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Deep Sea Fisheries (DSF) Project - Toothfish Workshop Report

Deep Sea Fisheries Project

COMMON OCEANS PROGRAM

Deep-sea fisheries project

Report of the DSF Project workshop on data and knowledge sharing in toothfish longline fisheries

4 & 6 August 2026

Context for the workshop

The Common Oceans Deep-sea Fisheries Project, implemented by FAO, facilitated an online workshop on data and knowledge sharing in toothfish longline fisheries, which took place over two 2-hour sessions, on 4 and 6 August 2026 (see Annex 1). The workshop was chaired by Alistair Dunn and supported by Keith Reid.

The Common Oceans Deep Sea Fisheries (DSF) Project is funded by the Global Environment Facility and partners with seven regional fisheries management organisations that manage deep-sea fisheries in areas beyond national jurisdiction (NAFO, NEAFC, GFCM, NPFC, SPRFMO, SEAFO and SIOFA). While CCAMLR is not a formal partner, there is active and ongoing informal collaboration on various DSF Project activities.

The DSF Project is framed around three areas of work that aim to implement and strengthen regulatory frameworks, improve deep-sea fisheries management and identify cross-sectoral interactions. An overarching area of work promotes the sharing of knowledge, experience and good practice to advance sustainable deep-sea fisheries management. In this context, the workshop brought together key stakeholders to improve shared understanding and identify practical opportunities for collaboration.

Demersal longline fisheries for Patagonian toothfish (*Dissostichus eleginoides*) are currently conducted in areas managed by SPRFMO, SIOFA, SEAFO and CCAMLR as well as in other areas beyond national jurisdiction. Some fisheries are managed using integrated assessments in the Atlantic and Indian Ocean sectors under the auspices of CCAMLR, although there are also data-limited (exploratory) fisheries for toothfish in the CCAMLR Area that are bordering the three RFMOs. Despite differences in terminology and the time over which fisheries have been undertaken, each management body has recognised the data limitations associated with their respective fisheries management approaches.

The first session of the workshop introduced the perspectives of different organisation/stakeholders on current toothfish fisheries; the second session reviewed key issues and knowledge gaps from Session 1 and sought to identify where the combined knowledge base could be used to address data limitations to support improved management and assessment approaches.

The overall aims of the workshop were to facilitate stakeholder engagement (see Annex 2) and discussion as an enabling mechanism for shared understanding of the different Patagonian toothfish longline fisheries and their management approaches, and to promote opportunities for:

(i) data sharing to improve availability and interpretation of information required for management,

(ii) sharing insights and experiences of successful management approaches,

(iii) considering harmonised requirements to provide operational consistency for vessels that fish under different management arrangements.

Stakeholder Perspectives

The first session of the workshop comprised of a series of short presentations of the toothfish fisheries in the different regions and the perspective of nations and the fishing industry that operates in those fisheries. The following presentations were given:

CCAMLR: Stéphane Thanassekos (CCAMLR Secretariat) outlined the extensive CCAMLR toothfish tagging programme including the use of the data in biomass estimation and toothfish movements. He also outlined the data sharing workflows with neighbouring RFMOs.

SEAFO: Takehiro Okuda (Japan) described the history of the fishery in SEAFO. In 2015 SEAFO agreed a data limited HCR based on NAFO Greenland halibut HCR that uses the slope of CPUE in the most recent 5 years.

SPRFMO: Trent Timmiss (Australia) described how toothfish fisheries in SPRMFO have been conducted under a formal exploratory framework since 2016 with many of the requirements being well aligned with those of CCAMLR. SPRMFO will hold a workshop in 2026 to determine how the existing fisheries transition from exploratory to established fishery as SPRFMO requires this to occur after 10 years.

SIOFA: Roberto Sarralde (Spain) outlined the three Patagonian Toothfish Management Areas in SIOFA that are managed under separate TACs developed using a trend analysis based on the CCAMLR approach. Biomass estimates are highly sensitive to the choice of reference area and the assumed coefficient of variation in CPUE.

National: Hyejin Song (Korea) provided an overview of Korea's Patagonian toothfish longline fishery in FAO Area 41 in which 9–10 Korean-flagged vessels have fished per year between 2016 and

2025. She described how the data collection and reporting requirements are implemented via the Korean national authority licence and are largely consistent with the CCAMLR requirements.

Industry: Rhys Arangio (COLTO) described how the Coalition of Legal Toothfish Operators is a global industry body representing licensed Patagonian and Antarctic toothfish operators since 2003. It has 50 members who collectively account for 85% of the total global catch including SPRFMO, SIOFA, SEAFO, CCAMLR and FAO Area 41. Fishing in these areas necessitates completing four similar, but not identical, catch reporting forms that creates more work at sea, more chance of error and makes comparisons across regions more difficult.

Summary of Session 1 key issues

Region	Current situation	Challenges
CCAMLR	Long-running tagging program; nearly half a million fish tagged; established hub for toothfish tagging supplies, recapture linking and bilateral data exchanges.	How best to share data collection protocols, processing tools, summaries and reference knowledge with RFMOs without assuming identical use-cases.
SEAFO	Long catch time-series and observer coverage; Catch limits set using CPUE-trend via a HCR based on Greenland halibut model agreed in 2015.	HCR to be reviewed in 2026 due to changes in fishery participants and impact on the CPUE time-series. Low tagging rate and few recaptures.
SPRFMO	Regulations for exploratory fisheries for Antarctic and Patagonian toothfish largely aligned with CCAMLR including tagging rates. Exploratory phase of fisheries is time limited.	Transition from exploratory fisheries; no formal catch-limit setting arrangement outside of exploratory fisheries; transboundary movements and removals.
SIOFA	Has three toothfish management areas where catch limit set using CCAMLR-aligned trend analysis. Sufficient recaptures for a Chapman estimate in 1 of 3 areas.	Biomass estimation is hampered by currently low recapture rate of tagged fish (from a recently initiated tagging programme) and sensitivity to choice of reference areas and CPUE assumptions. An HCR is in development.
FAO Area 41	Korea consistently takes largest catch of toothfish by non-coastal states in FAO 41, use the CCAMLR C2 form for catch reporting to domestic authority and have 100% observer programme.	Other nations also fish in the area but there is no central data integration, no tagging programme, age validation or joint assessment process.

Session 2 -

Researchers and managers often have, by necessity, a focus on individual fisheries and/or regions. However, fisheries targeting toothfish in different regions have many common attributes. While there is often an emphasis on collecting data to provide region-specific information, there are typically many life-history attributes that are common across regions that could be used to enhance assessments. Despite differences in terminology and the time over which fisheries have been active, each management body has recognised the data limitations associated with their respective management approaches.

In the second session of the workshop participants identified the following three thematic areas to be presented to the relevant organisations for their consideration:

1. Data sharing to improve availability and interpretation of information that is required for the management processes implemented by each organisation

Data sharing arrangements

CCAMLR holds the only formalised tagging-data arrangements in this group, with established exchanges in place with SPRFMO and SIOFA and cooperative mechanisms involving SEAFO. SEAFO, SIOFA and SPRFMO do not have comparable arrangements among themselves, meaning CCAMLR effectively serves as the central hub for most toothfish tagging information. Participants recognised the value of expanding such links but also the administrative effort required, to set them up.

In the case of toothfish, where many of the same Members are engaged in toothfish fisheries across different regions, the workshop participants considered that it may be more practical for those nations to develop cross-region collaborations and to bring joint analyses to the scientific meetings of the different organisations.

While the workshop focussed on data sharing for scientific purposes, there was also a recognition that an analogous process for data sharing pertaining to the implementation of conservation and management measures related to toothfish fisheries would be valuable, especially given the common requirements, including to implement the CCAMLR Toothfish CDS.

Toothfish tagging

Currently the CCAMLR Secretariat is a coordination hub for tagging equipment (including tags) and this is seen as an effective way to avoid both duplication of effort and any duplication of tag number sequences that would negatively impact existing tag-linking algorithms.

Maps of tagged fish release and recapture locations in the CCAMLR Area are publicly available (https://fishdocs.ccamlr.org/SpDescr_TOP_2025.html) . The workshop participants agreed that a similar mapping product that included all recaptures of Patagonian toothfish from all areas would be helpful in understanding the linkages between regions and organisations.

2. Shared insights and experiences of successful management approaches

Current approaches to using trend analysis to set catch limits

Data-limited assessment approaches for Patagonian toothfish are converging around seabed-area analogy and decision frameworks based on CPUE trends and mark-recapture estimates where sufficient recaptures are available (https://fishdocs.ccamlr.org/TrendAnalysis_2025.html). This approach leverages information from data-rich, assessed toothfish fisheries (denoted as 'reference areas') to inform estimates of biomass in data-limited areas. Initially developed within CCAMLR, this approach is used in SIOFA and is being considered for adoption in SPRFMO. SEAFO currently uses a separate CPUE-based harvest-control rule derived from the NAFO Greenland halibut HCR.

The workshop participants recognised the opportunities for:

- R Code sharing: CCAMLR, SIOFA and SPRMFO have GitHub repositories where the trend-analysis code is shared allowing the cross-validation and code functionality testing as well as shared updates to data inputs especially updated bathymetry and reference area biomass estimates.
- Standardisation of CPUE estimation: CPUE is integral to the trend analysis and differences in CPUE may arise between fishing fleets and gear types (e.g., whether effort is measured by line length or number of hooks). Where CPUE is used to tune the biomass estimate and/or used in the trend analysis, the estimation methods should be standardised wherever possible. This could include cross-region and comparisons of CPUE from individual vessels.
- Development of criteria for the choice of reference area: The choice of reference area is clearly influential in the estimation of biomass by seabed area analogy; an examination/development of criteria for the choice of reference area may reduce uncertainty in biomass estimates.
  Collaboration on simulation testing: Simulation testing of the trend analysis method is being developed in CCAMLR and there is an opportunity for collaboration across organisations that are using the same overall approach.

Moving beyond data-limited exploratory fisheries

The workshop discussed the difference between organisations in nomenclature and criteria for exploratory fisheries and noted that the description of a fishery as 'exploratory' may not be directly linked to the amount and quality of data available from that fishery. The process of transition from an exploratory to an established fishery (or a fishery not referred to as exploratory) has both a science element, in terms of the assessment approach and data requirements, and a policy element related to nomenclature, regulation and fishery access.

The workshop only considered the scientific aspects and suggested that following a stepwise approach as data improves represents a pragmatic approach. This could involve progressing from using estimates of biomass based on seabed area analogy, to including mark-recapture Chapman estimates, to incorporating these estimates into surplus production/population models. Within such a process there is considerable scope for cross-region sharing of parameters as well as leveraging information from assessed toothfish fisheries.

A potential cross-region work programme for data-limited toothfish assessments could address the following questions

1. Which life-history parameters, such as growth, maturity, length-at-age are reasonably transferable, and what criteria should be met before sharing across regions?
2. Are species level similarities or regional differences more important in making progress across regions?
3. How should CPUE/trend rules select vessels, time windows, bounds and reference areas; which assumptions most need sensitivity testing?
4. When Chapman estimates are feasible, what minimum recapture/quality criteria should trigger their use?
5. Could management strategy evaluation or other simulation testing be shared for similar data-limited decision rules?
6. How should removals and information from connected areas be incorporated?
7. For age-based assessment approaches could shared age-reading calibration, biological reference libraries or common metadata standards be accelerators?

Workshop participants cautioned that CPUE alone may not reliably indicate abundance, particularly where aggregation, fleet behaviour or spatial concentration maintain catch rates as stock size changes.

In respect of question 1, the cross-regional consistency of data also relies on consistency in observer instructions/training, operation and data quality/processing. The criteria for comparability of length measurement across regions used in growth estimates and age-length keys could be guided by an analysis of the length of tagged fish at release and at recapture where there is a short time at liberty. This examination of length data could also include an evaluation of whether different length measurement methods, such as standard length or total length, provide improved reliability.

3. Advantages of, and potential for harmonised catch data collection and reporting

The workshop discussed the common requirements for haul-by-haul data in all areas and noted that while there are similarities in the catch reporting formats, these are different across regions. The workshop participants recognised that standardisation to a single toothfish longline fishery reporting format could enhance data quality through common workflows and data quality assurance processes that spanned data collection on vessels to data management in Secretariats. Currently catch reporting logbooks used in SEAFO are modelled on the CCAMLR C2 form and the same form is used in the SPRFMO exploratory fishery. The SIOFA vessel logbook form shares some of the reporting requirements included in the CCAMLR C2 form but differs in layout and nomenclature. The CCAMLR C2 form is also accompanied by a thorough data reporting manual to guide the use of the form. The workshop participants recognised the value of each organization considering the potential for a single toothfish longline catch reporting form.

The workshop participants requested the DSF Project to provide an overview of vessel logbook forms and reporting requirements currently in use for toothfish longline fisheries to identify the minimum set of requirements across all organisations and determine if there is an optimum reporting format available. The workshop participants noted that interoperability, achieved through common definitions and core data requirements, may be more practical than creating identical systems.

The workshop acknowledged that some observers in the toothfish fishery also work across regions and there may be similar benefits of reporting format harmonisation. However, as observer data reflects a more diverse suite of data reporting, and that such harmonisation should include training, tasking and reporting requirements, it was considered that priority should be given the harmonising vessel catch and effort data.

4. Future Plans

The workshop participants thanked the DSF Project for holding the workshop and agreed that the report should be presented to the respective scientific committees for their deliberations. The workshop participants also supported continuing efforts for cross-organisational coordination on toothfish data and assessment methods, noting that this coordination would require engagement and resources and should not duplicate existing organisational mandates.

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Annex 1: Workshop Agenda

Session 1	**4 August 0800 UTC**
0800–0810	Introduction and Workshop Objectives
0810–0900	Presentations on CCAMLR, SEAFO, SPRFMO and SIOFA
0900–0930	Presentations from National and Industry perspectives
0930–1000	Review of approaches, challenges and data/knowledge gaps
Session 2	**6 August 0800 UTC**
0800–0815	Summary of Session 1
0815–0845	Data reporting formats and assessment approaches – opportunities and synergies
0845–0915	Tagging and coordination (protocols and data)
0915–0945	Future collaboration frameworks
0945–1000	Workshop summary and close.

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Annex 2: Workshop Attendees

Name		Location/Organisation
Rhys	Arangio	COLTO
Santiago	Barreiro	Spain
Paul	Brewin	Falkland Islands
James	Brown	SPRFMO Secretariat
Sangdeok	Chung	Korea
Daphnis	de Pooter	CCAMLR Secretariat
Susanna	Delgado	SPRFMO Secretariat
Jack	Fenaughty	New Zealand
Jessica	Fuller	SPRFMO Secretariat
Eunjung	Kim	Korea
Tim	Lamb	Australia
Marco	Milardi	SIOFA Secretariat
Moa	Mori	Japan
Andrew	Newman	COLTO
Takehiro	Okuda	Japan
Jeongseok	Park	Korea
Vanessa	Rojo Mendez	Spain
Roberto	Sarralde	Spain
Sobahle	Somnlaba	South Africa
Hyejin	Song	Korea
Stéphane	Thanassekos	CCAMLR Secretariat
Trent	Timmiss	Australia
Bernard	Vigga	SPRFMO Secretariat
Andy	Wrigth	SPRFMO Secretariat
Alistair	Dunn	Chair
Eszter	Hidas	FAO DSF Project
Keith	Reid	FAO DSF Project