Australian Government
Australian Fisheries Management Authority

Seventieth meeting of the Sub-Antarctic Resource Assessment Group (SARAG)

FINAL MINUTES

SARAG 70

28-29 MAY 2024

SUB- ANTARCTIC RESOURCE ASSESSMENT GROUP (SARAG)

CHAIR: Mr Bruce Wallner

Date: 28-29 May 2024

Venue: Old Woolstore Apartment Hotel, Hobart, Tasmania

Attendance

Members
Dr Philippe Ziegler, AAD
Dr Cara Masere, AAD
Dr Rich Hillary, CSIRO
Dr Tim Ward, IMAS
Brad Milic, Industry (ALF Pty Ltd)
Rhys Arangio, Industry(Austral Fisheries)
Danait Ghebrezgabhier, AFMA

Invited Participants & Observers
Dr Heather Patterson, ABARES
Dr Pia Bessell-Browne, CSIRO
Dale Maschette, IMAS/AAD
Mr Malcolm McNeill, Industry (ALF Pty Ltd)
Mr Martijn Johnson, Industry (ALF Pty Ltd)
Dr Julie McInnes (agenda item 6 only)
Selina Stoute, AFMA
Kelvin Montanaro, AFMA

Executive Officer
Robert Wood, Executive Officer, AFMA

Introduction

Agenda item 1 - Preliminaries

1.1 Welcome and Apologies

The seventieth meeting of the Sub-Antarctic Resource Assessment Group (SARAG 70) was opened at 9:00am on 28 May 2024 by the Chair, Mr Bruce Wallner. The Chair welcomed members and observers to the meeting and acknowledged the Muwinina people as the traditional owners and custodians of the land SARAG 70 met on, including their ongoing connections to land and sea country and paid respects to elders past, present and emerging.

Members noted that the meeting was being recorded for the purpose of developing the meeting minutes.

1.2 Declarations of Interest

The Chair reminded members and observers of the procedure for declaring and managing conflicts of interest as outlined in the Fisheries Administration Act 1991 and AFMA Fisheries Administration Paper No. 12, including that all members must declare any actual or perceived conflicts of interest (not limited to pecuniary gain) in the fishery at the commencement of the meeting and as soon as they become evident during the discussion of relevant agenda items. If a member discloses an interest in an item, and unless the RAG decides otherwise, the member must absent themselves from the meeting while the RAG deliberates and decides about the matter where a conflict exists, including any discussions about decisions to allow the member to be present during deliberations on the matter in conflict. If the RAG decides at any time that a conflict of interest exists and that this conflict is likely to interfere with the RAG's consideration of a particular issue(s), the RAG may ask to hear the member's views on the issue and then require them to retire from the meeting while it is discussed by the other members and the advice/recommendation is formalised.

The Chair noted that industry has a strong interest in stock assessment agenda items and the MITF Longline fishing season extension trial (agenda item 6), however, suggested that industry should participate in discussions until such time a recommendation was to be agreed.

SARAG noted declarations of interest from members, invited participants and observers at the start of the meeting. All declared interests are reflected in the standing register at **Attachment A**.

1.3 Adoption of Agenda

The agenda **Attachment B** was adopted with an addition of a discussion item under 'Other business' in relation to the potential impact of the Heard Island and McDonald Islands (HIMI) marine reserve review on the stock assessment.

SARAG **requested** that AFMA provided future SARAG Agenda papers and corresponding attachments as a compilation as well as individually.

Agenda item 2 – Actions Arising

SARAG noted an update from the AFMA member on the status of actions arising from previous SARAG meetings at **Attachment C**.

Agenda item 3 – Member Updates

3.1 Industry and scientific member updates

SARAG noted the following verbal updates from industry members:

Australian Longline Fishing Pty Ltd

- One of the vessels had to stop fishing part way through the 22/23 HIMI fishing season due to a medical emergency on board the vessel.
- Both vessels participated in Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) New and Exploratory fisheries which went well.
- The company is currently fishing in the HIMI and the MIT Fisheries and the vessels have reported standard catch rates with good fish size. The fishing vessel at HIMI is participating in the initiative to increase the spread of fishing effort in the fishery and has to date completed 70% of the research hauls designated in the instructions developed by the AAD.
- The vessel had to apply the voluntary whale move-on protocols in response to Sperm whales encounters at HIMI on one occasion.

Austral Fisheries Pty Ltd

- Two vessels have operated in the HIMI fishery since the start of April, with one vessel also fishing at Williams Ridge within the Southern Indian Ocean Fisheries Agreement

(SIOFA) area in late February/early March. Both Austral vessels have or are about to complete their first trips for the current season and return to port.

- Being able to start the RSTS one week earlier was useful as it allowed for better structuring of fishing operations.
- The random stratified trawl survey (RSTS) caught 25 tonnes of mackerel icefish and 86 tonnes of Patagonian toothfish, the second largest survey catch of toothfish on record.
- Sperm whales were encountered by the vessels in April and May.

3.2 AFMA update

SARAG noted the written update provided by AFMA on the following items:

i. CCAMLR New and Exploratory Fisheries applications
ii. The MITF ecological risk assessment
iii. AFMA management response to increased risk of High Pathogenicity Avian Influenza (HPAI) outbreak in Commonwealth fisheries
iv. AFMA's climate adaptation program
v. Amendment of gear specifications is the *Fisheries Management (Heard Island and McDonald Islands Fishery) Regulations 2002*
vi. The Sub-Antarctic Fisheries Electronic Monitoring trial
vii. AFMA Observer Deployments and tagging update
viii. Fishery Assessment Plans (FAP) – including a verbal update from the AFMA Member that the HIMI FAP was finalised and executed on 23 May.
ix. Live release of small toothfish at the HIMI Fishery

With regards to the HPAI related updated (iii above), the ALF Industry Member advised SARAG that they have also developed their own safety protocols for the handling of seabirds by crew members that are complementary to those developed and implemented by AFMA for on-board observers.

With regards to the suggestion to trial the climate adaptation program in the MITF (iv above), it was suggested that this may be more appropriate following conclusion of the MSE project. This is because the MSE will investigate climate change impacts on the assessment and management procedure thus influencing understanding of potential climate related risks.

With regards to the amendment of the HIMI Regulations (v above), the Austral Industry Member requested to be put in contact with the relevant officials at the Department of Agriculture, Forestry and Fisheries leading this process regarding the importance and benefits of the amendments of the gear specifications to industry.

With regards to the live release of small toothfish in the HIMI fishery (ix above), SARAG noted:

- the ALF Industry Member's request to also consider this option for the MITF.
- that the option is only being considered for longline caught small fish with a high expectation of survival; and
- that SARAG will need to further consider (ideally at the SARAG August meeting) any potential scientific implications of releasing the small fish including appropriate sampling and accounting for the catch in the stock assessment.

Agenda item 4 – MITF Management Strategy Evaluation (MSE) project

SARAG noted the update paper provided by the CSIRO on the progress of the preliminary work to identify and test alternative management procedures (MPs) for the MITF, and the presentations provided at the meeting (**Attachment D**) which gave a high-level overview of the process for developing MPs and performance testing using MSE. This project aims to explore management approaches for Patagonian toothfish in the MITF that may be considered more appropriate than the CCAMLR approach used currently given the nature of undesirable performance behaviors that are evident. It also aims to reduce the reliance on stock assessment to generate catch advice with this approach anticipated to have a number of benefits including reduced complexity, testability of the management approach, providing greater scope to develop assessments and reduced interannual catch variability.

The project proposes to use the tagging data to estimate harvest rates and identifies two MP options that can be 'tuned' and tested to determine the one that best achieves the pre-agreed management objectives for the fishery. CSIRO indicated that the project is now at a point where extensive stakeholder input on the management objectives, range of uncertainty, robustness tests and performance measures is required for integration in the MSE.

SARAG reiterated its support for the continuation of this work noting the benefits of the project, once completed, to also inform the review of the application of the CCAMLR decision rule for HIMI and potentially other toothfish fisheries managed under the CCAMRL framework. SARAG provided the following feedback, with CSIRO to follow up at SARAG 71 with a finalised list:

Management objectives and timeframes:

- retention of current CCAMLR target and limit reference points (50% TRP & 20% LRP) to ensure that the MSE results are relevant to the HIMI fishery
- noting current total allowable catch variability, test TAC setting frequency at 2, 3 and 4 years
- 10-15% maximum change in catch limit
- Inclusion of under and over catch provisions
- explore the potential for optimizing multiple objectives to the extent that there is no duplication

Uncertainty in OM and robustness tests:

- robustness to changes in spatial dynamics
- Climate change impacts, tested through time varying biological parameters:
    - primarily through a decline in average recruitment
    - altered growth
    - directional change in the length/weight relationship
    - age-dependent *M*
- consideration of how recruitment variability is captured in the OM

Performance measures:

- Changes in tagging rate

- Total catch and catch variability (non-spatial catch limits)
- Probability of being below the LRP
- Average fish size
- Catch per unit effort (CPUE)

An update will be provided to SARAG in 2025 on the results of the integrated feedback and candidate MPs.

Agenda item 5 – HIMI Patagonian Toothfish stock assessment

SARAG noted the AAD paper provided on the preliminary results of an updated integrated stock assessment for Patagonian Toothfish (*Dissostichus eleginoides*) in HIMI and presentations on ongoing supplementary work to progress the workplan developed during CCAMLR-42 and to support a revised HIMI stock assessment.

Preliminary HIMI 2024 stock assessment

The preliminary 2024 toothfish stock assessment was run with Casal2 and built on the 2023 stock assessment to include updated catch data to 2024, observations data to the end of 2023 and re-estimated growth parameters. No additional areas of high tagging concentration were identified, and new tag recapture data for 20 fish from previously identified areas were excluded from the assessment (total removed 242). Model estimates were largely consistent with those from the 2023 assessment model. The estimated virgin spawning stock biomass (SSB) was estimated at 63,898t (64,520t in the 2023 assessment) and the SSB status in 2024 was estimated at 0.37 (0.39 in 2023 in the 2023 assessment). Survey catchability (q) was still estimated to be greater than 1 albeit a little bit lower than in the 2023 assessment. The annual catch limits, calculated over the 35-year projection period as per the CCAMLR decision rules, were estimated to be 2,620 tonnes. AAD advised that the draft assessment does not reflect any revisions that may be introduced as a result of the ongoing work within CCAMLR to address the issues of spatial bias.

SARAG briefly discussed the recruitment estimates in the HIMI stock assessment considering previous concerns raised about the recruitment pattern and the model estimates not reflecting recent high juvenile toothfish catches in the RSTS. SARAG noted that various recruitment scenarios and their effects will be explored in the stock assessment presented to the next meeting, noting that the various approaches to dealing with recruitment time series will also be discussed at the upcoming WG-SAM meeting.

Update on ongoing supplementary work in CCAMLR toothfish stock assessments

AAD gave an update on the progress of the collaborative work being undertake for HIMI and the other CCAMLR integrated toothfish stock assessments for South Georgia, Kerguelen Island and the Ross Sea, to try and address issues of spatial variability in fishing effort as well as estimation and projection of recruitment, consideration of dynamic B0 within assessments and the CCAMLR decision rule. This work will be presented at the upcoming meeting of the Working Group on Statistics, Assessments and Modelling (WG-SAM).

i. Effects of spatial variability in fishing effort on tagging data

Some work has been undertaken to try to characterise and quantify the spatial changes in fishing and tagging effort over time. Results have been developed for a number of methods so far including a correspondence analysis which identifies changes in the central fishing locations between seasons, calculation of overall dissimilarity indices (DI) between seasons based on relative coverage, and kernel density estimates with a DI at a finer resolution and boundary. Further work has begun on temporal series clustering and tag spatial overlap and bias statistics. In addition, work has begun on developing a stratified Chapman estimate for abundance which would be based on subareas of similar levels of effort and coverage over time. This approach is intended to address some of the issues related toto the effects of tagging concentration due to spatially restricted intensity of fishing effort and the violation of underlying assumptions in mark-recapture methods (i.e. random mixing and movement by toothfish). The next steps of this process include refinement of these approaches as well as the translation of these metrics for use in integrated assessments in CCAMLR.

ii. Alternative Decision rules

SARAG noted that AAD is also currently undertaking work to explore and evaluate harvest rate and biomass harvest control rules that are based on harvest rates rather than constant catch, and to evaluate their robustness against changes in recruitment and productivity. SARAG discussed the potential impact that new decision rules might have on the HIMI Fishery TAC and noted that much of the work to date on harvest rate and biomass-based harvest control rules assumes that there is no misspecification in the there is no misspecification of the stock assessment, which is not believed to be the case. SARAG **recommended** that the performance of alternative decision rules is evaluated through MSE before being implemented.

iii. Dynamic B_0

AAD advised that a concept paper is being developed on the feasibility of adopting a dynamic B_0 approach. This involves evaluating evidence for changes in productivity and determining whether dynamic B_0 approaches are required. SARAG noted that a dynamic B_0 approach relies on various stock assessment assumptions and that there are risks associated with the approach. It was noted that a dynamic B_0 approach could result in a “shifting the goal post” scenario and ultimately becomes a policy decision depending on the management objectives being pursued. Additional issues may arise if there is low confidence in year-class-strength estimates or there is evidence of model misspecification when applying dynamic B_0.

Longline Research Hauls (LRH) 2024

SARAG noted the AAD paper on instructions developed in early 2024 for fishery-independent longline research hauls in the HIMI toothfish fishery to develop a time series of unbiased tag-based abundance index for the stock assessment. The initiative consists of 119 hauls to be fished across designated areas within core fishing grounds and other parts of the fishery that are less frequently fished. The LRH aims to strike a balance between operational flexibility and collection of scientifically meaningful data with a mix of random and vessel-chosen stations, and splitting the allocation of total stations between the two fishing companies based on SFR holdings. The LHR is trialled as a voluntary measure in the 2024 fishing season.

SARAG noted feedback from Industry Members that they appreciate the importance of the work. In their view the overall LRH plan is achievable and they are interested to continue, noting that there are potential challenges to meeting all objectives in their current form while balancing practicality and profitability. The Austral Industry Member reported that they have achieved 30% of the allocated effort (hooks) in 30% of the allocated time. The Member further advised that there is an opportunity cost associated with leaving high catch areas for LHR locations what are further away and have potentially lower yields, which also contributes to loss of operational momentum, especially when there are other factors to contend with such as moving on from whale encounters. The member suggested additional vessel chosen stations or buffer zones around the locations in the core fishing areas to provide more operational flexibility.

The ALF Industry Member advised that it took an equivalent of 10 fishing days to complete 70% of their allocation which has led to lower catch rates for this time of the season. The Member expressed concern that the lack of on-water coordination between vessels may make it challenging to meet the plan due to overlap in the random stations fished by the different companies, as has been the case in one instance this season. The Member highlighted coordination would be improved if all vessels were using automatic identification system (AIS). The Member also requested increased flexibility to reduce time spent undertaking the research shots.

SARAG thanked AAD and Industry on the progress of this initiative to date and **recommended** further discussions to fine-tune the LRH plan including the consideration of appropriate buffer zones.

Agenda item 6 – MITF longline fishing season extension trial

SARAG noted the information provided in the agenda paper to inform its further consideration of a season extension trial in the MITF with a view to formulating its final advice for the trial, including:

- A summary of observer data collected during the 2022/23 fishing season
- An overview by Dr Julie McInnes on two data sets relating to seabirds on and around Macquarie Island.
- AFMA's proposed arrangements for a two-week season extension trial including seabird interaction limits and clarification of minimum effort levels that would apply to undertake and progress the week-based trial stages.

Presentation by Dr Julie McInnes on the current knowledge on the utilisation of the Macquarie Island Marine Park (MPA) by seabirds and marine mammals

Dr McInnes presented on two projects that are currently underway, aimed at improving the current understanding of the biodiversity and natural values of the Macquarie Island Marine Park to inform future management and conservation efforts.

The first project, which follows the recent expansion of the marine park boundaries, involves the retrospective analysis of new and existing tracking (GPS and GLS) data for 13 seabird and marine mammal species, for which data are available, over the period 1992-2019 to

assess how different species utilised the area. The project looked at the proportion of time spent by seabird and marine mammal species within the Macquarie Island Marine Park during the breeding season using utilisation distribution and movement persistence models. Habitat modelling was overlayed to the analyses to provide complementary information on the intensity of habitat use (habitat preference) within the Marine Park.

The results showed that Black-browed albatross (*Thalassarche melanophris*) had the strongest utilisation of the Macquarie Island Marine Park during the summer breeding period, with Northern giant petrel (*Macronectes halli*) also showing strong utilisation. Grey-headed albatross (*Thalassarche chrysostoma*), Light-mantled albatross (*Phoebetria palpebrate*), Wandering albatross (*Diomedea exulans*), and Southern giant petrel (*Macronectes giganteus*) showed lower, but still notable utilisation of the Marine Park during the summer breeding season. Grey petrel utilisation was strong during the winter breeding season. Grey-headed albatross, Northern giant petrel, and Southern giant petrels showed utilisation distributions close to Macquarie Island during the summer breeding seasons. Wandering albatross showed a utilisation distribution to the north of the island during the summer breeding season, whereas the Grey petrel showed a similar utilisation distribution during the winter breeding season. Light-mantled albatross utilisation distribution was close to Macquarie Island and to the south-west towards the ice edge. Movement persistence models indicated that Black-browed and Wandering albatross core foraging areas were around the island, with Wandering albatross also foraging to the north. Grey petrels foraged to the north-east of Macquarie Island and Giant petrels were focused on the island. Preferred habitat analysis suggested north of the island, ridgelines and the island were important seabird habitat.

While the data used in the project consists of varying degrees of accuracy and detail, as well as being sparse and unevenly distributed across species and time periods, it does provide some useful insight on the presence/absence and seasonal abundance patterns of Albatross and petrel species that are relevant to the MITF (with the exception of Soft-plumaged petrel (*Pterodroma mollis*) for which there was no data). The project has so far also highlighted the lack of contemporary data for other key species, for example while the data for grey petrels is relatively recent and robust, other species like the wandering albatross had limited and older data.

The second project examines a land-based Macquarie Island seabird dataset collected by Dr Jeremy Bird during 2017-2018 (year-round) and October 2022 – April 2023, and comparing this to published data from 2002-03 through opportunistic seabird counts on Macquarie Island headlands. A partial effects model provided a broad indication of seabird presence and absence. Migratory patterns for Black-browed albatross, Grey-headed albatross, Light-mantled albatross, and White-capped albatross (*Thalassarche steadi*) showed a sharp decline in abundance during the winter period. Similar patterns were also noted for White-headed petrel (*Pterodroma lessonii*), Soft-plumaged petrel, Prions, and Sooty shearwaters (*Ardenna grisea*). Wandering albatross and Giant petrels showed stable abundance year-round, whereas Grey petrels and Cape petrels had a higher abundance during the winter period.

Dr McInnes concluded that the next steps for the Marine Parks project entail collection of current foraging and dietary data to better understand behaviour and distribution of marine species around Macquarie Island as well as changes over time. There is also potential to

identify the location and timing of peak seabird foraging activity and investigate spatial and temporal overlap between seabirds and the MITF.

Seabird observer data

SARAG noted a presentation from the Executive Officer on the review of the observer data from the 2023-24 MITF fishing season (**Attachment E**), as per SARAG 69 request. With respect to fishing during the one-week season extension period (1-7 September), SARAG noted that 130,900 hooks were set over 7 days (total hooks set during 1-7 Sep is now 238,600), with no seabird interactions reported or observed. AFMA observers were able to undertake six seabird daily counts over the 7 days, which was a marked increase compared to observations during the 2022/23 season extension period. SARAG noted that additional analysis of the observer data would be useful to better understand the proportion of night and day-time observations and potentially compare it to Dr Jeremy Bird's data set for similarities. SARAG also **recommended** further seabird identification training for observers given the large proportion of seabirds in the observer data that are not reported at the species level.

SARAG noted AFMA advice that whilst the AFMA observer program has attempted to meet SARAG 69's recommendation to further increase the frequency of observer daily seabird counts, it has proven challenging to deliver due to other data collection priorities. Industry members advised SARAG that there may be an opportunity to consider co-management arrangements, allowing crew members to undertake observer duties to allow for the increase in daily seabird counts. AFMA welcomed this suggestion and advised that it was open to discussing this option further with industry.

Proposed season extension trial arrangements

SARAG discussed AFMA's proposed season extension trial arrangements (summarised in the table below) to support the continuation of the trial inclusive of a second week (8-14 September) as agreed in principle at SARAG 69. SARAG noted the distinction between industry's proposal and AFMA's arrangements on the three-seabird limit that would apply to non-critical species and the approach to extending the trial to three weeks (15-21 September).

SARAG noted Industry members' concern that, given the consequences if triggered (i.e. cessation of all/part of the trial), the three-bird limit for non-critical species was too conservative to account for accidental seabird mortalities that may occur due to unforeseen circumstances. SARAG **recommended** that a provision is added to this arrangement to allow AFMA to consider any exceptional circumstances that may have applied in the event that three non-critical seabirds were caught and killed during the extension period in a single season.

SARAG also noted Industry members' request for the RAG to consider and support arrangements that would allow the trial to progress to a third week at this meeting, recalling its discussion at SARAG 69 that, given the likely increase in the risk profile (of seabird interaction) further into September, commencement of a third week extension would be subject to further RAG consideration. SARAG **supported** the two-week season extension trial in the fishery and agreed that the continued collection of regular seabird data during the trial is essential and any supporting analysis of that data will inform the RAG's ongoing assessment of the likely risk to seabirds over that period. The RAG noted AFMA's advice that such analysis would need to be performed by someone with the appropriate scientific expertise and that a discreet project would be required to analyse the data.

Subject to the seabird limits not being triggered during the trial, SARAG agreed that, once 250,000 hooks have been set in the period 8-14 September (week 2) over at least 3 seasons, it will discuss the results to date of that trial extension period. If SARAG is satisfied that any new data does not indicate an increased level of risk to unacceptable levels, then once 300,000 hooks have been set in the period 8-14 September, a season extension trial between 15 and 21 September will be enabled. The trial periods for each of week 1, week 2 and week 3 are proposed to be concluded once a cumulative total of at least 500,000 hooks have been set in each period.

SARAG noted that post-trial arrangements would need to be developed in consultation with SARAG and SouthMAC once the trial is completed successfully, including formal inclusion of a season extension for the relative period.

Daylight setting

SARAG briefly discussed Industry's request to vary the prohibition on daylight setting in the fishery and noted additional advice provided by industry on the potential benefits of this (see update to action item 13). SARAG noted that the additional analysis required to further evaluate the risk of daylight setting has not been undertaken due to lack of resourcing, further noting AFMA's advice that if such work remains a priority a scope needs to be developed for a discrete project. Such work may also include the analysis of observer seabird data to support SARAG's ongoing risk-assessment of the season extension trail.

Agenda item 7 – CCAMLR papers to WG- SAM

SARAG noted that the WG - SAM meeting will also be considering papers on other concurrent work to resolve the issues being experienced in the various CCAMLR toothfish stock assessments (assumptions, stock recruitment relationships, mismatch in model and survey estimate trends, stepped time series), in addition to those covered in Agenda Item 5.

Agenda item 8 – Bycatch updates

8.1 Skate and Ray post release mortality update

SARAG noted the update AAD paper, initially considered at SARAG 69, on the work that is underway to manage skate bycatch in the HIMI Fishery. SARAG also noted a verbal update on the progress of the research project investigating skate bycatch management in the HIMI fishery, the outcomes of which will be presented to SARAG 71 by the Principal Investigator Dr Collette Appert.

ACTION ITEM - SARAG recommended that Collette Appert (principal investigator) be invited to SARAG 71 to present the outcomes of her work on skates in the HIMI.

8.2 TEP interactions and gear loss.

SARAG noted the written update on threatened, endangered, and protected (TEP) species interactions and gear loss for the previous season of the HIMI and MIT and CCAMLR New and Exploratory Fisheries. The paper was taken as read.

Industry indicated that environmental factors could contribute to the amount of gear lost and recovered in the different Sub-Antarctic Fisheries. They also raised concerns with a seabird interaction in the MITF, for a seabird species that is known to regularly swim underwater being classified as 'water logged' and potentially killed. The seabird was seen go underwater at night by an observer but was not seen again, therefore they questioned the preliminary outcome.

Agenda item 9 – Other business

Potential impact of HIMI Marine Reserve Review on stock assessment

The HIMI Marine Reserve review was also raised in relation to its potential impacts on the HIMI stock assessment and all the work that is currently underway to address spatial bias if the area is extended. SARAG noted that, there will be an impact on the stock assessment but the extent of the impact will be difficult to evaluate and will depend on how much is locked away and any other changes introduced as part of the new Marine Reserve. There would potentially be no impact on the stock assessment if fish were mixing evenly. It would help if research hauls were permitted in the new reserve, if there is an expansion, to be able to maintain an index of abundance that would apply to the whole population but the resultant effects on catch are uncertain. The Chapman estimate work that is aiming to quantify spatial overlap may be relevant to assessing the impact of contractions in the area of the fishery, if there are any. Furthermore, quantitative analyses associated with the spatial footprint of both effort and tagging may be applicable.

Agenda item 10 – Next Meeting

SARAG **agreed** that SARAG 71 would take place from 28 to 29 August 2024, post the industry meeting.

Attachment A

Table 1. Member, invited participant and observer declarations of interest as advised to date.

Name	Membership	Declared interests
Bruce Wallner	Chair	No pecuniary or other potential interests in sub-Antarctic fisheries.
Dr Philippe Ziegler	Scientific member	Employed by AAD and is the Fishery scientist responsible for Heard Island and McDonald Islands Fishery (HIMIF) work, including the HIMI stock assessments. Dr Ziegler has no pecuniary interest in the sub-Antarctic and his salary is not connected to any research grants noting that he is a principle and co-investigator on current FRDC projects. Dr Ziegler is also the scientific member of SouthMAC, and the Scientific Representative for Australia to CCAMLR.
Dr Cara Masere	Scientific member	Member of the Fisheries team within the Southern Ocean Ecosystems Program at the AAD and has no pecuniary or other interests in the sub-Antarctic fisheries.
Dr Rich Hillary	Scientific member	Employed by CSIRO and is the Principal Investigator of the Macquarie Island Toothfish Fishery (MITF) stock assessment. He is a member of AFMA's Southern Bluefin Tuna Management Advisory Committee (SBTMAC) and Tropical Tuna RAG. Dr Hillary advised that he has no pecuniary interests in the sub-Antarctic fisheries.
Dr Tim Ward	Scientific member	Institute Marine and Antarctic Studies, University of Tasmania, Associate Professor, Fisheries Scientist AFMA Small Pelagic Fishery Resource Assessment Group, Scientific Member AFMA Research Projects (SPF Monitoring, Blue Mackerel Spawning Fraction), Principal Investigator Natural Environment and Resources, Tasmania (Developmental Tasmanian Sardine Fishery), Scientific Advisor, Principal Investigator South Australian Marine Scalefish Fishery Management Advisory Committee, Independent Conservation Scientist, Member Pelamis Pty Ltd (Environmental Consulting Company), Director
Brad Milic	Industry member	General Manager, Operations, at ALFPL which holds various fishing rights in, and operates vessels in, the sub-Antarctic fisheries and New and Exploratory fisheries under the jurisdiction of CCAMLR. I own a consultancy business that currently has a contract with Atlantis Fisheries Consultancy

Name	Membership	Declared interests
		Group, involved with their clients interests in the BSCZSF, and their fishery and cold chain MSC accreditation.
Rhys Arangio	Industry member	Employed by Austral Fisheries P/L (Austral Fisheries) as the General Manager of Science and Policy. Austral Fisheries owns Statutory Fishing Rights (SFRs) in the Australian sub-Antarctic fisheries, which include waters under the jurisdiction of CCAMLR. Noting no changes since the last meeting, Mr Arangio is the Executive Officer of COLTO, as well as being a member of SouthMAC. He was not aware of any investigation or prosecution action by AFMA against his Company, nor of any legal action taken by his Company against AFMA, and has an interest in all agenda items.
Danait Ghebrezgabhier	AFMA member	AFMA employee, no interests pecuniary or otherwise.
Robert Wood	Executive officer	AFMA employee, no interests pecuniary or otherwise.
Dr Heather Patterson	Invited participant	Employed by the Department of Agriculture, Fisheries and Forestry and is the author of the chapters relevant to SARAG in the Australian Bureau of Agricultural Resource Economics and Sciences (ABARES) Fishery Status Reports. Dr Patterson noted that she has no pecuniary interest in the sub-Antarctic fisheries.
Dr Pia Bessell-Browne	Invited participant	Employed by CSIRO as an assessment scientist. Dr Bessell-Brown advised they are the principal investigator on the FRDC project 'Developing a harvest control rule to use in situations where depletion can no longer be calculated relative to unfished levels.' Dr Bessell-Browne noted they have no pecuniary interests in the sub-Antarctic fisheries.
Dr Julie McInnes*	Invited observer	Dr Julie McInnes is a Research Associate with the Institute for Marine and Antarctic Studies at the University of Tasmania. She is the Primary Investigator on an Australian Heritage Grant 'A strategic assessment of wildlife populations on Macquarie Island', Parks Australia funded grant 'The utilisation of Macquarie Island Marine Park by seabirds and marine mammals – a review of current knowledge and future directions' and co-investigator on the 'Macquarie Island Wildlife Monitoring Program' (led by NRE). Julie is one of Australia's representatives on the ACAP Population and Conservation Status working group and Taxonomy working group. Dr McInnes advised that she has no pecuniary interests in the sub-Antarctic fisheries.

Name	Membership	Declared interests
Dale Maschette	Observer	Employed by IMAS and is a fishery scientist responsible for HIMI work including the HIMI icefish stock assessments. They hold no pecuniary interest in the subantarctic fisheries. Their salary is connected to two FRDC research grants related to Southern Ocean fisheries, one that they are the primary investigator on, another that they are a co-investigator on.
Malcolm McNeill	Industry Observer	Mr McNeill is the Managing Director of Australian Longline Fishing Pty Ltd (ALFPL) which holds various fishing rights in, and operates vessels in, the sub-Antarctic fisheries and New and Exploratory fisheries under the jurisdiction of Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). Mr McNeill is a member of SouthMAC, the Ross Sea MSC Client Group, a Board member of the Coalition of Legal Toothfish Operators (COLTO), and a Director of Petuna Sealord Deepwater Fishing (PSDF) company and its associated companies. Mr McNeill was not aware of any investigation or prosecution action by AFMA against his Company or of any legal action taken by ALFPL against AFMA.
Martijn Johnson	Industry Observer	An employee of Australian Longline Fishing Pty Ltd (ALFPL). Mr Johnson is the Sustainability and Operations Coordinator of ALFPL which holds various fishing rights in, and operates vessels in, the sub-Antarctic fisheries and New and Exploratory fisheries under the jurisdiction of CCAMLR. Mr Johnson is not aware of any investigation or prosecution action by AFMA against ALFPL or any litigation entered in to by ALFPL.
Selina Stoute	AFMA observer	AFMA employee, no interests pecuniary or otherwise.
Kelvin Montanaro	AFMA observer	AFMA employee, no interests pecuniary or otherwise.

* attended for Agenda Item 6 only.

Attachment B

70th Meeting of the Sub-Antarctic Resource Assessment Group (SARAG)

28-29 May 2024

Draft Agenda

Time (AEDT): 28 May 9:00am – 5:00pm, **29 May** 9:00am – 5:00pm

Location: Drovers Room**,** The Old Woolstore, 1 Macquarie St, Hobart

Chair Name: Bruce Wallner

Approximate time	Item	Purpose	Lead Presenter
SARAG 70 - Day 1 - 28 May 2024			
9:00	**1. Preliminaries**		
	1.1 Welcome and apologies	For noting	Chair
	1.2 Declaration of interests	For advice	Chair
	1.3 Adoption of agenda	For advice	Chair
	2. Actions Arising	For noting	AFMA
	3. Member updates		
	3.1 Industry and scientific member update	For noting	All*
	3.2 AFMA update	For noting	AFMA
10:45	**Morning tea**		
	4. MITF Management Strategy Evaluation project	For advice	CSIRO
12:30 (45 min)	**Lunch**		
	4. MITF Management Strategy Evaluation project (*continued*)	For advice	CSIRO
14:30 (15 min)	**Afternoon Tea**		
14:45	**5. HIMI Patagonian Toothfish stock assessment**	For advice	AAD
17:00 - Close of Day 1			

SARAG 70 - Day 2 - 29 May 2024			
9:00	**5. HIMI Patagonian Toothfish stock assessment (*continued)***	For advice	AAD
10:30 (15min)	**Morning tea**		
11:00	**5. HIMI Patagonian Toothfish stock assessment (*continued)***	For advice	AFMA
12:30 (45 min)	**Lunch**		
13:15	**6. MITF longline fishing season extension trial**	For advice	AFMA
15:00 (15 min)	**Afternoon Tea**		
15:15	**7. CCAMLR Meetings WG-SAM, EMM WG-FSA, SC & Commission (verbal update)**	For noting	AAD
15:45	**8. Bycatch updates**		
	8.1 Skate and ray post-release mortality project update	For noting	AAD
	8.2 TEP interactions & gear loss	For noting	AFMA
16:30	**9. Other Business**	For noting	All*
	9.1 Potential impact of HIMI Marine Park Review on stock assessment	For discussion	
	10. Next Meeting	For advice	Chair*
17:00 - Close of Day 2			

* Verbal update, no agenda paper provided

Attachment C

Item	Action arising	Status as at SARAG 70
1	**Longline survey** AAD to keep SARAG up-to-date regarding a longline survey in the HIMIF (SARAG 62 Agenda Item 7), and to develop a paper with 3 RSLS options and cost/benefits for each approach for discussion (SARAG 65 Agenda Item 11). AAD to integrate survey design scenarios, sample size stations and predict some inputs to progress the recommendations of the RLS paper. AAD will incorporate this work into the overarching research priorities document to determine operational components of the RLS. (SARAG 66 Agenda Item 5.5) AAD to provide a paper on RLS design, including number of lines, potential shot placements, and opportunity cost at **SARAG 70** (SARAG 68 Agenda Item 7)	**Completed** The AAD provided SARAG 70 with the paper *HIMI Toothfish fishery: Longline Research hauls 2024* which was discussed at the meeting. The paper outlines the instructions developed by AAD to guide industry to voluntarily spread fishing effort in a structured form. SARAG 70 noted that the design of the longline research hauls will continue to develop as fishing progresses and recommended that this action item is closed with subsequent updates on the LRH to be provided as part of Action Item 4 below - HIMI Data Collection Approaches.
2	**Observer Data Collection** At SARAG 68 (May 2023) AFMA and AAD agreed that AAD would review data needs of the CCAMLR New and Exploratory, HIMI and MITF fisheries, and to subsequently meet with AFMA to review and update the observer instructions and handbook for the 2023/24 seasons; including seabird data collection requirements and with regard to the Fisheries Data & Monitoring Strategy.	**Completed** **Ongoing Action Item** SARAG proposed that AAD and AFMA undertake a comprehensive review of the observer data collection requirements relative to the data collection and reporting needs of the HIMI, MITF and CCAMLR New and Exploratory Fisheries in late 2024/early 2025as priorities allow.
3	**MITF Management Arrangements** CSIRO to present an updated MSE options paper with further refined options for discussion at SARAG 70 (SARAG 68, Agenda Item 6.3)	**Completed.** CSIRO presented an update on the progress of the project at SARAG 70 – Agenda Item 4.

4	**HIMI Data Collection Approaches** AAD to work with CSIRO, industry and AFMA to provide a paper to the next SARAG meeting outlining the broad scientific and resource costs and benefits associated with the implementation of different surveys and research proposals: Random Stratified Trawl Survey (RSTS review, including variations to the periodicity), continued refinement of the longline research hauls (RLH) and development of a time series of fishery independent longline hauls & Close Kin Mark Recapture (CKMR) (SARAG 66, Agenda Item 5.4)	**Ongoing** SARAG advised that it still considers this work as an ongoing priority for the HIMI Fishery. SARAG suggested revising the wording of the action item to reflect the development and continued refinement of the longline research hauls at HIMI.
5	**Electronic Monitoring (EM)** - AFMA to review EM WG membership and reconvene the group (SARAG 66, Agenda Item 6). AFMA to schedule an OOS meeting of SARAG to progress planning process for a Sub-Antarctic EM data collection trial (SARAG 68, Agenda Item 2)	**Completed** SARAG 70 further considered the discussion in relation to Action Item 2 with respect to undertaking a comprehensive review of observer data collection duties which may provide information on how to best integrate EM into the data collection and monitoring program of Sub-Antarctic Fisheries. SARAG 70 suggested having a standing agenda item on EM related updates for future RAG meetings.
6	**Marine Mammal Interactions** AFMA to provide a discussion paper for SARAG 69 to explore data or investigation/analysis needs regarding elephant seal interactions (SARAG 68, Agenda Item 9.3).	**Completed** SARAG 70 noted the completion of this action item.
7	**Climate Change Adaption Workshop Feedback-** AFMA to seek SARAG feedback on the HIMI climate adaptation workshop report by 31 August 2023 (SARAG 69 – Agenda Item 5)	**Completed** SARAG 70 noted the completion of this action item.
8	**HIMI Toothfish Stock Assessment-** Toothfish Stock Assessment AAD to undertake additional analyses to address the ongoing uncertainties impacting the toothfish stock assessment, including: - Evaluation of the impact of the spatial distribution of fishing effort on tag recaptures on the stock assessment - Further examination of the disparity between cohort strength of young fish observed in the RSTS and older fish observed in the longline fishery, and potential linkages to movement patterns - Toothfish fishing mortality assigned to the RSTS and the weighting of the LL1 and LL2 strata splits (SARAG 69 – Agenda item 6)	**Complete** SARAG 70 noted that this action item is captured in the CCAMLR toothfish stock assessment and decision rule workplan and considered business as usual and as such does do not need to be identified as an action.

9	**Domestic Decision Rule HIMI-** Development of a domestic decision rule for HIMI Toothfish TAC setting be explored going forward, noting this may require specific funding (SARAG 69 – Agenda item 6)	**Ongoing** SARAG 70 noted that the progress of this action item is to some extent dependent on other work that is currently underway such as the MSE project for MITF and the exploration of different decision rules at CCAMLR.
10	**MITF Bycatch Analysis -** Analysis of bycatch trends over time to be provided as part of the stock assessment to inform future SARAG considerations of bycatch limits for the MITF.	**Ongoing -** Due May 2025 SARAG 70 noted that bycatch analysis is now part of the stock assessment project and not within the current scope of the MSE development.
11	**Observer Seabird interactions –** SARAG recommended that observers conduct daily seabird observations, at regular intervals, for the remainder of the 2023/24 season and during the 2024/25 season	**Completed** SARAG 70 noted the completion of this action item.
12	Observer data to be analysed for gaps in observation (time of day) and develop paper on species specific diurnal patterns and risk for SARAG 70.	**Ongoing** SARAG 70 noted that the additional analysis required to further evaluate the risk of daylight setting to seabirds in MITF has not been undertaken due to lack of resourcing, further noting AFMA's advice that if such work remains a priority a scope needs to be developed for a discrete project. Such work may also include the scientific analysis of observer seabird data to support SARAG's ongoing risk-assessment of the season extension trail.
13	**Daylight Setting Definition -** Industry to provide an updated proposal with a more specific outline of "daytime setting" and proposed trial period for discussion at SARAG 70.	**Completed** Industry tabled a revised proposal at SARAG 69 that provides additional details on the preferred timings to commence a daylight setting trial. Industry verbally advised SARAG 70 that being able to undertake some daylight fishing may potentially allow them to set an estimated 5,000 hooks/day (difference between avg. hooks hauled in HIMI and MACCA where the daylight setting is the only real difference), at a catch rate of 0.23kg/hook (5 yr avg) amounting to 166t of toothfish catch in a 145-day season.

14	**Funding Additional Seabird Abundance Data -** AFMA to explore funding options to progress seabird experts to provide a paper summarizing any additional seabird abundance data for consideration at SARAG 70.	**Complete** SARAG 70 noted the completion of this action item.
15	**Toothfish Stock Assessment -** Industry, CSIRO and AAD to meet out of session to discuss alternative data source timelines and potential contributions to the toothfish stock assessment and means of better understanding and incorporating movement and mixing characteristics of the stock.	**Complete** SARAG 70 noted the completion of this action item.
16	**RSTS review paper**- AAD to provide an updated RSTS review paper for discussion at SARAG 70.	**Close and incorporate into current action item 4 above** as a place holder to continue to progress the work tabled at SARAG 69 taking into account the feedback received from SARAG members on the paper at the time. The urgency to review the current settings of the RSTS in the short term, especially its frequency, have been resolved by bringing the start of the survey forward to remove the overlap with the start of the longline fishing season which minimises some of the associated opportunity costs to industry. This work is also part of the research agreement that AAD and Industry have signed.
17	**Sub Antarctic Fisheries 5-Year SRP -** AFMA to circulate the revised draft Sub Antarctic Fisheries 5-Year SRP (2024-2028) for comment out of session.	**Ongoing** AFMA will circulate a copy for comment in the coming weeks.

Attachment D

Management Procedures and Management Strategy Evaluation

SARAG Meeting 70

Pia Bessell-Browne & Rich Hillary | 28th May 2024

Management Procedures (MPs)

- A set of rules used to determine management actions, including specification of:
  - Data collection
  - Assessment methods
  - Control rules
- Sometimes referred to as harvest strategies
- Are required for Commonwealth fisheries in Australia as described in the Harvest Strategy Policy

Aims of MPs

- The objectives of a MP will be set in a broad sense by the HSP
  - E.g. aim to maintain biomass at TRP and prevent decline below LRP
- However, more detailed aspects of MPs and how they achieve the goals specified by policy will vary by fishery:
  - Economic constraints
  - Data availability
  - Fishery constraints (e.g. preference for stable catches)
- There are different ways to achieve the same overarching goal, e.g. a MP for SBT will be different to that for the NPF

Development of MPs

- The objectives of MPs will vary by fishery
- We need to test the performance of different options, including:
  - Assessment type
  - Control rules
- History has shown that the most popular ideas on paper do not always have the best performance
- We need to test performance of potential options using Management Strategy Evaluation (MSE)

MSE

- A tool used to quantitatively evaluate the performance of alternative management measures
- The performance is evaluated over a range of different plausible fishery characteristics (e.g. spatial area, fleet dynamics)
- This ensures that the MP is robust to a spectrum of plausible future scenarios

MSE features

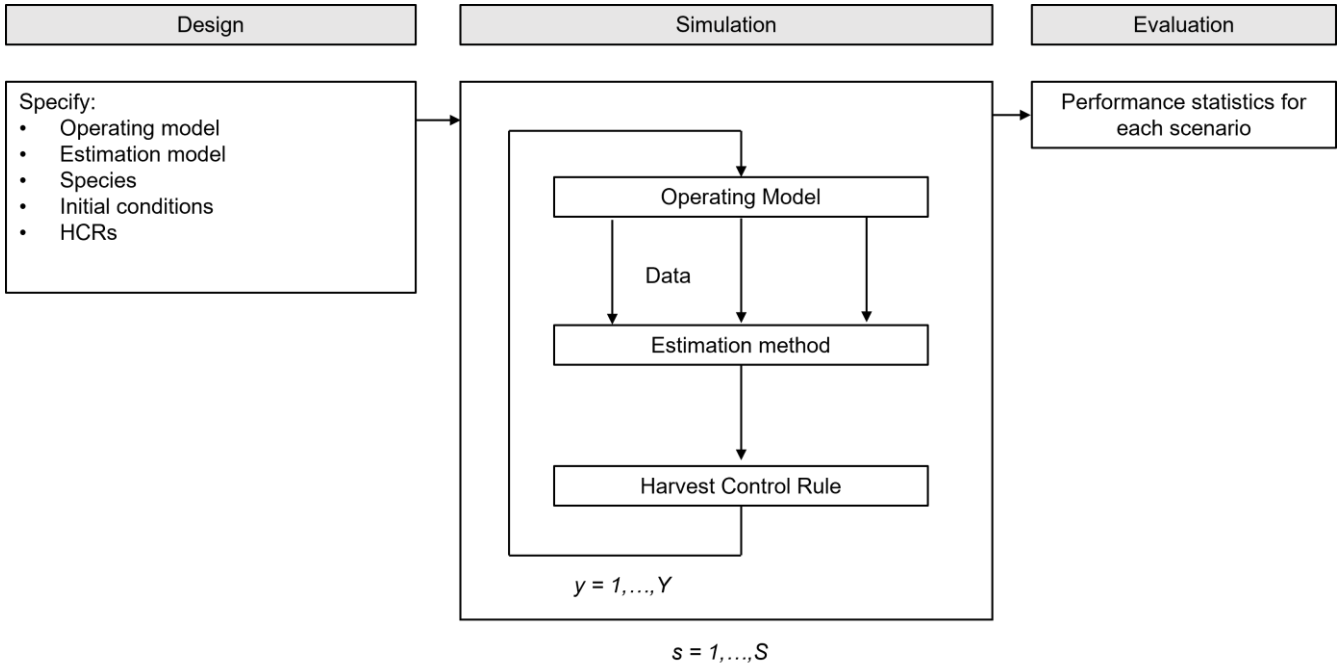
Observation Model (OM)

- A ‘true’ version of reality
- Contains range of uncertainty in the system
- Used to generate data and test performance of assessment and management measures

Estimation Method (EM)

- The ‘observed’ system
- Includes assessment and management measures

MSE framework



Stakeholder input in MSE

- Is a critical component of MSE
- Example aspects include:

MP objectives	Uncertainty	Performance measures
TRP	Spatial structuring	Mid and final depletion
LRP	Climate change impacts	Prob depletion < LRP
	Fleet dynamics	Total catch
		Catch variability

A MP for Macquarie Island toothfish

- We’re looking to develop an alternative MP approach to the current CCAMLR rule
- This involves stepping back from using the stock assessment to generate catch advice
- This has many benefits, including:

Complexity	Testability	Separation of powers
Simple often outperforms more complex	We often update stock assessments	Decoupling assessment and management advice
Easier to understand changes	This is impossible to MSE test	Allows more freedom for assessment development

Preliminary MP development and MSE results

Stakeholder input

- We're looking for input on:

Management objectives & timeframes	Uncertainty in OM & robustness tests	Performance measures
50% TRP?	Spatial structuring	Mid and final depletion
20% LRP?	Climate change impacts	Prob depletion < LRP
TAC setting frequency	Fleet dynamics?	Total catch
Minimum/maximum change		Catch variability
Exceptional circumstances		

Revising management at Macquarie Island

Rich Hillary & Pia Bessell-Browne

ENVIRONMENT
www.csiro.au

Outline

- Project to explore new management approaches for MI
- Current approach (history, implementation, issues)
- Outline of alternative approaches
- Simple example
- Management objectives and practical constraints
- Process timeline

Current management approach for Macq. Is.

- Last decade or so we've applied "The CCAMLR Rule"
- Approach used in CCAMLR for major toothfish fisheries
- Constant catch strategy based on future projections
- Idea:
  1. Obtain estimate of current spawning stock biomass
  2. Find catch that leaves 50% of unifished level after 35 yrs
  3. Find catch where it's above 20% unfished 90% of the time
  4. Pick the lowest of those two for your TAC
- Original context: do a survey, get biomass, calculate TAC
- Current context: complex integrated assessment, calculate TAC

Issues with CCAMLR rule

- The logic behind it doesn't apply anymore
- It's never been *fully* simulation tested
- How sensible is projecting 35 years into the future?
- Driven by complicated assessments
- When things change it's hard to nail down exactly why
- There are no constraints on TAC variability
- Assessment issues at HIMI are amplified by the rule

Idea on alternative to CCAMLR approach

- At Macca the tagging data are the main information source
- Almost all abundance information coming from these data
- Idea is to use tag data in simplified model:
  - Aggregate across release size, sex
  - Perhaps even location (non-spatial model)
  - Estimate “average” exploitation rates/abundance
- These are then input to suite of candidate HCRs

Operating Models & data generation

- OM structure: time/sex/age/size/age population
- Time-varying options for:
  - Growth, natural mortality, recruitment
  - Migration
  - Selectivity, spatial fishing pattern
- Data generation options:
  - Mark-recapture data
  - Length composition, age-given-length data
  - Abundance indices

Tagging estimators

- Two variants:
  1. Non-spatial Brownie model
  2. Spatially structured Brownie model
- Both require an assumed value of natural mortality
- Model 1: annual harvest rates
- Model 2: annual spatial harvest rates and migration
- Model 2 closer to assessment tagging module

Motivational MSE example

- Assume basically same life-history as Macca toothfish
- Spatial: two-area model with 10% annual migration
- Fishery: longline, one fleet in each region
- Initial conditions: unfished equilibrium
- Fishing: 20 yrs @ implied effort yielding 50% depletion
- Tagging: 10 yrs after fishing starts @ 3 t.p.t
- MP implementation:
    1. Start after 20 years of fishing
    2. TAC decision every 5 years
    3. Projections go 20 years into the future

Candidate Management Procedures

- General form:

$$TAC_{y+1} = TAC_y \times \text{HCR multiplier}$$

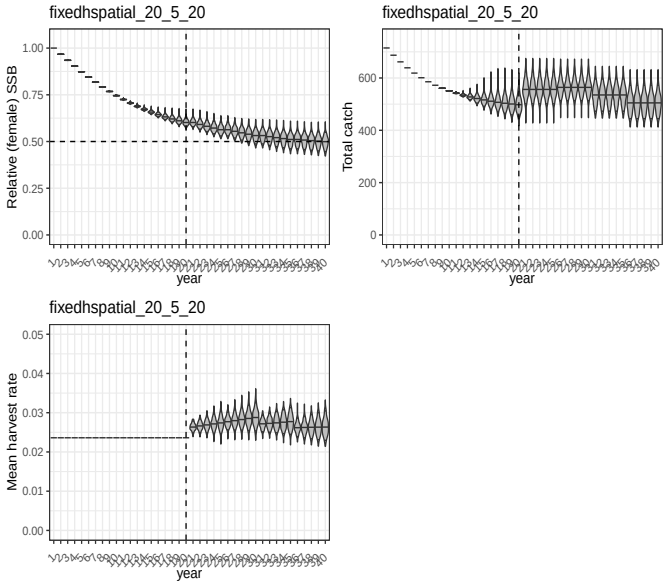
- **MP1**:
  - Non-spatial tagging estimator
  - Input: 4 year moving average harvest rate
  - HCR: ratio of target and average harvest rate
- **MP2**:
  - Spatial tagging estimator
  - Input: spatially-averaged 4 year MA harvest rate
  - HCR: same as for **MP1**

Objectives, tuning & operational parameters

- Objective: SSB depletion 50% prob. 0.5 after 20 yrs
- Tuning: target harvest rate key HCR tuning parameter
- TAC frequency: every 5 years
- TAC constraints: symmetric maximum change of 20%
- Performance statistics:
    1. SSB depletion during MP implementation period
    2. Average TAC following MP implementation
    3. AAV (TAC variation percentage)
    4. Probability maximum TAC change constraint triggered

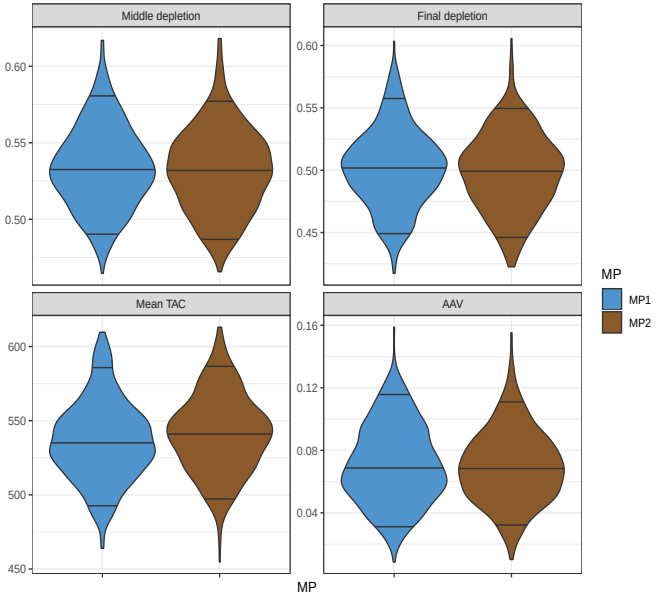
Simple MSE summary: time-series

- Relative SSB (TL), TAC (TR), and harvest rate (BL)
- Violins are median with 95% probability interval



Simple MSE summary: performance statistics

- Intermediate and final SSB depletion (top)
- Mean TAC (left) and AAV (right)
- Max. TAC change probability: **MP1** is 0.015, **MP2** is 0.011



Simple MSE summary

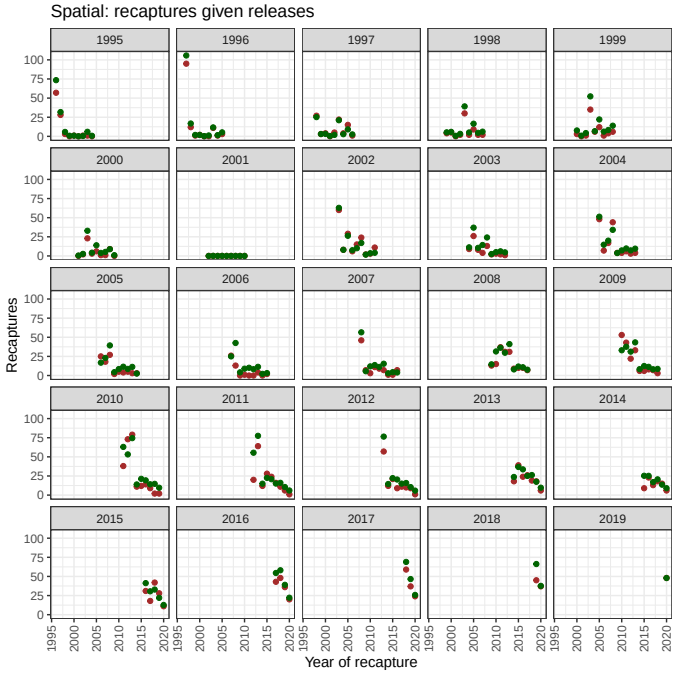
- **MP2** *marginally* better than **MP1**
- Spatially balanced population and fishery reasons why
- Takeaways:
  1. Even simple tag-driven MPs can do the job
  2. Data variability, population+fishery *very* Macca-like
  3. TAC variation well below 20%
- Don’t need complexity of assessment to get what we need
- Very likely don’t have to change TAC every two years...

Fitting models to actual Macca data

- Further tested potential of simpler tag models
- Fitted spatial model to Macca data *ca.* 2021
- Questions:
  1. Can we fit to the actual data?
  2. How well do we replicate mean harvest rates?
  3. How well do we replicate migration estimates?

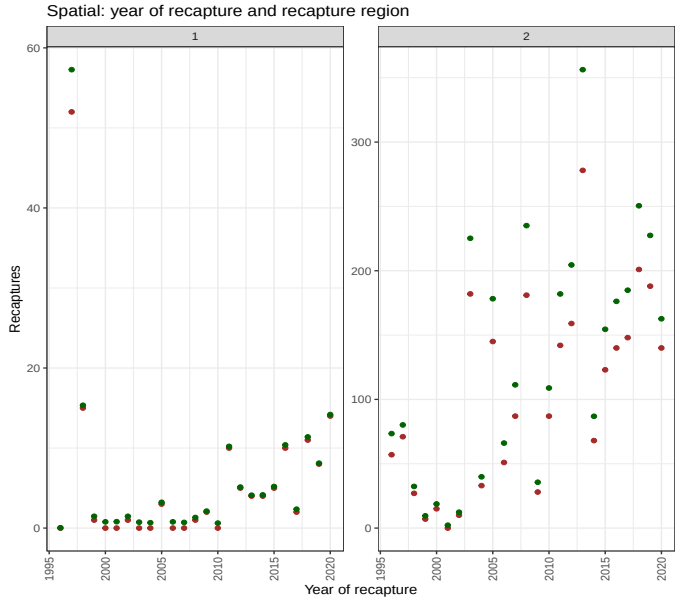
Fits to Macca tag data I

- Each panel release year and subsequent recaptures



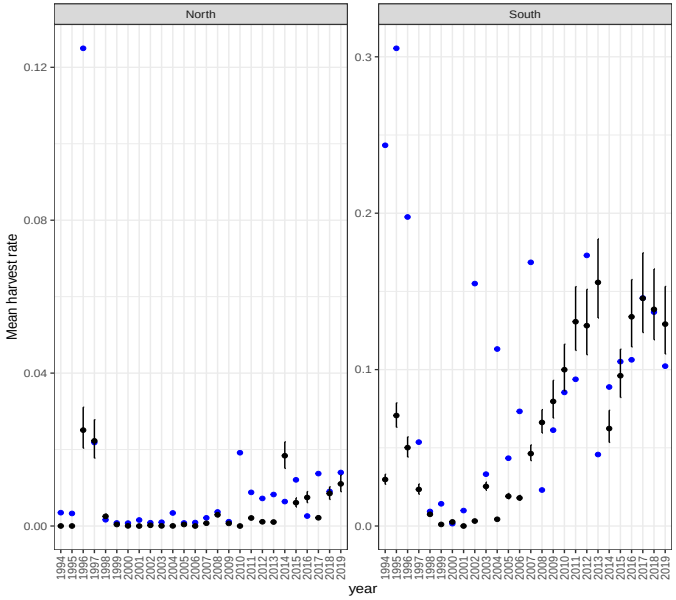
Fits to Macca tag data II

- Each panel is recapture region



Mean harvest rate comparison

- Northern (left) & Southern (regions)
- Black stock assessment, blue simpler MP estimator



MP model fitting summary

- Fits to data as well as assessment does
- Early (trawl) harvest rates over-estimated
- Recent (longline) estimates fairly good
- Migration *slightly* lower than assessment
- Overall - getting recent averages about the same
- Initial exploration looks promising

Summary of initial MSE work

- Exploration of tag driven MPs looks encouraging
- Candidate MPs could:
  1. Reasonably estimate average harvest rate
  2. Use as input in simplified HCR
  3. Attain current “objective” over meaningful time-frame
  4. No obvious need for 2 year TACs
  5. Also kept AAV clearly below 20%
- Obviously lots more work to do...
- ...but no reason to assume approach couldn’t work

Practical next steps

- Discuss management objectives & time-frames
- Range of uncertainties required in OMs
- Robustness tests (e.g. climate change, operational)
- Discuss operational practicalities:
    1. Form and magnitude of TAC change constraints
    2. Frequency of TAC change (currently 2 year cycle)
    3. Timing and role of stock assessment
    4. Exceptional Circumstances

Current timeline

- This SARAG: first look at general idea
- Looking for extensive feedback
- Integrate feedback, come with candidate MPs @ SARAG 2025
- Ideally look to adopt new MP for Macquarie Island

Thank You

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ATTACHMENT E

Attachment B to Agenda Item 6 (SARAG 70) – An update on the nature and extent of observer seabird data for the Macquarie Island Toothfish Fishery (MITF) 2023 longline season.

Background

1. In 2023, SARAG 69 recommended a review of observer data and outcomes of the 2023 season extension to identify any seabird observation biases or patterns. SARAG 69 also recommended that observers should conduct daily seabird counts at consistent, regular intervals for the remainder of the 2023/24 season and throughout the 2024/25 season. This paper presents the number of daily observations, seabird abundance and diversity, and their corresponding times throughout the 2023/24 MITF longline season. The summary does not include analysis of variability between observers.

Data availability and collection

2. Data presented includes seabird abundance, number of species, species observed, and effort data (number of hooks). To aid analysis, MITF longline season weeks were defined, with week 1 starting on 15 April, and week 21 starting on 1 September (Table 1).[1] To allow the season extension in week 21 to be displayed separately, week 20 is shortened to the 26-31 August (Table 1). Week 0 includes a small number of seabird abundance observations not associated with demersal longline fishing activity in early April.

Table 1:Definition of MITF longline season weeks. All weeks are 7 days from the opening of the longline season on 15 April, except for Week 20(*) which is shortened to 6 days to avoid dividing the September season extension period.

April	May	June	July	August	September
Week 1 15-21 April	Week 3 29 Apr – 5 May	Week 7 27 May – 2 Jun	Week 12 1 – 7 Jul	Week 16 29 Jul – 4 Aug	Week 21 1-7 Sep
Week 2 22-28 April	Week 4 6 – 12 May	Week 8 3 – 9 Jun	Week 13 8 – 14 Jul	Week 17 5 – 11 Aug	
	Week 5 13 – 19 May	Week 9 10 – 16 Jun	Week 14 15 – 21 Jul	Week 18 12 – 18 Aug	
	Week 6 20 – 26 May	Week 10 17 – 23 Jun	Week 15 22 – 28 Jul	Week 19 19 – 25 Aug	
		Week 11 24 – 30 Jun		Week 20* 26 – 31 Aug	

3. Seabird data was collected during setting and hauling activities and through daily observations. Setting, hauling, and daily observations consist of one five-minute count of all birds and marine

[1] Note that the MITF fishing season runs from the 15 April to 14 April the following year. The MITF longline season occurs within this period and takes place between 15 April and 31 August with a trial extension of 1-7 September.

mammals within a 180-degree arc and 300m radius around the stern of the vessel. Daily observations took place when the vessel was not undertaking fishing activities and did not occur consistently due to the timing of fishing activity, prioritisation of other tasks, and the number of observers deployed. All daily observations took place during dawn, day, or dusk, except for one observation that took place during night on the 18 August 2023. Setting observations took place after nautical dusk as management requires night setting of demersal longlines in the MITF.

4. SARAG 69 emphasized the importance of consistency in daily observation times. Some progress is evident for this objective, with the peak daily observation time occurred at 03:00 am (UTC+0) (Table 2).

Table 2: Daily observation times during the 2023/2024 season.

Observation Times (UTC+0)	Number of observations
21:00	2
22:00	5
23:00	5
00:00	2
01:00	7
02:00	7
03:00	9
04:00	1
05:00	4
06:00	2
07:00	2
TOTAL	**44**

Number of Species

5. Over the 2023/24 season, species diversity was recorded for set, haul, and daily observations.[2] The greatest species diversity was observed in week 3 during a haul observation, where 14 different seabird species were observed (Figure 1, Table 3). Greatest species diversity was

[2] Note that the number of observations undertaken may have influenced the species diversity recorded.

generally recorded during haul observations (Figure 1, Table 3). Comparatively, species diversity was noticeably lower for set observations (Figure 1, Table 3).

6. Overall, the number of species was greater at the beginning of the MITF longline season (Figure 1, Table 3). By week 14, the number of species remained relatively consistent, with no increase occurring during the season extension in week 21 (Figure 1, Table 3).

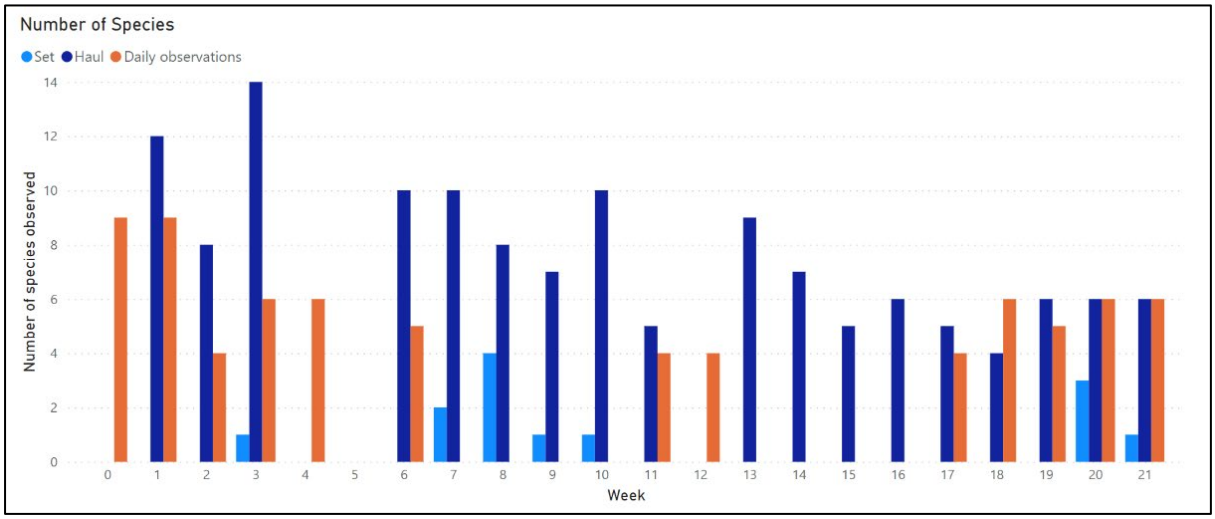


Figure 1: Number of species observed determined by set, haul, and daily observations for the 2023/24 MITF longline season.

Table 3: Total number of species observed per week observed during daily, set and haul observations.

Week	Species Diversity Set	Species Diversity Haul	Species Diversity Daily
Week 0	0	0	9
Week 1	0	12	9
Week 2	0	8	4
Week 3	1	14	6
Week 4	0	0	6
Week 5	0	0	0
Week 6	0	10	5
Week 7	2	10	0
Week 8	4	8	0
Week 9	1	7	0
Week 10	1	10	0
Week 11	0	5	4
Week 12	0	0	4
Week 13	0	9	0
Week 14	0	7	0
Week 15	0	5	0
Week 16	0	6	0
Week 17	0	5	4
Week 18	0	4	6
Week 19	0	6	5

Week 20	3	6	6
Week 21	1	6	6

Average Weekly Seabird abundance

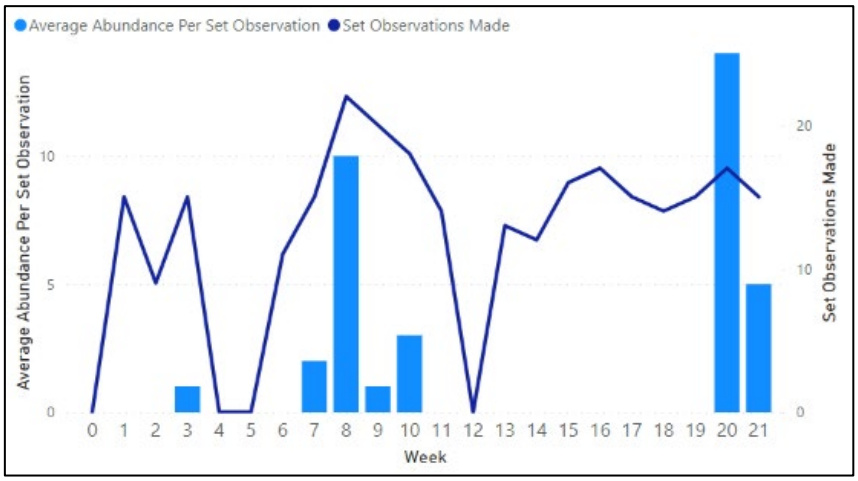
7. Average weekly seabird abundance counts were calculated for the 2023/24 MITF longline season.[3] Average abundance counts during setting were generally lower than for other types of observation (Figure 2). However, peaks in average weekly seabird abundance did occur for set observations during weeks 7 to 10 and weeks 20 to 21 (Figure 2A). The average weekly seabird abundance was generally higher for haul observations compared to other methods or times, showing a steady rise throughout the season (Figure 2). A noticeable increase in average weekly seabird haul observations occurred in week 7 (181) (Figure 2B and Table 4). Weekly average abundance counts were apparently associated with the number of observations undertaken and remained relatively low throughout the season, with a notable spike observed between weeks 18 and 21 (Figure 2, Figure 3).

8. Weekly total average abundance and weekly total observations across all methods showed an increase in average weekly seabird abundance through the season with a notable increase in week 7 and between weeks 18-21 (Figure 3).

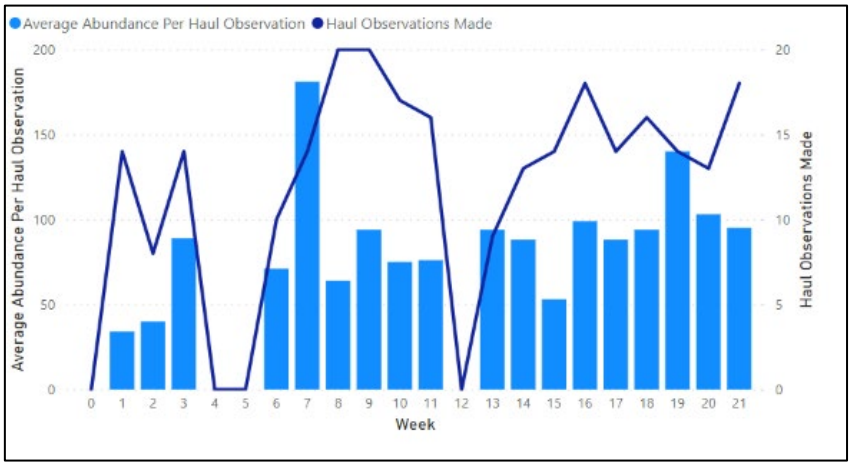
9. During the 2023/24 season, a total of 44 daily observations, 273 set observations, 262 haul observations were recorded (Table 5). During the week 21 trial extension, six daily observations, 15 set observations and 18 haul observations took place (Table 5). This was a strong increase compared to the 2022/23 season, where there were 13 daily observations, 20 set observations, 240 haul observations. Only two daily observations and 12 haul observations occurred during the 1-week trial extension during the 2022/23 season.

[3]Average weekly seabird abundance counts were calculated by dividing the weekly total seabird count by total weekly number of observations. This was calculated for haul, set, and daily observation types.

A)



B)



C)

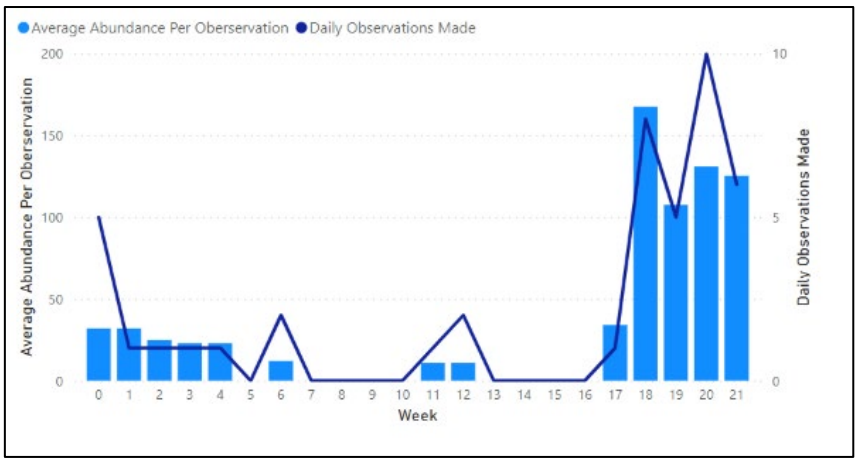


Figure 2: Average weekly abundance per observation and weekly number of observations for: A) Sets; B) Hauls; and C) Daily seabird observations.

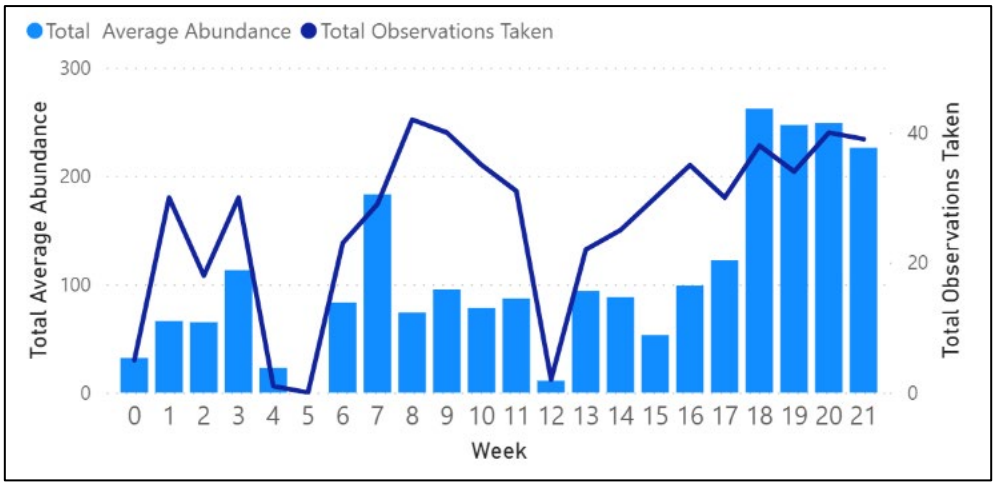


Figure 3: Weekly total average abundance and weekly total observations.

Table 4: Average weekly seabird abundance per set, haul, and daily observation.

Week	Average seabird abundance per set observation	Average seabird abundance per haul observation	Average seabird abundance per daily observation
Week 0	0	0	32
Week 1	0	34	32
Week 2	0	40	25
Week 3	1	89	23
Week 4	0	0	23
Week 5	0	0	0
Week 6	0	71	12
Week 7	2	181	0
Week 8	10	64	0
Week 9	1	94	0
Week 10	3	75	0
Week 11	0	76	11
Week 12	0	0	11
Week 13	0	94	0
Week 14	0	88	0
Week 15	0	53	0
Week 16	0	99	0
Week 17	0	88	34
Week 18	0	94	168
Week 19	0	140	108
Week 20	14	103	131
Week 21	5	95	125

Table 5: Weekly total number of set, haul, and daily observations undertaken.

Week	Number of Haul Observations	Number of Set Observations	Daily Observations Taken	Total Observations taken
Week 0	0	0	5	5
Week 1	14	15	1	30
Week 2	8	9	1	18
Week 3	14	15	1	30
Week 4	0	0	1	1
Week 5	0	0	0	0
Week 6	10	11	2	23
Week 7	14	15	0	29
Week 8	20	22	0	42
Week 9	20	20	0	40
Week 10	17	18	0	35
Week 11	16	14	1	31
Week 12	0	0	2	2
Week 13	9	13	0	22
Week 14	13	12	0	25
Week 15	14	16	0	30
Week 16	18	17	0	35
Week 17	14	15	1	30
Week 18	16	14	8	38
Week 19	14	15	5	34
Week 20	13	17	10	40
Week 21	18	15	6	39
Total	262	273	44	579

Effort Data

10. Fishing effort gradually increased during the 2023/24 season, with a total of 1,835,300 hooks being set (Figure 4, Table 6). During the 1-week trial extension 130,900 hooks were set representing 7% of total effort (Figure 4, Table 6).

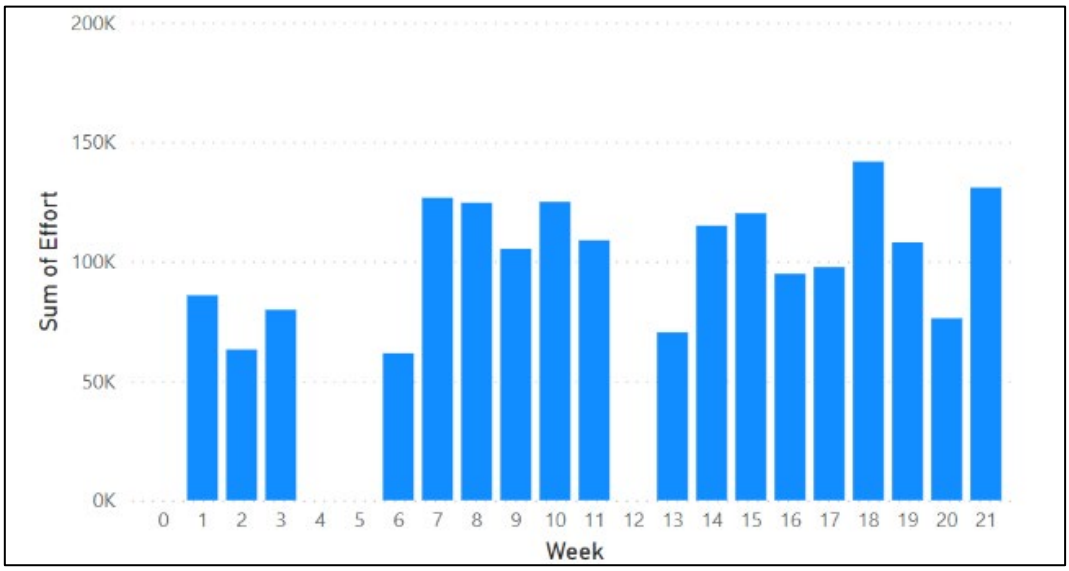


Figure 4: Total weekly effort, measured as the total number of hooks set.

Table 6: Effort (hooks) by week throughout the 2023/2024 season.

Week	Number of Hooks Set
Week 1	85,800
Week 2	63,100
Week 3	79,800
Week 4	-
Week 5	-
Week 6	61,500
Week 7	126,700
Week 8	124,500
Week 9	105,200
Week 10	125,000
Week 11	108,900
Week 12	-
Week 13	70,400

Week 14	114,900
Week 15	120,100
Week 16	94,900
Week 17	97,700
Week 18	141,800
Week 19	107,900
Week 20	76,200
Week 21	130,900
Total	1,835,300

Species observed

11. Cape Petrels (*Daption capense*) were the most abundant species observed, with a total abundance of 9,875 individuals throughout the 2023/24 season (Figure 6, Table 7). Cape Petrel abundance peaked at 1,118 individuals during week 18 (Figure 6, Table 7). Giant Petrels (*Macronectes spp.*) were observed a total of 8,055 times and had a particularly high abundance in week 7 (Figure 6, Table 7). Week 7 had the highest seabird abundance during the longline season, where 2,171 seabirds were observed (Figure 5, Figure 6, Table 7). This was primarily driven by the strong presence of Cape Petrels (698) and Giant Petrels (1,300) (Table 7). Considerable seabird abundance was observed in weeks 20 and 21 (the one-week trial extension period), where 1,444 and 1,749 individuals were noted respectively (Table 7). These figures were largely influenced by Cape Petrel (838 in week 20 and 833 in week 21) and Giant Petrel (428 in week 20 and 679 in week 21) abundance (Figure 6, Table 7).

12. A sharp increase in Buller's Albatross (*Thalassarche bulleri*) abundance occurred in week 9, where 974 individuals were observed (Figure 6, Table 7). Wandering Albatross (*Diomedea exulans*) and Southern Black-Browed Albatross (*Thalassarche melanophris*) were less abundant, with observations distributed across multiple weeks (Figure 5, Table 7). Other species, such as the Grey-Headed Albatross (*Thallassarche chrysostoma*), White-Chinned Petrel (*Procellaria aequinoctialis*), and Northern Giant Petrel (*Macronectes halli*), exhibited fewer overall observations but demonstrated sporadic sharp increases in specific weeks (Figure 6, Table 7).

Wandering Albatross, Black-browed Albatross, Grey-headed Albatross, Grey Petrel (Procellaria cinerea), and Soft-plumaged Petrel (Pterodroma mollis).

13. Throughout the 2023/24 season, Southern Black-Browed Albatross were observed 262 times, with a peak of 103 sightings in week 9 and an additional 12 recorded during the 1-week trial

extension (Figure 5, Table 7). The Grey-Headed Albatross was observed 54 times, reaching its highest abundance in week 9 (Figure 5, Table 7). Grey Petrel were observed 26 times during the season, with its peak of 9 sightings in week 1 (Figure 5, Table 7). No Grey-Headed Albatross or Grey Petrel were observed during the trial extension (Figure 5, Table 7). Albatrosses were observed 1,399 times during the season, with the highest abundance of 176 individuals occurring in week 19 (Figure 5, Table 7). Notably, 171 Albatrosses were observed during the trial extension (Figure 5, Table 7). The Wandering Albatross was observed 268 times, with a peak abundance of 65 individuals in week 7 and 19 individuals observed during the trial extension. (Figure 5, Table 7).

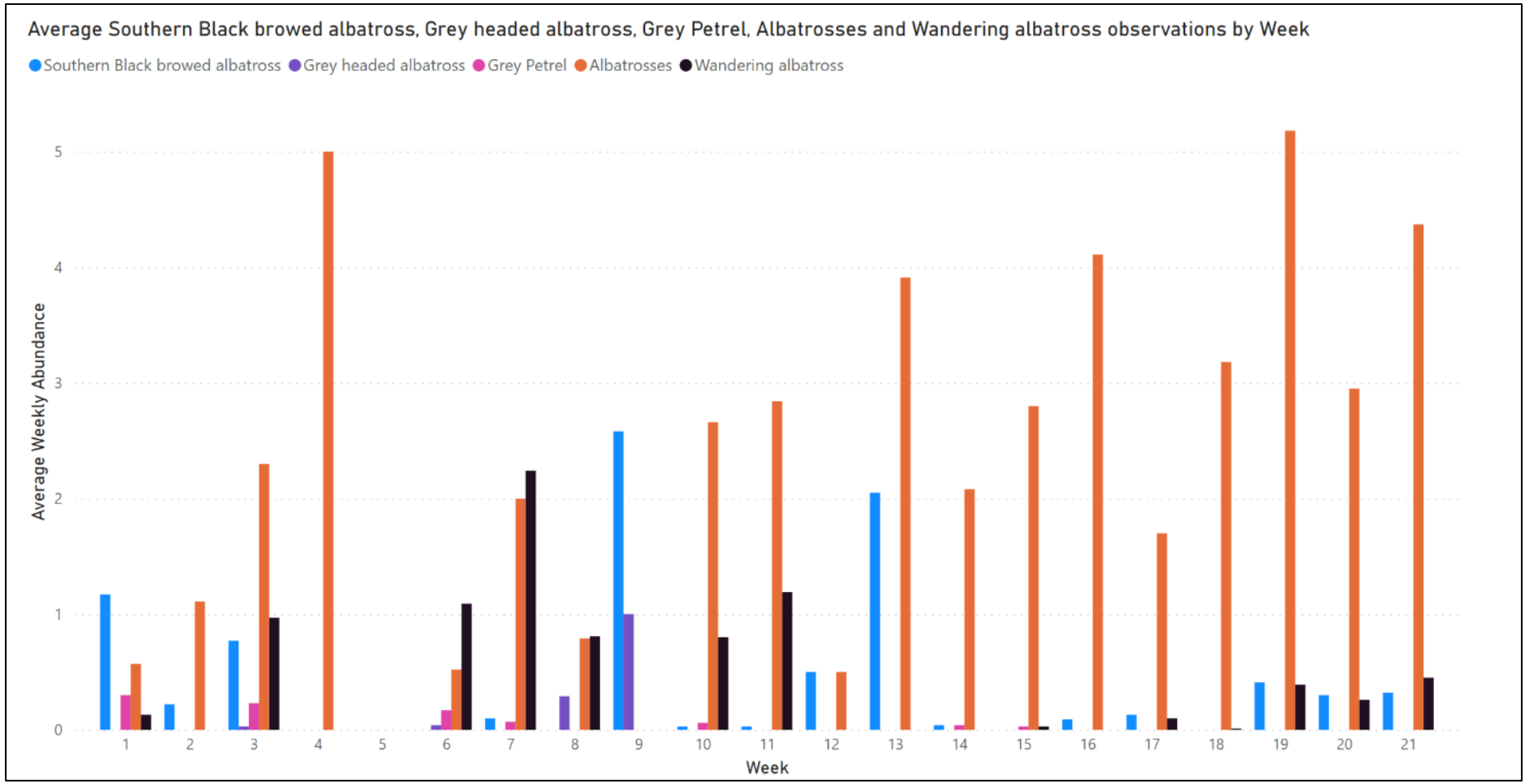


Figure 5: Average weekly abundance per observation for southern black-browed albatross, grey-headed albatross, grey petrels, albatrosses, and wandering albatross. Set, haul, and daily observations were used for the calculation of the average weekly abundance.

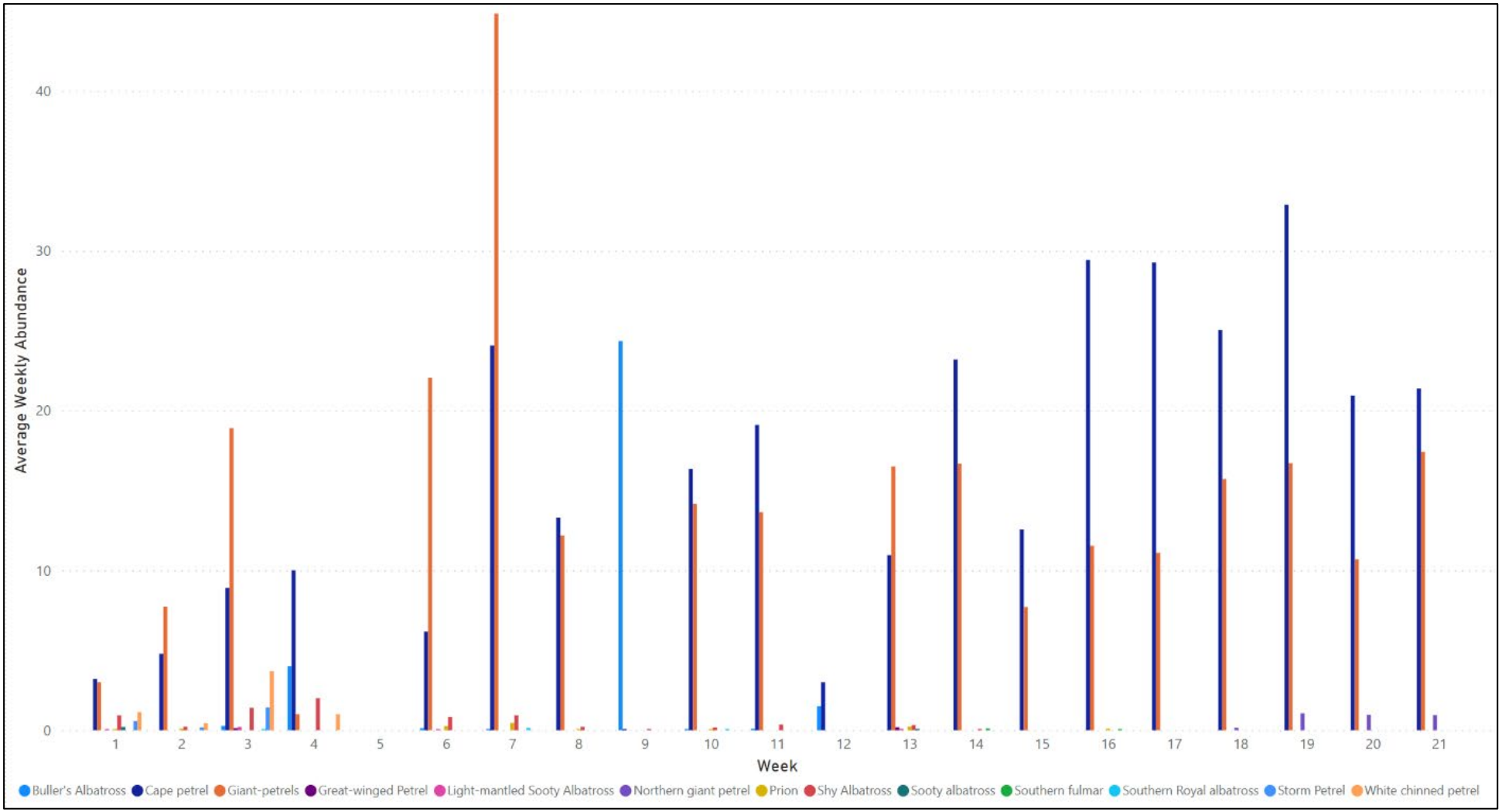


Figure 6: Average weekly abundance per observation for species other than southern black-browed albatross, grey-headed albatross, grey petrels, albatrosses, and wandering albatross. Set, haul, and daily observations were used for the calculation of the average weekly abundance.

Table 7: Total seabird abundance per week and per species. Set, haul, and daily observations were used for the total seabird abundance calculations.

	Cape petrel	Giant-petrels	Albatrosses	Buller's Albatross	Wandering albatross	Southern Black browed albatross	Shy Albatross	White chinned petrel	Northern giant petrel	Storm Petrel	Grey headed albatross	Prion	Grey Petrel	Light-mantled Sooty Albatross	Sooty albatross	Great-winged Petrel	Southern Royal albatross	Southern fulmar	Total
Week 1	96	90	17	-	4	35	28	34	-	17	-	2	9	2	6	-	-	-	**340**
Week 2	86	139	20	-	-	4	4	8	-	3	-	2	-	-	-	-	-	-	**266**
Week 3	267	567	69	8	29	23	42	111	-	43	1	-	7	6	-	4	1	-	**1,178**
Week 4	10	1	5	4	-	-	2	1	-	-	-	-	-	-	-	-	-	-	**23**
Week 6	142	507	12	3	25	-	19	-	-	-	1	6	4	1	-	-	-	-	**720**
Week 7	698	1,300	58	1	65	3	27	-	-	-	-	13	2	-	-	-	4	-	**2,171**
Week 8	558	512	33	-	34	-	9	-	-	-	12	1	-	-	-	-	-	-	**1,159**
Week 9	2	-	-	974	-	103	3	-	-	-	40	-	-	-	-	-	-	-	**1,122**
Week 10	572	496	93	1	28	1	6	-	-	-	-	1	2	-	-	-	1	-	**1,201**
Week 11	592	423	88	3	37	1	11	-	-	-	-	-	-	-	-	-	-	-	**1,155**
Week 12	6	-	1	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	**11**
Week 13	241	363	86	-	-	45	7	-	-	-	-	5	-	2	2	4	-	-	**755**
Week 14	580	417	52	-	-	1	1	-	-	-	-	-	1	-	-	-	-	3	**1,055**
Week 15	377	231	84	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	**694**
Week 16	1,030	404	144	-	-	3	-	-	-	-	-	4	-	-	-	-	-	1	**1,586**
Week 17	878	333	51	-	3	4	-	-	-	-	-	-	-	-	-	-	-	-	**1,269**
Week 18	951	597	121	-	0	0	-	-	6	-	-	-	-	-	-	-	-	-	**1,676**
Week 19	1,118	568	176	-	13	14	-	-	36	-	-	-	-	-	-	-	-	-	**1,926**
Week 20	838	428	118	-	10	12	-	-	38	-	-	-	-	-	-	-	-	-	**1,444**
Week 21	833	679	171	-	18	12	-	-	37	-	-	-	-	-	-	-	-	-	**1,749**
Total	**9,875**	**8,055**	**1,399**	**997**	**268**	**262**	**159**	**154**	**117**	**63**	**54**	**34**	**26**	**11**	**8**	**8**	**6**	**4**	**21,499**