	Not Available
	2020-21	Not Available	64.00	Not Available
	2019-20	Not Available	51.34	Not Available
ABARES Status (2023 report)	**Fishing mortality: Uncertain**		**Biomass: Uncertain**	
Climate Sensitivity **Uncertain**	There is currently no available information regarding climate change sensitivity of deepwater sharks.			

Assessment summary

Key Model technical assumptions/ parameters	The Tier 4 assessment assumes there is a linear relationship between CPUE and exploitable biomass, and that the character of the estimated CPUE has not changed in significant ways.
Significant Changes to data inputs	Catches in this assessment are based on open areas Tier 4 assessment: Western Deepwater Sharks only. Discards were not used in this assessment as agreed by SERAG (26-27 September 2023) given they are poorly estimated - there is only one available estimate in 2018 and it also differs from the corresponding logbook recorded estimate (Sporcic, 2023b).
Assessment results and RAG comments	The 2023 estimated RBC is 326.7 t, an increase of 92.7 t compared to the 2018 estimated RBC (235 t; see Sporcic 2018). The increase in RBC of approximately 93 t can be mostly attributed to an increase in the most recent CPUE and hence the mean of the most recent four-year average which is used to calculate the RBC. Also, the CPUE in 2023 is above the CPUE target based on the Tier 4 Harvest Control Rule (0.62) and has been above target since 2015 (Sporcic, 2023b). See Deepwater Shark (East) for comments on the development for a Dynamic Tier 4 assessment.

RAG Recommendations

SERAG (Nov 2023) recommended the RBC (326.7 t) produced by the Tier 4 for the Deepwater Shark West assessment. SERAG supported the use of this RBC for a three-year MYTAC but noted that a Dynamic Tier 4 may become available (subject to MSE testing) in 2024.

RBC (t)	**Year**	**RBC (t)**	**Is a MYTAC Recommended?**
	2026	327	Yes.
	2025	327	

	2024	327	SERAG recommended the use of the RBC for a three-year MYTAC, noting that a Dynamic Tier 4 may become available in late 2024.
Discount Factor (t)	N/A	SERAG recommended not applying a discount factor given the protection afforded to the stock by closures.	
State catch (t)	N/A	Previously recorded by SA however there are no recent catches,	
Discards (t)	N/A	There are no reliable estimates of discards for the western species basket. Discards were not used in the Tier 4 assessment because they are poorly estimated and as such were not deducted from the RBC.	
Recreational Catch (t)	N/A	There are no estimates of recreational catch.	
RCA (t)	N/A	There has been no specific research catch allocated.	
Provisional TAC under the Harvest Strategy		327 t	

AFMA Advice

AFMA management recommends a TAC of 327 t for the deepwater shark west basket during the 2024–25 season, as the 1st year of a 3-year MYTAC, with undercatch and overcatch provisions set at 10 per cent and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

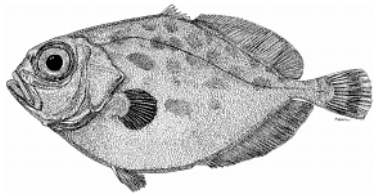
Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Smooth Oreo (Cascade)

Pseudocyttus maculatus



Species Summary

Stock Assessment	Tier 4 Species – last assessed by SlopeRAG in 2010.
Stock Structure	Stock structure of smooth oreodory is unknown. For assessment and management purposes the Cascade Plateau is regarded as a separate stock.

Stock status against reference points (CLim/CTarg)

Tier	Assessment Year	$CPUE_{Recent}$	$CPUE_{Target}$	$CPUE_{Limit}$
4	2010	1.3575	0.4989	0.1996
4	2008	1.962	0.4905	0.1962
4	2008	96 t (C_{CUR})*	-	-

*Tier 4 assessment used geometric mean catch rates not standardised CPUE.

Stock trend and other indicators

Stock status: the most recent assessment (in 2010) used data up to 2009 and concluded that the CPUE-based biomass proxy was above the target reference point. SlopeRAG (November 2011) questioned the validity of the unrealistically high RBC from the 2010 assessment, concluding that CPUE may not be an accurate index of abundance. Low catches and effort since 2009 have precluded any updates to the Tier 4 assessment.

Biomass trend: When last assessed, CPUE had been extremely variable and the fluctuations were considered to be not indicative of changes in stock status.

Species Category
Trigger Species

TAC Setting Approach

As it has been more than six years since the last assessment for Smooth Oreo Cascade, SESSFRAG will determine the timing of a review of available data and assessment options for this species. A 50 t review trigger will apply in the interim.

Catch and TAC (t)

SESSF season	Agreed TAC	TAC after unders/overs	Commonwealth Retained Catch
2023-24	150	169	-
2022-23	150	169	<1
2021-22	150	168	0

Economics (Byproduct) Commonwealth Trawl and Scalefish Hook

Financial Year	Species GVP ($m)	Fishery GVP ($m)	% Fishery GVP
2021-22	0	80.00	0
2020-21	0	64.00	0

	2019-20	0	51.32	0
	2018-19	0	49.47	0
ABARES Status (2023 report)	**Fishing mortality: Not subject to overfishing**		**Biomass: Not overfished**	
Climate Sensitivity **Low**	Preliminary projections indicate (with low confidence) a 5% decline in abundance through to 2040, with the decline more evident in the north.			

Assessment summary

Key Model technical assumptions/ parameters	The Tier 4 assessment assumes there is a linear relationship between catch rates and exploitable biomass, and that the character of the estimated catch rates has not changed significantly since the reference period to the end of the most recent year. Catch rates are estimated as catch per shot rather than catch per hour.
Significant Changes to data inputs	SlopeRAG (October 2010) considered whether data from Zone 70 should be included in the analysis, given that the area was now closed to fishing. Noting the uncertainty of movement of the species between closures and permitted areas, SlopeRAG recommended excluding Zone 70 catches and CPUE from future stock assessments.
Assessment results and RAG comments	Using the standardised CPUE and the updated catches for 2009, the Tier 4 assessment showed the recent CPUE are well above the target, resulting in the calculation of a large RBC (711 t). It is uncertain whether the CPUE value for 2009 is valid, as only 60 kg of data meet reporting requirements. The rapid changes in apparent CPUE indicates that the observed catch rates are unlikely to be representative of the stock size, therefore the validity of applying a Tier 4 should be considered. SlopeRAG (October 2010) noted that were was a low number of boats, with a low level of catch, and that standardised CPUE contained a large number of errors. SlopeRAG (October 2010), due to the lack of confidence in CPUE as an indicator of stock status, recommended using the RBC from the previous assessment (247 t) and maintaining the TAC from the 2010-2011 fishing year (150 t). SlopeRAG recommended maintaining the TAC at this level until catches reach at least 10 t. SERAG (Nov 2022) noted the there is no basis to change management advice.

RAG Recommendations

SESSFRAG (Aug 2023) adopted the use of a Trigger Species category. Species in this category must satisfy a number of criteria and catch will be monitored annually. The TAC is rolled over until a specified trigger is breached, or six years elapse from the last assessment (whichever occurs first), at which point a new assessment is considered.

The recommended long-term TAC for Smooth Oreo (Cascade) is 150 t, with a TAC review of 50 t. SESSFRAG will determine the timing of a review of available data and assessment options for this species.		
RBC (t)	247	RBC from the 2008 assessment. No longer relied upon as a TAC of 150 t has been maintained since the 2010–2011 season.
Discount Factor (t)	N/A	SlopeRAG (November 2011) determined that a discount factor was not required, due to the TAC being set at a level well below the RBC.
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.
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		Maintain TAC of 150 t in accordance with trigger species arrangements.

AFMA Advice

AFMA management recommends a TAC of 150 t for Smooth Oreo (Cascade) for the 2024-25 season, including overcatch and undercatch provisions of 10 per cent, and a determined amount of 2 t.

MAC Recommendations

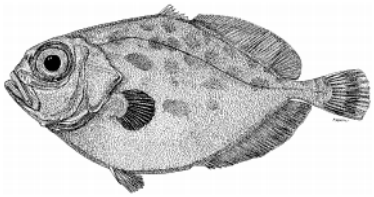
Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Smooth Oreo - Other



Pseudocyttus maculatus

Species Summary

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 (FCur/FMSY)	**Tier**	**Assessment Year**	**$F_{Current}$**	**F_{MSY}**	**F_{Limit}**
	Weight of evidence	2020	F<FMSY	FMSY = 0.16	FLIM = 0.23
	Weight of evidence	2019	F<FMSY		
	Tier 5	2015	N/A 90 t TAC Maintains stock >35%B_0		
Stock trend and other indicators	Catches have reduced in the last two seasons and remain below the 90 t TAC.				
Species Category Trigger Species	**TAC setting approach**				
	A review of available data and assessment options is scheduled for 2026, in accordance with the 6-year threshold, or if 68 t (i.e., 75% of the TAC) is landed, whichever occurs first.				
Catch and TAC (t)	**SESSF season**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**	
	2023-24	90	97	-	
	2022-23	90	97	20	
	2021-22	90	103	44	
Economics (Byproduct) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**	
	2021-22	0.14	80.00	0.18	
	2020-21	0.15	64.00	0.23	
	2019-20	0.13	51.34	0.25	
ABARES Status (2023 report)	**Fishing mortality: Uncertain**		**Biomass: Uncertain**		

Climate Sensitivity **Low**	Preliminary projections indicate (with low confidence) a 5% decline in abundance through to 2040, with the decline more evident in the north.
Assessment summary	
Key Model technical assumptions/ parameters	The Sustainability Assessment of Fishing Effects (SAFE) provides an absolute measure of risk of overfishing by estimating fishing mortality rates, relative to fishing morality rate reference points (based on life history parameters). To measure fishing mortality, SAFE estimates: • 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 Fishing mortality is the fraction of overlap between fished area and the species distribution, adjusted by catchability and post-capture mortality. Uncertainty around the estimated fishing mortality is estimated by including variances in encounterability, selectivity, survival rate and fishing effort between years. Assumes that: • 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.
Assessment results 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. 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. 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 BMSM, similar to the target species MSY. Considering the outcomes of the ERA and recent catches, SERAG (Oct 2019) recommended rolling over the 90 t TAC for a single year, and reviewing catches 2020.

	SERAG (2022) recommended maintaining the 90 t TAC for the 2023-24 fishing year.

RAG Recommendations

SESSFRAG (Aug 2023) adopted the use of a Trigger Species category. Species in this category must satisfy a number of criteria and catch will be monitored annually. The TAC is rolled over until a specified trigger is breached, or six years elapse from the last assessment (whichever occurs first), at which point a new assessment is considered.

The recommended long-term TAC for Smooth Oreo (Other) is 90 t, with TAC review triggers of 68 t or 6 years elapsed since the last assessment (i.e. 2020 + 6 = 2026).

RBC (t)	90	Long-term RBC to be used until the next assessment.
Discount Factor (t)	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.
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		Maintain TAC of 90 t in accordance with trigger species arrangements.

AFMA Advice

AFMA management recommends a TAC of 90 t for Smooth Oreo (Other) for the 2024–25 season, including overcatch and undercatch provisions set at 10 per cent, and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Orange Roughy Southern Zone

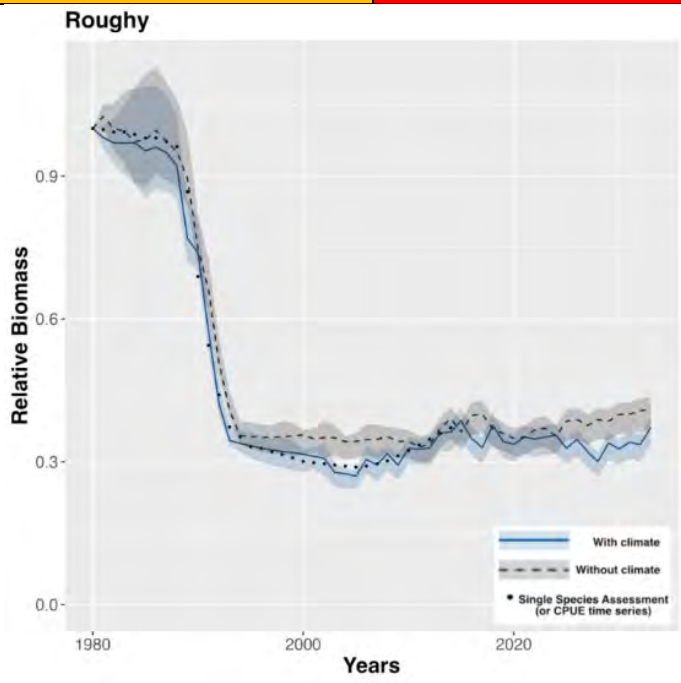
ABARES (2012): Line Drawing – Rosalind Poole

Hoplostethus atlanticus

Species Summary

<table>
<tr><td>Stock Assessment</td><td colspan="6">Tier 1 Species – Southern Zone last assessed by SlopeRAG in 2000
Pedra Branca has been assessed as part of the Eastern Zone Tier 1 stock assessment since2002 and was last assessed by SERAG in 2021.</td></tr>
<tr><td>Stock Structure</td><td colspan="6">Multiple regional stocks of orange roughy are assumed and the fishery is managed and assessed as a number of discrete regional stocks.
Recent genetic studies indicate little genetic diversity between all south east Australian stocks, however they may be demographically separate.
The part of the Southern Zone catch that is caught on the Pedra Branca grounds is assumed tobe part of the eastern stock.</td></tr>
<tr><td rowspan="4"><u>Southern</u>
Stock status against reference points(%B0 in year +1)</td><td>Tier</td><td>Assessment Year</td><td>Biomass</td><td colspan="3"></td></tr>
<tr><td>-</td><td>2000</td><td><30 (95% probability)</td><td colspan="3" rowspan="3">Maintain spawning biomass above 30% of the spawning biomass at the onset of significant commercial fishing (1988).
Where there is a greater than 50% probability that a stock is below 30%, the TAC will be set such that the biomass reaches 30%B0 by 2004</td></tr>
<tr><td>-</td><td>1996</td><td><30 (56–68% probability)</td></tr>
<tr><td>-</td><td>1995</td><td><30 (9–55% probability)</td></tr>
<tr><td rowspan="4"><u>Pedra Branca</u>
Stock status against reference points(%B0 in year +1)</td><td>Tier</td><td>Assessment Year</td><td>Biomass (from assessment year)</td><td>Biomass (revised in most recent assessment)</td><td>Target</td><td>Limit</td></tr>
<tr><td>1</td><td>2021</td><td>30</td><td>30</td><td rowspan="3">48</td><td rowspan="3">20</td></tr>
<tr><td>1</td><td>2017</td><td>33</td><td>26</td></tr>
<tr><td>1</td><td>2014</td><td>26</td><td>22</td></tr>
<tr><td>Stock trend and other indicators</td><td colspan="6">Southern Zone
Stock status: unresolved in the Southern Zone. The most recent accepted assessment (2000) concluded that the stock was less than the limit reference point.
The component of the Southern Zone stock that resides in the Pedra Branca seamounts is assessed as a part of the Eastern Zone stock assessment due to the stock structure assumptions. The Eastern Zone assessment in 2021 estimated the stock status in the Pedra Branca area to be 30% of unfished biomass in 2021 and projected to be at 30% B0 at the beginning of 2022 (Burch et al, 2021).</td></tr>
</table>

<table>
<tr><td></td><td>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.

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.</td></tr>
<tr><td>Species Category
Depleted</td><td>TAC setting approach
Annual bycatch TAC set in accordance with the Orange Roughy Rebuilding Strategy with an additional allocation for the Pedra Branca management area.</td></tr>
<tr><td>Catch and TAC (t)</td><td>
<table>
<tr><th>SESSF season</th><th>Agreed TAC</th><th>TAC after unders/overs</th><th>Commonwealth Retained Catch</th></tr>
<tr><td>2023-24</td><td>105</td><td>105</td><td>-</td></tr>
<tr><td>2022-23</td><td>113</td><td>113</td><td>50</td></tr>
<tr><td>2021-22</td><td>127</td><td>127</td><td>120</td></tr>
</table>
</td></tr>
<tr><td>Economics (Primary) Commonwealth Trawl and Scalefish Hook</td><td>
<table>
<tr><th>Financial Year</th><th>Species GVP ($m)</th><th>Fishery GVP ($m)</th><th>% Fishery GVP</th></tr>
<tr><td>2021-22</td><td>Not Available</td><td>80.00</td><td>Not Available</td></tr>
<tr><td>2020-21</td><td>Not Available</td><td>64.00</td><td>Not Available</td></tr>
<tr><td>2019-20</td><td>Not Available</td><td>51.34</td><td>Not Available</td></tr>
</table>
</td></tr>
<tr><td>ABARES Status (2023 report)</td><td>Fishing mortality: Uncertain | Biomass: Overfished</td></tr>
<tr><td>Climate Sensitivity
Low</td><td> 

Atlantis modelling suggests that climate change has a minor influence on the biomass of Orange Roughy. Depletion by fishing in the 1980s-1990s affected the species much more strongly than any climate related shifts.</td></tr>
</table>

Assessment summary	
Key Model technical assumptions/ parameters	For Pedra Branca, see Orange Roughy East.
Significant Changes to data inputs	For Pedra Branca, see Orange Roughy East.
Assessment results and RAG comments	SERAG has previously agreed that, despite the absence of an agreed assessment model for the Southern Zone stock, the data show there is little targeting or bycatch of orange roughy. As such, the incidental bycatch TAC is applicable and does not impede recovery of the stock. For Pedra Branca, see Orange Roughy East. SERAG (2021) recommended a 3-year MYTAC for Orange Roughy (East) using the outputs of the MCMC analysis (see Orange Roughy East). 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. The orange roughy Pedra Branca area 3-year MYTAC will constitute 7 per cent of this RBC apportioned to the eastern zone. SERAG (Nov 2022) recommended maintaining the 31 t incidental bycatch TAC for the remainder of the Southern zone.

RAG Recommendations

SERAG (2021) recommended a 3-year MYTAC for orange roughy (East) using the outputs of the MCMC analysis (see Orange Roughy East). 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. The orange roughy Pedra Branca area 3-year MYTAC will constitute 7 per cent of this RBC apportioned to the eastern zone.

SERAG (Nov 2023) noted there is no new information to change the current bycatch TAC of 31 t (Southern) therefore recommended maintaining it at current levels.

	Year	RBC (t): Southern	RBC (t): Pedra Branca	Is a MYTAC Recommended?
RBC (t)	2025	0	58 (7% of 830)	Southern: No. Rebuilding species. Pedra Branca: Yes – (93% of the Eastern Zone Tier 1 stock assessment, with 7% apportioned to the Pedra Branca area of the Southern Zone.)
	2024	0	55 (7% of 789)	
	2023	0	52 (7% of 740)	
	2022	0	48 (7% of 681)	
Discount Factor (t)	N/A	Discount factors are not applied to Tier 1 stock assessments (Pedra Branca) and there is no assessment for the Southern Zone.		
State catch (t)	N/A	There are no estimates of State catches.		

Discards (t)	N/A	There are no estimates of discards.
Recreational Catch (t)	N/A	There are no known recreational catches for Orange Roughy.
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		Southern Zone: 31 t - Incidental bycatch TAC Pedra Branca: 55 t noting that the TAC based on constant catch projections is 67 t for this area.

AFMA Advice

AFMA management recommends a single year TAC of 98 t (consisting of a 31 t incidental bycatch amount and a 67 t allocation to the Pedra Branca management area based on the constant catch projections) for Orange Roughy South during the 2024–25 season, with no overcatch or undercatch provisions and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC(t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Orange Roughy Western Zone

Hoplostethus atlanticus

ABARES (2012): Line Drawing – Rosalind Poole

Species Summary

Stock Assessment	Tier 1 Species – Last assessed by SlopeRAG in 2002			
Stock Structure	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. Recent genetic studies indicate little genetic diversity between all South Eastern Australian stocks, however they may be demographically separate.			
Stock status against reference points (%B_0)	**Tier**	**Assessment Year**	**Biomass (revised in most recent assessment)**	**Target Limit**
	-	2002	<30 (>50% probability)	Maintain spawning biomass above 30% of the spawning biomass at the onset of significant commercial fishing (1988). Where there is a >50% probability that a stock is below 30%, the TAC will be set such that the biomass reaches 30%B_0 by 2004.
	-	2000	<20 (97% probability)	
Stock trend and other indicators	Stock status is unresolved in the Western Zone however considering that there has been minimal fishing in the Western Zone and that the eastern stock has rebuilt to a harvestable level it is appropriate to consider that similar rebuilding may have occurred in the Western Zone.			
Species Category Depleted	**TAC setting approach**			
	Annual bycatch TAC set in accordance with the Orange Roughy Rebuilding Strategy			

Catch and TAC (t)	**SESSF season**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**
	2023-24	60	60	-
	2022-23	60	60	12
	2021-22	60	60	10

Economics (Primary) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**
	2021-22	Not Available	80.00	Not Available
	2020-21	Not Available	64.00	Not Available

	2019-20	Not Available	51.34	Not Available
ABARES Status (2023 report)	**Fishing mortality: Uncertain**		**Biomass: Overfished**	
Climate Sensitivity **Low**	Atlantis modelling suggests that climate change has a minor influence on the biomass of Orange Roughy. Depletion by fishing in the 1980s-1990s affected the species much more strongly than any climate related shifts.			

Assessment summary

Key Model technical assumptions/parameters	N/A
Significant Changes to data inputs	N/A
Assessment results and RAG comments	SERAG has previously agreed that, despite the absence of an agreed assessment model, the data show there is little targeting or bycatch of western orange roughy. As such the incidental catch TAC is applicable and does not impede recovery of the stock. Bearing in mind the rebuild of the eastern stock from a low biomass it could be argued that the Southern and Western Zones should have recovered somewhat. This is tempered by not knowing if recruitment processes and stock movement in the Southern and Western Zones are similar or different to those in the Eastern Zone. SERAG (Dec 2022) noted that the Western Zone continues to be managed under an incidental bycatch TAC and noted there was no additional information that would provide a basis for SERAG to change its' previous TAC advice. SERAG recommended that the Western Zone orange roughy incidental bycatch TAC remain unchanged – 60 t. SERAG noted that given the life history of orange roughy, multiple years of sufficient data will be required to provide informed advice on the recovery of western orange roughy. SERAG recommended maintaining the Western Orange Roughy Research Plan, including the research catch allowance of 200 t.

RAG Recommendations

SERAG (Nov 2023) noted there is no new information to change the current bycatch TAC of 60 t, therefore recommended maintaining it at current levels.

SERAG (Sep 2023) recommended maintaining the 200 t (100 t trigger) RCA for the 2024-25 fishing year to support the WORRP, and this continue to be reviewed annually.

RBC (t)	0 t	The RBC is set to zero for all depleted species.
Discount Factor (t)	N/A	Discount factors are not applied to bycatch TACs.
State catch (t)	N/A	There are no estimates of State catches.
Discards (t)	N/A	Discards are not deducted from the bycatch TAC.
Recreational Catch (t)	N/A	There are no known recreational catches for Orange roughy.

RCA (t)	200	Research catch allocated under the Western Orange Roughy Research Plan.
Provisional TAC under the Harvest Strategy		60 t - Incidental bycatch TAC

AFMA Advice

AFMA Management recommends an incidental bycatch TAC of 60 t for the Orange Roughy Western Zone during the 2024–25 season, with no undercatch or overcatch provisions and a determined amount of 2 t.

AFMA Management also recommends a 200 t RCA for the Orange Roughy Western Zone during the 2024–25 season with a catch trigger of 100 t for each of the three sampling areas within this zone.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

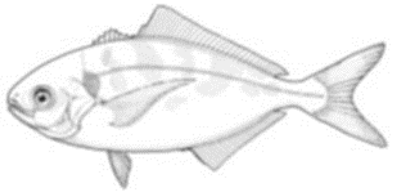
Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Shelf Species

Blue Warehou

Seriolella brama



ABARES (2012): Line Drawing – Rosalind Poole

<table>
<tr><th colspan="6">Species Summary</th></tr>
<tr><td>Stock Assessment</td><td colspan="5">Tier 4 Species - last assessed by ShelfRAG in 2013.</td></tr>
<tr><td>Stock Structure</td><td colspan="5">There is evidence that there are two stocks of Blue Warehou, east and west of the Bass Strait. However, the stock is managed under a single TAC.</td></tr>
<tr><td rowspan="4"><u>East</u>
Stock status againstreference points (CLim/CTarg)</td><td>Tier</td><td>Assessment Year</td><td>CPUE_{Recent}</td><td>CPUE_{Target}</td><td>CPUE_{Limit}</td></tr>
<tr><td>4</td><td>2013</td><td>0.1861</td><td>2.0717</td><td>0.8287</td></tr>
<tr><td>4</td><td>2012</td><td>0.2214</td><td>2.0055</td><td>0.8022</td></tr>
<tr><td>4</td><td>2011</td><td>0.2219</td><td>1.939</td><td>0.7756</td></tr>
<tr><td rowspan="4"><u>West</u>
Stock status againstreference points (CLim/CTarg)</td><td>Tier</td><td>Assessment Year</td><td>Biomass</td><td>Target</td><td>Limit</td></tr>
<tr><td>4</td><td>2013</td><td>0.2681</td><td>1.9249</td><td>0.7699</td></tr>
<tr><td>4</td><td>2012</td><td>0.307</td><td>1.8679</td><td>0.7472</td></tr>
<tr><td>4</td><td>2011</td><td>0.349</td><td>1.8175</td><td>0.727</td></tr>
<tr><td>Stock trend and other indicators</td><td colspan="5">The last agreed Tier 1 assessment in 2006, estimated the eastern stock to be depleted below the limit reference point. In 2013, blue warehou was assessed as a Tier 4 species and was assessed as being below the limit reference point.

In contrast, the western stock was estimated to be above the limit reference point and close to the biomass maximum sustainable yield (B40) level. However, the 2006 assessment predicted that the western stock will have dropped below the limit reference point by 2007 if the landed catches remained high and if recruitment was average.

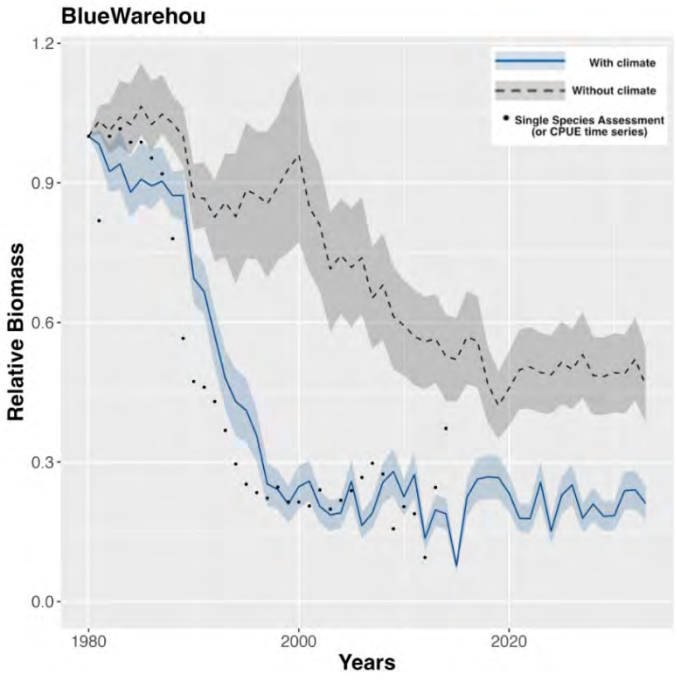
<u>Biomass trend</u>

<u>Zone 10-30</u> – Annual standardised CPUE trend is flat since 1992 and consistently below average since 1999 (Sporcic, 2023).

<u>Zone 40-50</u> – Annual standardised CPUE trend is flat since 1992 and mostly below average. Catch rates prior to the introduction of quotas are highly variable both within and between years. At that time blue warehou data was mixed with silver warehou data so this early data is less trustworthy. Data are now so sparse that the analyses can no longer be trusted to represent the stock (Sporcic, 2023).</td></tr>
</table>

<table>
<tr><td></td><td>Catch against TAC

Since the implementation of the blue warehou Rebuilding Strategy in 2008, the TAC has decreased from 365 t in 2008-09, to an incidental bycatch TAC of 183 t in 2009-10 and 2010-11, 133 t in 2011-12, 118 t in 2012-13, 50 t in 2021-22 and then 30 t in 2023-24.

Commonwealth catches have always been less than the incidental TAC, with the TAC being 6 per cent caught in 2022-23.</td></tr>
<tr><td>Species Category
Depleted</td><td>TAC setting approach
Annual bycatch TAC set in accordance with the Blue Warehou Stock Rebuilding Strategy.</td></tr>
<tr><td>Catch and TAC (t)</td><td>
<table>
<tr><th>SESSF Fishing Year</th><th>Agreed TAC</th><th>TAC after unders/overs</th><th>Commonwealth Retained Catch</th></tr>
<tr><td>2023-24</td><td>30</td><td>30</td><td>-</td></tr>
<tr><td>2022-23</td><td>50</td><td>50</td><td>3</td></tr>
<tr><td>2021-22</td><td>50</td><td>50</td><td>4</td></tr>
</table>
</td></tr>
<tr><td>Economics (Secondary) Commonwealth Trawl and Scalefish Hook</td><td>
<table>
<tr><th>Financial Year</th><th>Species GVP ($m)</th><th>Fishery GVP ($m)</th><th>% Fishery GVP</th></tr>
<tr><td>2021-22</td><td>0.03</td><td>80.00</td><td>0.04</td></tr>
<tr><td>2020-21</td><td>0.01</td><td>64.00</td><td>0.02</td></tr>
<tr><td>2019-20</td><td><0.01</td><td>51.34</td><td><0.02</td></tr>
</table>
</td></tr>
<tr><td>ABARES Status (2023 report)</td><td>East -Fishing mortality: Subject to overfishing
West -Fishing mortality: Uncertain
Biomass: Overfished</td></tr>
<tr><td>Climate Sensitivity
Medium</td><td> 
</td></tr>
</table>

	Atlantis modelling suggests that climate change has a moderate influence on the biomass of Blue Warehou and is contributing to a lower biomass than would have occurred otherwise.
Assessment summary	
Key Model technical assumptions/ parameters	The Tier 4 assessment assumes there is a linear relationship between catch rates and exploitable biomass, and that the character of the estimated catch rates has not changed significantly since the reference period to the end of the most recent year. Due to low catches and avoidance behaviour, CPUE is no longer considered a reliable index of abundance for this species.
Significant Changes to data inputs	N/A
Assessment results and RAG comments	Logbook catch and effort data is the only information available for this species – age and length data are not collected. SERAG (Nov 2018) noted a significant increase in estimated discards in 2017 for the eastern stock – 91 per cent and 216 t. This was influenced by a single observed Danish seine trip where large amounts of small fish were discarded. Discards rates for Blue Warehou remain high; the 2022 estimate was 95 per cent (23 t), following figures of 97 per cent (43 t) in 2021 and 73 per cent (6 t) in 2020. There is evidence of considerable unreported blue warehou discards across the fleet. For example, blue warehou were only reported in 0.4% of Danish seine logbooks shots in 2021 compared to 43% of observed shots. Similarly, blue warehou were only reported in 0.9% of board trawl shots, compared to approximately 20% of observed shots. An alternative primary index of abundance needs to be developed as a high priority for use in future stock assessments, and this species should be considered as a candidate for application of close-kin genetics assessments. SERAG (Nov 2021) considered a companion species analysis which investigated the link between target species catch and the associated level of unavoidable bycatch of recovering species. The analysis incorporated a range of factors such as area, depth fished and gear type – also known as métiers. Using logbook data from 2019 and 2020, and expected 2022-23 TACs for the main companion species, the estimated unavoidable bycatch of blue warehou for 2022 was 11.4 t, with a range between 7.0 and 17.6 t. SERAG (Nov 2022) noted the revised Blue Warehou Rebuilding Strategy had been completed and uploaded to AFMA website. SERAG (Nov 2023) noted the implementation of the recent Rebuilding Species Closures and the completion of the structural adjustment. In the absence of an updated métier analysis, SERAG were unable to provide updated advice on a bycatch TAC for Blue Warehou.

RAG Recommendations

SERAG (Nov 2023) noted that additional trawl closures, the buyback of trawl boat statutory fishing rights (SFRs), and changes to Danish seine gear in 2023, while beneficial to depleted shelf species, will have a significant impact on the key index of abundance (CPUE) for these species and make it difficult to evaluate the effectiveness of these (and other) conservation measures contained in the relevant rebuilding strategies.

SERAG (Nov 2023) recommended maintaining the incidental bycatch TAC of 30 t for Blue Warehou during the 2024–25 season on the basis that there is no new information to suggest a need to deviate from this amount.

RBC (t)	0 t	The RBC is set to zero for all depleted species.
Discount Factor (t)	N/A	Discount factor not applied to incidental bycatch TAC.
State catch (t)	East = 6 West = 1.9	State catches are not deducted from the bycatch TAC.
Discards (t)	East = 162.6 West = N/A	There are no estimates of discards in the west. Discards are not deducted from the bycatch TAC. The high weighted average discard estimate is driven by observed discard rates in 2021 applied across Commonwealth and State catches (see “Data and RAG Comments”)
Recreational Catch (t)	N/A	Tasmanian recreational catch estimates are available for 1997 (101.9 t), 2001 (19.5 t), 2008 (11.9 t), 2010 (32.5 t), 2013 (15.4 t) and 2018 (0.8 t).
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		30 t – incidental bycatch TAC

AFMA Advice

AFMA Management recommends an incidental bycatch TAC of 30 t for Blue Warehou during the 2024–25 season, with no overcatch or undercatch provisions and a determined amount of 2 t.

MAC Recommendations

Commercial fishers’ interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC				
2023-24 agreed TAC (t)	**2024-25 recommended TAC (t)**	**Overcatch and undercatch (%)**	**Determined amount (t)**	**Change in TAC (t)**

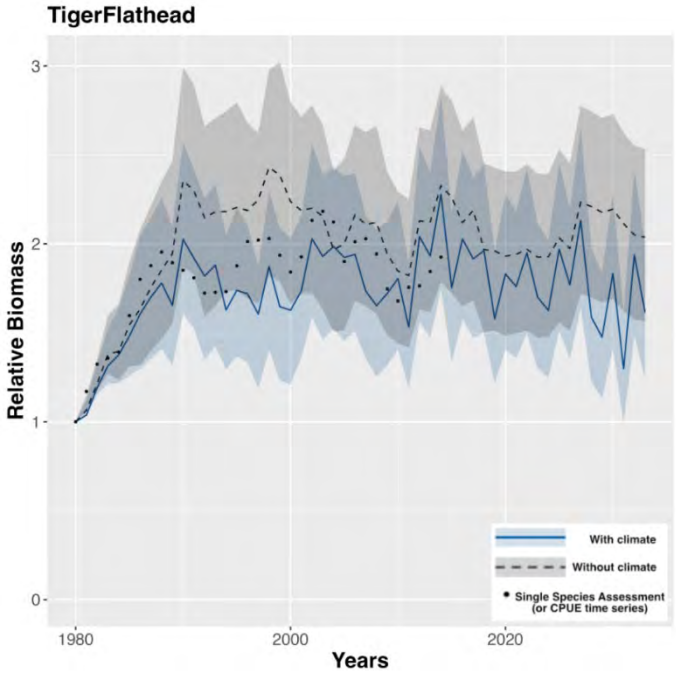
Flathead

Neoplatycephalus richardsoni

<table>
<tr><th colspan="7">Species Summary</th></tr>
<tr><td>Stock Assessment</td><td colspan="6">Tier 1 Species - last assessed by SERAG in 2022.</td></tr>
<tr><td>Stock Structure</td><td colspan="6">For management purposes a single continuous stock has been assumed throughout all zones of the SESSF.</td></tr>
<tr><td rowspan="4">Stock status against reference points (%B_0 in year +1)</td><td>Tier</td><td>Assessment Year</td><td>Biomass (from assessment year)</td><td>Biomass (revised in most recent assessment)</td><td>Target</td><td>Limit</td></tr>
<tr><td>1</td><td>2022</td><td>40</td><td>40</td><td rowspan="3">40</td><td rowspan="3">20</td></tr>
<tr><td>1</td><td>2019</td><td>34</td><td>33</td></tr>
<tr><td>1</td><td>2016</td><td>42</td><td>34</td></tr>
<tr><td>Stock trend and other indicators</td><td colspan="6">Otter board trawl CPUE in Zone 30 (east coast of Tasmania) - The annual standardised CPUE trend was noisy and flat between 1986 - 2001, and after a transitional period between 2002- 2006 during which catches surged, was noisy and flat from 2007 to 2021. The catch in 2022 (154 t) from zone 30 was the lowest since 2012.

Otter board trawl CPUE in Zones 10 and 20 – Annual standardised CPUE appears cyclical above and below average, has remained below average in 2017-2018 and increased to the long-term average in 2021, and subsequently decreased to below average based on the 95% confidence intervals. The structural adjustment had a profound effect upon the influence of the vessel factor reducing the standardised trend well below the nominal geometric mean CPUE (Sporcic, 2023).

Danish seine in Zone 20 and 60 – Annual standardised CPUE appears cyclical above and below average and has remained below average over 2012-22, based on 95% confidence intervals. There has also been an overall decrease in standardised CPUE over the 2007-2020 period and significant increases towards the long-term average in the last two years (2021 and 2022) relative to 2020 (Sporcic, 2023).</td></tr>
<tr><td rowspan="2">Species Category
MYTAC species</td><td colspan="6">TAC setting approach</td></tr>
<tr><td colspan="6">The current season (2023-24) is the 1st year of a 3-year MYTAC. The next assessment is due in 2026</td></tr>
<tr><td rowspan="3">Catch and TAC (t)</td><td colspan="2">SESSF season</td><td>Agreed TAC</td><td>TAC after unders/overs</td><td colspan="2">Commonwealth Retained Catch</td></tr>
<tr><td colspan="2">2023-24</td><td>2,333</td><td>2,510</td><td colspan="2">-</td></tr>
<tr><td colspan="2">2022-23</td><td>2,333</td><td>2,483</td><td colspan="2">1,860</td></tr>
</table>

	2021-22	2,333	2,361	2,143
Economics (Primary) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**
	2021-22	14.13	80.00	17.66
	2020-21	17.06	64.00	26.66
	2019-20	12.96	51.34	25.24
ABARES Status (2023 report)	**Fishing mortality: Not subject to overfishing**		**Biomass: Not overfished**	
Climate Sensitivity **Low**	 Atlantis modelling indicates that climate change does not have an influence on the stock abundance.			

Assessment summary

Key Model technical assumptions/parameters	The current 2022 assessment models growth separately for both Males and Females. Tiger Flathead constitute a single stock within the area of the fishery, from zone 10 (NSW), through zone 20 (eastern Bass Strait), zone 60 (Bass Strait) and zone 30 (eastern Tasmania). While alternative stock structures have been previously suggested, with the eastern Tasmanian stock potentially a separate stock (Cui et al. (2004); Punt (2005a); Punt (2005b); Klaer (2006); Klaer (2009); Klaer (2010)), this is the current stock structure agreed to by the SERAG. The stock is assumed to be unexploited at the start of 1915 when the steam trawl fishery commenced. Catches prior to this time are thought to have been minimal. The CVs of all abundance indices (including the FIS) were initially set to the root mean squared deviation from a loess fit to the fleet specific indices

	(Sporcic, 2022), and then tuned to match the model-estimated standard errors by estimating an additional variance parameter within SS. Six fishing fleets are modelled. Selectivity is assumed to vary among fleets, but the selectivity pattern for each separate fleet is modelled as length-specific, logistic, and mostly time-invariant. The selectivity for Danish seine is allowed to change in 1978, and that of the East trawl is changed in 1985. The two parameters of the selectivity function for each fleet are estimated within the assessment. Retention is also defined as a logistic function of length, and the inflection and slope of this function are estimated for the 3 fleets where discard information is available (Danish seine, East trawl and Tas trawl). Retention for the Steam trawl fleet was implicitly assumed to be independent of length as no length frequency composition data is available on discards for this fleet. The sample sizes for length and age frequencies were tuned for each fleet so that the input sample size was approximately equal to the effective sample size calculated by the model. Before this retuning of length frequency data was performed, any sample sizes with a sample size greater than 200 shots or trips were individually down-weighted to a maximum sample size of 200. Samples with fewer than 100 measured fish were excluded from the analysis. This is because the appropriate sample size for length frequency data is more closely related to the number of shots or trips sampled, rather than the number of fish measured (Bessell-Browne 2022).
Significant Changes to data inputs	The following were included in the updated 2022 assessment: Steepness (h) was fixed at 0.75. rather than estimated in the base case. This change resulted from likelihood profiles in the 2019 assessment and 2022 preliminary base case highlighting that there was limited information in the available data to inform estimation of this parameter. This meant that each time the assessment was conducted, h was estimated to be higher (0.62, 0.72 and 0.85 in 2016, 2019 and 2022 respectively), resulting in undesirable retrospective patterns. Fixing h at the SESSF default value of 0.75 resolved this problem, however, future work should investigate whether another fixed value of h may be more suitable for tiger flathead (Bessell-Browne 2022). The maximum length bin was extended from 59 cm to 65 cm. This change was made because there was a large proportion of measured lengths, in both the East trawl and Tas trawl fleets, in the 59 cm plus group over the past 10 years. Extending the plus group to 65 cm removed the large peak of measured fish in the maximum length bin and allows more accurate estimation of growth parameters (Bessell-Browne 2022).
Assessment results and RAG comments	There are poor fits to the end of the Danish seine CPUE index from 2013 onwards, where the model is overestimating the input values, this trend was also apparent in the 2019 assessment (Day, 2019). While sensitivities have shown that this is not due to fitting the Tas trawl CPUE series further investigation into the cause of this misfit would benefit future assessments (Bessell-Browne 2022), SERAG (Nov 2022) supports this investigation.

	Discard proportion was showing cycler patterns in all fleets while the input data was remaining relatively flat. The RAG hypothesised this was perhaps due to smaller fish coming through the fishery. The RAG noted the increase in estimated stock status was in-part influenced by the new age and length data. Likelihood profiles have demonstrated there is conflict between different data sources in the assessment when estimating key parameters. The profile on MM suggests higher parameter values are preferred by the model and this is also supported by sensitivity results. The preference of the model to estimate higher values of MM has been evident since the 2010 assessment and investigating this alternative parameter space and its feasibility should be a focus of future work (Bessell-Browne 2022). The 2019 assessment and the 2022 preliminary base case identified a very flat likelihood profile for h, suggesting that there is insufficient data in the assessment to allow estimation of this parameter. This led to fixing this parameter at 0.75, the default value used in the SESSF, for this assessment. As likelihood profiles on h are not available for assessments prior to 2019 it is difficult to determine whether earlier assessments were able to accurately estimate h, or whether similar issues persisted. There is a likelihood profile on h that was conducted in Punt et al. (2014), which revealed a minimum log likelihood was obtained at h values around 0.6, suggesting that earlier assessments may have had adequate information in the data to inform estimation of this parameter. Given this estimated value of around 0.6 and the 2010 stock assessment h estimate of 0.62, these informed values would be a better choice to base the pre-specified value rather than the default value of 0.75, which has no specific relation to Tiger Flathead (Bessell-Browne 2022). SERAG (Nov 2022) noted this should be considered in future assessments. The assessment estimates that the projected 2023 stock status will be 40% of unfished spawning stock biomass (SSB0), assuming 2021 catches are maintained in 2022. Under the 20:35:40 HCR, the 2023 RBC is 2,838 t, while the long-term yield is 2,867 t. The average RBC over the 3-year period 2023-2025 is 2,831 t. Exploration of model sensitivity showed a variation in spawning biomass from 28% to 68% of SSB0 in 2022, which occurred when natural mortality (M) was fixed (M= 0.22) and estimated (M = 0.37), respectively. For the other standard sensitivities, the variation in spawning biomass was narrower, ranging between 33% and 45% of SSB0 (Bessel-Browne 2022). SERAG (Nov 2022) recommended a 3-year MYTAC using the average RBC of 2,831 t. It is premature to deviate from the base case agreed at SERAG 1 (Oct 2022) which used a fixed steepness value (0.75), fixed natural mortality of 0.27 and a target reference point of B40. SERAG (Nov 2022) recommended that additional work be undertaken on estimating growth parameters, developing an informative prior on h, investigating the different trends apparent between CPUE series between fleets and whether these are indexing abundance, and the preference of the model to estimate higher values of M. The results should be presented as

	advice before the next scheduled Tier 1 tiger flathead assessment commences.

RAG Recommendations

SESSFRAG (August 2023) recommended that the 3-year average MYTAC be revisited to ensure catches of Jackass Morwong (E) continue to be constrained.

SERAG (Nov 2023) noted there is less value in a restricting the TAC on Flathead now given the recent implementation of additional trawl closures. However, the TAC should not be increased from 2,333 t until a full season of catch data is available and considered by the RAG.

	Year	RBC (t)	Is a MYTAC Recommended?
RBC (t)	2025	2,828	Yes. Using the 3-year average value as fluctuations are minor.
	2024	2,827	
	2023	2,838	
	3-year average	2,831	
Discount Factor (t)	N/A	Discount factors are not applied to Tier 1 assessments.	
State catch (t)	135.2	Mostly NSW catches	
Discards (t)	213 t (2023) 214 t (2024) 215 t (2025)	The 3-year average modelled discards (i.e. 214 t) for the period 2023-2025 are deducted from the 3-year average RBC.	
Recreational Catch (t)	N/A	Assessment only considers tiger flathead, which are not considered a key recreational species.	
RCA (t)	N/A	There has been no specific research catch allocated	
Provisional TAC under the Harvest Strategy		2,482 t	

AFMA Advice

AFMA Management recommends a TAC of 2,333 t for Flathead during the 2024–25 season (unchanged from the current season), as the second year of a three-year MYTAC, with overcatch and undercatch provisions set at 10 per cent and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	

MAC advice and any dissenting views			
Undercatch (%)	**Overcatch (%)**	**Determined amount (t)**	**TAC (t)**

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Jackass Morwong

Nemadactylus macropterus

Species Summary

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 (%B0 in assessment year +1)

Tier	Assessment Year	Biomass (from assessment year)	Biomass (revised in most recent assessment)	Target	Limit
1	2018	68	68	48	20
1	2015	69	61		
1	2011	67	38		

East
Stock status against reference points (%B0 in assessment year +1)

Tier	Assessment Year	Biomass (from assessment year)	Biomass (revised in most recent assessment)	Target	Limit
1	2021	15	15	48	20
1	2018	35	15		
1	2015	37	17		

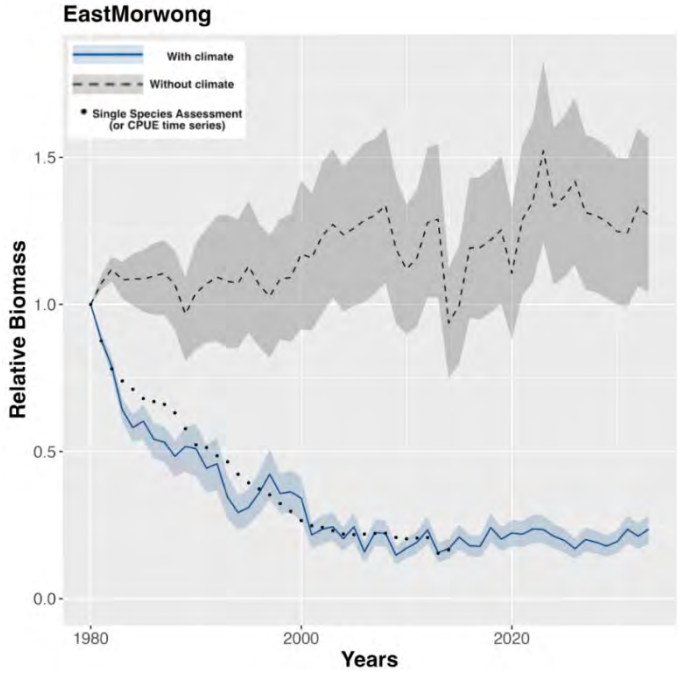
Stock trend and other indicators

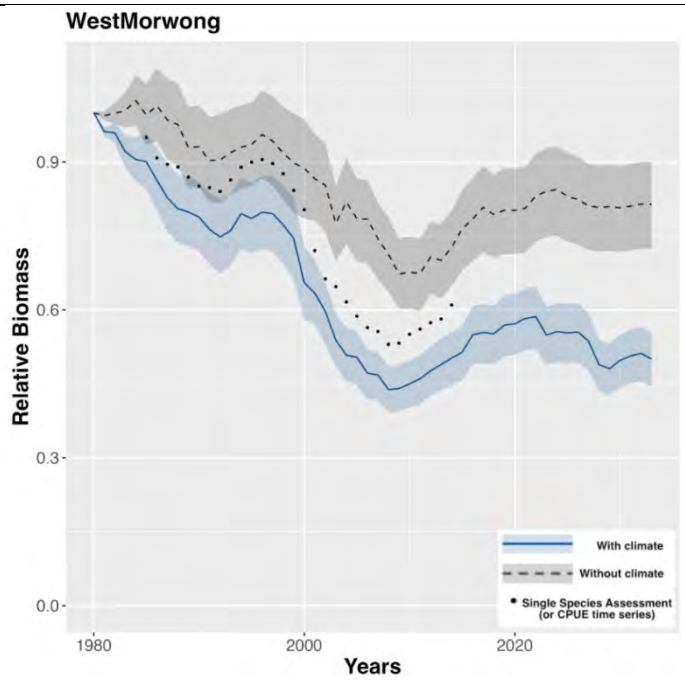
Zone 30 – Annual standardised CPUE has been below the long-term average since about 2001. More recently, the relative CPUE trend has been flat since at least 2015 (i.e., not statistically different from each other over the last eight years). The recorded catch of 54 t in 2019 was the highest since after 2013 (102.9 t). By contrast, the recorded catch (14.4 t) from zone 30 in 2021 was the lowest in the series (Sporcic, 2023).

Zone 10-20 – Most catch was reported in zone 20 in less than 200 m. Annual standardised CPUE has been below the long-term average since about 2000 with apparent periodicity. The recoded catch (14.7 t) from zones 10 and 20 in 2022 was the lowest in the series (Sporcic, 2023).

Zone 40-50 – Most catch from zone 40 occurred at a shallower depth compared to zone 50. Since 2007, standardised CPUE has been below the long-term average, with the most recent estimate decreased relative to the previous year. The recorded catch (7.9 t) from the west in 2020 was the lowest since 2015. The recorded catch of 9.9 t from the west in 2022 corresponds to the lowest number of vessels (7) (Sporcic, 2023).

Species Category	**TAC setting approach**
Depleted	Subject to an annual incidental bycatch TAC. Rebuilding strategy to be developed.

Catch and TAC (t)	**SESSF Fishing Year**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**
	2023-24	50	50	-
	2022-23	20	65	36
	2021-22	463	507	98
Economics (Secondary) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**
	2021-22	0.39	80.00	0.49
	2020-21	0.33	64.00	0.52
	2019-20	0.20	51.34	0.39
ABARES Status (2023 report)	**Fishing mortality: Subject to overfishing**		**Biomass: Overfished**	
Climate Sensitivity **High**				



Atlantis modelling suggests that climate change has a major influence on the biomass of Jackass morwong and is contributing to a much lower biomass than would have occurred otherwise.

Assessment summary

Key Model technical assumptions/parameters	West (2018) Single sex model and single stock in Zones 40 and 50 One fleet: trawl Natural mortality (M) fixed at 0.15 (agreed by SERAG) Recruitment is estimated from 1989 to 2012 East (2021) Single sex model and single stock in Zones 10, 20 and 30 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). Natural mortality fixed at 0.15 (agreed by SERAG) Recruitment is estimated from 1945 to 2015.
Significant Changes to data inputs	There were no significant changes to data inputs from the 2018 assessment.
Assessment results and RAG comments	West The 2015 Tier 1 assessment (Tuck et al, 2015) 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. 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, 2021). The results should be treated with considerable caution due to the limited data quality and quantity. SERAG (Oct 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. <u>East</u> 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. 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. 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. 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). 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. 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 recruitment, which has proven to be optimistic. The stock is estimated to be 15% in 2022. See projected rebuild timeframes under 'projected biomass' below. 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 métiers. 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. 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 TMIN (the minimum time that would be taken to rebuild in the absence of any commercial fishing), or up to 2xTMIN 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 ($2xT_{MIN}$). A métier analysis was not completed in 2022 because fishing effort will be impacted by closures and the structural adjustment. In the absence of a métier analysis, SERAG (2022) considered a bycatch TAC of 60 t would be sufficiently low to allow some catch in the west, while constraining catches in the east. SERAG (Nov 2023) noted the implementation of the recent Rebuilding Species Closures and the completion of the structural adjustment. In the absence of an updated métier analysis, SERAG were unable to provide updated advice on bycatch TACs.

RAG Recommendations

SERAG (Nov 2023) noted that additional trawl closures, the buyback of trawl boat SFRs, and changes to Danish seine gear in 2023, while beneficial to depleted shelf species, will have a significant impact on the key index of abundance (CPUE) for these species and make it difficult to evaluate the effectiveness of these (and other) conservation measures contained in the relevant rebuilding strategies.

SERAG (Nov 2023) recommended maintaining the incidental bycatch TAC of 50 t for Jackass Morwong during the 2024–25 season on the basis that there is no new information to suggest a need to deviate from this amount.

RBC (t)	0 t	The RBC is set at zero for all depleted species.
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 = 7.9 West = 0.3	Four-year (2019–2022) weighted average state catch - mostly NSW from. 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 2024 are estimated to be 2.4 t under an incidental bycatch TAC of 50 t (total mortality of 52.5 t), and 5.1 t under 100 t (total mortality of 105.1 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.
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		50 t – incidental bycatch TAC

AFMA Advice

AFMA Management recommends an annual incidental bycatch TAC of 50 t for Jackass Morwong for the 2024–25 season with no overcatch or undercatch provisions and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

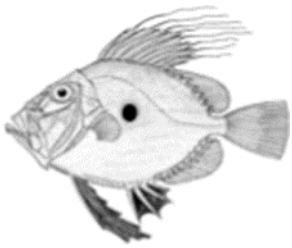
Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

John Dory

Zeus faber



Species Summary

Stock Assessment	Last assessed as a Tier 4 by SERAG in 2021.				
Stock Structure	For management purposes, a single stock is assumed for the SESSF.				
Stock status against reference points (C_{Lim}/C_{Targ})	**Tier**	**Assessment Year**	**$CPUE_{Recent}$**	**$CPUE_{Target}$**	**$CPUE_{Limit}$**
	4	2021	0.4695	1.464	0.7320
	-	2020	N/A – Weight of evidence		
	3	2017	F_{CUR} = 0.036	F_{MSY} = 0.126	F_{LIM} = 0.198
Stock trend and other indicators	Catches and catch rates have declined since the early part of the time series – 1970. The status of the stock during the default reference period is uncertain for the purpose of estimating a current depletion level, however standardised catch rates show a continued long-term decline. The CPUE fluctuated around the limit reference point between 2002 and 2009 and has been below the limit since 2010. Zone 10-20 – Standardised CPUE has been below the long-term average since 1997. Also, there has been a gradually declining trend since at least 1996, with a small increase in CPUE in the last three years relative to 2019, but with a marked increase in the 2022 CPUE. The total catch in 2022 was the lowest in the series (Sporcic, 2023).				
Species Category Depleted	**TAC setting approach**				
	Subject to an annual incidental bycatch TAC. Rebuilding strategy to be developed.				
Catch and TAC (t)	**SESSF Fishing Year**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**	
	2023-24	60	60	-	
	2022-23	60	60	43	
	2021-22	60	104	50	
Economics (Secondary) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**	
	2021-22	0.23	80.00	0.29	
	2020-21	0.58	64.00	0.91	
	2019-20	0.49	51.34	0.95	
ABARES Status (2023 report)	**Fishing mortality: Uncertain**		**Biomass: Overfished**		

Climate Sensitivity **Medium**	Preliminary projections indicate (with low-medium confidence) a 40% decline in abundance through to 2040.
Assessment summary	
Key Model technical assumptions/parameters	The Tier 4 assessment assumes there is a linear relationship between standardised 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. The assessment assumes the biomass was around the target reference point proxy of 48%B during the reference period 1986-1995. The average of discard rate estimates from 1998-2006 have been used to backfill discard proportion estimates pre-1998. This is consistent with estimates that NSW DPI have on record. Forward fill missing discards in the time series repeating 2019 discard data in 2020. The catch time series used was derived in Sporcic and Day (2021), which incorporated the July 2021 revised NSW estimates and was endorsed by SERAG (28-29 September 2021) (Sporcic, 2021d).
Significant Changes to data inputs	This is the first Tier 4 completed for this species.
Assessment results and RAG comments	Based on the results of the 2020 catch-MSY and SPM assessment for 1970 – 2019, and assuming that productivity has remained unchanged over the history of the fishery, the John dory stock is estimated to have been at a 40%B0 target in about 1985 (catch-MSY) or 1990 (SPM). This would indicate that the conventional reference period for SESSF Tier 4 assessments of 1986-1992 could be appropriate, assuming that productivity has not changed (Penney, 2020). SERAG (Oct 2021) considered a Tier 4 assessment (Sporcic, 2021d) for the purpose or providing RBC advice for the 2022-23 fishing year and noted the following: • The recent CPUE (0.4695) is below the CPUE limit (0.732) and has been since 2010 on the basis of the Tier 4 assessment. • There was insufficient catch in zone 30 to inform a revised CPUE series to account for the suspected southerly shift in catch. • John dory discards were estimated to be 8 t in 2020. • The dynamics of the fishery have changed over time and John dory are not a targeted component of the fishery. SERAG considered the 'alternative' CPUE series (requested by SESSFRAG) which excluded catch and effort from boats that are no longer a major part of the fishery – this made very little difference to the CPUE series. SERAG noted that the application of the default reference period and assumed stock status (48%B0 during the period 1986-92) assumes there has been no change in productivity. There is the potential for a change in productivity, in which case the CPUE series would be compromised, however there is little current evidence to support this and the RBC advice should be based on the outputs of the Tier 4 assessment.

	On the basis of the outputs of the Tier 4 assessment, SERAG recommended an RBC of 0 t. SERAG noted it is unlikely that fishing is driving the decline in abundance, and as a non- targeted species, total mortality is unlikely to be constrained by TACs. SERAG (Nov 2021) considered a companion species analysis which investigated the link between target species catch and the associated level of unavoidable bycatch of recovering species. The analysis incorporated a range of factors such as area, depth fished and gear type – also known as métiers. Using logbook data from 2019 and 2020, and expected 2022-23 TACs for the main companion species (trawl caught flathead) the estimated unavoidable bycatch of John dory for 2022 is 61.3 t, with a range between 56.5 and 66.4 t. This is close to the 60 t MSY value from the 2020 Surplus Production model. SERAG (Nov 2022) noted the absence of a métier analyses to inform bycatch TACs due to the impending significant structural changes and did not recommend any changes to the bycatch TAC.

RAG Recommendations

SERAG (Nov 2023) noted that additional trawl closures, the buyback of trawl boat SFRs, and changes to Danish seine gear in 2023, while beneficial to depleted shelf species, will have a significant impact on the key index of abundance (CPUE) for these species and make it difficult to evaluate the effectiveness of these (and other) conservation measures contained in the relevant rebuilding strategies.

SERAG (Nov 2023) recommended maintaining the incidental bycatch TAC of 60 t for John Dory for the 2024–25 season on the basis that there is no new information to suggest a need to deviate from this amount.

RBC (t)	0 t	The RBC is set at zero for all depleted species.
Discount Factor (t)	N/A	A discount factor is not applied to the bycatch TAC.
State catch (t)	3.7	Four-year weighted average – mostly NSW catch. State catches are not deducted from a bycatch TAC but should be considered as a source of mortality.
Discards (t)	5.4	Four-year weighted average. Discards are not deducted from a bycatch TAC but should be considered as a source of mortality.
Recreational Catch (t)	N/A	There are no estimates of recreational catch.
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		60 t – incidental bycatch TAC

AFMA Advice

AFMA Management recommends an annual incidental bycatch TAC of 60 t for John Dory during the 2024–25 season with no undercatch or overcatch provisions and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Mirror Dory

Zenopsis nebulosus

Species Summary

Stock Assessment	Tier 4 Species – last assessed by SERAG in 2023.
Stock Structure	An eastern and western stock is currently assumed for assessment purposes. However, mirror dory is managed under a global TAC.

East
Stock status against reference points (C_{Lim}/C_{Targ})

Tier	Assessment Year	$CPUE_{Recent}$	$CPUE_{Target}$	$CPUE_{Limit}$
4	2023	0.8759	1.1686	0.4869
4	2022	0.7170	1.1842	0.493
4	2021	0.6543	1.178	0.4908

West
Stock status against reference points (C_{Lim}/C_{Targ})

Tier	Assessment Year	$CPUE_{Recent}$	$CPUE_{Target}$	$CPUE_{Limit}$
4	2023	0.733	1.0219	0.4258
4	2022	0.6374	1.0244	0.4268
4	2021	0.6655	1.018	0.4242

Stock trend and other indicators

Zones 10 - 30 exhibits large scale, apparently cyclical changes in CPUE. It appears that as catches decline so does CPUE, and as catches increase so does the CPUE. This is unexpected as the intensity of fishing is usually expected to be negatively correlated with CPUE. It may be the case that catches and CPUE change relative to availability of the stock rather than the influence of the fishery on the stock. Better evidence is needed to make such an assertion with confidence. Over the period when CPUE was lower than average (about 1995 - 2004) there was an increase in small shots of < 30 kg, which is suggestive of low availability or high levels of small fish. Standardised CPUE has declined on average from 2009 to 2016. It differs from unstandardised CPUE early in the fishery (1986 - 1990), in the second half of the fishery (2000 - 2007), over the 2014 - 2017 period and over the last four years. The most recent changes appear strongly correlated with changes in the average depth of fishing with a shift to more relatively shallow water fishing, compared to the second half of the fishery. Standardised CPUE increased in 2022 relative to the previous year and has been below the long-term average and relatively stable for the past five years (Sporcic, 2023).

Zones 40-50 – Mirror Dory catches in the west appear to be episodic with peaks in 1997, 2001 - 2003, and 2010 and 2011, which roughly coincides with minor peaks in CPUE in a manner similar to that observed in the east, although with a more rapid cycle and less extreme variation. There has been an increase of reported catches in waters of 200 m, relative to the start of the series, which is unusual for Mirror Dory in the west. The statistical model fit is very good with the deviations at the extremes in the qqplot being made up of far less than 5% of records at each end. The amount of catch remains minor until about 1995 after which the amount of

<table>
<tr><td></td><td>catch and the number of records remains at levels that permit usable analyses, with relatively tight precision levels around the mean estimates to be made. From 1990 the CPUE trend for Mirror Dory in the west appears to be relatively periodic and noisy around the long-term average with periods above and below (Sporcic, 2023).</td></tr>
<tr><td rowspan="2">Species Category
MYTAC species</td><td>TAC setting approach</td></tr>
<tr><td>Mirror Dory is currently managed through a single year TAC.
The next assessment is scheduled for 2024, with a two-year MYTAC to be applied from the 2025–26 season onward.</td></tr>
<tr><td>Catch and TAC (t)</td><td colspan="4"><table>
<tr><th>SESSF Fishing Year</th><th>Agreed TAC</th><th>TAC after unders/overs</th><th>Commonwealth Retained Catch</th></tr>
<tr><td>2023-24</td><td>121</td><td>130</td><td>-</td></tr>
<tr><td>2022-23</td><td>129</td><td>140</td><td>94</td></tr>
<tr><td>2021-22</td><td>144</td><td>154</td><td>107</td></tr>
</table></td></tr>
<tr><td>Economics (Secondary) Commonwealth Trawl and Scalefish Hook</td><td colspan="4"><table>
<tr><th>Financial Year</th><th>Species GVP ($m)</th><th>Fishery GVP ($m)</th><th>% Fishery GVP</th></tr>
<tr><td>2021-22</td><td>0.13</td><td>80.00</td><td>0.16</td></tr>
<tr><td>2020-21</td><td>0.50</td><td>64.00</td><td>0.78</td></tr>
<tr><td>2018-19</td><td>0.37</td><td>49.47</td><td>0.75</td></tr>
</table></td></tr>
<tr><td>ABARES Status (2023 report)</td><td colspan="2">Fishing mortality: Not subject to overfishing</td><td colspan="2">Biomass: Not overfished</td></tr>
<tr><td>Climate Sensitivity
Medium</td><td colspan="4">Preliminary projections indicate (with medium confidence) a 15% decline in abundance through to 2040.</td></tr>
<tr><td colspan="5">Assessment summary</td></tr>
<tr><td>Key Model technical assumptions/parameters</td><td colspan="4">The Tier 4 assessment assumes there is a linear relationship between catch rates and exploitable biomass, and that the character of the estimated catch rates has not changed significantly since the reference period to the end of the most recent year.</td></tr>
<tr><td>Significant Changes to data inputs</td><td colspan="4">N/A</td></tr>
<tr><td>Assessment results and RAG comments</td><td colspan="4">East
The increase in RBC of approximately 132 t can be mostly attributed to an increase in the most recent CPUE (including discards) and hence the mean of the most recent four-year average. Also, the CPUE in 2022 is above the CPUE limit based on the Tier 4 Harvest Control Rule (0.49) and above the CPUE target, the first time since 2011 (Sporcic, 2023).
SERAG (Sep 2023) flagged concern of high discard weights for Mirror Dory East, reviewed the ISMP report and accepted the number.
West</td></tr>
</table>

	The 2023 estimated RBC was 76.32 t, an increase of 27.6 t compared to the 2022 estimated RBC (48.72 t; Sporcic 2022). The increase in RBC of approximately 27.6 t can be attributed to an increase in the mean of the most recent four-year average CPUE. The 2023 RBC is greater than the reported catch of approximately 41 t in 2022 for this stock (Sporcic, 2023).

RAG Recommendations

SERAG (Sep 2023) recommended the RBC derived from the Tier 4 assessments of both Mirror Dory East (269.89 t) and Mirror Dory West (76.32 t). The discount factor would be applied.

	Year	RBC (t)		Is a MYTAC Recommended?
RBC (t)	2024	East: 269.89 West: 76.32	Total: 346.21	No; a single year TAC will be applied for the 2024–25 season. A two-year MYTAC will apply after the 2024 assessment.
Discount Factor (t)	52	The default Tier 4 discount factor of 15 per cent is applied.		
State catches (t)	East: N/A West: N/A	There are no estimates of State catches for mirror dory (east or west).		
Discards (t)	East: 54.4 West: N/A	Discards are considered low for the west and are not included in the Tier 4 assessment. Estimated discard rates in the east increased to 58.6% (equating to 66.4 t) in 2022 compared to 42.6% (and 57.5 t) in 2021, resulting in an increase to the 4-year weighted average discard estimate.		
Recreational Catch (t)	N/A	Recreational catches are not considered in assessment and are assumed to be low.		
RCA(t)	N/A	There has been no specific research catch allocated.		
Provisional TAC under the Harvest Strategy		240 t		

AFMA Advice

AFMA management recommends a single-year TAC of 240 t for Mirror Dory during the 2024–25 season, with overcatch and undercatch provisions set at 10 per cent, and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC				
2023-24 agreed TAC (t)	**2024-25 recommended TAC (t)**	**Overcatch and undercatch (%)**	**Determined amount (t)**	**Change in TAC (t)**

Ocean Perch (basket)

Offshore ocean perch *(Helicolenus barathri)*

Inshore ocean perch *(Helicolenus percoides)*

Species Summary

Stock Assessment	Tier 4 Species – Offshore last assessed by SERAG in 2020. Inshore last assessed by SERAG in 2017.				
Stock Structure	The ocean perch basket is made up of two species: offshore ocean perch (*Helicolenus barathri*) and inshore ocean perch (*Helicolenus percoides*). A single basket TAC is set based on the Tier 4 assessment for offshore ocean perch.				
Inshore Stock status against reference points (C_{Lim}/C_{Targ})	**Tier**	**Assessment Year**	**$CPUE_{Recent}$**	**$CPUE_{Target}$**	**$CPUE_{Limit}$**
	4	2017	0.9669	0.3255	0.1628
	4	2013	1.769	1.0553	0.5065
	4	2012	0.8538	1.3056	0.5222
Offshore Stock status against reference points (C_{Lim}/C_{Targ})	**Tier**	**Assessment Year**	**$CPUE_{Recent}$**	**$CPUE_{Target}$**	**$CPUE_{Limit}$**
	4	2020	1.0765	0.9273	0.4637
	4	2017	0.9668	0.9283	0.4642
	4	2013	0.9381	1.1456	0.4582
Stock trend and other indicators	Offshore Zone 20-30 – Annual standardised CPUE has been below average and relatively flat between 1995 and 2006. The trend from 2007 to 2010 has also been relatively flat and on average, below average and flat between 2011 to 2016 and increasing to either on or above average since 2017, based on 95% confidence intervals. Also, standardised CPUE has increased since 2015 and the 2022 estimate was the highest in the series (Sporcic, 2023). Zone 10-50 – Annual standardised CPUE has been below average and relatively flat between 1995 and 2006. The trend from 2007 to 2010 has also been relatively flat and on average, below average and flat between 2011 to 2016 and consistently increasing to either on average or above average since 2017, based on 95% confidence intervals. Also, CPUE has increased since 2015 and the 2022 estimate was the highest in the series (Sporcic, 2023). Inshore Zone 10-20 – Annual standardised CPUE has been relatively flat in six of the last seven years with the 2022 estimate above average, based on the 95% confidence intervals (Sporcic, 2023).				

Species category Trigger	**TAC setting approach**			
	A review of available data and assessment options is scheduled for 2026, in accordance with the 6-year threshold, or if 236 t (i.e., 75% of the TAC) is landed whichever occurs first.			
Catch and TAC (t)	**SESSF Fishing Year**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**
	2023-24	318	341	-
	2022-23	305	330	163
	2021-22	304	323	178
Economics (Secondary) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**
	2021-22	0.48	80.00	0.60
	2020-21	0.44	64.00	0.68
	2019-20	0.65	51.34	1.27
ABARES Status (2023 report)	**Fishing mortality: Not subject to overfishing**		**Biomass: Not overfished**	
Climate Sensitivity **Low**	An information poor assessment based on life history characteristics indicated a low sensitivity to climate change.			

Assessment summary

Key Model technical assumptions/ parameters	The Tier 4 assessment assumes there is a linear relationship between catch rates and exploitable biomass, and that the character of the estimated catch rates has not changed significantly since the reference period to the end of the most recent year.
Significant Changes to data inputs	The average discard proportion for years after 1998 are used to 'backfill' the estimates pre-1998. Previously reported NSW annual catch was used for the period 1986-97 inclusive. However, revised NSW estimates were used for the period 1998-2019 inclusive (Sporcic, 2020a).
Assessment results and RAG comments	The assessment uses catch rates from Zones 10 and 20 – most catch comes from Zone 10. The average CPUE has increased since the last assessment, resulting in an increased RBC of 421.2 t from the 2020 assessment compared to 344.7 t from the 2017 assessment. This was also driven by an increase in C_{Targ} because of the addition of historical discard estimates (Sporcic, 2020a).

RAG Recommendations

SESSFRAG (Aug 2023) adopted the use of a Trigger Species category. Species in this category must satisfy a number of criteria and catch will be monitored annually. The TAC is rolled over until a specified trigger is breached, or six years elapse from the last assessment (whichever occurs first), at which point a new assessment is considered.

The recommended long-term TAC for Ocean perch (basket) is 318 t, with TAC review triggers of 236 t or 6 years elapsed since the last assessment (i.e. 2020 + 6 = 2026).

RBC (t)	421.2	Long-term RBC to be used until next assessment.
Discount Factor (t)	63.2	Applying the default Tier 4 discount factor of 15 per cent.
State catches (t)	7.8	Offshore ocean perch only – mostly NSW catches.
Discards (t)	39.9	Estimates of discards have been variable and ranged between 21 t in 2021 and 75 t in 2013. Only offshore ocean perch discards.
Recreational Catch (t)	N/A	Estimates of recreational catch available for Tasmania in 2013, 1.1 t. Recreational catches are not included in the assessment and are not deducted from the TAC.
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		Maintain TAC of 318 t in accordance with trigger species arrangements.

AFMA Advice

AFMA management recommends a TAC of 318 t for Ocean perch (Basket) for the 2024–25 season, with overcatch and undercatch provisions set at 10 per cent, and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Redfish

Centroberyx affinis


ABARES (2012)

Species Summary

Stock Assessment	Tier 1 Species - last assessed by SERAG in 2020
Stock Structure	No formal stock discrimination studies have been conducted in Australia. Tagging studies suggested a single unit stock of redfish off NSW. Previous studies of mean length at age suggest differences in growth rates between the 'northern' and 'southern' sectors of the fishery off eastern Australia. The boundary being Latitude 36°S (just north of Montague Island).

Stock status against reference points $\%B_0$ in year +1)

Tier	Assessment Year	Biomass (from assessment year)	Biomass (revised in most recent assessment)	Target	Limit
1	2020	4	4	48	20
1	2017	8	3		
1	2014	12	2		

Stock trend and other indicators	The 2020 Tier 1 assessment estimates a slightly larger absolute spawning biomass compared to the 2017 assessment; however the relative spawning biomass has decreased from 7.8%B0 to 3.8%B0. Zones 10-20 – Annual standardised CPUE has declined between 1994-96 (relative to 2993) and has been below average since 2000, based on 95% confidence intervals (Sporcic, 2023).

Species Category
Depleted

TAC setting approach

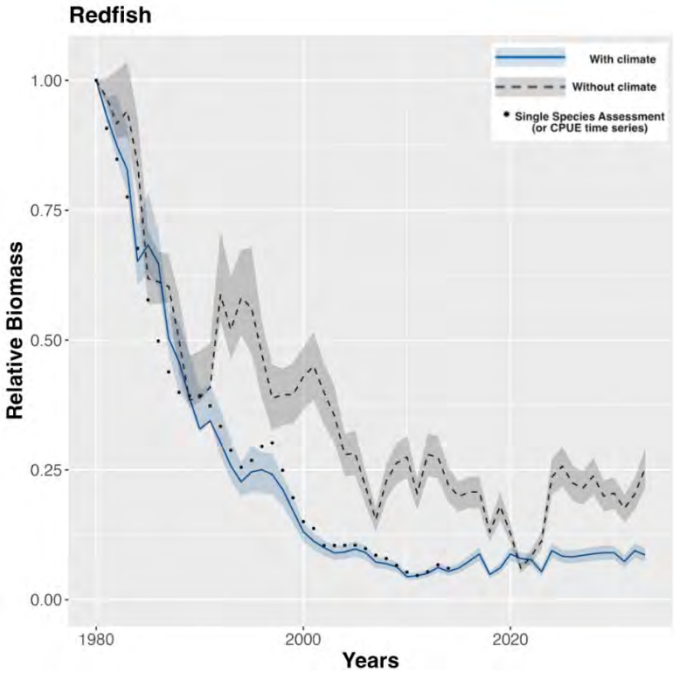
Annual bycatch TAC set in accordance with the Redfish Stock Rebuilding Strategy.

Catch and TAC (t)

SESSF Fishing Year	Agreed TAC	TAC after unders/overs	Commonwealth Retained Catch
2023-24	30	30	-
2022-23	30	30	17
2021-22	50	50	22

Economics (Secondary) Commonwealth Trawl and Scalefish Hook

Financial Year	Species GVP ($m)	Fishery GVP ($m)	% Fishery GVP
2021-22	0.22	80.00	0.28

	2020-21	0.16	64.00	0.25
	2019-20	0.13	51.34	0.25
ABARES Status (2023 report)	**Fishing mortality: Not subject to overfishing**		**Biomass: Overfished**	
Climate Sensitivity **Medium**	 Atlantis modelling suggests that climate change has a moderate influence on the biomass of Redfish and is contributing to a lower biomass than would have occurred otherwise.			

Assessment summary

Key Model technical assumptions/parameters	Two sex, single stock in two regions; NSW and East Bass Strait. Steepness is fixed at 0.75. Natural mortality (M) estimated at 0.075 (range 0.066 - 0.083) Recruitment deviations are estimated to 2015. The previous assessment (2017) estimated two selectivity patterns, one for onboard data and another for port, with one retention function. The current assessment structure only estimates one selectivity pattern for both NSW and eastern Bass Strait. The current assessment estimates two retention functions, one for each region to allow for differences in discard practices between each region.
Significant Changes to data inputs	There were no significant changes to data inputs other than the standard inclusion of revised catch, CPUE, discards and biologicals.
Assessment results and RAG comments	Length composition data is missing for the period 1993 - 1998 which has been filtered out in the data processing due to missing length type and location information Fits to CPUE

	Fitting to two separate catch rate indices results in similar fits to NSW catch rates as in the 2017 assessment, while also fitting to the eastern Bass Strait index. Recruitment The model estimates above average recruitment in 2013, returning to below average recruitment in 2014 and 2015 and addresses the retrospective pattern revising recruitment deviations down with the inclusion of additional years of data. Biomass Estimate The new model structure reduces uncertainty in the biomass estimate in the early part of the time series, and results in a lower estimate of absolute and relative biomass. Likelihood profiles Natural Mortality (*M*) – the likelihood profile suggests a range of values from 0.066 - 0.083, with the most likely value 0.075. Steepness (*h*) – there is little information in the model that can inform estimation of h and it is fixed at 0.75 in the model. SS_{B2019} - the likelihood profile suggests that the model estimates depletion in 2019 with high certainty, between 2% and 4.75% of unfished levels. Fixed catch projections from the 2020 Tier 1 assessment suggested there is three years difference in expected rebuilding timeframes for catches of 0 t, 50 t or 100 t under average recruitment, and five years between catch scenarios under a low recruitment scenarios (see Projected Biomass, Fig 18). However, catch projections should be treated with caution given the limited recovery of this species observed to date (Figure 16). SERAG (Nov 2020) considered a companion species analysis which investigated the link between target species catch and the associated level of unavoidable bycatch of recovering species. The analysis incorporated a range of factors such as area, depth fished and gear type – also known as metiers. Using logbook data from 2018 and 2019, and expected 2021-22 TACs for the main companion species, the estimated unavoidable bycatch of Redfish for 2021 is 32.2 t, with a range between 26.7 and 38.7 t. SERAG (November 2021) reviewed the catch and effort information in 2021. The majority of catch continues to be taken off the east coast of NSW, and there has been no apparent shift distribution. There are two boats which have consistently caught redfish in high amounts, relative to other boats in the fleet, and a third boat has appeared in 2020 and has caught more than any other boat in recent years – this may be evidence of targeting. Catches have increased in 2020 and are close to the estimated level of fishing that would constitute overfishing estimated in the 2020 stock assessment. SERAG could not resolve the estimates of discards, and could not provide advice on whether total mortality is sufficiently low to allow rebuilding. Observed estimates of discards over time have been higher than those modelled. SERAG (Nov 2022) noted there was no metier analyses being presented at this meeting as they rely on fishing activity as a predictor of catches for next year.

RAG Recommendations

SERAG (Nov 2023) noted that additional trawl closures, the buyback of trawl boat SFRs, and changes to Danish seine gear in 2023, while beneficial to depleted shelf species, will have a significant impact on the key index of abundance (CPUE) for these species and make it difficult to evaluate the effectiveness of these (and other) conservation measures contained in the relevant rebuilding strategies. The RAG also noted that AFMA has begun to collect tissue samples from Redfish for CKMR analysis (to estimate population size).

SERAG (Nov 2023) recommended maintaining the incidental bycatch TAC of 30 t for Redfish during the 2024–25 season on the basis that there is no new information to suggest a need to deviate from this amount.

RBC (t)	0	The RBC is set at zero for all depleted species.
Discount Factor (t)	N/A	Discount factors are not applied to Tier 1 assessments.
State catch (t)	5.3	State catches are not deducted from the bycatch TAC but are considered as part of the annual review of the rebuilding strategy each year. The four-year (2019–2022) weighted average catch for the states is 5.3 t.
Discards (t)	N/A	Discards are modelled in the Tier 1 assessment but are not deducted from the bycatch TAC. The estimate for 2024 is 17.4 t.
Recreational Catch (t)	N/A	There are no estimates of recreational catch.
RCA(t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		30 t – incidental bycatch TAC

AFMA Advice

AFMA Management recommends an incidental bycatch TAC of 30 t for Redfish during the 2024–25 season with no undercatch or overcatch provisions and a determined amount of 2 t.

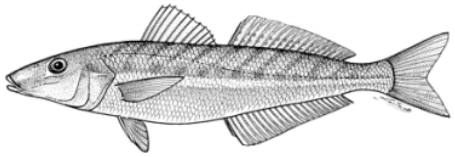
MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC				
2023-24 agreed TAC (t)	**2024-25 recommended TAC (t)**	**Overcatch and undercatch (%)**	**Determined amount (t)**	**Change in TAC (t)**

School Whiting



Sillago flindersi

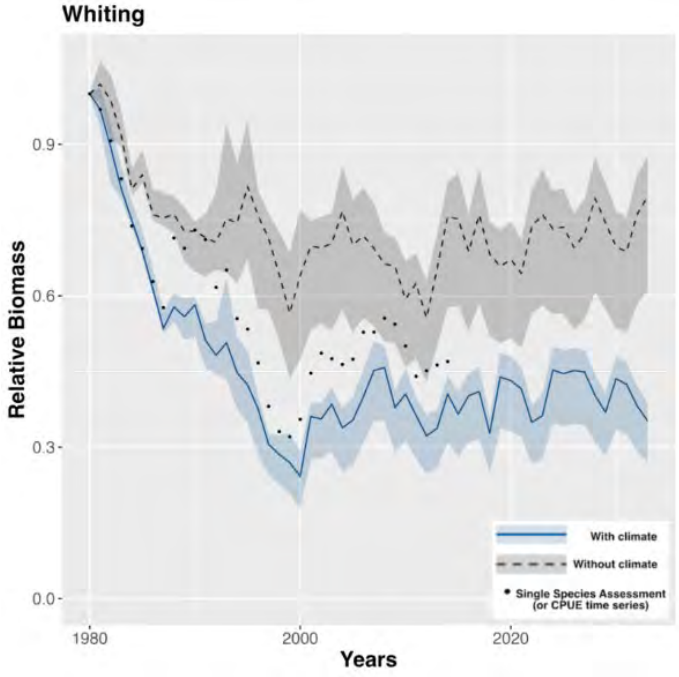
Species Summary

Stock Assessment	Tier 1 Species - Last assessed by SERAG in 2020
Stock Structure	Eastern school whiting is currently managed as a single stock from western Victoria, around Tasmania and along the east coast of Australia to southern Queensland. Dixon et al. (1986, 1987) report a discontinuity in the relatedness between samples observed between Forster and Coffs Harbour, which may indicate some degree of separation between the fish from northern and southern NSW. A FRDC project is currently underway to improve our understanding of stock structure using improved genetic techniques. The results of this project were not available for the 2020 assessment.

Stock status against reference points (%B_0 in year +1)

Tier	Assessment Year	Biomass (from assessment year)	Biomass (revised in most recent assessment)	Target	Limit
1	2020	41	41	48	20
1	2017	47	36		
1	2009	50	39		

Stock trend and other indicators	The stock declines slowly from the beginning of the fishery in 1942, before a sharp decline in the 1980s corresponding to an increase in catch. The stock status then varied between around 30% SSB0 to 50%B0 from 1992. In 1999 the stock declines to a low of 28% SSB0, then increases to over 40% SSB0 between 2006 and 2009, followed by another decline to 29% SSB0 in 2014, and then varying between around 30% and 40% SSB0 since then. The increase in stock status from 1999 to 2007 occurred during a period of general decline in total catches starting in the mid-1990s and lasting around 25 years. This rebound in spawning stock biomass from 1999 to 2008 also appears to have been boosted by good recruitment in 1999, 2003 and 2005 (Day et al., 2020). Commonwealth catch is mostly by Danish seine. The Danish seine (Zone 60) (excluding seismic survey records) standardised CPUE exhibits a flat trend over 2012-17 and has declined and dropped below the long-term average over the 2017-20 period, based on 95% confidence intervals. Also, there has been an increase in standardised CPUE in 2021 relative to the previous year, followed by a decrease in 2022 relative to 2021. The recorded catch of 297 t in 2022 was the lowest since 2011 (Sporcic, 2023).
Species Category MYTAC species	**TAC setting approach** The current season (2023–24) is the 3rd year of a 3-year MYTAC The next assessment is scheduled for 2024.

<table>
<tr><td rowspan="4">Catch and TAC (t)</td><td>SESSF Fishing Year</td><td>Agreed TAC</td><td>TAC after unders/overs</td><td>Commonwealth Retained Catch</td></tr>
<tr><td>2023-24</td><td>914</td><td>998</td><td>-</td></tr>
<tr><td>2022-23</td><td>917</td><td>1,004</td><td>399</td></tr>
<tr><td>2021-22</td><td>917</td><td>986</td><td>502</td></tr>
<tr><td rowspan="4">Economics (Primary) Commonwealth Trawl and Scalefish Hook</td><td>Financial Year</td><td>Species GVP ($m)</td><td>Fishery GVP ($m)</td><td>% Fishery GVP</td></tr>
<tr><td>2021-22</td><td>7.48</td><td>80.00</td><td>9.35</td></tr>
<tr><td>2020-21</td><td>2.22</td><td>64.00</td><td>3.47</td></tr>
<tr><td>2019-20</td><td>1.18</td><td>51.34</td><td>2.30</td></tr>
<tr><td>ABARES Status (2023 report)</td><td colspan="2">Fishing mortality: Not subject to overfishing</td><td colspan="2">Biomass: Not overfished</td></tr>
<tr><td>Climate Sensitivity
Medium</td><td colspan="4"> 

Atlantis modelling suggests that climate change has a moderate influence on the biomass of Whiting and is contributing to a lower biomass than would have occurred otherwise.</td></tr>
<tr><td colspan="5">Assessment summary</td></tr>
<tr><td>Key Model technical assumptions/parameters</td><td colspan="4">Natural mortality (M) – fixed at 0.6
Steepness (h) – fixed at 0.75
Recruitment deviations – estimated from 1981-2016
CV growth – estimated at 0.0937
Growth (K) – estimated at 0.329
Growth l_{Min} – estimated at 7.26</td></tr>
</table>

	Growth l_{Max} – estimated at 23.1
Significant Changes to data inputs	<u>Additional Data</u> Catch adjusted with revision to 1942-2016 catch history – replace estimated 2017 catch with actual catch. Added three years of Commonwealth data – catch, CPUE, discards, length composition and conditional age-at-length data to 2019 (include revisions to NSW historical catch data, see below) Revised five-fleet model (Danish seine, trawl, NSW Danish seine, NSW trawl and NSW prawn trawl) <u>NSW Data</u> New NSW Danish seine, NSW trawl and prawn trawl catch, CPUE, discard, length and age data included in the assessment. Monthly CPUE (NSW trawl and prawn trawl) available from 1998-2008 and daily CPUE for 2010-2019. This data is collected at a much coarser spatial and temporal resolution compared to Commonwealth CPUE. Discard rates are available for NSW trawl (1993-95 and 2014-16) and NSW prawn trawl (1990-92 and 2017-19).
Assessment results and RAG comments	<u>Biologicals</u> Commonwealth length frequency data is showing larger fish are being recorded on board compared to port based sampling since 2015. It is not clear why this is occurring – AFMA are investigating. <u>Recruitment</u> Of the last ten years of recruitment estimated: • two years are good: 2014, 2015 • five years are poor: 2007, 2009, 2011, 2012, 2016 • three years is average: 2008, 2010, 2013 • ten year average recruitment deviation: -0.142 • five year average recruitment deviation: -0.017 The average recruitment deviation over the last ten years is lower than the average deviation over the previous ten years; however SERAG did not consider this compelling enough to consider a low recruitment scenario when recommending an RBC. The average recruitment deviation over the last five years has been close to zero, reflecting recruitment that can be considered close to. <u>Discards</u> There is a paucity of reliable discard estimates from Commonwealth Danish seine boats from about 2000 to 2010. The length and age sampling achieved over the same period suggests there was representative coverage. Resolving this would require further investigation of data collected by observers, which was not undertaken as part of this assessment. Both the observed and estimated NSW trawl and prawn trawl discard proportions are considerably larger than Commonwealth discards.

	New base case (adding NSW age, length and CPUE data – recommended as new base case) M and h are fixed (M fixed at 0.6 and h fixed at 0.75) Five different selectivity curves (five-fleet model) Model fits to CPUE. Fits to Commonwealth Danish seine and NSW trawl CPUE are reasonable; less so for NSW prawn trawl CPUE. Likelihood profiles Natural Mortality (M) - broad range of values from 0.64 - >1.0, with the optimal value at 0.9 which seems biologically implausible. Agreed to fix M at 0.6. 2019 biomass estimate (SSB2019) – broad range of plausible values from 27%B_0 to 39%B_0, with the optimal value at 33%B_0. Likelihood profiles cannot be constructed for 2021 stock status for technical reasons. Recruitment The most recent estimate of recruitment (2016) is still below the long-term average (see summary above). 2021 Spawning stock biomass estimate There is much less uncertainty in the estimate of historical and current biomass compared to the 2017 assessment, due in part to fixing the value of M. The estimate of spawning stock biomass for 2021 is 41% SSB0. SERAG (December 2020) considered options for future work: • Explore stock structure (this is being progressed as part of the FRDC project led by Dr Karina Hall) • Spike of large fish in the 2018 trawl on board length data should be investigated. (Actioned) • Automatic processing of NSW length and age data (may need additional resourcing). • Encourage ongoing collection and provision of NSW data (supported). • Retrospective analysis on final base case, rather than initial base case (supported on case-by-case basis). • Consider seismic effects on catches and catch rates in Bass Strait (considered a priority and will be considered at 2021-2023 data meetings - must be considered in next assessment). • Consider the need for time-blocking selectivity and retention functions for NSW fleets to account for changes in gear and management regimes over time (supported). SERAG (Dec 2020) recommended a 3-year RBC of 2,237 t, based on the 3-year average, minus the 3-year average of discards (378 t) for the SESSF. Fishery indicators will be monitored annually for any significant changes in fishery/stock trends.

RAG Recommendations

SESSFRAG (Aug 2023) recommended that the 3-year average RBC (of 2,237 t) minus the 3-year average of discards (378 t) be used in 2024-25 as the third year of a three-year MYTAC for School Whiting.

<table>
<tr><th rowspan="5">RBC (t)</th><th>Year</th><th>RBC (t)</th><th>Is a MYTAC Recommended?</th></tr>
<tr><td>2023</td><td>2,321</td><td rowspan="4">Yes
3-Year MYTAC using average RBC of 2,237 t.
SERAG recommended reviewing the fishery indicator data each year as part of the annual MYTAC analysis.</td></tr>
<tr><td>2022</td><td>2,250</td></tr>
<tr><td>2021</td><td>2,140</td></tr>
<tr><td>Long-term</td><td>2,448</td></tr>
<tr><td>Discount Factor (t)</td><td>N/A</td><td colspan="2">Discount factors are not applied to Tier 1 assessments</td></tr>
<tr><td>State catch (t)</td><td>673 (including 36 t of non-NSW catch)</td><td colspan="2">Primarily NSW catches, which have declined substantially from 1230 t in 2019 to 582 t in 2022.</td></tr>
<tr><td>Discards (t)</td><td>3-year average: 378</td><td colspan="2">Model estimated discards from the most recent Tier 1 assessment are deducted from the TAC.</td></tr>
<tr><td>Recreational Catch (t)</td><td>N/A</td><td colspan="2">Recreational catch estimates are uncertain, and species (including King George whiting) are not clearly delineated.
Recreational catch is not included in the assessment.</td></tr>
<tr><td>RCA (t)</td><td>N/A</td><td colspan="2">There has been no specific research catch allocated</td></tr>
<tr><td colspan="2">Provisional TAC under the Harvest Strategy</td><td colspan="2">1,186 t (using 3-year averages)</td></tr>
</table>

AFMA Advice

AFMA Management recommends a TAC of 914 t for School Whiting during the 2024–25 season (unchanged from the current season), as the 4th year of a 3-year MYTAC, with undercatch and overcatch provisions set at 10 per cent and a determined amount of 2 t.

This advice is based on the minor (i.e. 2 t or <0.5 per cent) difference between the current TAC and the output of the calculations that account for the 50:50 catch split with NSW. That is the 3-year RBC (2,237 t) minus model estimated discards (378 t) minus non-NSW catches (36 t) multiplied by 0.5 (= 912 t).

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	

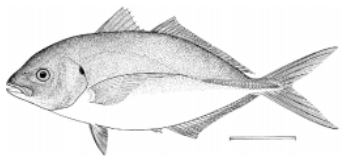
MAC advice and any dissenting views			
Undercatch (%)	**Overcatch (%)**	**Determined amount (t)**	**TAC (t)**

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Silver Trevally

Pseudocaranx georgianus



Species Summary

Stock Assessment	Tier 1 Species – Joint assessment (Commonwealth and NSW DPI) presented to SERAG in 2023
Stock Structure	Preliminary research suggests that the silver trevally off south-eastern Australia consist of a single stock.

Stock status against reference points (%B_0 in year +1)

Tier	Assessment Year	Biomass (from assessment year)	Target	Limit
1	2023	26.7	48	20

Tier	Assessment Year	$CPUE_{Recent}$	$CPUE_{Target}$	$CPUE_{Limit}$
4	2022	0.4787	0.9504	0.396
4	2021	0.5172	0.9418	0.3924

Stock trend and other indicators

Zones 10-20 including MPA- Annual standardised CPUE trend is noisy and relatively flat since about 1992 and has remained below average since 2012 despite the recent increases between 2020 and 2022 relative to 2019. A major change from the nominal geometric mean occurs from 2013 onwards and this is mainly due to changes in the vessels operating, the depths in which they fish, and the reduced amount of fish caught. The number of vessels actively contributing to this fishery has reduced to low numbers and this may also be related to the recent major deviation from the nominal CPUE. Seven vessels operated in 2019 contributing to a total of only 1.9 t, the lowest in the series. By contrast, annual catches have increased between 2020-2022 which corresponds to more vessels operating across these years. The 2020 catch (37.7 t) is comparable with the 2018 catch (30 t) (Sporcic, 2023).

Zones 10-20 excluding MPA- Annual standardised CPUE trend is noisy and relatively flat since about 2012 and mostly below average, despite recent increases towards average between 2020 and 2022 relative to 2019. A deviation similar to that in the 'include MPA' scenario is apparent where the standardised trend deviates markedly from the nominal geometric mean trend from 2013 - 2017 and for the same reasons of changes in vessels fishing, low numbers of significantly contributing vessels, changes in the depth distribution of fishing and lower catches and numbers of records (Sporcic, 2023).

Species Category
MYTAC

TAC setting approach

Silver Trevally is currently managed through a single-year TAC.

The timing of the next Silver Trevally assessment is subject to further consideration.

Catch and TAC (t)	**SESSF Fishing Year**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**
	2023-24	25	25	-
	2022-23	51	70	40
	2021-22	197	226	23
Economics (Secondary) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**
	2021-22	0.20	80.00	0.25
	2020-21	0.08	64.00	0.12
	2019-20	0.21	51.34	0.41
ABARES Status (2023 report)	**Fishing mortality: Uncertain**		**Biomass: Overfished**	
Climate Sensitivity **Medium**	These species were assessed to be moderately sensitive to climate change using an information poor assessment based on life history characteristics.			

Assessment summary

Key Model technical assumptions/parameters

The summary below was sourced from Burch *et al.* (2023).

Stock Structure and Data

The assessment assumes a single stock of Silver Trevally in NSW and Victorian state waters and in the adjacent Commonwealth waters (CTS zones 10, 20 and 60). This region provides more than 95% of the catches and all of the available biological data (lengths, ages, biological parameters).

Commercial and recreational landed catch estimates from NSW, Victoria and Commonwealth CTS zones 10, 20 and 60 (the areas off NSW and Victoria) from 1955–2022.

Seven catch fleets: NSW trawl, NSW trap, NSW line, NSW estuary, Commonwealth trawl, the NSW and Victorian recreational sector and Victorian commercial.

Estimated discards for the NSW trawl fleet after the introduction of the minimum legal length (MLL) in 2007. Other NSW fleets do not select fish below the MLL.

Length data for six of the catch fleets and the Kapala survey, with selectivity estimated for all fleets except NSW trawl (fixed at values estimated from an earlier model due to difficulties implementing the retention function) and Victorian commercial (mirrored to Commonwealth trawl).

Age-at-length data for 1998 from NSW trawl, NSW trap, NSW line and NSW estuary fisheries.

Standardised CPUE for the NSW trawl, NSW trap and Commonwealth trawl fisheries.

Low Recruitment

Several SESSF stocks have shown evidence of below average recruitment over the last two decades, including eastern Jackass Morwong, eastern

<table>
<tr><td></td><td>Redfish, eastern Gemfish, Blue Warehou and Silver Warehou. For Silver Trevally, the estimated recruitment deviations provide a reasonable level of evidence that this stock has experienced below average recruitment over much of the last 30 years. SERAG directed that the base case assessment be projected assuming future recruitment remains below the long-term average. Future recruitment was set to the average of the most recent 10 years of estimated recruitments (2010–2019).

<u>Natural Mortality</u>

Estimates of natural mortality for Silver Trevally from life history studies in south-eastern Australia are M=0.12–0.19 yr^{-1}, while the estimate from New Zealand is M=0.10 yr^{-1}. The New Zealand estimate is based on a maximum age of 45 years, which is almost double the maximum age of 25 years observed in Silver Trevally from south-eastern Australia. Additionally, New Zealand Silver Trevally also mature at 32–37cm, much larger than the 19–23cm for Silver Trevally in south-eastern Australia. Finally, the growth rates of Silver Trevally in south-eastern Australia and New Zealand are substantially different. Based on these differences, natural mortality for the 2023 base case Silver Trevally assessment was pre-specified at the estimate of M=0.18yr^{-1} derived from life history correlates in the most recent NSW assessment (Fowler et al. 2023).</td></tr>
<tr><td>Significant Changes to data inputs</td><td>N/A - this is the first Tier 1 assessment on Silver Trevally.</td></tr>
<tr><td>Assessment results and RAG comments</td><td>The base case assessment estimates unfished female spawning biomass (SSB_0) at 5,091t and current spawning biomass (SSB_{2024}) at 1,360t with current stock status (SSB_{2024}/SSB_0) estimated to be 26.7%. If average recruitment is assumed, then current stock status is estimated to be 32.8%. The assessment is very sensitive to the assumed value of natural mortality, with the base case assuming M=0.18yr-1. Current stock status estimates from models with plausible natural mortality values of M=0.11–0.18yr^{-1} are 12.8–26.7%. For catches of 50–150 t per annum, stock status in 2027 is estimated to increase to 30.3–32.9% for the base case and 22.3–24.5% for a low recruitment scenario with M=0.14yr^{-1} (Burch et al. 2023).

Table 1. Selected sensitivity scenarios to the 2023 base case Silver Trevally model. Estimates of current stock status and the difference between the current stock status from the base case and the sensitivity (Δ Stock Status). All models assume below average recruitment during the projection period (2020 onwards), with the exception of the 2023 base case with average recruitment. † Denotes models that have had their Francis weighting recalculated, while the other models retain the base case Francis weighting.

<table>
<tr><th>Sensitivity Scenario</th><th>Current Stock Status (%)</th><th>Δ Stock Status (%)</th></tr>
<tr><td>†2023 base case (M=0.18yr^{-1})</td><td>26.7</td><td>-</td></tr>
<tr><td>†2023 base case (M=0.18yr^{-1}) assuming average recruitment</td><td>32.8</td><td>6.1</td></tr>
<tr><td>†Low natural mortality (M=0.14yr^{-1})</td><td>18.6</td><td>-8.1</td></tr>
<tr><td>Very low natural mortality (M=0.11yr^{-1})</td><td>12.8</td><td>-13.9</td></tr>
<tr><td>Low steepness (h=0.6)</td><td>22.7</td><td>-4.0</td></tr>
<tr><td>High steepness (h=0.8)</td><td>30.3</td><td>3.6</td></tr>
<tr><td>†Remove NSW trap CPUE</td><td>23.8</td><td>-2.9</td></tr>
<tr><td>Commonwealth CPUE 1992–2022</td><td>23.3</td><td>-3.4</td></tr>
<tr><td>Halve the weighting on the CPUE data</td><td>24.4</td><td>-2.4</td></tr>
<tr><td>Double the weighting on the CPUE data</td><td>29.0</td><td>2.2</td></tr>
</table>

SERAG (Nov 2023) noted if models can estimate M this is often a preferred approach, however estimating natural mortality will not be possible for this year's assessment. CSIRO noted most assessments where an estimation</td></tr>
</table>

	of M is used there is a reasonable set of age data available, this assessment is only using the one year of age data. This highlights the need to collect Silver Trevally otoliths for ageing. SERAG (Nov 2023) was comfortable with accepting the base case (low productivity scenario) as it reflects the decisions agreed to by SERAG 1 (2023) and that of the Silver Trevally Working Group.

RAG Recommendations

SERAG (Nov 2023) noted the different rebuilding rates produced by the constant catch projections and that a range of catches allow for rebuilding to the target, albeit over different timeframes. SERAG noted recent catches (from all sources) have been around 100 t.

SERAG (Nov 2023) noted that under scenarios where M was reduced to 0.14 (with the low recruitment assumption) the rebuilding rates are similar to those presented in the base case in the medium to long term.

SERAG (Nov 2023) recommended that this year's advice should be integrated into a 3-year MYTAC which will allow time for ageing samples to be collected to inform the next assessment.

Table. Stock Status estimates for fixed catch projections of 50, 75, 100, 125 and 150 t using the base case (M=0.18yr^{-1})

Year	50 t yr^{-1}	75 t yr^{-1}	100 t yr^{-1}	125 t yr^{-1}	150 t yr^{-1}
2024	26.7	26.7	26.7	26.7	26.7
2027	32.9	32.3	31.6	31.0	30.3
2032	41.3	39.8	38.3	36.8	35.3
2042	51.0	48.7	46.3	43.9	41.5
2052	54.7	52.2	49.7	47.1	44.3

The implementation of the SESSF Tier 1 harvest control rule within Stock Synthesis does not work correctly for low recruitment projections, as it projects future catches assuming recruitment is at the long-term average. Given this base case uses a low recruitment scenario the table of constant catch projections was projected to inform catch and the associated risk levels. .

RBC (t)	N/A	See fixed catch projections below.
Discount Factor (t)	N/A	Discount factor no longer applied to this species due to the assessment method becoming a tier 1.
State catch (t)	44.2 in 2022 69.2 in 2021 61.0 in 2020 56.7 in 2019	Four year weighted mean of State plus Recreational catches (i.e. 73.0 t) is deducted from fixed catch projections below.
Discards (t)	N/A	Discards are accounted for in the catch projections
Recreational Catch (t)	19.1-19.2	NSW and Vic Recreational catches for 2019–2022
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		Provisional TACs under fixed catch projections: 50 t yr^{-1} – 0 t TAC

	70 t yr^{-1} – 0 t TAC 100 t yr^{-1} – 27 t TAC 125 t yr^{-1} – 52 t TAC 150 t yr^{-1} – 77 t TAC

AFMA Advice

TBC

MAC Recommendations

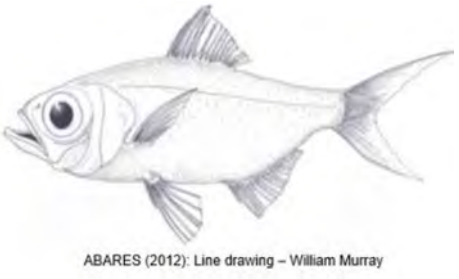
Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Slope Species



ABARES (2012): Line drawing – William Murray

Alfonsino

Beryx splendens

Species Summary					
Stock Assessment	Tier 3 species - last assessed by SlopeRAG in 2013.				
Stock Structure	Little is known of the stock structure of alfonsino in the SESSF. It is a straddling stock between the Australian Fishing Zone (AFZ) and the high seas. This assessment summary pertains only to the ECDWT Sector, as this is the only resource under quota management.				
Stock status against reference points (F_{48}/F_{20})	**Tier**	**Assessment Year**	**$F_{Current}$**	**F_{48}**	**F_{20}**
	3	2013	0.022	0.149	0.479
	3	2010	0.025	0.149	0.479
	3	2008	0.283	0.149	0.479
Stock trend and other indicators	No more than 4 t of Alfonsino has been caught in any of the last three years (Sporcic, 2023) and catches remain well below the TAC. When last assessed (in 2013), the age structure indicated that the stock had not been greatly impacted by fishing. There has been very little fishing since then, with the first catch recorded in 2019 (~6 t) though not in a part of the fishery that requires quota, hence zero catch is recorded below under 'Cth Retained Catch'.				
Species Category Trigger Species	**TAC setting approach**				
	As it has been more than six years since the last assessment for Alfonsino, SESSFRAG will determine the timing of a review of available data and assessment options for this species. A 50 t review trigger will apply in the interim.				
Catch and TAC (t)	**SESSF Season**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**	
	2023-24	1,017	1,119	-	
	2022-23	1,017	1,119	0	
	2021-22	1,017	1,119	0	
Economics (Byproduct)	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**	
	2021-22	0	80.00	0	

East Coast Deepwater Trawl	2020-21	Confidential	64.00	Confidential
	2019-20	Confidential	51.34	Confidential
ABARES Status (2023 Report)	**Fishing Mortality: Not subject to overfishing**		**Biomass: Not overfished**	
Climate Sensitivity **Medium**	Preliminary projections indicate (with medium confidence) a 20% decrease in abundance of Alfonsino through to 2040, occurring in a spatially uniform manner across the stock.			

Assessment summary

Key Model technical assumptions/ parameters	Tier 3 species use estimates of fishing mortality (F) that will reduce spawning biomass to a given level (reference points). The Tier 3 target reference point for alfonsino is the level of F that will produce a spawning biomass of 48% of unfished levels. The Tier 3 limit reference point for alfonsino is the level of F that will produce a spawning biomass of 20% of unfished levels.
Significant Changes to data inputs	Calculation of the RBC only uses AFZ data, and so pertains only to the AFZ.
Assessment results and RAG comments	Tier 3 assessments are no longer used under the SESSF Harvest Strategy, and there is little new data available due to lack of fishing for operational reasons. SESSFRAG Data Meeting (2023) endorsed Alfonsino for inclusion as trigger species along with the associated trigger limit of 50 t.

RAG Recommendations

SESSFRAG (Aug 2023) adopted the use of a Trigger Species category. Species in this category must satisfy a number of criteria and catch will be monitored annually. The TAC is rolled over until a specified trigger is breached, or six years elapse from the last assessment (whichever occurs first), at which point a new assessment is considered.

The recommended long-term TAC for Alfonsino is 1,017 t, with a TAC review trigger of 50 t. SESSFRAG will determine the timing of a review of available data and assessment options for this species.

RBC (t)	1,070	Long-term RBC to be used until the next assessment.
Discount Factor (t)	53.5	The default Tier 3 discount factor of 5 per cent will continue to be applied.
State catch (t)	N/A	There are no estimates of State catches, rarely caught in State fisheries.
Discards (t)	N/A	There are no estimates of discards.
Recreational Catch (t)	N/A	There are no estimates of recreational catches.
RCA (t)	N/A	There has been no specific research catch allocated.

Provisional TAC under the Harvest Strategy	Maintain TAC of 1,017 t in accordance with trigger species arrangements.

AFMA Advice

AFMA Management recommends a TAC of 1,017 t for Alfonsino for the 2024–25 season, with undercatch and overcatch provisions set at 10 per cent, and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Blue-eye Trevalla

(Hyperoglyphe antarctica)

ABARES (2012): Line drawing – FAO

Species Summary

Stock Assessment	Tier 4 assessment for slope stock was considered by SERAG in 2023. 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	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. Fish on the seamounts are assumed to be reproductively isolated from the slope stock. Potential stock structure among the seamounts is not clear. 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.

SLOPE
Stock status against reference points (C_{Lim}/C_{Targ})

Tier	Assessment Year	$CPUE_{Recent}$	$CPUE_{Target}$	$CPUE_{Limit}$
4	2023	0.8131	1.2285	0.5119
4	2022	0.7917	1.2286	0.5119
4	2021	0.901	1.2287	0.512

SEAMOUNT
Stock status against reference points (%B_0)

Tier	Assessment Year	Stock Status	Target	Target Limit
5	2021	33*	48	20
5	2018	33*	48	20

No assessment prior to 2018.

*Current depletion for the seamount stock was estimated to be about 0.33B_0 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.

Stock trend and other indicators	Total blue-eye trevalla catches have declined from 700 t in 2004 to 275.3 t in 2022 Slope Zone 20-30 - Annual standardised CPUE has been below average since about 1996 and shows a relatively flat trend (Sporcic, 2023). Zone 40-50 - Annual standardised CPUE has been mostly below average since about 1996 while the trend has been mostly flat. CPUE is consistent from 1988–1991 (i.e., before the introduction of quotas in 1992) but are double that

following the introduction of quota. Relatively very few vessels now contribute to significant catches.

Seamount

Catch from the seamounts has been less than 40 t for the past 3 years.

Species Category

TAC setting approach

Slope:
MYTAC species

The Blue-Eye Trevalla slope stock is currently managed through a single year TAC based on a Tier 4 assessment. A Dynamic Tier 4 assessment is being developed with the expectation is will finalised in 2024 which may allow for a MYTAC to be set in future.

Seamount:
Trigger species

A review of available data and assessment options for the seamount stock is scheduled for 2027, in accordance with the 6-year threshold, or if 27 t (i.e., 75% of the seamount TAC) is landed, whichever occurs first.

Catch and TAC (t)

SESSF Season	Agreed TAC	TAC after unders/overs	Commonwealth Retained Catch
2023-24	238	242	-
2022-23	241	247	235
2021-22	241	284	243

Economics (Primary) Commonwealth Trawl and Scalefish Hook

Financial Year	Species GVP ($m)	Fishery GVP ($m)	% Fishery GVP
2021-22	3.09	80.00	3.86
2020-21	2.48	64.00	3.87
2019-20	2.21	51.34	4.30

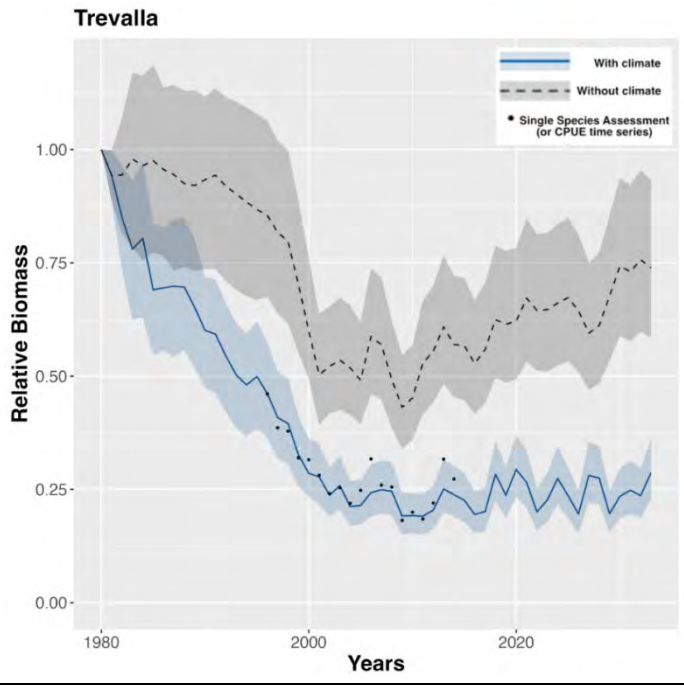
ABARES Status (2023 Report)

Fishing Mortality: Not subject to overfishing

Biomass: Not overfished

Climate Sensitivity

Medium



	Atlantis modelling suggests that climate change has a moderate influence on the biomass of Blue-eye trevalla and is contributing to a lower biomass than would have occurred otherwise.
Assessment summary	
Key Model technical assumptions/ parameters	Slope: The Tier 4 assessment assumes there is a linear relationship between standardised 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. Both assessments assume that biomass was unfished prior to 1985 (when fishing started). Seamount *Catch-MSY* 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. *Age-structured stock reduction analysis* 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.
Significant Changes to data inputs	Slope Changes to the time zone (from Coordinated Universal Time (UTC) to local time) in logbook records since 2021 resulted in changes to the Day/Night term which is employed CPUE standardisation analyses. This resulted in no discernible differences in the combined standardised catch-per-hook series between this years' and last years' standardisations. There is more information coming through in the CDR data transfer from AFMA to CSIRO this year and this has an effect for the data points in 1997-1998 (1997 increased 136 t and 1998 increased 29.31 t). These years are currently included in the reference period used for Blue-eye Trevalla. An overall downward trend for both combined standardised catch-per-hook and catch-per-day CPUE over the 2018-21 period, which was followed by an increase to above average in 2022. Seamount The 2021 update to both data-poor methods included catches from the Tasman seamounts plus the Lord Howe Rise whereas the 2018 assessment did not include the Lord Howe Rise. Catch data were provided by NSW fisheries and the Commonwealth logbooks. Discard rates are negligibly low.

	SERAG (2021) 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.
Assessment results and RAG comments	Slope *Tier 4 (2023)* The 2023 RBC was approximately 275.16 t, corresponding to a 26.08 t increase compared to the 2022 RBC, i.e., 249.08 t. This increase in RBC between consecutive assessments can be mostly attributed the updated standardised CPUE series which resulted in a higher most recent four-year average compared with the corresponding average standardised CPUE from the previous assessment. The estimated 2023 RBC (i.e., for the 2024 fishing season) is greater than the reported catch of approximately 263.18 t in 2022 for this species (Sporcic, 2023a). Seamount *Catch-MSY Analysis (2021)* 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. 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. 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). *Age-structured stock reduction analysis (2021)* SERAG (Nov 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. 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 50-100 t range.

	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 t is within the range of RBCs produced when a harvest control rule is applied to the outputs of the SRA and that there was no basis for revising the previous TAC advice. Because blue-eye trevalla are prone to localised depletion, it was advised that catches be spread across seamounts rather than concentrating on one area.

RAG Recommendations

SESSFRAG (August 2023) adopted the use of a Trigger Species category. Species in this category must satisfy a number of criteria, with catch monitored annually. The TAC is maintained until a specified trigger is breached, or six years elapse from the last assessment (whichever occurs first), at which point a new assessment is considered. The Blue-Eye Trevalla seamount stock has been put in this category.

The recommended long-term TAC for the Blue-Eye Trevalla seamount stock is 36 t, with TAC review of triggers of 27 t annual catch or 6 years elapsed since the last assessment (i.e. 2021 + 6 = 2027).

SERAG (Nov 2023) recommended the RBC produced by the Blue-Eye Trevalla (slope) Tier 4 of 275.16 t. This is to be combined with the 36 t RBC from the Seamount 2021 assessment. SERAG (November 2023) also recommended the discount factor be applied to the RBC for the slope stock.

	Year	RBC (t): Slope	RBC (t): Seamount	Is a MYTAC Recommended?
RBC (t)	2024	275	36	No. SERAG recommended a single-year TAC to ensure the slope CPUE series is closely monitored.
	2023	249	36	
	2022	349	36	
Discount Factor (t)	41 t (applied to Tier 4 RBC)	SERAG (November 2023) supported the application of the 15 per cent discount factor to the RBC for the slope stock. 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		
State catches (t)	7.1 t	Mostly NSW catches – declining in recent years.		
Discards (t)	N/A	Estimates of discards are considered to be low 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 catches.		
RCA (t)	N/A	There has been no specific research catch allocated.		
Provisional TAC under the Harvest Strategy		263 t TAC with a trigger arrangements for the seamount stock.		

AFMA Advice

AFMA recommends a single-year TAC of 263 t for Blue-Eye Trevalla during the 2024–25 season with overcatch and undercatch provisions set at 10 per cent, and a determined amount of 2 t.

MAC Recommendations			
Commercial fishers' interest	*All sections below have been intentionally left blank*		
Species specific management (target, companion, and bycatch)			
MAC advice and any dissenting views			
Undercatch (%)	**Overcatch (%)**	**Determined amount (t)**	**TAC (t)**

Final Agreed TAC				
2023-24 agreed TAC (t)	**2024-25 recommended TAC (t)**	**Overcatch and undercatch (%)**	**Determined amount (t)**	**Change in TAC (t)**

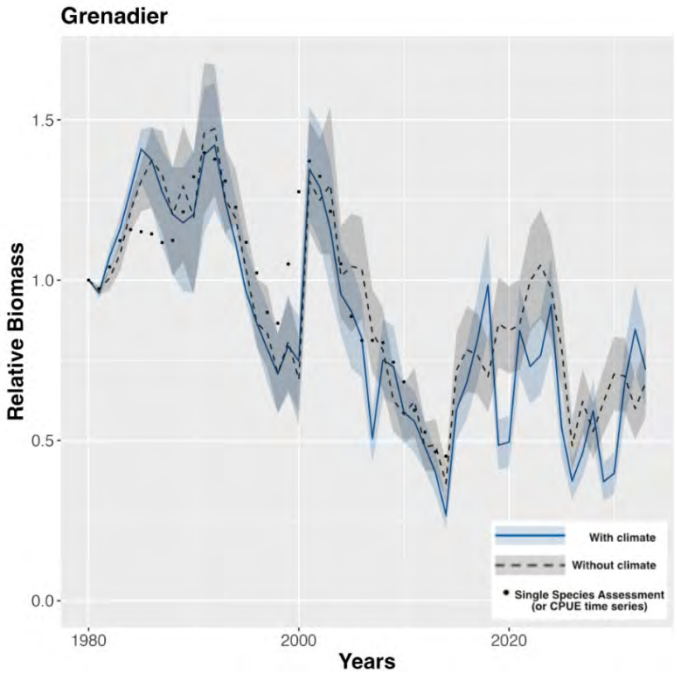
Blue Grenadier

Macruronus novaezelandiae

ABARES (2012) Line drawing - Rosalind Poole

Species Summary

Stock Assessment	Tier 1 Species - last assessed by SERAG in 2022.					
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 $\%B_0$ in year +1)	**Tier**	**Assessment Year**	**Biomass (from assessment year)**	**Biomass (revised in most recent assessment)**	**Target**	**Limit**
	1	2022	124	124	48	20
	1	2021	155	123		
	1	2018	122	109		
Stock trend and other indicators	Annual standardised CPUE have been below average between 1993 – 2013, with two apparent cycles, each peaking in 1999 and 2008 respectively. Between 2014 to 2015, these indices were above average. Also, there has been a consistent and above average increase between 2018-20, despite the decrease in 2021 and 2022 (Sporcic, 2023).					
Species Category MYTAC	**TAC setting approach**					
	The current season (2023–24) is the 1st year of a of 3-year MYTAC. The next assessment is scheduled for 2024 and so a new, 4-year MYTAC period, is expected to commence in 2025–26.					
Catch and TAC (t)	**SESSF Season**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**		
	2023-24	17,084	18,899	-		
	2022-23	18,275	19,217	6,265		
	2021-22	12,183	13,041	10,958		
Economics (Primary) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**		
	2021-22	33.12	80.00	41.40		
	2020-21	21.86	64.00	34.16		
	2019-20	12.47	51.34	24.29		
ABARES Status (2023 Report)	**Fishing Mortality: Not subject to overfishing**		**Biomass: Not overfished**			

Climate Sensitivity **Low**	 Atlantis modelling suggests that climate change has a minor influence on the biomass of Blue Grenadier. Greater climatic variability may contribute to increased variability in stock abundance.
Assessment summary	
Key Model technical assumptions/parameters	2 sex model, age-structured Steepness (h) is fixed at 0.75 Recruits estimated between 1974 and 2018 Maturity: 50% female maturity at 63.7 cm The base case estimates natural mortality for females at 0.23 and males at 0.24
Significant Changes to data inputs	The base case specifications agreed by the SERAG in 2021 were maintained into the preliminary base case. The main difference between the assessment model of 2021 and 2022 is the inclusion of 2020 and 2021 acoustic survey estimates of biomass. This was recommended due to the high degree of uncertainty in the 2021 assessment.
Assessment results and RAG comments	The assessment has been updated since the previous full assessment by including recent length-composition and conditional age-at-length data from the spawning and non-spawning fisheries; updated standardised CPUE series (Sporcic, 2022a), the total mass landed and discarded, and updated age-reading error matrices. Acoustic estimates of spawning biomass (2003–2010; 2020–2021) and estimates of the female spawning biomass in 1994 and 1995 from egg surveys (Bulman et al., 1999) are included. Data were formulated by calendar year, as in previous models (Tuck and Bessell-Browne, 2022). SERAG (Oct 2022) noted adding the new data did not affect the assessment history greatly and reduced uncertainty in the estimate of biomass, however, there has been a downward revision to recruitment estimates.

	Results of the base case show reasonably good fits to the length-composition data, conditional age at length, egg and discard mass. Fits to the newly included 2020 and 2021 acoustic survey biomass estimates are reasonable but with a preference for the higher 2020 survey point. As has been noted in previous blue grenadier assessments, the fit to the standardised non-spawning CPUE index is generally poor; the model is unable to fit to the high early catch rates and over-estimates catch rates during the early 2000s. More recent catch rates fit reasonably well, with a reduction in recent estimated catch rates coinciding with a decrease in the observed catch rate value in 2021 (Tuck and Bessell-Browne 2022). The estimated virgin female spawning biomass (B0) is 35,680 tonnes (compared to 37,445 tonnes in the 2021 assessment) and the projected 2023 spawning stock biomass will be 124% of virgin female spawning biomass (projected assuming 2021 catches in 2022), compared to 155% at the start of 2022 from the 2021 assessment. The reduction in estimated relative spawning biomass is likely due to the reduced 2021 catch rate, the inclusion of the acoustic survey points and updated composition data leading to slightly reduced estimates of recent recruitment. The 2023 RBC under the 20:35:48 harvest control rule is 20,168 t that includes 240 t of estimated discards (19,928 t retained). The long-term RBC is approximately 7,200 t with 200 t discards. 155% at the start of 2022 from the 2021 assessment. The reduction in estimated relative spawning biomass is likely due to the reduced 2021 catch rate, the inclusion of the acoustic survey points and updated composition data leading to slightly reduced estimates of recent recruitment (Tuck and Bessell-Browne 2022). The likelihood profiles reinforce that initial biomass is uncertain, as is the estimate of current stock status. The stock status uncertainty has reduced somewhat when compared to the broader estimates of the 2021 assessment, which may reflect the inclusion of more recent survey estimates of biomass. All model sensitivities showed current relative biomass being well above the target and likely to be above virgin biomass levels. There continues to be strong estimates of recent recruitment (the most recent nine years are above average) which is a positive sign for the fishery. As has been observed in previous assessments of blue grenadier, the fit to the non-spawning fleet CPUE, especially in the early years, is poor. Further refinement of the model should consider alternative GLM models for CPUE standardisation, or potential changes to model structure to account for the poor fit. The assessment shows retrospective patterns of concern for recruitment. This result suggests that there could be some misspecification in the assessment with a time varying factor that may not be accounted for in the assessment. Further investigation of these patterns in future assessments is warranted (Tuck and Bessel-Browne 2022). At SERAG (Oct 2022) Industry members noted that this fishery is well suited to cope with recruitment-driven fluctuations in biomass. Freezer boats are unlikely to fish when TACs are low. SERAG (Nov 2022) noted that the recent high RBC's have resulted from consecutive strong recruitment pulses into the fishery, possibly influenced by environmental drivers such as westerly winds.

RAG Recommendations

SESSFRAG (Aug 2023) recommended that the 3-year average RBC (of 17,313 t) be used in 2024–25 for the 2nd year of a 3-year MYTAC for Blue Grenadier.

	Year	RBC (t)	Is a MYTAC Recommended?
RBC (t)	2025	14,590	Yes. Using the 3 year-average RBC
	2024	17,182	
	2023	20,168	
	3-year average	17,313	
Discount Factor (t)	N/A	A discount factor was not applied.	
State catches (t)	N/A	State catches are negligible and not included in the assessment.	
Discards (t)	229 t (3 yr average)	Model estimated discards are 240 t (2023), 225 t (2024), 222 t (2025).	
Recreational Catch (t)	N/A	There are no estimates of recreational catch.	
RCA (t)	N/A	There has been no specific research catch allocated.	
Provisional TAC under the Harvest Strategy		17,084 t	

AFMA Advice

AFMA Management recommends a TAC of 17,084 t for Blue Grenadier during the 2024-25 season, as the 2nd year of a 3-year MYTAC, with overcatch and undercatch provisions set at 10% and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

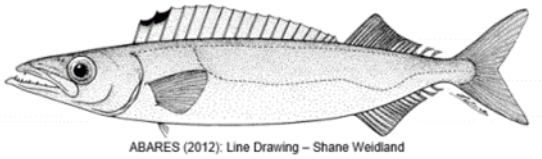
Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final Agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Gemfish East

Rexea solandri

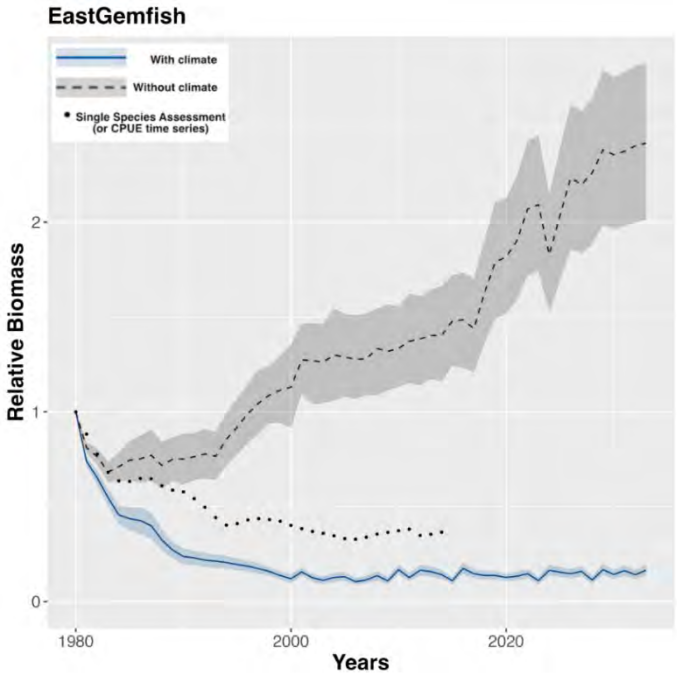

ABARES (2012): Line Drawing – Shane Weidland

Species Summary

Stock Assessment	Tier 1 Species - last assessed by ShelfRAG in 2010.				
Stock Structure	Recent genetic research (Ovenden et al. 2020) has revealed evidence of genetically different populations between the east and west (boundary: west of 146°22'E, north of 42°43'S) (with no gene flow), with a mixing (overlap) of the two stocks in western Bass Strait, through to Portland. The current assessment is based solely on eastern gemfish, caught south of Latitude 43° south off western Tasmania, and east of longitude 146° 22`.				
Stock status against reference points $\%B_0$ in year +1)	**Tier**	**Assessment Year**	**Biomass (from assessment year)**	**Target**	**Limit**
	1	2010	15.6	48	20
	1	2008	16.5		
	1	2007	10		
Stock trend and other indicators	Non spawning stock - Following a large spike in standardised CPUE in the late 1980s, which coincided with a large spike in catches, the annual standardised CPUE trend dropped rapidly despite large reductions in catches and, since 1995 has been relatively flat and below average although with what appears to be a 14 - 15-year cycle of rise and fall. The 2021 estimate significantly increased relative to the previous year and there was no discernible difference between the last two years. There have been efforts to actively avoid eastern Gemfish for the last few years and this may have been reflected in the change apparent in the depth of fishing. It means that the most recent CPUE, from about 2013, will not be representative of the state of stock (Sporcic, 2023). Spawning stock - Annual standardised CPUE trend has declined since 2010 and remained below average since 2011, with the last two years either below or above average, based on 95% confidence intervals. This reflects what appears to be a longer-term cycle of CPUE values, which suggests that CPUE values would soon be expected to rise, which occurred in 2019, 2020 and 2021. However, the relatively low catches since the past eight years indicate that industry avoidance strategies are effective, and this means the recent CPUE may not provide an unbiased representation of relative stock status (Sporcic, 2023).				
Species Category Depleted	**TAC setting approach**				
	Annual bycatch TAC set in accordance with the Eastern Gemfish Stock Rebuilding Strategy.				
Catch and TAC (t)	**SESSF Season**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**	
	2023-24	100	100	-	
	2022-23	100	100	37	
	2021-22	100	100	74	

Economics (Secondary) Commonwealth Trawl and Scalefish Hook	Financial Year	Species GVP ($m)	Fishery GVP ($m)	% Fishery GVP
	2021-22	0.23	80.00	0.29
	2020-21	0.16	64.00	0.25
	2019-20	0.04	51.34	0.08
ABARES Status (2023 Report)	**Fishing Mortality: Uncertain**		**Biomass: Overfished**	

Climate Sensitivity
High



Atlantis modelling suggests that climate change has a major influence on the biomass of Gemfish East and is contributing to a much lower biomass than would have occurred otherwise.

Assessment summary

Key Model technical assumptions/ parameters

The data in the model is divided into four fleets:

i. A non-trawl fleet (1993 – 2009)
ii. A fleet targeting the winter spawning run (1975 – 2000 and inclusion of the results of the 2007 and 2008 surveys)
iii. A non-spawning (summer) season fleet (1975 – 2009), and
iv. A recent (spawning season) winter bycatch fleet (2000 – 2009).

Significant Changes to data inputs

N/A

Assessment results and RAG comments

SERAG (Dec 2020) noted the non-spawning CPUE index has increased over the last 3- years, which is consistent with industry reports of higher catch rates in 2019 and 2020.

Total Commonwealth landings for 2019 were 72 t, more than double the 2018 catch of 34 t.

	The stock assessment has not been formally updated since 2010 due to a paucity of data, and the main index of abundance is no longer considered reliable due to avoidance behaviour. Model fits to the non-spawning trawl fleet in the 2010 Tier 1 stock assessment were good. While not as valuable as the winter spawning index, it could be considered as an alternative index of abundance. CSIRO will clarify what is required to update the assessment, including whether the non-spawning CPUE index can be used as an index of abundance. Fixed catch projections from the 2010 Tier 1 assessment estimate catches of up to 100 t will allow for recovery under average recruitment. However, catch projections should be treated with caution given the failure of this species to recover since the 2010 stock assessment. SERAG has previously pointed out the eastern gemfish stock may now be at a new equilibrium and the stock may not rebuild under current conditions. Recent research by (Ovenden, et al., 2020) identified genetic drift and divergence as potential factors influencing the ability of gemfish stocks to rebuild. SERAG (Dec 2020) noted that total mortality for the 3 years immediately after the 2010 stock assessment were higher than those expected to allow for rebuilding of the stock. While the projections are based on landed catches of 100 t, the discard proportion for those years was high, between 55 and 67 per cent, resulting in total mortality of nearly double the projected catches. Total mortality from 2014 to 2018 was less than 100 t, and recent increases in CPUE are consistent with the modelled predicted increase in biomass when total mortality is less than 100 t. Eastern gemfish was scheduled for a Tier 1 stock assessment in 2022. The main index of abundance from the spawning stock is not thought to be reliable because of avoidance behaviour, so completing a new assessment might not be possible. However, SERAG recommended at least updating the 2010 stock assessment to include catches up to 2020, and projecting forward using various fixed catches and recruitment scenarios. SERAG (Nov 2021) considered a targeting analysis for eastern gemfish as part of the 2021 annual review of the rebuilding strategy and noted: - While catches in the northern part of the fishery have reduced, there is no apparent shift in the spatial distribution of catches. - There is no evidence of boats targeting eastern gemfish. - There are higher catches in the automatic longline hook sector in 2020, however these need to be understood before any advice around targeting or indicators of stock status can be resolved. - Standardised spawning and non-spawning CPUE has increased over the last 3 years, but without an assessment it isn't possible to determine whether this is indicative of an increase to biomass. - There is still some uncertainty around whether total mortality is sufficiently low to allow rebuilding – this will need to be resolved as part of updating the stock assessment in 2022. SERAG (Nov 2021) considered a companion species analysis which investigated the link between target species catch and the associated level of

	unavoidable bycatch of recovering species. The analysis incorporated a range of factors such as area, depth fished and gear type– also known as métiers. Using logbook data from 2019 and 2020, and expected 2022-23 TACs for the main companion species (blue-eye trevalla, pink ling and blue grenadier) the estimated unavoidable bycatch of eastern gemfish for 2022 is 88.7 t, with a range between 68.9 and 111.9 t. SERAG (Nov 2022) noted the absence of métier analyses to inform bycatch TACs due to the significant structural changes occurring next year.

RAG Recommendations

SERAG (Nov 2023) noted the spatial closures, structural adjustment and gear requirement changes, while beneficial to the species, have significant impacts on the key index of abundance (CPUE) for these rebuilding species and that this makes it very difficult to measure the performance of the rebuilding strategies.

SERAG (Nov 2023) noted there is no new information to change the current bycatch TAC of 100 t therefore recommended maintaining it at the current level.

RBC (t)	0 t	The RBC is set at zero for all depleted species.
Discount Factor (t)	N/A	Discount factors are not applied to Tier 1 assessments.
State catches (t)	N/A	State catches, 1 t are not deducted from the bycatch TAC but should be considered as a source of mortality.
Discards (t)	N/A	Projections from the 2010 Tier 1 assessment are based on landed catch, and so estimates of discards (23.1 t) are not deducted from the bycatch TAC but should be considered as a source of mortality.
Recreational Catch (t)	N/A	There are no estimates of recreational catch.
RCA (t)	N/A	There has been no specific research catch allocated
Provisional TAC under the Harvest Strategy		100 t – Incidental bycatch TAC

AFMA Advice

AFMA Management recommends an incidental bycatch TAC of 100 t for Eastern Gemfish during the 2024–25 season, with no undercatch or overcatch provisions, and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

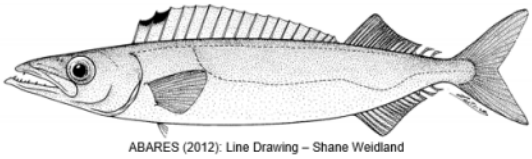
Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

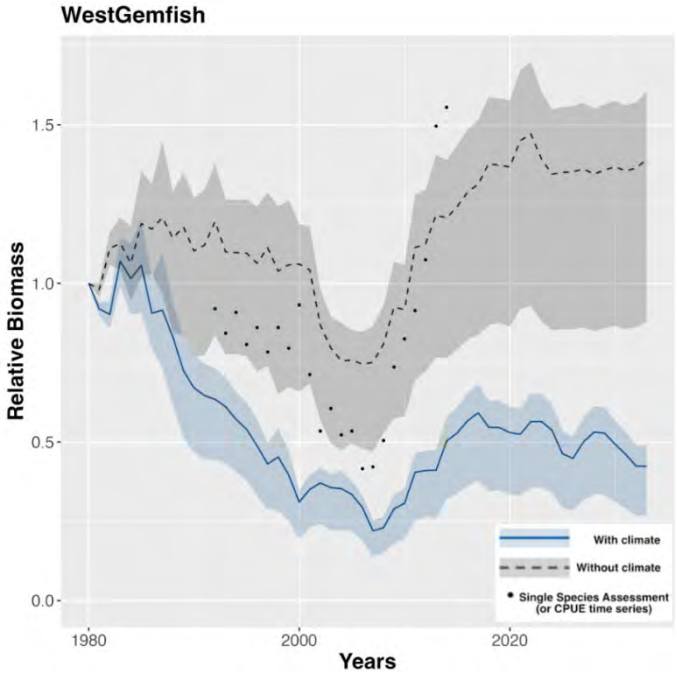
Gemfish West

Rexea solandri


ABARES (2012): Line Drawing – Shane Weidland

Species Summary

Stock Assessment	Tier 4 Species - last assessed by SERAG in 2022				
Stock Structure	Recent genetic research (Ovenden et al. 2020) has revealed evidence of genetically different populations between the east and west (boundary: west of 146°22'E, north of 42°43'S) (with no gene flow), with a mixing (overlap) of the two stocks in western Bass Strait, through to Portland. Both eastern and western gemfish migrate towards opposite ends of their distributions and spawn six months apart; which is likely to be the major contributor to the genetic differentiation seen.				
Stock status against reference points (C_{Lim}/C_{Targ})	**Tier**	**Assessment Year**	**$CPUE_{Recent}$**	**$CPUE_{Target}$**	**$CPUE_{Limit}$**
	4	2022	1.0459	1.0289	0.4287
	4	2019	1.0418	0.9942	0.4143
	4	2016	0.9378	1.1816	0.4923
Stock trend and other indicators	Zones 40 and 50 – Annual standardised CPUE are noisy and flat since 1992 and consistently mostly below average since 2001. However, there has been an overall increase in CPUE (to the long-term average) since 2007, with estimates in the last three years above the long- term average (Sporcic, 2023). Zones 40 and 50 in the GAB - Annual standardised CPUE has been consistently below average and flat since 1999, with small overall increases in annual estimated CPUE (to the long-term average) in 2020 and to above the long-term average in 2021. However, the CPUE from 1986 - 1994 is more representative of zone 50 than of the GAB. Given recent evidence that the stocks of western Gemfish in the GAB and most of zone 50 are different biological stocks it is doubtful that these data should be combined (Sporcic, 2023).				
Species Category Trigger	**TAC setting approach**				
	A review of available data and assessment options is scheduled for 2028, in accordance with the 6-year threshold, or if 135 t (i.e., 75% of the TAC) is landed, whichever occurs first.				
Catch and TAC (t)	**SESSF Season**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**	
	2023-24	180	209	-	
	2022-23	340	371	77	
	2021-22	343	372	73	

Economics (Secondary) Commonwealth Trawl and Scalefish Hook	Financial Year	Species GVP ($m)	Fishery GVP ($m)	% Fishery GVP
	2021-22	0.04	80.00	0.05
	2020-21	0.04	64.00	0.06
	2019-20	Not Available	51.34	Not Available
ABARES Status (2023 Report)	**Fishing Mortality: Not subject to overfishing**		**Biomass: Not overfished**	
Climate Sensitivity **Uncertain**	 Atlantis modelling suggests that climate change has a moderate influence on the biomass of Gemfish West and is contributing to a lower biomass than would have occurred otherwise.			

Assessment summary

Key Model technical assumptions/ parameters	The Tier 4 assessment assumes there is a linear relationship between CPUE and exploitable biomass, and that the character of the estimated CPUE has not changed in significant ways. It also assumes the reference period provides a good estimate of the stock when it was at a depletion level of 48%B0 and that historical catch records are accurate.
Significant Changes to data inputs	N/A
Assessment results and RAG comments	The standardised CPUE series has increased since 2017, with the recent 4-year CPUE average currently above the Target CPUE. SERAG (Nov 2022) noted a very high discard estimate for 2013. GABRAG previously considered a Tier 1 assessment, a Tier 4 assessment (no discards) and a Tier 4 assessment (discards). These analyses identified

	deficiencies in the data which prevented precise estimates of stock status being made, and a weight of evidence approach was adopted to set an RBC of 200 t for 2019. This species is now assessed as a Tier 4 species only, based on advice from SESSFRAG, using CPUE from Zone 50 in the CTS. The 2022 estimated RBC was approximately 221.37 t, a 201.69 t decrease compared to the 2019 estimated RBC (423.06 t; Sporcic 2019). The decrease in RBC of ~202 t is largely attributed to a decrease in the most recent CPUE (including discards) and hence the mean of the most recent four-year average which is used to calculate the RBC. The 2022 RBC is greater than the reported catch of 75.1 t (75.5 t including estimated discards) in 2021 for this stock (Sporcic 2022). SERAG (Nov 2022) recommended a 3-year MYTAC using the RBC of 221 t from the 2022 Tier 4 assessment.

RAG Recommendations

SESSFRAG (Aug 2023) adopted the use of a Trigger Species category. Species in this category must satisfy a number of criteria and catch will be monitored annually. The TAC is rolled over until a specified trigger is breached, or six years elapse from the last assessment (whichever occurs first), at which point a new assessment is considered.

The recommended long-term TAC for Gemfish (West) is 180 t, with TAC review triggers of 135 t or 6 years elapsed since the last assessment (i.e. 2022 + 6 = 2028).

RBC (t)	221	Long-term RBC to be used until the next assessment.
Discount Factor (t)	33	The default Tier 4 discount factor of 15 per cent is applied
State catches (t)	N/A	State catches are not included in the assessment and are considered low.
Discards (t)	3.8	Four-year weighted average (2019-2022).
Recreational Catch (t)	N/A	Recreational catch is not significant and not considered in the assessment.
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		180 t – in accordance with trigger species advice.

AFMA Advice

AFMA management recommends a TAC of 180 t for Gemfish (West) for the 2024-25 season, including overcatch and undercatch provisions of 10 per cent, and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target,	

companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

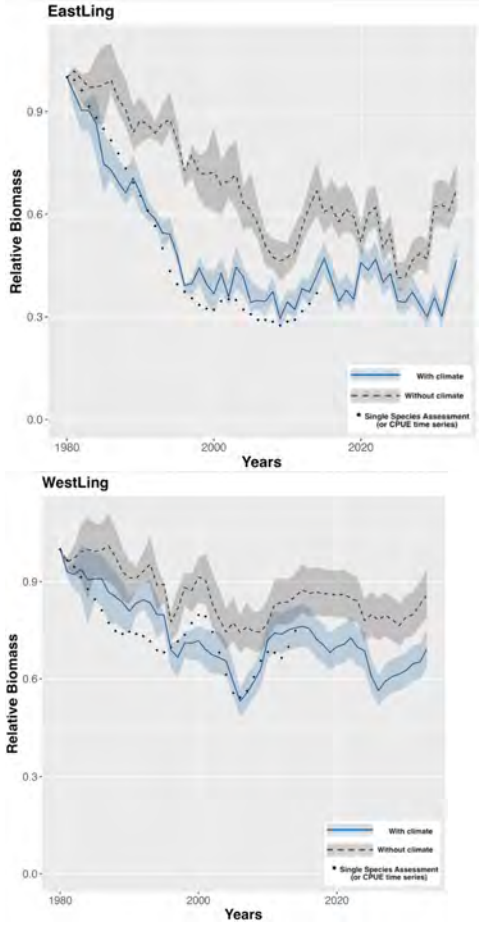
2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount t)	Change in TAC (t)

Pink Ling

Genypterus blacodes

Species Summary

Stock Assessment	Tier 1 Species - last assessed by SERAG in 2021				
Stock Structure	Pink ling are assessed as separate stocks east and west of Longitude 147° East. 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.				
East **Stock status against reference points (%B0 in year +1**	**Tier**	**Assessment 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**	**Assessment Year**	**Biomass**	**Target**	**Limit**
	1	2021	91	48	20
	1	2018	84		
	1	2015	73		
Stock trend and other indicators	Zones 10-30 - Annual standardised CPUE has been below average corresponding to a relatively flat trend over the 2001-19 period, with the 2021 estimate just below the long-term average, based on 95% confidence intervals. More recently, CPUE has increased since 2015, despite the decrease in 2021 relative to the previous year. The structural adjustment had a major effect upon the influence of the vessel factor from 2006 or 2007 onwards (Sporcic, 2023). Zones 40-50 - Annual standardised CPUE reached to a minimum in 2005 and increased since then to the long-term average from 2013 to 2016, increased to above average in 2017 to 2018, decreased to the long-term average in 2019 and then increased above the long-term average in 2020 and 2021 based on the 95% confidence intervals. Also, there has been an overall increase in CPUE since 2005 (i.e., the lowest CPUE index). The differences between this years' and last years' standardised series can be mostly attributed to a change in the number of vessels analysed. A vessels' distinguishing symbol which was originally categorized as two different vessels, has been re-categorized as the same vessel in this years' analysis. (Sporcic, 2023).				
Species Category	**TAC setting approach**				

<table>
<tr><td>MYTAC</td><td colspan="4">The current season (2023–24) is the 2nd year of a 3-year MYTAC for both Eastern and Western Pink Ling.
The next assessment, for the eastern stock only. is scheduled for 2024. The timing of the next assessment for the western stock is yet to be determined.</td></tr>
<tr><td rowspan="4">Catch and TAC (t)</td><td>SESSF Season</td><td>Agreed TAC</td><td>TAC after unders/overs</td><td>Commonwealth Retained Catch</td></tr>
<tr><td>2023-24</td><td>1,565</td><td>1,677</td><td>-</td></tr>
<tr><td>2022-23</td><td>1,568</td><td>1,653</td><td>983</td></tr>
<tr><td>2021-22</td><td>1,121</td><td>1,229</td><td>818</td></tr>
<tr><td rowspan="4">Economics (Primary) Commonwealth Trawl and Scalefish Hook</td><td>Financial Year</td><td>Species GVP ($m)</td><td>Fishery GVP ($m)</td><td>% Fishery GVP</td></tr>
<tr><td>2021-22</td><td>9.10</td><td>80.00</td><td>11.38</td></tr>
<tr><td>2020-21</td><td>6.76</td><td>64.00</td><td>10.56</td></tr>
<tr><td>2019-20</td><td>6.37</td><td>51.34</td><td>12.41</td></tr>
<tr><td>ABARES Status (2023 Report)</td><td colspan="2">Fishing Mortality: Not subject to overfishing</td><td colspan="2">Biomass: Not overfished</td></tr>
<tr><td>Climate Sensitivity
Medium</td><td colspan="4"> 

Atlantis modelling suggests that climate change has a moderate influence on the biomass of Pink Ling and is contributing to a lower biomass than would have occurred otherwise.</td></tr>
</table>

Assessment summary	
Key Model technical assumptions/ parameters	Single area, two sex, age-structured (east and west) Von Bertalanffy growth, single natural mortality (M) Fixed maturity and steepness (h = 0.75) SSB: female only, mid-year Two fisheries: trawl, non-trawl Time-blocked selectivities for trawl 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. Estimate parameters: B0, growth, recruitments strengths, natural mortality, selectivities. Data weighting followed Francis (except age-length not fully down-weighted). 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.
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).
Assessment results and RAG comments	<u>West</u> A comparison of trawl CPUE series across the last four stock assessments shows a similar trend, with western CPUE trending upwards. Western MPD runs estimate relative biomass ranging from 78%B_0 to 93%B_0 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%B_0 to 95%B_0 under high (0.26) and low (0.2) values of M. 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. There is a ‘spike’ in fish around 90-95cm in 2018 which the model cannot fit. The likelihood profile for B_0 showed little conflict between the data sets with the MPD estimate at 5910 t and little support for values below 4000 t. 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). <u>East</u> A comparison of trawl CPUE series across the last four stock assessments shows a similar trend, with eastern CPUE trending upwards.

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.

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%B_0 to 33%B_0 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%B_0 to 36%B_0 under high (0.26) and low (0.2) values of M.

Model fits to the eastern trawl CPUE, length frequencies and Fishery Independent Survey Indices (5 years) are very good.

The likelihood profile for B_0 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.

SERAG (Sep 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.

The MCMC estimates the 2021 eastern stock biomass at 34%B_0 with a 2022 RBC of 410 t and the western stock is estimated to be 91%B_0 with a 2022 RBC of 1300 t (Figure 14). The table below provides the likelihood of being below 20%B_0, or 30%B_0 or being at or above 48%B_0 in 2024 and 2031 under constant catch scenarios.

Catch (t)	E(B24) (%B0)	E(B31) (%B0)	P (ss24 <0.2)	P (ss31 <0.2)	P (ss24 < 0.3)	P (ss31 < 0.3)	P (ss24 ≥ 0.48)	P (ss31 ≥ 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

RAG Recommendations

SESSFRAG (Aug 2023) recommended that the 3-year average RBC be used in 2024-25 as the third year of a three-year MYTAC for Pink Ling. 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.

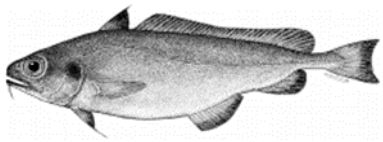
<table>
<tr><td colspan="6"></td></tr>
<tr><td rowspan="5">RBC (t)</td><td>Year</td><td>RBC (t): East</td><td>RBC (t): West</td><td>Combined (t)</td><td>Is a MYTAC Recommended?</td></tr>
<tr><td>2024</td><td>490</td><td>1,090</td><td>1,580</td><td rowspan="4">Yes.
3-year MYTAC using average east (457 t) and west (1,193 t) RBCs from the 2021 assessment.</td></tr>
<tr><td>2023</td><td>470</td><td>1,190</td><td>1,660</td></tr>
<tr><td>2022</td><td>410</td><td>1,300</td><td>1,710</td></tr>
<tr><td>Long term yield</td><td>570</td><td>730</td><td>1,300</td></tr>
<tr><td>Discount Factor (t)</td><td>N/A</td><td colspan="4">A discount factor is not applied.</td></tr>
<tr><td>State catch (t)</td><td>East = 46
West = 0.9
Combined = 47</td><td colspan="4">The majority of State catches were recorded in NSW (east) and TAS (west) and are deducted from the RBC.</td></tr>
<tr><td>Discards (t)</td><td>East = 63
West = 7.6
Combined = 70.6</td><td colspan="4">Discards are not modelled in the Tier 1 assessment – weighted average discards are deducted from the RBC.</td></tr>
<tr><td>Recreational Catch (t)</td><td>N/A</td><td colspan="4">There are reports of increasing recreational catch of this species, but catches are not estimated and unlikely to be significant.</td></tr>
<tr><td>RCA (t)</td><td>N/A</td><td colspan="4">There has been no specific research catch allocated.</td></tr>
<tr><td colspan="2">Provisional TAC under the Harvest Strategy</td><td colspan="4">East: 348 t
West: 1,185 t
Combined: 1,533 t
* Eastern notional catch limit is 475 t based on the constant catch scenarios</td></tr>
<tr><td colspan="6">AFMA Advice</td></tr>
<tr><td colspan="6">AFMA Management recommends a TAC of 1,533 t for Pink Ling during the 2024–25 season, as the third year of a 3-year MYTAC, with undercatch and overcatch provisions set at 10 per cent and a determined amount of 2 t.</td></tr>
<tr><td colspan="6">MAC Recommendations</td></tr>
<tr><td>Commercial fishers' interest</td><td colspan="5">All sections below have been intentionally left blank</td></tr>
</table>

Species specific management (target, companion, and bycatch)			
MAC advice and any dissenting views			
Undercatch (%)	**Overcatch (%)**	**Determined amount (t)**	**TAC (t)**

Final agreed TAC				
2023-24 agreed TAC (t)	**2024-25 recommended TAC (t)**	**Overcatch and undercatch (%)**	**Determined amount (t)**	**Change in TAC (t)**

Ribaldo

Mora



Species Summary

Stock Assessment	Tier 4 Species - last assessed by SERAG in 2020				
Stock Structure	Assumed to be a single stock in the SESSF.				
Stock status against reference points (C_{Lim}/C_{Targ})	**Tier**	**Assessment Year**	**$CPUE_{Recent}$**	**$CPUE_{Target}$**	**$CPUE_{Limit}$**
	4	2020	0.7894	0.3728	0.1864
	4	2017	0.7978	0.3597	0.1799
	4	2013	0.6671	0.3416	0.164
Stock trend and other indicators	CPUE has been above the target reference point since the reference period and has increased from just above the target reference point in 2007 to a four-year average of more than double the target reference point in 2019. Annual standardised CPUE trend is noisy and relatively flat since about 2005 and mostly below average. (Sporcic, 2023). Zones 10-50 – Annual standardised CPUE trend is noisy and relatively flat since 1996 and mostly below average (Sporcic, 2023).				
Species Category Trigger	**TAC setting approach**				
	A review of available data and assessment options is scheduled for 2026, in accordance with the 6-year threshold, or if 295 t (i.e., 75% of the TAC) is landed, whichever occurs first.				
Catch and TAC (t)	**SESSF Season**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**	
	2023-24	393	429	-	
	2022-23	397	436	104	
	2021-22	396	437	98	
Economics (Byproduct) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**	
	2021-22	0.22	80.00	0.28	
	2020-21	0.29	64.00	0.45	
	2019-20	0.29	51.34	0.56	
ABARES Status (2023 Report)	**Fishing Mortality: Not subject to overfishing**		**Biomass: Not overfished**		

Climate Sensitivity **Uncertain**	Preliminary projections are uncertain, indicating both increases (10%+) or decreases (>50%) in abundance are possible through to 2040.

Assessment summary

Key Model technical assumptions/parameters	The Tier 4 assessment assumes there is a linear relationship between catch rates and exploitable biomass, and that the character of the estimated catch rates has not changed significantly since the reference period to the end of the most recent year.
Significant Changes to data inputs	The average of discard estimates from 1998-2004 (reference period) have been used to backfill discard rates from 1986-2003. There have been revisions to the NSW annual catch from 2009 onwards. CDR records begin in 2005 – the agreed catch history from the previous Tier 4 assessment was used again in 2020 (Sporcic, 2020a).
Assessment results and RAG comments	Most of the catch is taken in Zone 40. Catches have increased from 85 t to 126 t over the last four years. While CTarg increased because of revisions to NSW catches, a slight reduction in the four-year average CPUE has resulted in an RBC of 405.4 t, a reduction from 430.3 t from the 2017 assessment. SERAG (December 2020) recommended a 3-year MYTAC using the RBC of 405.4 t from the 2020 Tier 4 assessment.

RAG Recommendations

SESSFRAG (Aug 2023) adopted the use of a Trigger Species category. Species in this category must satisfy a number of criteria and catch will be monitored annually. The TAC is rolled over until a specified trigger is breached, or six years elapse from the last assessment (whichever occurs first), at which point a new assessment is considered.

The recommended long-term TAC for Ribaldo is 393 t, with TAC review triggers of 295 t or 6 years elapsed since the last assessment (i.e. 2020 + 6 = 2026).

RBC (t)	405	Long-term RBC to be used until the next assessment.
Discount Factor (t)	N/A	SERAG recommended not applying a discount factor because deepwater closures provide protection to the stock.
State catch (t)	0.7	Mostly NSW State catches; consistently low.
Discards (t)	10.9	The 2019 estimated discard rate of 9.1 per cent was carried forward to 2020 and 2021.
Recreational Catch (t)	N/A	There are no estimates of recreational catch – likely insignificant.
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		393 t – in accordance with trigger species advice.

AFMA Advice

AFMA management recommends a TAC of 393 t for Ribaldo during the 2024–25 season, including overcatch and undercatch provisions of 10 per cent, and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Royal Red Prawn

Haliporoides sibogae

Species Summary

Stock Assessment	Tier 4 Species - last assessed by SERAG in 2020				
Stock Structure	Little is known of the stock structure of Royal Red Prawns in Australia, but they are assumed to comprise a single stock off eastern Australia which straddles the Barrenjoey Point SESSF management line.				
Stock status against reference points (C_{Lim}/C_{Targ})	**Tier**	**Assessment Year**	**$CPUE_{Recent}$**	**$CPUE_{Target}$**	**$CPUE_{Limit}$**
	4	2020	1.6045	0.9463	0.3943
	4	2017	1.1114	1.0692	0.4455
	4	2013	1.0443	1.0615	0.4246
Stock trend and other indicators	Annual standardised CPUE trend is noisy and relatively flat across the years analysed, except between 2017 and 2020, where the trend is increasing and above the long-term average. From 2013 - 2016 the standardised trend deviates from the nominal geometric mean trend such that the trend stays on the long-term average CPUE while the geometric mean appears to rise well above it. The significant drop in the 2021 standardised CPUE relative to 2020 is attributed to the relatively low and sparse catches in 2021 (2.1 t) from only two vessels. This species was not actively fished in 2021, based on the high proportion (0.44) of small catches less than 30 kg. So, the standardisation has become more uncertain and dependent on fishers specific fishing activities (Sporcic, 2023).				
Species Category Trigger	**TAC setting approach**				
	A review of available data and assessment options is scheduled for 2026, in accordance with the 6-year threshold, or if 50 t is landed, whichever occurs first.				
Catch and TAC (t)	**SESSF Season**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**	
	2023-24	628	693	-	
	2022-23	651	712	8	
	2021-22	605	645	2	
Economics (Secondary) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**	
	2021-22	0.01	80.00	<0.02	
	2020-21	0.10	64.00	0.16	
	2019-20	0.56	51.34	1.09	
ABARES Status (2023 Report)	**Fishing Mortality: Not subject to overfishing**		**Biomass: Not overfished**		

Climate Sensitivity **Uncertain**	Preliminary projections of climate impact on this species are uncertain. These species were assessed to have a low sensitivity to climate change using an information poor assessment based on life history characteristics. However increased variability in the environment is expected to increase variability in stock abundance of short lived, fecund species such as prawns.
Assessment summary	
Key Model technical assumptions/parameters	The Tier 4 assessment assumes there is a linear relationship between catch rates and exploitable biomass, and that the character of the estimated catch rates has not changed significantly since the reference period to the end of the most recent year.
Significant Changes to data inputs	The average discard proportion for years after 1998, excluding years where estimates are not available, is used to 'backfill' the discard estimates pre-1998. A revised NSW catch series was provided by Dr Liggins for the period 1986 to 1997, however these were not used because the records were vastly different to previous catch series held by CSIRO. Dr Sporcic suggested this should be resolved before the catch series is updated for the next assessment in 2021.
Assessment results and RAG comments	The CPUE analysis was updated using bathymetry data to modify depth-reporting issues from the main boats in 2018 and 2019. SERAG (Dec 2020) noted the revised catch at depth is still too shallow but noted there was very little change in CPUE trajectory. State catches are high in the early part of the time-series (150 - 330 t), however have been typically less than 10 t since 2007. State catches in 2016 we 51 t, most likely from NSW catches north of Barrenjoey point. Commonwealth catch has been between 115 and 220 t since 2010, with 143.4 t landed in 2019. Commonwealth discards are typically low, between 1.3 and 5.5 per cent since 2011. The TAC has never been a limiting factor for this species – catches are influenced by market demand. There was little difference in the CPUE series after modifications to depth records. CPUE over the past six years has increased significantly, resulting in an RBC of 869.6 t from the 2020 assessment compared to 430.8 t from the 2017 assessment. This was also influenced by an increase in CTarg and the scaling factor (Sporcic, 2020a). The increase in CPUE is assumed to reflect an increase in biomass, however royal red prawns are only targeted by two boats, and it is difficult to account for targeting and improved efficiency when standardising CPUE. SERAG (Dec 2020) recommended a 3-year MYTAC using the RBC of 869.6 t from the 2020 Tier 4 assessment. SERAG noted the large change limiting rule would preclude the TAC from increasing by more than 50 per cent.

RAG Recommendations

SESSFRAG (Aug 2023) adopted the use of a Trigger Species category. Species in this category must satisfy a number of criteria and catch will be monitored annually. The TAC is rolled over until a specified trigger is breached, or six years elapse from the last assessment (whichever occurs first), at which point a new assessment is considered.

The recommended long-term TAC for Royal Red Prawn is 628 t, with TAC review triggers of 50 t annual catch or 6 years elapsed since the last assessment (i.e. 2020 + 6 = 2026).

RBC (t)	869.6 t	Long-term RBC to apply until the next assessment.
Discount Factor (t)	130.4	A discount factor was not applied in 2020-21 because of the protection afforded by deepwater closures. Due to the increased uncertainty in the 2020 Tier 4 assessment, SERAG agreed to apply the default 15 per cent discount factor.
State catch (t)	92.9	All NSW catch. There was a significant increase in the reported catch in NSW from less than 1 t in 2019, to 153 t in 2020 and 126 t in 2021.
Discards (t)	2.5	Estimated discard rates have been consistently low over time.
Recreational Catch (t)	N/A	Royal red prawn are a deep water species and are not targeted by recreational fishers.
RCA (t)	N/A	There has been no specific research catch allocated.
Provisional TAC under the Harvest Strategy		628 t – in accordance with trigger species advice.

AFMA Advice

AFMA Management recommends a TAC of 628 t for Royal Red Prawn during the 2024–25 season, including overcatch and undercatch provisions set at 10 per cent, and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	One operator received MSC certification for the harvest of Royal Red Prawn in June 2023. This certificate expires in June 2028.
Species specific management (target, companion, and bycatch)	*All sections below have been intentionally left blank*
MAC advice and any dissenting views	

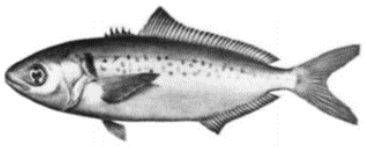
Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Silver Warehou

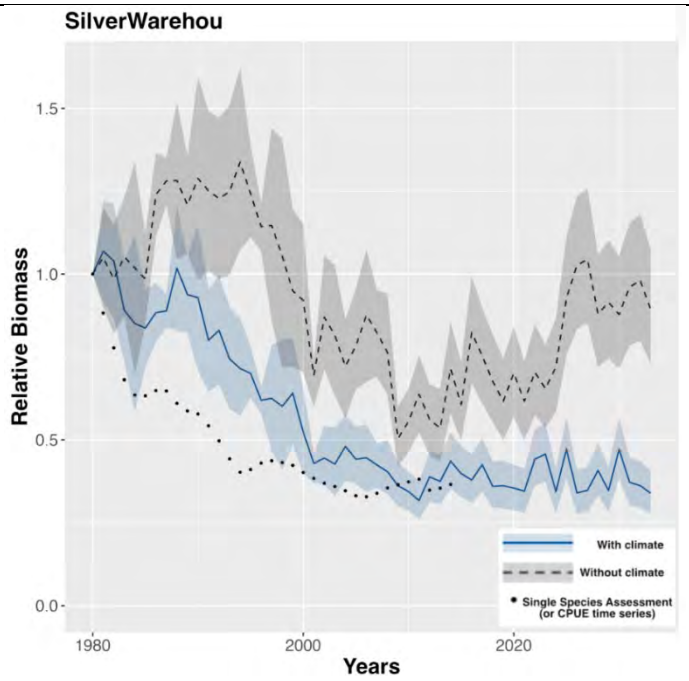
Seriolella punctata



ABARES (2012): Line drawing – FAO

Species Summary

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 ($\%B_0$ in year +1)	**Tier**	**Assessment Year**	**Biomass (from assessment year)**	**Biomass (revised in most recent assessment)**	**Target**	**Limit**
	1	2021	29	29	48	20
	1	2018	31	25		
	1	2015	40	22		
Stock trend and other indicators	Annual standardised CPUE has declined since 1994 and have been below average since 2000 and flat since about 2013. The 2022 catch (36.4 t) of Silver Warehou in the east was the lowest in the series (i.e., since 1986) (Sporcic, 2023).					
Species Category MYTAC	**TAC setting approach**					
	The current season (2023–24) is the 2nd year of a 3-year MYTAC. The next assessment is scheduled for 2024.					
Catch and TAC (t)	**SESSF Season**	**Agreed TAC**	**TAC after unders/overs**	**Commonwealth Retained Catch**		
	2023-24	350	384	-		
	2022-23	350	387	125		
	2021-22	450	487	234		
Economics (Primary) Commonwealth Trawl and Scalefish Hook	**Financial Year**	**Species GVP ($m)**	**Fishery GVP ($m)**	**% Fishery GVP**		
	2021-22	0.50	80.00	0.63		
	2020-21	0.73	64.00	1.14		
	2019-20	0.40	51.34	0.78		
ABARES Status (2023 Report)	**Fishing Mortality: Not subject to overfishing**		**Biomass: Not overfished**			

Climate Sensitivity **Medium**	 Atlantis modelling suggests that climate change has a moderate influence on the biomass of Silver Warehou and is contributing to a lower biomass than would have occurred otherwise.
Assessment summary	
Key Model technical assumptions/ parameters	Single stock model with two fleets, one in the east and one in the west Von Bertalanffy growth curve estimated for one sex including both males and females. Natural mortality (M) fixed at 0.3. Stock recruitment steepness fixed at 0.75. The initial value of the parameter determining the magnitude of process error in annual recruitment is set to 0.7. Selectivity estimated for both fleets. 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. The age observation plus group is modelled to be 23 years. The length-weight relationship is fixed based on previously determined estimates (aa = 0.0000065 g-1 cm, bb = 3.27). Female length at 50% maturity is assumed to be 37 cm.
Significant Changes to data inputs	There have been no significant changes to data inputs
Assessment results and RAG comments	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 3 (removing a known retrospective pattern in estimation). This had no impact in the estimation of stock status. 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. 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 SERAG. 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 21). 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 harvest control rule catches estimate that there is no increase in stock status towards the target reference point (48%B0) and stock status remains at 29%B0. 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 season, 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

RAG Recommendations

SERAG recommended setting the TAC for the 2022-23 season 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.

SERAG (Nov 2023) recommended a Tier 1 assessment is performed on Silver Warehou in 2024 given some concern for the stock.

	Year	RBC (t)	Is a MYTAC Recommended?
RBC (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)	N/A	State catches are very low and are not deducted from the RBC because a TAC based on constant catch is recommended.	
Discards (t)	85	Modelled discards from the 2021 stock assessment.	
Recreational Catch (t)	N/A	There are no estimates of recreational catch.	
RCA (t)	N/A	There has been no specific research catch allocated.	
Provisional TAC under the Harvest Strategy		506 t - calculated using the 3-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 recommends a TAC of 350 t for Silver Warehou during the 2024–25 season, the 3rd year of a 3-year MYTAC, with undercatch and overcatch provisions set at 10 per cent, and a determined amount of 2 t.

MAC Recommendations

Commercial fishers' interest	*All sections below have been intentionally left blank*
Species specific management (target, companion, and bycatch)	
MAC advice and any dissenting views	

Undercatch (%)	Overcatch (%)	Determined amount (t)	TAC (t)

Final agreed TAC

2023-24 agreed TAC (t)	2024-25 recommended TAC (t)	Overcatch and undercatch (%)	Determined amount (t)	Change in TAC (t)

Non-Quota species recommendations

Boarfish and Orange Roughy are non-quota species in the East Coast Deepwater Trawl (ECDWT) Sector and are currently managed under 'catch triggers'. These 'catch triggers' if met, initiate a closure of the sector and are more correctly known as 'catch limits'. This terminology was clarified at the September 2023 SERAG meeting – a 'catch limit' now refers to catch amount that cannot be exceeded, whereas a 'catch trigger' initiates a review of available data.

SERAG (September 2023) supported the use of a Trigger Species category for Boarfish and recommended that a catch limit be set at 200 t for the 2024-25 season with a catch trigger set at 10 t. For ECDWT caught Orange roughy, SERAG recommended maintaining the bycatch TAC of 50 t and for this bycatch TAC to be considered through the annual rebuilding species reviews in future.

The hagfish fishery commenced in 2015 to target the common hagfish (*Eptatretus cirrhatus*) as part of the Gillnet, Hook and Trap (GHAT) sector. Due to operational constraints, there was limited fishing activity in 2023 and the escape hole trial could not be completed. Without new information available to inform the management arrangements for hagfish, SERAG (November 2023) advised that it was not possible to review the existing TAC or management advice for the 2024-25 fishing season. The current TAC of 80 t is based on the maximum annual catch of the fishery since it started; it is split across two zones via concession conditions (north and south of the latitude 36˚45'South) that restricts catch to 40 t in each zone. There is an obligation for concession holders to provide 10% observer coverage.

There are no undercatch or overcatch provisions for non-quota species.

AFMA management recommends that:

- Boarfish in the ECDWT be managed as a trigger species with a catch limit of 200 t and a catch trigger of 10 t
- The bycatch TAC for Orange Roughy in the ECDWT sector be set at 50 t and considered through the annual rebuilding species reviews in future, and
- Current management settings are maintained for the hagfish fishery until further information is available.

Species specific research and priorities

Escape holes are required for hagfish traps to allow for the escapement of individuals smaller than the desired commercial size (> 100 g). At the November 2021 SERAG meeting, preliminary results of the escape hole trial were presented which suggested that 16 mm hole size may be appropriate to allow smaller animals to escape while optimising commercial catch. The trial was continued into 2023 to further examine the use of 17 mm escape holes for optimising commercial catch. Continued support for the escape hole trial in 2023 was provided by both SERAG and SEMAC. The data from the trial are being compiled.

Table 1 Summary of catch triggers for Non-Quota species determination

Non-Quota species	2023-24 Catch Trigger (t)	2024-25 Recommended Catch Limit/Trigger (t)	Change from 2023-24 (t)
Boarfish	200	200 t /10 t trigger	10 t trigger
Orange roughy	50	50	0
Hagfish	80 40 t each north and south of 36˚45'South	80	0

Glossary

Biological reference points – quantitative values, often stated in terms of fishing mortality or stock size, that summarise either a desired state for the stock (a target) or a state of the stock that should be avoided (a threshold).

Biomass – the total weight of all the fish in a stock or a component of a stock.

B_{LIM} (biomass limit reference point) – The point beyond which the risk to the stock is regarded as unacceptably high.

B_{MEY} (biomass at maximum economic yield) – Average biomass corresponding to maximum economic yield.

B_{MSY} (biomass at maximum sustainable yield) – Average biomass corresponding to maximum sustainable yield.

B_{TARG} (target biomass) – The desired biomass of the stock.

B_0 (mean equilibrium unfished biomass) – Average biomass level if fishing had not occurred.

CASAL (C ++ Algorithmic Stock Assessment Laboratory) - an advanced software package developed by the National Institute of Water and Atmospheric Research (NIWA, New Zealand) for fish stock assessment. The software implements a generalised age or length structured fish stock assessment model that allows a great deal of choice in specifying the population dynamics, parameter estimation and model outputs.

Catch Per Unit Effort (CPUE) – the number or biomass of fish caught as by a unit of fishing effort. Often used as a measure of fish abundance.

C_{TARG} (Catch target) – The target catch level.

CE_{LIM} (CPUE limit reference point) – the point below which CPUE is too low and can indicate stock depletion.

CE_{TARG} (CPUE target) – The target CPUE rate.

Close Kin Mark Recapture (CKMR) – uses advances in genetics to affordably and reliably identify parent-offspring pairs (and conceivably other types of kin), and then analyses the number and pattern of pairs in a mark-recapture framework.

Commonwealth Trawl Sector Fishery Independent Survey (CTS FIS) - a survey undertaken in the CTS to provide a time-series of abundance indices that are independent from commercial fishing.

Confidence interval – also called the confidence bound, a range of values within which the true value most likely lies.

Determined amount - for a quota species and a fishing year, means the amount (in kilograms) of that species specified in a determination made by AFMA for section 22A of the *Southern and Eastern Scalefish and Shark Fishery Management Plan 2003* for that species and year.

F (fishing mortality) – The instantaneous rate of fish deaths due to fishing a designated component of the fish stock. F reference points may be applied to entire stocks or segments of the stocks and should match the scale of management unit.

Instantaneous fishing mortality rates of 0.1, 0.2 and 0.5 are equivalent to 10 per cent, 18 per cent and 39 per cent of deaths of a stock due to fishing.

F_{LIM} (fishing mortality limit reference point) – The point above which the removal rate from the stock is too high.

F_{MEY} (fishing mortality at maximum economic yield) – The fishing mortality rate that corresponds to maximum economic yield.

F_{MSY} (fishing mortality maximum sustainable yield) – The fishing mortality rate that achieves maximum sustainable yield.

F_{TARG} (fishing mortality target) – The target fishing mortality rate.

Great Australian Bight Fishery Independent Survey (GABFIS) - a survey undertaken in the GAB to provide a time-series of abundance indices that are independent from commercial fishing.

Index of abundance – numerical value used to demonstrate the trend in relative abundance over time.

Markov Chain Monte Carlo (MCMC) – an approach to estimate uncertainty in a statistical model by beginning with a final model and shifting its associated parameter values slightly to recalculate the model's goodness of fit thousands or millions of times.

Maximum economic yield (MEY) – The sustainable catch level for a commercial fishery that allows net economic returns to be maximised. For most practical discount rates and fishing costs, MEY implies that the equilibrium stock of fish is larger than that associated with maximum sustainable yield (MSY). In this sense, MEY is more environmentally conservative than MSY and should, in principle, help protect the fishery from unfavourable environmental impacts that could diminish the fish population.

Maximum sustainable yield (MSY) – The maximum average annual catch that can be removed from a stock over an indefinite period under prevailing environmental conditions. MSY defined in this way makes no allowance for environmental variability, and studies have demonstrated that fishing at the level of MSY is often not sustainable.

Mortality – Deaths from all causes (usually expressed as a rate or as the proportion of the stock dying each year).

Multi-Year Total Allowable Catch (MYTAC) – MYTACs are applied for Tier 1, Tier 3, and Tier 4 species where suitable. The Harvest Strategy outlines criteria that should be considered when determining whether a stock is suitable for a MYTAC.

Overfished – A fish stock with a biomass below the biomass limit reference point. 'Not overfished' implies that the stock is not below the threshold.

Overfishing, subject to – A stock that is experiencing too much fishing, and the removal rate from the stock is unsustainable. Also:

- Fishing mortality (F) exceeds the limit reference point (F_{LIM}). When stock levels are at or above B_{MSY}, F_{MSY} will be the default level for F_{LIM}.
- Fishing mortality in excess of F_{LIM} will not be defined as overfishing if a formal 'fish down' or similar strategy is in place for a stock and the stock remains above the target level (B_{TARG}).
- When the stock is less than B_{MSY} but greater than B_{LIM}, F_{LIM} will decrease in

proportion to the level of biomass relative to B_{MSY}.

- At these stock levels, fishing mortality in excess of the target reference point (F_{TARG}) but less than F_{LIM} may also be defined as overfishing, depending on the harvest strategy in place and/or recent trends in biomass levels.
- Any fishing mortality will be defined as overfishing if the stock level is below B_{LIM}, unless fishing mortality is below the level that will allow the stock to recover within a period of 10 years plus one mean generation times the mean generation time, whichever is less.

Spawning stock biomass (SB) – the total weight of all adult (reproductively mature) individuals in a population. Also called spawning biomass.

SB_{MSY} – Spawning or 'adult' equilibrium biomass at maximum sustainable yield.

Stock assessment – an evaluation of the past, present and future status of the stock that includes a range of life history characteristics for a species, such as the geographical boundaries of the population and the

stock; information on age, growth, natural mortality, sexual maturity, and reproduction, feeding habits and habitat preferences; and the fisheries pressures affecting the species.

Stock Synthesis (SS) – is a statistical age-structured population modeling framework that has been applied in a wide variety of stock assessments globally (Methot & Wetzel, 2013).

Von Bertalanffy (VB) growth model – used in stock assessments to model the mean length or weight of fishes.

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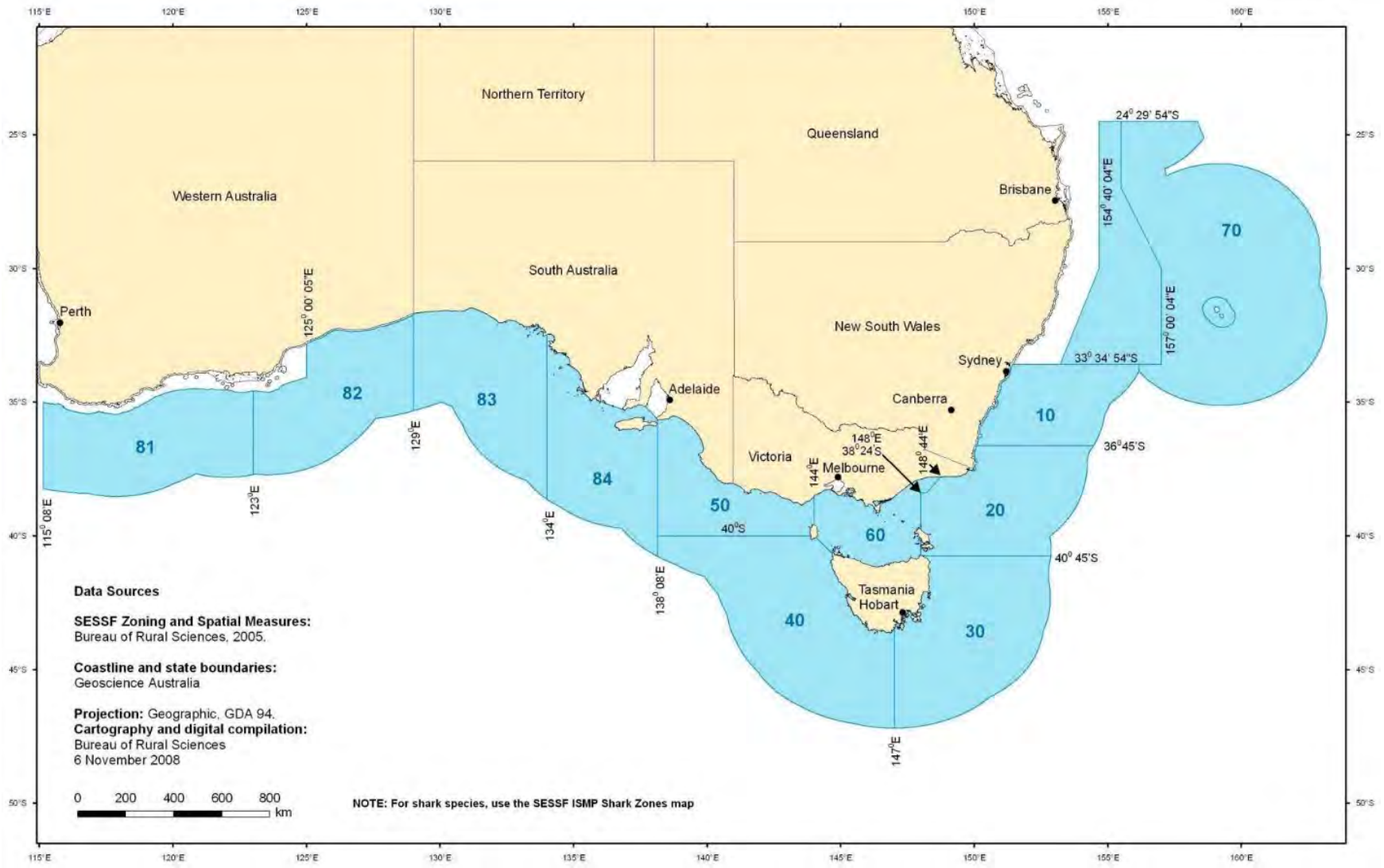
Appendix A – SESSF ISMP Scalefish Zones



Appendix B - Orange Roughy Zones