

Report of the Third Stock Assessment and Ecological Risk  
Assessment Working Group  
(SERAWG3)

Held via Zoom videoconferences and email correspondence  
on 8, 9 and 11 March 2021

*Items that were not addressed this year due to the reduced format and postponed to 2022 are in grey.*

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## **Agenda item 1 – Opening**

### **Agenda item 1.1 Opening statement from the Co-Chairs**

1. The third meeting of the SIOFA SC Stock Assessment and Ecological Risk Assessment Working Group (SERAWG3) was opened by the Chair, Dr Tsutomu Nishida of Japan, at 6:02 am (UTC) on 8 March 2021.
2. The Chair welcomed the participants to the meeting.

### **Agenda item 1.2 Introduction of participants**

3. The list of participants is attached (**Annex A**).

## **Agenda item 2 – Administrative arrangements**

### **Agenda item 2.1 Adoption of the Agenda**

4. The agenda was adopted (**Annex B**).

### **Agenda item 2.2 Confirmation of meeting documents**

5. The meeting documents (**Annex C**) were confirmed.

### **Agenda item 2.3 Appointment of rapporteurs**

6. Mr Alex Meyer (Urban Connections, Tokyo) was appointed as rapporteur with assistance from delegations.

### **Agenda item 2.4 Review of the SERAWG functions and terms of reference**

7. No changes to the functions and terms of reference of the SERAWG were proposed.

## **Agenda item 3 – Alfonsino**

### **Agenda item 3.1 Update on the fishery**

8. No updates were provided.

### **Agenda item 3.2 Data catalogue of available variables and attribute data in SIOFA**

### **Agenda item 3.3 Review of progress against CMM 2020-15 (Demersal stocks)**

9. Progress has been made as described in this report.

### **Agenda item 3.4 Review of alfonsino workplan (SC5 report Annex H)**

10. See agenda item 10.6.

### **Agenda item 3.5 Resource analyses by member countries**

#### Summary of paper

11. Cook Islands presented SERAWG-03-09 rev1, which provides Alfonsino growth, length and maturity estimates from fish sampled by Cook Island trawl vessels in the SIOFA Area. Alfonsino (*Beryx splendens*) aggregate in large numbers and are a major fishery in the SIOFA Area where they are fished using benthic-pelagic trawl gear. Between 2009 and 2020, 45,062 fish were sampled for length and maturity across all months of the year. The samples were collected from a wide

area in the south-central Indian Ocean and were obtained from five broad regions. This analysis provides updated age and growth information for alfonsino, a detailed description of the length samples by year, month, and marine feature, as well as updating the maturity schedule for alfonsino.

12. Gonad mass increases substantially with fish length. The monthly gonadosomatic index (GSI) trends show that alfonsino have a distinct spawning season through the Austral summer with the bulk of spawning taking place from December to February. The estimated  $L_{50}$  size-at-maturity was 38cm for both males and females which coincides with an age of 9 years. The size-at-maturity coincides with a change in the growth of the fish as well as a change in the relationship between fish age and otolith weight. For fish below the size-at-50% maturity the sex ratio is approximately balanced. However, after the onset of maturity the sex ratio becomes skewed in favour of females which may be related to a differential mortality of male and female fish.
13. Based on the paper, Cook Islands recommended that:
  - The SERAWG note that the otolith samples are broadly representative of the length sample of the tows from which they came.
  - Future assessments:
    - i. use the updated maturity schedule.
    - ii. use the revised growth curve.
    - iii. consider estimating size/age specific natural mortality.
  - Observers continue collecting biological data including otoliths, length and maturity information using the current protocols. But SIOFA should update and standardise data collection, including sampling protocols, length measurement units and gonad staging.
  - The sampling procedure should aim to ensure that length data are collected randomly and otoliths are collected evenly across the full size-range of fish. An updated protocol should be developed for consideration by SERAWG4.
  - The current alfonsino maturity classification tables should continue to be used, but SIOFA should update the gonad maturity classification scheme for consideration by SERAWG4, ensuring that GSI is not used to allocate a maturity stage to a gonad. When finalised the new classifications tables should be used in all SIOFA fleets catching alfonsino.

#### SERAWG discussion

14. The SERAWG **ENDORSED** the recommendations in SERAWG-03-09 rev1.
15. Regarding alfonsino maturity staging classifications, the SERAWG **NOTED** the need to revise and update the classification tables for alfonsino maturity staging classifications and that the existing GSI-based process continue to be used in the meantime.
16. Australia suggested that further analysis could be conducted that would explicitly account for the otolith sample length frequency relative to the catch and suggested that Perreault et al (2019) 77(3), DOI: 10.1139/cjfas-2019-0129, on responsive, selective stratified sampling, would be a useful reference for such work.
17. The Secretariat noted that the paper used historical biological data on alfonsino that was not provided to the Secretariat and recommended that Cook Islands

provide the observer data so all subsequent studies conducted on alfonsino could benefit from these data.

#### Summary of paper

18. SIODFA presented SERAWG-03-INFO-06, which provides considerations in the use of trawl surveys for management of alfonsino fisheries. The interpretation of the results of surveys is confounded by three difficulties: the nature of aimed benthic-pelagic trawling, the behaviour of alfonsino and similar deepwater species, and the diversity of the characteristics of the fishing grounds. Furthermore, randomisation of survey trawling is not feasible, results from repeating coverage will depend on fish behaviour and oceanographic conditions as much as fish abundance, and trawl stations would have to be carefully selected to avoid gear damage or lost gear, making them dependent on the knowledge of the person designing the survey and therefore highly subjective.

#### Agenda item 3.6 Future work plan

19. See agenda item 10.6.

#### Agenda item 3.7 Recommendations

##### 20. The SERAWG's summary of advice to the SC is:

(Alfonsino growth, length and maturity estimates)

- to note that the otolith samples are broadly representative of the length sample of the tows from which they came.
- that, in addition to the current sampling procedure, stratified otolith sampling protocols should be conducted to ensure that otoliths get collected across the full size-range of fish.
- that future assessments use the updated maturity schedule.
- that future assessments use the revised growth curve.
- that future assessments consider estimating a size/age specific natural mortality.
- that observers continue collecting biological data including otoliths, length and maturity information, and SIOFA should consider standardising data collection protocols between fleets, including length measurement units and gonad staging.
- that CCPs' historical data be provided to the Secretariat according to the specifications of CMM 2019/02 (Data Standards).
- to request CCPs present proposals for random length and stratified otolith sampling protocols and develop a standardised data collection protocol at SERAWG4.
- to task SERAWG4 with revising alfonsino maturity staging classifications, replacing GSI as a means to allocate a maturity stage to a gonad, for use in all SIOFA fleets.

## **Agenda item 4 – Patagonian toothfish**

### **Agenda item 4.1 Update on the fishery**

21. No updates were provided.

### **Agenda item 4.2 Review of progress against CMM 2020-15 (Demersal stocks)**

22. Progress has been made as described in this report.

### **Agenda item 4.3 Patagonian toothfish workplan**

23. See agenda item 10.6.

### **Agenda item 4.4 Resource analyses by member countries**

#### Summary of paper

24. France (Territories) presented SERAWG-03-05, which provides an update on the occurrence of whale depredation in toothfish fisheries in the SIOFA Area and highlights the need to collect consistent data on these interactions to increase the accuracy of fish stock assessments, to understand their impacts on whale populations and to develop mitigation solutions.
25. Three forms of killer whales (*Orcinus orca*) occur around the subantarctic islands of the southern Indian Ocean (42-53°S; 34-74°E). The form encountered in both inshore and offshore waters, described as generalist in its feeding preferences (seals, whales, penguins and fish as prey) and known to depredate toothfish from longliners, has been opportunistically photo-identified around the Crozet archipelago since the 1960s. Together with photo-identification data collected in the Prince Edward/Marion EEZ, Kerguelen EEZ and international waters, this paper provides up to date information on the abundance and distribution of the Crozet killer whales. Photographs taken during 2,109 encounters since 1964 were analysed, allowing 299 individuals to be identified.
26. Most encounters that had data available were from the Crozet EEZ and occurred after 2003 when photo-identification was implemented in the fishery observer programme. Among the 188 individuals recorded in the Crozet EEZ since 2003, 13 (7%) were also photographed in adjacent international waters. The frequently encountered subset of the Crozet killer whale population was composed of 23 social units (maternal groups), 19 of which included individuals alive in 2020. However, detailed analysis of data collected between 2005 and 2020 shows that the number of confirmed deaths (n = 51) exceeds the number of recorded births (n = 46), resulting in a 5% decrease of the population size over this period.
27. Factors contributing to mortalities, the extent of which is abnormally high for juveniles and reproductive females, are unclear, but may involve lethal interactions with illegal, unreported and unregulated (IUU) fisheries. When paired with the fact that the Crozet killer whales already underwent a severe mortality episode in the 1990s, these findings raise strong concerns about the future of the population and stress the necessity of conservation actions while maintaining an intensive monitoring effort.
28. Based on the paper, as well as SC-05-21, SC-04-INFO-06, and SERAWG-02-INFO-13, France (OT) recommended that the SC:
  - note the up-to-date information on the abundance and distribution of the Crozet killer whales based on interactions with fishing vessels.
  - note that among the 188 individuals recorded in the Crozet EEZ since 2003, 13 (7%) were also photographed in adjacent international waters.

- note a 5% decrease of the population size between 2005 and 2020.
- note mortality rates being abnormally high for juveniles and reproductive females, suggesting additive mortality being potentially caused by negative interactions with IUU fishing vessels.
- recommend the Meeting of the Parties (MoP) adopt a protocol for documenting all interactions with marine mammals and for collecting photo-identification data for all vessels operating in the SIOFA Area.
- recommend the MoP note that operational actions to mitigate such interactions while maintaining an intensive monitoring effort are urgently required.
- recommend the MoP increase monitoring efforts mitigating IUU fishing activities by adopting specific programs such as the one described in the Sentinel Program (PAEWG-02-07).

#### SERAWG discussion

29. The SERAWG **NOTED** the information in SERAWG-03-05.
30. The SERAWG **ENDORSED** the importance of documenting all interactions with marine mammals and for collecting photo-identification data for all vessels operating in the SIOFA Area.
31. The SERAWG **NOTED** the importance of mitigating interactions between killer whales and fishing vessels, while discussing that some CCPs would have difficulty taking operational actions.
32. The SERAWG discussed the usefulness of the Sentinel Program for monitoring interaction between albatross and fishing vessels and **NOTED** the potential usefulness of a similar program for monitoring killer whale interactions.

#### Summary of paper

33. France (Territories) presented SERAWG-03-06, which describes a proposed protocol for documenting marine mammal interaction in deep sea demersal longline fisheries. The details of this protocol have been presented as an example in the document SC-04-INFO-06. The consistent implementation of this protocol can be facilitated by following simple steps, by using small cameras and a photo naming tool as described in SERAWG-03-INFO-02.
34. This protocol requires the following information to be sent to the secretariat. For each haul and each species of depredating whales (killer whales (*Orcinus orca*) and (sperm whales *Physeter macrocephalus*), the following priority data should be collected.
  - Priority 1 data include:
    - i. presence/absence data: Presence / Absence / Not observed; and
    - ii. in the case of presence, photo-identification data in the form of photographs of specific body parts (for killer whales: dorsal fin, saddle patch and eye patches; for sperm whales: tail flukes) visible when whales come to the surface.
  - Priority 2 data include:
    - i. estimates of the number of individuals present around the vessel in the vicinity of the fishing gear.
  - Priority 3 data include:



- i. information about whether or not whales interact with the gear; and
  - ii. estimate of the time of arrival of whales in the vicinity of the gear.
35. Based on the paper, France (OT) recommended that the SERAWG and the SC:
- request CCPs to adopt this protocol for documenting all interactions with marine mammals and for collecting photo-identification data for all longline vessels operating in the SIOFA Area; and
  - recommend the MoP adopt this protocol for documenting all interactions with marine mammals and longline vessels operating in the SIOFA Area.

SERAWG discussion

36. The SERAWG **ENDORSED** the recommendations in SERAWG-03-06.

Summary of paper

37. France (Territories) presented SERAWG-03-08, which describes the naming convention and picture naming tool (PiNT)) adopted by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) for renaming observer photographs at sea. Once scientific observer programmes begin to collect images related to protocols for monitoring tagging, fishing gear, or fishing interactions with birds and marine mammals, the management of these images quickly becomes an issue. In order to maintain version control, to process and file the photographs efficiently, and to ensure compatibility and transferability between statistical subareas during different observer deployments, it is crucial to develop a common naming convention that enables tracking of where, when, and on which vessel a picture was taken and by whom, together with basic information on the picture content. Although the SIOFA scientific observer programme does not yet produce significant amounts of photographic information, the Secretariat should consider a naming convention and could adapt PiNT for use in SIOFA and make it available as a resource for CCPs.

38. Based on the paper, France (Territories) recommended that the SERAWG:
- note that the method of naming photos and the tool to facilitate this work has been introduced and deployed to the whole CCAMLR area and could be adapted to the context of the SIOFA;
  - recommend CCPs adopt and implement a common naming convention for images collected by scientific observers based on the CCAMLR convention;
  - recommend the Secretariat centralise and store photos collected in the SIOFA Area by scientific observers; and
  - recommend the SC adopt a common naming convention for images collected by scientific observers.

SERAWG discussion

39. The SERAWG **ENDORSED** the recommendations in SERAWG-03-08.

Summary of paper

40. France (Territories) presented SERAWG-03-INFO-02, which describes a protocol for implementing consistent photo-identification effort by observers or crews from fishing vessels experiencing depredation in the SIOFA area with limited costs and limited interference with existing workload. The key steps of the protocol include:
- Setting cameras in speed priority and high shutter speed (minimum 1/1000s);

- Photographing the dorsal fin, the saddle patch and the eye patch of killer whales when individuals come to the surface; and
  - Taking as many pictures as possible.
41. While the use of DSLR cameras with 400mm lenses is advised, bridge cameras can also be used for photo-identification purposes as a cheaper and easier-to-handle alternative.

#### SERAWG discussion

42. The SERAWG discussed the process for centralizing and storing marine mammals' photos collected in the SIOFA Area by scientific observers. Taking into account the expertise of France (Territories) and in order to avoid placing undue burden on the Secretariat, the SERAWG suggested that France (Territories) take the lead in this work. The SERAWG suggested that observer photos should be sent to the Secretariat first, and the Secretariat would then forward them to France (Territories). The SERAWG **NOTED** that, apart from the confidentiality of image rights, the Secretariat should ensure the confidentiality of the associated data transmitted, in order not to divulge the position of the vessels.

#### **Agenda item 4.5 Relevant information from CCAMLR**

##### **Agenda item 4.6 Future work plan**

43. See agenda item 10.6.

##### **Agenda item 4.7 Recommendations**

#### **44. The SERAWG's summary of advice to the SC is:**

(Whale depredation)

- to note the up-to-date information on the abundance and distribution of the Crozet killer whales based on interactions with fishing vessels.
- to note that among the 188 individuals recorded in the Crozet EEZ since 2003, 13 (7%) were also photographed in adjacent international waters.
- to note a 5% decrease of the population size between 2005 and 2020.
- to note mortality rates being abnormally high for juveniles and reproductive females that suggests additive mortality, possibly caused by interactions with IUU fishing vessels.
- to recommend the MoP adopt a protocol for documenting all interactions with marine mammals and for collecting photo-identification data for all vessels operating in the SIOFA Area.
- to recommend the MoP encourage CCPs to adopt operational actions to mitigate such interactions.
- to note the usefulness of programmes such as that described in the Sentinel Program (PAEWG-02-07) for monitoring efforts mitigating IUU fishing activities.

(Photo naming convention and tool)

- to note that the PiNT method of naming photos and the tool to facilitate this work has been introduced and deployed to the whole CCAMLR area and could be adapted to the context of the SIOFA.
- to recommend CCPs adopt and implement a common naming convention for images collected by scientific observers based on the CCAMLR convention.

- to recommend France (Territories) to centralise and store photos collected in the SIOFA Area by scientific observers.
- to recommend the SC adopt a common naming convention for images collected by scientific observers.

## **Agenda item 5 – Orange roughy**

### **Agenda item 5.1 Update on the fishery**

45. No updates were provided.

### **Agenda item 5.2 Review of progress against CMM 2019-15 (Demersal stocks)**

### **Agenda item 5.3 Orange roughy workplan (SC4 Annex G and W)**

46. See agenda item 10.6.

### **Agenda item 5.4 Resource analyses by member countries**

47. No papers were presented.

### **Agenda item 5.5 Future work plan**

48. See agenda item 10.6.

### **Agenda item 5.6 Recommendations**

## **Agenda item 6 – Other species**

### **Agenda item 6.1 Update on the fisheries**

### **Agenda item 6.2 Review of progress against CMM 2020-15 (Demersal stocks)**

### **Agenda item 6.3 Review of other species workplan (SC5 report Annex H)**

### **Agenda item 6.4 Resource analyses by member countries**

### **Agenda item 6.5 Future work plan**

### **Agenda item 6.6 Recommendations**

## **Agenda item 7 – Technical work to inform reference points and harvest strategy development**

### **Agenda item 7.1. Report of the consultancy for the SIOFA Harvest Strategy Development (Project SER2020-01)**

Summary of paper

49. The consultant, Marine Resource Assessment and Management Group (MARAM), University of Cape Town, presented SERAWG-03-10, the report on the development of harvest strategies for key target species in the SIOFA Area. The report includes a summary of the use of harvest strategies, and target and limit reference points used by other fishery organisations, a summary of the assessments available for the three major species under harvest in the SIOFA

Area (alfonsino, orange roughy and Patagonian toothfish), possible harvest strategy approaches for the aforementioned three major species and the pros and cons of each, and possible ways to move towards developing assessments for the other major species and consequently reference points and harvest strategies based on those assessments.

#### SERAWG discussion

50. The SERAWG **NOTED** the report SERAWG-03-10 and that:
- The report suggested that for alfonsino, orange roughy and toothfish, the advantages and disadvantages (pros and cons) of three different harvest strategy approaches need to be considered by the SC:
    - i. Maintaining catches at present levels (unless there is evidence of a marked downward trend in the resource) until sufficient further data become available for meaningful improvements to the existing assessments.
    - ii. Implementing an  $F_{\text{status-quo}}$  harvesting strategy, which varies catches up or down in proportion to the results from continued collection of some measure or index of abundance.
    - iii. Implementing a harvest strategy based primarily on some multiple of a proxy value of  $F_{\text{MSY}}$ , where this in turn is based on a proxy value for a  $B_{\text{MSY}}$  reference point whose value is informed by the most recent assessment of the resource.
  - More details of these approaches are given in SERAWG-03-10.
51. For most other SIOFA species that are data limited, assessments and consequently reference points and harvest strategies are not yet possible to develop.
52. For these SIOFA species, the SERAWG **NOTED** that approach i. could be the most viable at this time, but that this would need to be augmented by one or more precautionary provisions to check whether catches were sustainable and take corrective action in the event that there were persuasive indications to the contrary. The SERAWG **NOTED** that this could be implemented, for example, by application of risk assessment across a broad suite of species using, for example, the SAFE methodology. However, unless the spatial and temporal scale of the fishery is well known this may not be possible and other options would need to be investigated.
53. The SERAWG **NOTED** that an important associated priority is further data collection, especially more and better catch and effort information and the associated analyses of these data through space and time.
54. The SERAWG **SUGGESTS** to the SC that:
- The utility and specifics of the three alternative approaches, as they may apply in each case, be examined before a decision on the best approach is determined.
  - The SC consider interim reference points for orange roughy and alfonsino as follows: Target =  $B_{\text{MSY}}$  using a proxy of  $= 0.4 * B_0$ , and a Limit =  $0.2 * B_0$ . These interim reference points could be considered for SC reporting purposes.
  - With respect to toothfish, the SC consider that CMM 2020/15 has an objective to “ensure collaborative and complementary arrangements are in place for *D. eleginoides* between SIOFA and the CCAMLR”. Accordingly,

when setting reference points for toothfish, SIOFA consider the reference points adopted by CCAMLR: Target =  $0.5 * B_0$ , and Limit =  $0.2 * B_0$

- The SC consider fishing fleet behaviour and fish stock structure in the development of harvest strategies for a species.
55. The SERAWG **NOTED** that the development of harvest strategies for all relevant stocks would need to be reflected in the future workplan of the SC.
56. The SERAWG **RECOMMENDS** that the SC:
- Undertake analyses to determine the applicability and trade-offs between the three proposed harvest strategy approaches for each of the three species concerned, to provide an objective basis to underpin final decision making. For some approaches this will require consideration of appropriate reference points.
  - Consider developing a set of objectives, along with biological reference points where appropriate, to assist in the development of harvest strategies aimed at achieving those objectives. Stability of catch and effort as well as avoiding undue risk to the stock are three important objectives that should be considered amongst others to be determined by the SC and the MoP.

#### **Agenda item 7.2. Future work plan**

57. See agenda item 10.6.

## **Agenda item 8 – Ecological risk assessment**

### **Agenda item 8.1 Deepwater chondrichthyans**

#### **Agenda item 8.1.1 Implementation of FAO shark guides (CMM 2019-02, para. 8) and other efforts to improve data collection**

#### **Agenda item 8.1.2 Review of progress against CMM 2019-12 (Sharks), including development of precautionary bycatch limits (CMM 2019-12 para. 4)**

#### **Agenda item 8.1.3 Future work plan**

#### **Agenda item 8.1.4 Advice to the Scientific Committee**

### **Agenda item 8.2 Teleosts and others**

#### **Summary of paper**

58. France (Territories) presented SERAWG-03-07, which describes a proposed framework for mapping the distribution of seabirds by integrating tracking, demography and phenology. Seabirds are amongst the most threatened birds in the world (Dias et al. 2019). Albatrosses and petrels are particularly vulnerable as they are long-lived, have a delayed sexual maturity, and have a low annual reproductive output. They have a wide at-sea distribution, occurring across all oceans and adjacent coastlines and islands. These extensive ranges overlap with multiple threats in national and international waters.
59. Incidental bycatch in fisheries is one of the primary causes of population declines for many seabird species. Although attention focused initially on industrial longlining, a growing number of studies highlight the negative impact on seabirds of fisheries, such as trawl and artisanal fisheries. Bycatch can affect elements of seabird populations in different ways. For instance, sex- and age-biases are common features of seabird bycatch, which appear to be associated largely with

differences in at-sea distributions. Accounting for different life-history stages is therefore essential in threat assessment in order to direct management and conservation efforts towards areas where they have the greatest impact on populations.

60. France (Territories) overlapped the SIOFA boundary to the maps presented by Carneiro et al., (2019, 2020), which includes information from across different life-history stages, to give an overview of the importance of the SIOFA Area for albatrosses and petrels year-round and by year-quarter. This has helped fill gaps in the knowledge of at-sea distributions for these species.
61. Based on the paper, France (Territories) recommended that the SERAWG and the SC:
  - note that the Southern Territories are particularly important for albatross and petrel species.
  - note that overlap analysis highlights the particular importance of the SIOFA Area for seven species (Amsterdam albatross, wandering albatross, black-browed albatross, Indian yellow-nosed albatross, sooty albatross, grey petrel and white-chinned petrel).
  - recommend the MoP adopt a protocol for documenting all interactions with seabirds for all vessels operating in the SIOFA Area.
  - recommend the MoP adopt effective and efficient mitigation measures to reduce seabird bycatch.
  - taking the distribution of all life-history stages of albatrosses and petrels into account, conduct:
    - i. an ecological risk assessment based on overlap analysis.
    - ii. a combined ecological risk assessment or a joint future iteration of the global risk assessment by the tuna regional fisheries management organisations (RFMOs).

#### SERAWG discussion

62. The SERAWG **NOTED** the information in SERAWG-03-07.
63. The SERAWG **NOTED** the importance of documenting all interactions with seabirds for all vessels operating in the SIOFA Area, and that the documentation of such information is at least partially addressed by CMM 2019/02 (Data Standards) and CMM 2019/13 (Mitigation of Seabirds Bycatch).
64. Regarding mitigation measures to reduce seabird bycatch, the SERAWG **NOTED** their importance, while discussing that the occurrence of such bycatch in trawl fisheries in the SIOFA Area has been rare and that it would be desirable to implement measures in a staged approach.
65. France (Territories) drew the SERAWG's attention to the Vessel Seabird Management Plan implemented by Cook Islands (SC-03-06.2 (05)) as a useful reference for discussing seabird bycatch mitigation measures.
66. ACAP indicated that, in trawl fisheries, there may be a major risk of birds striking cables, resulting in cryptic or undetected mortality, if observers are not tasked to look for such incidents.
67. CMM 2019/02 tasks observers to monitor such incidents.
68. The Deep Sea Conservation Collation (DSCC) encouraged CCPs to aim for best practices in terms of documenting interactions with seabirds and implementing

measures to mitigate seabird bycatch. DSCC reminded the SERAWG that albatrosses are globally threatened species and CCPs have an obligation to minimise the impact on them.

69. The SERAWG **NOTED** that it would be useful to conduct a review, by SC7, of the seabird data collection and bycatch mitigation measures stipulated in CMM 2019/02 (Data Standards) and CMM 2019/13 (Mitigation of Seabirds Bycatch) against ACAP best practices, while taking into consideration SC-03-06.2 (05), to ensure that SIOFA's measures are effective and efficient.

**Agenda item 8.2.1 Update on progress with teleosts ERA**

**Agenda item 8.2.2 Priority species for further assessment**

**Agenda item 8.3 Report of Ecosystem Approach to Fisheries - Dr Fridtjof Nansen cruise (2018)**

**Agenda item 8.4 Future work plan**

70. See agenda item 10.6.

**Agenda item 8.5 Recommendations**

**71. The SERAWG's summary of advice to the SC is:**

(Seabirds)

- to note that the Southern Territories are particularly important for albatross and petrel species.
- to note that overlap analysis highlights the particular importance of the SIOFA Area for seven species (Amsterdam albatross, wandering albatross, black-browed albatross, Indian yellow-nosed albatross, sooty albatross, grey petrel and white-chinned petrel).
- to review, by SC7, the seabird data collection and bycatch mitigation measures stipulated in CMM 2019/02 (Data Standards) and CMM 2019/13 (Mitigation of Seabirds Bycatch) against ACAP best practices, while taking into consideration SC-03-06.2 (05), to ensure that SIOFA's measures are effective and efficient.
- taking the distribution of all life-history stages of albatrosses and petrels into account, to conduct:
  - i. an ecological risk assessment based on overlap analysis.
  - ii. a combined ecological risk assessment or a joint future iteration of the global risk assessment by the tuna RFMOs.

## **Agenda item 9 – SIOFA stock assessment framework – implementation, including species categorisation and data characterisation, including refining SIOFA species list**

### **Agenda item 9.1. Review and discussion**

## **Agenda item 10 – Consideration of SERAWG work plan and resource requirements**

### **Agenda item 10.1 Work plan to realise the General Objectives relating to the 2020 EU Grant**

#### **Agenda item 10.1.1 Report of the consultancy to coordinate, plan, and assist implementation of science consultancies to support the SIOFA scientific working plan (Project SCM2021-01)**

### **Agenda item 10.2 Support the assessment of the key target stocks**

### **Agenda item 10.3 Management of vulnerable Marine Ecosystem**

#### **Agenda item 10.3.1 Updates to ERA work – Updates the teleost ERAs with better and more recent input data**

### **Agenda item 10.4 Management of other ecosystems components**

#### **Agenda item 10.4.1 Updates to ERA work – Seabirds, Mammals, By-catch species**

### **Agenda item 10.5 Reinforcing the data collection, SIOFA data/bases systems, coding and data processes**

72. The SERAWG **NOTED** that it would be useful for the Secretariat to provide PAEWG, SERAWG and the SC with an annual paper summarising catch and effort trends in the SIOFA Area, covering overall catch by major species and effort by gear for the most recent year for which data are available and for past data. It should also contain coarse scale mapping or area-based summaries of catch and effort. Such information would better inform the SC and its advice to the MoP, particularly in the years between stock assessments.
73. The SERAWG **RECOMMENDS** that the SC task the Secretariat with compiling an annual paper summarising catch and effort trends in the SIOFA Area, covering overall catch by major species and effort by gear for the most recent year and historically. The paper should also contain some coarse scale mapping or area-based summaries of catch and effort.

### **Agenda item 10.6 Review and update of the Scientific Committee workplan**

74. The SERAWG reviewed and updated its workplan (**Annex D**).
75. The SERAWG **RECOMMENDS** that the SC take the updated SERAWG workplan (**Annex D**) into consideration when updating the SC workplan.

## **Agenda item 11 – Consolidated advice to Scientific Committee**

### ***In relation to Agenda item 3 – Alfonsino:***

**The SERAWG's summary of advice to the SC is:**



(Alfonsino growth, length and maturity estimates)

- to note that the otolith samples are broadly representative of the length sample of the tows from which they came.
- that, in addition to the current sampling procedure, stratified otolith sampling protocols should be conducted to ensure that otoliths get collected across the full size-range of fish.
- that future assessments use the updated maturity schedule.
- that future assessments use the revised growth curve.
- that future assessments consider estimating a size/age specific natural mortality.
- that observers continue collecting biological data including otoliths, length and maturity information, and SIOFA should consider standardising data collection protocols between fleets, including length measurement units and gonad staging.
- that CCPs' historical data be provided to the Secretariat according to the specifications of CMM 2019/02 (Data Standards).
- to request CCPs present proposals for random length and stratified otolith sampling protocols and develop a standardised data collection protocol at SERAWG4.
- to task SERAWG4 with revising alfonsino maturity staging classifications, replacing GSI as a means to allocate a maturity stage to a gonad, for use in all SIOFA fleets.

***In relation to Agenda item 4 – Patagonian toothfish:***

**The SERAWG's summary of advice to the SC is:**

(Whale depredation)

- to note the up-to-date information on the abundance and distribution of the Crozet killer whales based on interactions with fishing vessels.
- to note that among the 188 individuals recorded in the Crozet EEZ since 2003, 13 (7%) were also photographed in adjacent international waters.
- to note a 5% decrease of the population size between 2005 and 2020.
- to note mortality rates being abnormally high for juveniles and reproductive females that suggests additive mortality, possibly caused by interactions with IUU fishing vessels.
- to recommend the MoP adopt a protocol for documenting all interactions with marine mammals and for collecting photo-identification data for all vessels operating in the SIOFA Area.
- to recommend the MoP encourage CCPs to adopt operational actions to mitigate such interactions.
- to note the usefulness of programmes such as that described in the Sentinel Program (PAEWG-02-07) for monitoring efforts mitigating IUU fishing activities.

(Photo naming convention and tool)

- to note that the PiNT method of naming photos and the tool to facilitate this work has been introduced and deployed to the whole CCAMLR area and could be adapted to the context of the SIOFA.
- to recommend CCPs adopt and implement a common naming convention for images collected by scientific observers based on the CCAMLR convention.
- to recommend France (Territories) to centralise and store photos collected in the SIOFA Area by scientific observers.
- to recommend the SC adopt a common naming convention for images collected by scientific observers.

***In relation to Agenda item 7 – Technical work to inform reference points and harvest strategy development:***

The SERAWG **NOTED** the report SERAWG-03-10, and the SERAWG **NOTED**:

- The report suggested that for alfoncino, orange roughy and toothfish, the advantages and disadvantages (pros and cons) of three different harvest strategy approaches need to be considered by the SC:
  - i. Maintaining catches at present levels (unless there is evidence of a marked downward trend in the resource) until sufficient further data become available for meaningful improvements to the existing assessments.
  - ii. Implementing an  $F_{\text{status-quo}}$  harvesting strategy, which varies catches up or down in proportion to the results from continued collection of some measure or index of abundance.
  - iii. Implementing a harvest strategy based primarily on some multiple of a proxy value of  $F_{\text{MSY}}$ , where this in turn is based on a proxy value for a  $B_{\text{MSY}}$  reference point whose value is informed by the most recent assessment of the resource.
- More details of these approaches are given in SERAWG-03-10.

For most other SIOFA species that are data limited, assessments and consequently reference points and harvest strategies are not yet possible to develop.

For these SIOFA species, the SERAWG **NOTED** that approach i. could be the most viable at this time, but that this would need to be augmented by one or more precautionary provisions to check whether catches were sustainable and take corrective action in the event that there were persuasive indications to the contrary. The SERAWG **NOTED** that this could be implemented, for example, by application of risk assessment across a broad suite of species using, for example, the SAFE methodology. However, unless the spatial and temporal scale of the fishery is well known this may not be possible and other options would need to be investigated.

The SERAWG **NOTED** that an important associated priority is further data collection, especially more and better catch and effort information and the associated analyses of these data through space and time.

The SERAWG **SUGGESTS** to the SC that:

- The utility and specifics of the three alternative approaches, as they may apply in each case, be examined before a decision on the best approach is determined.
- The SC consider interim reference points for orange roughy and alfonsino as follows: Target =  $B_{MSY}$  using a proxy of  $= 0.4 * B_0$ , and a Limit =  $0.2 * B_0$ . These interim reference points could be considered for SC reporting purposes.
- With respect to toothfish, the SC consider that CMM 2020/15 has an objective to “ensure collaborative and complementary arrangements are in place for *D. eleginoides* between SIOFA and the CCAMLR”. Accordingly, when setting reference points for toothfish, SIOFA consider the reference points adopted by CCAMLR: Target =  $0.5 * B_0$ , and Limit =  $0.2 * B_0$
- The SC consider fishing fleet behaviour and fish stock structure in the development of harvest strategies for a species.

The SERAWG **NOTED** that the development of harvest strategies for all relevant stocks would need to be reflected in the future workplan of the SC.

The SERAWG **RECOMMENDS** that the SC:

- Undertake analyses to determine the applicability and trade-offs between the three proposed harvest strategy approaches for each of the three species concerned, to provide an objective basis to underpin final decision making. For some approaches this will require consideration of appropriate reference points.
- Consider developing a set of objectives, along with biological reference points where appropriate, to assist in the development of harvest strategies aimed at achieving those objectives. Stability of catch and effort as well as avoiding undue risk to the stock are three important objectives that should be considered amongst others to be determined by the SC and the MoP.

### ***In relation to Agenda item 8 – Ecological risk assessment:***

The SERAWG’s summary of advice to the SC is:

(Seabirds)

- to note that the Southern Territories are particularly important for albatross and petrel species.
- to note that overlap analysis highlights the particular importance of the SIOFA Area for seven species (Amsterdam albatross, wandering albatross, black-browed albatross, Indian yellow-nosed albatross, sooty albatross, grey petrel and white-chinned petrel).
- to review, by SC7, the seabird data collection and bycatch mitigation measures stipulated in CMM 2019/02 (Data Standards) and CMM 2019/13 (Mitigation of Seabirds Bycatch) against ACAP best practices, while taking into consideration SC-03-06.2 (05), to ensure that SIOFA’s measures are effective and efficient.
- taking the distribution of all life-history stages of albatrosses and petrels into account, to conduct:
  - i. an ecological risk assessment based on overlap analysis.

- ii. a combined ecological risk assessment or a joint future iteration of the global risk assessment by the tuna RFMOs.

***In relation to Agenda item 10 – Consideration of SERAWG work plan and resource requirements:***

The SERAWG **RECOMMENDS** that the SC task the Secretariat with compiling an annual paper summarising catch and effort trends in the SIOFA Area, covering overall catch by major species and effort by gear for the most recent year and historically. The paper should also contain some coarse scale mapping or area-based summaries of catch and effort.

The SERAWG **RECOMMENDS** that the SC take the updated SERAWG workplan (**Annex D**) into consideration when updating the SC workplan.

**Agenda item 12 – Appointment a new Co-chair of the SERAWG (Ecological Risk Assessment)**

76. The Chair explained that the position of the co-Chair for ecological risk assessment has been vacated and invited the SERAWG to nominate a new co-Chair.

**Agenda item 13 – Future meeting arrangements**

77. The SERAWG **REQUESTS** the SC to consider future meeting arrangements in conjunction with arrangements for SC7.

**Agenda item 14 – Other Business**

78. The Food and Agriculture Organization (FAO) of the United Nations presented SERAWG-03-INFO-01, which provides an update on the development of the FAO ABNJ Deep-Sea Fisheries (DSF) Project. Some aspects of the project that may be of particular relevance to SIOFA include data collection; data-limited stocks, such as alfonsino; deepwater sharks; bottom fishing measures and VMEs; collaboration and coordination, across RFMOs, industry, other stakeholders, and BBNJ negotiations; and an ecosystem approach including economic and human pillars.
79. Because of lack of time the planned interventions of SIODFA addressing the topics of applicability of acoustic methods for assessing alfonsino stocks, tagging of alfonsino, and whether alfonsino fisheries were data poor, were not presented.

**Agenda item 15 – Adoption of the meeting report**

80. The report of the 3<sup>rd</sup> meeting of the SIOFA SERAWG was adopted at 08:17 am (UTC), March 11, 2021.

## **Agenda item 16 – Close of meeting**

81. The meeting was closed at 08:19 am (UTC), 11 March 2021.

## ANNEX A – List of registered participants of the 3rd SERAWG of SIOFA

Delegation	Title	Name	Function	Contact
<b>MEETING CHAIRPERSON</b>				
	Dr	Tom Nishida	SERAWG Co-chair	aco20320@par.odn.ne.jp
<b>SIOFA CCPs</b>				
Australia	Mr	James Larcombe	Head of Delegation	james.larcombe@agriculture.gov.au
Australia	Mr	Rhys Arangio	Delegate	rarangio@australfisheries.com.au
Australia	Dr	Philippe Ziegler	Delegate	philippe.ziegler@awe.gov.au
Australia	Dr	Tim Emery	Delegate	tim.emery@awe.gov.au
China	Dr	Heng Zhang	Head of Delegation	zhangh1@ecsf.ac.cn
China	Mr	Tianfei Cheng	Alternate	chengtf@ecsf.ac.cn
China	Mr	Yongchuang Shi	Alternate	syc13052326091@163.com
China	Mr	Chong Sun	Alternate	admin1@tuna.org.cn
China	Dr	Zhou Fang	Alternate	zfang@shou.edu.cn
Cook	Ms	Chloe-Ane Wragg	Head of Delegation	c.wragg@mmr.gov.ck
Cook	Mr	Stephen Brouwer	Advisor	steve@saggitus.co.nz
European Union	Dr	Sebastian Rodriguez Alfaro	Head of Delegation	sebastian_chano@hotmail.com
France Territories	Dr	Patrice Pruvost	Head of Delegation	patrice.pruvost@mnhn.fr
France Territories	Dr	Jules Selles	Alternate	jules.selles@mnhn.fr
France Territories	Mr	Nicolas Gasco	Expert	nicolas.gasco@mnhn.fr
France Territories	Dr	Paul Tixier	Expert	paul.tixier@ird.fr
France Territories	Mr	Felix Massiot Granier	Expert	felix.massiot-granier@mnhn.fr
France Territories	Dr	Karine Delord	Expert	karine.delord@mnhn.fr
Japan	Dr	Takehiro Okuda	Head of Delegation	okudy@affrc.go.jp
Japan	Dr	Kota Sawada	Advisor	kotasawada@affrc.go.jp
Japan	Mr	Naohisa Miyagawa	Advisor	n-miyagawa@maruha-nichiro.co.jp
Japan	Mr	Shogo Ueki	Advisor	s-ueki@maruha-nichiro.co.jp
Japan	Mr	Toshiharu Muraoka	Advisor	t-muraoka@maruha-nichiro.co.jp
Japan	Mr	Sachio Hagiya	Advisor	s-hagiya@maruha-nichiro.co.jp
Japan	Mr	Fumiya Sato	Advisor	f-sato@maruha-nichiro.co.jp
Korea	Dr	Seok-Gwan Choi	Head of Delegation	sgchoi@korea.kr
Korea	Dr	Kyum Joon Park	Alternate	mogas@korea.kr
Korea	Mr	Sanggyu Shin	Adviser	gyuyades82@gmail.com
Seychelles	Ms	Sabrena Lawrence	Head of Delegation	slawrence@sfa.sc
Chinese Taipei	Dr	Ching-Ping Lu	Head of Delegation	michelleclu@gmail.com
Thailand	Mr	Pavarot Noranarttragoon	Head of Delegation	pavarotn@gmail.com
Thailand	Mr	Weerapol Thitipongtrakul	Alternate	weerapol.t@gmail.com

Delegation	Title	Name	Function	Contact
<b>OBSERVERS</b>				
DSCC	Mrs	Lyn Goldsworthy	Representative	lyn.goldsworthy@ozemail.com.au
DSCC	Mr	Barry Weeber	Representative	baz.weeber@gmail.com
IOTC	Ms	Lauren Nelson	Representative	lauren.nelson@fao.org
SIODFA	Dr	Ross Shotton	Head of Delegation	r_shotton@hotmail.com
SIODFA	Mr	Charles Heaphy	Advisor	charles.heaphy@sealord.co.nz
SIODFA	Mr	Brian Flanagan	Alternate	brian@theflanagans.co.za
ACAP	Mr	Igor Debski	Representative	idebski@doc.govt.nz
CITEB	Mr	Evgeny Romanov	Representative	evgeny.romanov@citeb.re
FAO-ABNJ	Dr	Anthony Thompson	Representative	anthony.thompson@fao.org
<b>CONSULTANTS</b>				
MARAM	Pr	Doug Butterworth	Consultant	doug.butterworth@uct.ac.za
MARAM	Dr	Susan Holloway	Consultant	susan.holloway@uct.ac.za
MARAM	Dr	Anabela Brandao	Consultant	anabela.brandao@uct.ac.za
<b>SIOFA SECRETARIAT AND ASSISTANTS</b>				
SIOFA	Mr	Alistair Dunn	SC Chairperson	alistair.dunn@oceanenvironmental.co.nz
SIOFA	Mr	Chumnarn Pongsri	MoP Chairperson	chumnarnp@gmail.com
SIOFA	Mr	Thierry Clot	Executive Secretary	thierry.clot@taaf.fr
SIOFA	Mr	Pierre Périès	Data Manager	pierre.peries@siofa.org
SIOFA	Mr	Thibault Pivetta	Assistant	thibault.pivetta@siofa.org
SIOFA	Mr	Alex Meyer	Rapporteur	meyer@urbanconnections.jp
SIOFA	Mr	Gary Morgan	Consultant	garymorg@hotmail.com

## ANNEX B – Agenda

Red: High priority, must be treated in session, by correspondence and video conference

Black: Urgent, may be treated in session or by correspondence

Grey: Will be not be addressed this year due to the reduced format and postponed to 2022

1. Opening
  - 1.1 Opening statement from the Co-Chairs
  - 1.2 Introduction of participants
2. Administrative arrangements
  - 2.1 Adoption of the agenda
  - 2.2 Confirmation of meeting documents
  - 2.3 Appointment of rapporteurs
  - 2.4 Review of the SERAWG functions and terms of reference
3. Alfonsino
  - 3.1 Update on the fishery
  - 3.2 Data catalogue of available variables and attribute data in SIOFA
  - 3.3 Review of progress against CMM 2020-15 (Demersal stocks)
  - 3.4 Review of alfonsino workplan (SC5 report Annex H)
  - 3.5 Resource analyses by member countries
  - 3.6 Future work plan
  - 3.7 Recommendations
4. Patagonian Toothfish
  - 4.1 Update on the fishery
  - 4.2 Review of progress against CMM 2020-15 (Demersal stocks)
  - 4.3 Review of Patagonian toothfish workplan (SC5 report Annex H)
  - 4.4 Resource analyses by member countries
  - 4.5 Relevant information from CCAMLR
  - 4.6 Future work plan
  - 4.7 Recommendations
5. Orange roughy
  - 5.1 Update on the fishery
  - 5.2 Review of progress against CMM 2020-15 (Demersal stocks)
  - 5.3 Review of orange roughy workplan (SC5 report Annex H)
  - 5.4 Resource analyses by member countries
  - 5.5 Future work plan
  - 5.6 Recommendations
6. Other species
  - 6.1 Update on the fisheries
  - 6.2 Review of progress against CMM 2020-15 (Demersal stocks)
  - 6.3 Review of other species workplan (SC5 report Annex H)
  - 6.4 Resource analyses by member countries
  - 6.5 Future work plan
  - 6.6 Recommendations
7. Technical work to inform reference points and harvest strategy development -
  - 7.1 Report of the consultancy for the SIOFA Harvest Strategy Development (Project SER2020-01)



## 7.2 Future work plan

### 8. Ecological risk assessment

#### 8.1 Deepwater chondrichthyans

8.1.1 Implementation of FAO shark guides (CMM 2019-02, para. 8) and other efforts to improve data collection

8.1.2 Review of progress against CMM 2019-12 (Sharks), including development of precautionary bycatch limits (CMM 2019-12 para. 4)

8.1.3 Future work plan

8.1.4 Advice to the Scientific Committee

#### 8.2 Teleosts and others

8.2.1 Update on progress with teleosts ERA

8.2.2 Priority species for further assessment

8.3 Report of Ecosystem Approach to Fisheries - Dr Fridtjof Nansen cruise (2018)

8.4 Future work plan

8.5 Recommendations

### 9. SIOFA stock assessment framework – implementation, including species categorisation and data characterisation, including refining SIOFA species list

9.1 Review and discussion

### 10. Consideration of SERAWG work plan and resource requirements

#### 10.1 Work plan to realise the General Objectives relating to the 2020 EU Grant

10.1.1 Report of the consultancy to coordinate, plan, and assist implementation of science consultancies to support the SIOFA scientific working plan (Project SCM2021-01)

10.2 Support the assessment of the key target stocks

10.3 Management of vulnerable Marine Ecosystem

10.3.1 Updates to ERA work – Updates the teleost ERAs with better and more recent input data

10.4 Management of other ecosystems components

10.4.1 Updates to ERA work – Seabirds, Mammals, By-catch species

10.5 Reinforcing the data collection, SIOFA data/bases systems, coding and data processes

10.6 Review and update of the Scientific Committee workplan

11. Consolidated advice to Scientific Committee

12. Appointment a new Co-chair of the SERAWG (Ecological Risk Assessment)

13. Future meeting arrangements

14. Other business

15. Adoption of the meeting report

16. Close of meeting

## ANNEX C – tables of agenda items and related papers

Agenda Item	Related Papers
<p><b>1. Opening</b></p> <p>1.1 Opening statement from the Chair 1.2 Introduction of participants</p>	
<p><b>2. Administrative Arrangements</b></p> <p>2.1 Adoption of the agenda 2.2 Confirmation of meeting documents</p> <p>2.3 Appointment of rapporteurs 2.4 Review of functions and terms of reference</p>	<p>SERAWG-03-01 Provisional Agenda SERAWG-03-03 Table of agenda items and related papers (this) SERAWG 03-04 List of participants</p>
<p><b>3. Alfonsino</b></p> <p>3.1 Update on the fishery 3.2 Data catalogue of available variables and attribute data in SIOFA - 3.3 Review of progress against CMM 2020-15 (Demersal Stocks) 3.4 Review of Alfonsino Workplan 3.5. Resource analyses by member countries</p> <p>3.6. Future work plan</p> <p>3.7 Recommendations</p>	<p>SERAWG-03-09 rev1 Alfonsino growth, length and maturity estimates from fish sampled (Cook) SERAWG-03-INFO-05 Alfonsino fisheries - data poor or not (SIODFA) SERAWG-03-INFO-06 Use of Survey for the management of Alfonsino fishery (SIODFA) SERAWG-03-INFO-07 Tagging Alfonsino (SIODFA)</p>
<p><b>4. Patagonian toothfish</b></p> <p>4.1 Update on the fishery - 4.2 Review of progress against CMM 2020-15 (Demersal stocks) 4.3 Patagonian toothfish workplan 4.4 Resource analyses by member countries</p> <p>4.5 Relevant information from CCAMLR 4.6 Future work plan 4.7 Recommendations</p>	<p>SERAWG-03-05 Depredation (France Territories) SERAWG-03-06 Protocol for documenting marine mammals interactions (France Territories) SERAWG-03-08 PiNT - a tool for renaming observer photographs at sea (France Territories) SERAWG-03-INFO-02 Killer whale photo-identification made easy (France Territories)</p>

<p><b>5. Orange roughy</b></p> <p>5.1 Update on the fishery  5.2 Review of progress against CMM 2020-15 (Demersal stocks)  5.3 Review of orange roughy workplan (SC5 report Annex H)  5.4 Resource analyses by member countries  5.5 Future work plan  5.6 Recommendations</p>	
<p><b>6. Other species</b></p> <p>6.1 Update on the fisheries  6.2 Review of progress against CMM 2020-15 (Demersal stocks)  6.3 Review of other species workplan (SC5 report Annex H)  6.4 Resource analyses by member countries  6.5 Future work plan  6.6 Recommendations</p>	
<p><b>7. Technical work to inform reference points and harvest strategy development -</b></p> <p>7.1 Report of the consultancy for the SIOFA Harvest Strategy Development (Project SER2020-01)  7.2 Future work plan</p>	<p><b>SERAWG-03-10</b> SIOFA harvest strategy report</p>
<p><b>8. Ecological risk assessment</b></p> <p>8.1 Deepwater chondrichthyans  8.1.1 Implementation of FAO shark guides (CMM 2019-02, para. 8) and other efforts to improve data collection  8.1.2 Review of progress against CMM 2019-12 (Sharks), including development of precautionary bycatch limits (CMM 2019-12 para. 4)  8.1.3 Future work plan  8.1.4 Advice to the Scientific Committee  8.2 Teleosts and others  8.2.1 Update on progress with teleosts ERA  8.2.2 Priority species for further assessment  8.3 Report of Ecosystem Approach to Fisheries - Dr Fridtjof Nansen cruise (2018)  8.4 Future work plan  8.5 Recommendations</p>	<p><b>SERAWG-03-INFO-03</b> A preview of an account of Deepwater Sharks (SIODFA)  <b>SERAWG-03-INFO-04</b> Southern Oceans Deep-sea Elasmobranch Exploration Project SO-DEEP (SIODFA)</p> <p><b>SERAWG-03-07</b> Albatross and petrel distribution within SIOFA (France Territories)</p>
<p><b>9. SIOFA stock assessment framework – implementation, including species categorisation and data characterisation, including refining SIOFA species list.</b></p> <p>9.1 Review and discussion</p>	

<p><b>10. Consideration of SERAWG work plan and resource requirements</b></p> <p>10.1 Work plan to realise the General Objectives relating to the 2020 EU Grant</p> <p>10.1.1 Report of the consultancy to coordinate, plan, and assist implementation of science consultancies to support the SIOFA scientific working plan (Project SCM2021-01)</p> <p>10.2 Support the assessment of the key target stocks</p> <p>10.3 Management of vulnerable Marine Ecosystem</p> <p>10.3.1 Updates to ERA work – Updates the teleost ERAs with better and more recent input data</p> <p>10.4 Management of other ecosystems components</p> <p>10.4.1 Updates to ERA work – Seabirds, Mammals, By-catch species</p> <p>10.5 Reinforcing the data collection, SIOFA data/bases systems, coding and data processes</p> <p>10.6 Review and update of the Scientific Committee workplan</p>	
<p><b>11. Consolidated advice to Scientific Committee</b></p>	
<p><b>12. Appointment a new Co-chair of the SERAWG (Ecological Risk Assessment)</b></p>	
<p><b>13. Future meeting arrangements</b></p>	
<p><b>14. Other Business</b></p>	
<p><b>15. Adoption of the meeting report</b></p>	
<p><b>16. Close of meeting</b></p>	

## ANNEX D WORK-PLAN (updated)

Source of Budget		SIOFA budget (except 2nd HS & RP consultant by the EU fund)												to be decided later	
Year		2021												2022	
Month		3	4	5	6	7	8	9	10	11	12	1	2	3	4 - 12
Meetings		WG3 +SC6												WG4 +SC7	
Harvest strategies (HS) and Reference Points (RP)													[2nd] Consultant (15K) (EU budget)		
Teleosts ERA work		Australia													
Orange roughy	Acoustic data				Acoustic data (2018-2020) process (Consultant) (20K)										
	Stock assessment										Consultant (25K)				
Alfonsino	Acoustic data						Investigation (Consultant) (0.5K)								Acoustic data process (Consultant) (15K) if the investigation (2021) proves feasibility to use.
	Estimation of the growth equation (WEST)	National scientists to be encouraged to do this work this (aged data by otolith by Fish Ageing Services are available & not yet analyzed) (n=250 each ♂ & ♀)													
	Age validation using bomb calorimetry														Consultant (15K)
	Stock assessment (with more size and other biological data)														Consultant (25K)
Patagonian toothfish	Stock analyses	National scientists and/or the joint works with CCAMLR													
	Tagging	National scientists collaborating with the CCAMLR													
	Stock structure (molecular analysis)													(1) SIOFA (Del Cano) and CCAMLR (Crozet, Kerguelen & Prince Edward) (2) SIOFA (William's Ridge) and CCAMLR (Kerguelen's and Heard & McDonald's) (EU?, France Territories, Japan? & Australia)(*) (CONSULTANT)	
	Growth equation (otolith)													Collection of otolith and ageing (Del Cano Rise and William's Ridge) (EU?, France Territories, Japan? & Australia) (*) (CONSULTANT)	
														(*) EU & Japan will decide in SC6 if they will join.	