

SCARFISH: A new SCAR action group to co-ordinate Antarctic fish research

1 | INTRODUCTION

Fish are among the most understudied components of the Southern Ocean food web, yet they are critically important to the functioning of Antarctic marine ecosystems (Caccavo et al., 2021; McCormack et al., 2021). Fish make up a significant portion of the biomass in the Southern Ocean (Dornan et al., 2022; Eastman, 2005), support economically important fisheries (Brooks, 2013; Everson, 2019; Grilly et al., 2015; Stoeckl et al., 2024) and comprise a dazzling array of unique biodiversity along with high endemism (Duhamel et al., 2014; Eastman, 2005; Hill et al., 2017), adaptations (Bista et al., 2023; Daane & Detrich, 2022; Hotaling et al., 2023) and evolutionary history (Dornburg et al., 2017; Near et al., 2012). Recent syntheses have highlighted the compounding impacts of climate change, including increasing variability in temperature, acidification, sea ice coverage and primary productivity, together with anthropogenic pressures such as pollution, tourism and fisheries on Southern Ocean ecosystems (Chown et al., 2022; Constable et al., 2023). Although studies have highlighted the pressures on Antarctic marine ecosystems, associated uncertainties and knowledge gaps more broadly, there is a critical need to assess research priorities with respect to Southern Ocean fish species, especially with regard to genomics, climate change impacts, as well as status, trends and vulnerabilities of non-targeted and by-catch species (Caccavo et al., 2021). Furthermore, improved co-ordination of international research efforts, especially those focused on climate change impacts on Southern Ocean fish, will strengthen the understanding of this key ecosystem component, providing much-needed information for conservation and management purposes, helping to achieve the objectives of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), as well as those of other international bodies and conventions such as the International Union for Conservation of Nature (IUCN), the Convention on Biological Diversity (CBD) and the Intergovernmental Panel on Climate Change (IPCC).

Recognizing this, a group of research experts within the Scientific Committee on Antarctic Research (SCAR) have formed a new Action Group focused on fish: 'SCARFISH'. SCARFISH aims to bring together existing research communities by facilitating knowledge exchange, improving co-ordination of priorities, disseminating recent research

developments, navigating data sharing and broadening participation in these communities from currently underrepresented groups. In this paper, we introduce SCARFISH and its Working Groups and encourage widespread participation in this new initiative.

1.1 | Connecting research to fisheries management

1.1.1 | SCAR

SCAR is an interdisciplinary body of the International Science Council, with a membership of 46 countries and comprises an extensive international network of scientists. SCAR initiates, develops and co-ordinates robust international scientific research in, from and about the Antarctic, including the Southern Ocean. SCAR also provides independent and objective scientific advice to the Antarctic Treaty System, including CCAMLR, and other bodies (Chown et al., 2024; Hughes et al., 2022). SCAR promotes scientific collaboration by encouraging open participation from the wider international community. This is achieved through SCAR scientific conferences and engagement in SCAR Science Groups, Action and Expert Groups, Scientific Research Programmes and Standing Committees, irrespective of nationality or institutional affiliation.

1.1.2 | CCAMLR

The primary decision-making body for conservation and management in the Southern Ocean is CCAMLR, an international body established under the Antarctic Treaty System to conserve marine life in the Southern Ocean. CCAMLR applies a precautionary, ecosystem-based approach, which considers conservation and commercial harvesting within the context of the complex relationships between all Southern Ocean species and their physical environment (CCAMLR, 1980). In other words, CCAMLR is required to consider impacts on fish targeted by commercial fisheries, but also on their predators, prey and the wider ecosystem.

CCAMLR's policy decisions are made by consensus among its member states grounded in scientific advice. CCAMLR has a variety

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of interseasonal working groups and workshops that report findings and scientific advice to its Scientific Committee (SC-CAMLR), which in turn provides advice to CCAMLR on an annual basis (CCAMLR, 2021; Sylvester & Brooks, 2020). Formal scientific participation and consensus decision-making in CCAMLR is centred on its 27 Members (26 States plus the EU). A number of non-governmental organizations (including SCAR), intergovernmental organizations and industry groups are invited to attend CCAMLR meetings as observers, without voting rights. Observers like SCAR are not allowed to attend scientific working groups, rather, scientists who attend working groups have to be from a national delegation. This can create a barrier to ensuring that extensive international research is considered in policy, for example, including from countries which are not members of CCAMLR and thus underrepresented in science policy. SCAR has been attending CCAMLR for decades and works to bring independent scientific advice forward. However, given that most of this advice comes from existing SCAR groups, before the creation of SCARFISH, there was not a dedicated group to bring forward information on fish research in particular.

1.2 | An opportunity for an action group on fish

There are significant barriers to translating scientific findings into effective management and policy. These include insufficient communication between research communities, and limited resources and mechanisms for integrating diverse forms of knowledge into decision-making processes (Cavanagh et al., 2021; Hughes et al., 2022). Before the creation of SCARFISH, none of the existing SCAR groups specifically focused on fish, or the role of fish in the Antarctic ecosystem. However, a recently formed SCAR krill Expert Group (SKEG) focused on krill and was incredibly successful at co-ordinating krill research and integrating research from the broader krill community into CCAMLR. This helped pave the way for a new SCAR group to focus specifically on fish and on co-ordinating and galvanizing the wider Antarctic fish community, including in terms of bringing this work forward into CCAMLR. Given the central role of fish in the Southern Ocean ecosystem, as well as the current knowledge gaps, we developed SCARFISH to grow SCAR expertise on these organisms through a dedicated group spanning all expert communities. As a distinct fish-focused group within SCAR, SCARFISH strengthens co-ordination and collaboration between the broader research community and CCAMLR. In this way, SCARFISH supports comprehensive and representative decision-making, providing expertise and resources from across the international research community regardless of nationality or discipline. By co-ordinating research among Southern Ocean ichthyologists, we address critical gaps in our understanding of the many factors (e.g., genomics, population dynamics, species distributions, life history, trophic interactions, pollution, pathogens and climate change) that can influence commercially targeted and non-harvested fish populations alike (Caccavo et al., 2021).

Improved knowledge regarding species that are not the target of fisheries at present, including mesopelagic and by-catch species, is

especially urgent for successful and precautionary ecosystem-based management (Caccavo et al., 2021). Furthermore, the recent CCAMLR workshop on climate change highlighted the need to study the potentially interactive effects of climate change and fishing on target, associated and dependent fish species (Cavanagh & Pardo, 2023). With the pace of climate change accelerating globally, accompanied by the rapid development in research tools and approaches, improved mechanisms for sharing knowledge on the biology and ecology of Southern Ocean fish are necessary to efficiently address gaps and streamline future research priorities.

Enhanced understanding of needs and priorities for management and conservation in the Southern Ocean will guide fieldwork, funding applications, research collaborations and the creation of student and postdoctoral fellowships in the wider Antarctic fish research community. Numerous national programmes have long-standing research expertise on Antarctic fish, for example, research on fish communities of the Weddell continental shelf from the R.V. *Polarstern* through Germany since “the 1980s (e.g., La Mesa et al., 2019), fish biology and ecology in the Ross Sea under the Italian Programme for Antarctic Research (e.g., Guidetti et al., 2014), New Zealand toothfish research programmes (e.g., Parker et al., 2019) and the shelves and fjord systems along the Antarctic Peninsula through, for example, Argentina, Germany and the United States since the early 2000s (e.g., Barrera-Oro, 2002; Kock & Jones, 2005; Novillo et al., 2024).” A key deliverable of SCARFISH will be to improve the co-ordination of these ongoing activities among national programmes with respect to Antarctic fish.

2 | SCARFISH OBJECTIVES

The three overarching aims of SCARFISH are to (1) identify and address Southern Ocean fish knowledge gaps through co-ordinated, inclusive and efficient collaboration; (2) develop a model of cointegration between SCAR's expertise on Southern Ocean fish and the research needs of conservation and management bodies (e.g., CCAMLR) to achieve conservation objectives; and (3) broaden the diversity of researchers engaged in Southern Ocean fish research.

2.1 | Identify and seek to address knowledge gaps

To achieve Aim 1, SCARFISH brings together and draws upon expertise from the SCAR fish research community through online and in-person workshops, meetings and working groups. SCARFISH developed seven working groups based on community-driven interest and engagement, achieved through a series of surveys shared with the wider SCAR community. These groups are as follows: (1) Horizon Scan to identify the major threats, gaps of knowledge and most important scientific questions regarding Southern Ocean fishes; (2) Biology and Life History (BLH) group to advance knowledge of Southern Ocean fish ecological strategies, such as how different life history, habitat usage and feeding and predator-avoidance behaviours promote

ecological success; (3) Biogeography, Modelling and Management tools (BMM) group to improve awareness of, and access to, state-of-the-art data, tools and products necessary for modelling species distributions, interactions and climate change impacts; (4) Genomics, Physiology and Pathology (GPP) group to understand evolutionary adaptation of Antarctic fish in response to environmental change, integrating genetic, physiological and ecological data to assess species' resilience; (5) Fieldwork group to increase knowledge sharing on planned fieldwork, best collection practices, fish data, sample availability and collection opportunities; (6) Data group to enhance understanding of data repositories and structures currently used to store Southern Ocean fish data; and (7) outreach group to produce communication materials on relevant research and engage policymakers and the public.

2.2 | Work across organizations to support conservation

For Aim 2, we are improving the exchange of information between the Antarctic fish research community and CCAMLR, as well as other international bodies and conventions such as the IUCN. Through online and in-person workshops, reports and publications, we synthesize fish research priorities from policymakers, solicit research from the Southern Ocean fish research community to fill these gaps and lay the groundwork to develop funding applications to address identified priorities and gaps. Further, we are broadening the accessibility of fish research and data by the wider community, while also ensuring that research findings are made available to policymakers in appropriate formats. This is achieved through intersessional workshops, synthesis papers (including both grey and peer-reviewed literature) on Southern Ocean fishes and papers on research being co-ordinated through SCARFISH. Throughout this process, we seek to coproduce research between the Southern Ocean fish community and the CCAMLR and wider management and conservation communities.

2.3 | Improve equity, diversity and inclusion

For Aim 3, SCARFISH strives to increase representation of non-male genders, early-career researchers (ECRs) and researchers from outside the traditional fish science community, particularly non-Anglophone countries, in Southern Ocean fish research. Initiatives that intentionally incorporate diverse and underrepresented perspectives have been shown to improve conservation outcomes (e.g., Chaplin-Kramer et al., 2023). SCARFISH is working towards a mutually beneficial culture of colearning by (1) prioritizing equity, diversity and inclusion (EDI) objectives within all SCARFISH activities, for example, ensuring that EDI actions from all working groups incorporate proven strategies, including, but not limited to, developing guidelines for clear and accessible communication, identification of key partners for support and accessible data sharing and publication (Valdez et al., 2024); (2) decreasing financial barriers to participation through funding for

members of underrepresented groups in the fish research community to attend SCARFISH in-person meetings and workshops; (3) pairing ECRs and more senior scientists in joint leadership positions within working groups; and (4) normalizing open data and accessible fieldwork informed by safety protocols and codes of conducts, both of which have been shown to improve EDI in research communities (Chtena et al., 2023; Coon et al., 2023; Johri et al., 2021; Nash et al., 2019).

SCARFISH does not have a dedicated EDI group; instead, EDI issues are addressed within all SCARFISH working groups. Recognizing that EDI issues are complex, and that SCARFISH does not have all the tools necessary to address these issues, we are increasing our equitable research capacity by collaborating with the SCAR EDI Action Group. Specifically, we are (1) raising awareness of, and procedures to access, fisheries data from CCAMLR; (2) facilitating opportunities for sampling aboard commercial fishing vessels; (3) improving access to data and samples collected aboard such vessels; (4) disseminating all SCARFISH outputs through open-access publications; (5) supporting participation in SCARFISH and Antarctic fish research from countries with emerging Antarctic programmes; and (6) providing opportunities for ECRs.

3 | SCARFISH WORKING GROUPS

3.1 | Horizon scan

Horizon scans are an established tool/mechanism that allows the research community, policymakers and overall network of practitioners to identify the main issues, threats and future directions of a specific field, discipline or region (Sutherland & Woodroof, 2009). By gathering a group of experts that use a systematic approach and receive input from the wider community, horizon scans collect important and reliable evidence that is useful for, among other things, planning, policy initiatives and defining research priorities (Sutherland & Woodroof, 2009). Horizon scans can have different scales, from local (e.g., Galparsoro et al., 2025). (to global (e.g., Herbert-Read et al. (2022); Sutherland et al. (2025)) assessments. SCAR undertook a broadscale horizon scan considering Antarctica and the Southern Ocean just over a decade ago. This exercise considered the entire region to define research priorities across disciplines (Kennicutt et al., 2014). Since then, a number of studies and action plans have been developed to highlight research directions in specific environments (e.g., National Academies of Sciences Engineering and Medicine, 2023), disciplines (e.g., Clark et al. (2023); Xavier et al. (2016)) and for all of Antarctica (e.g., Southern Ocean Task force, 2021).

The SCARFISH Horizon Scan Working Group aims to identify the major knowledge gaps and prioritize the most important scientific questions regarding Southern Ocean fish. Following the *Delphi method* that uses a sequence of *community* questionnaires and subsequent refinement by a *group of experts* (Mukherjee et al., 2015; Renzi & Freitas, 2015), this working group aims to produce both a Horizon

Scan Report to be delivered to SCAR, CCAMLR and COMNAP (Council of Managers of National Antarctic Programs) and a peer-reviewed publication for the wider scientific community. Furthermore, research priorities identified in this process will be used to guide the future work of SCARFISH, research projects and funding proposals. The SCARFISH Horizon Scan *group of experts* will comprise the members of the SCARFISH Horizon Scan Working Group, and the *community* (i.e., a wide group of researchers that suggest and provide their opinion on the research priorities), including those subscribed to the SCARFISH and SCAR Mailing Lists, and a broad group of practitioners interested in Southern Ocean fish. Furthermore, direct input will be requested from other SCARFISH Working Groups, SCAR and CCAMLR Working Groups, as well as national Antarctic programmes.

3.2 | Biology and life history

Understanding the biology, life histories and ecological roles of Antarctic fish is critical to understanding fish population health and resilience (Cavanagh & Pardo, 2023; Desvignes et al., 2025) while understanding the functional role of fishes in the Southern Ocean ecosystem. The BLH Working Group aims to advance understanding in two priority areas: (1) early life-history stages, with a focus on developing multistage identification material to track transitions from larvae to juveniles and accompanying ecological information; and (2) undertake a systematic review of life histories, including reproduction, recruitment, growth, productivity, feeding ecology and natural mortality. These efforts will help identify critical periods and habitats (e.g., nesting areas, spawning and nursery grounds) essential for fish growth and reproduction, and assist in future assessments on the impacts of stressors such as climate change and fishing on vulnerable life stages (Purser et al., 2022).

3.3 | Biogeography, modelling and management tools

The SCARFISH BMM Working Group aims to improve biogeographic and other modelling-based approaches applied to fish in the Southern Ocean, with an emphasis on methods to analyse species distributions, species and habitat interactions and climate change impacts. Moreover, this working group aims to contribute to ecosystem-based approaches to conservation by working towards integrating ecosystem models for use in management strategy evaluation (Kaplan et al., 2021).

Modelling is a key tool that can help to overcome limitations in spatial and temporal sampling, including at the species level (population, biogeographic, spatial; e.g., Freer et al., 2019; Woods et al., 2023), multispecies level (food web, community; e.g., McCormack et al., 2021; Murphy et al., 2025) and with reference to habitat association (e.g., Duhamel et al., 2014). Modelling can also be useful in understanding key dynamics and possible drivers of species distribution and abundance in the context of environmental

variability and change (Brasier et al., 2021; Saravia et al., 2022). There is a particular need to focus on key mesopelagic (including Antarctic silverfish and myctophids) and demersal species caught as by-catch in Antarctic fisheries. These groups are less well studied compared to target species (Webb et al., 2010), but they are ecologically important (Saunders et al., 2019) and potentially strongly affected by a combination of environmental variability, fishing and climate change (Freer et al., 2019; Woods et al., 2023).

This working group's primary objective is to showcase current fish modelling methods, resources and applications in a co-ordinated and coherent manner. Our review will identify special challenges, opportunities and accepted best practices for modelling to help understand and effectively manage Southern Ocean fish species, communities and associated ecosystems. This working group will also work closely with observationalists and data providers within the BLH and Data Working Groups to ensure awareness of, and access to, the modelling data, tools and products that can help understand, anticipate and manage multifarious drivers and impacts of change.

3.4 | Genomics, physiology and pathology

The Antarctic ichthyofauna is unique in that no other ectotherm vertebrate group has adapted to live year-round at temperatures below freezing (Cziko et al., 2014). This has led to numerous genomic and physiological adaptations and innovations e.g., Castiglione et al. 2023; Desvignes et al. 2023; Devries 1971; Hofmann et al. 2005; York 2023, enabling survival in one of the planet's most extreme habitats. However, as the planet warms, and the ocean absorbs >90% of the heat and >30% of the CO₂ from anthropogenic climate change, it is critical to leverage current genomic and physiology technological advances to understand the true diversity and unique adaptations of these taxa before they may disappear (Clark et al., 2023; Corso et al., 2024; Garmann-Aarhus et al., 2025; Gruber et al., 2019; IPCC, 2023; Parker et al., 2022). Antarctic fishes are at great risk because climate-driven changes such as ocean warming and acidification negatively affect their narrow physiology (Davis et al., 2018; Dowd & Kültz, 2024; Pörtner et al., 2007), which may result in population decline and even reduced biodiversity if species cannot physiologically and genetically cope, acclimate or adapt quickly enough (Noble et al., 2025; Todgham & Mandic, 2020). Further, anthropogenic pollution (e.g., chemical compounds and microplastics; Marrone et al. (2021); Valente et al. (2025)) and novel or resurgent pathogens (e.g., parasites and viruses; Desvignes et al. (2022); Grimwood et al. (2024); Hughes et al. (2020)) can compound the impacts of abiotic stressors and fishery pressures in ways we are only beginning to understand.

The GPP Working Group thus aims to summarize current knowledge, highlight methodological best practices and identify knowledge gaps across these disciplines through meta-analyses and comprehensive literature reviews. These approaches are essential for future research, technological advancements and medical applications (e.g., Beck et al. (2022); Santiago et al. (2016); William and Acker (2021)).

Further, the GPP Working Group interacts with other SCAR groups such as the Antarctic Wildlife and Health Network (AWHN) and the SCAR Plastic in Polar Environments Expert Group (SPEG) to monitor fish health and consequences of pathologies on the Antarctic ecosystem.

3.5 | Fieldwork

The SCARFISH Fieldwork Working Group seeks to enhance sampling activities in Antarctica by increasing (1) the accessibility of samples and data collected in the field; (2) awareness of planned activities with collection opportunities; and (3) availability of fieldwork-related resources, for example, best practices in developing sampling protocols, field safety plans and a review of methods for fish data collection. The goals and objectives of the SCARFISH Fieldwork Working Group address the growing need to prioritize knowledge sharing, ethical practices and innovative approaches required in a rapidly changing landscape. Specifically, the working group will develop a sample request and sharing platform, sampling and data reporting standardization guidelines and partnerships with key entities, such as CCAMLR, commercial fisheries and tourist vessels, to improve fish data collection and tracking (e.g., sharing of data related to by-catch, video footage and eDNA sampling).

After completing an initial census of existing Antarctic fish sampling methodologies, this working group will draft guidelines for field activities to homogenize protocols and appropriate metadata. Due to the intrinsic linkage between sampling activities and data, the Fieldwork Working Group will co-ordinate closely with the Data Working Group, especially regarding activities related to SCARFISH's objective of sharing needs and information on availability of samples. Additionally, the Fieldwork Working Group will provide information that seeks to reduce animal sacrifice. Addressing the urgent need of an Antarctic biorepository network (e.g., O'Brien et al. (2022)), increasing co-ordination among sampling expeditions and optimizing field protocols will benefit both Antarctic fish data collection and the broader research community, especially those who have limited access to fieldwork.

3.6 | Data

Southern Ocean fish data, like most Southern Ocean biological data, present multiple challenges, even as basic as data use (see Van de Putte et al. (2021) for details). Obtaining access to relevant data remains a major obstacle because data are stored in many different places and often without links to central repositories (e.g., OBIS or GBIF). Data are also subject to different levels of access, for example, fisheries-related data are often confidential, and large swaths of data collected within national programmes remain unpublished. This is despite the fact that Article III (1C) of the Antarctic Treaty specifies that data 'shall be exchanged and made freely available' (Antarctic Treaty, 1959). Data use is further hindered by significant lags between

data collection and publication, and the lack of data standardization, despite existing standards. Additional difficulties are posed by the nature of the Antarctic fish data, as they are collected in remote, difficult-to-access areas and are often scarce, limited in seasonality, geographic range and temporal coverage.

In this context, SCARFISH created a dedicated Data Working Group to (1) increase the community's understanding of existing data repositories and structures; (2) identify current hurdles to data publication and sharing; and (3) contribute to increased data availability. This group advises internally on tasks relating to literature searches and reviews of existing data repositories, ensuring that approaches across the different SCARFISH Working Groups are co-ordinated and complementary. Furthermore, it supports SCARFISH groups in their efforts to increase and update data and information (e.g., the SCAR Antarctic Biodiversity portal, OBIS, GBIF, WoRMS, Fishbase, NCBI GenBank and BOLD) and, where possible, promotes increased data accessibility. The Data Working Group will also work with existing outside groups within SCAR and the wider Antarctic community (i.e., SCADM, POLDER, Polar Data Search, Antarctic metadata directory, SOOS) on topics of data standardization and metadata vocabulary regarding Southern Ocean fish.

By promoting open data practices and reduced barriers to data access, SCARFISH will enable researchers across the globe to partake in Southern Ocean fish research, ultimately encouraging a greater diversity of engagement. Adopting FAIR (findability, accessibility, interoperability and reusability, Wilkinson et al., 2016) data principles can improve data accessibility for ECRs (Lucà et al., 2025), while also making research more accessible for researchers unable to participate in fieldwork due to disabilities, caring responsibilities or a lack of funding. Increased data accessibility may also reduce the need for in-person fieldwork, contributing to a reduced anthropogenic footprint in the Southern Ocean.

3.7 | Outreach

The SCARFISH Outreach Working Group's goal is to produce materials that communicate SCARFISH's activities to the wider community, invite collaborations, share relevant research (and data) and engage policymakers as well as the public. This group will contribute to the SCARFISH website, provide content to post to SCAR social media channels, create educational material, develop guide books (e.g., for researchers, schools, ship crews and tourism), produce videos and host webinars. In addition, we aim to produce communications that demystify outputs from policymakers such as CCAMLR.

By releasing material in multiple languages, the Outreach Working Group will engage the non-anglophone research community by reducing language barriers in communication. More broadly, the group aims to support Antarctic fish researchers worldwide in sharing their knowledge with wider audiences, helping researchers around the world to improve the communication and visibility of their work.

4 | OUTLOOK

As a SCAR Action Group, SCARFISH has a 4-year remit from September 2024 to September 2028. Over this time period, we aim to achieve the following SMART goals:

1. Publication of the Horizon Scan outputs to support the Antarctic fish community and guide the future work of SCARFISH.
2. Publication of review and meta-analysis articles from the BLH, BMM, GPP and Fieldwork working groups.
3. Annual presentation of relevant SCARFISH outputs to CCAMLR via papers submitted to CCAMLR's annual meetings.
4. Dissemination of SCARFISH activities and updates from CCAMLR and other management and conservation bodies via SCAR meetings and conferences, annual webinars and outreach/educational material aimed at the Antarctic fish community and wider SCAR audience.
5. Examples of improved sample and data accessibility through the Fieldwork Working Group's sample request and sharing platform, alongside the Data Working Group's promotion of FAIR data principles and collaboration with CCAMLR to help improve awareness of, and access to, CCAMLR datasets.
6. Continued emphasis on promoting EDI within the Antarctic fish research community by ensuring broad representation across gender, native language, geography and career stage in both leadership and membership.

Following our 4-year remit as a SCAR Action Group, we will petition the SCAR delegates to change our status from Action to Expert Group, which will extend our remit for another 6–8 years, with the ability to renew our mandate at the end of this period. As a SCAR Expert Group, we will align our goals and planned outputs with a long-term strategy, emphasizing the questions and gaps identified during our Horizon Scan.

We invite those wanting to stay up-to-date with the activities and outputs of SCARFISH, to [join our mailing list](#), check out the [SCARFISH website](#) or [sign up to join one of the working groups](#). Given the high connectivity and importance of Southern Ocean fish to the rest of the globe (e.g., Murphy et al., 2021), we encourage widespread engagement with SCARFISH from the Antarctic fish community and beyond.

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JAC, CB, RDC, LG, CJ, RK, DM, MM, MN, MHP and JPQ conceptualized the manuscript and developed the author team. JAC managed the author team, including author recruitment, solicitation of contributions, as well as manuscript streamlining and editing. The working group leads led the drafting of their subsections under section SCARFISH Working Groups: JPQ wrote the subsection “Horizon scan”; EC and WR wrote the subsection “Biology and Life History (BLH)”; JF and MHP wrote the subsection “Biogeography, Modelling and Management tools (BMM)”; TD, J-HK and JY wrote the subsection “Genomics, Physiology and Pathology (GPP)”; DDB, HK and CJ wrote the subsection “Fieldwork”; BK and APVdP wrote the subsection “Data”; and MN wrote the subsection “Outreach”. JAC drafted all other sections of the manuscript, with input from all main authors. All main authors as well as authors listed under “SCARFISH members” reviewed and approved the final version of the manuscript.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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