SPRFMO

South Pacific Regional Fisheries Management Organisation

12th Scientific Committee Meeting

30 September to 5 October, 2024

Lima, Peru

MEETING REPORT

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Lynda Goldsworthy (AUS), José Zenteno (CHL), Jan Geert Hiddink (EU), Jordi Tablada (NZ), Grecia Chávez (PER), Emily Reynolds (US), the Secretariat, and Working Group Chairpersons are acknowledged for their significant note taking and report writing contributions.

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SPRFMO SC12-REPORT EXECUTIVE SUMMARY

The 12th Scientific Committee Meeting (SC12) of the South Pacific Regional Fisheries Management Organisation (SPRFMO) took place from 30 September to 5 October 2024, in Lima, Peru, chaired by Dr Ricardo Oliveros Ramos (PER). The meeting was held in person and proceedings were livestreamed.

The SC12 was preceded by a Jack Mackerel Connectivity workshop (SCW15), a Squid Simulated Assessment Workshop (SCW16), and a technical session of the Squid Working Group.

There were 125 participants from 14 SPRFMO Members, three IGOs, and nine NGOs, including four invited experts, and the Secretariat. The Scientific Committee (SC) reviewed and assessed 101 meeting documents (including Working Papers) and provided 38 recommendations (including requests and advice) on a wide diversity of issues.

Technical work on the different subjects the SC covers was largely progressed through intersessional work.

Annual Reports were received from Australia, Belize, Chile, China, Cook Islands, Ecuador, European Union, Faroe Islands, Korea, New Zealand, Panama, Peru, Russian Federation, Chinese Taipei, United States of America, and Curaçao.

In terms of jack mackerel research, the Scientific Committee reviewed jack mackerel stock assessments, finding sustainable management with biomass above target levels. A 15% increase in the Total Allowable Catch (TAC) for 2025 was recommended, setting it at 1,428,000 metric tons, aligned with the harvest control rule to maintain FMSY limits. The SC endorsed additional scenarios to illustrate possible management outcomes in the 2025 advice to the Commission, while underscoring the need for thorough testing of any changes in management strategies within the Management Strategy Evaluation (MSE)

The SC reviewed updates on jumbo flying squid stock assessments, emphasising the importance of consistent observer coverage and electronic monitoring to improve data quality and strengthen resource management.

The SC addressed Deepwater matters and agreed that the "Maintain function" approach, though suitable for assessing significant adverse impacts (SAIs) on vulnerable marine ecosystems (VMEs), is currently impractical due to limited data. Additionally, the SC confirmed the lesser impact of midwater trawling for alfonsino, compared to bottom trawling, on the benthic environment. The SC endorsed management measures specific to each fishery, rather than blanket regulations, to effectively mitigate benthic impacts.

The SC recommended a multi-criteria and multi-spatial scale risk assessment for evaluating SAIs on VMEs within the Encounter Review Standard. This would require collecting and processing additional data from management-relevant areas to strengthen the dRBS (dynamic reference benchmark score) approach. Other recommendations include developing alternative metrics for assessing SAIs on VMEs, reviewing RFMO spatial management practices, and updating the Encounter Review Standard every five years to integrate new scientific information and best practices.

Addressing the work put forward by the Working Group on Electronic Monitoring Standards (WGEMS), the SC advanced the development of minimum standards for Electronic Monitoring Systems (EMS) in SPRFMO fisheries, aimed at improving compliance and data integrity. Members supported further collaboration between the Scientific Committee and the Compliance and Technical Committee to establish clear roles in EMS implementation. The SC agreed on the proposed objectives, purpose, and

scope of EMS standards, and recommended coordination across working groups to optimize monitoring efforts and data sharing.

Regarding Climate Change, the SC acknowledged the impact of climate variability on South Pacific fisheries; the SC promoted expanding habitat monitoring activities and integrating climate considerations into management strategies. The SC welcomed input from the FAO's Deep Sea Fisheries Project and prioritised research on environmental indicators that influence fishery dynamics in the multi-annual workplan. The Habitat Monitoring Working Group was reshaped and turned into an Ecosystem Working Group.

Supporting research and data collection, extensive data was provided by Members, especially regarding trends in jack mackerel migration. A framework was endorsed to prioritise data fields essential for effective catch and bycatch monitoring. The importance of the Data Working Group was highlighted and

The SC assessed the Fisheries Operation Plans of proposed exploratory fisheries put forward by New Zealand and Korea and deemed that they meet all the requirements set out in the respective CMM, and therefore it recommended that they be accepted by the Commission.

Strengthening partnerships with other organisations and participation in their processes was encouraged, including engaging with FAO-led projects and continue international cooperation to enhance climate resilience, as well as with the North Pacific Fisheries Commission, in order to share sustainable practices and support habitat and stock assessment improvements.

The Scientific Committee amended its multiannual workplan, prioritising research on stock assessment, management strategies, and climate resilience. A new structure of work for the SC was proposed and adopted; the terms of reference for a number of new working groups and task teams were adopted.

The SC12 highlighted the importance of data-driven, cooperative strategies to manage South Pacific fisheries sustainably and address both immediate and long-term environmental and fishery challenges.

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SPRFMO SC12-REPORT

Report of the 12th Meeting of the Scientific Committee

30 September to 5 October 2024
Lima, Republic of Peru

Adopted 5 October 2024, 18:12 hrs.

Opening of the Meeting

Meeting arrangements and opening ceremony

1. The Scientific Committee Chairperson (Dr Ricardo Oliveros Ramos) began proceedings by thanking Peru for their warm welcome and for hosting the Scientific Committee meeting. The president of the board of directors for IMARPE, Admiral Jorge Paz Acosta spoke about the importance of the Scientific topics that will be discussed. Ambassador Elvira Velásquez Rivasplata from Peru spoke about the relationship between the organisation and the coastal fisheries States. Sergio González Guerrero, the Minister of Production of Peru, welcomed participants to Lima and hoped that all delegates enjoyed their time in Lima and wished them every success with the development of the meeting outcomes.

2. The Executive Secretary (Mr Craig Loveridge) detailed the meeting arrangements, the streaming service and the local facilities available to in-person delegates.

3. The Scientific Committee Chairperson then opened the meeting and proceedings. Heads of Delegations (HoDs) were asked to introduce themselves and their delegations.

4. A list of participants is available in Annex 2 of this report.

Adoption of the Agenda

5. The SC Chairperson sought proposed changes to the provisional agenda (SC12-Doc01). The SC **adopted** the agenda without modification (Annex 3).

Meeting Documents

6. Meeting documentation, location and access were presented. The posted list of meeting documents (SC12-Doc03_rev2) and annotated agenda (SC12-Doc02) were made available and referred to throughout the meeting. Three documents were submitted late, and the SC agreed to accept them and include them into the discussions.

7. The SC noted that document SC12-Doc06 (providing a collation of the intersessional working group meeting reports) was not available for the start of the meeting. The Secretariat advised that this was because working group meetings were being held right up until the day before the start of the main SC meeting. The Secretariat agreed to compile this paper and record that it was only made available post meeting

Nomination of Rapporteurs

8. Minute taking and preparation of the draft report was supported by Lynda Goldsworthy (AUS), José Zenteno (CHL), Jan Geert Hiddink (EU), Jordi Tablada (NZ), Grecia Chávez (PER), Emily Reynolds (US), the Secretariat, and Working Group Chairpersons.

Meeting Programme and Timetable

9. The Chairperson presented the intended meeting programme (SC12-Doc04). Minor modifications were made to the schedule throughout the meeting. The final schedule is shown in Annex 4 to this report.

Annual Reports Discussion

10. Annual reports were received from Australia, Belize, Chile, China, Cook Islands, Curaçao, Ecuador, European Union, Faroe Islands, Korea, New Zealand, Panama, Peru, Russian Federation, Chinese Taipei, United States of America and Vanuatu (SC12-Doc14 to SC12-Doc34). A working paper was created for questions and answers about the different annual reports (SC12-WP01). All reports, including questions, responses, and final report summaries, were expected to be finalised prior to the meeting by 28 September.

Australia

11. Document SC12-Doc21 presents Australian fishing activity in 2023 in the South Pacific Regional Fisheries Management Organisation (SPRFMO) Convention Area. Two Australian-flagged vessels fished in the SPRFMO Area in 2023 using demersal longline gears with 592,000 hooks deployed. No Australian flagged vessel fished using trawl gears. The total retained catch reported in logbooks was 123.4 t, comprised primarily of yellowtail kingfish (*Seriola lalandi*), blue-eye trevalla (*Hyperoglyphe antarctica*), morwong (*Nemadactylus* spp.), jackass morwong (*Nemadactylus macropterus*), reef ocean perch (*Helicolenus percoides*) and other species.

12. Australia achieved 21.6% observer coverage in 2023. Observers did not report any bycatch of marine mammals, marine reptiles or other species of concern in non-trawl operations in the SPRFMO area in 2023. Observers reported 40 kg of benthic bycatch from 26 separate fishing operations in 2023, comprised of starfish (Class Asteroidae; 8.9 kg), non-living 'benthos' (15.8 kg), and stony corals (Order Scleractinia; 15.2 kg). The required annual data were submitted to the SPRFMO Secretariat in accordance with Australia's data confidentiality policies and the relevant CMMs.

Belize

13. Document SC12-Doc14 presents the Belize Scientific Annual Report and provides an account of the activities carried out by its fishing fleet within the SPRFMO Convention Area from January 1st to December 31st, 2023. It was noted that there was only one active fishing support vessel authorised to operate in the Convention Area in 2023 and no authorised fishing vessels within the Convention Area during this period.

Chile

14. Document SC12-Doc26 notes that since 2020, the fishing operations on Chilean Jack mackerel have been conducted exclusively within the Chilean EEZ. During the first half of 2024, the industrial fleet targeting this resource was made up of 38 fishing vessels using purse seines.

15. A progressive increase in the Jack mackerel catches has been observed in the 2013 - 2023 period, with a maximum reached in 2023. This trend is explained by the increase in the quota allocated to Chile plus quota transfers from other SPRFMO members to Chile along with the completeness of its extraction. Thus, until June 2024, 664,179 metric tons of Jack mackerel were caught in the Chilean EEZ, which corresponds to 81% of the national TAC.

16. Since 2016, size-structured Jack mackerel catches have shown a wide range of sizes, between 7 and 67 FL cm, with main modes fluctuating between 26 and 41 FL cm, with higher values towards the end of the series. Thus, during the first semester of 2024, the size range includes individuals between 22 and

61 cm in FL, with a main mode of 35 cm in FL, due to a low participation of individuals belonging to the immature fraction of the Jack mackerel stock.

17. Similarly, since 2011, age-structured Jack mackerel catches according to the new age group allocation criteria have shown a wide range of ages, with main modes fluctuating between age groups I to IV in the period 2011-2018. Then, starting in 2019, the main catch mode became represented by age group V.

18. Finally, it is important to reiterate that, as of January 2020, Image Recording Devices (DRI) have been implemented to monitor compliance with Bycatch Reduction Plans and Fishery regulations in the entire fleet. In addition, during 2020, the mandatory use of Electronic Logbooks Systems (SIBE) has also been implemented in the industrial fleet to report in a set-by-set basis and in real time, total catches, bycatch and discards, the locations of sets and other operational information according to legal requirements. To this date, the implementation of these Electronic Monitoring Systems (DRI and SIBE) in the Chilean industrial fleets have been focused on monitoring compliance with regulations applying to catches, discards and incidental bycatch of seabirds, marine mammals, sea turtles and Chondrichthyes. However, the extension of the use of these tools beyond control, such as the scientific monitoring of fishing activities to gather fisheries dependent data, has begun to be explored recently with the aim complementing it with traditional human observation programs, in a near future.

19. Document SC12-Doc27 notes that the Chilean jumbo squid fishery includes participation of both artisanal and industrial vessels. In 2023, the artisanal fleet landed 107,355 tons of this resource, representing 98.89% of the national total (108,550 tons). The artisanal fleet targeting this resource is made up of 1,807 vessels whose length is equal or less than 18 meters. However, the main fishing operation was carried out by vessels of length equal or less than 12 meters, which represented 97.67% of the total number of artisanal vessels, equivalent to 1,765. This type of vessel (≤ 12m) altogether landed more 99.3 % of the total landings for the artisanal sector.

20. For the industrial fleet in 2023 this resource was bycatch while targeting other resources, and represented landings of 1,195 tons and 1.1% of the total landings for jumbo squid in Chile for this year (108,550 tons). The industrial landings of jumbo squid involved 1 factory vessel and 38 fishing vessels of which 17 landed more than 3 tons per fishing trip. Out of those 17 vessels, 13 operated with purse seines (76.47%), 3 (17.64%) with trawls and 1 with jigging (5.88%). Trawling represented 65.43% of the catch, 34.01% with purse seine and only 0.55% with jigging. Bycatch of marine mammals, seabirds, or sea turtles was not observed for both fleets.

21. All catches of jumbo squid were performed within the Exclusive Economic Zone of Chile (EEZ).

China

22. Document SC12-Doc24 notes that in the year 2023, a total of 522 Chinese squid jigging vessels were operational within the Convention Area, resulting in a cumulative catch of 494,000 metric tons of jumbo flying squid. The number of active fishing vessels exhibited seasonal variation, with the lowest count of 272 vessels recorded in April and a peak of 439 vessels in December. The aggregate number of fishing days reached 100,306, with an average catch rate of 4.9 metric tons per fishing day. During the fishing seasons spanning 2022-2023 and 2023-2024, an observer program was implemented, involving ten observers and thirteen studying vessels. For the 2023-2024 fishing season, a total of six observers have been deployed, of which, as of August 2024, four observers have landed and the two are still working at sea. In 2023, a total of 1,214 fishing days and 50 transshipment activities were observed and over 100,000 squid specimens were collected and measured.

23. The observer program for the squid fishery was executed during the 2022-2023 and 2023-2024 fishing seasons, with the involvement of ten observers and thirteen studying vessels. For the 2022-2023 fishing season, four observers embarked in July and returned to Zhoushan port in July 2023. In the 2023-2024 fishing season, six observers embarked on carrier vessels from domestic ports between the months of July and August 2023, journeying to the squid fishing grounds within the Convention area, then

transferred to the fishing vessels to carry out their observer missions. As of July 2024, four of these observers had returned, while two continued their work on board. Throughout 2023, the observers worked on 21 fishing vessels. The eight observers who had already returned to land observed a total of 1,214 fishing days and 50 transshipment events. The returned observers with the studying fleet measured over 100,000 squids in 2023. Additionally, there are still thousands of samples awaiting to send to the laboratory for analysis. The samples collected by the observer program spanned the entire year, encompassing both the northern and southern fishing grounds. No seabirds, reptile or marine mammal were observed to be caught.

Cook Islands

24. Document SC12-Doc31 presents the Cook Island Annual report. In early 2023, only one Cook Islands vessel actively participated in fishing activities. The fishing vessel *Akanui* successfully completed the eighth fishing trip. However, after this trip, the vessel did not sail again and has since been docked in Papeete, Tahiti. Consequently, no fishing activities have been conducted from April onwards.

25. Several factors led to this cessation of operations. Firstly, economic considerations made continuing unfeasible. The costs of maintaining and operating the vessel became unsustainable, especially given a notably low lobster and crab catch this season. The reduced catch rates meant that the revenue generated was insufficient to cover operational costs.

26. The daily Kopernik CPUE limit was exceeded, as stipulated in Conservation Management Measure (CMM) 14b-2023 the vessel to cease further fishing activities in that area.

27. Recognising the need for diversification, the Cook Islands is moving towards Hapuka drop line and jigging fishing gear. These methods are seen as promising alternatives to traditional fishing techniques and present new opportunities for sustainability and profitability.

28. The Cook Islands have developed a comprehensive Fisheries Operation Plan (FOP) for Hapuka fishing. This collaborative effort aims to ensure that new fishing methods are sustainable, economically viable, and compliant with existing regulations. The plan includes detailed guidelines, operational protocols, and conservation measures to protect marine ecosystems while enabling the industry to explore new fisheries.

29. By diversifying into Hapuka drop line and jigging, the Cook Islands fishing industry hopes to overcome the economic challenges that currently hinder the fishing operations.

Curaçao

30. Curaçao currently has no vessels participating in the fisheries managed by SPRFMO. As such, Curaçao has no data or information to provide regarding Curaçao fisheries operating under SPRFMO jurisdiction in 2023 or 2024 (Document SC12-Doc15). Similarly, Curaçao has no information to provide regarding 1) catches, effort, and CPUE summaries; 2) fisheries data collection and research activities; 3) biological sampling and length/age composition of catches; 4) ecosystem approach considerations; and 5) observer implementation reports for fishing activities under SPRFMO jurisdiction.

Ecuador

31. Documents SC12-Doc32 and 33 provide Ecuador's reports. The small pelagic fishery is one of the most important incomes to the country in continental Ecuadorian platform. Thread herring (*Opisthonema* spp.), chub mackerel (*Scomber japonicus*), Pacific anchoveta (*Cetengraulis mysticetus*), Frigatetuna (*Auxis* spp.), Round herring (E*trumeus teres*), sardine (*Sardinops sagax*), anchovy (E*ngraulis ringens*) and jack mackerel (*Trachurus murphyi*) are the species caught by the purse-seine vessels. The products are mainly intended to produce fishmeal, canning and direct human consumption (fresh – frozen); all depending on the species This report presents biological and fishing information on jack mackerel, collected for the small pelagic fish monitoring program of the IPIAP (before known as the National Institute of Fisheries), considering when this resource is available in Ecuadorian waters and for the

purse seine fleet.

32. The giant squid *Dosidicus gigas* fishery in Ecuadorian waters is under development and represents a fishing alternative for the Ecuadorian fishing sector. The seasonal distribution in Ecuadorian waters is influenced by the Humboldt current, in whose area of influence the giant squid makes vertical nocturnal movements for feeding, where it is caught by the artisanal fishing fleet in directed fishing and incidental fishing, mainly during the new (dark) moon. This report presents the results achieved from the giant squid biological fishing monitoring, recorded by the IPIAP on the Ecuadorian continental coast during 2023.

European Union

33. Document SC12-Doc34 presents the European Union (EU) fishing activity in 2023 in the South Pacific Regional Fisheries Management Organization (SPRFMO) Convention area and the observer program implementation in 2023. The data on catches of Jack mackerel (*Trachurus murphyi*) by four EU trawlers in 2023 covers the period from June to October. Total catch in 2023 was 69,072 (52,288 CJM) tonnes. Three scientific observers were deployed on four EU fishing vessels in the period from end of June till mid-October 2023.

34. A short section on the PFA self-sampling program has been included in the report, demonstrating the main results of the self-sampling activities that cover all trips by EU vessels in the area.

35. A PFA self-sampling report has been submitted to the SPRFMO SC, in which a description is presented of the fisheries carried out by vessels belonging to members of the Pelagic Freezer-trawler Association (PFA) within the SPRFMO area from 2017 to 2023. In 2023 three PFA vessels (and in total four EU vessels) have been active in the SPRFMO convention area. In the first half of 2024, two PFA vessels were present in the area but did not yield any catch despite extensive searching. In 2023, 15 PFA trips were self-sampled observers.

36. During the Jack mackerel Benchmark Working Group (SCW14) it was decided to develop a protocol for inclusion of self-sampling data for the EU fleet for those quarters where no observer trips were carried out. This document describes that protocol and the selection of quarters for which the self-sampling data will be used. For SC12 It is proposed to only use the self-sampling data from 2021 and onwards and only for quarter for which no observer data is present. For 2023 there are samples for all quarters when there was a fishery. It is therefore proposed not to use self-sampling data for 2023.

37. Exploratory fishing for toothfish was undertaken by the Spanish vessel *Tronio* in accordance with CMM 14e-2021. In both 2021 and 2022 the TAC of 75 t was reached in 15 days and 17 days respectively. In 2023, logistic constraints on the vessel movements meant that only 8 days of fishing could be conducted, achieving just over half of the TAC. A detailed survey report is presented to the SC.

Faroe Islands

38. Document SC12-Doc20 presents the Annual Report of the Kingdom of Denmark in respect of the Faroe Islands. The Faroe Islands currently have no vessels participating in fisheries inside the SPRFMO Convention Area. As such the Faroe Islands have no data to the SC regarding fishing, research, and management activities over the previous year.

39. In 2024 the Faroe Islands agreed to transfer its 2024 quota of 12,682 tonnes of *Trachurus murphyi* to Chile. This was subject to the approval of Chile and is without prejudice to future agreements on the allocation of fishing opportunities as per paragraph 8 of CMM 01-2024.

40. The Faroe Islands have a continuing interest in the fisheries managed by SPRFMO and hope in the future again to have Faroese flagged vessels that fish the *Trachurus murphyi* quota. If this would be the case, the Faroe Islands would provide the SC with relevant data and information and abide with relevant measures adopted.

Korea

41. There were no Korean fishing activities in the SPRFMO Convention Area in 2023 (Document SC12-Doc18). Therefore, there is no update on either catch or biological information in 2023. One trawl vessel has resumed fishing operation targeting jack mackerel in the Convention Area this year. A summary of this fishing activity will be included in Korea's Annual Report to SC13.

42. Trawl fishery: Korea had been conducting trawl fishing targeting jack mackerel (*Trachurus murphyi*) since 2003 when Korean research trawl vessel *Tamgu No.1* operated pristinely in the SPRFMO Convention Area. The number of active Korean trawl vessels has varied from one to three in the last 15 years. Since 2020, Korea has not conducted any trawl fishing in the Convention Area.

43. Jigging fishery: Korea jigging fishery targeting jumbo flying squid (*Dosidicus gigas*) has been commercially operating in the Convention Area since 1990. The number of jigging vessels fluctuated from 0-50 in the last 30 years (Figure 1). In the 1990s, vessels peaked at 50 in 1995 and have decreased rapidly since then. Only the number of vessels remained the smallest in the 2000s. Korea has not conducted jigging fishing in the Convention Area since 2021.

New Zealand

44. The New Zealand (NZ) report is presented in Document SC12-Doc23.

45. Jack mackerel: New Zealand conducted no fishing for *Trachurus* species in the SPRFMO Convention Area in 2023. Chilean jack mackerel (*Trachurus murphyi*) was first observed in New Zealand waters in 1987, although its distribution in New Zealand waters has changed significantly over time. *T. murphyi* in New Zealand is thought to be a small, periodically separated component of the larger South Pacific stock which undergoes occasional expansions or migrations. It is unknown whether there has been any spawning of *T. murphyi* in New Zealand waters.

46. Catches of *T. murphyi* within the New Zealand EEZ were highest in the 1990s, estimated at around 20,000 tonnes, but have since decreased significantly. Based on observer sampling of species proportions in fisheries around New Zealand, annual catch of *T. murphyi* in New Zealand waters is estimated be around 5,000 tonnes on average in each of the last three New Zealand fishing years for which data is available (15/16, 16/17, and 17/18) (Oct-Sept) (Horn et al. 2019b; Langley et al 2016).

47. Squid: New Zealand conducted no pelagic fishing for *Dosidicus* species in the SPRFMO Convention Area during 2023.

48. New Zealand vessels have been bottom fishing in the now-SPRFMO Convention Area since before 1990. The New Zealand high seas bottom trawl and line fisheries are described in detail in the bottom fishery impact assessment 'Cumulative Bottom Fishery Impact Assessment for Australian and New Zealand bottom fisheries in the SPRFMO Convention Area, 2023' (http://www.sprfmo.int/science/benthic-impact-assessments/). Bottom fishing activities conducted during 2023 operated as described in that document.

49. Specific high seas fishing permits for New Zealand vessels in the now-SPRFMO Convention Area were first authorised in 2007-08. Figure 1 shows the total number of New Zealand vessels permitted to trawl in high seas areas (pre-2007) or specifically in the SPRFMO Area (post-2007) and those that were recorded as fishing in a given year. The most recent five years of information on the number of New Zealand vessels permitted to fish in the SPRFMO Convention Area and the number of vessels which bottom fished in the Convention.

Panama

50. Document SC12-Doc17 notes that Panama participated in the SPRFMO as a Cooperating Non-Contracting Party from 2014 until July 6, 2022. During this time, the participation in fisheries has been restricted under the rights granted by the Commission; It remained limited in the extraction of resources regulated by this Organization and in 2016 and 2017, only two (2) conditional vessels

participated in the squid fisheries in the South Pacific; These vessels fished for squid (*Dosidicus gigas*-GIS) in FAO Area 87 at an average depth of 15 m, using 11 individual pots per trip, generally with 21 persons on board and with an approximate investment of 5,656 fishing hours declaring an extraction of 1,130.96 tons of GIS.

51. Panama became a member of SPRFMO on July 7, 2022. For the 2023 calendar year, Panama did not carry out any catch per se activities of SPRFMO regulated species in the Convention Area.

52. For 2023 Panama has participated in the SPRMFO Convention Area only through vessels authorised to carry out activities related to fishing, such as the transfer of fishery products to refrigerated cargo ships and their subsequent unloading in port and in the supply of fuel and other fishing related services.

Peru

53. SPRFMO Area (Document SC12-Doc28): As of June 2024, there are 135 Peruvian vessels authorised and registered in the Commission record of vessels authorised to fish within the SPRFMO Convention area. In the first half of 2023 (until July), 38 Peruvian-flagged purse seine vessels reported a total catch of 20,056.06 tonnes of *Trachurus murphyi*. In parallel, these same vessels also caught a total of 7,360 tonnes of *Scomber japonicus*. However, no catches of *Trachurus murphyi* and *Scomber japonicus* were reported from the second half of 2023 to June 2024. Regarding *Dosidicus gigas*, there were no reported catches for 2023, but a total of 4.6 tonnes were reported during the first half of 2024. The research activities in the SPRFMO area, monitored by a Peruvian onboard observer program, provided reliable information on fishing effort, catch volumes, species composition of the catches, fishing areas, and distribution of the target species. No registers of top predator bycatch (seabirds, marine mammals, and sea turtles) were reported in any observation during the fishing activities from January 2023 to June 2024.

54. ANJ (Document SC12-Doc29): The Peruvian marine environment is characterized by its high productivity and variability. It is particularly exposed to the effects of the opposed significantly warm (El Niño) and cold (La Niña) climatic patterns in the Pacific Ocean that alternate with relatively short periods of close to neutral conditions. Between 2013 and the first part of 2018, these changing environmental conditions caused a more dispersed distribution, reduced availability, lower abundance indexes, and consequently lower catches of Jack mackerel. This has been followed by an expanded distribution in denser concentrations farther offshore, much higher abundance indexes, increased availability to the industrial and artisanal purse seine fleet, and higher catches of Jack mackerel from the second half of 2018 to 2022. In 2023, a Coastal Niño event was registered along the Peruvian coast, which led to a concentration of Jack mackerel south of the Peruvian coast, making this resource more accessible.

55. In 2024, the catches initially decreased for an initial dispersion of Jack mackerel schools; but when the environmental conditions cooled, Jack mackerel concentrated again south of the coast. This will be closely monitored throughout this year. Between January 2023 and June 2024, the fishery targeted a wide range of sizes, with the highest proportions of juveniles in February 2024 (63%) and March 2024 (78%). A research survey in 2023 also found younger and smaller juveniles with total lengths as small as 4 cm.

56. In late December 2023, IMARPE (Instituto del Mar del Perú) updated the available 2023 Jack mackerel assessment made for the Peruvian (far-north) stock with the JJM model using the configuration agreed during the 11th meeting of the Scientific Committee (SC11). This resulted in a range of options for setting the 2024 TAC that was included in its advice to the Government, recommending three scenarios: (i) the catch corresponding to an F equal to applied in 2023 (TAC = 143,000 t), (ii) the catch corresponding to applying 80% of the F_{MSY} (TAC = 187,000 t) and, (iii) the catch corresponding to an F equivalent to 1.5 that applied in 2023 (TAC = 204,000 t). Based on this advice, in December 2024, PRODUCE established a catch limit of 70,568 tons for the Jack mackerel (*Trachurus murphyi*) to be caught in Peruvian jurisdictional waters by the large-scale or industrial fleet during 2024 and a catch limit of 66,654 tons to be caught by the artisanal fishing vessels with purse seines and hold capacity

equal or greater than 20 m^3 up to 32.6 m^3. Also, based on their regular low catches throughout the year and socio-economic and legal considerations, no catch limit was set for artisanal fishing vessels that use passive fishing gear, and purse seine vessels with a hold capacity of less than 20 m^3. Later, on 12 July 2024, PRODUCE decided to establish a catch limit for the Jack mackerel for 2024 at 204,000 t., applicable to extractive activities carried out by fishing vessels with valid permits.

57. An updated assessment with the JJM model has been made by IMARPE based on the most recent information and data available up to June 2024. The recent observations and assessments confirm the increasing trend in the biomass estimates observed from 2016, nevertheless, the model projection for 2024 shows a slight decrease in its trend. Despite this, the Peruvian Jack mackerel stock is in an overall healthy situation.

Russian Federation

58. Document SC12-Doc16 provides information on fishing activities of the Russian Federation in 2023 in the Convention area of the South Pacific Regional Fisheries Management Organisation (SPRFMO) and data on the implementation of the Observer Program on fishing vessels.

59. The jack mackerel (*Trachurus murphyi*) fishing was conducted by three Russian flagged trawlers and covered the period from March to December 2023. The total catch of biological resources was 60,436.0 t, including 43,373.7 t of jack mackerel and 17,062.3 t of chub mackerel (*Scomber japonicus*).

60. Scientific observers were deployed on board vessels during the period of fishing and the average scientific observer coverage in the fishery was 81%.

Chinese Taipei

61. Document SC12-Doc22 presents the report of Chinese Taipei. Jumbo flying squid is widely distributed in the eastern Pacific Ocean and has been targeted by Chinese Taipei's squid-jigging fleet during 2002-2021. The fishery was temporarily suspended in 2022. There was no fishing activity in the SPRFMO Convention Area in 2023 fishing season for Chinese Taipei's fishing fleet. The number of fishing vessels varied from 2 to 29 during 2002–2021 with catches of 665 to 39,450 tons. The major fishing grounds located around 13°–18°S and 80°–85°W, while several vessels operated in the equatorial waters (around 1°–4° S and 95°–106° W) since 2017. Data of logbook, observer, transshipment, and landing have been collected entirely and submitted to the Secretariat of SPRFMO.

United States of America

62. The United States currently has no vessels participating in the fisheries managed by SPRFMO (Document SC12-Doc19). As such, the United States has no data or information to provide regarding U.S. fisheries operating under in the SPRFMO Convention Area in 2023 or 2024. Similarly, the United States has no information to provide regarding 1) catches, effort, and CPUE summaries; 2) fisheries data collection and research activities; 3) biological sampling and length/age composition of catches; 4) ecosystem approach considerations; and 5) observer implementation reports for fishing activities in the SPRFMO Convention Area.

63. The United States has a continuing interest in the fisheries managed by SPRFMO and may have vessels that participate in these fisheries in the future. If U.S.-flagged vessels participate in SPRFMO-managed fisheries, the United States would provide the Commission with all relevant data and information and abide by all relevant measures adopted.

Commission guidance and intersessional activities

SC multi-annual workplan

64. The 2024 workplan was posted as SC12-Doc05 and updated during the meeting sessions.

65. The SC reviewed the tasks and as in previous years developed a draft 2025 multi-annual workplan (SC12-WP02, Annex 5) to be presented to the forthcoming Commission.

66. The SC recognised that the workplan did not prioritise items and that this might be a useful future task. The SC therefore refrained from further prioritisation discussions.

Secretariat SC-related activities

67. The Secretariat presented SC12-Doc07, which summarised the activities conducted over the past year by the Secretariat in support of SC work. These activities include external meetings, project inputs and data releases.

68. The SC **noted** that in the SPRFMO forecast budget there is an item for the recruitment of a Science Manager in 2025. The SC recalled its recommendation from 2023 contained in paragraph 47 of the SC11-report and convened a small group in which current and previous Science Managers from neighbouring RFMOs provided their experiences. Following this, in addition to the 2023 recommendation SC12 identified other important Science Manager traits being strong interpersonal skills, ability to coordinate Scientific projects and activities, and technical coding skills (for example in R) for the efficient production of scientific analyses.

69. The SC also **noted** that as per the SPRFMO Staff Regulations (footnote 2) the Executive Secretary shall prepare the recruitment process and position description for the forecasted Science Manager in consultation with the Chairperson of the Scientific Committee.

Working group on Electronic Monitoring Standards

70. The Co-Chairs of the Working group on Electronic Monitoring Standards (WGEMS) informed the SC of the progress of the group, sought endorsement of the key proposed elements and the objectives, purpose, and scope of the draft standards, as well as solicited advice and input on the work remaining to support the Commission adopting Minimum Standards for the use of Electronic Monitoring Systems (EMS) in SPRFMO Fisheries (SC12-Doc35).

71. The WGEMS Co-Chairs also sought feedback from the SC on several potential roles the SC might play in implementing Electronic Monitoring Standards, in particular with respect to SC capacity to take on the roles described. The SC **noted** that some of the proposed roles might also fall within the scope of the CTC, and decisions on which bodies might take on different key implementation responsibilities would benefit from discussions of those responsibilities in the CTC and Commission.

72. The EU noted that, as EM will not be able to collect all data fields currently required in CMM02-2022, the prospect of EM use in SPRFMO fisheries makes it important for the SC to investigate what minimum levels of ongoing observer coverage would be necessary to ensure adequate monitoring of all data fields for SPRFMO fisheries. One of the Co-Chairs noted that this is not among the current planned tasks for the WGEMS but agreed that such advice from the SC in the future will be vital.

73. The SC **noted** the report, supported the work done so far, and **agreed**:

> that the proposed objectives, purpose, and scope of the standards were appropriate. The SC also **agreed** that SC working groups should work with the WGEMS, as appropriate, to avoid duplication of efforts and to continue to develop the draft standards, particularly the technical annexes.

Cooperation with Other Organisations

74. A representative from the FAO introduced SC12-Obs01 on the FAO Deep Sea Fisheries Project (DSF Project), a component project of the FAO's Common Ocean's Programme, that is working with RFMOs including SPRFMO to promote the sustainable management of deep-sea fisheries in Areas Beyond National Jurisdiction (ABNJ). The DSF project representative acknowledged the very extensive expertise that exists in the SPRFMO scientific community on a range of topics of interest to the project and encouraged scientists with relevant experience and expertise on these topics to contribute to DSF project, in particular through:

    a. Engagement with an upcoming review of the uptake of climate change considerations in the work of SPRFMO;
    b. Nomination of experts to contribute to the development of assessments of data-limited stocks and work with other RFMOs and ICES;
    c. Nomination of experts to review drafts reports on the status of relevant SPRFMO stocks for inclusion in the FAO State of the world fisheries and aquaculture;
    d. Nomination of experts to contribute to a proposed workshop on the impacts of deep-sea fisheries on deepwater chondrichthyans;
    e. Engagement in the Joint NAFO-ICES symposium on Applying the Ecosystem Approach to Fisheries Management in ABNJ to be held at the FAO Headquarters in 2025;
    f. Promoting the FAO E-learning course "Strengthening deep-sea fisheries management in the ABNJ".

75. The SC **welcomed** the update from the FAO and the nomination of experts from Members to contribute to items 2, 3 and 4 and looked for forward to the ongoing positive of engagement of SPRFMO in the DSF Project.

76. Under this, and other agenda items, the CPPS representative informed the SC about possible collaboration activities.

77. The NPFC Science Manager noted that his attendance at this meeting was supported under the existing MoU and that in-corridor discussions had already identified similar challenges and he appreciated the opportunity to see another RFMO in action and to be able to take those learnings back to the North Pacific deliberations.

Observer Programme accreditation process and progress

78. The Executive Secretary updated the SC on the current state of the appointment of an additional Observer Programme accreditation evaluator (as per SC12-Doc13). The SC did not provide any specific advice on this process.

Jack Mackerel

Review of intersessional activities

79. The Jack Mackerel Working Group met twice virtually in preparation for the Scientific Committee meeting on the 16/17th of July (report G70-2023) and 20/21st of August (report G79-2023). The workshops focused on progress made towards organizing an age-reading workshop, CPUE standardization, the connectivity study, the MSE work and preparation for the 2024 JM assessment. The jack mackerel Management Strategy Evaluation (MSE) work was discussed at six technical meetings (report G24-2024, G35-2024, G42-2024, G57-2024, G69-2024 and G96-2024) and the connectivity work at 2 technical meetings. A pre-SC workshop on connectivity was held 26-27th of September. Prior to SC12, the external expert in collaboration with the JM chair prepared the JM assessment and updated the group of preliminary results.

80. The Secretariat has provided an updated historical catch data series to 2024 as Annex 1 in document SC12-JM03. There were no notable changes to the historical catch history. As final annual catch figures are not due until 30 September, in many cases the 2023 data remain estimates.

81. Members provided the SC with expected catches, including transfers and pending transfers. All Members actively fishing in the area did so. Several Members provided updates to the catch estimates for 2023 and 2024. Previous estimates for total current catches have always been within about 10% of the final figures. Last year's SC11 2023 estimates for total catch show a relative overestimation of 1.0% overall. Boxplots showing historical monthly catches for each of the major fleets were presented and compared with the current monthly catches from the first half of 2024.

82. The paper also provided a short explanation of the *Trachurus murphyi* (CJM) catch history as used in the SPRFMO jack mackerel stock assessment. Section 6 in the paper was included to show information provided by IATTC on catches of epipelagic forage fishes (including *Trachurus* spp) for the entire IATTC area, but the information had not been updated for 2024.

Assessment data review and evaluation

83. The SC discussed the data inputs and preliminary assessment results and diagnostics, including stock status and reference points. This led to several revisions in total catch data, catch-at-age data and acoustic index at age data as some of these sources had age-0 data mislabelled. Corrections were made during the SC and assessments updated accordingly in line with accepted procedures.

84. The Pelagic Freezer-trawler Association (PFA) self-sampling report SC12-JM02 was taken as read. A description is presented of the fisheries carried out by vessels belonging to members of the PFA within the SPRFMO area from 2017 to 2024. The self-sampling program delivers information on spatial and temporal evolution of the fishery, species and length compositions and ambient fishing conditions (temperature and depth). Catch distributions and length compositions by quarter and division are presented for jack mackerel (CJM), chub mackerel (MAS) and southern rays bream (BRU). In the first half of 2024, two PFA vessels have been active in the SPRFMO convention area, and had trouble finding any Jack mackerel in the first month of their trips. Thereafter the fishery has alternated between a decent and poor fishery. Overall, the self-sampling activities for the jack mackerel fisheries during the years 2017 - 2024 (up to 22/08/2024) covered 60 fishing trips with 2,698 hauls, a total catch of 2010, 718 tonnes and 90,436 individual length measurements. Compared to the previous years, jack mackerel in the catch in 2021-2024 have been taken much more northernly. Median length of 27.5 cm compared to 21-36cm in the preceding years. The highest catch rates (catch/day) of jack mackerel have been recorded in 2021 (222 ton/day) and is at 151 ton/day in 2023. Bycatches of chub mackerel (MAS), Southern rays bream (BRU) and blue fathead (UBA) are being taken in the fishery for jack mackerel. During the years, reported here, 2,104 hauls with chub mackerel (MAS), 377 hauls with Southern rays bream (BRU) and 355 hauls with blue fathead (UBA) have been analysed as part of the program. For SC12, all quarters are covered by observer data and as such, no self-sampling data had to be used.

85. The SC **acknowledged** the work and looks forward to future reports.

86. Chile presented SC12-JM07 on effort creep in the jack mackerel south central fleet in Chile. The central-southern fleet for the jack mackerel fishery in Chile has experienced technological changes over time, which may not be reflected by other variables already considered in the CPUE standardization process. To account for these changes the SPRFMO Scientific Committee had agreed to apply a factor of 1% per year to correct the CPUE abundance indices of jack mackerel for the Chilean and Peruvian fleets. However, there are concerns over the technical implications of a fixed rate, and the exploration of alternative efficiency correction factors was recommended. In this study, they explored different approaches to estimate and include a creep correction factor into the standardization of the Chile CPUE index. From the survey of the JM fishery conducted during 2023, they used fisher's responses to determine the magnitude of perceived changes in fleet efficiency and periods of occurrence to estimate a creep factor. Next, they implemented a GLM, where the inclusion of a creep factor as a dummy variable in the standardization model of the Chile CPUE index showed multicollinearity and aliasing that

prevented its use as an additional factor in the model. However, when using the corrected CPUE index by an informed creep factor as the response variable in a GLM, the model exhibited a similar pattern as with the uncorrected CPUE. The benefits and limitations of this approach are finally discussed and proposed as next steps for adjusting and improving its reliability.

87. The SC discussed the paper and queried whether the previously presented documentation of major events in technology were still recorded within Chile. Although a slightly different approach has been used in the current year, the authors indicated they would be looking into developing and maintaining the documentation. Based on questions from the SC, the author indicated that the most dominant factors increasing technological creep were the availability of satellite information and the multibeam technology and that even if CPUE would decline, correcting for these technological improvements made sense. Future developments could focus on including the age of the vessel and experience of the skipper in the standardization while after the collapse of the stock only newer vessels and most experienced skipper remained in the business. Future developments in the standardization of the CPUE will be evaluated at the next JM benchmark.

88. Chile presented SC12-JM06 on a Bayesian spatio-temporal approach for the standardization of CPUE in the *Trachurus murphyi* fishery of central-southern Chile. Stock assessment models depend on indices of relative abundance derived from fishery catch-per-unit-effort (CPUE), which may be influenced by several factors that cause spatial variation and complicate standardization (e.g., environmental conditions, fishing methods, fishing season/area, and vessel size). This study updates the standardization of Chilean jack mackerel fishery-dependent CPUE from central-southern Chile for the period 1994-2024. The study employed Bayesian hierarchical spatio-temporal models with integrated nested Laplace approximation (INLA). The model identified vessel hold capacity, days at sea, quarter, year, spatio-temporal component, and environmental conditions (specifically sea surface temperature and chlorophyll-a) as significant predictors of Chilean jack mackerel CPUE. In the 2024 fishing season (January to June), the average duration of fishing trips (days at sea) was 2.62 days, representing an 18% increase compared to 2023. This increase is associated with a greater average distance of fishing sets from the port, which was 194 km—30% farther than in 2023. The average hold capacity of vessels in 2024 was 1,586 m3, nearly unchanged from 2023, when it was 1,575 m3. Biomass prediction maps for jack mackerel revealed a variable interannual pattern with two periods of coastal concentration (1995-2001 and 2012-2024) and one offshore expansion period (2002-2011). The standardized CPUE series indicated a period of high biomass stability, peaking in 2006, followed by a steady decline. Since 2015, an increase in CPUE has been observed, correlating with greater fishing activity near the main fishing ports. Moreover, the inclusion of environmental variables improved the standardization model's goodness-of-fit, suggesting a habitat-based aggregation of Chilean jack mackerel biomass. The year 2024 was characterized by an 11% decrease in estimated CPUE compared to 2023, possibly influenced by negative anomalies in sea surface temperature and chlorophyll-a observed in the study area. However, this trend needs to be verified by incorporating data from fishing operations in the second half of 2024. This approach offers a new, spatio-temporally standardized CPUE series for jack mackerel to be considered in the next benchmark of the Joint Jack Mackerel Stock Assessment Model.

89. China suggested that spatiotemporal models could be compared to other CPUE series standardized using GAMs. The presenter and WG chair noted that the previous CPUE used a GAM with zones.

90. The SC noted that the series in JM06 is a candidate to be considered in the next benchmark but noted that the proportion of the fleet captured by the different series is a potential reason for differences in CPUE indices that should be resolved. Furthermore, the potential for spatial effects in this work to explain differences with the series was raised and that influence plots could be helpful to determine which aspects of the results were having the most influence (Bentley et al. 2012).

91. Peru asked if the presence of Jack Mackerel is related to the presence of chlorophyll and mentioned that this could be included as an explanatory variable. The author mentioned jack mackerel presence can be patchier than this because the zooplankton can deplete chlorophyl, and so secondary productivity can be higher than primary productivity.

92. The SC noted that the series could be a candidate for the Management Procedure in the MSE development.

93. Peru presented SC12-JM08 on a user guide for the Joint Jack Mackerel (JJM) model. The document is intended to serve as a user's guide for those interested in learning about the JJM model internally and how to use it. Therefore, it focuses on the description of the mathematical equations of the population dynamics of Jack Mackerel, and computational aspects such as software installation (AD Model Builder), input and output files, model run, and a case study illustrating the practical application of the JJM model. Finally, it is important to mention that this document was created by IMARPE as a proposal to enhance the understanding of the model's internal aspects and that it is open to collaborations for future versions. From discussions, Peru agreed to provide this manual to the SC for being included on the SPRFMO GitHub account, provide links to the tutorial and workshop that was conducted prior to the 2022 benchmark.

94. Chile presented SC12-JM04 on the update of the CPUE index and acoustic biomass in the South-Central Chile. The abundance index based on the CPUE model of the south-central Chilean purse seiner fleet is one of the main indices used in the jack mackerel stock assessment model. This index was updated to June 2024. The CPUE model uses vessel hold capacity as both an independent and dependent variable. To evaluate the effect of using vessel hold capacity in the CPUE model, an alternative model based on the catch with vessel hold capacity as a covariate was fitted. The indices estimated by the two models were similar from 1983 to 2019. Then, the index based on the CPUE model remained stable until 2024, while the index based on the catch model decreased in the last two years. The relationships between the CPUE index and hydro-acoustic survey results in the south-central zone were analysed, including acoustic biomass, acoustic density, and fish distribution area. The acoustic surveys conducted in 2000, 2021, and 2023 estimated decreasing trends in biomass and the area occupied by the fish, and a high increase in density. A ramp model was fitted between the CPUE index and biomass. The CPUE index tends to increase with acoustic density until reaching an asymptotic level. A linear model was fitted between the CPUE index and area (excluding the last three years), which is proposed to correct the CPUE index. The corrected CPUE index did not increase in 2020 as the current CPUE index did; instead, it remained at a level similar to the previous year. It is recommended to take a precautionary approach when using the CPUE index because it seems to overestimate stock recovery in the central-south zone of Chile. Meanwhile, the acoustic surveys conducted in the north zone estimated an increasing trend in biomass in recent years. The 2024 survey recorded the highest density ever in the north zone. Overall, the decrease in acoustic biomass in the south-central zone seems to be compensated by the increase in the north zone, resulting in relatively stable acoustic biomass across the entire zone.

95. Chile presented SC12-JM05 on the outcomes of the hydroacoustic assessment of Jack mackerel in the North of Chile in 2024. The acoustic research was carried out with the "*Abate Molina*" R/V, owned by the Undersecretary of Fisheries and Aquaculture and administered by the Chilean Fisheries Development Institute. During the study, 33 transects were carried out with a western limit of 100 nm, off the coast of northern Chile. The acoustic quantification of jack mackerel biomass was carried out with the Simrad EK–60 scientific echo sounder with a frequency of 38 KHz, collecting information from the surface up to 500 meters deep. The identification of the acoustic data was carried out through the interpretation of the echograms, jointly with the results of the identification fishing. The main results from the survey indicate a total biomass of more than 2.78 million t. The size ranged from 9 to 52 cm (FL). Jack mackerel ranging from 22 to 24 cm were absent with modes at sizes 30, 35, and 36 cm. Finally, the species was distributed between the south of Arica (18º25'S) and Valparaíso (33º00'S), with three main concentrations (off of Arica, SW of Antofagasta, and off of Huasco).

96. The SC inquired about differences in the age-histograms presented in relation to the length frequency plots. The author indicated that the frequency plots might actually reflect biomass rather than numbers. The US noted that the survey results point to the highest estimate on record and asked if the area surveyed has remained constant. It was explained that the area surveyed has changed and had been expanding over the years. The US also asked if this was a multispecies survey, and it was clarified it was for jack mackerel. The increasing acoustic density together with the reduced areal use of Jack

mackerel was discussed and the author indicated that more time was needed to explore the density estimates. In SC discussions, the author indicated that Chile intends to continue the acoustic survey.

97. The SC **noted** that the continued availability of the survey is important for further MSE developments.

98. Chile presented SC12-JM10 on suggested additions to the Jack mackerel catch and risk table. Given the good stock status they explored the impact of increasing the current maximum limit on TAC increase as stipulated in the rebuilding plan of 15%. As an exercise, they showed projections with higher limits of TAC changes of +50%, +75% and +100%. The change limit of +100% produced a 2024 catch that was 44% of the catch compared to that computed using F_{MSY}. This level, given future fishing mortalities set equal still resulted in a high probability (0.88) that Spawning stock biomass (SSB) will be greater than SSB_{MSY} in the year 2033. Therefore, the additional projections showed that there is room to increase the upper limit of the TAC change under a precautionary approach.

99. The SC discussed the implications of the paper, and some Members expressed concern over the assertions that the stock is in a different state. The SC **noted** that the reason there was a maximum change in TAC from year to year of 15% was based on the tested management procedure (MP) done in 2014 (SC02). The SC **noted** that one of the reasons that a maximum change in TAC from year to year of 15% was used in the Jack mackerel advice to account for potential model misspecification, not to account for rebuilding potential. They further noted that care should be taken to step outside of the agreed MP without substantial testing as is taking place in the MSE. It was noted that management procedures without TAC change limits were tested and resulted in higher risks to the stock.

100. After extensive discussion, the SC **agreed**:

> that changes to the MP should be tested in an MSE prior to recommending it to the Commission and made appropriate reminders wherever sensitivities to alternative 2025 catches were applied.

101. Chile noted that until the MSE is updated the SC should provide more alternatives in the risk table to Commission.

102. The SC **agreed**:

> to include additional scenarios in JM technical annex indicating that these scenarios are made available for illustration purposes and do not reflect the SC's recommendations on sustainable and precautionary catch options.

103. Chile presented SC12-JM09 on the terms of reference for an ageing workshop of Jack mackerel. Considering that Members that perform age and growth estimates should share their experience and research, a Terms of Reference (ToR) is proposed with the aim to present the jack mackerel (*Trachurus murphyi*) otolith readings criteria used by the age and growth laboratories from the SPRFMO Members.

104. Peru tabled the SC12-WP04 containing a ToR proposal for an ageing workshop with similar objectives that they considered important to include into the ToR.

105. The SC discussed document SC12-WP14 ToR and the validation of the first annual growth ring. It was **clarified** that the first workshop would focus on evaluating methodologies for the implementation of age reading in otoliths. The suggested timeline for the workshops was considered too short, leaving no possibility for several Members to make experts available. Given that funding will expire at the end of October 2024 the WG chair suggested to continue planning the workshop early 2025 where Members would carry their own expenses. The SC **suggested** that the use of "smartDots", an ICES platform for checking age reading might be considered to both train and validate age-determination reading methods.

106. The SC **agreed:**

> that this could be part of a second workshop.

107. The SC **agreed**:

> to the ageing workshop ToR as proposed in SC12-WP14 (Annex 8) and **recommended** to hold an age reading workshop at the beginning of 2025 for all interested Members.

Jack mackerel 2024 stock assessment

108. From the preparatory SC web meetings, and recognizing that the benchmark assessment occurred in July 2022, the SC **agreed**:

> that the assessment would be carried out in line with the results of the benchmark workshop.

109. The usual incremental analyses of adding each new data component were completed. This preliminary assessment was distributed two weeks prior to the SC and members were invited to review the assessment data prior to SC12. Given that the SCW14 benchmark was held recently (in 2022), it was agreed that limited sensitivity runs should be done.

110. The input data was scrutinized by SC scientists prior and during SC12. Updates to weight-at-age in the far north fleet were implemented and several updates on catch composition data in the Chile-north fleet were processed. The first round of assessment bridging with new data introduced in 2024 was presented by the external expert, Lee Qi. She noted that the assessment code is located at github.com/SPRFMO/jjm and that an output file in the form of an html document can be found on the Teams page. Data updates resulted in similar biomass estimates for the 1-stock hypothesis and a slight difference in estimates for the two-stock hypothesis. Updating the model to 2024 created an increase in biomass for the final year as Peruvian CPUE indicates a continued increase in stock abundance. Model sensitivities were included to address offshore fleet behaviour, allowing for flexibility in selectivity pattern, beginning in 2021. A break in catchability was also included for that year. Estimates of biomass, recruitment, and fishing mortality were similar to the base case model. The WG chair noted that the 2024 acoustic north survey data encountered a large quantity of young fish which led to an increase in recent stock estimates. It was noted that the terminal year CPUE only reflects a partial year and should therefore be down-weighted. The table of model sensitivities was discussed. In line with previous agreements in the SC, Chile requested for a decrease in CV for the acoustic North biomass survey, as data have been consistently collected for the past few years. The increase in confidence for this survey resulted in slightly more optimistic biomass and recruitment trends for recent years. Relative changes to the CV for the CPUE indices were discussed and it was decided that the CVs should not be re-weighted during this update assessment, as it warranted further analyses and was a topic more suited for a benchmark assessment.

111. The SC **agreed**:

> to use a 10-year average of the dynamically estimated B_{MSY} as the B_{MSY} value to be taken forward in the forecast. This B_{MSY} is estimated as 8,939 kt in 2024 for the single stock hypothesis.

112. The 1-stock and 2-stock models have some differences in the specifications of certain processes (e.g., on selectivity and recruitment). The assessment model fits the catch-at-age and catch-at-length data well although fits to the central-south and the offshore fleets are somewhat skewed towards older fish. The model furthermore fits the CPUE indices from Peru, Chile and offshore reasonably well. However, the model also over-predicts the Chilean CPUE, while it underestimates the Peruvian CPUE in 2023 and 2024. The Northern Chilean acoustic survey, although noisy, is fitted within its range of expectation, noting however a lack of 2-year-old fish in the survey in 2024. The selection pattern of especially the South-central Chilean fishery shows a continuous increase with age where in previous years selection flattened at around the age of 5. Both models were unable to fit to the plus group from the far north fleet, which dominated the length composition data in 2024.

113. The spawning stock biomass of the jack mackerel stock is estimated at around 17.7 million tonnes, well above the B_{MSY} value (of 8.9 million tonnes). Fishing mortality in 2024 is estimated at 0.14, well below long term estimates of F_{MSY}. Recruitment is estimated higher compared to the previous years, although not as high as in 2018-2019. Recruitment still sits well above the low productivity period at around 2010.

114. Comparing the 2024 assessment with the 2023 assessment (Figure 4.5.1) shows an increase in recent estimates of SSB, mainly driven by updates to the 2024 updates in the indices of abundance and the age composition data. Estimates of F and recruitment have remained largely the same.

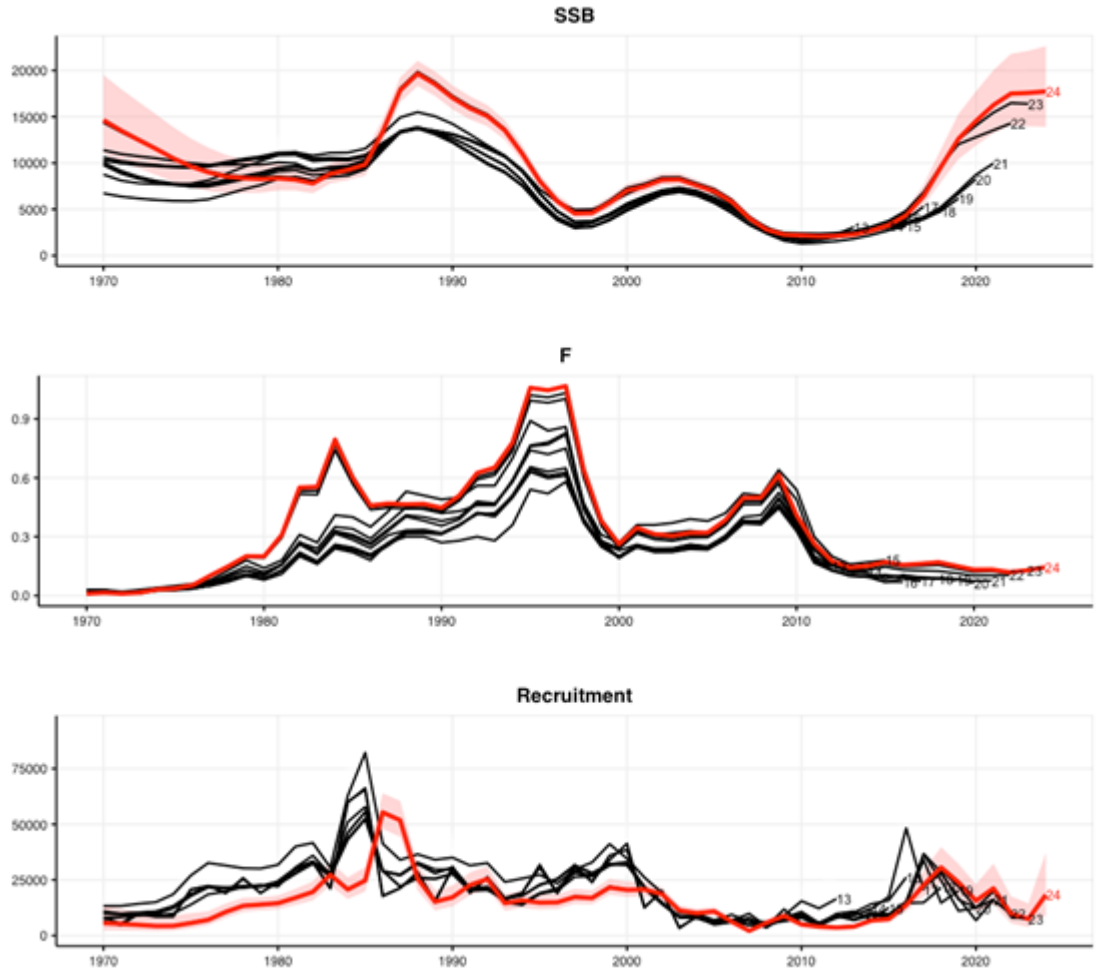

Figure 4.5.1 Historical retrospective of the 1-stock assessment outcomes for SSB, F and Recruitment.

Connectivity research

115. The JM Connectivity Task Team chair presented interim work on the literature review and pre-SC workshop outcomes relating to the Jack mackerel connectivity work. A systematic review on 11 key topics was undertaken to critically appraise sources of information that may be useful in evidencing population structure and connectivity of jack mackerel. Each topic was reviewed in a standardized approach and provided the background and rationale for the use of the approaches / field of study; a description and critical appraisal of methods described in the international literature; explored whether identified methods have previously been applied to jack mackerel or other small pelagic (and their effectiveness); and discussed the feasibility/limitations of these methods within the context of the High Seas of the South Pacific.

116. A workshop was held in Lima, Peru, on 26-27th September 2024, attended by more than 35 delegates from 5 SPRFMO Member delegations. The workshop provided an opportunity to review the results of the systematic review and undertake a prioritization exercise to identify those topics which, based on strength of evidence and logistical considerations, would be the most relevant topics for evidencing connectivity of jack mackerel.

117. Overlaps in approaches and techniques for data collection to inform the topics were identified, highlighting opportunities for optimizing sampling efforts and data collection. Participants of the workshop agreed that all 11 topics that were systematically reviewed would be relevant for evidencing connectivity of jack mackerel in the South Pacific, however, prioritization of topics based on strength of evidence and logistical considerations, identified 4 topics as priority areas to focus future efforts. Specifically: Genetics, Tagging methods, Early stages & Reproduction.

118. Should funding become available the JM connectivity TG proposes that a sampling and research programme aiming to collect the data required to inform the 4 high priority topics be developed. Recommendations and considerations for these next steps are provided.

119. Based on the discussion, the SC **notes** the collaborative approach, strengthened working relationships, and consensus achieved by members when engaging in the systematic review and the workshops.

120. The SC **agreed**:

a. That the approach taken in the connectivity activities (systematic review and workshop) was appropriate for identifying priority topics of research towards evidencing connectivity of jack mackerel in the South Pacific.
b. That all of the 11 topics systematically reviewed are considered relevant for evidencing connectivity of jack mackerel in the South Pacific, however, prioritization of topics based on strength of evidence and logistical considerations, identified 4 topics as priority areas to focus future efforts. Specifically: Genetics, Tagging methods, Early stages & Reproduction

121. Finally, the SC **recommended**:

a. That funding be provided for the sampling design and implementation of the 4 identified priority topics of research for evidencing JM connectivity (Genetics, Tagging methods, Early stages & Reproduction), subject to budgetary priorities and finalisation of sampling design.
b. That the JM connectivity TG actively collaborate with the Ecosystem Working Group and the JM Working Group to co-develop habitat modelling and understanding in fisheries dynamics to further support evidencing connectivity of jack mackerel in the South Pacific

Ageing research

122. The SC discussed the need for an age-reading workshop under Section 4.2.

Management Strategy Evaluation update

123. The SC reviewed SC12-JM11 on conditioning of operating models and exploratory evaluation of candidate management procedures for SPRFMO jack mackerel. Operating models for the South Pacific Chilean jack mackerel (*Trachurus murphyi*) stock have been developed to be used as a basis for the evaluation of alternative management procedures for the stock. The main axis of uncertainty incorporated in the OMs are stock structure, the steepness of the stock-recruitment relationship, and future recruitment regimes. Parameter uncertainty has been quantified through Markov chain Monte Carlo (MCMC). A number of candidate MPs have been defined and tested. Work is progressing on the full simulation design for tuning and evaluating the performance of those procedures under different scenarios. Based on discussions of this paper, the SC was reminded that the working group has

concluded further development of alternative operating models.

124. The SC **agreed:**

> with the working group's OM specification set.

125. The SC **welcomed** a presentation on openMSE by an observer. The SC discussed how the openMSE framework (and the presentation add-on named "Slick") was best used within the current MSE developments.

126. The **SC noted** that this framework would help evaluate alternative MPs and could inform on desirable characteristics. Such MPs could be then tailored and applied within the existing FLR framework.

127. The SC **agreed**:

> that the visualization application is useful to evaluate MP performance (https://harveststrategies.org/management-strategy-evaluation/shiny-app/).

128. The SC had a broad discussion on the role of MPs and how trade-offs can be considered. In particular, noting that the next steps are to develop and evaluate candidate MPs prior to the Commission so they can be considered for further refinements. Ideally, the candidate MPs considered by the Commission would undergo final refinements or adoption at SC13. The SC discussed the experiences in other RFMOs and how conflicting hypotheses on stock structure were considered. It was noted that it will depend on the degree of mixing, the differentiation in relative productivity, and the degree of natural fluctuation. The SC discussed the development and advice from the MSE work that has been carried out intersessional and planned the next phase of work leading up to the Commission meeting.

129. The SC **agreed** to schedule three working sessions in between the SC and the Commission meeting to:

> a. Hold another online capacity building workshop on MP design and MSE evaluation
> b. Discuss and review available MP architypes based on OpenMSE simulations to further refine in the FLR environment
> c. Discuss performance of selected MPs and types of performance indicators relevant for the Commission MSE workshop.

Chub mackerel research

130. No papers were submitted on chub mackerel research.

131. The SC **noted** the need to draft ToRs for a data compilation workshop with specific focus on catch, catch distribution, patterns of incidental catches in the Jack mackerel fishery, life history characteristics, and any available survey estimates.

132. The SC **agreed**:

> to add an item to the SC multi-annual workplan.

Advice to the Commission on jack mackerel

133. The SC prepared the 2025 JM advice to the Commission including updates to the workplan.

134. Advice on jack mackerel stock status at this meeting was based on stock assessments conducted using the Joint Jack Mackerel (JJM) statistical catch-at-age model, as developed collaboratively by participants since 2010. The jack mackerel stock(s) in the southeast Pacific was estimated to have increased from 2022 to 2023 due to an increase in recruitment and increases in the CPUE in the northern zone. The overall biomass in 2024 was estimated at around 17.6 million tonnes and is considered to be exploited

sustainably with fishing mortality estimated to be well below F_{MSY}. The biomass is estimated to be well above B_{MSY}.

135. As has been the standard since 2012, a comparison was made between the 1-stock and 2-stock model configurations. Both models showed similar trends with similar overall biomass levels. The trends in recruitment were also similar in recent years. Fishing mortality for both areas was estimated to be below the separate estimates of F_{MSY}.

136. The SC **noted** that, as was the case last year, the stock is estimated to be in the third tier of the harvest control rule. Within the third tier of the harvest control rule, catches should be limited to a fishing mortality of F_{MSY} which would be expected to result in catches in 2025 of 4,997 kt (this expected catch is more than 4 times the current catch levels and likely due to inflated F_{MSY} estimates from strong selection on older fish). However, according to the adopted MP directive of the Commission to the SC (COMM3, Annex C), catch advice (and TACs) shall not exceed a 15% increase.

137. Therefore, the SC **recommended**:

> the 2025 TAC to be at or below 1,428 kt. This represents a 15% increase over the 2024 TAC and applies throughout the range of jack mackerel. The SC noted that this level of catch was estimated to be about equal to the effort (F) estimated for 2024. This advice is also independent from alternative stock structure hypotheses.

138. The SC **noted** that under most catch scenarios evaluated at fishing mortality levels similar to those observed in recent years, catches are expected to show a continuous increase after 2025 (Table 4.8.1). Other catch scenarios are presented in table 4.8.1.

139. The SC **recommended**:

> that the Commission support holding a benchmark workshop with a focus on data for Jack mackerel to compile relevant stock indicators such as CPUE, fisheries independent surveys and opportunistic acoustic survey data. The SC furthermore recommended that the Commission support the data focused workshop be followed by a benchmark workshop to address model configuration, estimation of reference points and setting guidelines on stock projections.

140. The SC also **recommended**:

> that Member scientists continue to work closely within the technical group to continue the development of all aspects of the MSE and in specific the Management Procedures (MP) and confer with stakeholders and managers on the preferred performance indicators to evaluate MPs.

141. An overview of the advice provided by the SC, the management decisions by the SPRFMO Commission and the estimated catch by year has been compiled in Annex 6. This Annex demonstrates that the advice from the SC has been taken up by the Commission.

Table 4.8.1 Catch scenarios from the 1-stock assessment model.

Catch Scenario	Catch 2025 (kt)	Catch 2026 (kt)	B_{2026}	$P(B_{2026} > B_{MSY})$%	B_{2030}	$P(B_{2030} > B_{MSY})$%	B_{2034}	$P(B_{2034} > B_{MSY})$%
F = 0	0	0	19 461	100	19 008	100	17 509	99
*F = F_{2024}	1 462	1 679	16 724	100	12 409	90	10 694	72
*F = F_{MSY}	4 997	3 818	11 598	93	6 852	14	5 847	6
F=F_{2024} x 0.75	1 117	1 337	17 331	100	13 489	94	11 660	80
*F=F_{2024} x 1.25	1 794	1 981	16 159	100	11 534	83	9 933	63
TAC = TAC_{2024}	1 242	1 464	17 108	100	13 073	93	11 284	77
TAC = TAC_{2024} +15%	**1 428**	**1 647**	**16 781**	**100**	**12 504**	**90**	**10 779**	**72**

** Catch options are considered outside the agreed MP*

142. An extended version of this table is available in the JM technical annex (Annex 7).

Other jack mackerel matters

143. There were no other jack mackerel topics discussed.

Deepwater

Review of Intersessional activities

144. The interim chair of the DWWG reported to the meeting that most of the papers for consideration of under these agenda items were prepared through the New Zealand Government-run South Pacific Working Group. The DWWG held three meetings to consider two exploratory fishing proposals (to be considered under agenda item 8b) at the first meeting and the papers to be considered under agenda item 5 at the second and third meetings respectively. The DWWG consideration of each of these papers will be presented under the relevant agenda item. Records of these three meetings are available on the SPRFMO Microsoft Teams site.

Deepwater assessments

145. New Zealand presented SC12-DW05 and DW06 which outlined the Challenger Plateau orange roughy (*Hoplostethus atlanticus*) stock assessment. Following an acoustic survey by New Zealand to estimate the size of the orange roughy spawning stock on the Challenger Plateau in 2023, a stock assessment was conducted in 2024. The size of the stock before fishing started (the virgin spawning stock size, B_0), was estimated to be about 99,400 tonnes, and the stock in 2024 reduced by fishing to about 35% of this level. The future productivity of the stock was a concern as the stock was estimated to have been substantially reduced by fishing in the 1980s and 1990s. Due to orange roughy being a long-lived species, if this estimated reduction in the spawning stock biomass has had an effect on reproduction, it would likely only be observed now through recruitment into the fishery. A 57% TACC reduction is one of the options to maintain the stock at sustainable level through the projection period. The acoustic survey conducted in 2023 did not find spawning aggregations within the EEZ at either the eastern or western survey strata. However, the acoustic survey located a substantial spawning aggregation on the Volcano seamount (Westpac Bank FMA) and the biomass estimate was 8,132 tonnes.

146. The SC thanked New Zealand for presenting an updated stock assessment for the Challenger Plateau orange roughy stock. The Challenger orange roughy stock is a straddling stock that is mainly in the New Zealand EEZ but also includes the Westpac Bank are of SPRFMO. Historically 12.5% of the TAC for the stock has been apportioned to SPRFMO Westpac Bank Area.

147. The SC **noted** that the main updates to the model compared to the 2019 model were:

a. Acoustic SSB estimates for the three areas (Volcano, West, and East) were summed and used as a single index, rather than each assumed to provide an independent index of SSB.
b. One fishery was modelled instead of two.
c. Recruitment was assumed deterministic, and (mortality) M estimated, rather than recruitment estimated and M fixed.

148. The SC **noted** no spawning aggregations were found in the west stratum in 2023, and the east stratum in both 2018 and 2023. Further (survey) work and comparison with commercial CPUE data are required to evaluate whether the survey might have "missed" the fish. Information from the fishing fleet working over the longer period in winter months than the 7-day acoustic winter survey in 2023 could indicate that fish might be present in the wider area but not at the traditional spawning grounds surveyed acoustically.

149. The SC **noted** that the New Zealand Minister has decided to adopt a recommendation for a 57% reduction in the latest run of the models and set a TAC of 942 t and that New Zealand considered this approach to be precautionary.

150. On the basis of the New Zealand decision, the SC **recommended**:

> that the SPRFMO Commission amend CMM 03a to set a catch limit on the Westpac Bank FMA noting that catch from the Westpac Bank FMA will continue to be accounted for against the Total Allowable Catch for the Southwest Challenger Plateau orange roughy stock, for New Zealand vessels, which has just been reduced by 57% based on new stock assessment results. If the Commission maintains the historical 12.5% allocation to the Westpac Bank, then the TAC should be set at 111t.

151. HSFG noted that there was a substantial amount of commercial fishing effort in the ORH 7A (Challenger Plateau) fishery in the months and weeks immediately preceding the acoustic survey of the traditional spawning grounds. A total of 1,500 tons of orange roughy was harvested in the three months immediately preceding the survey, including from areas within the survey strata. In that context it is not surprising that the survey failed to detect spawning aggregations, as it is not unusual for orange roughy to disperse in response to fishing pressure, and without swim bladders the fish are largely invisible to acoustic surveys when they are not aggregated in a spawning plume.

152. In contrast, the Westpac Bank was fished commercially in 2024 for the first time in 3 years, so it is not surprising that substantial aggregations were found. The full 245 ton catch limit was caught in only 78 minutes of trawling (i.e. in 13 tows, with an average tow length of 6 minutes).

153. HSFG further noted that the acoustic survey was only conducted within a small area, and over a much shorter duration than is typical for orange roughy surveys (the survey vessel was on the survey grounds for less than 7 days). If the location or timing of orange roughy spawning is sensitive to changing ocean conditions, then it is probable that a larger-area and longer-duration survey would be required to locate and adequately survey the spawning aggregations. Substantial orange roughy aggregations were located and targeted by commercial vessels 80-100 miles to the south of the spawning ground during this time period.

154. DSCC emphasised that stock assessment advice should be highly precautionary, given the uncertainties and the lack of knowledge on the effects of climate change. DSCC considers the NZ Minister's decision for a 57% cut in their Challenger fishery to be insufficient to rebuild the stock and is thus not sufficiently precautionary.

155. DSCC noted the 2023 orange roughy survey only found a significant spawning aggregation on the Westpac Bank in SPRFMO waters while none were found in the NZ EEZ. This absence of spawning fish in key areas was also reported in 2022. The estimated stock size of 35% used by New Zealand in the recommendation relies on a model which includes no new survey data since 2013 and does not use the 2018 or 2023 acoustic surveys. If the 2023 survey is spatially accurate of the stock, then the South-West

Challenger stock is estimated at 16% B_0: a TAC cut of 70% is required to maintain spawning stock biomass let alone rebuild the stock and there is a 75% probability of the stock being below 20% B_0 in 5 years. DSCC urged that the SC to recommend no TAC be issued for the Southwest Challenger Bank (Westpac Bank).

Benthic bycatch ID and catchability

156. New Zealand presented SC12-DW07_Rev1 to help identify gaps and uncertainties associated with operationalising the definition of significant adverse impacts (SAIs) that can be used to improve SPRFMO's current approaches for assessing SAIs to vulnerable marine ecosystems (VMEs). The paper concluded that most RFMOs have adopted spatial management measures to prevent SAIs to VMEs, however, their assessment of SAIs has previously been identified as not very advanced (FAO 2016, Bell et al. 2019, SC07-DW18). However, attempts to improve assessment of SAIs are taking place across RFMOs, and these are occurring within structured and scientifically guided processes (e.g., the ICES 'benchmark' process, Working Groups and Scientific Committees of individual RFMOs). Despite these efforts, few of the individual RFMO approaches used to assess SAIs incorporate all of the SAI factors included in the Deep-Sea Fisheries Guidelines (FAO 2009), primarily because of data limitations as well as a lack of basic understanding about the ecology of VME indicator species.

157. Furthermore, there remains a deal of uncertainty around the underpinning data and ecological validity of the thresholding methods that are currently used by some RFMOs to distinguish SAIs to VMEs. None of the thresholding approaches used by SPRFMO, NAFO or ICES correspond to the "Natural variation" or "Maintain function" approaches identified by Hiddink *et al* (2023a) as ideal for monitoring 'good' versus 'degraded' ecosystem state. The "Maintain function" is arguably the more appropriate approach for assessing SAIs to VMEs, given the definition of VMEs and the ecosystem functions of their characterizing populations, communities and habitats, and the aim to maintain these functions by preventing SAIs from fishing (FAO 2009). Until such a time that RFMOs can obtain appropriate data to utilise the aforementioned approaches, multi-criteria and multi-spatial scale ecological risk assessments are a justifiable and pragmatic approach for assessing SAIs to VMEs. To adopt the use of such a type of risk assessment, SPRFMO would need to engage in work to improve and modify its current approaches for assessing SAIs, and could include these in a formal ERA framework for VMEs, alongside those for fish, in the regular BFIAs.

158. The SC **noted**:

a. that a review has been undertaken to identify gaps and uncertainties associated with operationalising the definition of significant adverse impacts (SAI).
b. the review describes the range of approaches used by RFMOs to identify known or likely vulnerable marine ecosystems (VMEs) and assess SAIs on VMEs.

159. The SC **agreed** :

a. that the "Maintain function" approach identified by Hiddink et al. (2023a) would arguably be the best single approach for assessing SAIs to VMEs, but SPRFMO currently lacks the appropriate data to implement this approach;
b. that evaluating whether it is possible to derive an SAI threshold from an empirical study tailored to the dRBS approach would be very useful

160. The SC **recommended**:

a. that a multi-criteria and multi-spatial scale risk assessment approach is developed for inclusion in the SPRFMO Encounter Review Standard to improve SPRFMO's current approaches for assessing SAIs to VMEs;
b. that to improve the utility of the dRBS approach for assessing SAIs on VMEs, additional data be collected from areas of interest to management (where feasible) and existing data is processed (where available) to better inform VME indicator taxa abundance model development and validation;
c. developing other metrics for assessing SAIs on VMEs that can be used in a multi-criteria and multi-spatial scale risk assessment approach to help inform the SPRFMO encounter review process and benthic impact risk assessments.
d. a review is undertaken to identify/determine how RFMOs use spatial management approaches to prevent SAIs on VMEs.

161. New Zealand presented SC12-DW08_rev1. The paper explores the frequency and the spatial distribution of interactions between midwater trawl targeting bentho-pelagic species on one side and Vulnerable Marine Ecosystem (VME) indicator taxa on another side from New Zealand flagged vessels in the SPRFMO Evaluated Area to inform any potential future improvements to the spatial management measures. This work has been undertaken as part of the SPRFMO Scientific Committee (SC) multiannual workplan task to develop "a process to review all recent and historical benthic bycatch data to determine the ongoing effectiveness of the spatial management measures".

162. Approximately 95% of the analysed tows had alfonsino as the target species, with the rest of the effort divided between southern boarfish, bluenose, and orange roughy (Table 6 in the paper). Most of the tows that included VME indicator taxa bycatch (n = 14) were from the alfonsino fishery (Table 6 in the paper).

163. Considering the low percent of midwater trawl tows targeting alfonsino that contact the benthos (SC02-10, SPRFMO trawl impact workshop in July 2017), and the low levels of VME indicator taxa bycatch in midwater tows that do contact the benthos (none of which would have triggered the Encounter Protocol during the entire period represented in the data), the benthic impacts of the midwater fishery targeting alfonsino can be described as substantially low compared to those associated with bottom trawling.

164. The SC **noted**:

a. that midwater trawling for bentho-pelagic species from New Zealand flagged vessels within the SPRFMO Evaluated Area since 2008 has occurred within current Fishery Management Areas in the Tasman Sea, and approximately 97% of the analysed effort has occurred within current Midwater Trawl Management Areas;
b. that approximately 95% of the analysed tows had alfonsino as the target species, with the rest of the effort divided between southern boarfish, bluenose, and orange roughy
c. that metrics describing the frequency and spatial distribution of historic bycatch of VME indicator taxa have been updated with reference to the midwater trawl fishery (targeting bentho-pelagic species) from New Zealand flagged vessels within the SPRFMO Evaluated Area;
d. that none of the analysed midwater trawl tows would have triggered the Encounter Protocol had measures been in place at the time that fishing took place;
e. that within the analysed dataset, the percentage of midwater trawl tows targeting alfonsino that had VME indicator taxa bycatch was more than 6 times lower than the percentage of bottom trawl tows with VME indicator taxa bycatch targeting the same species;
f. that levels of VME indicator taxa bycatch in the New Zealand midwater trawl fishery for alfonsino are lower than those from the New Zealand bottom trawl fishery within the SPRFMO

Evaluated Area.

g. the reduction in bottom fishing (including midwater trawl targeting bentho-pelagic species) from New Zealand flagged vessels within the SPRFMO Evaluated Area since 2019 with the introduction of CMM 03-2019 and the impacts of the COVID-19 pandemic.

165. The SC **agreed**:

a. that the impact from the New Zealand midwater trawl fishery targeting alfonsino on the benthic environment, and particularly VMEs, is lower than that from bottom trawling;
b. that any future management actions (e.g. spatial closures) that aim to avoid or limit bottom fishing impacts on the benthos (and VMEs in particular) within the SPRFMO Evaluated Area should be fishery specific (i.e., not apply broadly to all bottom fisheries.

Encounters with VMEs

166. New Zealand presented two papers (SC12-DW09_rev1 and SC12-DW10) relating to the revision of the interim encounter protocol standard. The papers describe the process followed by New Zealand to develop an "Encounter Review Standard" (SC12-DW10) which is recommended to be adopted at the 12th Meeting of the Scientific Committee (SC).

167. The proposed Encounter Review Standard is based largely on the content provided by New Zealand in SC09-DW08, with some changes to address the recommendations made by the IWG at the 11th Meeting of the Commission in 2023 (COMM11-Doc07) and suggestions from environmental Non-Governmental Organisations and the Fishing Industry through the South Pacific Working Group. The structure of the proposed Encounter Review Standard is similar to that of SC09-DW08, where clear steps are provided for both the Member or CNCP and the SC to follow after an encounter has been notified.

168. The Member or CNCP must:

a. provide a detailed description of each encounter
b. provide an assessment of whether a VME is known or likely to occur within the encounter area
c. determine if reopening the encounter area will expose any VMEs to SAIs
d. 1dentify management actions they consider necessary to prevent SAIs on VMEs

169. And following on from the assessment by the Member or CNCP, the SC must:

a. review the encounter(s)
b. provide advice to the Commission on management actions it considers appropriate for each reviewed encounter.

170. The Scientific Committee **noted**:

a. that New Zealand has developed a VME Encounter Review Standard for SPRFMO bottom fisheries that builds on SC9-DW08.
b. that CMM 03-2023 includes a package of management measures designed to prevent SAIs on VMEs, including spatial management measures as the primary management measure, an encounter protocol and associated move-on rule as a backstop, and comprehensive observer coverage.

171. The SC **agreed** that the Encounter Review Standard submitted by New Zealand:

a. aligns with the FAO Deep-sea Fisheries Guidelines, and;
b. takes into account the guidance contained in paragraph 166(f) of the 2023 Report of Bottom Fishing Intersessional Working Group (COMM11-Doc07) as required by paragraph 41 of CMM03-2023;

172. The SC **recommended**:

> a. That the Commission adopts the Encounter Review Standard submitted by New Zealand (SC12-DW10);
> b. The Scientific Committee shall review, and update if required, the Encounter Review Standard every 5 years, starting in 2029, to ensure that it reflects best practice;
> c. The Scientific Committee shall, in addition to the 5 yearly reviews, update the Encounter Review Standard as needed to account for the best available scientific information relevant to determining the presence of VMEs or to assessing adverse impacts on VMEs

173. Recalling disagreement on this point at SC11, HSFG stated that New Zealand scientists have now acknowledged that VME bycatch is not an index of VME abundance on the ocean floor. In that context, it is now almost certain that the effect of a VME move on rule triggered by VME bycatch will be to cause increased impacts on VMEs, not decreased impacts. On that basis the VME move on rule should be discontinued.

174. In discussions of the multi-annual work plan, HSFG urged that if the VME move on rule is not discontinued, it is imperative that research is done to demonstrate that it can operate without causing increased rather than decreased impact. They urged that a spatial simulation analysis be delivered, testing the effect of the move on rule under a range of different assumptions about VME spatial patch configuration and VME taxa catchability.

175. New Zealand responded that a similar evaluation (SC9-DW07) was recently undertaken and there was no new data to update that assessment. HSFG responded that to their knowledge no such evaluation has ever been done. They also reported that direct observations from fishers with access to detailed bathymetry and historical trawl tracks supports the expectation that triggering a move on rule currently set at moving away 1 nautical mile from all parts of the trawl will generally displace effort out of already-impacted locations and into more pristine locations, i.e., causing increased impact.

CMM 03 request regarding VMEs

176. New Zealand presented a paper on the development of a bioregionalization based on VME indicator taxa (SC12-DW11_rev1).

177. Bioregions are large areas of relatively similar environmental conditions that can support similar communities of species. Using occurrence information for Vulnerable Marine Ecosystem (VME) indicator taxa and environmental data, a VME-specific bioregionalisation was produced for the Evaluated Area of the SPRFMO Convention Area and adjacent waters. Various bioregionalisation methodologies were explored, and a hierarchical classification approach was carried forward, drawing from the results of a genus-level gradient forest model. Bioregions may provide an additional spatial scale to assess the performance of spatial conservation measures to prevent Significant Adverse Impacts to VMEs.

178. The EU considered the science applied in the bioregionalization informative and appropriate. How the SC can apply this work in the evaluation of the impacts of bottom fishing on VMEs, in addition to the currently applied FMA scale evaluation, will require careful consideration. As it stands, it is not clear how this work may be used in the future, and the EU thinks that the rationale for any application in the assessment and management of VMEs will need further detailed consideration by the SC.

179. DSCC noted that it is important that the bioregionalisation approach should be rejected by the SC as an approach for providing advice to the Commission, and that the Scientific Committee should resist attempts to turn away from assessing significant adverse impacts of bottom trawling on vulnerable marine ecosystems (VMEs).

180. The Scientific Committee **noted**:

a. that a hierarchical approach has been used to develop a bioregionalisation for VME indicator taxa in the Evaluated Area portion of the SPRFMO Convention Area, and 7-, 8- and 9-group classifications have been described;
b. that the hierarchical approach used means that a nested classification with up to 50 classes (representing, for example, something more akin to communities), has been produced which has more classification detail;
c. existence of limitations and associated uncertainties to bioregionalisations, mainly linked to the use of predictive models to delineate bioregion boundaries; with principal limitations associated with the quantity and quality of data used to train models (including uncertainties with catchability of the sampling gear used to collect the biological data);
d. that a more detailed 28 level classification is included in the paper.

181. The Scientific Committee **agreed:**

a. that the approach used to develop the VME indicator taxa bioregionalisation is appropriate;
b. that the 7-group classification delineates the fewest number of bioregions, while maintaining classification strength;
c. that further Investigations are required to establish whether bioregions may provide an additional spatial scale for evaluating the performance of spatial management measures. Evaluation is required to determine if bioregions represent a more ecologically relevant large spatial scale than FMAs where there is sufficient data

182. The Scientific Committee **recommended:**

a. that until enough data are available to demonstrably improve the bioregionalisation, independent statistical validation of the bioregionalisation should be conducted to inform its utility for management;
b. that, if the bioregionalisation is assessed as having utility for management, a task is added to the SC's multi-annual workplan to use the VME indicator taxa bioregionalisation to evaluate the performance of the bottom fishing spatial management measures;
c. that further development and validation of abundance models for VME indicator taxa be undertaken so that they can be used for future development of the bioregionalization.

Bottom Fishing Impact Assessment

183. New Zealand presented paper SC12–DW12_rev1 to update of the quantitative impact assessment component of the Cumulative Bottom Fishery Impact Assessment for Australian and New Zealand bottom fisheries, which was submitted to the 11th meeting of the SPRFMO Scientific Committee (SC) in 2023 (SC11–DW01_rev1). A range of experts were approached to revise estimates of R and D for each tax. The total accumulated footprint from bottom trawling inside the Evaluated Area in 1989–2023 was calculated to be 57,037 km^2. By comparison, the equivalent accumulated footprint from midwater trawling was 0.24 km^2 and the equivalent footprint from bottom longlining was 119.9 km^2. The very small footprint of midwater trawls stems from the trawl impact workshop conclusion that, on average, only 30% of midwater trawls contact the seafloor and that contact happens on average only twice per tow, for an average of 25 seconds each time.

184. Overall, for the BTMAs implemented under CMM03-2023, results generally show that dRBS exceeds 0.95 for most combinations of taxa, spatial scale, sensitivities, and temporal scale. Dynamic RBS status outside of BTMAs is 0.9 or greater in all cases and above 0.95 for all but one case.

185. The EU noted that the BFIA updates are very useful and the application of the dRBS is a step forward in

this process. A strong implicit assumption of the dRBS approach is that once the abundance of a VME indicator species has been completely depleted by historical trawling, no recruitment will happen in this area and therefore no recovery is possible in that cell. This is different from the equilibrium RBS approach that was applied up to now, which do implicitly assume that recovery of fully depleted cells is possible when trawling intensity is reduced. For future BFIAs, it would be useful to evaluate the ecological justification for these assumptions, and to evaluate the effect of including/excluding a level of recruitment in the dRBS approach.

186. The EU stated that the BFIA states that the recovery of the indicator of VME abundance used does not necessarily represent recovery of the state and function of VMEs back to the unfished state, which is likely to correlate more closely to biomass or % cover of the VMEs rather than the abundance of individuals or colonies, and it is appreciated that this is made so explicit in the report. While the EU considered the current approach appropriate for the current BFIA, they suggested that the recommendation from SC11 on work presented by NZ on Spatial predictions of density for 15 VME indicator taxa in SC11-DW07 be further progressed, specifically that the SC recommended: once density models have been fully evaluated, and if considered to be adequate to inform management decisions, they are incorporated into the ongoing review of the effectiveness of the spatial management arrangements and used to quantify the vulnerability of VME indicator taxa to physical disturbance.

187. The EU also noted the BFIA present two different approaches for estimating VME abundance, the ROC linear and power mean approaches both of which are representations of Habitat Suitability models using occurrence data of VME indicator taxa. While the ROC linear approaches are a standard approach which the EU feels is justifiable and reproducible, they had concerns about the non-standard approach of the Power Mean. Particularly around the possibility of predicting extremely concentrated patches of predicted VME indicator taxa, potentially resulting in very low or very high fishing impact depending on the overlap with the fishing footprint, which may not be realistic. It is unclear, and the EU thinks unjustifiable, which of the approaches (power mean or ROC linear) provides the most realistic interpretation where there are conflicting results. Rather than revisit the usefulness of Power mean estimates and enter discussions about how best to consider power mean with ROC linear, the EU suggests that it would be more informative to undertake future RBS estimates using the newly developed abundance models should the SC considered these to be adequate to inform management decisions.

188. The Scientific Committee noted:

a. the quantitative benthic impact assessment component of the 2023 Cumulative BFIA has been updated, using an alternative implementation of RBS;
b. that the update incorporates bottom fishing impact data from recent fishing activity, re-assesses taxon-specific depletion and recovery values, re-evaluates relationships between estimated habitat suitability and observed abundance, and includes 306 assessments of status for the full suite of 17 modelled VME indicator taxa in 9 FMAs using two transformations of HSI as proxies for abundance;
c. recovery for this assessment does not mean complete restoration of the complex three-dimensional structure of some habitats (e.g., coral mounds) that may take centuries to achieve, but rather recovery of the abundance (number of individuals, coral heads, etc, per unit area) of the VME indicator taxa concerned;
d. that the forward projection scenarios have been updated to reflect changes in catch limits, although there is a high level of uncertainty in estimates of future fishing effort;
e. that current and future status estimates of VME indicator taxa were derived at three spatial scales: within FMAs, within BTMAs in each FMA, and outside of BTMAs in each FMA.
f. that for any taxa assessed which include multiple species, a status for any taxa group does not indicate that there is the same status for all of the species included in that taxa group.
g. that further developments of dRBS estimations should evaluate the sensitivity of the assessment to different assumptions about recovery following local depletion.
h. that the use of HSI power mean to represent abundance lacks robustness and encourages the

SC to use more robust estimates of abundance developed in SC11-DW07.

189. The SC **agreed:**

a. that the revised methods used in the update are consistent with the requirements of the BFIAS and should be applied to the review and update of the BFIA scheduled for 2026.
b. that, with respect to estimates of the status of VME indicator taxa:
    i. the new benthic impact assessment provides estimates of current and future (at 2044) status for 17 VME indicator taxa, 9 FMAs, and 2 abundance index sensitivities. Within FMAs, of these 306 combinations:
        1) current status is estimated to be at or above 80% for 297 (base case) and 294 (low case); future status (no fishing) is estimated to be at or above 80% for 298 (base case) and 297 (low case);
        2) current status is estimated to be < 80% for 5 (base case) and 8 (low case); future status (no fishing) is estimated to be < 80% for 4 (base case) and 5 (low case);
        3) for 4 combinations in each case there are no estimates available.
    ii. when considering only the areas within each FMA that are inside BTMAs:
        1) current status is estimated to be at or above 80% for 276 (base case) and 268 (low case); future status (no fishing) is estimated to be at or above 80% for 281 (base case) and 277 (low case);
        2) current status is estimated to be < 80% for 5 (base case) and 8 (low case); future status (no fishing) is estimated to be < 80% for 4 (base case) and 5 (low case);
        3) for 10 combinations in each case there are no estimates available.
    iii. when considering only the areas within each FMA that are outside BTMAs:
        1) current status and future status (no fishing) is estimated to be at or above 80% for all 300 combinations where estimates are available, for both base and low cases;
        2) for 6 combinations in each case there are no estimates available.
    iv. the survey of experts for revising taxon-specific depletion and recovery rates likely resulted in improved estimates for these inputs, but that could not be easily verified. Therefore, uncertainty was accounted for by providing sensitivities around status estimates for best case (low D/high R) and worst case (high D/low R) based on an arbitrary ± 20% of median values.
c. that evaluating whether it is possible to derive an SAI threshold from an empirical study tailored to the dRBS approach would be very useful.
d. there is a substantial degree of uncertainty associated with the estimated status of those taxa most impacted by fishing due to the inherent uncertainty within the input parameters (in particular, the taxon-specific depletion and recovery rates, and does not consider the impacts of climate change and ocean acidification).

190. The SC **recommended**:

a. that the revised benthic impact assessment is added as an addendum to the Cumulative Bottom Fishery Impact Assessment for Australian and New Zealand bottom fisheries, 2023 (AUS/NZL).
b. that the Commission adds to the SC multi-annual workplan a task to further develop and validate abundance models for VME indicator taxa so that they can be used in future updates of the benthic impact assessment to reduce the need for data transformations, with a focus on those taxa currently assessed at being most at risk.
c. that the Commission adds to the SC multi-annual workplan a task to conduct research to improve the reliability and estimation of uncertainty for the D and R values that inform the calculation of dRBS, with a focus on those taxa currently assessed at being most at risk

191. HSFG gave a presentation of their paper SC12-Obs04_rev1, 'Acknowledging progress toward the re-establishment of evidence-based management in SPRFMO bottom fisheries'. They emphasized the following:

a. The new BFIA using the dRBS method is an important improvement upon the science previously available to SPRFMO and provides good actionable information. By relying again on the cumulative impact assessment method rather than the 'percent protected' analysis considered in 2023, SPRFMO is once again in compliance with the requirements of CMM03 and the BFIAS.
b. Adopting a quantitative/ operational definition of SAI, e.g. the MSC-derived 'recovery to 80% status in 20 years' standard, is the final decision that is required from Commission, to complete the bottom fishing impact management framework (as required in SC10 paragraph 138).
c. The new BFIA shows that bottom fishing impacts on VME taxa are very low: Current status for most VME taxa is estimated to be > 0.99 in all FMAs, and there are only a few combinations of VME taxon * FMA where status < the 0.8 SAI threshold.
d. Where the VME status is high, it is also estimated with very high certainty (despite highly uncertain biological inputs). This is because the fishing footprint is small, and outside that footprint, uncertain biological estimates are multiplied by zero.
e. Focused investigation is required of model inputs giving rise to status estimates for a single stony coral species, *G dumosa,* noting that the model estimates low status primarily in those FMAs where the model predicts -- and DTIS data support -- that the species is very rare or absent.

192. HSFG made specific recommendations for minor analyses or supporting information to be delivered to aid interpretation of the BFIA, noting that these same items could reasonably have been expected for inclusion already in SC12-DW12rev1, and the amount of work required to deliver them is minimal (i.e. not worthy of inclusion in the multi-annual work plan). The specific items requested include:

a. A data characterization of the biological data used to parameterize the VME spatial models, and of the DTIS camera data used to test the predictive power of the VME spatial models.
b. Alternate VME status estimates under a future fishing effort scenario in which the BTMAs are expanded to include the full historical fishing footprint
c. A re-production of SC11-DW01_rev1 Table H2, using the correct (status quo) BTMA boundaries

193. In discussions of the multi-annual work plan, HSFG noted that it is not necessary to acquire independent data in order to validate VME spatial model predictions. Spatial validation can be performed by re-fitting the models while withholding spatially contiguous data at the scale of whole FMAs, then comparing predicted vs actual values in the locations where the data was withheld. Without this kind of validation, spatial models are highly prone to over-fitting (as previously described in SC11-Obs01).

CMM 03 request regarding Species of Concern

194. New Zealand presented paper SC12-DW13 on interactions with marine mammals, seabirds, reptiles and other species of concern. This paper summarises information available on interactions with marine mammals, seabirds, reptiles, and other species of concern in bottom fisheries for 2022-2023 to meet the requirements of CMM03-2023. This paper does not include reporting on interactions that occurred during exploratory fisheries, such interactions are reported on under agenda item 8 of SC12 (Exploratory Fisheries). Only one seabird interaction was reported for the period and that the bird was released alive.

195. The SC:

a. **noted** the summary of seabirds, marine mammals, reptiles, and other species of concern reported captured in bottom fisheries undertaken under CMM03 in the SPRFMO Area from 2022-2023, together with the IUCN threat classification categories and life status, is contained in Table 2, and that this will be reviewed again in 2026.
b. **noted** that captures of marine mammals, seabirds and reptiles are rare in bottom fisheries conducted under CMM03.
c. **agreed**:

that, based on the information presented, no additional spatial/temporal closures, spatially/temporally limited gear prohibitions, bycatch limits or measures for an encounter protocol for any of these species are required under CMM03 at this time.

Advice to the Commission on Deepwater

196. In relation to the Deepwater agenda items, the SC **recommended:**

a. that the SPRFMO Commission amend CMM 03a to set a catch limit on the Westpac Bank FMA noting that catch from the Westpac Bank FMA will continue to be accounted for against the Total Allowable Catch for the Southwest Challenger Plateau orange roughy stock, for New Zealand vessels, which has just been reduced by 57% based on new stock assessment results. If the Commission maintains the historical 12.5% allocation to the Westpac Bank, then the TAC should be set at 111t.
b. That the Commission adopts the Encounter Review Standard submitted by New Zealand (SC12-DW10);
c. The Commission task the Scientific Committee to review, and update if required, the Encounter Review Standard every 5 years, starting in 2029, to ensure that it reflects best practice;
d. The Commission task the Scientific Committee to, in addition to the 5 yearly reviews, update the Encounter Review Standard as needed to account for the best available scientific information relevant to determining the presence.
e. That, if the bioregionalisation is assessed as having utility for management, a task is added to the SC's multi-annual workplan to use the VME indicator taxa bioregionalisation to evaluate the performance of the bottom fishing spatial management measures:
    i. That the revised benthic impact assessment is added as an addendum to the Cumulative Bottom Fishery Impact Assessment for Australian and New Zealand bottom fisheries, 2023 (AUS/NZL; SC11-DW01_rev1).
    ii. that the Commission adds to the SC multi-annual workplan a task to further develop and validate abundance models for VME indicator taxa so that they can be used in future updates of the benthic impact assessment to reduce the need for data transformations, with a focus on those taxa currently assessed at being most at risk.
    iii. that the Commission adds to the SC multi-annual workplan a task to conduct research to improve the reliability and estimation of uncertainty for the D and R values that inform the calculation of dRBS, with a focus on those taxa currently assessed at being most at risk.

Request regarding ongoing appropriateness of CMM 03

197. DSCC presented its two papers, SC12-Obs02 and SC12-Obs03, which addressed the UNGA Resolutions and FAO Deep Sea Guidelines, the context of significant adverse impacts on VMEs, the need for a precautionary and ecosystem approach in SC's considerations and advice to the Commission. DSCC noted that CMM 03-2023 has still to be implemented by the Commission. The BFIA Standard and the BFIA should follow the BBNJ Agreement Part IV requirements, since equivalence between the BBNJ and SPRFMO assessments is required.

198. DSCC cited in SC12-Obs03 the scientific evidence for recognizing seamounts as VMEs: as surveyed seamounts consistently meet at least 4 of 5 VME criteria, visual surveys consistently reveal seamounts hosting extensive VME communities, and seamounts are places where VMEs are likely to occur. For these reasons DSCC advocated the inclusion of seamounts in Annex 9 of CMM 03-2023 which is the register of known VMEs.

199. One Member noted that until the definition and consequence of serious adverse impacts on VMEs are agreed and understood within the SPRFMO context, such a broad definition of VMEs is not appropriate.

Squid

Review of intersessional activities

200. Peru presented SC12-SQ05 where the spatial distribution of mature females (stages 3 and 4) of the three morphotypes (small, medium and large) was mapped for use as proxies of spawning potential. Two spawning hotspots of *Dosidicus gigas* were identified, one in the north and one in the south of Peru. The aforementioned areas were utilized as spawning zones for early life stage drift experiments over a 30-day period. It was observed that the northern area exhibited greater spatial and temporal variability (on a seasonal scale) in dispersal patterns, particularly along the longitudinal axis. The northern zone was distinguished by a higher loss of spawned individuals in surface layers (5-15 m) transported offshore even up to Galapagos Islands, while the southern zone demonstrated superior conditions for retention.

201. In this context of showing a new approach to the jumbo flying squid study, Peru presented a working paper on the effect of the environment, specifically El Niño, on the availability of the squid resource, as detailed in document SC12-WP15.

Assessment process and CMM development

202. Chile presented SC12-SQ01 showing that because an in-season stock assessment and in-season management are hard to implement for *D. gigas* in the SPRFMO area, an annual stock assessment with the Stochastic Production model in Continuous Time (SPiCT) is an option. The first attempt to apply SPiCT to *D. gigas* in FAO area 87 estimated lower intrinsic growth rates (r) than expected for a fast-growing and short-life species, and their values depended on the production model used. The second SPiCT application aimed to evaluate the impact of fitting the model to one global abundance index or to indices by country; the impact of fixing the Schaefer model; the use of more informative r prior distribution; and the impact of initial year in the data. The population growth parameter estimations were improved, stock status was highly uncertain, but the stock seemed to be overfished, and the TAC at F_{MSY} ranged from 473,000 to 636,000 tons. The aim of the present study was to update with data up to 2022 the SPiCT with the same seven scenarios used last year. An increase in the abundance indices for the recent years had important effects on the retrospective patterns. The best retrospective pattern was obtained with Scheafer model fit to a global index, and the worse with a model that estimated the productivity curve, without r prior, and fit to indices by country. The general biomass trend had a fast increase from 2001 to 2005 and then a decreasing trend from 2006 to 2023. The 2023 stock status is

uncertain but seems close to MSY. TAC at current catch was greater than TAC at F_{MSY}. TAC at F_{MSY} ranged from 874,000 to 963,000 tons. Further analyses on abundance indices and the impact of phenotypes are needed.

203. Given the current implementation of SPiCT, it does not consider the application of time-varying parameters; therefore, there is difficulty in incorporating variations in the surplus production parameters across phenotypes and/or environmental factors. The squid working group recommended the explicit incorporation of environmental variables and the narrowing of scenarios to retain only the best-informed and most likely scenarios for further analyses.

204. China presented SC12-SQ02 containing an updated stock assessment of the jumbo flying squid in the South-East Pacific. The CPUEs of China's squid-jigging, Chilean artisanal jiggers, and industrial trawlers were standardized using generalized additive models (GAM) with gamma-distributed errors. These standardized CPUE time series, along with Peruvian raw CPUE data, were used as abundance indices in the Bayesian state-space surplus production models, considering the period from 2012 to 2022. This model incorporates the environmental effects of El Niño/La Niña cycles, with different hypotheses affecting carrying capacity (K) and the intrinsic growth rate (r). The main improvements of this approach are the inclusion of Chilean and Peruvian data and a new model for standardizing CPUE for the Chinese fleet. Of the seven environmental-dependent surplus production models, K model performed the best and indicates that K is higher during El Niño and lower during La Niña. Across all years and scenarios, the stock is sustainable.

205. All models showed that Jumbo flying squid was extremely sensitive to climate change, which had a significant impact on the carrying capacity. The results from the application of the state-space biomass dynamics models were questioned in light of the effect of El Niño on carrying capacity. According to theory, El Niño is expected to decrease productivity in the Southeast Pacific, and yet the results should show the opposite, with K being lower during El Niño years. Therefore, the way the environment is incorporated into this model should be revisited.

206. CALAMASUR presented SC12-Obs05 containing a stock assessment methodology and its application to the database extended to 1969 with total annual landings from FAO records. The methodology takes into account habitat differences through estimating distinct natural mortality rates in Peruvian, Chilean and oceanic international waters, and time-varying parameters by considering the environmental cycle of El Niño and normal conditions that is major ecosystem determinant in the region.

207. This methodology consists of two stages. In Stage 1, the database of total catches, total fishing effort, and mean weight of squid in the catch was used to fit multi-annual, multi-habitat, and multi-fleet generalized depletion models at monthly time steps, covering the period from January 2012 to December 2022 for Chilean, Peruvian, and Asian fleets. In Stage 2, a generalized surplus production model utilized (i) the total annual landings across the Southeast Pacific (SEP) from 1969 to 2022, (ii) predicted monthly biomass and its standard error from the depletion model, and (iii) 23 transitions between El Niño and normal conditions in the ecosystem. All combinations of time-varying parameters led to 16 alternative hypotheses describing increasingly complex changes in the environment's carrying capacity, the symmetry of the production function, and the intrinsic rate of population growth.

208. The results of the time-varying parameters surplus production model support the hypothesis that only the intrinsic rate of population growth varies between El Niño environmental cycles. The stock has entered a regime of wide fluctuations, making MSY and B_{MSY} inadequate reference points. Overall, results of both the depletion model as well as the surplus production model indicate that the stock is not overfished though it might be undergoing overfishing due to high fishing removals in the last five years (2018 to 2022), higher than the estimated sustainable harvest rates. This latter point though has to be considered as less reliable due to high statistical imprecision in the estimation of sustainable harvest rates.

209. Monthly mean weight estimated data by CALAMASUR for the model from the Peruvian fleet were questioned, as they do not match what is reported in the Peruvian stock assessment by IMARPE. This raises concerns about the data used as an input in the model and calls for a revision of the procedure, particularly regarding weight structures by month. The working group identified an error in the total landings data for the last four years used in the 2-Stage model, which was corrected during the presentation to the SC plenary session.

Assessment Simulation Task team

210. The Jumbo Squid ASTT held a workshop the 27-28 September. The terms of reference of the working group were translated into a simulation plan and an updated workplan was drafted and an in-person workshop in 2025 is planned. Details are presented in SC12-WP17 (Annex 9).

Standardised biological sampling

211. No papers were presented for this topic.

Advice to the Commission on appropriate level of observer coverage

212. The SC **noted** that work required to meet the observer coverage requirements contained in the squid CMM (18-2024) were incorporated into the SC workplan.

Squid assessment data (including effort)

213. The Secretariat presented paper SC12-SQ03 which contained a review of the data holdings by the Secretariat and a summary of statistics on vessel activity and fishing effort from annual reports submitted by Members. The data was presented in a similar way to the data that the Secretariat has been providing to the Jack Mackerel working group in recent years. Following discussion raised the issue of enabling Members to query datasets based on specific criteria, and the need to expand the database to store variables of importance that may be used in future stock assessments.

214. The SC **agreed**

> that some of the existing limitations should collaboratively be addressed by the Data Working Group.

Genetics and connectivity research

215. Peru presented SC12-SQ04 on population genomics analysis of D gigas using SNPs. There is a great interest in understanding the biological and genetic aspects of *Dosidicus gigas* to implement effective management strategies. Knowing the number of subpopulations and their distribution throughout their geographic range, is important because they could exhibit unique demographic characteristics and respond independently to fishing pressures and environmental changes. In this study, ddRAD-seq analysis was performed, obtain more than 14,000 single nucleotide polymorphisms (SNPs), neutral and under selection loci, to characterize population structure potential selection signals of Jumbo flying squid. A total of 92 samples in mature stages (II and IV), collected in Peruvian jurisdictional waters were evaluated, considering a spatial and temporal sampling criterion. According to neutral loci, comparing its geographic distribution, northern coastal and southern oceanic groups showed significant differences, and the groups were also discriminated in their latitudinal distribution. According to the neutral and under selection loci, differences between phenotypic groups were observed, even more so for the organisms more distant from the coast (oceanic group). An important difference was also observed with loci under selection between the different years sampling periods, 2018-2019 versus 2021-2022. Peru highlighted that apparently, the variation observed with the neutral loci revealed differences according to the geographical location of the species, whereas the adaptive variation revealed phenotypic diversity. The intention to use lcWGS for the population genomics and the

integration of different delegations involved was also mentioned.

216. Ecuador expressed their interest in participating in the population genomics group.

217. The genetic group (Peru, China, Chile and Ecuador) held discussions for obtaining a consensus on the criteria of sampling and technology for the population genomics analysis of Jumbo flying squid.

218. The genetic group agreed (SC12-WP11, Annex 10) to:

a. sampling design criteria, including females at maturity stages III and IV per phenotype-size groups per area (n=30), from 2024 to December 2025;
b. phenotype-size groups by area by Member delegation (Peru in areas E1 (S+M) and E2 (S+M+L); China in areas O1 (S+M), O2 (S+M+L), O3 (M+L), and O4 (L); Chile in E3 (L) and E4 (L); and Ecuador in E1 (S+M));
c. provide a template for biological data;
d. select a single DNA sequencing facility as well as sequencing technique (lcWGS), and provide sequencing results to the genetic group;
e. develop protocols for tissue sampling, DNA sequencing, pipelines, and population genomic analysis, to be worked out during 2025, in virtual meetings.

Advice to the Commission on squid

219. The Scientific Committee **noted**:

a. That progress had been made in the stock assessment for jumbo flying squid.
b. That the availability of catch data for stock assessment is still a major challenge, particularly in terms of timeliness, with the result that stock assessment and the provision of management advice lag behind the needs of the fishery.
c. A decline in the availability of the jumbo flying squid in the South Pacific has been observed, concurrent with a strong and prolonged climate event.
d. The assessment results were again split in terms of the stock status assessed. Two models had explicit consideration of environmental effects within the assessment, which was seen as an important point of progress. This seems particularly useful given the complexities presented by phenotypic variability and the current situation.
e. That progress had been made in genetics studies for jumbo flying squid.

220. The SC **agreed:**

a. to enhance cooperation among members in the collection and sharing of data in support of stock assessment and other scientific research on jumbo flying squid.
b. that assessment model and simulation code should be shared on SPRFMO's GitHub to make it available to members and ensure transparency.
c. provide a single template for data collection to implement the stock assessment methods currently in use. Additionally, provide templates for desirable data that should be collected in the future to improve current approaches.
d. the need to reinforce research on the jumbo flying squid, in particular on the relationship between the resource and the environment.

221. The SC **recommended**:

a. that the Commission requests that coastal members make their data from jurisdictional waters available and to ensure transparency in the process of estimating key quantities needed to implement current approaches for assessing jumbo flying squid.
b. to support the exploration and development of new management strategies for jumbo flying squid that are specifically tailored for short-lived species.
c. that the Commission supports research on the jumbo flying squid, in particular on the relationship between the resource and the environment.

Habitat Monitoring

Review of intersessional activities

222. Chile presented SC12-HM03 as an updated report comparing biomass estimates for CJM derived from acoustic data collected by opportunistic fishing vessels with those obtained from systematic surveys conducted in the central-southern zone of Chile. Acoustic data were collected from fishing trips made by five national vessels equipped with echosounders between 2009 and 2021 in the South-Central Zone of Chile. For comparison, only data from scientific echosounders (model EK60) collected during June and July were used for estimating CJM abundance through the opportunistic survey. The comparison focused on variables such as specific time, biomass estimates, and area for the years when systematic surveys were conducted. Biomass estimates were derived using geostatistical methods for both survey types, systematic and opportunistic. Results indicate that when there is an overlap between the spatial distribution of CJM and the systematic survey transects, the biomass estimates are closely matched. In contrast, when there is little to no overlap, the estimates differ significantly.

223. In conclusion, opportunistic surveys offer a valuable alternative for estimating CJM biomass, particularly in years without formal acoustic assessment cruises. Furthermore, continuous data collection by the fleet throughout the CJM fishing season enables monitoring of changes in the resource's distribution, behaviour, and availability, as well as its interactions with other species and the environment. It was clarified that all vessels used in the acoustic assessment are calibrated to scientific standards to minimize biases in biomass estimation.

224. Chile presented SC12-HM04 to evaluates and contrasts the spatial distribution, mean density, and biomass estimates of Chilean jack mackerel (CJM) obtained by opportunity vessels in 2024 with previous years. The estimates, derived from acoustic data collected by four vessels of the CJM fishing fleet during routine operations, encompass the years 2019 through 2024. A fully randomized survey design and geostatistical methods were employed for the analysis. Acoustic data were continuously recorded using eco-integration systems throughout the vessels trips, covering the entire route from the harbour to the fishing grounds and back.

225. Analysis of the 2024 acoustic data revealed significant spatial and temporal variability in CJM distribution, with a notable expansion observed during the year. In 2024, CJM abundance was estimated at 3.24 billion individuals, a biomass of 1,826,276 tons, reflecting a 144% increase in abundance and a 44.9% increase in biomass compared to 2023. This increase was primarily attributed to a higher proportion of smaller fish, with a mode centred around 30 cm FL, indicating a substantial increase and expansion.

226. Spatial distribution trends showed a broad distribution in 2018, contraction towards the coast from 2019 to 2023, and further expansion in 2024. Acoustic density patterns peaked between February and April, with a notable decrease in June and July. The comparison of random and systematic survey methods demonstrated consistent results, especially when surveys coincided in time and space. This

study highlights the value of utilizing opportunistic vessel data to complement traditional survey methods and improve the understanding of CJM stock dynamics. It was clarified that all vessels used in the acoustic assessment are calibrated to scientific standards to minimize biases in biomass estimation.

227. The WG Chair emphasized the need to incorporate fleets beyond those of central-southern Chile to obtain regional acoustic indicators.

228. It has been identified that acoustic biomass estimates generated from opportunistic surveys yield results comparable to those from systematic cruises. Therefore, it is recommended to incorporate this type of information as indices in future stock assessments. Regarding the use of opportunistic vessels, it is important to consider that fleets beyond those of Peru and Chile could also implement existing procedures to facilitate the common collection of acoustic data. This would enable an expansion of distribution indices and abundance estimates for chub and jack mackerel.

Indicators from fishing vessels on target pelagic species

229. Peru presented SC12-HM02 showing in recent years there has been a positive trend regarding an increase of the jack mackerel abundance and availability, that is, an increase towards average levels of abundance compared to past decades. Catches in the same period (1983-2024) also show, in general, better fishing performance in years when calculated biomass has been higher. The calculated abundance of jack mackerel, using various stratification methods based on acoustic data collected during the summer 2024, have been given in a range of 22 to 458 thousand tons in the areas prospected by fishing vessels only.

230. Also, in recent years there has been a positive trend regarding the chub mackerel biomass, i.e. an increase towards average levels of abundance in comparison with past decades. Catches in the same period (1983-2024) show, in general, better catches in years when biomass has been higher. The calculated abundance of chub mackerel, using various stratification methods based on acoustic data collected during the summer 2024, have been given in a range of 55 to 60 thousand tons in the areas prospected by fishing vessels only.

231. There is a large biomass of mesopelagic fishes in the surveyed area, though the impossibility of collecting length data makes not possible to produce reliable abundance assessments on these species.

Standardised oceanographic data products and modelling

232. There was no new information in this topic. The ICES metadata convention developed by their “FAST” working group for data management was presented and adopted previously by SC11.

Species behaviour and preference

233. Peru presented SC12-HM05 containing an update of the analysis on changes in the habitat of Jack mackerel and Chub mackerel has been carried out, emphasizing what was observed between 2021 and 2024, in addition to aspects of the abundance of other species of top predators.

234. The summer of 2024 has been dominated by positive temperature anomalies until the beginning of March, when the sea began to cool from north to south. In March 2024, ENFEN announced the end of the Coastal El Niño that began a year earlier. In this context, and regarding the habitat, it was observed that during the summer of 2024 the presence of Jack mackerel and Chub mackerel has again occurred in a typical way, that is, along the fronts between oceanic and coastal waters, unlike the year 2020 when they were observed in oceanic waters, which was considered unusual at least for that season.

235. From the analysis of the various variables regarding the habitat of Jack mackerel and Chub mackerel, it is concluded that there have been different conditions in recent years, where the only parameter analysed that remained within a narrow range is salinity. Another striking fact is that both species have been available for fishing in areas with low chlorophyll concentration and relatively high altimetry values and high sea surface anomaly. In the case of Jack mackerel, its distribution on the central coast

during January is noteworthy compared to its southern distribution in previous seasons. In the case of Chub mackerel, a higher availability was observed in the southern zone during the summer of 2024. However, it should be noted that there were no trips during February and March, due in most cases to the maintenance needs of the fishing vessels. At the moment of drafting paper (SC12-HM05), the fleet was fishing for both Jack mackerel and Chub mackerel in the southern area.

236. A significant presence of marine fauna has been recorded in the areas of operation of three fishing vessels. A total of 2,671 individuals were observed between seabirds, whales, dolphins and sea lions, with the most numerous taxonomic group being seabirds with 1,772 individuals, dolphins were the second group with 810 individuals, then sea lions with 77 individuals and whales with 12 individuals.

237. In the habitat reports submitted in the previous years (2019 to 2023) to the SPRFMO Habitat Monitoring Working Group, as well as in the present case, it should be specified that what has generally been mapped and modelled the ideal environmental conditions (habitat) for adult fish of Jack and Chub mackerel only. A similar type of study is pending for the early stages of both species. It was noted that, although oxygen plays a key role in the vertical distribution of jack mackerel schools, the availability and diversity of food items must also be considered.

238. Chile presented SC12-HM01 based on the fishing activities off central-southern zone of Chile (30ºS - 42ºS) that represent the most significant fishing ground in the southern Humboldt ecosystem due to its geographic and oceanographic conditions. This region is characterized by high primary production values driven by strong seasonal upwelling, which is influenced by the seasonal movement of the South Pacific anticyclone, with intensive upwelling events occurring during the austral spring and summer. Historically, the highest levels of Chilean jack mackerel (CJM) landings have been recorded in this region, surpassing 4.5 million tons in the mid-1990s. Fish have specific habitat requirements, so environmental changes can impact the spatiotemporal distribution of pelagic species and thus affect the location of fishing grounds. This study analysed the variability of habitat conditions in CJM fishing grounds in central-southern Chile during the recent coastal distribution period (2012-2014) using data from industrial fishing activity monitoring and satellite remote sensing. During the 2023- 2024 fishing season, CJM fishing sets occurred within a wide temperature range, centred around 13.9ºC.

239. The interannual variability of the sea surface temperature (SST) anomaly in central-southern Chile is linked to ENSO dynamics, but these do not appear to significantly impact the location of CJM fishing grounds. The interannual chlorophyll-a anomaly showed alternating periods of higher productivity, which tended to coincide with colder periods and increased occurrences of La Niña. The location of CJM fishing grounds does not appear to change significantly during periods of higher or lower chlorophyll-a productivity. The sea level anomaly exhibits alternating positive and negative periods that appear to be related to ENSO dynamics. While sea surface temperature shows a decreasing trend at CJM fishing grounds, chlorophyll concentration shows an increasing trend. This may be associated with a higher concentration of CJM in coastal upwelling centres. It was noted that around 85% of the fleet is represented in the database supporting this study.

240. The WG Chair emphasised the importance of considering the current system in the South Pacific, which is often overlooked in studies linking oceanography and the environment to jack mackerel. Additionally, key species as prey, such as euphausiids and myctophids, should be considered, given that both jack and chub mackerel move in schools and sometimes mix while foraging.

New tools and approaches

241. During the intersessional period a workshop coordinated by Peru was organized to discuss about the implementation of quantitative use of sonars to estimate biomass of jack mackerel. This new sonar tool and the methodology were implemented. The methodology and the analysis involved were incorporated through a course held in Concepcion conducted by the expert Héctor Peña, where specialists from research institutes of Peru and Chile were trained.

242. This area of research represents an important opportunity to evaluate the impact of escape responses of jack mackerel and other species to scientific echo sounders, as well as the implementation of complementary biomass quantification tools using sonars.

Symposium on Habitat Monitoring

243. The co-chairpersons of the HMWG presented SC12-HM06 as a summary of the Symposium State of the Art of Habitat Monitoring that was held between November 6 to 10, 2023 at the city of Concepcion, Chile. There were 39 oral presentations divided in 5 sessions with their respective keynote speakers about State of the Art. The symposium proceedings will be published in a special journal issue, and this was added to the annual SC work plan.

Advice to the Commission on Habitat Monitoring

244. The SC Chair presented a new Terms of Reference (ToR) document for the Ecosystems Working Group, previously known as the Habitat Monitoring Working Group. While it was generally agreed that this represents a positive step forward, the SC expressed concerns and comments regarding the scope of the proposed ToR and the inclusion of new tasks. There were questions about the alignment between this Working Group and others, as well as their respective structures. The importance of linking ecosystems with fisheries was emphasized as a fundamental purpose of SPRFMO. Taxonomic inclusion was also a key topic of discussion.

245. It was suggested to include more specific terms related to the ecosystem approach, in addition to habitat like physical, chemical, climate.

246. The Scientific Committee **noted**:

a. The Symposium "State of the Art of Habitat Monitoring" provided a comprehensive and insightful overview of the latest advancements in habitat monitoring techniques, methodologies, and technologies, offering valuable perspectives from a diverse range of experts in the field.

b. Considerable progress has been made in the use of fishing vessels to produce abundance indicators that can be useful for the assessments

247. The SC **agreed:**

a. to adopt new terms of reference for the WG (SC12-WP16, Annex 11) and,
b. to rename the Habitat Monitoring WG into an Ecosystems WG

248. The SC **recommended**:

to support studies considering the relationship between fishery resources and the ecosystem in the context of climate change.

Exploratory Fisheries

Exploratory fishery updates (AU, CK, EU, NZ)

249. Australia introduced SC12-DW04 on their toothfish exploratory fishery in an area known as the Macquarie Ridge Continuation Research Block (MRCRB). Fishing commenced in late August 2024, and thus far seven days of fishing has been undertaken and 4.5t of toothfish caught. As the data is not yet available, a full summary of this trip is not able to be provided to SPRFMO SC12 but will be provided to SC13.

250. The EU presented SC12-DW03 which summarizes the results of the 3-year exploratory Patagonian toothfish (TOP, *Dissostichus eleginoides*) bottom longline fishing campaign in the George V Fracture Zone (CMM-14e-2023). Objectives for the exploratory fishery, fishing vessel and methods, and data collection have remained consistent throughout the period. Fishing occurred for 15, 13 and 8 days respectively and during similar time windows (around three weeks in October-November) across each of the years. The lower effort in 2023 was a result of logistic issues. Twenty-seven, thirty-two and seventeen lines were set for these years respectively, and a total green weight of TOP of 74,889, 74,898 and 42,957 kg was caught, consistently lower than the TAC. Fishing was conducted generally on the same seamounts, with a lower variability in 2023, when fishing focused mainly on three neighboring seamounts. Bycatch was less than 1% of the total catch in each year, with *Macrourus holotrachys* (MCH) and *Antimora rostrata* being the most frequently caught bycatch species. *Lepidion* spp*, Spectrunculus grandis* (pudgy/giant cusk-eel), and *Muraenolepis* spp. (eel cod) were also occasionally caught. Biological data were recorded for all bycatch species. No seabird mortalities were recorded. Eight species of marine birds were observed in 2022 and 14 species in 2023, including 3 species listed as Endangered (EN) under IUCN Red Listing. No marine mammals or reptiles were observed or caught.

251. VME indicator taxa caught during the campaign comprised of small amounts of sea fans/bamboo corals (*Gorgoniidae*), stony coral fragments (Scleractinia) and a small amount of black coral (Antipatharia). Caught VME indicator taxa totalled 1.995, 4.300 and 0.350 kg in the consecutive years. Seabed video indicates patchy rock and silty sand habitat with low abundance and diversity of VME indicator taxa.

252. Tagging of TOP was carried out at a rate of 5 fish / tonne, using standard tagging methods. In 2021, 379 tagged fish were released, 380 in 2022, and 222 in 2023. Three tagged TOP were recovered in 2022 that were originally tagged in the GVFZ in 2021 and 2 out of 3 fish that were caught in 2023 were released in 2022. Tag overlap statistics achieved were 66.20% (2021), 69.77% (2022), and 83.43% (2023). All fish were recovered on the same seamount from which they were released, indicating some level of site fidelity. However, another 6 tagged TOP were recovered that were originally tagged in the Macquarie Ridge fishery, showing that migration is in fact also occurring.

253. A total of 1,310, 1,007 and 849 TOP individuals were sampled by the scientific observers in the consecutive years, informing on length, weight, sex, and reproductive stage of all sampled fish. Furthermore, TOP otoliths were collected; 271 pairs in 2021, 318 pairs in 2022 and 194 pairs 2023. TOP data will be used for biomass estimation and improved understanding of the *Dissostichus eleginoides* stock and management in this under-studied region of the Southern Ocean. Current iteration of this assessment show relatively consistent estimates over 2022 and 2023.

254. Finally, oceanographic data was collected in 2021 and in 2023, showing similar results in terms of ocean structure.

255. In conclusion, tag recoveries indicate connectivity to the wider region from as far as Macquarie Ridge, 700nm to the east of the GVFZ. Patterns of sex ratio and reproductive state of toothfish fish caught changed throughout the study period. These patterns are possibly related to early exploitation of a virgin stock or alternatively, variability in reproductive pattern and migration between deep and shallower depths. Further exploration in the area may provide some explanation. Supplementary genetic and otolith samples collected will be analysed and should provide critical information on the age distribution and connectivity of Patagonian toothfish in the region's adjacent toothfish fisheries.

256. The Cook Islands did not fish this year but noted that they have purchased genetic sampling kits and have been training their observers in sampling techniques. The genetic sampling will augment the hapuka biological sampling for age and maturity as well as the lobster biological sampling being undertaking. It is hoped that these data will assist in the understanding of stock structure between the two broad areas fished by the Cook Islands (the Northern seamounts and Foundation seamount chain) as well as provide information on linkages between seamounts within each area.

257. New Zealand did not conduct exploratory fishing between the SC11 and SC12 but are planning to in the remainder of the calendar year.

New exploratory fishery proposals (NZ, KOR)

258. New Zealand presented SC12-DW01_rev1, an application for New Zealand vessels to conduct exploratory fishing for toothfish (D*issostichus* spp.) using demersal longline in the southern SPRFMO Convention Area in for the years 2025-2027. The current application includes two new proposals for exploratory fisheries in areas south of the New Zealand EEZ; one extending east and another west of the current exploratory fishing area by Australia (CMM 14f-2024) extending south to the CCAMLR Convention Area. Fishing is proposed on seamounts and features when found at depths ranging from 600 – 2,500 m where suitable habitat for toothfish may exist. The annual TAC for the eastern area shall not exceed 240 tonnes with a maximum of 50 tonnes for each research block; and 50 tonnes for the western area. The main objective of these proposals is to assess the viability of sustainable fisheries for toothfish within the proposed exploratory fishery areas. Additional objectives include the collection of bathymetry data, the collection of relevant biological data for toothfish, the collection of acoustic data and the recording of any encounter with VME indicator taxa, the recording of other species of interest (i.e., marine mammals, seabirds), among others.

259. Following discussion, NZ prepared SC12-DW01_rev2.

260. The European Union queried the possible use of bathymetry information for informing catch limits with the intent of implementing minimum standards for the exploratory fisheries operational plans. The Interim Chair of the DWWG noted that this issue was discussed at the DWWG where NZ considered that the current data was insufficient to support this approach.

261. Regarding the New Zealand proposal, the SC discussed and accepted the recommendations provided by the Deepwater Working Group and:

a. **noted** the New Zealand proposal and its Fisheries Operation Plan for an exploratory demersal longline fishery for toothfish in the SPRFMO in the area south and south-east of New Zealand;
b. **recognised** the cautious, exploratory nature of the proposal;
c. **recognised** the scientific benefits of the proposed data collection, especially for understanding the distribution, movement, spawning dynamics, and stock structure of toothfishes and supporting the CCAMLR stock assessment models for Antarctic toothfish;
d. **approved** the Data Collection Plan included in the proposal; and
e. **advised** the Commission that the proposal is acceptable in terms of Articles 2 and 22, CMM 13-2024 (exploratory fisheries), CMM 03-2023 (bottom fisheries) and the BFIAS (Annex 12).

262. The Republic of Korea presented SC12-DW02_rev1, its fisheries operation plan (FOP) to conduct exploratory bottom fishing for toothfish (*Dissostichus* spp.) under Paragraph 8 of CMM 13-2024 of the SPRFMO. The research area will cover eight specific strata, with starting coordinates at 56°00' South, 155°00' West, and additional points at 56°00' South, 145°00' West; 52°00' South, 145°00' West; 52°00' South, 115°00' West; 60°00' South, 115°00' West; 60°00' South, 155°00' West; and back to the starting point. During the prospecting phase, catch limits will be set for each of the eight strata. The proposed catch is 40 tonnes per stratum (in green weight, combining both species of toothfish). The total catch across the entire research area will be capped at 240 tonnes per year (2025-2027), consistent with the limits established for New Zealand's exploratory fishery. The exploratory fishing will be carried out by the F/V *Greenstar*, owned by TNS Industries Inc., using trotline gear configuration and a baiting system for all longline sets targeting *Dissostichus* spp. The primary research objectives of the FOP are to:

a. assess the distribution and abundance of Antarctic toothfish in the southern SPRFMO Area,
b. gain a better understanding of the stock structure of toothfish in the region, especially in relation to adjacent stocks in CCAMLR Subareas 88.1, 88.2, and 88.3, and
c. collect data on the spatial and depth distributions of bycatch species to improve bycatch mitigation measures.

263. The Interim Chair of the DWWG noted that although many issues raised at the DWWG have been

addressed in SC12-DW02_rev1, some issues required further consideration.

264. Following additional consultations, the Republic of Korea submitted SC12-DW02_rev3.

265. Regarding the Korean proposal, the SC discussed and accepted the recommendations provided by the Deepwater Working Group and:

a. **noted** the Republic of Korea proposal and its Fisheries Operation Plan for an exploratory demersal longline fishery for toothfish in the SPRFMO in South Central Pacific Ocean;
b. **recognised** the cautious, exploratory nature of the proposal;
c. **recognised** the scientific benefits of the proposed data collection, especially for understanding the distribution, movement, spawning dynamics, and stock structure of toothfishes and supporting the CCAMLR stock assessment models for Antarctic toothfish;

d. **approved** the Data Collection Plan included in the proposal; and
e. **advised** the Commission that the proposal is acceptable in terms of Articles 2 and 22, CMM 13-2024 (exploratory fisheries), CMM 03-2023 (bottom fisheries) and the BFIAS (Annex 13).

Climate Change

Implications of climate change on habitat and fisheries

266. An invited expert, Dr Kelly Ortega Cisneros from the University of Cape Town gave a presentation titled "An Integrated Workflow for Simulating Climate Change Impacts on Marine Ecosystems". Dr Ortega presented the Fisheries and Marine Ecosystem Model Intercomparison Project (FishMIP), an implementation framework and workflow to standardise the climate and fishing forcings used by marine ecosystems models, collaboratively developed through a network of more than 100 researchers. FishMIP includes a set of global and regional marine ecosystem models that can be run using the provided workflow. The workflow if flexible and facilitates a series of steps to help deal researchers with bias correction, spatial scale considerations (i.e. downscaling) and model forcings. Ultimately, FishMIP seeks to enhance future research on marine ecosystems models (and their applications), foster continuous development of regional marine ecosystem model ensembles, improve model evaluation and benchmarking, and allow for global-to-regional model comparisons.

267. The representative from the Permanent Commission of the South Pacific (CPPS) introduced the CPPS to SC Members. The CPPS is an intergovernmental organisation established in Chile in 1952 and includes Chile, Colombia, Ecuador and Peru among its members. The CPPS coordinates efforts to protect the marine environment, including coastal areas, from the adverse effects from climate change. The CPPS fosters and scientific research and collaboration among its members. On of the most important projects the CPPS has been leading is the Regional Study of the El Nino Phenomenon, which dates from 1974. The CPPS is involved in monitoring activities (acidification observation programme) and developing and implementing actions plans, such as the Regional Action Plan for the Conservation and Management of Sharks, Rays and Chimaeras in the Southeast Pacific Regional. The CPPS would like to collaborate for SPRMFO through data collection and scientific programmes to implement the Decision 13-2023 from Commission.

268. DSCC presented paper SC12-Obs06, which encourages the SC to initiate a review of existing CMMs to identify information gaps and to commit to performing additional research to support that review, to review the effectiveness of risk approaches underpinning harvesting strategies (including decision rules and reference points). DSCC also emphasized that would support initial discussions on the potential risks of climate change and ocean acidification impacts of healthy ocean ecosystems.

269. During the discussion that followed the presentations, Ecuador indicated that a collaborative approach to address some of the issues raised by DSCC could include other parties and organisations that may hold useful information and expertise relevant to climate change impacts. The EU indicated that current tasks in the work plan should go beyond just collection of data.

270. After the presentations, the SC Chair proposed to have a separate session with interested Members to help drive a task team to further develop recommendations regarding climate change. A document SC12-WP08 containing the terms of reference and workplan for the Climate Change Task Team was circulated and discussed during the following days.

271. The SC discussed the document and **agreed**:

> to create the Climate Change Task Team to identify ways in which climate change limits the confidence or relevance of advice SC currently provides to the Commission; propose work to address those limitations and draft a research plan to implement such work within the framework of the SC.

272. The SC **agreed:**

> that the Climate Change Task Team will be coordinated by Dr Jorge Tam (Peru).

273. The SC **recommended:**

> that the Commission support the planned activities on climate change.

Data Working Group

Terms of reference and prioritisation of data needs

274. Drawing from Document SC12-Doc12, the Chair noted that the Data Working Group (DWG) had evolved in response to the growing need for more structured and effective data management to support the organization's conservation and management objectives. He recalled the many significant data limitations identified, including the need for standardization of data collection and reporting protocols, improving the quality and usability of data assets, and advancing electronic reporting capabilities and the necessity for improved data processes.

275. The DWG was formalised in the 2023 SC Multi-Annual Workplan and an inception meeting, held in 2023, laid the groundwork for the group's objectives, structure, and scope of work, and concluded that the Group would be most effective under the purview of the SC.

276. Since SC11, Mr Bernard Vigga has been appointed as Data Manager, and Draft Terms of Reference developed.

277. The SC discussed the proposal and: Members discussed potential workstreams that the Working Group should be involved with, and emphasis was placed on the need of effective communication and collaboration with other groups and bodies, such as the CTC, the SC, and the EM Working Group, to avoid overlapping and duplication of work.

278. The SC discussed the proposal and **agreed:**

> a. that the Data Working Group should include appropriate experts from Members and CNCPs;
> b. to encourage Members to submit nominations for the position of Chair of the Working Group;
> c. to adopt the Terms of Reference for the Data Working Group as drafted in SC12-Doc12_rev1 (Annex 14).

279. The SC **recommended**:

> that the Commission formally establishes the Data Working Group as an independent working group reporting to the SC, the CTC, and the Commission (at the discretion of the Commission).

Review and update of Data standards CMM 02

280. Paragraph 8 of CMM 02-2020 (Conservation and Management Measure on Standards for the Collection, Reporting, Verification and Exchange of Data) states that the CMM shall be reviewed no later than the regular meeting of the Commission in 2025 based on advice from the 2024 meeting of the Scientific Committee.

281. The SC **agreed**:

> that the DWG would initiate the review of data standards CMM 02 and provide advice to SC13 for consideration.

282. The Data Manager provided an interactive presentation of the program Gateaux interlinking with the current data portal, explaining that this data platform, and associated tools yet to be developed, would streamline data collection, validation, and reporting. This would ensure data is of high quality, reliable and consistent, while offering advanced features like automated reporting, dynamic geospatial visualization, and improved data storage, providing a more robust and user-friendly experience for Members.

283. The SC **supported**:

> the direction being taken by the new Data Manager and the database provider and **recommended** that these efforts continue.

Research in the Salas y Gomez and Nazca Ridges Area

Compilation and review of scientific information and data

284. The SC12 **noted** the presentations of Chile and Peru (SC12-Doc36, SC12-Doc37), which highlighted the ecological importance of this area for the South Pacific, being a global biodiversity hotspot, with high level of biological endemism and the necessity to continue the work to achieve the mandate of the Commission to recommend possible measures based on and ecosystem-based approach that aims at preserving its biodiversity and SPRFMO fishing resources, as well a sustainable use of marine resources.

285. Chile presented the SC12-Doc36 highlighting the global importance of the Salas y Gomez and Nazca Ridges, with the highest level of marine endemism in the world and that was declared “Ecologically or Biologically Significant Marine Area (EBSA)” by the Convention on Biological Diversity (CBD) in 2014. These ridges face numerous threats including fishing activities, and the high seas area (>73%) lacks protection. This area represents only 1.9% of all the SPRFMO area and fishing effort is still very low and mainly focused on jumbo flying squid fisheries in the northern part of the Nazca ridge outside the Peruvian jurisdictional waters. The jumbo flying squid fisheries in the EBSA only represent 4% of the total area regulated by SPRFMO. The water column and benthos are integrated systems linked through several biophysical and ecological processes. Disrupting these processes could have major impacts in benthic and pelagic communities, particularly in ultraoligotrophic waters like Salas y Gómez ridge.

286. Regarding the SC12-Doc 36, Peru stated that pelagic fishing practices may not have impact on benthic communities and caution on this regard is advised, considering the specific characteristics of each area. Peru also expressed concerns with the IUCN list of species presented, regarding to inaccuracies for various species, such as very coastal seabirds, albatrosses, and petrels that nest in New Zealand and only occasionally pass through the area, among others. Regarding cetaceans, there are species that reside at the edge of the continental shelf, such as the Minke whale, and others that are found in strictly coastal waters, such as the Spotted dolphin. Coastal pelagic sharks and open ocean sharks are listed, inhabiting depths from the surface to 200 meters. The impact of surface fishing is mentioned, despite

the initial assertion in the document that fishing effort in the area has been low, which may be inconsistent with the application of the precautionary principle in the pelagic zone. Also, a further explanation was requested regarding how the fishery is connected to the export of dissolved organic carbon to the seabed, considering that the main contributor of this component comes from phytoplankton, and that only zooplankton, microzooplankton, and viruses are involved in the formation of exudates.

287. Peru presented the SC12-Doc37 Nazca Ridge Report: Geology, Chemistry and Biophysical Coupling components, which states that the Easter-Salas y Gomez Seamount Chain (ESC) and Nazca Ridge are separate units or systems with important differences in their history, geology, oceanography, hydrodynamic features, structure and function; in that sense, the degree of dependence on matter and energy between the surface and the seabed (benthic-pelagic coupling) could be different between both systems. Finally, it recommends greater scientific research effort in order to achieve a better understanding of key processes, such as, the carbon export in relation to the pelagic fishery.

288. During the discussion, the Cook Islands stated that it has an ongoing exploratory fishery that includes sites in the Salas y Gomez area. As part of this exploration, the Cook Islands are collecting biological data including genetic information and they will be investigating biological links between seamounts within this area as well as links to the Foundation Seamount Chain. The Cook Islands believe that they will, in the next year or two, have information that would contribute to the understanding of the stock linkages as well as fish productivity within and between these areas. The Cook Islands also deploys cameras and video equipment on their lobster traps that will allow an evaluation of trap impacts from trap landing, movement while deployed and drag while being retrieved. Noting that these impacts are not well understood and increasing inter-trap distance can reduce retrieval drag which is thought to cause the biggest impact.

289. In addition, the Cook Islands stated that this area is vast, and there will be value in considering a zoned approach, where some kinds of lower impact activities could be undertaken in some areas while other high impact activities would be prohibited. The Cook Islands also think that it would be unfair to prohibit the low impact activities of a small island state in the area while continuing to allow vessels flagged large economies to continue their activities such as those targeting swordfish. Closing this area would remove 46% of the Cook Islands potential exploratory fishing sites, which is a significant reduction and a simple statement that the closure represents 1.9% of SPRFMO is misleading when considering the impact on individual fisheries. Some of these considerations could be considered by the task team and the Cook Islands would be happy to explore all options within the task team.

290. Peru, Russia and China raised similar concerns to those from The Cook Islands and expressed the need for further research to better inform an ecosystem-based approach to fisheries management.

291. Chile proposed the creation of a Task Team for the Salas y Gomez and Nazca Ridges Area in document SC12-Doc36. A draft for the Terms of Reference for the Task Team was circulated as SC12-WP10 and discussed with the SC.

292. The SC discussed the document and **agreed**:

> to establish a Task Team for the Salas y Gomez and Nazca Ridges Area to compile and review all relevant scientific information and data about the Area and recommend possible measures to be presented to the SC13 in 2025, based on an ecosystem-based approach that aims at preserving its biodiversity and fishing resources in the Convention Area.

293. The SC **agreed:**

> that the Salas y Gomez and Nazca Ridges Area Task Team will be coordinated by the USA.

294. The DSCC, supported by the Pew Charitable Trusts (Pew), Conservation International (CI), and Oceana welcomed the continuing initiative, following Commission Decision 17-2024, to recognise and protect the key biodiversity values of the Nazca and Salas y Gomez Ridge, and the recommendation to create a Task Team to progress this work. The DSCC, Pew, Oceana and CI consider this to be a key means of continuing the scientific investigations reported here, address any further scientific questions which may arise, including those that were raised in the plenary discussion, and to increase collaboration. The DSCC noted that the international community has strongly emphasised the need to protect biodiversity, most recently in the Kunming-Montreal Global Biodiversity Framework. This is an important opportunity for SPRFMO to show that it is responding to the challenges, engaging in proactive co-operation and co-ordination to protect biodiversity and responding to the need to address climate change, as China noted, including in recognising the need for climate refugia. It is also a clear application of the precautionary approach which is required in the SPRFMO Convention.

295. Global Fishing Watch expressed their interest in this subject and shared their suggestions regarding the work to be considered including: to describe the impact of El Niño and la Niña on the area and their effect on fishing (fleets) behaviour; study the movement patterns or dynamics of the fleets in the area; assess the effort and transit for the vessels and make a more accurate calculation of the total effort in the area; propose an effort forecast/projection taking into account the vessels from all fisheries concerned.

Other Matters

Cross cutting issues

296. No other cross cutting issues were discussed.

Appointment of officers

297. Trent Timmiss (AUS) was elected as the new chair of the Deepwater Working Group, having served on an interim basis during SC12; Sebastián Vásquez (CHL) was elected as the new chair of the Ecosystems Working Group. Jim Ianelli was appointed as interim chair of the Jack Mackerel Working Group, as there were no nominations from other delegations.

298. There were no nominations for the chairpersonship of the Data Working Group and the SC thanked Jordi Tablada (NZ) for assuming the role of interim chair during SC12. The SC thanked Niels Hintzen (EU), Aquiles Sepúlveda (CHL) and Mariano Gutierrez (PER) for their service as working group Chairpersons.

Planned Inter-sessional activities and funding

299. The SC **agreed**:

> on the terms of reference of two task teams (Climate Change – Annex 15 and Salas y Gomes and Nazca – Annex 16) and the task teams were created for a term of one year.

300. The SC **agreed**:

> on the content of SC12-Doc11 (Annex 17) and **adopted** the new guidelines for the work and structure of the SC.

Next meeting venue and timing

301. The SC noted the offer of the Russian Federation to host the meeting in 2025. No other offers were received. Some Members requested that the SC Chairperson engage with the Commission prior to the end of the year to discuss hosting of the 2025 SC meeting.

302. The SC noted the offer of the Faroes Islands to host the meeting in 2026.

Other business

303. No other business items were raised.

Report Adoption and Meeting Closure

304. On behalf of the SC the Chairperson expressed his appreciation to the Government of Peru for hosting the meeting and for supporting the delegates throughout the week.

305. The meeting report was adopted at 6:12pm, 5 October 2024

306. The meeting was closed at 6:16pm, 5 October 2024.

Annex 1: Collated SC Recommendations and Requests

(Items that the SC "noted" or "agreed" are in the main body of the report and not repeated here)

On Commission guidance and intersessional activities

Section 3.3 Working group on Electronic Monitoring Standards

- [The SC] **agreed** that the proposed objectives, purpose, and scope of the standards [for Electronic Monitoring refer: SC12-Doc35] were appropriate. The SC also **agreed** that SC working groups should work with the WGEMS, as appropriate, to avoid duplication of efforts and to continue to develop the draft standards, particularly the technical annexes.

On Jack Mackerel Items

Section 4.2 Assessment data review and evaluation

- The SC **agreed** that changes to the MP [Management Procedure] should be tested in an MSE [Management Strategy Evaluation] prior to recommending it to the Commission and made appropriate reminders wherever sensitivities to alternative 2025 catches were applied
- The SC **agreed** to include additional scenarios in JM technical annex indicating that these scenarios are made available for illustration purposes and do not reflect the SC's recommendations on sustainable and precautionary catch options.
- [The SC] **clarified** that the first [ageing] workshop would focus on evaluating methodologies for the implementation of age reading in otoliths
- The SC **agreed** that [the use of "smartDots"] could be part of a second workshop.
- The SC **agreed** to the ageing workshop ToR as proposed in SC12-WP14 and **recommended** to hold an age reading workshop at the beginning of 2025 for all interested Members.

Section 4.3 Jack mackerel 2024 stock assessment

- The SC **agreed** that the assessment would be carried out in line with the results of the benchmark workshop.
- The SC **agreed** to use a 10-year average of the dynamically estimated B_{MSY} as the B_{MSY} value to be taken forward in the forecast. This B_{MSY} is estimated as 8,939 kt in 2024 for the single stock hypothesis

Section 4.4 Connectivity research

- The SC **agreed:**
  a. That the approach taken in the connectivity activities (systematic review and workshop) was appropriate for identifying priority topics of research towards evidencing connectivity of jack mackerel in the South Pacific.
  b. That all of the 11 topics systematically reviewed are considered relevant for evidencing connectivity of jack mackerel in the South Pacific, however, prioritization of topics based on strength of evidence and logistical considerations, identified 4 topics as priority areas to focus future efforts. Specifically: Genetics, Tagging methods, Early stages & Reproduction

- The SC **recommended:**
  a. That funding be provided for the sampling design and implementation of the 4 identified priority topics of research for evidencing JM connectivity (Genetics, Tagging methods, Early stages & Reproduction), subject to budgetary priorities and finalisation of sampling design.
  b. That the JM connectivity TG actively collaborate with the Ecosystem Working Group and the JM Working Group to co-develop habitat modelling and understanding in fisheries dynamics to further support evidencing connectivity of jack mackerel in the South Pacific

Section 4.6 Management Strategy Evaluation update

- The SC **agreed** with the [MSE] working group's OM [Operating Model] specification set.
- The SC **agreed** that the visualization application is useful to evaluate MP performance (https://harveststrategies.org/management-strategy-evaluation/shiny-app/).
- The SC **agreed** to schedule three working sessions in between the SC and the Commission meeting to:
  a. Hold another online capacity building workshop on MP design and MSE evaluation
  b. Discuss and review available MP architypes based on OpenMSE simulations to further refine in the FLR environment
  c. Discuss performance of selected MPs and types of performance indicators relevant for the Commission MSE workshop.

Section 4.7 Chub mackerel research

- The SC **agreed** to add an item [on chub mackerel research] to the SC multi-annual workplan.

Section 4.8 Advice to the Commission on jack mackerel

- The SC **recommended** the 2025 TAC to be at or below 1,428 kt. This represents a 15% increase over the 2024 TAC and applies throughout the range of jack mackerel. The SC noted that this level of catch was estimated to be about equal to the effort (F) estimated for 2024. This advice is also independent from alternative stock structure hypotheses.
- The SC **recommended** that Member scientists continue to work closely within the technical group to continue the development of all aspects of the MSE and in specific the Management Procedures (MP) and confer with stakeholders and managers on the preferred performance indicators to evaluate MPs.

On Deepwater Items

Section 5.2 Deepwater assessments

- The SC **recommended** that the SPRFMO Commission amend CMM 03a to set a catch limit on the Westpac Bank FMA noting that catch from the Westpac Bank FMA will continue to be accounted for against the Total Allowable Catch for the Southwest Challenger Plateau orange roughy stock, for New Zealand vessels, which has just been reduced by 57% based on new stock assessment results. If the Commission maintains the historical 12.5% allocation to the Westpac Bank, then the TAC should be set at 111t

Section 5.3 Benthic bycatch ID and catchability

- The SC **agreed**
  a. That the "Maintain function" approach identified by Hiddink et al. (2023a) would arguably be the best single approach for assessing SAIs to VMEs, but SPRFMO currently lacks the appropriate data to implement this approach;
  b. That evaluating whether it is possible to derive an SAI threshold from an empirical study tailored to the dRBS approach would be very useful

- The SC **recommended**:
  a. That a multi-criteria and multi-spatial scale risk assessment approach is developed for inclusion in the SPRFMO Encounter Review Standard to improve SPRFMO's current approaches for assessing SAIs to VMEs;
  b. That to improve the utility of the dRBS approach for assessing SAIs on VMEs, additional data be collected from areas of interest to management (where feasible) and existing data is processed (where available) to better inform VME indicator taxa abundance model development and validation;
  c. Developing other metrics for assessing SAIs on VMEs that can be used in a multi-criteria and multi-spatial scale risk assessment approach to help inform the SPRFMO encounter review process and benthic impact risk assessments.
  d. A review is undertaken to identify/determine how RFMOs use spatial management approaches to prevent SAIs on VMEs.

- The SC **agreed**:
  a. that the impact from the New Zealand midwater trawl fishery targeting alfonsino on the benthic environment, and particularly VMEs, is lower than that from bottom trawling;
  b. that any future management actions (e.g. spatial closures) that aim to avoid or limit bottom fishing impacts on the benthos (and VMEs in particular) within the SPRFMO Evaluated Area should be fishery specific (i.e., not apply broadly to all bottom fisheries).

Section 5.4 Encounters with VMEs

- The SC **agreed** that the Encounter Review Standard submitted by New Zealand:
  a. aligns with the FAO Deep-sea Fisheries Guidelines, and;
  b. takes into account the guidance contained in paragraph 166(f) of the 2023 Report of Bottom Fishing Intersessional Working Group (COMM11-Doc07) as required by paragraph 41 of CMM03-2023.

- The SC **recommended**:
  a. That the Commission adopts the Encounter Review Standard submitted by New Zealand (SC12-DW10);
  b. The Scientific Committee shall review, and update if required, the Encounter Review Standard every 5 years, starting in 2029, to ensure that it reflects best practice;
  c. The Scientific Committee shall, in addition to the 5 yearly reviews, update the Encounter Review Standard as needed to account for the best available scientific information relevant to determining the presence of VMEs or to assessing adverse impacts on VMEs

Section 5.5 CMM 03 request regarding VMEs

- The SC **agreed:**

  a. that the approach used to develop the VME indicator taxa bioregionalisation is appropriate;
  b. that the 7-group classification delineates the fewest number of bioregions, while maintaining classification strength;
  c. that further Investigations are required to establish whether bioregions may provide an additional spatial scale for evaluating the performance of spatial management measures. Evaluation is required to determine if bioregions represent a more ecologically relevant large spatial scale than FMAs where there is sufficient data

- The SC **recommended**:

  a. that until enough data are available to demonstrably improve the bioregionalisation, independent statistical validation of the bioregionalisation should be conducted to inform its utility for management;
  b. that, if the bioregionalisation is assessed as having utility for management, a task is added to the SC's multi-annual workplan to use the VME indicator taxa bioregionalisation to evaluate the performance of the bottom fishing spatial management measures;
  c. that further development and validation of abundance models for VME indicator taxa be undertaken so that they can be used for future development of the bioregionalization.

Section 5.6 Bottom Fishing Impact Assessment

- The SC **agreed**:

  a. that the revised methods used in the update are consistent with the requirements of the BFIAS and should be applied to the review and update of the BFIA scheduled for 2026.
  b. that, with respect to estimates of the status of VME indicator taxa:
     i. the new benthic impact assessment provides estimates of current and future (at 2044) status for 17 VME indicator taxa, 9 FMAs, and 2 abundance index sensitivities. Within FMAs, of these 306 combinations:
        1) current status is estimated to be at or above 80% for 297 (base case) and 294 (low case); future status (no fishing) is estimated to be at or above 80% for 298 (base case) and 297 (low case);
        2) current status is estimated to be < 80% for 5 (base case) and 8 (low case); future status (no fishing) is estimated to be < 80% for 4 (base case) and 5 (low case);
        3) for 4 combinations in each case there are no estimates available.
     ii. when considering only the areas within each FMA that are inside BTMAs:
        1) current status is estimated to be at or above 80% for 276 (base case) and 268 (low case); future status (no fishing) is estimated to be at or above 80% for 281 (base case) and 277 (low case);
        2) current status is estimated to be < 80% for 5 (base case) and 8 (low case); future status (no fishing) is estimated to be < 80% for 4 (base case) and 5 (low case);
        3) for 10 combinations in each case there are no estimates available.
     iii. When considering only the areas within each FMA that are outside BTMAs:
        1) current status and future status (no fishing) is estimated to be at or above 80% for all 300 combinations where estimates are available, for both base and low cases;
        2) for 6 combinations in each case there are no estimates available.
     iv. the survey of experts for revising taxon-specific depletion and recovery rates likely resulted in improved estimates for these inputs, but that could not be easily verified. Therefore, uncertainty was accounted for by providing sensitivities around status estimates for best case (low D/high R) and worst case (high D/low R) based on an arbitrary ± 20% of median values.

c. that evaluating whether it is possible to derive an SAI threshold from an empirical study tailored to the dRBS approach would be very useful.
d. there is a substantial degree of uncertainty associated with the estimated status of those taxa most impacted by fishing due to the inherent uncertainty within the input parameters (in particular, the taxon-specific depletion and recovery rates, and does not consider the impacts of climate change and ocean acidification).

- The SC **recommended**:

a. that the revised benthic impact assessment is added as an addendum to the Cumulative Bottom Fishery Impact Assessment for Australian and New Zealand bottom fisheries, 2023 (AUS/NZL).
b. that the Commission adds to the SC multi-annual workplan a task to further develop and validate abundance models for VME indicator taxa so that they can be used in future updates of the benthic impact assessment to reduce the need for data transformations, with a focus on those taxa currently assessed at being most at risk.
c. that the Commission adds to the SC multi-annual workplan a task to conduct research to improve the reliability and estimation of uncertainty for the D and R values that inform the calculation of dRBS, with a focus on those taxa currently assessed at being most at risk

Section 5.7 CMM 03 request regarding Species of Concern

- The SC **agreed** that, based on the information presented, no additional spatial/temporal closures, spatially/temporally limited gear prohibitions, bycatch limits or measures for an encounter protocol for any of these species are required under CMM03 at this time.

Section 5.8 Advice to the Commission on Deepwater

- In relation to the Deepwater agenda items, the SC **recommended**:

a. that the SPRFMO Commission amend CMM 03a to set a catch limit on the Westpac Bank FMA noting that catch from the Westpac Bank FMA will continue to be accounted for against the Total Allowable Catch for the Southwest Challenger Plateau orange roughy stock, for New Zealand vessels, which has just been reduced by 57% based on new stock assessment results. If the Commission maintains the historical 12.5% allocation to the Westpac Bank, then the TAC should be set at 111t.
b. That the Commission adopts the Encounter Review Standard submitted by New Zealand (SC12-DW10);
c. The Commission task the Scientific Committee to review, and update if required, the Encounter Review Standard every 5 years, starting in 2029, to ensure that it reflects best practice;
d. The Commission task the Scientific Committee to, in addition to the 5 yearly reviews, update the Encounter Review Standard as needed to account for the best available scientific information relevant to determining the presence.
e. That, if the bioregionalisation is assessed as having utility for management, a task is added to the SC's multi-annual workplan to use the VME indicator taxa bioregionalisation to evaluate the performance of the bottom fishing spatial management measures:

i. That the revised benthic impact assessment is added as an addendum to the Cumulative Bottom Fishery Impact Assessment for Australian and New Zealand bottom fisheries, 2023 (AUS/NZL; SC11-DW01_rev1).
ii. that the Commission adds to the SC multi-annual workplan a task to further develop and validate abundance models for VME indicator taxa so that they can be used in future updates of the benthic impact assessment to reduce the need for data transformations, with a focus on those taxa currently assessed at being most at risk.
iii. that the Commission adds to the SC multi-annual workplan a task to conduct research to improve the reliability and estimation of uncertainty for the D and R values that inform the calculation of dRBS, with a focus on those taxa currently assessed at being most at risk.

On Squid Items

Section 6.6 Squid assessment data (including effort)

- The SC **agreed** that some of the existing limitations [relating to enabling Members to query datasets and expanding the database to store additional variables] should collaboratively be addressed by the Data Working Group.

Section 6.8 Advice to the Commission on squid

- The SC **agreed:**
  a. to enhance cooperation among members in the collection and sharing of data in support of stock assessment and other scientific research on jumbo flying squid.
  b. that assessment model and simulation code should be shared on SPRFMO's GitHub to make it available to members and ensure transparency.
  c. Provide a single template for data collection to implement the stock assessment methods currently in use. Additionally, provide templates for desirable data that should be collected in the future to improve current approaches.
  d. the need to reinforce research on the jumbo flying squid, in particular on the relationship between the resource and the environment.
- The SC **recommended:**
  a. that the Commission requests that coastal members make their data from jurisdictional waters available and to ensure transparency in the process of estimating key quantities needed to implement current approaches for assessing jumbo flying squid.
  b. to support the exploration and development of new management strategies for jumbo flying squid that are specifically tailored for short-lived species.
  c. that the Commission supports research on the jumbo flying squid, in particular on the relationship between the resource and the environment.

On Habitat Monitoring Items

Section 7.7 Advice to the Commission on Habitat Monitoring

- The SC **agreed**:
  a. to adopt new terms of reference for the WG (SC12-WP16, Annex 11) and,
  b. to rename the Habitat Monitoring WG into an Ecosystems WG
- The SC **recommended** to support studies considering the relationship between fishery resources and the ecosystem in the context of climate change

On Exploratory fisheries Items

Section 8.2 New exploratory fishery proposals (NZ, KOR)

- Regarding the New Zealand proposal, the SC:
  d. **approved** the Data Collection Plan included in the proposal; and
  e. **advised** the Commission that the proposal is acceptable in terms of Articles 2 and 22, CMM 13-2024 (exploratory fisheries), CMM 03-2023 (bottom fisheries) and the BFIAS
- Regarding the Korean proposal, the SC:
  f. **approved** the Data Collection Plan included in the proposal; and
  g. **advised** the Commission that the proposal is acceptable in terms of Articles 2 and 22, CMM 13-2024 (exploratory fisheries), CMM 03-2023 (bottom fisheries) and the BFIAS

On Climate Change

Section 9.1 Implications of climate change on habitat and fisheries

- The SC discussed the document and **agreed** to create the Climate Change Task Team to identify ways in which climate change limits the confidence or relevance of advice SC currently provides to the Commission; propose work to address those limitations and draft a research plan to implement such work within the framework of the SC.
- The SC **agreed** that the Climate Change Task Team will be coordinated by Dr Jorge Tam (Peru).
- The SC **recommended** that the Commission support the planned activities on climate change.

On the Data Working Group

Section 10.1 Data Working Group update

- The SC discussed the proposal [SC12-Doc12] and **agreed**:
  a. that the Data Working Group should include appropriate experts from Members and CNCPs;
  b. to encourage Members to submit nominations for the position of Chair of the Working Group;
  c. to adopt the Terms of Reference for the Data Working Group as drafted in SC12-Doc12_rev1 (Annex 14).
- The SC **recommended** that the Commission formally establishes the Data Working Group as an independent working group reporting to the SC, the CTC, and the Commission (at the discretion of the Commission).
- The SC **agreed** that the DWG would initiate the review of data standards CMM 02 and provide advice to SC13 for consideration.
- The SC **supported** the direction being taken by the new Data Manager and the database provider and recommended that these efforts continue.

On Research in the Salas y Gomez and Nazca Ridges Area

Section 11.1 Compilation and review of scientific information and data

- The SC discussed the document [SC12-WP10] and **agreed** to establish a Task Team for the Salas y Gomez and Nazca Ridges Area to compile and review all relevant scientific information and data about the Area and recommend possible measures to be presented to the SC13 in 2025, based on an ecosystem-based approach that aims at preserving its biodiversity and fishing resources in the Convention Area.
- The SC **agreed** that the Salas y Gomez and Nazca Ridges Area Task Team will be coordinated by the USA.

On Other Matters

Section 12.2 Appointment of officers

- Trent Timmiss (AUS) was elected as the new chair of the Deepwater Working Group, having served on an interim basis during SC12; Sebastián Vásquez (CHL) was elected as the new chair of the Ecosystems Working Group. Jim Ianelli was appointed as interim chair of the Jack Mackerel Working Group, as there were no nominations from other delegations

Section 12.3 Planned Inter-sessional activities and funding

- The SC **agreed** on the terms of reference of two task teams (Climate Change – Annex 15 and Salas y Gomes and Nazca - Annex 16) and the task teams were created for a term of one year.
-

Annex 2: SC12 List of Participants

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Annex 3: SC12 Meeting Agenda

1) OPENING OF THE MEETING
   a. Meeting arrangements
   b. Adoption of Agenda
   c. Meeting Documents

2) ANNUAL REPORTS DISCUSSION

3) COMMISSION GUIDANCE AND INTER-SESSIONAL ACTIVITIES
   a) SC multi-annual workplan
   b) Secretariat SC related activities
   c) Working Group on Electronic Monitoring Standards
   d) Cooperation with other Organisations (ACAP, CPPS, FAO Deepsea Fisheries Project)
   e) Observer Programme accreditation process and progress

4) JACK MACKEREL
   a) Review of inter-sessional activities
   b) Assessment data review and evaluation
   c) Management Strategy Evaluation update
   d) Jack mackerel assessment
   e) Connectivity research
   f) Ageing techniques
   g) Advice to the Commission on jack mackerel
   h) Assessment Development chub mackerel

5) DEEPWATER
   a) Review of inter-sessional activities
   b) Deepwater assessments (Orange roughy, stock structure, ecological risk, data)
   c) Benthic bycatch ID and catchability
   d) Encounters with VMEs
   e) CMM 03 request regarding encounters with VMEs
   f) Bottom Fishery Impact Assessment
   g) CMM 03 request regarding marine mammals, seabirds, reptiles and other species of concern
   h) Advice to the Commission on Deepwater
   i) CMM 03 request regarding ongoing appropriateness

6) SQUID
   a) Review of inter-sessional activities
   b) Assessment progress and CMM development
   c) Assessment Simulation Task Team
   d) Standardise biological sampling
   e) Advice to COMM 13 on appropriate level of observer coverage
   f) Squid assessment data (including effort)
   g) Genetics and connectivity research
   h) Advice to the Commission on Squid

7) HABITAT MONITORING
   a) Review of inter-sessional activities
   b) Indicators from fishing vessels on target pelagic species
   c) Standardised oceanographic data products and modelling
   d) Species behaviour and preferences
   e) New tools and approaches
   f) Symposium on Habitat Monitoring
   g) Advice to the Commission on Habitat Monitoring topics
   h) Future direction of the Working Group

8) EXPLORATORY FISHERIES
   a) Exploratory Fishery updates (AUS, COK, EU, NZ)
   b) New exploratory fishery proposals (KOR, NZ)

9) CLIMATE CHANGE
   a) Management implications of Climate Change on habitat and fisheries in the SPRFMO Area

10) DATA WORKING GROUP
   a) Terms of Reference and prioritisation of data needs
   b) Review and update data standards (paragraph 8 of CMM 02-2020)

11) RESEARCH IN THE NAZCA AND SALAS Y GOMEZ RIDGES AREA
   a) Compilation and review of scientific information and data

12) OTHER MATTERS
   a) Crosscutting issues (as necessary)
   b) Appointment of Officers
   c) Planned Inter-sessional activities and funding
   d) Next meeting venue and timing
   e) Other business

13) REPORT ADOPTION AND MEETING CLOSURE

Annex 4: SC12 Meeting Schedule

	Session 1 09:00 – 10:30	Session 2 11:00 – 12:30	Session 3 13:30 – 15:30	Session 4 16:00 – 18:00	
Mon 30 Sep 24	Opening ceremony Administration Arrangements Agenda Meeting documents	Item 2) Annual reports Item 3a) Workplan (intro)	Item 8a) Exploratory fishery updates Item 8b) New exploratory proposals	Item 6a) Inter-sessional activities (SQ) Item 6b) Assessment progress Item 6c) Simulation	5pm Dinner
Tue 1 Oct 24	*Review of advice/meeting report progress* Item 6d) Sampling Item 6f) Assessment data Item 6g) Genetics & Connectivity	Item 9a) Climate Change (intro) Item 7c) Oceanographic products and modelling	Item 7a) Inter-sessional activities (HM) Item 7b) Indicators Item 7d) Species preferences Item 7e) New tools Item 7f) Habitat Monitoring Symposium	Item 4a) Inter-sessional activities (JM) Item 4b) Data review	6pm Side event
Wed 2 Oct 24	*Review of advice/meeting report progress* Item 10a) Data Working Group Item 10b) Data Standards review	Item 9a) Climate Change (completion) Item 11a) Nazca and Salas y Gomez information review	Cultural event Until 14:30 Item 5a) Inter-sessional activities (DW) Item 5b) Assessments Item 5c) Benthic bycatch	Item 4c) MSE Item 4d) JM Assessment	
Thu 3 Oct 24	*Review of advice/meeting report progress* Item 3b) Sec activities Item 3c) EM Item 3d) Cooperation Item 3e) Observer prog	Item 5d) VME encounters Item 5e) Regarding encounters Item 5f) BFIAs Item 5g) Species of concern (DW)	Item 12a) Cross cutting Item 3a) Workplan (Completion)	Item 4d) JM Assessment (cont.) Item 4e) Connectivity Item 4f) Ageing research Item 4h) Chub mackerel assessment development	
Fri 4 Oct 24	Item 6h) Squid Advice	Item 4g) Jack mackerel advice	Item 5h) Deepwater Advice Item 5i) Ongoing appropriateness of CMM03	Item 7g) Habitat Monitoring advice Item 7h) Future direction (including Alignment of Deepwater and Habitat Monitoring workstreams)	
Sat 5 Oct 24	Item 12b) Officers Item 12c) inter-sessional activities Item 12d) Next meeting Item 12e) Other business	SC report preparation	SC report adoption	SC report adoption Meeting close	

SC	Exploratory Fisheries	Squid	Habitat Monitoring	Jack Mackerel	Deepwater	Climate Change

	Session 1 09:00 – 10:30	Session 2 11:00 – 12:30	Session 3 13:30 – 15:30	Session 4 16:00 – 18:00	Social events
Mon 30 Sep 24	Scientific Committee	Scientific Committee	Exploratory fisheries	Squid	*Welcome dinner & tour:* *17h departure* *Museo Larco cafe*
Tue 1 Oct 24	Squid	Climate Change Habitat Monitoring	Habitat Monitoring	Jack Mackerel	*Side Event: Salas y Gomez & Nazca Ridge dinner (18-20h)*
Wed 2 Oct 24	Data	Climate Change Nazca and Salas y Gomez	Deepwater	Jack Mackerel	*Cultural display* *Lunchtime* *12:30 – 14h*
Thu 3 Oct 24	Scientific Committee	Deepwater	Scientific Committee	Jack Mackerel	
Fri 4 Oct 24	Squid	Jack Mackerel	Deepwater	Habitat Monitoring	*Side Event: Sexual behaviour of cephalopods (18-17h)*
Sat 5 Oct 24	Scientific Committee	Scientific Committee	Scientific Committee	Scientific Committee	

Annex 5: Scientific Committee Multiannual Workplan

1. Introduction

The SPRFMO Scientific Committee Multiannual Workplan contains the activities, timelines, and funding priorities for the short and medium-term work of the Scientific Committee. It is an instrument of cyclic synergy between the Scientific Committee and the Commission; it serves as a reference for the work of the Scientific Committee throughout the year and is endorsed annually by the Commission.

A proposed multiannual workplan is prepared by the Scientific Committee during its meeting and included as an annex within the SC meeting report. It is then submitted to the Commission as a meeting document for consideration, amended wherever necessary, and ultimately adopted. The workplan adopted by the Commission is then published as a standalone Annex to the meeting report and guides the current and future work of the Scientific Committee.

The following tables associate each identified task with an expected timeline, coordinator and funding source. The year is associated with the Scientific Committee meeting at which the work is expected to be reported back on. In some cases, the work is expected to be repeated over several years, and this is indicated with a plus (+) sign or a range. The column labelled “Coordinator” identifies the Member(s) (or in some cases the Secretariat or Chairperson) who has specifically been assigned to ensure that progress towards the task is made intersessionally. In some cases, no Member has been specifically identified and this is indicated with a blank, in that case, it is a task for the whole SC to address. The amount of additional funding required is identified as well as funding sources (such as the SC Scientific Support Fund or a Member voluntary contribution) if known. A notation of “In-kind” signifies that the work will be conducted by Members and that no additional funding is expected to be required.

2. Jack Mackerel Working Group

Jack Mackerel Task	Subtask	Timeline	Coordinator	Funding
Jack mackerel assessment	Review available input data and its quality for the JM assessment.	2025	CHL/EU	In-kind
	Continue to update and compare standardizations of commercial tuning indices among different fleets and the impacts of increased efficiency in the fleets.	2025	CHL/PER/EU	In-kind
	SC and other funds to support experts during SC assessment.	2025+	SC Chair/ Secretariat	NZ$ 15K (SC)
	Provide TAC advice according to Commission request.	2025	SC	In-kind
	Update and compare standardizations of commercial tuning indices among different fleets and review the potential bias in CPUE indices due to possible increased efficiency of the fleet and observed changes in the jack mackerel spatial distribution (benchmark).	2025+	CHL	In-kind
	Organise a benchmark data workshop (1) for JM to compile relevant stock indicators such as CPUE, fisheries independent surveys and opportunistic acoustic survey data to be followed by a benchmark workshop (2) to address model configuration.	2025-2026		NZ$ 24K CHL for workshop arrangements NZ$ 30K SC fund for external reviewers and Sec
Jack mackerel MSE	MSE workshop at COMM13 with stakeholders and managers to present outcomes and receive feedback on future developments.	2025	ECU	*New EU project from Aug 2024*
	Develop and carry out an MSE.	2024+	EU	*New EU project from Aug 2024*
Jack mackerel connectivity research	In collaboration with the Ecosystem Working Group, use SDMs to predict seasonal distribution patterns of JM over time.	2025	EU/CHL/PER	In kind
	Organise two in-person workshops to: 1. Identify key practical requirements and considerations for sampling approaches for progressing work on the identified priority topics (genetics, tagging methods, early stages & reproduction) including outlining possible iterative/annual changes to sampling design. 2. Identifies key hypotheses on connectivity and a description of how these hypotheses could be tested using the priority topics. Describe an approach for considering evidence. Produce workshop reports and outputs to inform the development of a sampling and research programme.	2025-2026	EU/CHL/PER	Coordination: NZ$ 6K (SC) NZ$ 40K (SC) Research funding

Jack Mackerel				
Task	Subtask	Timeline	Coordinator	Funding
	Design and undertake a sampling and research programme (including data analysis and reporting) across the 4 combined identified high priority topics *Genetics, Tagging methods* and *Reproduction/Early Stages,* to evidence jack mackerel connectivity.	2026-2032	EU/CHL/PER	NZ$ 75K/year (SC from 2026) Also seeking industry funding
Jack mackerel ageing techniques	Workshop to evaluate methodologies for implementation in age readings in otoliths of jack mackerel (*T. murphyi*) among the age and growth laboratories of the SPRFMO.	2025+	CHL/PER	In-kind
Chub mackerel	Organize a data compilation workshop to compile an overview on catch, catch distribution, mixing densities in the JM fishery, life history characteristics and independent survey estimates on chub mackerel	2025	PER/CHL	NZ$ 45K (SC) *New EU project from Aug 2024*

3. Deepwater Working Group

Deepwater group				
Task	Subtask	Timeline	Coord.	Funding
Orange roughy assessment	1. Explore alternative stock assessment models 2. Estimate stock status 3. Provide advice on sustainable catch levels	2025+	NZ	In-kind
Orange roughy assessment data	Coordinate and design acoustic surveys for relevant stocks (*intersessional consideration*)	2025+	NZ	In-kind
Deep water stock structure	Review the list for deepwater stock structure analyses based on assessment for non-orange roughy stocks	2025+		In-kind
	Develop workplan to drive stock structure delineation studies for orange roughy and alfonsino and other key target species	2025+	NZ	In-kind
Other stock assessments, & ecological risk assessment	Review the risk assessment of teleost and elasmobranch species considering new available information and methods	2025	AU	In-kind
	Develop a tier-based assessment framework for all DW stocks and recommend relevant reference points and/or management rules for these stocks	2025+	AU	In-kind
VME Encounters and benthic bycatch	Develop VME taxa ID guide for benthic bycatch, following the steps proposed in SC9-DW12, and associated training videos	2025+	NZ	In-kind
	Further Investigations are required to establish whether bioregions may provide an additional spatial scale for evaluating the performance of spatial management measures	2025	NZ	In-kind

Deepwater group				
Task	Subtask	Timeline	Coord.	Funding
	Assess the feasibility and develop a research programme within the SPRFMO Convention Area to allow the determination of taxon-specific estimates of catchability for VME indicator taxa.	2025+	NZ	In-kind
CMM 03 request regarding Encounters with VMEs	Developing a multi-spatial scale risk-based approach to assess encounters with VME indicator taxa	2025+	NZ	In-kind
	Review all reported VME encounters	2025+	DWWG	In-kind
CMM 03 request regarding ongoing appropriateness	Review all available data and provide advice on the ongoing appropriateness of the management measures to ensure the CMM continues to achieve its objective and the objectives of the Convention	2025+	DWWG	In-kind
Bottom Fishery Impact Assessment	The Scientific Committee shall review, and update if required, the SPRFMO BFIAS every 5 years, to ensure that it reflects, as appropriate, best practice. Standing item	2025	DWWG	In-kind
	For VME taxa potentially at risk of SAI, improve and validate abundance models, using independent data	2025+	NZ	
	With a focus on VME Indicator taxa currently estimated to be most impacted by fishing, work to reduce uncertainties in risk assessments for benthic habitats and VMEs by exploring the overlap between the spatial distribution of bottom trawling fishing impact (i.e., the 'naturalness layer') and abundance estimates of VME indicator taxa [potentially at multiple spatial scales, including Management Areas] Contingent on previous task	2025++	NZ	In-kind
	Complete Cumulative BFIA. Standing item	2026	AU/NZ	
	Derive an SAI threshold from an empirical study tailored to the dRBS approach	2025+	NZ	In-kind
CMM 03 request regarding Marine mammals, seabirds, reptiles and other species of concern.	The Scientific Committee shall provide advice biennially to the Commission on: 1. Direct and indirect interactions between bottom fishing and marine mammals, seabirds, reptiles and other species of concern; 2. Any recommended spatial or temporal closures or spatially/temporally limited gear prohibitions for any identified hotspots of these species; and 3. Any recommended bycatch limits and/or measures for an encounter protocol for any of these species.	2026 2028	AU/NZ	In-kind

4. Squid Working Group

Squid				
Task	Subtask	Timeline	Coordinator	Funding
Squid workshop	Squid Workshop including potential assessment techniques, abundance indices and simulated assessment; to be held in person	2025	SQWG Chair / Secretariat	TBD (2025)
Squid assessment and CMM development	Develop a plan for more detailed within-season fishery Monitoring depending upon the uptake of EM, etc.	2025	SQWG	In-kind
Squid assessment and CMM development	Form a task team to conduct simulation and model evaluations for squid stock assessments	2024-25	SC Chair	In-kind
	Design and evaluate MSE and harvest control rules	2026+	SQWG	In-kind
Observer Coverage	Provide advice on the appropriate level of observer coverage in the jumbo flying squid fishery	2026	SQWG	In-kind
Squid assessment data	Develop template for monthly data, including catch, effort and CPUE	2025	SQWG	In-kind
	Develop a template for biological data, including time, location, length, weight and maturity stage	2025	SQWG	In-kind
	Protocol for data submission and templates management	2025	SQWG	In-kind
Squid connectivity	Collect samples for population genomic studies (Convention area and adjacent National Jurisdiction Areas)	2024-25		NZ$ 97K (CHN)
	DNA Sequencing using IcWGS, for population genomics analysis	2026+		In-kind
	Provide a single report describing the genetic diversity based on mtDNA ND2 gene marker, integrating data from all members and include a review of the existing protocol	2025		In-kind

5. Ecosystems Working Group

Task	Objective	Timeline	Coordinator	Funding
Evaluate the applicability of data collected from fishing vessels targeting pelagic species	Mapping spatial-temporal population density distribution of jack mackerel using a combination of the existing acoustic survey data and acoustic information as obtained from industry vessels	Permanent	PER/CHL	In-kind
	To provide acoustic indices from fishing vessels for consideration in the data and stock assessment benchmarks of jack mackerel and chub mackerel	2025	PER/CHL	In-kind

Task	Objective	Timeline	Coordinator	Funding
	To assess the feasibility of developing a regional integrated index based on acoustic surveys to inform the jack mackerel stock assessment	2025	PER/CHL	In-kind
Further developments of standardised oceanographic data products and modelling	Characterise jack mackerel habitat (e.g., past studies done in Peru and Chile)	Permanent	PER/CHL	In-kind
	Provide ecosystem status overview for SC at seasonal to decadal scale	2025+	PER/CHL	In-kind
	Explore the concept of jack mackerel habitat under an interdisciplinary ontogeny approach for jack mackerel and other species (by life history stages and regions) *Workshop to be virtually conducted* in synergy with the JM connectivity Task Team.	2025	PER/CHL	In-kind
	Integration of databases provided by different members of the HMWG and other working groups of the SC with linkage to a metadata repository	2025+	PER/CHL	In-kind
Species behaviour and preferences	Analyse the habitat preferences of jumbo squid	2025+	PER/CHL	In-kind
	Analyse behaviour, distribution, and abundance information about mesopelagic, euphausiids and other key species of the Humboldt Current System	2025+	PER/CHL	In-kind
Use of new tools	Develop new approaches based on different tools such as GAM, GLM, INLA, ROMS, eADN, Biogeochemical, Geostatistics, big data and machine learning (e.g., for acoustic classification of targets) and utilization of different platforms (Scientific surveys, fishing vessels, satellite oceanography, gliders, buoys, AUV)	Permanent	PER/CHL	In-kind
Symposium	Symposium on State of the Art of Habitat Monitoring (2023, Concepción, Chile). Publication of a special issue of scientific journal.	2025	Symposium Steering Committee	NZ$ 15k (USA)
Modelling	Analysis and modelling of the spatial distribution and habitat preferences of jack mackerel and chub mackerel, showing its relationship with the environment and impacts of climate change to changes in its distribution.	2025	EcoWG Chair	In-kind

6. Other (Crosscutting issues)

Crosscutting				
Task	Subtask	Timeline	Coord.	Funding
Seabird/ bycatch monitoring	Progress southern hemisphere quantitative risk assessment (SEFRA)	2025+		In-kind
Seabird bycatch mitigation	Convene a workshop to prioritize and draft amendments to CMMs 02 and 09 based on the review carried out by ACAP and the best-practice advice provided (SC11-Obs04)	2025+	NZ/PER	In-kind
EBSA	Evaluate impacts of fishing activities	2025+		In-kind

Crosscutting				
Task	Subtask	Timeline	Coord.	Funding
CMM 17 Marine pollution	SC Members and CNCPs are encouraged to undertake research into marine pollution related to fisheries in the SPRFMO Convention Area to further develop and refine measures to reduce marine pollution and are encouraged to submit to the SC and the CTC any information derived from such efforts	2025+		In-kind
Climate change	Identify management implications of climate change on habitat and fisheries in the SPRFMO area (Decision 13-2023)	2024+	USA	In-kind
	Form a task team to identify ways in which climate change limits the advice SC currently provides and propose work to address those limitations.	2025	PER	In-kind
	Compile, review and assess climate-related data, reanalysis and models needed for SPRFMO research, including climate change scenarios; identifying any gaps and limitations.	2025	Secretariat/ SC Chair	NZ$ ~19.7K (2024 SC fund balance)
CMM 02 Data Standards	Review and update data standards to ensure appropriate scientific data are collected in SPRFMO fisheries (Paragraph 8 of CMM 02-2020)	2024+		In-kind
FAO ABNJ Deep Sea Fisheries	Coordinate activities over their next five-year plan that could involve member scientists and a number of SPRFMO science projects	2024+	Secretariat	In-kind
Alignment	Work involving the alignment of Deepwater and Ecosystem workstreams	2024+		In-kind
Species synopses	To update long version profiles (FAO species synopsis format) for jack mackerel, chub mackerel and jumbo flying squid	2024+		
Research in the Nazca and Salas y Gomez ridges area	Publication of a review of the oceanography, geology, biodiversity, ecology, importance, connectivity, threats, fishing importance, governance and conservation of the Salas y Gomez and Nazca Ridges.	2025	CHL	In-kind
	Analysis, systematization, reporting and publishing data gathered to the Salas y Gomez and Nazca Ridges.	2025	CHL	In-kind
	Form a task team to review and discuss the data and present possible measures to SC13.	2025	USA	In-kind
Data Working Group	Prioritise data needs of Members. Provide input to the Secretariat in developing improved data management infrastructure including databases, data repositories and data processing tools	2025+	DWG	In-kind
CPPS joint work plan	Increase cooperation and collaboration between both organisations.	2025+	Secretariat	In-kind
	Update existing MoU	2025	Secretariat	
Secretariat scientific support	Continue with analyses of catch composition and fishing activities; support CPUE analyses; and general scientific analyses, as capacity allows.	2025+	Secretariat	In-kind

Crosscutting				
Task	Subtask	Timeline	Coord.	Funding
Assessment and monitoring	Development of assessments for species in the SPRFMO Convention Area that are bycaught or subject to targeted fishing operations (in line with tier-based assessment approach)	2025+		In-kind
SC functioning	Development of terms of reference for all WG	2025	SC Chair	In-kind

Annex 6: Jack Mackerel Summary of Advice

Stock status summary for Jack mackerel, October 2024

Stock: Jack Mackerel (*Trachurus murphyi*)
Region: Southeast Pacific

In conformity with the approach by the SC since 2012, a comparison was made between the 1-stock (H1) and 2-stock (H2) model configurations for Jack mackerel. Both models showed similar trends with an increasing overall biomass, high recruitments in recent years, and low fishing mortality.

Advice for 2024

Following the guidelines set out by the accepted rebuilding plan and given stock assessment results, 2025 catches should be at or below 1 428 000t.

Stock status

		2023	2024
Fishing mortality in relation to:	F_{MSY}	Below	Below
Spawning stock biomass in relation to:	B_{MSY}	Above 100%	Above 100%

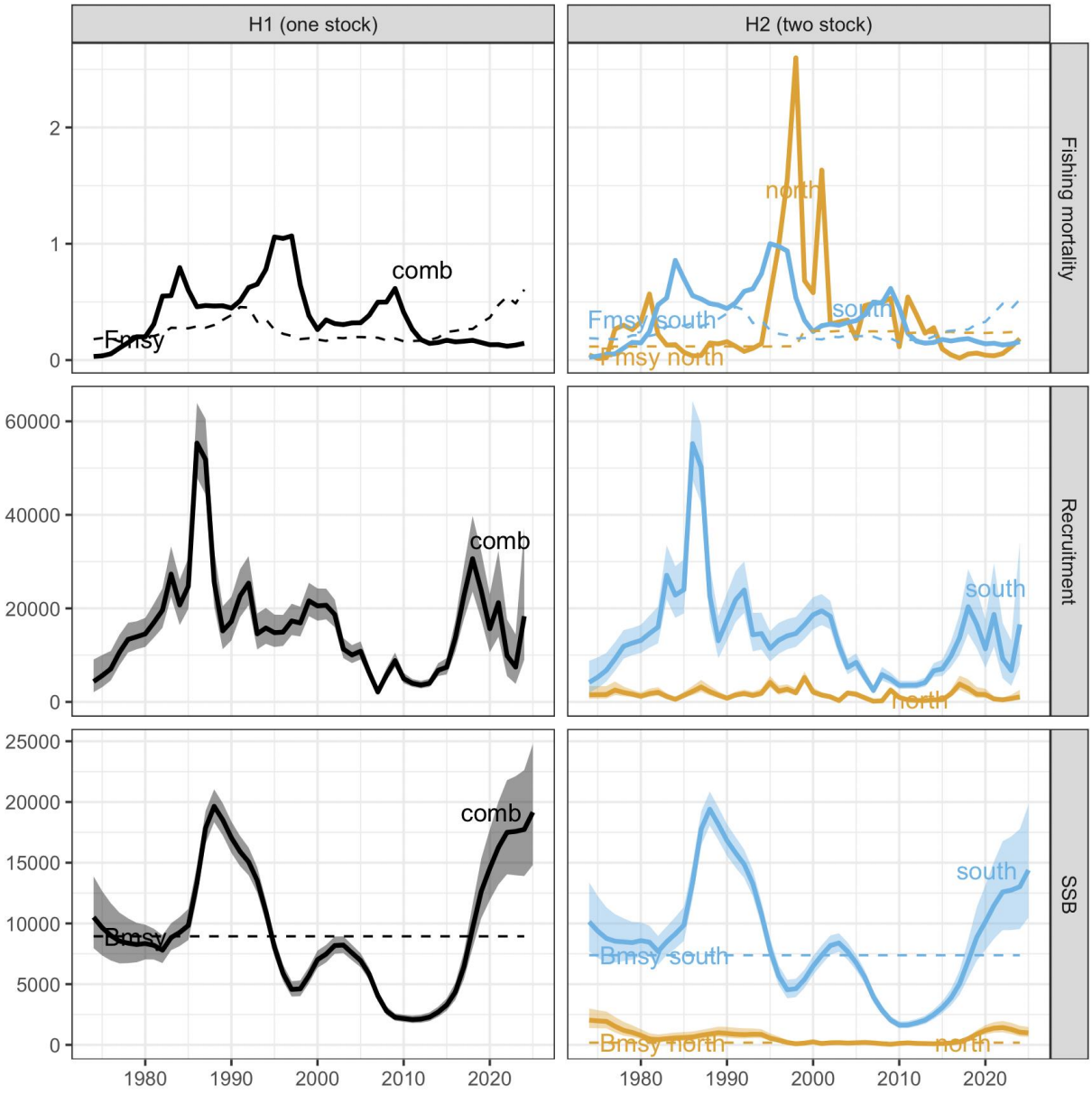

Figure 1. Jack mackerel in the southeast Pacific. Summary of stock assessment estimates over time showing spawning biomass (in thousands of tonnes; top), total fishing mortality (as an instantaneous rate per year; middle), and recruitment at age 1 (millions; bottom). Columns show results for the one-stock hypothesis (H1, left) and two-stock hypothesis (H2, right, "north" stock in yellow and "south" stock in blue). Shaded areas refer to the estimated uncertainties

Table 2: Advised catch, Catch Limits and reported catch of Jack Mackerel in the southeast Pacific.

Year	Advice	Recommended Maximum Catch	Catch Limit CMM area	Catch Limit throughout range	Catch throughout range
2013	Projection results under the assumption of recent average recruitment at the levels estimated for the recent period (2000–2012) indicate that fishing mortality should be maintained at or below 2012 levels to improve the likelihood of spawning biomass increasing. This results in catches for 2013 on the order of 441kt or lower.	441,000	360,000	438,000	355,539
2014	In sum, the advice to the Commission is to aim to maintain 2014 catches for the entire jack mackerel range in the southeast Pacific at or below 440 kt.	440,000	390,000	440,000	415,366
2015	The Commission should aim to maintain 2015 and 2016 catches for the entire jack mackerel range in the southeast Pacific at or below 460 kt.	460,000	410,000	460,000	395,210
2016	The SC agreed that the recommendation from 2014 for catches in 2016 is still appropriately precautionary. Namely, that the Commission should set 2016 catches limits for the entire jack mackerel range in the southeast Pacific at or below 460 kt, based on a status quo fishing mortality of 2014.	460,000	410,000	460,000	389,101
2017	On the application of the adjusted rebuilding plan adopted by the 2nd Meeting of the Commission as proposed from SC02, the Commission should aim to maintain 2017 catches for the entire jack mackerel range in the southeast Pacific at or below 493 kt.	493,000	443,000	493,000	406,126
2018	Given current stock status, the second tier of the Jack mackerel rebuilding plan could be applied, thereby substantially increasing the potential catch. Considering the uncertainties in the assessment however, the Scientific Committee adopts a precautionary approach and advises to maintain 2018 catches for the entire Jack mackerel range in the southeast Pacific at or below 576 kt.	576,000	517,582	576,000	527,539
2019	The SC recommended status quo fishing effort which gives 2019 catches throughout the range of the Jack mackerel stock(s) at or below 591 kt. Although the stock is estimated to be in the "second tier" of the harvest control rule (>80% of B_{MSY}), the retrospective analysis shows a tendency of overestimating the stock size. In addition, there is information that suggests that the growth of jack mackerel has been underestimated. These two factors warrant additional precaution and further investigation.	591,000	531,061	591,000	635,569
2020	In line with the accepted rebuilding plan ("Adjusted Annex K") and because the Jack mackerel biomass is estimated to be above B_{MSY}, the SC recommended a 15% increase in 2020 catches throughout the range of Jack mackerel resulting in a total catch limit at or below 680 thousand tonnes.	680,000	618,001	680,000	725,945
2021	In line with the accepted rebuilding plan ("Adjusted Annex K") and because the Jack mackerel biomass is estimated to be above B_{MSY}, the SC recommended a 15% increase in 2020 catches throughout the range of Jack mackerel resulting in a total catch limit at or below 782 thousand tonnes.	782,000	710,702	782,000	802,048
2022	In line with the accepted rebuilding plan (outlined in the SCW14 report) and because the Jack mackerel biomass is estimated to be above 100% of BMSY, the SC recommended: a precautionary 15% increase in 2022 catches throughout the range of Jack mackerel- at or below 900 kt.	900,000	817,943	900,000	961,428
2023	In line with the accepted rebuilding plan (outlined in the SCW14 report) and because the jack mackerel biomass is estimated to be above BMSY, the SC recommended a precautionary 15% increase in 2023 catches throughout the range of jack mackerel- at or below 1,035 kt. This advice for catch limits in 2023 does not depend on the stock structure hypothesis that is used.	1,035,000	981,832	1,080,000	1,117,719*
2024	In line with the accepted rebuilding plan (outlined in the SCW14 report) and because the jack mackerel biomass is estimated to	1,242,000	1,135,295	1,242,000	1,265,175*

Year	Advice	Recommended Maximum Catch	Catch Limit CMM area	Catch Limit throughout range	Catch throughout range
	be above BMSY, the SC recommended a precautionary 15% increase in 2024 catches throughout the range of jack mackerel- at or below 1,242 kt. This advice for catch limits in 2024 does not depend on the stock structure hypothesis that is used.				
2025	In line with the accepted rebuilding plan (outlined in the SCW14 report) and because the jack mackerel biomass is estimated to be above BMSY, the SC recommended a precautionary 15% increase in 2025 catches throughout the range of jack mackerel- at or below 1,428 kt. This advice for catch limits in 2025 does not depend on the stock structure hypothesis that is used.	1,428,000			

2013 advice was given by the Science Working Group.

* Preliminary values estimated at SC12

Annex 7: Jack Mackerel Technical Advice

Accessible via the SC12 meeting webpage when available

Annex 8: Terms of Reference for Jack Mackerel Ageing workshop

To be added (SC12-WP14)

1. Introduction

During the first plenary session of the 12th meeting of the SPRFMO Scientific Committee, which is being held in Lima, Peru, from September 30 to October 5, 2024, the delegations of Chile and Peru presented proposals for technical terms of reference (documents SC12_JM09 and SC12-WP04) to hold a workshop on jack mackerel otolith reading among the age and growth laboratories of the organization's member countries. After reviewing the proposals, both delegations saw it as appropriate to agree on the terms of reference for the workshop and present it in an additional document, which will be presented at the plenary for discussion and approval by SPRFMO members.

These agreements include the evaluation of age reading methodologies, which includes the review of dating and processing techniques, the analysis of new techniques, the performance of otolith processing tests and the interpretation of growth marks, analysis of the implementation of an otolith imaging protocol for morphometric analysis, and the examination of validation criteria using microstructures through tests of the techniques. This will allow, through subsequent joint work, to standardize the criteria for determining the age of jack mackerel, with the aim of achieving a more precise estimation of growth parameters.

In this context, this document contains the proposal agreed between the delegations of Peru and Chile on the terms of reference for the implementation of the otolith workshop within the framework of SPRFMO. The activities to be carried out jointly by the age and growth laboratories of the organization are detailed. In addition, it is suggested that all or part of the process be accompanied by an external specialist, jointly selected, according to the needs that should be covered to ensure a clear scheme in the application of the methods.

2. Workshop objectives

The objective of the workshop is to evaluate the methodologies for determining the age of *T. murphyi otoliths* among the age and growth laboratories of the SPRFMO member countries for the standardization of age reading criteria, according to:

a. Discussion of the methodologies of the preparation and implementation process
b. Discussion of the protocol for taking images
c. Discussion of age validation criteria

3. Workshop organization

The workshop is planned to be held in person at a SPRFMO member age and growth laboratory. To do so, a virtual meeting must be previously arranged to evaluate the workshop work plan. The workshop will address 3 main objectives, as follows:

a. **Discussion of methodologies for age reading:** This objective focuses on analyzing the methods and techniques used in sample preparation, as well as the criteria applied in reading age in otoliths. The purpose is to identify and evaluate the main difficulties associated with processing and interpretation, as well as to propose new alternatives or improvements in the techniques used. Processing trials are also planned to be carried out with a view to standardizing the procedures.

b. **Discussion of the imaging protocol:** This objective is focused on establishing a standardized protocol for obtaining images of whole otoliths, which will subsequently facilitate the morphological and morphometric characterization of the samples. These in turn will allow a spatial differentiation of the structure throughout its distribution area and a better spatial understanding of the otolith structure.

c. **Discussion of validation criteria:** This objective is aimed at evaluating the techniques used in age validation and interpretation through the analysis of otolith microstructure. As part of this process, a trial of these techniques and interpretations will be carried out, using both unprocessed and preprocessed samples. The activity should be accompanied by the participation of an external expert, previously selected by consensus among the workshop participants.

The diagnosis of these objectives will allow us to formulate medium-term goals in the joint validation processes and the unification of criteria for determining the age of jack mackerel.

4. Activity calendar

Table 1: Workshop plan for evaluating methodologies for implementation in otolith age readings of jack mackerel *T. murphyi* Nov 2024

Targets	Activities	Mode	Aug	Set	Oct	Nov	Dec
Preparation of the TDR	Workshop coordination	Virtual	x	x			
	Workshop agreements at the SC SPRFMO plenary session	In-person			x		
Discussion of methodologies for age reading	Previous coordination to the in-person workshop	Virtual				x	
	Methodological review of age determination in jack mackerel	In-person				x	
	Otolith processing techniques in the context of the SPRFMO	In-person				x	
	Implementation of alternative processing techniques	In-person				x	
Discussion of the protocol for taking otolith images	Discussion of the protocol for taking otolith images	In-person				x	
Discussion of age validation criteria	Evaluation of the techniques used in the age validation processes	In-person				x	
Presentation of the final report	Writing of the final report	Virtual					x

5. Workshop report and documents

A report containing the workshop's outcomes will be prepared in collaboration with SPRFMO members.

Annex 9: Squid Assessment Simulation Task Team - Terms of Reference

Summary

Strong evidence of the complex population structure of the jumbo flying squid (*Dosidicus gigas*) in the Eastern Pacific Ocean exists. Three morphotypes with different size ranges, maturity sizes, and spatial distribution have been described for this species. Currently, three stock assessment models are under discussion in the context of the SPRFMO. However, these models currently do not take into account the biological and ecological knowledge of the species. For these reasons, an Assessment Simulation Task Team (ASTT) for the jumbo flying squid assessment with simulated data was proposed during SC11 and approved at COMM12 (COMM12-Doc06), with a reporting cycle for 2024 and 2025. The objective of the ASTT is to test the robustness of potential assessment models to the multiple uncertainties in the population structure of jumbo flying squid and the impact of the data availability in the performance of the assessment. The simulated assessment will provide understanding of the uncertainties associated with the assessment of Jumbo Flying Squid and the impact in the management measures for this resource within the SPRFMO area.

1. Introduction

The assessment of cephalopods on a global scale is currently impeded by the life history of this resource and the paucity of information available from fisheries. The aforementioned species possess a number of distinctive biological characteristics, such as high phenotypic plasticity, rapid growth and a comparatively short lifespan. As a consequence of these attributes, it proves particularly challenging to develop a modelling tool that attempts to reproduce their population dynamics in a manner that more closely resembles reality (Arkhipkin et al. 2021), even more if there is evidence of a complex population structure as in the case of the jumbo flying squid *Dosidicus gigas* (Arguelles et al. 2001, 2017, 2019, 2019, 2023a, 2023b, Csirke et al 2018, Fang et al 2017, Gretchina & Zúñiga 2017 and 2018, Nigmatullin et al. 2001, Payá 2019, Xu et al 2018). The jumbo flying squid in the Eastern Pacific Ocean presents high variability in size at maturity, as was described by Nigmatullin et al. (2001) where three groups with different size ranges, maturity sizes and spatial distribution are mentioned.

Despite these difficulties, within the framework of the SPRFMO, efforts have been made to implement models that attempt to reproduce the population dynamics of *D. gigas*. Within the SPRFMO Jumbo Flying Squid Working Group, preliminary assessment models have been presented (China: Xu et al 2018 - SC6-SQ06, Peru: Cordue et al. 2018 - SC6-SQ07, Chile), which necessitated the incorporation of biological data (e.g., size, maturity) throughout its distribution area. Subsequently, three models presented during SC 10 (SPRFMO SC10-Report 2022) were discussed. To date, three models are under discussion (Payá 2023 SC11-SQ07, Li et al. 2023 SC11-SQ08 and Roa-Ureta and Wiff 2023 SC11-Obs03). However, a limitation of these models is that they operate on the assumption of a single population with identical longevity, length at maturity, growth rate, and natural mortality across the extensive range of the jumbo flying squid's distribution.

The Assessment Simulation Task Team (ASTT) for the jumbo flying squid assessment with simulated data was proposed during SC11 and approved at COMM12 (COMM12-Doc06), with a reporting cycle for 2024 and 2025. The ASTT will assess the robustness of the proposed models to the various uncertainties inherent to the population structure of the jumbo flying squid. This will entail an investigation into the existence of at least three clearly differentiated morphotypes in the southeastern

Pacific, as proposed by Arkhipkin et al. (2021). Additionally, the ASTT will elucidate the uncertainties associated with the utilisation of potential assessment models and their implications for the management of the resource. This document sets forth the objectives of the group and its terms of reference for the activities of the group.

2. Terms of Reference

The objective of the ASTT is to test the robustness of the potential assessment models to the multiple uncertainties in the population structure, unique biological and life history characteristics of jumbo flying squid and the impact of the data availability in the performance of the assessment.

The Jumbo Flying Squid ASTT has the following Terms of Reference (TR):

1. Generate simulated data consistent with the requirements described in the next session.
2. Elaborate a protocol for the comparison of assessment models for the jumbo flying squid stock assessment in the Southeastern Pacific.
3. Apply this protocol for the comparison of candidate assessment models.
4. Produce a realistic simulation model of the population dynamics of the jumbo flying squid in the Southeastern Pacific for its future use as operative model in a management strategy evaluation (MSE) context.
5. Report the results to the Scientific Committee

3. Simulated data requirements

The simulated data should fulfil the following requirements:

Biology: to reproduce the different morphotypes of jumbo flying squid identified in the Southeastern Pacific (Nigmatullin et al. 2001), considering their differences in both growth and size at first maturity, and to mimic the semelparous biological trait and high natural mortality after spawning of the species.

Ecology: to consider ontogenetic migrations and spatial distributions of different phenotypes reported in the literature (e.g. Csirke et al. 2015, Hu et al. 2022), as well as the high degree of cannibalism observed in this species. To consider the effect of climate variability on key parameters related to the life history of this species (e.g., growth, natural mortality, among others).

Fisheries: to take into account the differences in selectivity among the various fleets operating on this species in the Southeastern Pacific, both at the size level (e.g., offshore vs. inshore fleets) and sex level (e.g., trawl vs. jigging).

Sampling: to consider different uncertainty scenarios associated with different levels of sampling effort (e.g., observer coverage, number of ports sampled).

Data reporting: to produce both aggregate statistics (i.e., catches, average sizes) and disaggregated data by size, fishing area, and fleet type, consistent with standardization of sampling effort among Members.

4. Simulation plan

4.1 Population structure

One population, common spawning ground with spatial structure.

H1.0: Just one morphotype (control)

H1.1: Three morphotypes (small, medium and large) are spatially defined (space is a good proxy of environment but constant)

H1.2: Three morphotypes (small, medium and large) are environmentally defined (more than one phenotype is possible to be observed in some areas).

Each morphotype has its own set of parameters (growth, mortality and reproduction).

4.2 Fisheries structure

H2.1 Two fisheries: Artisanal (Peru, Ecuador and Chile) and industrial (high seas)

H2.2 Four fisheries: Equatorial + Peru + Chile + High Seas

Each fishery has its own set of parameters (fishing mortality and gear selectivity).

- Time variability in fishing mortality for each fishery will be simulated consistently with historical trends.

4.3 Parameter Uncertainty

Parameter	Value	
	CONSTANT	SCENARIOS
	One value per ontogenetic stage (e.g. gnomonic model, definition of stages is important). Higher in the high seas (1 o.m.), lower in coastal areas. **Check: SC7-SQ07, SC6-SQ06.**	**Variability given by the environment (PCTI, Humboldt Current Index, use several). Smooth variation, not only on/off.** **Check: SC11-OBS04, SC11-SQ03**
Reproduction/ Recruitment	Peak in austral spring/summer, spawning all year (medium and large). Relative fecundity different by morphotype. Total fecundity is different by morphotypes. Maturity norm different by morphotype. SR: steepness by morpho Stock-Recruitment specific for cephalopods, do not use BH. Ricker to Shepherd. Check Ibañez et al. (2015)	Squid matures at smaller sizes during El Niño.
Growth	Schnute model One growth curve by morphotype	As with mortality
Gear Selectivity	By fleet High seas: different for Chinese (equatorial) **Asymptotic selectivity, by fleet.**	

All parameters will include process error, possibly with temporal autocorrelation.

4.4 Data collection and availability uncertainty

	H4.0 (perfect information) monthly	H4.2 (current)	H4.3 (near future)
Catch (total)	X (no error)	Monthly	Monthly
Catch (by fleet)	X (no error)	Monthly	Monthly
Catch-at-length (total)	X (no error)	-	-
Catch-at-length (by fleet)	X (no error)	Only for high seas, daily	All fleets
Average catch length (total)	X (no error)	-	-
Average catch length (by fleet)	X (no error)	Only for high seas, daily	All fleets
CPUE (by fleet)	X (no error)	Year	Year
Fishing Effort	X (no error)	-	Month, all fleets
All environmental indices used	X	X	X

5. Workplan

2023-2024: Report to SC 12 (2024)

First coordination meeting (10-Jun-2024)

Agenda for In-person ASTT workshop (25-27 September 2024, Lima-Perú)

- Adoption of terms of reference
- Discussion on implementation of Operating Models (TR 4)
    - Environmental effects
    - Uncertainty quantification
- Scenarios for the generation of simulated assessment data (TR 1)
    - Population and fisheries structure
    - Parameter uncertainty
    - Data collection and availability uncertainty
    - Environmental scenarios and climate change
- Protocol for the comparison of assessment models (TR 2)
- Draft of report for SC (TR 5)

2024-2025: Report to SC 13 (2025)

a. First coordination meeting (Early 2025)
b. Final simulated datasets (End of March 2025)
c. Second coordination meeting (Early April 2025)
d. Start of Simulated Assessment (April 2025)

Agenda for In-person ASTT meeting (Early July 2025)

- Presentation of assessment models
- Discussion on the results of the simulated assessment (TR3)
- Discussion on improvements to operating models (TR4)
- Draft of report for SC (TR5)

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Annex 10: Jumbo flying squid genetics and connectivity topics

At the previous SC meetings, different delegations presented advances and results regarding the population genetic analysis of the jumbo flying squid, with results based on mtDNA and SNPs analysis but with different methodologies, which complicated the interpretation of the available information on the genetic population of the species (SC6-SQ10 , SC6-SQ11, SC7-SQ10, SC7-SQ11, SC7-SQ13, SC9-SQ06, SC9-SQ07, SC10-SQ05, SC10-SQ09_rev1, SC10-SQ12, SC11-SQ02, SC11-SQ06, SC12-SQ04)

During SC12, the Genetic group of delegations from Peru, Chile, China and Ecuador held conversations and agreed to develop a population genomic study of the jumbo flying squid, considering a consensus in the sampling design up to the data analysis.

The Group of Population Genetics on jumbo flying squid aims to evaluate the population genomics of the three phenotype-size groups, small (S), medium (M) and large (L), along the distribution range of the jumbo flying squid in the SE Pacific, considering the length at maturity in Table 1.

The genetic group of Jumbo flying squid agreed by consensus on the following:

- Spatial and temporal criteria for the sampling design, collecting in the areas E and O indicated in figure 1, number of females in maturity stages III and IV per phenotype-size group per area (n=30), during 2024-2025.
- Peru will collect samples in the E1 (S+M) and E2 (S+M+L) areas. China will sample in O1 (S+M), O2 (S+M+L), O3 (M+L), and O4 (L) areas. Chile will collect samples in E3 (L) and E4 (L), and Ecuador E1 (S+M). Samples will be collected until December 2025.
- A template will be provided for filling the biological data of sample, including sex, mantle length, gonadal maturity stage, coordinates of catch or sampling site, date and location.
- Muscle tissues or DNA samples will be sent to only one DNA sequencing facility (e.g., Novogene) and sequenced for the lcWGS (low coverage of the Whole Genome Sequencing) technique, and results will be provided to all the genetic group of jumbo giant squid.
- Protocols for tissues sampling, characteristics for DNA sequencing, pipelines and genomic population analysis, will be worked in virtual meetings.

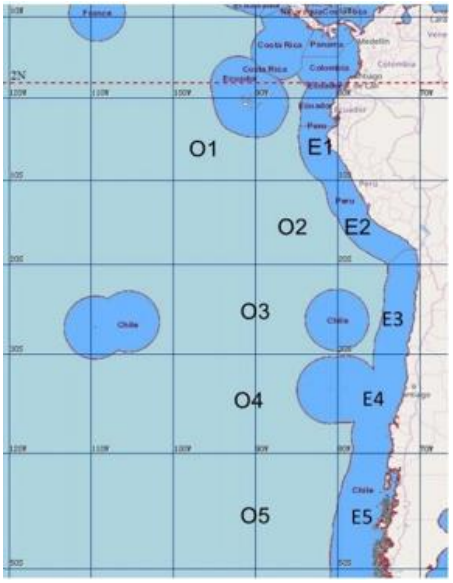

Figure 1. Areas for collecting samples along the Jumbo giant squid distribution (ref. Annex 9-SC06-Final Report)

Table 1. Summary table of the three groups or possible population subunits of *Dosidicus gigas* distinguishable by their length at maturity (after Nigmatullin et al. 2001) observed of the Peruvian coast (Obtained from Csirke et al. 2018)

Grupos según talla de madurez sexual ~ Groups by size at sexual maturity	Rango de longitud de manto al estado adulto (mm) ~ Range of mantle length at adult stage (mm)		Rango de distribución latitudinal ~ Latitudinal distribution range	Años de mayor incidencia observada en aguas peruanas ~ Years of higher incidence observed in Peruvian waters
	Machos ~ Males	Hembras ~ Females		
Talla pequeña ~ Small size	130 a 260	140 a 340	Cerca de la zona ecuatorial (latitudes bajas) ~ Close to the Equatorial zone (low latitudes)	1979-1983 & 1989-1999
Talla media ~ Medium size	240 a 420	280 a 600	Casi todo el rango de la especie excepto las latitudes altas ~ Almost the whole distribution range, except for the high latitudes	1979-1983, 1989-1999, 2002 & 2013
Talla grande ~ Large size	400 a 500+	550 a 1000+	Al norte de los 10°N, al sur de los 10°S y aguas frías a lo largo de la costa norte-centro del Perú ~ To the north of 10°N, to the south of 10°S and cold waters along the northern and central parts of the Peruvian coast	1958-1962, 1990 & 2000-2017

Reference

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Annex 11: Terms of Reference for the Ecosystems Working Group

INTRODUCTION

Following decisions of the SPRFMO Commission at the 6th meeting in January 2018, a workshop was organized with the objective of defining the terms of reference for a working group on "Habitat definition and monitoring". After that, the Habitat Monitoring Working Group was created and operated until 2024. Considering the additional tasks this WG was assigned, in consideration of Decision 13-2023 related to Climate Change, the terms of reference of the WG were updated during SC12 and an agreement to rename the group to Ecosystems Working Group was considered appropriate given the new terms of reference described in this document.

Main objective of the Working Group

The main objective of the Ecosystem Working Group is to plan and evaluate research to inform fisheries management in an ecosystem context, from the habitat analysis to ecosystem models, focusing in biological and ecological interactions.

Focus on pelagic species

1. Identify, prioritise, and provide environmental and ecosystem indicators associated to the habitat of the main commercial resources in the SPRFMO area to complement assessment and scientific advice for fisheries management.
2. Determination of habitat and habitat use of the main species in the South Pacific Ocean and the SPRFMO area.
3. Retrospective-continuous studies for: historical fisheries and research cruises data; acoustic monitoring of fishing companies; satellite data; historical meteorological data from coastal stations, etc.
4. Prepare inventories of technologies currently available on each fishing vessel, including the information on the presence of VMS or AIS on board, on-board observers, existence of biometry data by fishing haul etc.
5. Determine and characterise the environmental variables and oceanographic mechanisms or processes associated with the spatial-temporal distribution of resources (area evolution, location and volume over time, distribution, fishing effort efficiency, abundance, availability, etc.).
6. Review protocols of data collection, processing and analysis used within the working group's main objective (i.e. data, acoustics, data quality, opportunity platforms, fishing boats, etc.).
7. Review, identify, develop and validate appropriate predictions model for the working group's objectives; to conduct modelling studies to understand changes in species distribution in response to ecosystem variability, with a focus on climate change scenarios in the South Pacific.
8. Review and promote the development of research projects in the topic of habitat monitoring and ecosystem research, to recommend specific lines of research in the SPRFMO framework.
9. Foster synergies with the other WG to identify how climate variability affects the current advice provided by the Scientific Committee and propose a framework to address these limitations.
10. To promote dissemination through publications and protocols.

Annex 12: Checklist for the NZ exploratory fisheries proposal

Scientific Committee Considerations Fisheries Operation Plans

8. The Scientific Committee shall provide recommendations and advice to the Commission on each Fisheries Operation Plan on the following matters, as appropriate:

Fisheries Operation Plan Considerations	Rationale	Assessment
a) management strategies or plans for fishery resources; [**Note** that SC has previously interpreted this as to mean as having a clear objective for the fishery]	The overall aim of these proposals is to assess the viability of sustainable fisheries for toothfish within the proposed exploratory fishery areas. Key objectives are identified on page 8 of the proposal (SC12-DW01)	Yes
b) reference points, including precautionary reference points as described in Annex II of the 1995 Agreement;	Proposed new areas are unexplored with no recorded history of fishing within the last 10 years. Catches from this SPRFMO research will be included in the current CCAMLR stock assessment as has been the case for the previous project further east.	Partial
c) an appropriate precautionary catch limit;	See section 4.1.6 of SC12-DW01	Yes
d) the cumulative impacts of all fishing activity in the area of the exploratory fishery;	The proposal has been prepared to comply with all requirements of Articles 2 and 22, CMM- 13-2024 (exploratory fisheries), CMM03-2023 (bottom fisheries), and the BFIAS. The proposal incorporates the cluster design, used in the previous programme to distribute research effort which incorporates a maximum hook limit per cluster thus minimising any cumulative effects on one area.	Yes
e) the impact of the proposed fishing on the marine ecosystem;	See sections 4.3 to 4.5 of SC12-DW01	Yes

f) the sufficiency of information available to inform the level of precaution required and the degree of certainty with which the Scientific Committee's advice is provided;	Annex 1 of SC12-DW01 contains a detailed risk assessment 9updated from the previously approved programme) in accordance with FAO's Guidelines for the Management of Deep-sea Fisheries, considering the SPRFMO Bottom Fishery Impact Assessment Standard, BFIAS. Annexes 2-5 detail proposed mitigation measures for seabirds, non-target fish and Chondrichthyes, VME, and Marine Mammals and turtles.	Yes
g) the degree to which the approach outlined in the Fisheries Operation Plan is likely to ensure the exploratory fishery is developed consistently with its nature as an exploratory fishery, and consistently with the objectives of Article 2 of the Convention[1]; and	This proposal is an extension of previous agreed research, to be carried out in a stepwise manner and which is based on precautionary catch limits, mitigation measures, and measures to limit local depletion and spread research effort.	Yes
h) in respect of a Fisheries Operation Plan that proposes any bottom fishing activity, advice and recommendations in accordance with paragraph 20 (b) of CMM 03-2020 (Bottom Fishing)[2].	Fully covered in the proposal section 4.7 and in Annex 1	Yes

Data Collection Plans

9. *When considering a Fisheries Operation Plan […] the Scientific Committee shall develop a Data Collection Plan in respect of that exploratory fishery which should include research requirements, as appropriate. The Data Collection Plan shall identify and describe the data needed and any operational research actions necessary to obtain data from the exploratory fishery to enable an assessment of the stock, the feasibility of establishing a fishery and the impact of fishing activity on non-target, associated or dependent species and the marine ecosystem in which the fishery occurs. The Scientific Committee shall review and update the Data Collection Plan for each exploratory fishery annually as appropriate.*

[1] The objective of this Convention is, through the application of the precautionary approach and an ecosystem approach to fisheries management, to ensure the long-term conservation and sustainable use of fishery resources and, in so doing, to safeguard the marine ecosystems in which these resources occur.

[2] The Scientific Committee shall undertake a review of the proposed assessment and provide advice to the Commission on:

i. whether the proposed bottom fishing would contribute to having significant adverse impacts on deep sea fish stocks for which no stock assessment has been completed, bycatch species and/or VMEs and, if so,

ii. whether any proposed or additional mitigation measures would prevent such impacts.

10. The Data Collection Plan shall require, as appropriate:

Data Collection Plan considerations	Rationale	Assessment
a) a description of the catch, effort and related biological, ecological and environmental data required to undertake the evaluations described in paragraph 24;	A full fisheries operation plan is presented in Section 5 of the proposal (SC12-DW01). This plan incorporates and builds on previous research in the more easterly exploratory fishery from 2016 onwards.	Yes
b) the dates by which the data must be provided to the Commission;	Covered in the proposal section 5.3. The timing of data submission will be conditional on the timing of fishing operations. Following CM 02-2022, data from Jan – Dec will be provided no later than 30 September the following year. As required by CMM 02-2022, annual interim reports will be submitted to the SPRFMO SC. As this proposal covers the three calendar years 2025 – 2027, it is anticipated that reports will be submitted in 2026 and 2027 with a final, more detailed report submitted in 2028.	Yes
c) a plan for directing fishing effort in an exploratory fishery to allow for the acquisition of relevant data to evaluate the fishery potential and the ecological relationships among harvested, non-target and associated and dependent populations and the likelihood of adverse impact;	A full fisheries operation plan is presented in section 4 of the proposal.	Yes
d) where appropriate, a plan for the acquisition of any other research data obtained by fishing vessels, including activities that may require the cooperative activities of scientific observers and the vessel, as may be required by the Scientific Committee to evaluate the fishery potential and the ecological relationships among harvested, non-target, associated and dependent populations and the likelihood of adverse impacts; and	Covered under section 5 and subsections 5.2.1 to 5.2.5 of the proposal.	Yes

e) an evaluation of the time scales involved in determining the responses of harvested, dependent and related populations to fishing activities *[*Note that SC has previously interpreted this as to mean "when will data be analysed and available"*]*	Covered under section 5 and specifically subsections 5.3 and 5.5 of the proposal.	Yes

Annex 13: Checklist for the Korean exploratory fisheries proposal

Fisheries Operation Plan checklist

Fisheries Operation Plan Considerations	Rationale	Assessment
a) management strategies or plans for fishery resources; [**Note** that SC has previously interpreted this as to mean as having a clear objective for the fishery]	The objectives are outlined in sections 6 and 7 of the proposal.	Yes
b) reference points, including precautionary reference points as described in Annex II of the 1995 Agreement;	No reference points have been defined for toothfish stock in this fishing region. Therefore, we propose to apply a stepwise research design and implementation approach for exploratory toothfish fisheries.	Partial
c) an appropriate precautionary catch limit;	See section 2.1 of the proposal	Yes
d) the cumulative impacts of all fishing activity in the area of the exploratory fishery;	The Scientific Committee has agreed to develop a tiered assessment framework (Nicol et al. 2017, paper SC-05-DW-04) and information gathered during the proposed exploratory fishing should help to inform that initiative.	Yes
e) the impact of the proposed fishing on the marine ecosystem;	See section 2.9 of the proposal	Yes
f) the sufficiency of information available to inform the level of precaution required and the degree of certainty with which the Scientific Committee's advice is provided;	Data Collection Plan and Fisheries Operation Plan explain the processes and information that will be gathered during the exploratory fishing. These plans include biological data of target and bycatch species, tagging which contribute to the scientific understanding necessary to make precautionary decisions.	Yes
g) the degree to which the approach outlined in the Fisheries Operation Plan is likely to ensure the exploratory fishery is developed consistently with its nature as an exploratory fishery, and consistently with the objectives of Article 2 of the Convention[3]; and	The precautionary limits, spatial separations of lines, and mitigations put in place should ensure this from the onset. The data collection will continue to inform precautionary development throughout the 3 years of the proposal (2025-27) and beyond.	Yes

[3] The objective of this Convention is, through the application of the precautionary approach and an ecosystem approach to fisheries management, to ensure the long-term conservation and sustainable use of fishery resources and, in so doing, to safeguard the marine ecosystems in which these resources occur.

h) in respect of a Fisheries Operation Plan that proposes any bottom fishing activity, advice and recommendations in accordance with paragraph 20 (b) of CMM 03-2020 (Bottom Fishing)[4].	See section 2.5 of the proposal	Yes

5.1 Data Collection Plan checklist

Data Collection Plan considerations	Rationale	Assessment
a) a description of the catch, effort and related biological, ecological and environmental data required to undertake the evaluations described in paragraph 24;	A full fisheries operation plan is presented in section 2, 4 and 7 of the proposal.	Yes
b) the dates by which the data must be provided to the Commission;	See section 4.2 of the proposal	Yes
c) a plan for directing fishing effort in an exploratory fishery to allow for the acquisition of relevant data to evaluate the fishery potential and the ecological relationships among harvested, non-target and associated and dependent populations and the likelihood of adverse impact;	A full fisheries operation plan is presented in section 2, 4 and 7 of the proposal.	Yes
d) where appropriate, a plan for the acquisition of any other research data obtained by fishing vessels, including activities that may require the cooperative activities of scientific observers and the vessel, as may be required by the Scientific Committee to evaluate the fishery potential and the ecological relationships among harvested, non-target, associated and dependent populations and the likelihood of adverse impacts; and	A data collection plan is included in section 4 of the proposal.	Yes
e) an evaluation of the time scales involved in determining the responses of harvested, dependent and related populations to fishing activities *[*Note that SC has previously interpreted this as to mean "when will data be analysed and available"*]*	See section 4.2 of the proposal	Yes

[4] The Scientific Committee shall undertake a review of the proposed assessment and provide advice to the Commission on:

iii. whether the proposed bottom fishing would contribute to having significant adverse impacts on deep sea fish stocks for which no stock assessment has been completed, bycatch species and/or VMEs and, if so,

iv. whether any proposed or additional mitigation measures would prevent such impacts.

Annex 14: Terms of Reference for the Data Working Group

Data Working Group status and Terms of Reference (ToR)

Secretariat

1. Introduction

The concept of a Data Working Group (DWG) within the South Pacific Regional Fisheries Management Organisation (SPRFMO) has evolved in response to the growing need for more structured and effective data management to support the organization's conservation and management objectives. Discussions regarding the formation of such a group began during the 10th Meeting of the Scientific Committee (SC10), where members identified significant data limitations including the need for standardization of data collection and reporting protocols, improving the quality and usability of data assets, and advancing electronic reporting capabilities and the necessity for improved data processes. This initiative was formalised in the 2023 Multi-Annual Workplan of the Scientific Committee (SC), which included a directive to create Terms of Reference (ToR – see Annex 1) for the DWG and prioritise the data needs of SPRFMO Members.

An inception meeting for the now established Data Working Group was held on 13 April 2023, drawing participation from 38 experts and representatives. This meeting laid the groundwork for the group's objectives, structure, and scope of work. However, there were initial challenges in defining the exact subsidiary body under which the DWG should operate, with varying opinions on whether it should fall under the SC or the Compliance and Technical Committee (CTC). Despite these discussions, there was a general agreement that the DWG would be most effective under the purview of the SC, though this arrangement may be revisited if necessary.

The DWG is still in its early stages, with ongoing efforts to refine its ToR and operational framework. The SC is encouraged to continue supporting this initiative, recognizing its potential to significantly enhance the data management capabilities of SPRFMO and its Members. Adjustments to the group's structure, mandate, or operations will be made as necessary to ensure alignment with SPRFMO's evolving needs and priorities. Draft terms of Reference were presented in SC11-Doc12 Data Management Update paper, and have been included into this document as Annex 1. The group currently lacks a chairperson and the 2023 list of interested representatives may benefit from additional nominations.

This paper invites the SC to:

- ***Nominate a chairperson*** *for the Data Working Group (DWG)*
- ***Provide feedback*** *on the potential areas of work to guide the Data Management workplan within the Secretariat.*
- ***Adopt the proposed Terms of Reference*** *for the DWG, with any necessary modifications based on feedback during the 12the meeting of the Scientific Committee.*
- ***Encourage Members and CNCPs*** *to ensure that the appropriate experts are made available to participate in the DWG*

2. Potential areas of work for the Data Working Group:

1. Provide input to the development of SPRFMO's improved data management infrastructure, including databases, data repositories, and data processing tools.
    - This could include a new portal to provide both public and private interfaces for managing uploads of submissions, edits to data, and reports extracting/summarising while being cognizant of Members and CNCPs data confidentiality rules.
    - Annex 2 provides a short review of the data platform under the new database services provider. It details the migration of data to the new platform, added geospatial functionality, and new data reports and reporting options. Annex 2 also provides several suggestions for Members to consider in order to enable the continued development of this platform.
2. Provide input/oversight into data related projects (e.g. development of a Transhipment notification/declarations system, integration of FAO GIES for port inspections, automation of FAO FIRMS reporting etc)
3. Provide input/support for the development and implementation of the Electronic Monitoring Reporting initiative.
4. Assess data quality for SPRFMO data (providing an understanding of completeness, consistency, accessibility and reliability etc).
5. Ensuring that data reports and analytical outputs are accurate, timely, and presented in a manner that support effective decision making by the Commission and its subsidiary bodies.
6. Organise capacity building workshops for data preparation, processing, and submissions (e.g., use of R/Python)
7. Review appropriateness of current data submissions e.g. are all required data submissions still relevant, are all desired data fields included, are data fields being consistently reported, are the reporting frequencies resulting in duplication of effort and data, etc

3. Organisation of work

The Data Working Group (DWG) will report to both the Scientific Committee (SC) and the Compliance and Technical Committee (CTC), ensuring its work supports both scientific assessments and regulatory compliance. Reporting to the SC allows the DWG to enhance data quality for stock assessments and ecosystem research; while reporting to the CTC ensures data management aligns with compliance and enforcement measures. This dual structure integrates scientific integrity with regulatory functions, fostering a comprehensive approach to data management across SPRFMO.

To effectively support its dual reporting function, the DWG could hold four key meetings annually. An intersessional meeting scheduled before the Scientific Committee (SC) meeting, allowing the group to identify and prepare key data management items for presentation. A second meeting during the SC would enable real-time discussions and adjustments. Similarly, an intersessional meeting held before the Compliance and Technical Committee (CTC) meeting, followed by a meeting during the CTC. These intersessional meetings will be scheduled early enough to ensure thorough preparation and alignment with the annual meetings' agendas, enhancing coordination and responsiveness to SPRFMO's data needs.

4. Conclusion

The establishment of the Data Working Group represents a critical step in strengthening SPRFMO's data management capabilities, ensuring that the organization is equipped to meet its conservation and management objectives.

By providing expert oversight and fostering collaboration, the DWG will play a pivotal role in enhancing the quality and utility of data that underpins decision-making within SPRFMO.

Annex 1. Terms of Reference

1. The scope of the DWG's work will encompass all aspects of data management within SPRFMO, with a focus on the work of the Compliance and Technical Committee (CTC) and Scientific Committee (SC), to support other subsidiaries as appropriate, and to respond to specific requests from the Commission.
2. The DWG aims to guide, through collective development of data protocols and processes, the collection, transmission and delivery of reliable, higher quality , timely and consistent data readily available to the SC and CTC and other subsidiary bodies.
3. The group will be led by a chairperson, who will be responsible for setting agendas, facilitating discussions, and reporting to the SC, CTC and the Commission. Administrative support will be provided by the Secretariat, which will handle meeting logistics, document distribution, and record-keeping.
4. The DWG will be composed of experts from various domains relevant to fisheries data management, including (but not limited to):
    a. SPRFMO Secretariat representatives responsible for coordinating data management activities
    b. Representatives from SPRFMO Member States, CNCPs and other relevant organisations with experience in fisheries data management and/or a stake in SPRFMO's data management processes
    c. Fisheries Scientists and Statisticians with experience in stock management and ecological modelling
    d. IT Specialists with experience in developing and managing large-scale data systems.
5. All data made available to participants of this group, by the Secretariat, shall be treated as confidential in accordance with the rules outline in paragraph 6 of CMM 02-2022.
6. The Working Group will:
    a. Advise the Commission and its subsidiary bodies on data collection, submission, and management needs to support the work of the SPRFMO Commission.
    b. Assess the appropriateness of data collected by the Commission and its subsidiary bodies to support SPRFMO scientific and management objectives and to improve the quality and usability of SPRFMO data assets.
    Specific examples may include:
        i. Develop and evaluate data standardisation protocols and data submission templates
        ii. Identify reporting needs/desires with a focus towards advancing electronic reporting capabilities
7. The WG shall report annually to the CTC and SC (and the Commission) on the group's activities over the previous year as well as current data-related challenges and opportunities. The group may also hold ad hoc meetings to address urgent issues or to respond to specific requests from the SC,CTC or the Commission.

Annex 2. Review of data platform

The initial database provider (FINNZ) had its contract come to an end due to the service no longer meeting the evolving needs and the system's inherent limitations. Given the constrained timeframe to develop an alternative portal, Dragonfly was contracted to swiftly replicate the existing FINZ system, acknowledging its known limitations, to ensure continuity of service. A more advanced and improved data platform was planned for subsequent development.

Between 2023 and 2024, Dragonfly Data Science successfully completed the creation of a new data platform, effectively replacing all systems previously managed by FINZ. Key components of this new platform include:

- A replication of the previous system and [SPRFMO website] (https://sprfmo.org) to allow for continuity of service. This provides functionality for managing vessel registration that supports the uploading and storage of various data file types.
- A robust research database build process that consistently loads, validates, and generates reports on diverse datasets, including files submitted by members.
- A reporting system that facilitates reproducible and fully automated reporting via the [Gâteaux platform] (https://gateaux.sprfmo.org). Initial reports cover topics such as Jack Mackerel (SC12-JM03), Squid (SC12-SQ03), and observed captures of species of concern (SC12-Doc10).
- Direct storage of geospatial objects within the reporting database using the PostGIS database, enabling seamless access for reporting tools like QGIS.

The systems provided are all operational now, with support provided by the team at Dragonfly Data Science. Work is continuing to refine the data processing and reporting.

Additionally, VMS vessel track data is now available via API access to the CLS database. These data are now available for subsequent analysis.

Suggestions for the development of improved data and reporting platform.

1. Redevelopment of an enhanced data platform and portal to address current system limitations and to elevate the capabilities of our data management infrastructure. This initiative will not only streamline the integration, validation, and reporting of diverse datasets submitted by members but also ensure a more robust, user-friendly interface for stakeholders through advanced features such as automated reporting, dynamic geospatial data visualization, and improved data storage solutions.

2. Public facing data visualisation of key data (activity, catch, observer) on the https://sprfrmo.org website. This visualisation would develop common presentation formats of data to improve overall communication between members and with other stakeholders and the public. The visual assets would be made available to download and cite for all fishery managers and researchers. An example is the PSC site developed by Dragonfly for displaying protected species captures information in New Zealand's EEZ: https://protectedspeciescaptures.nz/PSCv7/released/.

3. Continuing automation of all standard reporting for the SC, CTC and the Commission. Some of these reports have been completed. These automated reports will free up time for the data management team at SPRFMO to focus on the further improvements.

4. Creation of public and member tools for accessing key summary data of annual catch, fishing activity, observer data, and vessel information. These tools can provide prepared data in open formats (CSV) for use by researchers.

5. A detailed reconciliation report on the final reporting database to provide assurance that all data provided has been incorporated. This would include detailed tables of any grooming or linking completed in the automated processing, along with reconciliation tests to ensure that data quality is maintained. This reporting would be used internally at SPRFMO for data management but would be available to members.
6. Transhipment records are currently stored but not processed into a validated reporting database. Historical transhipment data can be processed to provide a starting point for further transhipment data management, including incorporation into future data capture methods (APIs, mobile applications).
7. The VMS data provides an opportunity to support the compliance monitoring with linked data reports from activity, transhipment and vessel data. This enhanced reporting would augment the existing Themis system provided by CLS.

Annex 15: Climate Change task team Terms of reference and Workplan

SUMMARY

In 2023, the Scientific Committee (SC) was required to address climate change at all annual meetings, focusing on data and analyses that illustrate its potential impacts. The SC will also recommend adaptations or new conservation and management measures (CMMs) for climate resilience in the Convention Area. This document outlines the objectives and terms of reference for the Task Team (TT) assigned to this organise this effort. The main objectives of the TT include identifying limitations in current advice for adaptation and resilience to climate change impacts, proposing solutions and developing a research plan.

Introduction

In 2023, the Scientific Committee has been mandated to include climate change as an agenda item at all its annual meetings. Under this agenda item, the SC will highlight analyses and data collection programmes that best illustrate the potential impacts of climate change. The SC has also been asked to make recommendations to the Commission on how to design existing conservation and management measures (CMMs) or propose new CMMs for adaptation and resilience to climate change impacts in the Convention Area. This document sets forth the objectives of the task team and its terms of reference for the activities to come.

Terms of Reference

The objective of the TT is to identify ways in which climate change limits the confidence or relevance of advice SC currently provides to the Commission; propose work to address those limitations and draft a research plan to implement such work within the framework of the SC.

The TT has the following Terms of Reference (TR):

1. Review current SPRFMO's CMMs and identify limitations for adaptation to climate change impacts and resilience in the Convention area.
2. Propose guidelines to address the identified limitations.
3. Propose climate change related tasks for the multiannual workplan 2025.

Workplan

First general meeting (TBD)

Planning of coordination web meetings with other fisheries or international organisations developing Climate Change plans, e.g.,

MoU with SPRFMO

- Western and Central Pacific Fisheries Commission (WCPFC)
- North Pacific Fisheries Commission (NPFC)
- Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)
- Comisión Permanente del Pacífico Sur (CPPS)
- Inter-American Tropical Tuna Commission (IATTC)

Other organisations

- General Fisheries Commission for the Mediterranean (GFCM)
- Northwest Atlantic Fisheries Organization (NAFO)
- South-East Atlantic Fisheries Organisation (SEAFO)
- International Commission for the Conservation of Atlantic Tunas (ICCAT)
- Red de Investigación de Estresores Marinos – Costeros en Latinoamérica y el Caribe (REMARCO)
- Global Ocean Acidification Observing Network (GOA-ON)
- International Atomic Energy Agency (IAEA)
- IOC-UNESCO
- UN DOALOS on the Regular Process of the World Ocean Assessments
- Food and Agriculture Organization of the United Nations (FAO)
- Fisheries and Marine Ecosystem Model Intercomparison Project (FishMIP)
- World Meteorological Organization.
- UNFCCC UN Framework Convention on Climate Change
- North-East Atlantic Fisheries Commission

Second general meeting (~ May 2025)

Terms of reference and agenda for pre-SC workshop (no later than 26 May 2025)

Pre-SC workshop (2 days, September 2025)

Report to SC13 (Late document including SC workshop discussions)

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Annex 16: Salas y Gomez and Nazca task team Terms of Reference and Workplan

SUMMARY

At its 2024 annual meeting, the Commission adopted Decision 17-2024 that tasked the Scientific Committee (SC) to include Salas y Gómez and Nazca Ridges as an agenda item for its meeting in 2024 and annually thereafter. Within this agenda item, the SC — taking into consideration its priorities and available resources during its first year — will compile and review all relevant scientific information and data about the area and recommend possible measures to the Commission at its following regular meeting , based on an ecosystem-based approach that aims at preserving its biodiversity and SPRFMO fishing resources as well as a sustainable use of marine resources.

For the consideration of the SC 12 Chile presented the SC12 Doc 36: Salas y Gómez and Nazca ridges: the need for protection, with a minimum impact on fisheries, which "recommends that the area located in ABNJ of the Salas y Gómez and Nazca EBSA should be permanently closed to fishing activities regulated by the SPRFMO as soon as possible", This recommendation was not agreed by the Scientific Committee.

Peru presented the SC12 - Doc 37 Nazca Ridge Report: Geology, Chemistry and Biophysical Coupling components, which states that the Easter-Salas y Gomez Seamount Chain (ESC) and Nazca Ridge are separate units or systems with important differences in their history, geology, oceanography, hydrodynamic features, structure and function; in that sense, the degree of dependence on matter and energy between the surface and the seabed (benthic-pelagic coupling) could be different between both systems. Finally, it recommends greater scientific research effort in order to achieve a better understanding of key processes, such as, the carbon export in relation to the pelagic fishery.

Finally, the creation of a Task Team for SGN was proposed and supported by some CNCPs. In this regard, the Salas y Gomez and Nazca Ridges Task Team will produce a report for presentation to SC13 in 2025 that

1) complements the information presented to the SC12 that reviews and summarizes relevant scientific information relating to the Salas y Gomez and Nazca Ridges (here after called "area").

2) includes the characterisation geological, oceanographic, biogeochemical (including carbon exportation), biodiversity, ecology, cultural, connectivity, bentho-pelagic coupling and conservation information of the area.

3) includes the current status of SPRFMO's benthic and pelagic resources fished within the area, as well as possible threats to those resources;

4) assesses the current level of fishing effort by gear including 2024 fishing activities and its possible impacts within the area;

5) considers the current possible level of impact of the other threats identified previously in the SC12-Doc 36;

6) Present to the SC possibles measures based on the ecosystem approach that aims at preserving the biodiversity in the Salas y Gomez and Nazca Ridges and SPRFMO fishing resources, as well as sustainable marine resources and provide possible actions for the SC to consider; and

7) propose a monitoring and evaluation scheme for future work.

1. Introduction

At its 2024 annual meeting, the Commission adopted Decision 17-2024 that tasked the Scientific Committee (SC) to include Salas y Gomez and Nazca Ridges as an agenda item for its meeting in 2024 and annually thereafter. [5] Within this agenda item, the SC — taking into consideration its priorities and available resources during its first year — will compile and review all relevant scientific information and data about the area and recommend possible measures to the Commission at its following regular meeting, based on an ecosystem-based approach that aims at preserving its biodiversity and SPRFMO fishing resources as well as a sustainable use of marine resources.

In addition, the 2025 multiannual work plan of the SC considers the Salas y Gomez and Nazca Ridges as a cross-cutting task, defining the following subtasks; 1) research cruises aimed to know the biooceanographic and meteorologic characteristics of Salas y Gomez ridge; as well as biodiversity, current circulation, morphology and geology of sea bottom for 2023 – 2024; 2) Climate change impacts of fisheries in Salas y Gomez and Nazca Ridges for 2024 and, 3) expedition to Salas y Gomez and Nazca aboard oceanographic research vessel for 2024-2025.
In line with that tasking and to support the effective and efficient preparation of scientific advice for the Commission, the SC agrees to create a Salas y Gómez and Nazca Ridges Task Team with these terms of reference.

2. Terms of Reference

a. Objective

The objective of the Task Team, in line with Decision 17-2024, shall be to review relevant scientific information and data about the area (including the papers in References), as well as other relevant information provided by members and observers, and to provide advice to the SC possible measures based on the ecosystem approach that aims at preserving the biodiversity in the Salas y Gomez and Nazca Ridges and SPRFMO fishing resources, as well as sustainable marine resources
All activities carried out by the Task Team will refer to the Area of Application of the Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean, as specified in its Article 5.

b. Structure

The Task Team is open to all interested Members, CNCPs and observers who may nominate one or more suitably qualified representatives to the Secretariat before 15 November 2024.

Ideally, all meetings should allow the virtual participation so as not to unfairly discriminate against small delegations with limited ability to travel. In addition, the meeting calendar of this Task team shall consider the overlap with other RFMOs meeting dates to avoid clashes with SIOFA and WCPFC meetings , or any other relevant RFMOs.

c. Responsibilities

- 1) complements the information presented to the SC12 that reviews and summarizes relevant scientific information relating to the Salas y Gomez and Nazca Ridges (here after called “area”).

- 2) includes the characterisation geological, oceanographic, biogeochemical (including carbon exportation), biodiversity, ecology, cultural, connectivity, bentho-pelagic coupling and conservation information of the area.
- 3) includes the current status of SPRFMO's benthic and pelagic resources fished within the area, as well as possible threats to those resources;
- 4) assesses the current level of fishing effort by gear including 2024 fishing activities and its possible impacts within the area;
- 5) considers the current possible level of impact of the other threats identified previously in the SC12- Doc 36;
- 6) Present to the SC possibles measures based on the ecosystem approach that aims at preserving the biodiversity in the Salas y Gomez and Nazca Ridges and SPRFMO fishing resources, as well as sustainable marine resources and provide possible actions for the SC to consider; and
- 7) propose a monitoring and evaluation scheme for future work.
- Produce a report for presentation to SC13 in 2025.
- Propose a monitoring and evaluation scheme for any actions listed.
- Submits a report to the Secretariat and the SC Chair to be discussed in the 2025 SC meeting.
- Creates an open repository of the documentation reviewed for the SC members.

3. Workplan

The activities of the Task Team will require several meetings, but endeavours to virtually meet at least twice a year and if cost effective, also include an in-person workshop before the following 2025 SC meeting.

Activity	Date	Objective
Virtual meeting	November 2024 (last week)	Agreed the procedural aspect of the work of the Task Team and agreed the matters and topics for the workshop.
In person workshop*	TBC at the first task team meeting	Address the relevant scientific information relating to the Salas y Gomez and Nazca Ridges.
Virtual meeting	August 2025	Work on the results and recommendations.
In person meeting	Sept/Oct. 2025 (in the margins of SC-13)	Agreed the final document including the recommendations.

* Chile and the Center for Ecology and Sustainable Management of Oceanic Islands (ESMOI) are available to organize the in-person workshop and finance all arrangements including the participation of one representative from each Member. To maximise participation and reduce travel and SPRFMOs carbon footprint it is preferable for this meeting be held just prior to, or after to SPRFMO COMM13. The dates will be confirmed at the first task team meeting.

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Annex 17: Guidelines for the work and structure of the SC

Suggested Framework for the Scientific Committee and its Working Groups and Task Teams

SC Chairpersons

1. Introduction

This document follows from SC10-Doc11 and provides an update of the information contained in said document. The purpose of this document is to:

a. provide a clear picture of the current SC working groups and task teams
b. propose a standardised framework for the various working groups and task teams

This document was prepared by the SPRFMO Secretariat and considered similar frameworks in other international organisations.

The SC is asked to:

- note this document, and
- based on the information herein provided, adopt a working structure and standards that support the work of the SC and aligns with the SPRFMO Rules of Procedure.

2. Background on Current SC Working Groups

At its first annual meeting in La Jolla, USA, in 2013, the SPRFMO Scientific Committee agreed on the creation of two Working Groups (WGs): the Jack Mackerel Working Group and the Deepwater Working Group. These WGs followed on from the former Jack Mackerel and Deepwater sub-groups that previously operated under the Science Working Group framework prior to the entry into force of the SPRFMO Convention. The SC also agreed that:

- WGs should have a chairperson (appointed by the SC), and that
- WGs should meet annually.

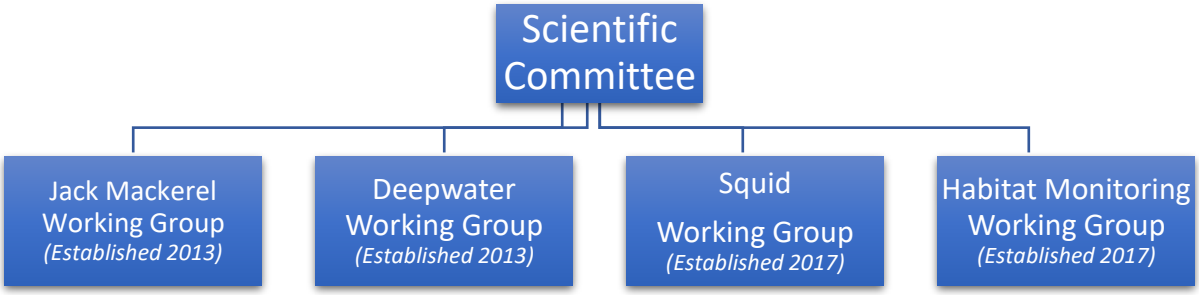
Although earlier workshops had been held, the first designated Scientific Committee workshop (SCW1) was held in 2015 just prior to the 2015 Annual SC meeting in Port Vila, Vanuatu. Subsequently the Scientific Committee workshop has held 16 such workshops either in-person, virtually or in-hybrid mode. These workshops are often, but not always, convened in association with the SC meeting.

At its fourth annual meeting (2016), the SC created a squid subgroup and appointed a chairperson. By the fifth SC annual meeting, and following the first squid workshop, the subgroup went on to be known as the Squid Working Group.

At its fifth annual meeting (2017), a proposal to create a task team on ecosystem and habitat monitoring was put forward. SC5 decided that creating a WG on the wide theme of “ecosystem monitoring” was appropriate and recommended evaluating the possibility of constituting a dedicated group and at its sixth annual meeting (2018), the SC recommended the creation of a WG now referred to as Habitat Monitoring Working Group. Two delegates were selected to share the co-chairing of this WG. The

Habitat Monitoring Working Group was the first SC WG to have set Terms of Reference[6] that were agreed by the SC.

Currently, the SC has four standing Working Groups, which provide input related to their specific thematic area which is forward to the SC Committee for further consideration.



Different intersessional task teams, ad-hoc working groups, expert groups, and subgroups have been created throughout the history of the SC, as necessary.

3. Current and historic SC Working Structure

The following table indicates what the different groups have been formed under the Scientific Committee (active groups are marked Green):

Subject	Designation	Lead	Years of operation
Deepwater*	Working Group	Chairperson Rodolfo Serra (2013,14) Mauricio Galvez (2016) John Syslo (2021+)	2013+
Jack Mackerel*	Working Group	Chairperson Jim Ianelli (2013-18) Martin Pastoors (2019-22?) Niels Hintzen (2022-24)	2013+
Jack mackerel age and growth	Task Team	Chairperson Rodolfo Serra (2013) Francisco Cerna (2014)	2013-2016
Fisheries dependent acoustic data	Task Group	Coordinator[7] Francois Gerlotto (2014-17)	2014-2017
Squid	Working Group	Co-chairpersons: Ignacio Paya (2023) Gang Li (2016+)	2016+
Observer programme	Ad-hoc WG		2016
Habitat Monitoring	Task Team	Co-chairpersons E. Yañez (2017) F. Gerlotto (2017)	2017

[6] Both the Jack mackerel and Deepwater Sub-Groups had interim terms of reference agreed during the 5th SWG meeting.
[7] Initially appointed as a chairperson, title changed in later SC reports.

Habitat Monitoring*	Working Group	Co-chairpersons[8] Mariano Gutiérrez (2018+) Aquiles Sepúlveda (2018+)	2018+
Revision of the BFIAS	Small intersessional WG	Australia/New Zealand	2019
Management Strategy Evaluation	Task group	Coordinator Niels Hintzen (2019, 2020)	2019,20
Develop work plan	Small intersessional WG	Coordinator Secretariat	2020
Symposium on the State of Art Habitat Monitoring	Steering committee	Project leads: Aquiles Sepúlveda and Mariano Gutiérrez (2020+)	2020-23
Jack mackerel ageing analysis	Task group	Coordinator: Ignacio Payá (2021+)	2021+
Analysis of Assessment Methods	Subgroup of specialists	Coordinator: Mariano Gutiérrez (2022+)	2021+
Classification of fishing fleets regarding acoustic data collection capacities	Subgroup of specialists	Coordinator: Mariano Gutiérrez (2022+)	2021+
Jack mackerel Connectivity	Task group	Co-chairpersons: Fabrice Stephenson, Giovanna Sotil, Sebastián Vásquez (2022+)	2022+
Species Composition	Task group		2022,23
Squid Assessment Simulation	Task Team	Coordinator: Ricardo Oliveros (2024+)	2023-25

**Indicates that a new Chairperson of the Working Group will need to be elected at the SC12 (2024) meeting.*

4. Proposals for adoption

The Scientific Committee generally works in a more informal way than the Commission. The ability of the SC to remain a flexible body has always been considered a strength. The ever-increasing workload of the SC, however, requires that minimum standards, transparency, and best practices are observed and enforced in its work. It is important to be mindful and respectful of people's time; if we strive to plan activities as far in advance as possible, they are more likely to be successful, thus progressing the workplan and achieving the outcomes the Commission expects from the SC.

a. Proposed SC work framework

The Secretariat proposes the following framework to guide the formation and working structure for Scientific Committee created Working Groups and Task Teams. As part of good practice all working groups and Task Teams should have defined Terms of Reference[9].

[8] Initially Dr Gutierrez was appointed as chairperson, with Dr Sepulveda as vice and in 2019 the current co-chairperson arrangement was put in place.

[9] ToRs should be developed (revised) and agreed for each current WG

TYPE OF GROUP	Lead	Participation	Operation	Support
Working Group *(Permanent unless otherwise decided)*	Chairperson selected by the SC from amongst Members and CNCPs. 2-year term as per the SC.	SC members plus SC invited experts.	Meets at least once a year and reports to the SC. Has a standing item in the SC agenda for this purpose.	Intersessional work to be supported by the Secretariat or by SC funds for this purpose.
Task Team *(Temporary 1-3 years)*	Coordinator selected by the Task Team from SC members.	SC members. Open to interested external experts.	Meets intersessionally. Convened to progress specific items of work.	Operates autonomously. Limited Secretariat support.

b. Working Groups

The Chairpersons of the Working Groups are elected by the Scientific Committee from among the Contracting Parties or Cooperating Non-Contracting Parties for a term of two years. Working Group Chairs are eligible for re-election for more than two consecutive terms.

The Chairpersons of the Working Groups shall organise at least one preparatory meeting prior to the annual meeting of the SC to discuss the documents submitted for the forthcoming annual meeting and draft recommendations.

WG Chairpersons are responsible for inviting the SC to all activities of the WG and for reporting to the SC on all activities of the WG.

c. Task Teams

Task Team Coordinators are elected by the members of the Working Group to which they belong from any member of the Scientific Committee, including Observers, for the planned duration of the Task Team. The Task Team is required to submit at least one report to the annual meeting of the SC summarising the progress made during the intersessional period. Task Team Coordinators report to the WG Chair and present a progress report at WG meetings. Task Team workshops are submitted to WG chairperson for consideration and diffusion to SC members.

d. Suggested Intersessional Work Standards

TYPE OF MEETING	Lead	Participation	Operation	Support
Scientific Committee Workshop (SCW)	The SC Chairperson or convening WG Chairperson	SC members plus SC invited experts	As per the SC, the requirements of the rules of procedure (registration and credentials) are enforced, and a dedicated web page is set up to collate and retain all the papers and reports.	Supported by the Secretariat to the same level as an SC meeting.

Other workshops (for WGs or TTs as necessary)	The convening Chairperson or coordinator	SC members. Open to external experts	As decided by the WG or Task Team consistent with its ToR.	Operates autonomously. Limited Secretariat support
Preparatory Sessions	The WG Chairperson	SC members plus SC invited experts	Most commonly, virtual.	Supported by the Secretariat.
Virtual meetings	The SC Chairperson or convening WG Chairperson	SC members plus SC invited experts	Virtual.	Supported by the Secretariat

e. Scientific Committee Workshops

SC workshops are normally held in person and should be scheduled as far in advance as possible, ideally at least **105 days prior** - this information for the meeting, including materials, should be sent to the Secretariat by the SC/WG Chair; meeting materials, agenda and links should be circulated by the Secretariat at least **90 days prior**.

f. Other Workshops

Workshops held in person should be scheduled as much in advance as possible and announced ideally at least **45 days prior** –this information for the meeting, including materials, should be passed on to the Secretariat by the SC/WG Chairperson; meeting materials, agenda and links should be circulated by the Secretariat no later than **30 days prior**.

Workshops held virtually should be scheduled as much in advance as possible and announced ideally at least **21 days prior** –this information for the meeting, including materials, should be passed on to the Secretariat by the SC/WG Chairperson; meeting materials, agenda and links should be circulated by the Secretariat no later than **14 days prior**.

g. Preparatory meetings

Working Group Preparatory Meetings should be organised at least **30 days before** the SC Annual Meeting. The preparatory meeting of the SC should be organised at least **14 days before** the annual meeting of the SC.

Preparatory meetings should be scheduled as much in advance as possible and announced ideally at least **21 days prior** –this information for the meeting, including materials, should be passed on to the Secretariat by the SC/WG Chairperson; meeting materials, agenda and links should be circulated by the Secretariat no later than **14 days prior**.

h. Virtual meetings

Virtual meetings should be scheduled as much in advance as possible and announced ideally at least **14 days prior** –this information for the meeting, including materials, should be passed on to the Secretariat by the SC/WG Chairperson; meeting materials, agenda and links should be circulated by the Secretariat no later than **7 days prior**.

i. Invited Experts

The Scientific Committee may find beneficial to invite experts to their annual meetings to contribute with their expertise and support its work. Specific topics where additional expertise is needed can be discussed during the annual meeting.

Invited experts are proposed by SC Chairperson after coordination with WG Chairpersons and suggestions from SC Members. Suggestions can be submitted to the SC Chairperson before or during the first virtual meeting of the SC. The SC Chairperson submit the list of Invited Experts to the SC for consideration and agreement at least 120 days before the SC Annual Meeting and instruct the Secretariat to invite the experts afterwards.

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