Australian Government
Australian Fisheries Management Authority

Sub-Antarctic Resource Assessment Group (SARAG)

FINAL MINUTES

SARAG 66

11 AUGUST 2022

SUB- ANTARCTIC RESOURCE ASSESSMENT GROUP (SARAG)

CHAIR: Mr Bruce Wallner

Date: 11 August 2022

Venue: Teleconference and Australian Antarctic Division

Attendance

Members	Observers
Dr Phillippe Ziegler, AAD	Dr Heather Patterson, ABARES
Dr Cara Miller, AAD	Martijn Johnson, Industry
Dr Rich Hillary, CSIRO***	Fiona Hill, AFMA
Brad Milic, Industry	Dr Pia Bessell-Browne, CSIRO
Rhys Arangio, Industry	Dr Dale Maschette, IMAS
Dr Nigel Abery, AFMA	Dr Jaimie Cleeland, AAD
	Dr Stuart Corney, IMAS*
	Alice McDonald, AFMA**
	Nathan Jackson, A/ Executive Officer, AFMA
	Dr Genevieve Phillips, IMAS****

*Attended Agenda Item 7
**Attended Agenda Item 4 and Agenda Item 7
***Joined Agenda item 6.1 onwards
****Attended Agenda item 5.4.

Introduction

Agenda item 1 - Preliminaries

1.1 Welcome and Apologies

The sixty sixth meeting of the Sub-Antarctic Resource Assessment Group (SARAG 66) was opened at 8:30am on 11 August 2022 by the Chair, Mr Bruce Wallner. Mr Wallner welcomed members and observers to meeting.

The following members, invited participants and observers were noted as apologies:

Dr Tim Ward, Scientific Member
Claire Wallis, Executive Officer
Selina Stoute, Observer
Malcolm McNeill, Observer

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Mr Wallner, on behalf of all members and observers, acknowledged the Traditional Owners of the land on which the meeting occurred and paid respects to Elders past, present and emerging.

1.2 Adoption of agenda

SARAG adopted the agenda with the following amendments:

- Agenda item 7 was separated into the following sub notations:

  Agenda Item 7.1 – TREV Update

  Agenda Item 7.2 – Close-kin sampling pilot update

  Agenda Item 7.3 – HIMI sea lice sampling update

The agenda can be found at **Attachment A.**

1.3 Declaration of interests

Name	Membership	Declared interests
Bruce Wallner	Chair	Mr Wallner advised that he holds no pecuniary or other potential interests that might compromise his duties as the Chairperson of SARAG.
Dr Phillipe Ziegler	Scientific member	Dr Ziegler advised that he is 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 Miller	Scientific member	Dr Miller advised that she is a 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	Dr Hillary advised that he is 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.

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Dr Tim Ward	Scientific member	Apology for SARAG 66, interests to be declared at next meeting
Brad Milic	Industry member	Mr Milic advised he is the 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.
Rhys Arangio	Industry member	Mr Arangio advised that he is employed by Austral Fisheries P/L (Austral Fisheries) as the Senior Manager of Environment 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.
Dr Nigel Abery	AFMA member	AFMA employee, no interests pecuniary or otherwise.
Nathan Jackson	A/Executive officer	AFMA employee, no interests pecuniary or otherwise.
Dr Heather Patterson	Invited Participant	Dr Patterson advised she is an employee of the Department of Agriculture, Fisheries and Forestry and is the Editor of the Australian Bureau of Agricultural Resource Economics and Sciences (ABARES) Fishery Status Reports. Dr Patterson noted that she had no pecuniary interest in the sub-Antarctic fisheries.
Fiona Hill	Invited Participant	AFMA employee, no interests pecuniary or otherwise.
Dr Pia Bessell-Brown*	Invited Participant	Dr Bessell-Brown advised they are 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-Brown noted they have no pecuniary interests in the sub-Antarctic fisheries.

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Dr Dale Maschette	Invited Participant	Dr Maschette advised he is employed by IMAS and is a Fishery scientist responsible for HIMIF work including the HIMI icefish stock assessments. He holds no pecuniary interest in the subantarctic fisheries. His salary is connected to two FRDC research grants related to Southern Ocean fisheries, one that he is the primary investigator on, another that he is a coinvestigator on. He is also one of the alternative Scientific Committee representatives to CCAMLR.
Martijn Johnson	Invited Participant	Mr Johnson advised he was attending as an observer to SARAG and 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.
Malcolm McNeil	Invited Participant	Mr McNeill advised he 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 the Chair of the Ross Sea Industry Client Group. Mr McNeill remains a member of Sub-Antarctic Management Advisory Committee (SouthMAC) and Board member of the Coalition of Legal Toothfish Operators (COLTO). Mr McNeill was not aware of any investigation or prosecution action by AFMA against his Company or of any legal action taken by his Company against AFMA.
Selina Stoute	Observer	AFMA employee, no interests pecuniary or otherwise.
Alice McDonald	Invited Participant	AFMA employee, no interests pecuniary or otherwise.
Dr Stuart Corney	Invited Participant	Dr Corney advised their work is funded by an FRDC grant (FRDC 2018-133), and they don't believe that is a conflict of interest in this forum. Dr Corney declared they have no other financial or other interest that could be considered a conflict.

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Dr Jamie Cleeland	Invited Participant	Dr Cleeland declare that they have no pecuniary or other personal interest, direct or indirect, in any matter that raises or may raise a conflict with their duties as a Fisheries Scientist at the Australian Antarctic Division participating in the AFMA Sub-Antarctic Resource Assessment Group.
Dr Genevieve Phillips	Invited participant	Dr Phillips advised that they have no pecuniary or personal interests.

*Provided via email after distribution of papers.

SARAG noted the addition of the declaration of interest provided by Dr Bessell-Brown via email before the meeting.

SARAG noted during recommendation discussions panel members with declared interests are to leave the meeting temporarily to allow recommendations to occur.

1.4 Minutes from Previous Meeting

The draft minutes from SARAG 65 held on 5 May 2022 were circulated for comment on 12 July 2022. Comments were received from Mr Arangio and Mr McNeill.

Members noted the minutes from SARAG 65 were finalised with the following amendment:

- Page two date amended from 5 August to 5 May 2022.

Agenda item 2 – Actions Arising from SARAG 65

Actions arising from SARAG 65

The following summarises the action arising items from SARAG 65.

Item	Action arising	Status
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).	Ongoing. See Agenda Item 5.
2	**Skate bycatch workshop** – AAD to set a date and develop an agenda for an industry workshop (SARAG 65 Agenda Item 7).	Complete. AAD to provide an update at Agenda Item 5.

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Item	Action arising	Status
3	**Electronic monitoring trial** – Industry agreed to discuss with AAD how footage collected might support skate and ray data collection (SARAG 64 Agenda Item 12).	AAD and Industry to provide an update at Agenda Item 4.
4	**Bycatch limit approaches** – Following the industry workshop, the SARAG will revisit the consideration of bycatch limit approaches, with a view to develop a future plan (SARAG 65 Agenda Item 8).	Not complete. For discussion at SARAG 67.
5	**Trawl Gear Modification** – AFMA to issue a scientific permit congruent with CCAMLR CMM requirements to allow continued trialing of new net and pursue amending the Regulations (SARAG 65 Agenda Item 9).	Ongoing. Austral Fisheries will need to submit a scientific permit application to progress this action.
6	**Trawl Gear Modification Trial** – AAD to provide a presentation on performance of the new net to the bycatch workshop (SARAG 65 Agenda Item 9).	AAD to provide an update on the workshop at Agenda Item 5.
7	**Random Stratified Trawl Survey Review** – AAD to present a paper on the RSTS review at SARAG 66 (SARAG 65 Agenda Item 10).	AAD to provide an update on the review at Agenda Item 5.
8	**Random Stratified Trawl Survey** – AAD to consider number of shots and whether the stratification change from five years ago has been effective and provide an update in the future (SARAG 65 Agenda Item 10).	For discussion at SARAG 68.
9	**Close-kin sampling project** – CSIRO to present a project update on close kin sampling project results at SARAG 67 (SARAG 65, Agenda Item 15)	CSIRO to provide an update at Agenda Item 7.
10	**Toothfish responses to environmental variability (TREV)** - AFMA to invite Dr Hill to provide an update on the TREV project at SARAG 66 (SARAG 65, Agenda Item 15).	Presentation to be provided by Dr Corney at Agenda Item 7.

Members noted that action item 3 will be incorporated into the general discussion around Electronic Monitoring provided in the update from AFMA. This action item itself can be reported as completed.

Members noted that action item 6 update will be given under agenda item 5 completing this action item. Members noted that if SARAG requests further updates this will be recorded as a new action item.

Agenda item 3 – Correspondence

SARAG noted the following correspondence which had been received out-of-session since the last meeting in May 2022:

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- An email dated 28 June 2022 from Claire Wallis seeking comments on the draft Sub-Antarctic Fisheries Annual Research Statement 2023-24 and the draft agenda for SARAG 66, scheduled for 11 August 2022; and
- An email dated 12 July 2022 from Claire Wallis seeking comments on the updated draft Sub-Antarctic Fisheries Annual Research Statement 2023-24; and
- An email dated 12 July 2022 from Claire Wallis seeking comments on the draft minutes from SARAG 65; and
- An email dated 29 July 2022 from Claire Wallis requesting members provide written declarations of their interests in advance of SARAG 66;
- An email dated 29 July 2022 confirming the date and location of SARAG 66
- An email dated 2 August 2022 seeking final declarations of interests in advance of SARAG 66.

Agenda item 4 – Fisheries Update

4.1 AFMA Management

SARAG noted the following written updates provided to the members as read.

Observer deployment during Covid-19

The impacts of Covid-19 on observer deployments have reduced over time, with no significant effects to report since May 2022.

Observer deployments

Between 1 December 2021 and 29 June 2022 AFMA deployed an observer on nine completed voyages, achieving 346 fishing days spread across HIMI, MITF and CCAMLR exploratory fisheries

- 6 HIMI voyages, (228 fishing days)
- 1 MITF voyage, (58 fishing days); and
- 2 CCAMLR exploratory fisheries (1 Ross Sea and 1 East Antarctic) voyages (60 fishing days).

Tagging update for 2022 season

Since the commencement of the fishing season there have been a total of 2,266 Toothfish tagged (531 recaptured) and 140 skates tagged (5 recaptured) spread across HIMI, MITF and CCAMLR exploratory fisheries

- 1421 toothfish were tagged at HIMI (419 recaptured).
- 115 skates were tagged at HIMI (4 recaptured).
- 353 toothfish were tagged at Macquarie Island (88 recaptured).
- No skates were tagged or recaptured at MITF.

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- 492 toothfish were tagged in Exploratory fisheries (24 recaptured).
- 25 skates were tagged in Exploratory fisheries (1 recaptured).

SARAG noted the request for upgrading of observer cameras to a more suitable model for the conditions of the fishery. SARAG recalled that discussion of upgrades began multiple years ago. SARAG noted that images taken by these cameras are necessary for a large amount of work occurring within the fishery, however that the current camera models are prone to fogging, resulting in poor quality pictures of smaller objects particularly species photos. Members noted the Sub-Antarctic and Antarctic fisheries have unique operating conditions compared to other fisheries.

Recommendation: AFMA to clarify with observer program whether current cameras are adequate for Southern Ocean work, and if change needed AFMA, AAD and Industry to explore and cost options where required (Action Item 1).

SARAG noted that during the MSC reassessment for MITF and HIMIF the matter of observer deployment of cameras to collect benthic habitat information was discussed, with questions posed around the stratification of the collection of these data, and how this is managed across the fleets. The current arrangement is that the deployment and retrieval of the benthic cameras is a crew responsibility, with observers assisting with uploading footage from the cameras. SARAG recommended development of a stratification process to collect these data following the finalisation of FRDC Project 2019-169.

SARAG also recommended that the current Antarctic observer priorities as described in the observer handbook and task list should be reviewed in their entirety.

Recommendation: SARAG to review the observer handbook and task list (out of session). AFMA to update the observer handbook and task list prior to the AFMA observer workshop to ensure that observer priorities match fishery management needs and requirements.

AFMA to send out the current observer handbook and task lists to SARAG members to review and provide comments (out of session) and update the observer handbook prior to the annual observer workshop **(Action Item 2).**

SARAG noted an update given by Alice McDonald (Climate Adaption Senior Program Manager, AFMA) on AFMA's work to integrate climate adaptation into the management of Commonwealth fisheries. Tthe AFMA Commission recently endorsed a suite of actions to build explicit and structured consideration of available information and research on climate change impacts into RAG, MAC and Commission decision-making processes.

These actions will include the production of a "climate and ecosystem status report" for RAG and MAC meetings, the introduction of a standing agenda item on "climate and ecosystem update" to provide important context for TAC/TAE discussions by the RAG or MAC, and greater integration of information on fishery and species climate sensitivity and impacts. The actions endorsed by the Commission will be rolled out by AFMA's Climate Adaptions Program over the next 6-12 months to priority fisheries, which will likely include the Sub-Antarctic fisheries.

SARAG also noted it would be good to integrate the work in CCAMLR into this program, specifically oceanographic and warming papers relating to Kerguelen Plateau.

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ACTION ITEM 1 –	**AFMA, Industry and AAD to facilitate offline conversations about what camera equipment is appropriate for Antarctic fisheries observers to use while performing duties and explore funding options as required.**
ACTION ITEM 2 –	**SARAG Members to provide advice on the Observer data collection priorities prior to the annual observer workshop.**

4.2 Industry

Mr Arangio and Mr Milic provided SARAG with verbal updates on fishing operations in the HIMIF, MITF and CCAMLR exploratory fisheries.

Mr Milic noted that since the last meeting a vessel had unloaded in Hobart. The current season catch has been poor at Macquarie Island. There has been an increase in gear loss for the company due to increased water currents and moving effort into areas not usually fished.

Mr Arangio noted the longline season had been a normal year to date, with captures dropping off in the middle of the season and picking up more recently. Both fishing vessels *Cape Arkona* and *Atlas Cove* completed their last trips and *Isla Eden* will pursue another trip later in the year which would continue fishing on Williams Ridge in the SIOFA area after December 1st when the new season starts.

Agenda item 5 – Heard Island and McDonald Islands Fishery

5.1 Mackerel Icefish Stock Assessment

Mr Maschette presented an update on the paper 'A preliminary assessment for mackerel icefish (*Champsocephalus gunnari*) in Division 58.5.2, based on results from the 2022 random stratified trawl survey' in alignment with a presentation.

SARAG noted the stock assessment for Mackerel icefish at HIMI.

SARAG noted the length-weight relationship is updated every year, with almost identical estimates between the current and the previous year. The members noted there was a very large 3+ age cohort in the population, with a slightly smaller than average 2+ cohort. This year's icefish catch was the largest on record and spread across both strata, resulting in the large biomass estimate. Using standard CCAMLR methods (CMIX and Generalized Yield Model), catches of 2 616 t in the 2022/23 season and 1 857 t in the 2023/24 season satisfied the CCAMLR decision rules

SARAG noted the CMIX model is also used for bycatch assessments and krill assessments and needs upgrading. SARAG also noted that any re-writing of the model would require clearance in CCAMLR.

Members and observers with a stated conflict of interest exited the room for the recommendation discussions regarding the icefish stock assessment and TACs.

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Recommendation – SARAG agreed that this assessment with the recommended catch limits of 2, 616 t for the 2022/23 season and 1, 857 t for the 2023/24 season should be presented to WG-FSA-2022.

Recommendation - SARAG recommended upgrading the CMIX program, with AAD to explore funding options and report back to SARAG.

5.2 Bycatch Workshop Update (*Verbal update, no paper provided)*

Dr Cleeland provided a verbal update on the skate bycatch workshop (SARAG 65 Agenda Item 7) which occurred on 10 August 2022. Based around three themes (avoidance, mitigation, limit) the workshop discussed a wide range of issues, including abundance patterns of skates in both the longline and icefish fisheries, stock assessments, the move-on rule relating to the spatial patterns of hauls with two tonnes of catch and the feasibility of this rule, and diurnal and bait effects on patterns in skate bycatch CPUE.

The RAG noted the workshop's discussion regarding progression towards species and/or fishery specific management procedures, based upon the differences in catch profile of the three skate species. SARAG noted that the stock assessments for *B. eatonii* and *B. murrayi* represented best available science, however more work will be done for *B. irrasa*. For *B. irrasa*, biomass estimates are derived from the RSTS data and as such do not reflect the entire population of the species which is mainly caught in the longline fishery. SARAG noted the importance of gaining a better estimate of fishing-induced mortality of *B. irassa*, and recalled an AFMA-funded project that will investigate post-release mortality using pop-up satellite tags.

The RAG noted the need for accurate counts of skate bycatch and the potential for electronic monitoring to aid data collection.

The RAG recalled the overall 120 tonnes catch limit in place, with a bycatch limit of 80 tonnes for the icefish fishery prior to the toothfish fishery commencing, and a 'discussion point' when skate bycatch catch reaches 50 tonnes.

5.3 Random Stratified Trawl Survey (*Verbal update, no paper provided)*

The RAG discussed the design of the random stratified trawl survey (RSTS). The RAG recalled that the sampling design in the Evitas stratum was changed in 2015 from randomly-chosen grid cells to one high and one low density substrata in 2015, but since this time, no efficacy review or analysis had been undertaken.

The RAG recommended to conduct a review of the updated approach. In addition, the analysis should also include an evaluation of sampling the three strata with the lowest historical catches and the potential for excluding these, since they take significant time and effort to sample. The RAG agreed an analysis will occur on these points and will be provided at a future meeting **(Action Item 3).**

ACTION ITEM 3 –	**AAD to provide an analysis update for the May 2023 meeting on the effectiveness of changing RSTS surveying method. Analysis to include potential of scaling back particular strata identified by Industry.**

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5.4 Random Stratified Trawl Survey Periodicity

DrPhillips gave a presentation of the paper ‘Evaluating the periodicity of fisheries-independent data collection in the Patagonian toothfish and mackerel icefish fisheries at Heard Island & McDonald Islands: does reducing survey frequency impact assessment results and management advice?’.

The project performed a retrospective analysis to determine the effect of reduced RSTS frequency to two, five, or ten years, or no RSTS at all, on both the biennial CASAL integrated stock assessments for the Patagonian toothfish fishery at HIMI between 2015 and 2021 and the annual GYM assessments for Mackerel Icefish between 2012 and 2021.

The RAG noted that toothfish estimates of spawning stock biomass, spawning stock biomass status and year class strength of most alternative assessment scenarios with reduced RSTS frequency were within the 95% confidence intervals of the respective models with annual RSTS data. The RAG noted this relatively small impact of the RSTS data on the toothfish stock assessments since 2015 is likely due to the large amount of data from the commercial fishery available now which also includes tagging data to inform on biomass abundance. However, SARAG noted that there was a conflict in the age-composition data between the RSTS and the commercial fishery, and scenarios run with all RSTS data but no commercial age catch composition data resulted in different estimates for spawning stock biomass and year class strength. SARAG recommended continued investigation into this issue.

SARAG noted that the RSTS provides crucial data input for the short-term icefish assessment and TAC setting, and any reduction in RSTS frequency would have resulted in data gaps and either a reduction of the TAC in most years or no TAC at all.

Mr Arangio noted the results and agreed with the benefits of the annual RSTS for icefish assessments. Mr Arangio noted the toothfish aspect of the survey is very expensive for industry, costing over a million dollars in time, effort, and fuel to conduct each year. Mr Arangio noted there is no aim to reduce the survey to a ten, five or even three-year frequency, but considered that the RSTS could be reduced to a two-year survey, noting future analysis would not remove any historical data.

Mr Milic noted agreement with Mr Arangio. Mr Milic noted this would not need to occur straight away to aid in continuation of the analysis mentioned by Dr Phillips but depending on the costs and the benefits of the results they would be supportive of a transition.SARAG also noted other uses of the RSTS data, including for the analysis of toothfish trends and recent year class strength in non-assessment years for CCMLAR bycatch assessments and to provide a unique perspective into the broader ecosystem at HIMI.

SARAG requested that AAD conduct a cost-benefit analysis on all data streams (including the RSTS, the potential longline survey, and the close kin project) that inform assessments and management for the HIMI fisheries to be presented at the next SARAG meeting **(ACTION Item 4).**

Recommendation – SARAG recommends continuing with the annual RSTS until the conflict between the survey and commercial toothfish data has been identified and resolved, and drivers for the observed toothfish recruitment patterns are better understood.

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ACTION ITEM 4 – 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, including variations to the periodicity), Random Longline Survey (RLS) & Close Kin Mark Recapture (CKMR).

5.5 Random Longline Survey Draft Proposal

Dr Miller provided an update on the implementation of a potential Randomised Longline Survey (RLS) at HIMI. Following discussions at SARAG 65, the survey design was focused to depths between 500 to 2000m, and included options for simple random sampling, geographic spatial grid sampling, or randomised stratified sampling.

SARAG noted that individuals tagged during a RLS would be helpful in meeting a number of scientific objectives, including (i) provide an index of abundance for HIMI, (ii) estimate natural mortality, (iii) collect growth data from known age individuals, (iv) explore movement patterns, (v) investigate the current stock structure hypothesis, and (vi) gain an estimation of *q* of the trawl surveys.

SARAG also noted that the RLS would address important assumptions underpinning closed mark-recapture models, including; (i) randomly spreading effort across HIMI, (ii) aligning more closely with depth coverage of commercial fishing activities, and (iii) using the same gear type as is predominant in commercial fishing activities. Adherence to these assumptions would provide increased confidence and robustness to associated abundance and biomass estimates. Such objectives were consistent with the key recommendations from FRDC report 2018-124 (Ziegler *et al.* 2021) which identified three approaches to improve precision and accuracy in stock abundance estimates; estimate small-scale movement patterns to adjust historical tag-recapture data, explore spatially explicit stock assessment models, and develop a structured fishing program.

Dr Miller presented results from power analyses to estimate the number of sample hauls that would be required to have confidence that a RLS survey design would be able to detect a relative change of 10, 20 or 30% in two response variables, i.e. toothfish tag-recapture rate per 10,000 hooks and catch-per-unit-effort (CPUE). The power analysis was based on the last 5 years of commercial longline data fishing between depths of 500 – 2000m with a 5% significance level and 80% power value. Furthermore, the power analysis tested the total number of shots as 150, 200, 250 and 300.

SARAG discussed the general findings of the power analyses including the balance between relative sample size (i.e. the number of hauls) and the level of change that would be expected to be able to be detected. In general, the greater the number of hauls the more likely the survey would be in picking up smaller changes in tag-recapture rates or toothfish CPUE. Furthermore, it was predicted that a higher number of hauls would be necessary to detect changes in tagging rates as compared to toothfish CPUE.

SARAG discussed potential issues with the implementation of the RLS, including the appropriate degree of change that the RLS should be designed to detect, whether the RLS might be able to be conducted in conjunction with fishing activities, how reductions in the size

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of the commercial fleet may affect the RLS survey design, the potential for some changes to the current fishing footprint to facilitate discovery of new fishing areas, and how information (such as areas in which gear entanglement was known to be of higher risk) could be incorporated within the survey design.

SARAG requested that Dr Miller incorporate feedback from SARAG 66 and liaise with Industry and AFMA to provide an updated RLS proposal with specific options and recommendations for implementation of a potential RLS, including how such a survey would be undertaken in concert with commercial fishing activities **(Action Item 5).**

ACTION ITEM 5 –	**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.**

Agenda item 6 – CCAMLR & Exploratory Fisheries

6.1 Update from WG-EMM, WG-ASAM & WG-SAM

SARAG noted the 2022 CCAMLR Working Group on Acoustic Survey and Analysis Methods (WG-ASA) was held on 29 May - 3 June 2022 with a focus on krill biomass.

SARAG noted the Working Group on Statistics, Assessments and Modelling (WG-SAM) was held on 27 June - 1 July 2022. SARAG noted that Australia co-authored a paper on the development of Casal2 models, and presented research results and a new research plan for the exploratory toothfish fishery in Divisions 58.4.1 and 58.4.2.

SARAG noted the Working Group on Ecosystem Monitoring and Management (WG-EMM) was held on 4-11 July 2022 with a focus on krill and spatial management.

6.2 Papers to WG-FSA, SC & Commission

SARAG noted that the CCAMLR Working Group on Fish Stock Assessment (WG-FSA) will be held on 10 - 20 October 2022, Scientific Committee will be held on 24 - 28 October 2022, and Commission meetings will be held on 31 October - 4 November 2022. All meetings will be held in person for the first time since 2019. Australia intends to present results of the Random Stratified Trawl Survey and the icefish assessment at HIMI, an updated skate condition assessment and handling protocol, and research results and the updated research plan for the exploratory toothfish fishery in Divisions 58.4.1 and 58.4.2

Agenda item 7 – Recent Research

SARAG noted the written update provided by AFMA regarding the annual research statement.

In 2022/23, the Annual Research Statement committed to the following:

- Macquarie Island Toothfish Fishery 2021 stock assessment ($135,075)

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- Macquarie Island Toothfish Fishery 2023 stock assessment ($140,000)
- Quantifying post-release survival of skate bycatch in the Heard Island and McDonald Islands Patagonian Toothfish longline fishery ($120,000)

The 2023/24 Annual Research Statement was developed and finalised out of session by SARAG, and supported with amendments by SouthMAC. The remaining steps in the process for the current funding round are as follows:

- Late August 2022 – ARC considers priorities/scopes submitted as well as strategic issues and agrees on priorities to include in AFMA call for proposals
- Early September 2022 – the ARC's call for applications is published, with proposals due mid-October 2022
- Late October 2022 – proposals submitted are provided to RAGs and MACs and AFMA Management for comment, with comments due by mid-December 2022.
- February 2023 – ARC meets to assess and recommend research proposals for funding to AFMA CEO for 2023-24 financial year

SARAG noted the progression of Electronic Monitoring standards-based program at AFMA. SARAG noted AFMA is performing an internal review of the Electronic Monitoring Working Group membership, to perhaps include the new EM team and International Compliance team. **(Action Item 6)**

ACTION ITEM 6 - AFMA to review EM WG membership and reconvene the group.

7.1 TREV Project Update

Dr Corney presented an update on the Toothfish Response to Environmental Variability (TREV) project.

As part of four inter-connected work packages, the project has characterised environmental variability on the Kerguelen Plateau, developed qualitative models to explore the likely responses of the Patagonian toothfish fishery to future changes, quantified relationships between environmental conditions and catch rates through time at different spatial scales, and developed future scenarios of the HIMI ecosystem using a multispecies size spectrum model.

Dr Corney noted the work on the multispecies size spectrum model will continue and use a range of future emissions scenarios to drive a commonly used IPCC Earth System model to get an estimate for long-term future conditions. Under the scenarios explored so far, toothfish population biomass and mean body weight, and the overall fishery catches were projected to decline by mid-century.

SARAG noted the final report is due 28 October and welcomed further discussions on project results for advice on short- and long-term management decisions.

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7.2 Close-kin Sampling Pilot update

Dr Hillary presented an update of the close kin sampling project to collect tissue samples from Patagonian toothfish at HIMI for Close-Kin Mark Recapture and gene tagging analysis, with the view of exploring the use of this technology to estimate population size. The pilot is supported by Industry, CSIRO and the AFMA observer program.

SARAG noted issues of collecting genetic samples and cross contamination in the samples which need to be resolved before any DNA analysis can be effectively performed. SARAG noted the logistical concerns of collecting and returning the samples for this fishery are uniquely difficult and these need to be sorted and addressed. SARAG noted that the usability of the samples should be confirmed before gathering more samples.

Dr Hillary noted he will get information from the lab on the usability of the already collected samples **(Action Item 7).**

SARAG noted the need for a uniform approach to sampling techniques and this should be pursued relatively quickly **(Action Item 8).**

SARAG also noted that the cost-benefit analysis in Action Item 4 should include consideration of the Close-Kin Mark Recapture approach**.**

ACTION ITEM 7 –	**Dr Hillary to get Close Kin sample quality information from the lab and provide this information to the members of the RAG.**
ACTION ITEM 8 –	**Dr Hillary to work with industry to ensure that the tissue sampling technique is uniform before continuing collection of tissue samples for CKMR.**

7.3 HIMI sea lice sampling update

Mr Maschette provided an update of the FRDC project 2020-097 on HIMI sea-lice sampling. During a recent fishing trip, 264 sea lice traps were deployed across 65 hauls. The sea lice samples were measured for volume, weight and photographed for count. A total of 13.8kg of lice were sampled.

SARAG noted that sea lice were collected from all sampled lines, however there was great variability within any given line. The RAG noted that further analysis of the data will be conducted, including on the effects of different bait types.

SARAG noted that short instructions for setting and hauling (in English and Indonesian for the crew), detailed instructions for measuring and data recording sheets (in English) for the observer, and a form for recording mag positions and mag counts during setting and hauling for the skipper had been developed.

SARAG noted the benefit of mag-by-mag data to aid in the analysis of bycatch and toothfish catch rates patterns , and requested that AAD collaborate with AFMA and Industry to develop data log sheets for mag-by-mag recording **(Action Item 9).**

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SARAG noted a decision is required in January 2023 whether to expand sea lice sampling to the entire HIMI fishing fleet. SARAG noted that AAD will provide Industry with the sea lice analysis for discussion before January 2023 for this decision (**Action Item 10**).

ACTION ITEM 9 –AAD, in consultation with AFMA and Industry, to develop marked up data log sheet for mag-by-mag recording.
ACTION ITEM 10 – AAD to provide Industry with the Sea lice analysis for discussion before January 2023 decision of sea lice sampling to the entire HIMI fleet.

Agenda item 8 – Environment

8.1 Environment Interactions and Gear Loss

SARAG noted the following written update from AFMA.

Seal and Seabird Interactions

HIMI Fishery 2021/22 season

During the 2021/22 HIMI Fishery fishing season to 31 July 2022, three (3) seabirds and two (2) elephant seals died as a result of interactions with fishing gear.

MITF 2022/23 season

During the 2022/23 MITF season to 31 July 2022, no TEP wildlife interactions with fishing gear resulting in a death. There was one porbeagle shark killed as a result of an interaction with fishing gear.

CCAMLR Exploratory Fisheries 2021/22 season

During the 2021/22 season, 110,550* hooks were set, with no marine mammal or bird interactions with fishing gear resulting in death in CCAMLR Exploratory Fisheries.

Agenda item 9 – Other

9.1 Other Business

Marine Mammal Rule

SARAG noted effective 1 January 2023, all fisheries exporting to the United States must have received a Comparability Finding under the MMPA Import Provisions.

SARAG noted that NOAA has asked AFMA follow-up questions regarding treatment of marine mammals for aquaculture activities. The RAG noted NOAA assured DAFF they will advise of any concerns with Australian fisheries prior to making any final decisions and will ensure Australia has an opportunity to respond to any identified concerns.

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Biosecurity

Industry is waiting to hear from DAFF regarding an update on biosecurity of fishing bait which is an issue across most fisheries.

Unloads and Observer Sampling

SARAG requested that industry get the list of samples that observers collect throughout a fishing trip, and noted that AAD and AFMA are in the process of formalizing a process (**Action Item 11).**

SARAG noted the need for verified catch weights by AAD to conduct data analyses, however there was sometimes a significant time lag between experienced by AAD in receiving the report on verified vessel unload weights. AFMA noted that verifying these unload weights also depended on the observer reports being completed. SARAG noted the importance of timeliness of data finalization.

SARAG noted a paper on Blue Antimora Growth by Korostelev et al. which contained antimora data collected in the MITF. SARAG noted this was a historical request for data and went through the normal process for data collection and release.

ACTION ITEM 11 – AAD and AFMA to update Industry when formalisation of observer sample collection process has occurred.

9.2 Next Meeting

Members agreed to hold the next meeting of the SARAG on 2 May 2023 at the Australian Antarctic Division.

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ATTACHMENT A

Sub-Antarctic Resource Assessment Group (SARAG) Meeting 66

Final Agenda

Time (AEST): 8:30-16:00
Location: Australian Antarctic Division, Hobart

Approximate time	Item	Purpose	Lead presenter
8:30 (30 min)	**1. Preliminaries**		
	1.1 Welcome and apologies	For action	Chair
	1.2 Declaration of interests	For action	Chair
	1.3 Adoption of agenda	For action	Chair
	1.4 Minutes from previous meeting	For noting	Chair
	2. Actions Arising	For noting	AFMA Member
	3. Correspondence	For noting	AFMA Member
9:00 (30 min)	**4. Fisheries Update**		
	4.1 AFMA Management	For noting	AFMA Member
	4.2 Industry	For noting	Industry Members
9:30 (60 min)	**5. Heard Island & McDonald Islands Fishery**		
	5.1 Mackerel Icefish Stock Assessment	For action	AAD Member
	5.2 Bycatch Workshop Update *	For action	AAD Member
10:30 (15 min)	**Break**		
10:45 (85 min)	5.3 Random Stratified Trawl Survey Review *	For noting	AAD Member
	5.4 Random Stratified Trawl Survey Periodicity	For noting	AAD Member
	5.5 Random Longline Survey Draft Proposal	For action	AAD Member
12:10 (20 min)	**6. CCAMLR & Exploratory Fisheries**		
	6.1 Update from WG-EMM, WG-ASAM & WG-SAM	For noting	AAD Member

	6.2 Papers to WG-FSA, SC & Commission	For noting	AAD Member
12:30 (30 min)	**Break**		
13:00 (120 min)	**7. Recent research**		
	7.1 TREV Project Update		Dr Stuart Corney
	7.2 Close-kin Sampling Pilot update		CSIRO
	7.3 HIMI sea lice sampling update		Dr Dale Maschette
15:00 (15 min)	**Break**		
15:15 (20 min)	**8. Environment**		
	8.1 Environmental Interactions and Gear Loss	For noting	AFMA Member
15:35 (25 min)	**9. Other**		
	9.1 Other Business	For action	Chair
	Blue Antimora Growth Paper	For action	Industry Member
	9.2 Next Meeting	For action	Chair
16:00	**Close**		

* Verbal update, no agenda paper provided