WORLD FISHERIES CONGRESS
ADELAIDE • AUSTRALIA
11-15 OCTOBER 2020

WFC2020 Abstract Submission Guidelines

The World Fisheries Congress 2020 (WFC2020) Steering Committee and International Program Committee invite authors to submit abstracts in all areas related to global fisheries issues and key developments needed to ensure a sustainable future for our oceans, lakes, estuaries and rivers, including commercial, recreational and Indigenous fisheries.

Abstracts can be submitted online via the Abstract Submission Portal, available on the Congress Website.

Abstracts cannot be received via mail, email or fax.

ABSTRACTS KEY DATES

Abstract Submissions Open	November 2019
Abstract Submissions Close	31 January 2020
Early Bird Registration Opens	February 2020

ABSTRACT CATEGORIES

When submitting an abstract you will be required to choose a theme (as listed below) that best represents the content of your abstract.

The four Congress themes are:

- Sustainable Fisheries (Assessment, Regulation, Enforcement)
- Fish and Aquatic Ecosystems (Biodiversity, Conservation, Ecosystem Function, Integrated Management)
- Fisheries and Society (Contributions to Sustainable Development)
- Future of Fish And Fisheries (Innovations in Fisheries)

You will then be required to enter a topic into the portal (within the specified theme) that your abstract best relates to. The list of topics can be found at the end of this document and on the Congress website.

Final allocation of abstracts to themes and topics however, will be decided by the International Program Committee based on programming needs.

TITLE

The title of your abstract needs to clearly describe the nature of the presentation. Abbreviations and acronyms should be avoided in the abstract title, but may be used in the text, if they are defined at first usage.

AUTHORS

The names (full first names, family names) and places of work (institution, city, country) of all authors must be shown. The presenting author needs to be identified.

BODY OF THE ABSTRACT

The abstract should:

1. Describe the specific objective of the study/presentation.
2. Describe the basic methods used, where applicable.
3. Summarise the key results.
4. Highlight the major conclusions.

The length of the abstract should not exceed 350 words.

Abstracts can be saved in draft status and completed until the deadline.

Please ensure that your abstract does not contain spelling, grammatical or scientific errors, as it will be reproduced exactly as submitted.

POSTER AND ORAL PRESENTATION

You will be required to select your preferred method of presentation, either Oral or Poster. Please understand that the Program Committee may not be able to accommodate your primary choice. The final decision lies with the Program Committee.

THE ABSTRACT PROCESS

When submitting an abstract you will be asked to set up an account with a password, which you can then use to submit additional abstracts as well as edit saved draft abstracts until the closing date.

ABSTRACT ACKNOWLEDGEMENT

A confirmation email acknowledging receipt of your abstract submission will be automatically emailed to you once you have finalised the online abstract submission process. If you do not receive this confirmation email, please contact the All Occasions Group (Congress Organiser), via conference@aomevents.com

NOTE: If you wish to edit your abstract only, 'saved as draft' abstracts can be edited online (until the closing date). To access your draft click the portal link and sign in with your email and password.

Additional abstracts may be submitted in the same portal. Each finalised submission will send a confirmation email. To make changes to a submitted abstract please contact the All Occasions Group (Congress Organiser), via conference@aomevents.com

Please note that all correspondence will be sent to the e-mail address from which the submitted abstract was received.

REGISTRATION

Authors acknowledge that they may be required to present on any day of the Congress. All presenting authors must register and pay for their own registration, accommodation and travel for their attendance at WFC2020. The Congress does not provide financial assistance/scholarships. Final confirmation of abstract acceptance will require author registration to be completed.

ICES EARLY CAREER SUPPORT

The International Council for the Exploration of the Sea (ICES) is providing Early Career Support to assist early career scientists from ICES countries attending the WFC2020. The ICES Early Career Support will cover WFC2020 registration fees only. Please note that limited funds are available. Applicants will be selected based on how well their application matches the Congress theme and whether they fulfil the necessary criteria as listed below.

To apply for ICES Early Career Support you must meet the following criteria:

1. You are an early career scientist that is either 35 years of age or younger OR you have completed your PhD in the last 5 years; AND
2. You are from an ICES member country. A list of ICES member countries is available here.

If you are interested in applying for ICES Early Career Support, please tick the box 'I would like to apply for ICES Early Career Support' in the Abstract Submission Portal when submitting your abstract. You will then receive an e-mail confirming your abstract submission that will include a link to an application form you will need to complete to be considered for ICES Early Career Support.

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If you would like to withdraw your abstract, please email conference@aomevents.com as soon as possible.

For more information on the submission process, or to discuss your submission, please visit the website or contact the WFC2020 organiser:

All Occasions Group
Address: 12 Stirling St, Thebarton SA 5031, Australia
Phone: +61 8 8125 2200
Email: conference@aomevents.com
Website: https://wfc2020.com.au/

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THEME 1: SUSTAINABLE FISHERIES (ASSESSMENT, REGULATION, ENFORCEMENT)

1. Sustainable Development Goals – progress towards global obligations

Descriptor:
Launched in 2015, the Sustainable Development Goals (SDGs) reiterated international resolve to address global challenges related to poverty, health, equality, environmental degradation, climate and social justice. Fisheries lie at the intersection of many of these challenges, with sustainable fisheries and healthy aquatic ecosystems (SDG14) underpinning community development (SDG1), food security (SDG2), health and wellbeing (SDG3), empowerment (SDG5) and economic growth (SDG8), among other targets. With 2020 marking a key milestone in evaluating progress towards the SDGs, this session aims to synthesize current knowledge on fisheries-related issues, presenting research efforts across local and national scales to build a picture of our shared progress. The global roadmaps presented in the session will emphasise the inter-dependence of all countries in achieving sustainable use of our oceans and invite participants and audience members to focus on common challenges and shared opportunities for synergistic outcomes.

Contacts:
Kendra Thomas Travaille (University of Western Australia) (kendra.travaille@research.uwa.edu.au), David Tickler (Minderoo Foundation)

2. The Sustainable Development Goals opportunity for holistic freshwater and fishery governance

Descriptor:
The UN Sustainable Development Goals (SDGs) are a unique opportunity to insert ecological interests in policies that will define the next decade of development. The SDGs are a global reference for 'The Future We Want', however, inland fish and fisheries are poorly represented in its text. Policies being written to meet the SDG 2030 agenda may overlook fish and fishery interests. Also, the 2015 global conference, Freshwater, fish, and the future – cross-sectoral approaches to sustain livelihoods, food security, and aquatic ecosystems produced a forward-looking call-to-action characterized by the 2015 Rome Declaration "Ten Steps to Responsible Inland Fisheries." In this session, fishery and non-fishery stakeholders will use the SDGs to identify progress towards responsible inland fisheries, as well as cross-sector synergies that protect fish biodiversity and maximise fishery ecosystem services for representation in SDG development policies. The aim of this session will be to solicit feedback to serve as the foundation for an action plan for global inland fisheries.

Contacts:
Sui Chian Phang (University of Portsmouth) (sui.phang@googlemail.com), Vittoria Elliot (Worldfish), Abigail Lynch (US Geological Survey), Steve Cooke (Carleton University), Doug Beard (US Geological Survey), Ian Cowx (University of Hull), Simon Funge-Smith (FAO), Devin Bartley (Michigan State University), William Taylor (Michigan State University)

3. International fisheries – what progress has been made in managing international and multi-jurisdictional fisheries?

Descriptor:
This session will explore a range of issues associated with internationally managed fisheries, both bilateral and multi-jurisdictional. Regional Fisheries Management Organisations (RFMOs) and Agreements have a history of mixed success in terms of sustainable stock management. The goal of the session will be to hear from those directly and indirectly involved in stock management on progress made, areas for improvement, and best practice aspirations, from a wide variety of examples from many parts of the

world and dealing with many different RFMO issues. Topics for discussion will include inter-jurisdictional / transboundary stock management, including harvest strategies; new data gathering science; successful combatting of Illegal, Unreported and Unregulated (IUU) fishing; ecologically related species; certification schemes and modern-day slavery.

Contacts:
David Wilson (International Pacific Halibut Commission) (David.Wilson@iphc.int), Brian Jeffriess (ASBTIA), Campbell Davies (CSIRO)

4. **Eastern and western approaches to fisheries: what can we learn from each other?**

Descriptor:
The western world differs from the East in culture, socio-economic development, diet tradition and institutional settings. Reflected in fisheries, the former is more selective for larger fish and more valuable species, and focuses more on output controls that require rigorous monitoring and produce large discards. In the East, fishing is more intensive and catches a wide spectrum of species and sizes with little waste. These two approaches have different implications for policy, benefits, and ecosystem. This session aims to bring people from both sides to study their essence and learn from each other for sustainable fisheries management.

Contacts:
Shijie Zhou (Shijie.Zhou@csiro.au), Yimin Ye (FAO), Xianshi Jin (CSIRO)

5. **Sustainable coastal fisheries challenges and solutions in developing nations**

Descriptor:
This session will discuss the challenges facing coastal fisheries in developing countries, including but not limited to the Pacific, Indian Ocean, Indonesia and Africa, with a focus on identifying realistic solutions. Rapidly rising human populations, a high dependence on coastal marine resources for food and livelihoods, and low levels of education and awareness, predisposes coastal fisheries in developing nations to overfishing. With poor resourcing and therefore limited local capacity there is a consequent disengagement by many fishers from rules-based management programs and a lack of quality data upon which to base decisions. Ultimately coastal fish populations decline, further reducing access to vital protein. Assistance from western nations is often short-term and complex with little or no extended temporal components. Is this a lack of understanding of local cultures and context which is not creating sustainable solutions? This session aims to bring together examples of coastal fisheries in developing nations to focus on the challenges faced, and where possible solutions. Collectively, using an innovative and interactive approach, the session aims to raise the profile of coastal fisheries issues and, in particular, identify meaningful and sustainable solutions.

Contacts:
David Welch (C2O Pacific) (d.welch@c2o.net.au), Andrew Halford (The Pacific Community - SPC), Jan Robinson (SWIOFish3, Department of Blue Economy), Bradley Moore (National Institute of Water and Atmospheric Research, New Zealand)

6. **Small-scale fishery accessibility to voluntary sustainability standards: Addressing challenges, driving improvement and maximising benefits**

Descriptor:
Much of the world's population depends on protein from species captured in small-scale marine and freshwater fisheries. Although the amount of food secured by these activities is small in comparison to large-scale industrial fisheries, it supports significant numbers of people and often dominates the commerce of local communities. However, due to many factors, many small scale fisheries are overfished and/or have negative impacts on habitat. While many of the world's large scale

fisheries are certified as sustainable or are under action plans or fisheries improvement projects that will advance their management to meet sustainable fisheries criteria, most small-scale fisheries are not. This session will focus on the variety of technical, social, and economic challenges facing small-scale fishers and fishing communities throughout the world. Case examples of fisheries either needing or desiring sustainable certification will be featured, as well as presentations on success stories and promising techniques and progress

Contacts:
Yemi Oloruntuyi (Marine Stewardship Council) (Oluyemisi.Oloruntuyi@msc.org)

7. **What are the experiences and challenges for fisheries moving to transferable property rights? Under what conditions are (catch or effort) entitlement managed fisheries more likely to be sustainable than those that aren't?**

Descriptor:
Globally, many fisheries operate under TACs with ITQs to meet the objectives of their harvest strategy, while ensuring property rights to quota holders. While TACs/ITQs can work effectively as management approaches in large/high value, (predominantly) single species fisheries, their application to low value/small, artisanal and recreational fisheries has been questioned. Effort entitlement (TAE/ITE) management systems may be more likely to meet objectives defined in harvest strategies of multi-species, multi-sectorial fisheries, while ensuring access rights. Are effort entitlement management systems efficient and cost effective to manage and monitor small scale/low value, multi-species commercial, artisanal and recreational fisheries? What are likely to be more efficient approaches to meeting harvest strategy objectives of sustainable fishery resources, ecosystems, fishery economics and social amenities in small scale multi-species, multi-sectoral fisheries, while ensuring access rights?

Contacts:
Brett Molony (CSIRO) (Brett.Molony@csiro.au), Patrick Cavalli (DPIRD WA)

8. **Small-scale' fisheries in big and developed economies – what futures?**

Descriptor:
Small Scale Fisheries (SSFs) are defined by the FAO as "firmly rooted in local communities, traditions and values", and global guidelines are designed to protect their contribution to "nutrition, food security, sustainable livelihoods and poverty alleviation of many countries" (FAO, Research Agenda for Small Scale Fisheries). However, are these concepts and needs being applied to SSFs in all contexts - developing and developed countries - and do they need to be? This session is focused on exploring how small scale or independent fishers in developed nations are faring under current management and how this might be improved to provide options and sustainability for non corporatised fishers. The session invites papers and discussions, that explore how small-scale fisheries might be re-interpreted in developed countries; how they relate to their immediate and broader communities; and means by which increased equity in choice and outcomes may be achieved for these fishers, including through alternative management approaches.

Contacts:
Kate Brooks (FRDC/KAL Analysis Pty Ltd) (Kate@kalanalysis.com.au), Emily Ogier (FRDC), Rob Stephenson (Canadian Fisheries Research Network)

9. **Indigenous fisheries – fishing rights, knowledge and management systems**

Descriptor:
This session will examine Indigenous fisheries rights, knowledge and the role in management. Case studies will be invited from around the world. A key study will be the introduction of New Zealand's Quota

Management System (QMS) that forced the nation to resolve claims to fisheries by its indigenous people, the Maori. Since this time the Maori have grown their fisheries interests while reinvigorating their economic, cultural, political and social development in New Zealand. The Maori developments will be explored, along with other First Nation economic opportunities from the use of aquatic resources; acknowledgement and protection and appropriate use of Indigenous cultural fishing practices; Indigenous fisheries knowledge and how it may mesh with scientific knowledge; and Indigenous fisheries governance and two-way capacity building and its potential role in co-management.

Contacts:
Chris Calogeras (FRDC Indigenous Reference Group) (chris@c-aid.com.au), Shane Holland (PIRSA), Stan Lui (Torres Strait Regional Authority), Maru Samuels (Iwi Collective Partnership)

10. **Indigenous fisheries – cultural values, human rights and water conflicts**

Descriptor:
Many First Nations peoples are oppressed, marginalised and dispossessed of land, water, knowledge and cultural life. The legacy of the dispossession continues in economic, social and political disadvantage. Aboriginal and Torres Strait Islander communities hold complex knowledge, which supports and reinforces their relationship and deep connection to Country as the Traditional Owners of their cultural landscapes. They have distinct responsibility to care for Country and protect cultural sites of significance. Increasingly in Australia and globally, Indigenous knowledge is being recognised as an important factor in human and planet survival, including to inform adaptation to, and mitigation of, adverse impacts of a changing climate. This session proposes to explore ways in which Indigenous knowledge can inform contemporary water and fisheries management practices through presentations about methodological approaches, best practice, and case studies.

Contacts:
Phil Duncan (Macquarie University) (phil.duncan@mq.edu.au), Ana Silva (Norwegian Institute for Nature Research), Abigail Lynch (US Geological Survey, National Climate Adaptation Science Centre), Dan McCaw (Penobscot Nation), Morgan Disspain (Southern Cross University), Lynley Wallis (The University of Notre Dame Australia)

11. **Valuing the World's inland recreational fisheries**

Descriptor:
Though undoubtedly important, estimating the global economic value of recreational fisheries in inland waters is challenging. Few countries currently possess comprehensive statistics on national recreational harvest; assumptions must be made about the particulars of harvest; and, in some locations, harvest is somewhat irrelevant to value as angling is principally catch-and-release. This session welcomes participants who can steward/assemble country or continental inland recreational harvest and value estimates to compile at a global scale. We intend to follow presentations with a workshop to develop an improved recreational total use value estimate for global inland recreational fisheries.

Contacts:
Abby Lynch (US Geological Survey, National Climate Adaption Science Centre) (ajlynch@usgs.gov), Andy Thorpe (University of Portsmouth), David Bunnell (US Geological Survey), Simon Funge-Smith (FAO)

12. **Embedding the recreational dimension in future fisheries management**

Descriptor:
Recreational fisheries (RF) have large social and economic benefits, but also have impact on fish stocks. RF are diverse and dispersed in nature, making monitoring, management, and

enforcement difficult, leading to challenges with inclusion in traditional fisheries management. In addition, RF motivation is based on many factors alongside catch, making response to management very difficult to predict. Hence, novel multidisciplinary approaches are needed to balance the social, economic, and ecological trade-offs needed for RFs.

In this session, we propose to bring together scientists, managers, policy makers, and stakeholders from across the globe to address key challenges with governance, monitoring, assessment, management, and enforcement of RF in both inland and marine waters. Specifically, we would like to invite presentations in the following areas:

- Governance structures and policy development that embed recreational fisheries within management frameworks.
- Balancing social, economic, and ecological objectives in the management of recreational fisheries.
- Understanding factors that influence recreational fisheries participation, effort, catch, economics, and social benefits, and indicators to measure them.
- Integrating established and novel monitoring approaches for recreational fisheries.
- Incorporating recreational fisheries in stock assessment accounting for uncertainty.
- Impact of angler behaviour, motivation, and heterogeneity on monitoring and management of recreational fisheries.
- Approaches for enforcement and engendering compliance with regulations, including the influence of angler social networks.
- Building trust and developing dialogue through engagement, education, and co-development processes.
- Importance of recreational fisheries for local communities, cultural heritage, and tourism.

This session will be of broad interest to scientists outside of recreational fisheries. It supports the general theme of the Congress as RF are key to a sustainable vision for the future of fisheries.

Contacts:
Kieran Hyder (Cefas, UK) (kieran.hyder@cefas.co.uk),Robert Arlinghaus (Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Germany), Jeremy Lyle (Institute of Marine and Antarctic Studies, University of Tasmania, Steven Cooke (Carleton University, Canada), Andy Moore (Department of Agriculture, Australia), Sean Tracey (University of Tasmania, Australia), Mike Steer (South Australian Research and Development Institute, Australia), Tim Lynch (CSIRO), Ashley Fowler, Rowan Chick (New South Wales Department of Primary Industries, Australia), and Karina Ryan (Western Australian Department of Primary Industries, Australia).

13. Resource access, allocation and property rights (sponsored by Seafood New Zealand)

Descriptor:
This session will explore the current uncertainty and risk in resource sector allocation, access and property rights, including how to minimise this risk while still maintaining sustainability and maximise economic value. The session will also examine what best practice resource access security looks like and how is it achieved. This will include examination of legislative frameworks and mechanisms that provide best practice resource access security for the commercial seafood industry. Discussion of characteristics that define resource access security and how resource security in fisheries compares to security and property characteristics of other public terrestrial and aquatic resources will be a focus.

Contacts:
Tim Pankhurst (Tim.Pankhurst@seafood.org.nz), Karen Olver

(Seafood New Zealand), Jane Lovell (Seafood Industry Australia)

14. Key conditions towards successful co-management of fisheries

Descriptor:
Effective co-management of fisheries requires collaborations between governments and fisher organizations. However, a dilemma exists here: (i) if the distance between governments and fishers is too close, the governments may hesitate to introduce new stringent regulations or strictly enforce existing rules, while (ii) if the distance between the governments and fishers are too far apart, no government visions are shared by the fishers and little stewardship is realized. This session will invite case studies, theoretical analyses, and other research results on the above aspects to discuss key conditions toward successful co-management.

Contacts:
Nobuyuki Yagi (University of Tokyo) (yagi@fs.a.u-tokyo.ac.jp), Atsushi Hagiwara (Nagasaki University), Simon Clark (SG and WC Prawn Fishermen's Association), David Power (AFMA)

15. Sustainable ecosystems: recovering fisheries, overfished stocks and biodiversity

Descriptor:
This session will highlight management actions and conditions that have successfully led to recovered fisheries, stocks, or biodiversity. There are now many examples of recovery, in some cases brought about by fisheries restrictions such as reduced catch quotas, gear restrictions, or closed areas, or by changes in legislation, surveillance, or compliance, but there may be others where recovery has occurred predominantly or entirely because of environmental or social change, despite management (or lack thereof). In some cases it may be a combination of factors. We seek examples that can help fisheries managers and researchers identify the best path to recoveries elsewhere.

Contacts:
Pamela Mace (Fisheries New Zealand) (Pamela.Mace@mpi.govt.nz), Matt Dunn (NIWA)

16. Vulnerable and threatened species management and fishery rebuilding issues

Descriptor:
Rebuilding of depleted fisheries is required for our world to support a global population of 9.8 billion in 2050. There are a number of definitions that outline the terms and conditions that describe critical depletion of species, leading to different perspectives on what constitutes a 'conservation crisis' for the oceans? In this session we will consider the synergies and divergences of these definitions, and critical elements for reaching consensus in identification and designation of threatened or near-threatened status for fish populations. Presentations and panel discussions will consider current differences and opportunities for harmonisation across current policy and practise of international and regional conventions (fisheries and biodiversity conservation) and what is required to achieve that consensus — in order that we achieve the critical mass required for recovery of depleted fish populations.

Contacts:
Kim Friedman (FAO) (Kim.Friedman@fao.org)

17. Assessing and managing fisheries impacts on non-target species and habitats

Descriptor:
Since about the 1990s, there has been increasing interest and concern about the impact of fisheries on non-target species and habitats. To what extent have the science, fisheries management, industry, eNGO, recreational, artisanal, subsistence and indigenous communities embraced, focussed attention on, and mitigated these impacts in

the last 20-40 years? There are many plans and strategies internationally, regionally and locally, but have we managed to mitigate fisheries impacts and maintain or enhance biodiversity? What do we need to do to improve? Do risk assessments help, and are/how are they being implemented?

Contacts:
Pamela Mace (Fisheries New Zealand) (Pamela.Mace@mpi.govt.nz)

18. Integrating environmental flow and fisheries management to support sustainable inland fisheries

Descriptor:
In regulated rivers and estuaries worldwide, the provision of environmental water allocations to augment modified flow regimes is a common approach for rehabilitating ecosystem function. Many rivers and estuaries also support valuable commercial and recreational fisheries that provide economic and social value. Fishing, however, may reduce fish populations and appear contrary to the objective of ecosystem rehabilitation. Nevertheless, fishers are key stakeholders of aquatic systems, and in some cases, are powerful advocates for ecosystem rehabilitation and conservation. As such, there remains a need to better align objectives and management of environmental flows and fisheries to ensure beneficial yet sustainable outcomes. This session will include presentations on: 1) the influence of river flow (including environmental flows) on commercially and recreationally important fishes; 2) the management of environmental flows and fisheries: how these align and interact, real-life case studies, suggestions for improvements; and 3) supporting commercial fishery production through environmental flow delivery; mechanisms, approaches, ethics, sustainability.

Contacts:
Chris Bice (Chris.Bice@sa.gov.au), Qifeng Ye (South Australian Research and Development Institute)

19. The land of plenty: advances and future directions in population dynamics modelling to support fishery management

Descriptor:
Around the turn of the 20th century, the field of marine population dynamics modeling and stock assessment began to flourish, because of the need for scientific advice to support implementation of catch limits and input regulations. There continues to be active research on the science that supports fisheries management, with advancements in population dynamics modelling to address modern challenges (e.g., climate change and the availability of new data sources), as well as enduring issues (e.g., accounting for spatial and ecosystem complexities). This session overviews the trajectory of marine and coastal population dynamics modelling, while exploring the intertwined futures of stock assessment and fisheries management. Six non-overlapping sub-sessions will be held with both applied and theoretical submissions considered under the following categories:

- **General stock assessment methodology and statistics:** This sub-session solicits examples of novel assessment applications and methodologies, especially advances in multi-model inference (e.g., ensemble modelling) and integrated approaches combining a variety of data sources, modelling, or statistical techniques.
- **Spatial models:** This sub-session will explore the range of modelling techniques currently being developed for analyzing spatial data and implementing spatial stock assessment models, as well as the use of these tools in fishery management.
- **Ecosystem dynamics and climate change:** This sub-session will investigate the range of frameworks and techniques that have been developed to integrate environmental and ecosystem science with population dynamics to improve scientific advice and better address climate impacts on marine resources.

- **Data-limited methods**: This sub-session will review data-limited approaches that can be used to inform fishery management, identify their strengths and limitations, advise on new approaches that have been developed, and provide perspectives on how these approaches might best be employed to foster sustainable fisheries. This session is cross-listed and will be co-hosted with the session "Data-poor fisheries – stock assessment, approaches and applications; how do we move forward?".
- **Management strategy evaluation (MSE) and biological reference points (BRPs):** This sub-session will address the progress and future of MSE in fishery management, including existing, as well as new and innovative approaches that extend or refine simulation methods, ways to model different harvest strategy decision rules, biological, economic and ecosystem performance indicators, cross-discipline communication, and stakeholder engagement. It will also include discussions of BRPs, and their ability to facilitate achievement of sustainability goals.
- **Summary discussion:** This sub-session will close out the symposium in a discussion format that summarizes the state of the science advisory process for fishery management, reviews lessons learned, and explores future directions.

Contacts:
Daniel Goethel (NOAA) (daniel.goethel@noaa.gov), Patrick Lynch (NOAA), Aaron Berger (NOAA), Kristen Omori (Virginia Institute of Marine Science), Mark Maunder (Inter-American Tropical Tuna Commission, IATCC), Richard McGarvey (South Australian Research and Development Institute, SARDI), André Punt (University of Washington), James Thorson (NOAA), Jason Cope (NOAA), Éva Plagányi (CSIRO), Mark Dickey-Collas (ICES), Carryn de Moor (University of Cape Town), Richard Methot (NOAA), Ann Preece (CSIRO), Natalie Dowling (CSIRO), Simon Hoyle (NIWA), Pamela Mace (Fisheries New Zealand)

20. Data-poor fisheries – stock assessment, approaches and applications; how do we move forward?

Descriptor:
Data-poor fisheries include those with limited data (e.g., type, amount, quality) and/or capacity (e.g., research, institutional, funding). Data-poor stock assessment methods have been the subject of considerable research activity over recent years. It is also likely that increasing numbers of data-poor fisheries will require assessment in the future, for example, due to policy requirements, greater consideration of bycatch species, growing exploitation by recreational fisheries and ongoing reductions in monitoring budgets. Various methods that have been proposed require only specific subsets of the data typically required for a more comprehensive stock assessment, replacing missing data with assumptions (or priors). New methods continue to be proposed, while published approaches continue to be assessed, compared and applied. The emphasis is often on pragmatic approaches that make best use of the available information, but the challenge is defending these as valid contributions to sustainable fisheries management. This session is intended to review the approaches that are currently available, identify their strengths and limitations, validate that assessment results are reliable, advise of new approaches that have been developed, and provide perspectives on how these approaches might best be employed to provide stock assessment advice to satisfy the requirements for fisheries management, particularly in the context of their being embedded within formal harvest strategies. Is the uncertainty associated with lack of data, which required assessment using data-poor approaches, fully accounted for by those methods, and how reliable are the methods in this context? Alternatively, under what

circumstances may it be preferable to focus on rapidly improving data, and monitoring trends in existing data, rather than applying model-based assessment approaches that make many strong assumptions?

Contacts:
Alex Hesp (Alex.Hesp@fish.wa.gov.au), Daniel Gaughan (DPIRD), Natalie Dowling (CSIRO), William Michaels (NOAA), Jason Cope (NOAA)

21. The fishery improvement toolbox: practical solutions for sustainability science adoption

Descriptor:
Digital tools supporting fisheries management are increasingly being developed to help fishing industry, NGOs, and managers access scientific insights and understand their operational implications for improving fishing practices. These often rely on global data and broad research collaborations, offering user-friendly interfaces to powerful simulation-testing and spatial analyses of impacts or projected risks, stakeholder facilitation and decision-support in making improvements towards meeting management or even ecolabeling schemes' requirements. This session will involve interactive presentations to introduce recently-developed tools already in use, discussing recipes for success dealing with ease of access, robustness to misuse, data sharing and open source models, technical expertise and training needs.

Contacts:
Catherine Longo (MSC) (katie.longo@msc.org), Natalie Dowling (CSIRO)

22. Fishery monitoring in support of sustainable fisheries: approaches to ensure the availability of timely and statistically dependable inferences on removals

Descriptor:
Dependable estimates of removals are the cornerstone of stock assessments and sustainable fishery management. There are numerous approaches to monitor catch: surveys or censuses, based on government or third-party monitoring, or resource-user reports. Limited monitoring resources constrain the precision of catch estimates, while involuntary and voluntary (e.g., observer effects, unreported catch) deviations from ideal program implementation can generate biases and incorrect characterization of uncertainty. This session will examine methods to quantify the consequences of deviations on catch estimates, as well as different monitoring approaches, modern tools (e.g., electronic monitoring) and novel data treatment methods (data mining, modelling) that can improve precision and/or reduce bias, and generally provide timely data of sufficient statistical quality to meet monitoring objectives.

Contacts:
Hugues Benoît (Fisheries and Oceans Canada) (Hugues.Benoit@dfo-mpo.gc.ca), Thomas Catchpole (U.K. Centre for Environment Fisheries and Aquaculture Science), Craig Faunce (NOAA), Jerzy Filar (The University of Queensland)

23. Digital solutions to improve fisheries monitoring: exploring advances in electronic logbook reporting, VMS, automated data-cleaning methods, catch validation and methods for better data integration and sharing

Descriptor:
Calling all data nerds! Catch-and-effort data collected from commercial fishers are used globally to inform fisheries and ecosystem management, and form valuable, historical 'big data' sources. These data are used to monitor fishing pressure, assess stock biomasses and stock statuses and are applied increasingly in other contexts, including ecological risk assessments and marine estate management. For many species these are the primary or only data available. Given the widespread collection and use of fishery-dependent data, it is alarming how few

studies specifically assess the accuracy of these data, the effects of errors and outliers on stock assessment outputs and innovations to improve their collection and quality. This session will explore current research and emerging technologies to improve the efficiency and accuracy of fishery-dependent data capture, validation, analyses and sharing.

Contacts:
Karina Hall (karina.hall@dpi.nsw.gov.au), Doug Ferrell (NSW DPI), Daniel Gledhill (DPIWE Tasmania)

24. Using recent technological advances and high-resolution data to provide information for managing fisheries and other industries

Descriptor:
In this session, we invite contributors that use technological advances to monitor highly mobile pelagic sharks, fish and other marine predators, and assimilate complex datasets on habitat and oceanographic features, industry and vessel activities, and related fisheries data-streams to solve complex questions pertaining to the sustainable management of fisheries and other spatially managed areas. We will invite participants to address one or all of the following questions: how well does the information collected match the spatial scales of habitats used by key fisheries and species; how can this be improved in a cost-effective manner; are we looking at other disciplines enough to learn how to better use our existing data; what key gaps and recent break-throughs in available technologies exist, and how can they impact the provision of spatially explicit fisheries management advice?

Contacts:
Paul Rogers (SARDI) (Paul.Rogers@sa.gov.au)

25. Understanding and changing behaviour related to illegal fishing, the role of education, nudges, and other interventions

Descriptor:
There are a wide range of theories around behavioural drivers of illegal fishing activity, and corresponding responses to address those drivers. This session will explore current thinking around these drivers, including both theoretical and empirical work on the drivers themselves and management responses to address them.

Contacts:
Mary MacKay (Mary.Mackay@csiro.au), Chris Wilcox, Denise Hardesty (CSIRO), Anna Willock (AFMA)

26. New approaches and technologies to improve compliance monitoring control and surveillance in fisheries, from risk assessment to remote sensing

Descriptor:
A wide range of technologies and supporting analytical tools are emerging to address fisheries compliance monitoring and surveillance. These range from low cost satellite radar to onboard cameras to harvesting alternative data sources such as AIS. This session will explore the use of these new technologies, evaluating both pilot projects and operational uses. Key questions of interest are new capacities facilitated by these tools, along with evaluation of their outcomes for fisheries management.

Contacts:
Jessica Ford (Jessica.Ford@csiro.au), Chris Wilcox (CSIRO), Anna Willock (AFMA)

27. Estimating illegal fishing and associated crimes, feasibility, methods, and challenges in making local, national, and global estimates and understanding associations

Descriptor:
Since the initial work by Agnew and colleagues in the early 2000s there has been an ongoing interest in estimating the level of illegal fishing and its associations with other crimes. A 2015 workshop by FAO attempted to identify methods that could be widely adopted for

estimating IUU fishing. More recently, this research has touched on associations between fisheries crimes and human trafficking, labour abuses, smuggling of drugs and firearms, among other topics. Various estimates have emerged, and sometimes been hotly contested by management agencies and researchers. There remains significant controversy over how estimates should be made and presented, what counts as evidence, and the challenges of estimating the size of a clandestine activity. This session will present research into both methods and results for estimating various aspects of IUU fishing, along with exploring associations among fisheries crime and other criminal activities.

Contacts:
Chris Wilcox (Chris.Wilcox@csiro.au), Vanessa Mann (CSIRO), Anna Willock (AFMA)

THEME 2: FISH AND AQUATIC ECOSYSTEMS (BIODIVERSITY, CONSERVATION, ECOSYSTEM FUNCTION, INTEGRATED MANAGEMENT

28. Advances in Ecosystem-based Fisheries Management

Descriptor:
There has been clear recognition of the rationale, benefits and requirements to execute fisheries management in a broader ecosystem context. Certainly some in the field still question the "what's and why's" of ecosystem-based fisheries management (EBFM), but largely those have been addressed. Certainly some in the field object to EBFM based on dated concerns that have largely been disproven as myths. But what remain as valid concerns are the "how's" of actually implementing EBFM. In this session we provide space for and discussions about lessons learned, victories and setbacks experienced, obstacles overcome, remaining challenges, improvements and enhancements for major outcomes of fisheries, and other examinations of progress in global attempts to implement EBFM. The ultimate aim is to coalesce on common features of success that can be more widely reported and applied, and hence assist in the wider implementation of EBFM.

Contacts:
Jason Link (NOAA) (jason.link@noaa.gov), Beth Fulton (CSIRO), Mark Dickey-Collas (ICES), Erik Olsen (IMR), Alida Bundy (DFO)

29. Building a framework for ecosystem-based sustainable inland fisheries

Descriptor:
This session will advance the vision of an ecosystem approach to sustainable inland fisheries management. Emphasising practical examples from freshwater and marine fisheries we will gather insights from ecological (e.g., species interactions and critical habitat protections), socio-economic (e.g., triple bottom line accounting), community capacity building (e.g., value chain improvement) and governance (e.g., water law, leverage of multinational agreements) expertise. Our goal is a transferable, enforceable and socially acceptable management framework wherein inland fisheries, and the fish populations upon which they are based, are adequately valued and sustainably managed.

Contacts:
Michael Cooperman (Conservation International) (mcooperman@conservation.org)

30. Fishing strategies to achieve environmental, social and economic sustainability

Descriptor:
Fisheries management has multiple goals. In particular, maximizing catches, conserving biodiversity and maintaining ecosystem structure are internationally agreed principles. The current management approaches encourage selectively harvesting certain groups of fish, often at high intensity for high yield. However, selectively catching certain groups while protecting others alters community composition, contrary to the conservation principles. Such discriminative strategies also results in loss of utilizable production from non-targeted but often abundant and productive species. This session aims to discuss conventional and novel fishing

strategies (including balanced harvest) for achieving an ecosystem approach to fisheries in terms of production, conservation, profitability, and employment goals.

Contacts:
Shijie Zhou (CSIRO) (Shijie.Zhou@csiro.au), Jeppe Kolding (University of Bergen), Mike Plank (University of Canterbury)

31. Anticipating future fisheries management: scientific advances for marine socio-ecological models

Descriptor:
Models are used for strategic and tactical decision-making for fisheries management globally. In the context of Ecosystem Based Management (EBM) models need to represent whole ecosystems rather than single species, and be able to develop economic and social system outcomes. EBM is firmly on the fisheries management agenda hence it is timely to re-assess socio-ecological models for management applications. What are the important next steps for developing models that adequately represent socio-ecological systems for strategic and/or tactical decision-making? Can we adequately represent other marine sectors – where are the gaps – and what might be needed in 2050?

Contacts:
Ingrid van Putten (ingrid.vanputten@csiro.au), Eva Plaganyi, Rich Little (CSIRO)

32. Integrating economic performance into fisheries management – "triple bottom line"

Descriptor:
While resource sustainability remains a primary objective for fisheries management, economic sustainability of the fleet and maximising the economic returns from the resource is also increasingly becoming an important consideration in fisheries management. Further, social outcomes from management decision making are also attracting considerable attention in many fisheries jurisdictions, as are broader environmental outcomes beyond just the fishery resource. Navigating these multiple objectives requires new tools to support fisheries management decision making. The aim of this session is to focus on tools and experiences in integrating economic performance and other objective outcomes into fisheries management.

Contacts:
Sean Pascoe (CSIRO) (Sean.Pascoe@csiro.au)

33. Social sciences – better integrated decision making processes

Descriptor:
This session will discuss the role of social sciences in integrated decision making. What role do the social sciences play in integrated decision making? What barriers and opportunities exist for expanding the engagement of social sciences in decision making? How does economics differ from other social sciences in relation to decision making integration, and what lessons can be provided to other social sciences in order to enhance their involvement in such processes? The emphasis in this session will be on case studies of successful social science integration into decision making. Papers are sought that outline the context of the social science integration or intervention, describe any barriers and how they were overcome or negotiated,

how social science inputs enhanced the decision outcome, and what general lessons were learned for the future.

Contacts:
Tanya King (Deakin University) (tanya.king@deakin.edu.au), Ingrid van Putten (CSIRO)

34. Methods for operationalising integration of policy, management and science for sustainable fisheries

Descriptor:
Successful integration of fishery policies, management and science at the practical level continues to be difficult to achieve. There are many methods available that have the potential to help this. But each area of policy making, fisheries management and science can be unaware of these methods. This session will aim to identify operational actions and conditions that deliver on the objectives of sustainable fisheries into the future. Bringing together policy makers, fisheries managers and scientists, presentations will address a "hypothetical fisheries problem" followed by discussion on the advantages and disadvantages of the methods used. The hypothetical problem will provide a practical focus for the integration. Each presenter will be asked to address the following hypothetical problem: "The government of a state has implemented the following policies:
i) The effectiveness of implemented management interventions of a fishery must be determined.
ii) Justification for any necessary changes in management and research of a fishery must be provided in terms of how it will contribute to meeting management objectives.
Hypothetical management objective: Conserve fish stocks and protect key fish habitat".

Abstract instruction: please submit your abstract showing how your method(s) would address achieving one or both of these two policies for a fishery of your choosing.

Contacts:
Karen Astles (NSW DPI - Fisheries) (karen.astles@dpi.nsw.gov.au), Roland Cormier (Helmholtz-Zentrum Geesthacht – Institute for Coastal Research, Human Dimensions in Coastal Areas)

35. Integrated ocean management – engaging with other sectors

Descriptor:
This session will examine Integrated Ocean Management (IOM), how it has evolved, and the impediments for uptake. There needs to be coordination/integration of management of fisheries (collectively) and engagement with other activities. To progress IOM, we need to overcome the four prevailing and difficult challenges of current management: 1) different activities managed by different groups in different ways, 2) incomplete suite of objectives (with neglect of social, economic and institutional aspects), 3) no ability to address trade-offs, and 4) no ability to address cumulative impacts.

Contacts:
Rob Stephenson (DFO) (Robert.Stephenson@dfo-mpo.gc.ca), Tim Ward (SARDI), Matt Dunn (NIWA), Mary Livingston (Fisheries New Zealand)

36. Cumulative impact assessments – science and society

Descriptor:

Cumulative impact assessment is a rapidly changing discipline that will be increasingly important into the future. Extreme climatic events have changed political and community attentions to risk and planning. Attention has shifted from the probability of an event to the level of potential effect – rare events are no longer ignored, preparations are now made regardless. Cumulative impacts have also been identified by bodies such as the IOC, UN and Australian State of the Environment Report as the greatest coming threat to ecosystems. They present significant challenges to business, governance and society. This is not simply due to climate events, but is a direct result of global change more broadly; the world is an increasingly crowded space, with new and expanding activities that may interact in unexpected ways, amplifying effects and causing damage in a way that is unappreciated if each activity is considered in isolation. Delivering prosperity and sustainability – nationally and internationally (e.g. delivering on the UN Sustainable Development goals) will require new methods of dealing with cumulative impacts – from scientific methods and technologies to governance structures. This session focusses on scientific approaches and societal use of cumulative impact assessments. Case studies relevant around the marine food sector are welcomed and the focus will be on scientific, as well as societal impacts, thus not only the methodological aspects from scientific perspective, but also if results have been used to inform decision making or management.

Contacts:

Beth Fulton (CSIRO) (Beth.Fulton@csiro.au), Jörn Schmidt (Kiel University), Mary Livingston (Fisheries New Zealand), Ian Tuck (NIWA)

37. Juggling biodiversity, resource management and food security

Descriptor:

Growing populations put ecosystems under pressure. Historically, biodiversity conservation has been seen as in opposition, or at least competition, with food security. This is highlighted by the fact they have been managed by different government departments and international agencies. As highlighted by ecosystem based management, the two need to be dealt with together as different aspects of delivering sustainable fished ecosystems. This session will focus on discussions of how to simultaneously ensure food security for a growing world population and the conservation of biodiversity and ecosystem structure and function. This will involve reflection on: lessons from current attempts to combine multiple objectives when managing marine systems; appropriate management frameworks (e.g. those that transparently deal with trade-offs and system thresholds); and gaps that remain to be addressed.

Contacts:

Beth Fulton (CSIRO) (Beth.Fulton@csiro.au)

38. Addressing priority uncertainties of ecological responses to static and dynamic spatial management of capture fisheries

Descriptor:

Spatial management tools, including marine protected areas (MPAs), are increasingly used as components of governance frameworks for marine activities, including fishing, and to protect

marine biodiversity. These spatially-managed areas and MPAs help meet the area-based goal of Aichi Biodiversity Target 11 and Sustainable Development Goal Target 14.5. This session will explore our understanding of the ecological response that occur locally, within and adjacent to areas subject to spatial and temporal restrictions on fishing and other ocean activities, and broader responses of entire populations, communities and ecosystems. The session includes but is not limited to the following: 1) What variables cause responses to marine protection to be variable among taxa, such as relative degree of site fidelity and mobility, and relative productivity and other life history attributes? 2) What variables influence the efficacy of MPAs to achieve ecological objectives? 3) Must spatial management measures be a component of a broader suite of management tools to achieve ecological objectives? 4) What ecological responses have been documented to be caused by fishery closures? 5) What are priority research areas for designing MPAs? and 6) What analytical methods are optimal to support inferring causation in assessments of ecological responses to fisheries spatial management?

Contacts:
Nic Bax (Nic.Bax@csiro.au), Paul Hedge (CSIRO), Eric Gilman (Hawaii Pacific University)

39. Higher and deeper: Arctic, Antarctic and deepwater fisheries – what are the special requirements for ensuring sustainability and maintenance or enhancement of biodiversity for these?

Descriptor:
Polar and deepwater fish are unique due to most (but not all) having low productivity, therefore requiring cautious management. Fisheries on these species are unique due to relatively lower accessibility, requiring larger vessels and crew, as well as tailored monitoring and enforcement of rules. Many believe that such fisheries either should not take place or should be managed ultra-conservatively. This session will highlight the requirements of these fisheries, issues with their assessment and that of associated or dependent species, and the management actions and conditions that have successfully led to ensuring sustainability and maintenance or enhancement of biodiversity. We seek examples that can help fisheries managers, industry and researchers identify best practice.

Contacts:
Pamela Mace (NZ Ministry of Fisheries) (Pamela.Mace@mpi.govt.nz)

40. Quantifying bottom fishing footprints, indicators and reference points for seabed impacts

Descriptor:
Bottom fishing is the most widespread direct human disturbance on the seabed. However, bottom trawling is also important for global food security, providing about a quarter of the world's wild-caught seafood. While there is much debate about the severity of bottom fishing impacts, there has been a void of large-scale quantitative investigation of the actual extent and risks bottom fishing poses to the marine environment. Likewise, quantitative tools, indicators and reference points are needed to assess the status of the seabed to support management practices that ensure fisheries are sustainable. This session will address and discuss recent progress with synthesising and mapping

bottom fishing footprints and quantifying their impacts world-wide, as well as statistical modelling methods and approaches for assessing the state of seabed habitats and fauna. Discussion will focus on the importance of providing such assessments for guiding management decisions, applications in data-limited situations, for the sustainability certification of fisheries and the needs for developing ecologically relevant thresholds/biological reference points for sustainable status of seabed communities and habitats. Issues of vulnerable benthic biotopes/habitats and VMEs — in EEZs and ABNJs — will also be explored.

Contacts:
Roland Pitcher (CSIRO) (Roland.Pitcher@csiro.au), Michel Kaiser (Heriot-Watt University)

41. Best practices in monitoring, assessing and managing fisheries by-catch

Descriptor:
Fisheries bycatch can have profound effects on the abundance of species with relatively low resilience to increased mortality, alter evolutionary characteristics of populations and affect ecosystem state and services through food web links. Participants will share knowledge on best practices for monitoring, assessing and managing bycatch. Participants will discuss selecting best methods and new approaches for ecological risk assessments of effects of fisheries, from data-deficient to data-rich fisheries. Considerations for bycatch management will cover applying sequential mitigation hierarchy and identifying key criteria for assessing alternative mitigation methods. Participants will discuss transitioning from piecemeal to integrated bycatch management to avoid cross-taxa conflicts.

Contacts:
Eric Gilman (Hawaii Pacific University) (ericlgilman@gmail.com), Gregg Verutes (USC, Campus Do Mar), Simon Goldsworthy (SARDI), David Power (AFMA)

42. Depredation in fisheries

Descriptor:
Depredation occurs in a wide range of net and line fisheries around the world, including both commercial and recreational sectors. It can have a negative impact due to extra mortality of target species, injury to and incidental mortality of the depredating species and reduction in the operational efficiency and profitability of fisheries. A wide range of taxa can be responsible for depredation, including sharks, cetaceans, seabirds, squid, teleost fish, pinnipeds and others. Important areas for research relating to this topic are the behavioural mechanisms underlying depredation and how they may develop, how depredation influences mortality of target species and the best way this can be incorporated into stock assessments, and the development and testing of a range of different mitigation options, including modifications to fishing practices based on detailed spatial and temporal information about the occurrence of depredation and the use of deterrent devices such as acoustic deterrents for cetaceans and pinnipeds and those that target the electrosensory system of sharks. Overall, the aim of this session is to stimulate future collaborations to investigate the causes and impacts of depredation in fisheries worldwide, and how it can be mitigated.

Contacts:
Jonathon Mitchell (University of WA) (jonathan.mitchell@research.uwa.edu.au), Tim Langlois (University of WA), Gary Jackson (DPIRD WA)

43. Enhancing fisheries productivity – aquaculture-based enhancement and wild fisheries implications

Descriptor:
Attempts to augment fishery production with aquaculture-based enhancement were first initiated in the 1870s. Since that time, the science base of marine and freshwater restocking, stock enhancement, and sea ranching has evolved significantly and has now reached a point where it is becoming possible to assess the likely contribution of such approaches to fisheries management goals prior to major investments being undertaken. With early adoption of new science and disruptive innovation, fisheries enhancement will transition from a research activity to a contemporary fisheries management strategy. This session will explore issues associated with enhancing fisheries productivity focusing on 'responsible' aquaculture-based enhancement.

Contacts:
Adam Main (PIRSA) (Adam.Main@sa.gov.au), Matt Taylor (NSW DPI Port Stephens), Neil Loneragan (Murdoch University)

44. Enhancing fisheries productivity – the role of habitat restoration

Descriptor:
Habitat losses over centuries have been key reasons for reduced productivity in many fisheries worldwide. In recent decades work on habitat restoration has driven successes in improving fisheries outcomes. Despite extensive habitat losses and success of restoration efforts, habitat is rarely incorporated into fisheries management as an opportunity for enhancement. There are numerous structural problems in delivering this outcome. This session will provide talks from fisheries managers, researchers and NGOs on how fisheries could be enhanced and productivity improved with a focus on habitat restoration, including habitat repair, oyster reefs and deployment of artificial habitat, and the successes so far. The session will also explore ways of controlling ecological and economic risks, strategies to maximise outcomes, integration in broader fisheries management frameworks, and the benefits that are possible through integrated strategies.

Contacts:
Craig Copeland (Oz Fish Unlimited) (craigcopeland@ozfish.org.au) (on behalf of The Angling Trust, NOAA, Bonefish and Tarpon Trust, Trout Unlimited, Inland Fisheries Ireland, Marine Fish Conservation Network, Fisheries and Oceans Canada, Wye and Usk Foundation and OzFish Unlimited), Euan Harvey (Curtin University), Matt Taylor (NSW DPI Port Stephens), Iain Suthers (UNSW Sydney), Neil Loneragan (Murdoch University)

45. Measuring the effectiveness of conservation and sustainable use actions for inland fisheries: where do we go from here?

Descriptor:
Management dollars for inland fish and fisheries are limited so determining what management actions provide the greatest value are needed to better allocate

limited resources. However, metrics used to measure the effectiveness of these actions are diverse or not clearly articulated. For example, measures of restored wetlands or stream distance available after barrier removal may not fully capture effectiveness, especially in fisheries beset by numerous simultaneous stresses. This session will include presentations on how different effectiveness measures are used, and a panel discussion to help better measure conservation effectiveness for inland fisheries in the future.

Contacts:
Craig Paukert (US Geological Survey) (paukertc@missouri.edu), Michael Cooperman (Conservation International USA), Abigail Lynch (US Geological Survey)

46. How will climate change interact with fisheries and fisheries management? How do we get ready?

Descriptor:
Floods, droughts and ENSO-related weather patterns are becoming increasingly recognized as direct and indirect effects of climate change with social, economic, and ecological consequences. For fisheries, the impacts can be significant. They may drastically affect recruitment processes and ecosystem dynamics with impacts on social cohesion and livelihoods. Understanding how aquatic ecosystems (freshwater/marine) will respond to these disturbances, including shifting distributions of fish stocks and fisheries, will better prepare managers to adapt and ensure sustainable ecosystem services. Through presentations and facilitated panel/audience discussion this session will examine the impacts of extreme climate events on fisheries and improvements in resilience of fisheries to these events, and potential adaptive management responses to reduce impacts and maximize opportunities.

Contacts:
Jarod Lyon (Arthur Rylah Institute) (Jarod.Lyon@delwp.vic.gov.au), Ian Cowx (University of Hull), Abigail Lynch (U.S. Geological Survey), Qifeng Ye (SARDI), Gary Jackson, Shane Walters, Arani Chandrapavan (DPIRD WA), Ryan Murphy (AFMA), Alistair Hobday (CSIRO)

47. Fisheries on the move: understanding and responding to shifting distributions of fish stocks and fisheries

Descriptor:
This session addresses the growing demand to prepare for, and respond to, shifting distributions of fish stocks and fisheries. Marine species are on the move with changing ocean conditions and other factors in many regions. Shifting distributions can impact fishers, fishing communities and fisheries management. The impacts are expected to increase as a result of both long-term change and occurrence of extreme events. Understanding and responding to shifting distributions is crucial for effective fisheries management. Through presentations and facilitated panel/audience discussion this session will identify (1) current and projected shifts in fish stocks and fisheries, including an understanding of the mechanisms underpinning shifts, (2) impacts on fisheries and fisheries management, including in an ecosystem context, and (3) strategies to reduce impacts and maximize opportunities, including development of decision-support tools or active interventions.

Contacts:
Roger Griffis (NOAA) (roger.b.griffis@noaa.gov), Alistair Hobday (CSIRO), Gretta Pecl (University of Tasmania)

48. Shifting futures – prediction and management for a changing world

Descriptor:
Environmental variability and change are fundamentally affecting marine ecosystems by redistributing marine species, impacting fisheries and reliant coastal communities. Detecting, predicting, and managing for such changes are needed to sustain and achieve management and conservation goals now and into the future. In this session we solicit contributions that explore the detection and prediction of shifting species habitats and productivity, responses of coastal communities to changing resources, and novel management strategies that have been applied to support climate change adaptation and reduce vulnerability of coastal communities.

Contacts:
Stephanie Brodie (stephanie.brodie@noaa.gov), Barbara Muhling, Elliott Hazen, Stefan Koenigstein, Erin Satterthwaite, James Smith (NOAA)

49. Oceanography, Global Ocean Observing System (GOOS), Essential Ocean Variables and use of oceanographic modelling for fisheries

Descriptor:
This session will explore the use of oceanographic models to better understand fisheries impacts, and the importance of critical habitats for species life histories. This may include tracking larval dispersal, linking production and environmental variables, estimating carrying capacity and the spread of harmful algal blooms. The session will also explore the GOOS and the communities developing the Essential Ocean Variables.

Contacts:
Mark Doubell (Mark.Doubell@sa.gov.au), Ana Redondo-Rodriguez

50. Marine pollution by microplastics – present status and outlook

Descriptor:
It is known that the distribution of microplastics is increasing in the world's oceans, and in Asian oceans is the richest in the world. Furthermore, if microplastic production rate is maintained at the present level, then its density at the sea surface will become approximately 2 fold and 4 fold that in 2030 and 2060, in the North-Pacific Ocean. This session will introduce recent findings of plastic waste and discuss the outlook of this problem in the world, including the fishing industry impacts and future-proofing against this growing challenge.

Contacts:
Yutaka Haga (Toyko University of Marine Science and Technology) (haga@kaiyodai.ac.jp), Atsushi Hagiwara (Nagasaki University), Bronwyn Gillanders (Adelaide University)

51. Aquatic biosecurity – how can we protect our fisheries resources from emerging diseases?

Descriptor:
Many fisheries resources, as well as aquaculture operations have been damaged by diseases, such as *Bonamia* in oysters, viruses and intracellular bacteria in abalone and viral disease in sardines.

Pathogens are difficult or impossible to control in open systems. Better knowledge is required to predict disease emergency and prevent establishment and spread in the wild. This session will focus on how we should protect fisheries resources from biosecurity threats.

Contacts:
Marty Deveney (South Australian Research and Development Institute) (Marty.Deveney@sa.gov.au)

52. *Non-native species* 2020 – impact and management

Descriptor:
Non-native species are a proven means to increase production and economic benefits from aquatic ecosystems, but they are also a major threat to aquatic biodiversity. This session will focus on objective analyses of the use and control of non-native species at local to global scales. Risk analysis, impact assessment and management will be dealt with in regards to both the benefits to human communities and the harm to aquatic ecosystems provided by non-native species. Through a series of presentations and discussions, participants will gain an appreciation of the complex decision processes and impact assessments needed for responsible use and control of non-native species.

Contacts:
Bill Taylor (Michigan State University) (taylorw@msu.edu) on behalf of the Great Lakes Fishery Commission and UN FAO

53. Small pelagic fish – resource sharing and food security on a changing blue planet

Descriptor:
This session will discuss small pelagic fish resource sharing and food security on a changing blue planet. Key topics will include stock assessment options; ecosystem interactions; interactions with recreational fisheries; aquaculture sustainability dependent on fishmeal production from ocean forage fish; and artisanal versus industrial fisheries in developing countries.

Contacts:
Tim Ward (Tim.Ward@sa.gov.au), Gretchen Grammer (South Australian Research and Development Institute), Jian Qin (Flinders University)

54. Anguillid eels – recovery challenges from sea to stream in the face of global change

Descriptor:
Freshwater eels epitomize contemporary conservation challenges for fisheries and aquatic resources. Their diadromous life cycle evolved to gain advantages of marine, estuarine, and freshwater habitats, but they are also vulnerable to human impacts in each environment. Despite their widespread distribution, adaptive capacity, and human value, a majority of the 16 species are imperiled or data deficient. Habitat degradation, migration barriers, pollution, parasites, overfishing, illegal trade, and climate change are global threats that require international cooperation. This session will share management practices, science, and policy across continents.

Contacts:
Thomas J. Kwak (US Geological Survey) (tkwak@ncsu.edu), Paul Coulson (Institute of Fisheries Management, UK),

Ian Cowx (University of Hull), Matthew Gollock (Zoological Society of London)

55. Salmon

Descriptor:
This session encourages contributions from a range of themes including: (1) fisheries science and stock assessment; (2) population dynamics, migrations, genetics and connectivity; (3) climate change and environmental processes; (4) Ecosystem-Based Fisheries Management (EBFM); and (5) recreational fishing and resource sharing.

56. Deep-water snapper

Descriptor:
Fisheries are vital in the economies of coastal communities, which necessitates improving the management of key stocks to achieve sustainability of fishery resources. This session explores progress that has been made in deep-water snapper across different global regions. Fisheries for deep-water snappers often feature high species diversity, dispersed fishing grounds and landing sites, complex supply lines, and dispersed landings by small-scale as well as mid-scale vessels. Basic biological knowledge on these stocks is often lacking. Hence, management of deep-water snapper fisheries is often challenging. The session will cover recent insights in the biology of these stocks, emerging management systems, innovative data collection and modelling, community engagement and partnerships.

Contacts:
Peter Mous (TNC Indonesia Fisheries Conservation Program) (pmous@TNC.ORG)

57. Buying an ornamental fish: How sustainable trade can serve to protect our oceans and rivers

Descriptor:
Fisheries supplying the ornamental aquatic industry are generally artisanal and small-scale, providing livelihoods for families and communities in developing countries. Sustainable trade, low impact and high value, can incentivise such communities to act as beneficial stewards, protecting sensitive ecosystems from environmentally damaging activities. This session will look at how such fisheries and the wider industry provides direct and indirect socio-economic and environmental benefits. It will look at best practices; how best practice may be measured together with the challenges and threats such fisheries face.

Contacts:
Tracey King (Ornamental Aquatic Trade Association Ltd (OATA) (tracey@ornamentalfish.org), Josiah Pit (Aquarium Industries)

58. Global status, recent developments and future of shark and ray fisheries

Descriptor:
Sharks and rays are diverse taxa that interact with a wide variety of fisheries globally. These interactions are often complex and require tailored science and/or management at local levels to ensure sustainability. As such, the scientific research that is undertaken on shark fisheries can vary greatly and often makes use of 'outside of the box' approaches that are not typically used to study other fisheries. This session on shark and ray fisheries will allow for this novel research to be presented and provide insight on how different scientists around the world study their local shark fisheries. This session will provide a

platform for shark and ray scientists to discuss recent research techniques, findings, and their implications for the future of shark and ray fisheries.

Contacts:
Jonathan Smart (SARDI) (Jonathan.Smart@sa.gov.au), Charlie Huveneers (Flinders University)

59. Crustaceans

Descriptor:
Crustaceans contribute to some of the world's premier seafoods and are the focus of many high value fisheries globally. This session encourages contributions from a range of themes including: (1) fisheries science and stock assessment; (2) population dynamics, genetics and connectivity; (3) climate change and environmental processes; (4) trap design, technological advances and gear conflicts; (5) Ecosystem-Based Fisheries Management (EBFM); (6) economic assessments; (7) fisheries compliance; (8) recreational fishing and resource sharing; (9) invasive species and anthropogenic impacts; (10) disease and parasites; and (11) social licence including third party certification.

Contacts:
Adrian Linnane (Adrian.Linnane@sa.gov.au), Crystal Beckmann (South Australian Research and Development Institute)

60. Molluscs

Descriptor:
Molluscs encompass a wide variety of highly sought after seafoods, both for their exceptional textures and flavours and their cultural value. Due to high global demand, they are the focus of many high value fisheries. This session encourages contributions from a range of themes including: (1) fisheries science and stock assessment; (2) the assessment of dive fisheries and spatially-structured stocks; (3) population dynamics, genetics and connectivity; (4) climate change and environmental processes; (5) Ecosystem-Based Fisheries Management (EBFM); (6) economic assessments; (7) fisheries compliance; (8) recreational fishing and resource sharing, cultural value including shell collection; (9) disease; (10) processes driving recruitment; (11) restocking; and (12) social licence, including third party certification.

Contacts:
Stephen Mayfield (Stephen.Mayfield@sa.gov.au), Ben Stobart, Owen Burnell, Katherine Heldt (South Australian Research and Development Institute)

61. Cephalopods – how can we sustainably manage fluctuating stocks of these short-living animals under growing demand for their catch and production?

Descriptor:
Stocks of long-lived fish have decreased worldwide, increasing fishing pressure on short-lived fish, shrimps and cephalopods. Specialized fisheries for cephalopods (jigging, traps, potting) are environmentally friendly (little habitat damage, low bycatch) but recent increases in fishing effort, especially in unregulated high seas areas, threaten overexploitation of key commercial cephalopods. Their short life-cycles and widely fluctuating stocks create challenges for assessment and management. In-season assessment and rapid implementation of conservation measures may be needed to prevent stock depletion. This session will seek ways to

sustainably fish (and culture) these species, and will examine alternative assessment methods for cephalopods and other short-lived species.

Contacts:
Alexander Arkhipkin (Fisheries Dept, Stanley, Faukland Islands) (AArkhipkin@fisheries.gov.fk), Graham Pierce (CSIC, Vigo Spain), Zoe Doubleday (University of South Australia), Karina Hall (NSW DPI)

THEME 3: FISHERIES AND SOCIETY (CONTRIBUTIONS TO SUSTAINABLE DEVELOPMENT)

62. Feeding the world – food security, nutrition and food safety

Descriptor:
This session will discuss global food security issues, including access, nutrition and food safety, and the role fisheries play.

Contacts:
Luiz Silva (Federal University of Sao Joao del-Rei (UFSJ) (luizsilva@ufsj.edu.br)

63. Simulated scenarios in seafood market access – your decisions have consequences

Descriptor:
Seafood is often stated to be the most traded commodity globally. During this session we will explore the interaction between food safety and market access to build an understanding of just how critical food safety is in the global trading arena. Presentations will cover stories of food safety failures and the ensuing market closures; technical barriers to trade based on food safety and how these can be avoided; and successful food safety market access programs. We hope to look at risks and opportunities in this field, and will conduct an interactive workshop stepping through a virtual example of a real market closure, to provide an understanding of the consequences that can occur during a food safety incident relating to seafood. We aim to interest all participants, not just food safety experts, as history shows that these events can close any fishery and have impacts to all stakeholders.

Contacts:
Natalie Dowsett (Natalie.Dowsett@sa.gov.au), Alison Turnbull (South Australian Research and Development Institute, SARDI, SafeFish)

64. Creating value out of food waste

Descriptor:
This session will discuss and look at examples of the opportunities food waste presents at the local, national and global scales for the fisheries industry. This includes discussing the lost economic and social opportunities that arise when food waste is not addressed as well as the significant environmental damage being done.

Contact(s):

Steve Lapidge (Fight Food Waste CRC) (steven@fightfoodwastecrc.com.au)

65. Investment in the seafood industry – what is happening and what is the risk?

Descriptor:
The landscape of the seafood industry is no stranger to change. Technological advancement, consumer trends, environmental conditions and regulatory frameworks play lead roles in shaping how our industry operates and creates value. As an industry, we often focus on how to resist change to keep businesses operating as usual - and sometimes we even hire personnel specifically to enact change resistance. Investment in the seafood industry has an opportunity to evolve with the times and pave the way for future generations of fishers to enter. This session will discuss the current investment incentives in the seafood industry, what barriers there are to progress, and what we can change to achieve our vision.

Contacts:
John Susman (john@fishtales.tel) (Fish Tales), Tom Cosentino (industry), Jörn Schmidt (Christian-Albrechts-Universität zu Kiel)

66. Aquatic animal welfare and ethics

Descriptor:
This session will discuss the increasing range of issues related to aquatic animal welfare, such as impacts of tagging on fish and their post-release survival, welfare in surgery and anesthesia, and dealing with invasive pest species.

Contacts:
Culum Brown (Macquarie University) (culumbrown@gmail.com)

67. Public perception, social licence and values

Descriptor:
This session will examine the community support and public perception of fisheries, and the interplay with social licence to operate. Why do the public perceive fisheries to be in decline, even in countries where there has been demonstrable progress and success? What is the value of fisheries to communities? The session will also include consideration of other issues that constitute social licence (e.g. animal welfare, environmental protection, community outreach), as well as how these issues are being handled, what has worked, what hasn't, how do we "get in front of the wave" and what is the role for industry, researchers and government.

Contacts:
Jörn Schmidt (Christian-Albrechts-Universität zu Kiel) (jschmidt@economics.uni-kiel.de), Sean Pascoe (CSIRO), Anders Magnusson (BDO EconSearch), Julian Morison (BDO EconSearch), Jane Lovell (Seafood Industry Australia), Simon Clark (SG and WC Prawn Fishermen's Association)

68. Educating schools in recreational fishing

Descriptor:
Let's invest in our next generation being educated about "OUR FISHERY". By planting seeds now we can reap the harvest in the next generation of fishers to consider the resources as shared and collectively "OURS". Be those fishers, recreational, aquaculture, commercial, Indigenous, spearfishing or gathering. Can we have a collaborative approach within our education system to educate the next generation on all things marine and fish equally? Other elements / benefits can include being outdoors and closer to nature, education on marine safety, sun / weather safety and of course the lunar system effect on tides and weather. This session will provide more educated discussions about "OUR FISHERY" that can form the future direction with a naturally more open and considered mind.

Contacts:
Colin Tannahill (Shimano) (colint@shimano.com.au)

69. Human voices for fish: improving community involvement in fisheries science, management and communication

Descriptor:
Fish can't speak. Our fisheries need human voices to talk on their behalf. As fisheries researchers, managers, community members and business owners, we are charged with this important role. However, it's a challenge. We need to convey a blend of scientific data and 'unscientific' information in stories that capture the attention of diverse audiences, often under trying complex social and political conditions. If

we are to be successful, we need to create relatable and compelling content that speaks to the values of different audiences. A key element is moving from deficit-style communications to greater inclusion of stakeholders in the research process. In this session, speakers will engage and entertain us with their reflections, practical advice and vision for elevating community understanding and involvement in fisheries science, management and communication.

Contacts:
Tom Rayner (The Global Wetlands project) (t.rayner@griffith.edu.au), Chris Brown (Griffin University)

70. People, models, places, numbers: case studies on science, narratives and communication in fisheries

Descriptor:
A common goal across fisheries management is effective communication to the right people at the right time in order to address the required ecological, social, economic and finally political issues of sustainable fishing, obtain mutual commitments and achieve fair decision-making. In this story-telling session, we expect that each contribution will tell an engaging story about *how* information in fisheries is used, *whose* information is used, and *why* this information is used. Our purpose is to learn how to produce and present fisheries knowledge in the most useful, relevant and beneficial way possible.

Contacts:
Dorothy Jane Dankel (University of Bergen) (dorothy.dankel@uib.no), Catherine Longo (Marine Stewardship Council), Jörn Schmidt (Christian-Albrechts-Universität zu Kiel), Sakari Kuikka (University of Helsinki)

71. Crossing the science to policy boundary: progress and innovations

Descriptor:
In a world where a constant and overwhelming stream of new and evolving knowledge is our everyday reality, it is often those that shout the loudest or have the most dramatic or pessimistic story that dominate the narrative. The question remains – what are the most effective means of working with policy-makers to support evidence-informed decision-making processes? In this session we invite contributions from those willing to bravely push the boundaries of the current science-policy interface to show progress in the field, and in particular, the strategies that create more effective relationships between marine science, policy and practice.

Contacts:
Mark Dickey-Collas (International Council for the Exploration of the Sea) (Mark.dickey-collas@ices.dk), Ingrid van Putten (CSIRO), Chris Cvitanovic (Australian National University), Eddie Allison (College of the Environment)

72. Future workforce needs in the seafood industry

Descriptor:
This session will explore the future workforce requirements in the seafood industry, including ethical employment. The different issues facing the fishing industry in different regions and scale of operations will be discussed.

Contacts:
Neil M^{ac}Donald (neil@nmac.com.au), Merilyn Nobes (Natural Resource Management, Mediation and Facilitation Services)

73. Building capacity for securing sustainable small-scale fisheries

Descriptor:

Both the diverse values of small-scale fisheries and their multiple challenges highlight the importance of capacity – i.e. capacity of fishing communities, industries, governments and civil society organizations in collectively managing and supporting small-scale fisheries. Capacity development is also argued in the "Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries" (SSF Guidelines) as imperative for the implementation of this landmark instrument. But what kind of capacity is needed, who should it target and how best to deliver? This session invites papers that illustrate good practices and lessons in capacity development initiatives that aim at building stronger small-scale fisheries to deal with current and emerging pressure, including those related to climate change, globalization, and development agendas like Blue Growth and Blue Economy. A handbook on capacity development for the implementation of the SSF Guidelines is envisaged as an output of the session.

Contacts:
George Freduah (University of the Sunshine Coast) (gfreduah@usc.edu.au), Andrew Song (James Cook University and University of Technology Sydney), Dave Mills (Illuminating Hidden Harvests)

74. Women in fisheries and the seafood industry

Descriptor:
This session will explore the multifaceted involvement of women in fisheries and the seafood industry worldwide. Their diverse roles and challenges, along with the impact of fisheries policies and economic development activities on women within industry will be explored.

Contacts:
Heidi Mumme (heidi.chadd@bigpond.com), Karen Holder, Tanya King (WISA)

75. Fishing industry safety – how do we make maritime safety part of sustainable fishing?

Descriptor:
Sustainable and socially responsible seafood includes ensuring the safety of the people catching it. In an industry where attitudes to safety are not consistently applied, what headway is being made to understand the barriers and motivators to safe practice and provide support? This session will discuss the many safety hazards and risks faced by fishers on a daily basis and what changes can be made to reduce these risks and ensure they come home safely. Efforts to address mental health issues and wellbeing in this industry will be discussed, including high rates of depression and suicide, and examples will be presented describing demonstrable improvements in operational safety performance and wellbeing. This session will also examine behaviour change and the challenges of improving the fishing industry's often negative approach to safety and training. Some of the key questions to address, include: We have this perception that fishing is a dangerous job—what can we learn from other industries like construction, aviation, rail and others? Risk perception—I have never had an accident therefore I am safe—Does this mean that people working in this industry lower their safety guard? What does facilitate the

development of a safety culture that will prevent, or mitigate the effects of, marine incidents really mean? What are the roles of the regulator, industry and crew in ensuring we integrate safety culture within sustainable fishing?

Contacts:
Brad Milic (brad.milic@amsa.gov.au), Michelle Grech, Sarah Cameron (AMSA), Steve Eayrs (SeSAFE), Kate Brooks, Heidi Mumme, Karen Holder, Tanya King (WISA), Roy Palmer (Aquaculture without Frontiers), Janine Pierce (University of South Australia)

THEME 4: FUTURE OF FISH AND FISHERIES (INNOVATIONS IN FISHERIES)

76. The state of fisheries management and science in the early 21st century – a perspective from the future. What will be the main drivers of fisheries change? What kind of skills are needed? How far have we come and where to next?

Descriptor:
Hindsight is said to be more accurate than foresight, yet blurred memories and the mist of time often cause imperfections to be overlooked. In the year 2020, managers and scientists could look back at progress made during the previous century, when the science-based approach to fisheries management had led to the development of approaches of ever increasing sophistication and complexity. In the first decade of the 21st century, the recognition that fisheries were still becoming overexploited led to increased use of risk-based harvest strategies and acceptance that broader ecosystem, social, and economic objectives needed to be considered in a more open consultative approach. This session examines how, in 2050, we would view the effectiveness and shortcomings of those approaches and strategies of the early decades of the 21st century. Was it an age of enlightenment, or an era of lost opportunity?

Contacts:
Brent Wise (Brent.Wise@dpird.wa.gov.au), Daniel Gaughan (DPIRD WA), Dorothy Dankel (University of Bergen), Jörn Schmidt (Christian-Albrechts-Universität zu Kiel), Atsushi Hagiwara (Nagasaki University), Tim Ward (South Australian Research and Development Institute), Rob Stephenson (St Andrews Biological Station), Anna Willock (AFMA), Andre Punt (University of Washington)

77. The future of seafood certification: where to in the next 20 years?

Descriptor:
2020 marks the 20th anniversary of the world's first certified-sustainable fishery by the Marine Stewardship Council (MSC). Since this time, seafood certification programs have grown significantly in terms of fishery engagement and market influence. The number of certification programs has also proliferated, such that consumers are faced with an assortment of 'sustainable' seafood, including environmental, social and ethical options. This session will focus on the role of certification programs moving forward, including lessons learned, current challenges (e.g. balancing ecological sustainability and social responsibility, expanding coverage in the developing world and small-scale fisheries, fisheries and the climate crisis) and potential solutions. The session will be used to develop a scientific paper summarising key discussion points and outcomes.

Contacts:
Kendra Thomas Travaille (The University of Western Australia) (kendra.travaille@research.uwa.edu.au), Lynda Bellchambers (DPIRD WA)

78. From boat to plate: seafood supply chains, product authenticity and traceability. Can we establish a global framework for tracing the provenance of seafood?

Descriptor:
Seafood is one of the most traded food commodities in the world. Supply chains are opaque, complex and at high risk to fraud, which undermines ethical and sustainable fishing practices. Multiple

approaches can be used to validate seafood authenticity including DNA barcoding, next generation gene sequencing, stable isotopes, trace element finger-printing and digital tracing technologies. Market research predicts that seafood traceability technology will grow 9% annually, with revenue potentially reaching as high as $14 billion for companies specializing in such technology. With this momentum, can we establish a global framework for tracing the provenance of seafood and take a step toward addressing this global challenge? This session will examine global patterns in seafood mislabelling and the application of these state-of-the-art authentication methods. The session will explore how these methods can be coupled with supply chain certification programs and universal standards in fisheries data to reduce the problem. It will also explore the impediments, incentives, and how do the needs of developing and developed countries differ to seafood traceability.

Contacts:
Natalie Hunter (Marine Stewardship Council) (natalie.hunter@msc.org), Zoe Doubleday (University of South Australia), Patrick Reis-Santos (University of Adelaide & MARE-Ulisboa), Thomas de Kock (Tuna Solutions)

79. Navigating the legal environment of the Blue Economy

Descriptor:
This session will discuss the regulatory environment in which fishing occurs and what that may look like into the future including trade regulations, digital economy, interaction with other industries using the ocean, new regulations of the ocean environment for sustainable business and digital impacts such as cryptocurrencies.

Contacts:
Katherine Hawes (Aquarius Lawyers) (KHawes@aquariuslawyers.com.au)

80. Seafood consumer trends and marketing

Descriptor:
This session will explore consumer trends in eating and purchasing seafood including unpacking future trends. Are these trends likely to change and what will be the drivers of change? How will the world fish markets change with the growth in, consumer convenience vs environmental issues and/ or access issues? Are these likely to have an impact and change consumer purchasing habits?

Contacts
Barbara Konstas (Melbourne Seafood Centre) (b.konstas@melbourneseafoodcentre.com.au), Peter Horvat (FRDC), Jane Lovell (Seafood Industry Australia), John Susman (Fish Tales)

81. Food security – opportunities in plant-based and cultivated seafood

Descriptor:
Consumer interest in meat alternatives is growing rapidly, spurred largely by "flexitarians" who are seeking new options that compare favourably on environmental sustainability, animal welfare, and health without compromising flavour or texture. In recent years the development of new plant-based seafood products and approaches has gained significant traction. At the same time, significant progress is being made in developing cultivated seafood. These new products and approaches offer the existing seafood industry an opportunity to satisfy shifting

consumer values, ensure a consistent supply in the face of growing global demand for seafood, and meet conservation and environmental sustainability targets.

Contacts:
Jen Lamy (The Good Food Institute) (jenl@gfi.org)

82. Innovative research and management tools – how are fisheries going to be managed and supported in the future? Ecological forecasting for fisheries.

Descriptor:
In an era of rapid environmental change, building the capacity to forecast ecological change is essential for managing fisheries in the future. Ecological forecasting is the prediction of near real-time or future biological responses to concurrent environmental conditions, including extremes such as marine heatwaves or deoxygenation events. This session will provide a theoretical and practical understanding of ecological forecasting systems, from acquiring and manipulating environmental data, to forecasting models and calculating summary metrics, to engagement approaches with forecast users. Forecast applications on a time scale of days to month to several years are encouraged, rather than submissions that present end-of-century projections. We encourage submissions from a wide range of ecological systems, including freshwater, estuarine, coastal and offshore.

Contacts:
Alistair Hobday (CSIRO) (Alistair.Hobday@csiro.au), David Power (AFMA), Jonathon Davey (Seafood Industry Victoria)

83. Advances in fishing vessel and gear technologies

Descriptor:
This session will explore advanced developments in fishing vessel and gear technologies that can enhance efficiencies, sustainability, and/or reduce bycatch and impacts on biodiversity. The session will also focus on approaches for de-carbonising fishing operations.

Contacts:
Lachie McLeay (South Australia Research and Development Institute) (Lachlan.McLeay@sa.gov.au), Dennis Holder (DM and KL Holder Pty Ltd and Two Gulfs Crab Pty Ltd), Anna Willock (AFMA), Rosie Hurst (NIWA)

84. Emerging technologies advancing data collection and processing – Machine Learning, Big Data and Fishery Applications

Descriptor:
Technology is becoming increasingly common for studying environments and species, and could revolutionise our understanding of aquatic systems. Advances in GPS, satellite communications, and imagery, for example, have allowed increased temporal and spatial data capture that previously would have been unimaginable. Today machine learning, robotics, and augmented reality also have the potential to further revolutionise and lead to “next generation” data advances. Technological advances are occurring through innovative expansion of current practice, answering questions that could not previously be answered (step-change), or exploring issues that we have not yet thought of (radical change). This session will promote the range of new technologies and interdisciplinary collaborations advancing data collection

and processing in fisheries and aquatic systems. This may include applications of robotics for data collection and monitoring, such as ROVs, AUVs, drones, sailing drones and acoustics, as well as machine learning, AI and block-chain technologies. The session will discuss the future for data collection and advanced technologies.

Contacts:
William Michaels (william.michaels@noaa.gov), Farron Wallace (NOAA), Jenq-Neng Hwang (University of Washington), Rich Little, Geoff Tuck, Dadong Wang (CSIRO), Bronwyn Gillanders (University of Adelaide), Charlie Huveneers (Flinders University), Gretchen Grammer (SARDI), Mike Gerner (AFMA)

85. Advances in electronic monitoring, data management and automation in fisheries observer programs

Descriptor:
The majority of global fisheries lack the scientific data needed for effective management. Fishery managers are now looking to new technologies to help fill in critical data gaps. On-vessel cameras (Electronic Monitoring – EM) have the potential to address many of the shortfalls that impede management, yet this new technology is challenged by its own impediments such as data storage, analysis and auditing. New techniques in Artificial Intelligence and Machine Learning offer promising solutions for the advancement of EM in fisheries. This session is interested in new approaches and techniques for EM.

Contacts:
Rich Little (Rich.Little@csiro.au), Geoff Tuck, Dadong Wang (CSIRO), Kim George (Fisheries New Zealand), Mike Gerner (AFMA)

86. Advances in genomics for sustainable fisheries

Descriptor:
The ongoing development of sequencing technologies has the potential to significantly advance fisheries management, biosecurity, conservation and aquaculture applications. The ability to generate genome-wide sequence data has enabled researchers to assemble full genome sequences, scan for marker and structural variation across the entire genome, and to test for genome-wide differences in gene expression patterns both at an ever-diminishing cost and in any species desired. Further, rapid development in the field of eDNA holds immense promise to improve the way we bio-monitor fisheries and biotic factors impacting them. They also provide a powerful and less costly means to document assemblages and even stock biomass, or tracking the spread of invasive species and pathogens that may negatively impact fisheries. This session will aim to evaluate the progress of these exciting advances by bringing together contributors in the field of fisheries genomics working in marine or freshwater systems.

Contacts:
Maren Wellenreuther (Plant and Food Research, New Zealand; University of Auckland) (Maren.Wellenreuther@plantandfood.co.nz), Luciano Beheregaray (Flinders University), Louis Bernatchez (Institut de Biologie Intégrative et des Systèmes (IBIS), Université Laval, Québec, QC, Canada), Peter Grewe (CSIRO)

87. **Harnessing the flood: integrating genomic data at all scales into monitoring and Ecosystem Based Fisheries Management (EBFM) (sponsored by the Fisheries Society for the British Isles, FSBI)**

Descriptor:
Globally there has been a change in the focus on the concept of sustainable fisheries; with this change emphasising the need to incorporate the wider ecological impacts of fisheries on marine ecosystems. In parallel to the advances in modelling for management, the advances made in fisheries genomics have been colossal, and we can now produce vast amounts of data to address questions that were beyond our reach just a few years ago. The integration of these novel sources of genetic information into EBFM is currently under-utilised, but the potential applications covers all levels of fisheries data, and goes well beyond the more widely used population genetics of fisheries target species. This session will bring together modellers and geneticists in order to optimize the integration of this data into EBFM, and there will be an emphasis in the novel applications of genetics to issues in fisheries, from an individual to an ecosystem level, for example metabarcoding for informing food webs or to identify processed fisheries discards; eDNA for targeted species detection, or community metabarcoding; or directly using genetics for stock estimation with novel methods such as genetic close-kin analysis. EBFM holds significant promise for revolutionising fisheries management (and marine natural resource management more generally) and this move towards an ecosystem approach to management can be enhanced with the inclusion of novel state of the art genomic data.

Contacts
Sarah Helyar (Queens University Belfast) (s.helyar@qub.ac.uk), Ilaria Coscia (University of Salford), Mark Bravington (CSIRO), Peter Grewe (CSIRO)

88. **Biomarkers in calcified structures: advancing chemical tracers in fish hard parts for sustainable fisheries**

Descriptor:
Chemical biomarkers stored in fish hard parts such as otoliths, scales, fin rays and vertebrae can reveal a myriad of essential information including natal origins, stock structure, migrations, growth rates, metabolism, physiological stress, and trophic interactions. This field is advancing rapidly with new and refined analytical techniques that can assay changes in chemical compositions across growth increments at high spatiotemporal resolutions and an expanded 'periodic table' of elements and isotope systems that can be quantified. This session will solicit multidisciplinary contributions that highlight state-of-the-art analytical developments and practical applications of chemical biomarkers in fish hard parts that are relevant to global fisheries management efforts. The session will provide an opportunity to gain a practical grounding in the application and interpretation of otolith chemistry, and how to integrate this information with other complementary approaches.

Contacts:
Benjamin Walther (Texas A&M University)-Corpus Christi (TAMU-CC) (Benjamin.Walther@tamucc.edu), Karin Limburg, State University of New York College of Environmental Science & Forestry (SUNY-ESF), Patrick Reis-Santos (University of Adelaide & MARE-Ulisboa), Chris Izzo (FRDC & University of Adelaide), Susanne Tanner (Marine Environment

Science Centre, MARE), Jess Farley (CSIRO)

89. The use of animal tracking to address sustainability issues; developing shared standards and open data in the many animal tracking systems around the world

Descriptor:
This session will explore advances in the use of animal tracking to address sustainability issues, including fisheries bycatch, in order to move the global community to shared standards and open data in the many animal tracking systems around the world.

Contacts:
William Michaels (NOAA) (william.michaels@noaa.gov), Nic Bax, Paul Hedge (CSIRO), Gretchen Grammer (SARDI)