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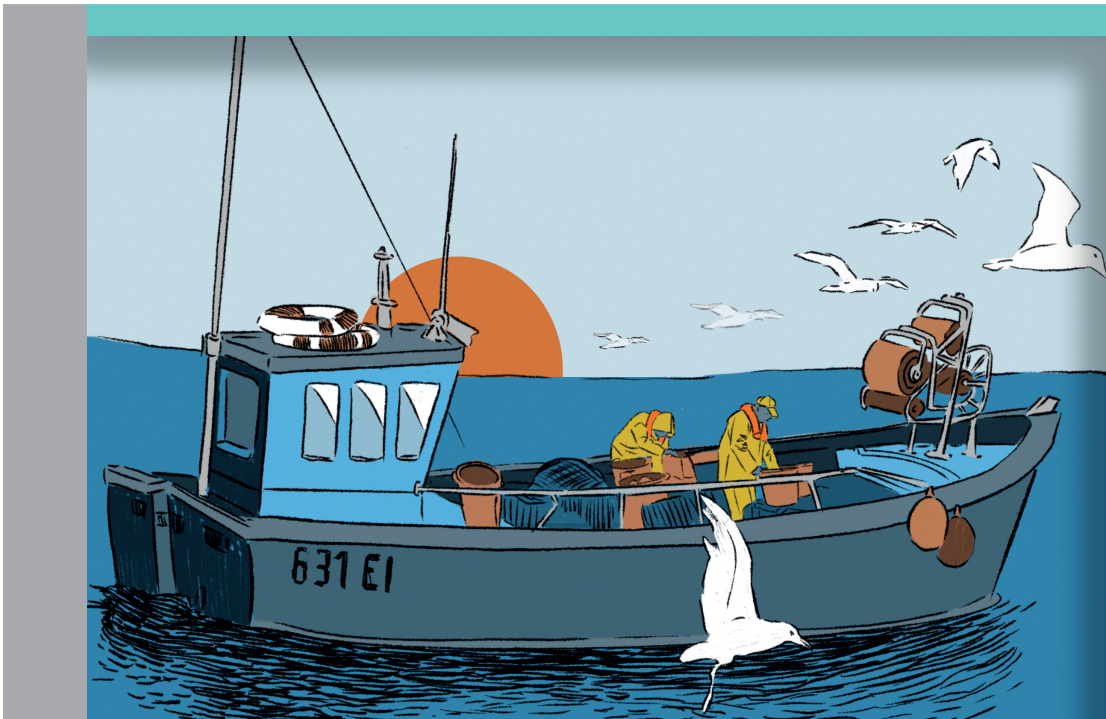
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8–12 January 2024
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Proceedings of the Sixth International Fishing Industry Safety and Health Conference (IFISH 6)

8–12 January 2024
Rome, Italy

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Preparation of this document

These proceedings have been prepared and edited by Jennifer Lincoln, Julie Sorensen, K.C. Elliott and Florence Poulain of the planning committee of the Sixth International Fishing Industry Safety and Health Conference (IFISH 6).

Contributing authors to the report include Raymon van Anrooy, Senior Fishery Officer, FAO.

The Sixth International Fishing Industry Safety and Health Conference (IFISH 6) was held at the Food and Agriculture Organization of the United Nations (FAO) over a period of five days from 8–12 January 2024. For each day of the conference, the report includes a description of the session(s) (moderator and presenters) and the summary of the abstracts submitted. Overall, there were over 100 presentations, 6 keynote speeches and 14 posters. The abstracts can be found in these proceedings. All abstracts have been reproduced as submitted, with minimal editorial adjustments for readability. The welcome address is reproduced as submitted. In addition, the document includes a section on the IFISH Innovation Exchange and a number of annexes (list of participants, IFISH 6 programme, welcome speech).



Abstract

The Sixth International Fishing Industry Safety and Health Conference (IFISH 6) was held at the Food and Agriculture Organization of the United Nations (FAO) on 8–12 January 2024. Over 158 researchers, safety and health professionals, instructors, workers and industry experts, government and regulatory representatives and other professionals participated from over 31 countries.

The information and debates generated by IFISH 6 aimed to:

- Help advance safety and health research in the industry, as well as within international fora, such as the FAO Committee on Fisheries.
- Increase awareness of and knowledge in safety and health issues among researchers and fishing safety practitioners, especially from developing countries, to implement at local level.
- Foster networking opportunities within research groups and practitioners that lead to additional research projects, new training curricula, joint development of innovations, safety working groups and other products.
- Support the next generation of researchers.

The Conference started with a pre-conference workshop on 8 January 2024, devoted to global instruments and safety initiatives jointly organized by the International Labour Organization (ILO), the International Maritime Organization (IMO), the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO). The pre-Conference Day concluded with a poster session from researchers and industry professionals from around the globe.

The Conference formally started on 9 January 2024 with a welcome speech by Manuel Barange, Assistant Director General (ADG) and Director, FAO Fisheries and Aquaculture Division, and an introductory note on the history of IFISH delivered by Jennifer Lincoln, US National Institute for Occupational Safety and Health (NIOSH). At the conclusion of the welcome speech and the introduction, and over the next 2.5 days, three concurrent sessions covering many themes related to the successes and continued challenges associated with occupational health and safety for the fishing, aquaculture and seafood processing industries were conducted. Key topics included international safety norms and standards, safety gear and technologies, safety awareness and training, vessel design, risk management and insurance, the mental health and well-being of workers, the impacts of climate change and other emerging issues. The conference brought a special focus on underserved populations, as well as promising interventions that bring workers safely home to their families.

The Conference concluded on 12 January 2024 with a post-Conference workshop to discuss insights and ideas generated by the IFISH 6 Conference, and a second workshop to gather feedback on the concept of an IFISH Innovation Exchange. Discussions indicated widespread interest in developing an Innovation Exchange mechanism that would allow researchers and safety advocates/practitioners to stay connected in between conferences. Potential mechanisms for collaboration included regular, virtual workgroup meetings or short-term work visits that allow participants to learn about new methods, to observe trainings or publish data.

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Foreword

Increasing pressure on fishing stocks and the challenges of feeding populations worldwide have been a necessary focus of international concern for many decades. In the past decade these concerns have only amplified as the world continues to struggle to meet the challenges of climate crisis, pollution and other environmental factors that affect the availability and access to aquatic food sources. While concerns are warranted, what is often missed in discussions centred around how to conserve and share aquatic resources is a consideration of how these factors and decisions impact the workers who produce, catch and process aquatic food.

It has long been acknowledged that commercial fishing is one of the most dangerous occupations in the world. Moreover, increasing efforts to understand worker safety and health risks in the seafood processing and aquaculture industries are leading to equally concerning discoveries of workplace hazards, such as respiratory and dermal exposures. Workers are also increasingly impacted by changes to their environment, such as increased frequency of storms or increasing competition for dwindling fish stocks and other aquatic resources. Unfortunately, existing efforts to manage these resources and environmental changes may lead to an increasing regulatory burden, competition for limited resources, market volatility and financial uncertainty, that in turn impact the safety and well-being of workers in these industries. Researchers and advocates have widely acknowledged growing concerns about stress, economic insecurity, access to healthcare, in addition to the longstanding concerns about safety for these workers. Discussions with workers underscore the ripple effect that economic insecurity has on their ability to invest in safety gear and equipment maintenance, to schedule appropriate rest hours and avoid hazardous weather, and to provide adequate income for their families and access to healthcare. Therefore, given the increased demand for aquatic food in a changing climate and the critical need to reduce human suffering and prevent loss of life, any consideration regarding the conservation and sustainable management of aquatic resources must also include consideration of the safety and welfare, and thus sustainability, of the aquatic food workforce.

In the coming decades, researchers, resource managers, policymakers, industry advocates, healthcare workers and safety specialists will need to work collectively and think creatively to focus international attention on the needs of these workers. Fortunately, the IFISH 6 Conference held at FAO Headquarters in Rome, Italy, provided a valuable opportunity for encouraging innovative thinking and global collaboration in ways that will ensure a brighter future for aquatic food supply workers.

As outlined in the IFISH 6 proceedings, several primary themes emerged from the presentations and keynotes shared in Rome. These include the need for investing in improvements for aquatic industry workers, ensuring that fisheries management and regulations are affordable and manageable for workers and industry groups, standardizing requirements across regulatory systems and considering how industry volatility impacts safety, stress and health. In particular, concerns regarding the unique vulnerability of small-scale fishers and aquatic industry workers in developing countries was shared, pointing to the need for particular consideration of these groups in future efforts. The proceedings outlined here also provide a helpful look at the International

Maritime Organization (IMO), International Labour Organization (ILO) and FAO regulations under consideration, and the crucial need to include workers and industry groups in these discussions.

As these conference proceedings indicate, there is much work to be done. Solutions and investments need to be made to support workers and the fishing communities, who rely on both their income and their product to survive. To this end, industry advocates, safety specialists and researchers will need to dedicate efforts to help consumers, policymakers and the general public understand the considerable importance that these industries play in our food supply. The IFISH 6 conference and these proceedings provide a great start for mobilizing this necessary shift in awareness and the need to better serve and support these workers.

Dr Jennifer Lincoln, Dr Julie Sorensen, K.C. Elliott and Florence Poulain.

Acknowledgements

The sixth edition of the International Fishing Industry Safety and Health Conference (IFISH 6) would not have been possible without the great collaboration between the National Institute for Occupational Safety and Health (NIOSH), the Northeast Center for Occupational Health and Safety in Agriculture, Forestry and Fishing (NEC), and FAO. A core planning committee, led by NIOSH, NEC and FAO's Fishing Technology and Operations team (NFIFO) organized all aspects of the programme.

A scientific programme committee worked with the Scientific Committee Chairs (Jennifer Lincoln and Florence Poulain) to organize oral and poster presentations by the most appropriate topic or research methodology. The committee was supported greatly by K.C. Elliott who was responsible for assigning all abstracts and ensuring timelines were met. Special thanks go to her and to the 15 members of the scientific programme committee namely: Derek Archer, Cor Blonk, Lissandra Cavalli, Leann Cyr, Eric Holliday, Ingunn Marie Holmen, Mahmud Islam, Mohamed Jeebhay, P Krishnan, Barb Neis, Sam Paling, Serge Raemaekers, Mike Savins, Julie Sorensen and LeiLei Zou. Their leadership has helped inform the research and practice for thousands internationally, and we are grateful for their time and talents in reviewing submissions and shaping the programme for IFISH 6.

Thanks are extended to all those who made presentations and moderated sessions. IFISH 6 would not have been possible without the attendance and active participation of the 158 individuals from research, government, and the safety and health sectors who joined us in Rome for a week of collaboration, learning and dedication to improving the safety, health and well-being of the global fishing, aquaculture and processing workforce. They provided a strong representation of safety and health in the fisheries and aquaculture sector from around 31 countries.

FAO managed logistics and hosted the Conference at FAO headquarters in Rome, Italy. Communication on the event was coordinated by John Huber, NEC and by Raffaella Rucci from the FAO Office of Communications (OCC). Special thanks are due to the work of Kim Gertz, Amanda Roome, Liane Hirabayashi, Pamela Milkovich, NEC and to the staff of the Fisheries and Aquaculture Division, in particular Maria Eugenia Escobar (office assistant), Duygu Maktav (operations specialist), Agnieszka Dutkiewicz (graphic designer) and Luca Limongelli (IT officer) in contributing to the success of the conference.

We would like to extend our gratitude to the co-sponsors of IFISH 6. Thanks to the efforts of FAO, the Lloyd's Register Foundation, The Seafarers' Charity, The Seaworthy Foundation, and Flynn/Wirkus, the participation of presenters from developing nations was made possible. Fishing Partnership Support Services provided fishing safety equipment which was displayed in the FAO Atrium to raise awareness on the dangers of fishing and promote the use of life jackets and other safety equipment.

The post-workshop conference and the innovation exchange provided additional expertise and knowledge in support of the overarching conference objectives of sharing knowledge and facilitating collaboration. Thanks to all who participated. Sophie Fridman, Magda Morales and Marianne Guyonnet are also acknowledged for their assistance in editing and publishing these proceedings.

Abbreviations

AMSA	Alaska Marine Safety Education Association
COFI	FAO Committee on Fisheries
FPSS	Fishing Partnership Support Services
IFISH	International Fishing Industry Safety and Health Conference
ILO	International Labour Organization
IMO	International Maritime Organization
IUU	illegal, unreported and unregulated fishing
MOB	man overboard
NIOSH	US National Institute for Occupational Safety and Health
OHS	occupational health and safety
PFD	personal floatation devices
PLB	personal locator beacon
RFB	regional fishery body
RFMO	regional fisheries management organization
SIDS	Small Island Developing States
SDG	Sustainable Development Goal
STCW-F	International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel
USCG	United States Coast Guard
WHO	World Health Organization

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1. Introduction

1.1 BACKGROUND

Few occupations are as old, or as hazardous, as commercial fishing. As the demand for aquatic foods and the number of fishers increase worldwide, and as climate change impacts fishing conditions, fishing could grow even more dangerous. The Thirty-fifth Session of the Committee on Fisheries (COFI35) recognized these challenges and requested FAO to increase its support to developing countries on fishing safety matters.

Responding to a growing global need for an international dialogue between policymakers, researchers, industry and worker organizations to increase safety in the fishing industry, the US National Institute for Occupational Safety and Health (NIOSH) created the International Fishing Industry Safety and Health Conference (IFISH).

Since then, five IFISH conferences have taken place in collaboration with FAO in: Woods Hole, Massachusetts (USA, 2000); Sitka, Alaska (USA, 2003); Mahabalipuram (India, 2006); Reykjavik (Iceland, 2009); and St. John's, Newfoundland (Canada, 2018)

This IFISH conference is the sixth edition of IFISH. It was co-organized and advised by NIOSH, NEC and FAO. Given the particular importance of safety to small-scale fisheries, and in line with COFI's request, the IFISH 6 conference gave a particular focus to safety in small-scale fishing.

1.2 OBJECTIVES

The objective of IFISH 6 was to showcase and disseminate relevant research, safety innovations and solutions, and to develop new and effective partnerships.

The information and debates generated by IFISH 6 aimed to:

- Help advance safety and health research in the industry, as well as within international fora (in particular COFI 36, and possibly also in the upcoming Ocean Decade Conference in April 2024, the Fourth International Conference on Small Island Developing States (SIDS) in 2024 and the United Nations Ocean Conference in 2025).
- Increase awareness of and knowledge in safety and health issues among researchers and fishing safety practitioners, especially from developing countries, in order to implement at local level.
- Foster networking opportunities within research groups and practitioners that lead to additional research projects, new training curricula, joint development of innovations, safety working groups and other products.
- Support the next generation of researchers.

It is also expected that the debates and conclusions will help FAO and its Members provide better support to the fishing and aquaculture sector, introduce transformative changes for improved fishers' safety and help to promote a safety culture throughout the fishing industry.

The event also gave support to FAO's ongoing joint work with the ILO and the IMO on safety and decent working conditions in fisheries, and the ratification and implementation of the 2007 ILO Work in Fishing Convention No. 188, the 2009 FAO Port State Measures Agreement (PSMA) and the 2012 IMO Cape Town Agreement. Finally, the event will contribute to the work of FAO and its Members towards achieving Sustainable Development Goal (SDG) 14 (Life below Water) of the 2030 UN Agenda for Sustainable Development, and other SDGs, such as SDG 3 (Good Health and Well-being), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth) and SDG 13 (Climate Action).

1.3 PLANNING AND SCIENTIFIC COMMITTEES

A core Planning Committee and a Scientific Programme Committee were created. The core Planning Committee, led by NIOSH, NEC and FAO's Fishing Technology and Operations team (NFIFO) organized all aspects of the programme. The Scientific Programme Committee, composed of 15 experts from around the world and chaired by FAO and NIOSH, reviewed proposals and led the development of the overall programme.

The following members are the members of the core Planning Committee and of the Scientific Programme Committee.

Core Planning Committee: Name	Position and affiliations
Jennifer Lincoln	Associate Director, Office of Agriculture Safety and Health National Institute for Occupational Safety and Health (NIOSH), Cincinnati, OH, United States of America
Florence Poulain	Fishery Officer (fishing safety), FAO Fisheries and Aquaculture Division, Rome, Italy
Julie Sorensen	Director, Northeast Center for Occupational Health and Safety in Agriculture, Forestry and Fishing (NEC), New York, United States of America
K.C. Elliott	Coordinator, Office of Agriculture Safety and Health, National Institute for Occupational Safety and Health (NIOSH), Anchorage, Alaska, United States of America

Scientific Programme Committee: Name	Position and affiliations
Jennifer Lincoln, Committee co-chair	Associate Director, Office of Agriculture Safety and Health National Institute for Occupational Safety and Health (NIOSH), Cincinnati, OH, United States of America
Florence Poulain, Committee co-chair	Fishery Officer (fishing safety), FAO Fisheries and Aquaculture Division, Rome, Italy
Derek Archer	Former Safety Officer, Caribbean Fisheries Training and Development Institute (CFTDI), Trinidad and Tobago
Cor Blonk	1. Secretary of Labour Affairs, Pelagic Freezer, Trawler Association; 2. Chair, FISH Platform
Lissandra Cavalli	Post-doctoral Researcher, Memorial University of Newfoundland, Canada
Leann Cyr	Executive Director, Alaska Marine Safety Education Association (AMSEA), United States of America
Eric Holliday	CEO, FISH Safety Foundation
Ingunn Marie Holmen	Research Manager, SINTEF Ocean, Norway
Mahmudul Islam	Associate Professor, Sylhet Agricultural University, Bangladesh
Mohamed Jeebhay	Professor and Head of Occupational Medicine, University of Cape Town, South Africa

Scientific Programme Committee: Name	Position and affiliations
Krishnan Paulpandian	Director, Bay of Bengal Programme Inter-governmental Organisation (BOBP-IGO), India
Barb Neis	Honorary Research Professor and John Lewis Paton Distinguished University Professor, Memorial University of Newfoundland, Canada
Sam Paling	Lead, Fishing Safety Strategy and Behaviours, Maritime Coastguard Agency, United Kingdom of Great Britain and Northern Ireland
Serge Raemaekers	Co-founder and executive director of ABALOBI, South Africa
Michael Savins	Professional boat builder and FAO Consultant
Julie Sorensen	Director, Northeast Center for Occupational Health and Safety in Agriculture, Forestry and Fishing (NEC), New York, United States of America
Leilei Zou	Associate Professor, Shanghai Ocean University, China

Kim Gertz, Amanda Roome and Liane Hirabayashi (NEC), provided support to the work of the committee by setting up committee meetings, collecting presentations, taking notes, organizing the conference proceedings and answering logistical and technical questions. Communication on the event was coordinated by John Huber (NEC) and Raffaella Rucci (FAO's Office of Communications). Raffaella Rucci and Agnieszka Dutkiewicz (FAO graphic designer) helped organize the exhibition in the FAO Atrium showcasing fishing safety issues and solutions.

1.4 PARTNERS

The conference was organized with the economic support of FAO and the following partners: the Lloyd's register Foundation, The Seafarers' Charity, The Seaworthy Foundation, and Flynn/Wirkus.

Fishing Partnership Support Services provided fishing safety equipment which was displayed in the FAO Atrium to raise awareness on the dangers of fishing and technology that can be used to improve fishers' safety at sea.

1.5 STRUCTURE AND CONTENTS

IFISH 6 activities extended over five days, including a pre- and two post-conference workshops, a poster session, and 2.5 days for the conference itself.

The pre-conference workshop on 8 January 2024 was devoted to global instruments and safety initiatives and included four presentations by the International Labour Organization (ILO), the International Maritime Organization (IMO), the World Health Organization (WHO) and FAO. Time was allowed for discussions. The pre-Conference Day concluded with a poster session from 14 researchers and industry professionals from around the globe and a reception at FAO.

The conference formally started on 9 January 2024 with a welcome speech by Manuel Barange, Assistant Director General (ADG) and Director, FAO Fisheries and Aquaculture Division, and an introductory note on the history of IFISH delivered by Jennifer Lincoln, US National Institute for Occupational Safety and Health (NIOSH). At the conclusion of the welcome speech and the introduction, the conference split into two mid-size breakout sessions rooms (capacity of about 50 people per room) and one large conference room (total capacity of 455). For 2.5 days the conference sessions were organized as follows:

- regular sessions (3–4 presentations on a given theme);
- panels (several short presentations on a given theme followed by discussion);
- roundtables (discussion sessions featuring short presentations by three or more speakers followed by audience participation); and
- workshops (guided sessions on a particular theme or issue led by one or two individuals).

The themes presented at the conference were as follows:

Red room (conference room)

- social and regulatory approaches for implementing safety and health standards;
- harnessing local knowledge and technology to improve safety in small-scale fisheries;
- preventing falls overboard and drowning;
- considerations of the impact of safety training;
- changing personal flotation use behaviour (parts 1 and 2);
- fishing vessel safety and design;
- programmes that facilitate fishers helping fishers to design and implement a fishing vessel safety programme;
- improving global fishing safety: Fish Platform's work to create a level playing field for international fishing vessel conventions; and
- setting the standard for sustainable fisheries training.

Mexico room

- decent fishery work in a changing climate;
- psychological hazards and promising health interventions;
- connectivity among training organizations to empower fishers as medical first responders through wilderness-style first aid training;
- dockside partnerships for health and well-being of fishers and their families;
- developing inclusive, equitable and climate resilient occupational safety and health for small-scale fishers;
- advancing social justice and decent work for all in the aquaculture sector;
- commercial seafood industry's health, safety and well-being in New Zealand;
- ensuring the economic stability and welfare of fishers and processors through insurance;
- improving safety, health and welfare through fisheries resiliency and sustainability initiatives; and
- promoting safety and social sustainability in Danish fisheries.

Lebanon room

- success stories and lessons learned by programmes supporting training, innovation and interventions;
- new research in occupational safety and health in fisheries and aquaculture;
- new frontiers in occupational safety and health interventions;
- challenges and measures for improved occupational health and safety in salmon farming;
- seafood processing hazards and risk factors;
- occupational hazards faced by fishers in the Indian fisheries and aquaculture sector;

- work-related asthma and allergy in the aquaculture and seafood processing industry: new insights into exposures, health outcomes and designing intervention strategies;
- data collection, analysis and trends in accident and fatality reporting in fishing;
- navigating regulatory and organizational uncertainties to address safety and health; and
- improving safety in commercial fishing: a discussion of risk influencing factors and contributing causes to hazardous events, measures for prevention and mitigation of occupational accidents, and how to improve safety management in the coastal fishing fleet.

Overall, there were over 100 presentations.

At the start and/or end of each day there were two keynote speeches highlighting prominent topics, such as safety at sea in small-scale fishing; the impacts of fisheries management on safety; and fisheries and aquaculture under the One Health umbrella. In total there were eight keynote speeches, including an introduction by the core Planning Committee on the IFISH 6 evaluation efforts and the need for feedback in the development of a COFI paper. Closing remarks were given by Raymon van Anrooy, Senior Officer, FAO.

1.6 WAYS FORWARD

In one of the two post-conference sessions on the last day, participants discussed their insights and the ideas generated by the IFISH 6 conference. Topics discussed included: emerging issues; best practices in health and safety, and where to focus our attention to make the greatest impact on fisheries; and seafood processing and aquaculture safety. The feedback from this session and the findings from the evaluation form were collected to inform a paper to be presented at COFI in July 2024.

1.7 FISHERIES INNOVATION EXCHANGE

The post-conference sessions concluded with an IFISH Innovation Exchange dialogue to sustain social ties and global collaboration, in an effort to increase the pace of solution development and dissemination. Discussions included considerations of how to support ongoing collaboration between fisheries researchers and advocates, such as virtual workgroup meetings or short-term scientific/training/ programme development missions. Attendees also outlined ideas for establishing an information hub with resources and the capacity for connecting with colleagues working in similar domains in other countries or regions. Recommendations for developing an advisory board and an application/review process for those interested in traveling to other countries for in-person exchanges were also offered.

Finally post-conference evaluations were sent to all attendees after the event. The survey was designed to elicit participants' evaluations of the event and explore their vision for the future. Survey questions were codesigned by NEC, NIOSH and FAO. This information is currently being combined and will be used to guide planning for the next IFISH conference.

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2. Pre-Conference workshop

This section summarizes the presentations that were delivered for the pre-Conference workshop on **Global Instruments and Safety Initiatives** on Monday 8 January. The workshop introduced the challenging and hazardous nature of work in the fishing sector, explaining the role of international standards, guidelines, codes, and other tools that address the safety and decent working conditions in the fisheries and aquaculture sectors. The workshop also made the case for drowning prevention initiatives to reduce human losses in the fishing industry.

The session was moderated by Raymon Van Anrooy, Senior Fishery Officer, FAO.

Presentation 1: The revision of the International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F): leveling-up the training standards for fishing vessel personnel

Olivier Lebrun, Senior Professional Officer, Office of the Director of the Maritime Safety Division, International Maritime Organization (IMO), delivered a presentation on behalf of the IMO on the revision of the International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F). In 1995, the STCW-F Convention was adopted by IMO. It is a binding treaty that sets certification and minimum training requirements for crews of seagoing fishing vessels with the aim to promote the safety of life at sea and the protection of the marine environment, taking into account the unique nature of the fishing industry and the fishing working environment. The presentation provided an overview of the process of the STCW-F Convention revision. The proposal for the review came in 2015 and it took 10 years to be concluded. Its entry into force is expected in 2026. The structure of the revised STCW-F has been improved and follows the structure of STCW Convention, i.e. the convention is now divided into two parts (Part A – mandatory and Part B – Recommendatory).

New features have also been included, such as:

- the requirement to use simulators;
- the need for medical standards and certificates for officers in charge of engineering watch;
- the division of engine propulsion power for engineer officers;
- the demand for detailed requirements for basic training and new requirements for onboard officers; and
- the new STCW-F code to provide tables containing specifications of minimum standards of competence for each capacity, function and training requirements.

The revision of the STCW-F Convention supports harmonization of qualifications by introducing a minimum level of training for everyone working on fishing vessels to which the Convention applies. This, in turn, facilitates free mobility of fishers between countries that have ratified and implemented the STCW-F Convention and creates a level playing field in the sector.

Presentation 2: International labour standards on occupational safety and health for the fishing sector

Francisco Santos O'Connor, Senior Specialist in Occupational Safety and Health, International Labour Organization (ILO), explained the role of the international labour standard, highlighting that the International Labour Conference decided to include "a safe and healthy working environment" in the ILO's framework of fundamental principles and rights at work at its One hundred and tenth Session in June 2022. The presentation emphasized that all of ILO's member states are now obligated to respect, to promote and to realize, in good faith and in accordance with the ILO Constitution, the principles concerning the fundamental right to a safe and healthy working environment.

The presentation then delved into the specifics of the ILO Convention No. 188, also known as the Work in Fishing Convention, 2007. This convention sets out binding requirements for ratifying Member States to address the main issues concerning work on board fishing vessels, including occupational safety and health, medical care at sea and ashore, rest periods, written work agreements, and social security protection at the same level as other workers.

Presentation 3: Drowning prevention: global overview

David Meddings, Technical Lead Global Drowning Prevention, World Health Organization (WHO) provided an overview of drowning as a global public health issue. The basic epidemiology and effective interventions to prevent drowning was discussed, as well as WHO's normative guidance in relation to drowning prevention. Intersections of drowning prevention with the Sustainable Development Goals (SDGs), as well as two recent UN resolutions (UN General Assembly and the World Health Assembly) were also discussed. The talk also presented current priority actions of WHO, including the recent establishment of the Global Alliance for Drowning Prevention and WHO's first ever Global Status Report on Drowning Prevention.

Presentation 4: Fishing safety: issues and areas for solution

Florence Poulain, Fishery Officer, Fisheries and Aquaculture Division, Food and Agriculture Organization of the United Nations (FAO) gave a talk on behalf of FAO. Fishing remains one of the most dangerous occupations in the world. Most accidents and fatalities occur in small-scale fisheries. Back in 1995, more than 170 Members of FAO adopted the Code of Conduct for Responsible Fisheries. The Code urges all States to ensure that fishing facilities and equipment, as well as fisheries activities, allow for a safe, healthy and fair working environment and living conditions and meet internationally agreed standards adopted by relevant organizations. Since 1995, FAO has continued to work with IMO and ILO on promoting ratification and implementation of safety standards and is assisting its member states to adopt safety standards, as laid down in the Code, as well as in the 2009 FAO Port State Measures Agreement (PSMA) and the 2014 FAO Voluntary Guidelines for Securing Sustainable Fisheries, in the context of food security and poverty alleviation. As we transform the blue portions of our world, we need to ensure the fisheries and aquaculture sectors are strong and thriving, and this includes making them safer. Safety of fishers and fishing vessels is an integral part of the programme of work of FAO through the design and construction of safe fishing vessels, as well as in the provision of safety education and training to the fisheries communities in developing countries.

Following discussions focused on the limited ability and resources of stakeholders to operationalize international fisheries' safety instruments. It is important that FAO, IMO and ILO continue to work together on awareness raising and implementation of worldwide endorsed instruments and standards for fishing safety and decent work. Interagency collaboration between maritime, labour and fisheries administration was also encouraged at a national level. The need to take a fisher's centric approach when developing new regulations was stressed. It was suggested to improve data gathering and enhance collective bargaining to safeguard the most vulnerable fishers, which are often small-scale fishers. New training packages targeting small-scale fisheries will continue to be developed, implemented and translated in local languages.

Poster session

The pre-conference concluded with a poster session. Researchers and industry professionals from around the globe presented a preview of their research. The names of the poster presenters and their presentations are indicated below. The abstracts are provided in section 6.

Name, position and affiliation	Poster title
Ann S. Backus, Harvard Chan Education and Research Center, United States of America	The challenge of whale-related regulations and windfarms for fishers in the North Atlantic
Lissandra Souto Cavalli, Memorial University of Newfoundland, Canada	Salmon aquaculture mass mortality events and occupational health and safety: A multinational risk analysis
Kerri Ann Ennis, Fisheries and Marine Institute of the Memorial University of Newfoundland, Canada	Improving the usage of floatation and emergency signaling devices by recreational fishers
Liane Hirabayashi, Northeast Center for Occupational Health and Safety: Agriculture, Forestry and Fishing, United States of America	Pathway to innovation in occupational health and safety: Creating the Northeast Center Research to Practice Incubator
Mohammad Minhazul Islam, Vaasa University of Applied Sciences, Finland	Underprivileged and ununited: Situational analysis of fishing labour in Bangladesh
Kenneth Keene, National Oceanic and Atmospheric Administration, United States of America	Bringing into service an underutilized safety resource: Fisheries observers
Akbar Marvasti, National Oceanic and Atmospheric Administration, United States of America	Moral hazard and self-selection in insurance markets: Evidence from commercial fisheries
Adam Parnell, CHIRP Maritime, United Kingdom of Great Britain and Ireland	Marine casualty prevention and incident information sharing
Amanda Roome Northeast Center for Occupational Health and Safety: Agriculture, Forestry and Fishing, United States of America	Lines of support: Tackling stress at sea
Julie Sorensen, Northeast Center for Agriculture, Forestry, and Fishing Safety and Health, United States of America	IFISH Innovation Exchange
S. Sabu, Cochin University of Science and Technology, India	Transformation of seafood processing side-stream to chitosan: Worker's health and safety considerations
Vishwa D. Samaraweera, Department of Zoology, University of Sri Jayewardenepura, Sri Lanka	Health impacts of jellyfish blooms on fishers: A case study from Sri Lanka
Trine Thorvaldsen, SINTEF Ocean, Norway	An engine emergency stop and alert system in case of man overboard (MOB) events
Bharat Yadav, Dr B. S. Konkan, Agricultural University, Ratnagiri, Maharashtra, India	Self-help groups (SHGs): A step towards women empowerment and livelihood generation through fish culture In Maharashtra, India

Plenary and break out sessions



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3. Day 1

The conference formally started on 9 January 2024 with a welcome speech by Manuel Barange, ADG and Director, FAO Fisheries and Aquaculture Division, and an introductory note on the history of IFISH delivered by Jennifer Lincoln, US National Institute for Occupational Safety and Health (NIOSH). At the conclusion of the welcome speech and the introduction, the conference split into two mid-size breakout session rooms (capacity of about 50 people per room) and one large conference room (total capacity of 455).

This section summarizes the conference introduction and the sessions that were conducted on day 1.

3.1 WELCOME REMARKS

A welcome remark was given by Manuel Barange, Assistant Director General (ADG) and Director of the FAO Fisheries and Aquaculture Division. He expressed concern about the number of fatalities in fishing and stressed that fishing safety is an integral part of the FAO Blue Transformation agenda. Within this agenda, FAO aims to increase capacity and access to safety at sea, social protection and decent working conditions, as well as to support and enhance safety standards for all fishing vessels. The ADG noted that IFISH 6 provided a unique opportunity at a global level to learn from each other's research and practical know-how, and transfer experiences for the safety of fishing. He noted this conference came at a good time and could inform the FAO Sub-Committee on Fisheries Management, which met for the first time on 15–18 January 2024.

The welcome speech is reproduced as submitted in Annex 3.

3.2 CONFERENCE INTRODUCTION

Jennifer Lincoln, NIOSH, recounted the history of IFISH. In the late 1990's, the National Institute for Occupational Safety and Health (NIOSH) was building its research programme in commercial fishing safety, due to the great need to reduce occupational safety risk in the United States (US) fishing industry. Although the fatality rate had decreased in Alaska, the rate remained elevated for the rest of the US. The scientific literature showed the fatality rates were 16–79 times higher in other nations such as Australia, Denmark, Finland, Korea and Sweden. At the time, the ILO and FAO estimated 7 percent of all worker fatalities worldwide occurred in fishing, but less than 1 percent of the working population were in the industry. NIOSH recognized a need to convene a global discussion on the topic and the International Fishing Industry Safety and Health (IFISH) Conference was born. During the first IFISH meeting in October of 2000, attendees identified the need for plausible solutions that neither hamper nor diminish the quality of the catch; and, at the same time, be practical and affordable for the industry. While the attendees benefited greatly from the international perspectives present, the ILO and FAO attendees explained that perspectives of small-scale fisheries must also be represented at IFISH. Since then, FAO has sponsored travel for these researchers and experts to attend.

Jennifer Lincoln stressed that IFISH is the only conference that provides an opportunity to researchers, policymakers, safety and health professionals, industry, and workers to share success stories, discuss research methods, and brainstorm solutions for addressing

continuing barriers. Since 2000, there have been six IFISH conferences around the world. This presentation covered the history of the conference and provided major themes and transitions that occurred from conference to conference. She concluded by highlighting that IFISH is not just a series of conferences, but it's where real work is done to help this industry/these workers find practical safety and health solutions in a changing industry and planet.

Following Jennifer Lincoln's talk, Jeremy Turner, former FAO staff, offered a eulogy speech in memory of Dr Y. S. Yadava, Director, Bay of Bengal Programme Inter-Governmental Organization (BOBP-IGO), India, and recalled his passionate advocacy to make safety an integral part of fisheries management.

At the conclusion of the welcome speech and the introduction, concurrent sessions covering specific topics pertaining to safety and health in fisheries and aquaculture were conducted. These are summarized below.

3.3 BREAKOUT SESSIONS

Session 1 A: Social and regulatory approaches for implementing safety and health standards

This abstract session was moderated by Amanda Roome, with presentations from the following:

Enforcement of fishing occupational health and safety (OHS) standards: Challenges in Atlantic Canada by Desai Shan, Memorial University of Newfoundland, Canada

Fishing is a hazardous occupation worldwide with a poor health and safety record. Between 2010 and 2020, an average of 236 marine accidents were reported to the Canadian Transportation Safety Board and an average of 33 percent involved fishing vessels. Like fisheries' governance more generally, governance of fishing health and safety is a wicked problem which cannot be solved once and for all but tends to reappear. While there are no panaceas for improving fishing safety, improved regulation can help. Fishing health and safety is often subject to regulations by multiple agencies, particularly in federalist states. In Canada, the federal government is responsible for providing a national regulatory framework that applies to the structural and operational safety of vessels, and provincial governments are responsible for the workplace health and safety of crews while they are engaged in commercial fishing activities and for workers' compensation. In this context, inconsistencies among standards and variability in levels of protection across fleets and provinces can exist, and jurisdictional conflicts may occur. However, few studies have examined this problem. To fill this research gap, guided by governance theory and drawing upon findings from a legal review of international, federal and provincial fishing operational health and safety (OHS) laws and regulations and a review of case law, this article identified multiple regulatory and enforcement challenges in OHS law in the Atlantic Canadian context. These challenges included: (1) fragmented OHS governance due to the division of powers between federal and provincial governments; (2) variation in OHS-related standards and protections between provinces; (3) evidence of jurisdictional disputes that can reduce the efficiency of enforcement and development of fishing OHS standards; and (4) indications that federal-provincial jurisdictional divisions may be impeding Canada's progress in ratifying and implementing international OHS instruments, such as the C-188, Work in Fishing Convention of the International Labour Organization.

Strategies for fatality reduction in commercial fishing by Scott Wilwert, United States Coast Guard, United States of America

The commercial fishing industry in Alaska has experienced a significant decline in the fatality rate since 1990. This has also influenced the reduction of casualties and fatalities in the rest of the United States (US) over the last 33 years. Alaska's reduction, from 210 fatalities in the decade of the 1990s to 62 fatalities from 2010–2020 (and 25 consecutive months without a fatality from 2021–2023) is cause for reflection and analysis of what is working correctly in the fishing industry. This presentation shared how, Regulation, Rationalization, Innovation, Collaboration and Training have been viewed as the key components that aided in the reduction of fatalities in small indigenous/artisanal fisheries in Alaska and large-scale industrial fishing operations alike. "Regulation" creates the framework and minimal carriage of emergency gear and training requirements. "Rationalization" through fishery management policies creates safer approaches to fishing. "Collaboration" creates the necessary relationships with industry and agency partners to share in implementing efforts and compare data to understand trends. "Innovation" allows for alternative approaches to create more practical solutions to regulatory requirements. "Training" creates the muscle memory required to act effectively in an emergency. Our lessons learned, and partnerships and data collected over a period of 33 years, were instrumental in advancing the commercial fishing vessel safety programme from its early voluntary compliance roots to an established and embraced standard in the industry in Alaska. This presentation described a successful approach to commercial fishing safety with an international audience in mind, while also learning from and exchanging ideas with international peers on their respective successes and lessons learned.

Health and safety at-sea audits by Kimberley Mackey, MRAG Ltd., United Kingdom of Great Britain and Northern Ireland

Fishing vessels and fleets around the world are the foundation of the wild, capture-based seafood industry. Making sure that seafood comes from supply chains that are free from forced labour, slavery, child labour, discrimination, other welfare concerns and illegal, unreported and unregulated (IUU) fishing is a priority for the commercial sector. In recent years, reported incidents in the seafood industry have instigated discussions and initiatives in the sector to prevent infringements of human rights and to improve working conditions at sea. A number of standards have been developed globally that provide guidance to fishing vessels on how to improve the conditions and general working practices in the fishing sector. While it is relatively easy to audit vessels against these conditions while in port, there has been very little formal monitoring of vessels while at sea. Vessels that may pass certain criteria may not necessarily follow the guidelines once they depart. At-sea audits would provide an opportunity to assess compliance against a set of standards in real time, although logistical restrictions and cost have made this impractical in the past. A number of options do exist, and this presentation looked at these options and, using real life examples, the procedures that can be followed to conduct health and safety audits at sea.

Decent work along the value chain and new international guidance to protect workers by Mariana Toussaint, FAO, Italy

In 2017, FAO received the mandate to develop guidance on social responsibility from Members to address social issues in the fisheries and aquaculture sector. Through a comprehensive and inclusive consultation process, FAO is developing practical and voluntary guidance to improve decent working conditions throughout the fisheries and

aquaculture value chains. The FAO Guidance on Social Responsibility in the Fisheries and Aquaculture Value Chains will be based on existing international conventions, agreements, and standards addressing human and labour rights, decent working conditions, and social protection. The target audience of the FAO Guidance is the industry; however, it can also be a valuable reference instrument for policymakers, regional fishery body (RFB), regional fisheries management organizations (RFMO), and civil society. The presentation gave an overview of the FAO Guidance, as well as the process and further developments.

Session 1 B: Decent fishery work in a changing climate (Mexico Room)

This round table session was moderated by Michelle Tigchelaar, Stanford University, United States of America; Jessica Sparks, Tufts University, United States of America; and K.C. Elliott, NIOSH, United States of America

An estimated 40 million people work in the primary fisheries sector – work that is inherently precarious, dangerous, typically low-wage, and increasingly vulnerable to exploitative labour practices. Climate change poses a growing threat to decent work in fisheries, as evidenced by the rising incidence of severe weather events, which impacts both physical health (like the recent capsizing of several boats during heavy storms in the Bay of Bengal), as well as working hours and remuneration. Fishery work is uniquely at risk from climate change, as it affects not only working conditions on vessels, but also – as fish stocks shift – where the work is taking place, and therefore the different legal and regulatory frameworks that govern it. In general, improvements to working conditions in fishing have been slow, and more attention is needed – in research, policy, and practice – to how climate change threatens to erode even incremental gains in achieving decent work. Climate adaptation strategies for fisheries do not typically include measures to safeguard the physical and mental health of workers in the sector, and interventions and policies designed to promote decent work in fisheries – such as the ILO Work in Fishing Convention (C 188) – are limited by a poor understanding of climate impacts, where new vulnerabilities will emerge, and how labour governance may need to respond to these new challenges. In this session we discussed emerging evidence on climate drivers impacting fishery workers; presented a conceptual framework demonstrating the linkages between climate change, fishery resources, and decent work; and identified adaptation strategies that would promote a just transition for fishery workers. A key goal is to begin to chart a roadmap for transdisciplinary research and action in this area for the next five years. The roundtable discussion focused on the conceptual framework under development (Michelle Tigchelaar), followed by opening statements on the following topics: Decent work in fisheries – Jessica Spark; Occupational and environmental health – K.C. Elliott; Labour policy and worker perspectives – Just transition and worker perspectives – Michael O’Brien (International Transport Workers’ Federation). Discussions focused on knowledge gaps which needed to be filled to inform effective action; promising policy, regulatory, and market avenues for climate adaptive decent work in industrial fisheries; and which actors need to be at the table to drive progress towards a just transition for fishery workers.

Session 1 C: Success stories and lessons learned by programmes supporting training, interventions, and innovations

This abstract session was moderated by Lissandra Cavalli, with presentations from the following:

Commercial fishing occupational safety research and training programme by Jennifer Lincoln on behalf of Bridgette Garrett, National Institute for Occupational Safety and Health, United States of America

Despite some successes in reducing work-related injuries and fatalities within the commercial fishing industry, commercial fishing remains one of the most dangerous occupations in the United States of America. Targeted research and training that address best practices to reduce occupational safety risk in the commercial fishing industry are critical. To this end, the Commercial Fishing Occupational Safety Research and Training Program at the Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH), was created to advance fishing safety research and provide targeted, regionally appropriate training for the commercial fishing industry. This programme is a partnership between the United States Coast Guard (USCG) and NIOSH. The Programme provides funding opportunities to qualified individuals in academia, members of non-profit organizations, municipalities, and businesses involved in the United States commercial fishing industry. The funding supports research and training to help improve the safety and health of commercial fishers. Awards can range from USD 150 000 –975 000 per project period. Since the inception of the Commercial Fishing Research and Training Program in 2018, approximately USD 12 million in research and USD 11 million in training grants have been awarded to support 17 research and 15 training projects, respectively. Research and training applications from different regions of the United States of America and on various commercial fishing topics have been received and awarded. Notable highlights from the research and training projects were presented.

The objectives of this presentation were to:

- Provide an overview of the NIOSH-USCG Commercial Fishing Occupational Safety Research and Training Program.
- Highlight preliminary findings from research and training project grants.
- Provide information on the application process and Frequently Asked Questions.
- This presentation provided the audience with information on available opportunities to help improve efforts to reduce injuries and fatalities in the commercial fishing industry.

Pathway to innovation in occupational health and safety: Creating the Northeast Center Research-to-Practice (R2P) Incubator by Liane Hirabayashi, The Northeast Center for Occupational Health and Safety, United States of America

Background: Incubators provide support to start-ups and individuals with important innovations who may lack the skills or resources required to move those innovations into practice. In August 2023, the Northeast Center launched a research-to-practice (r2p) incubator to help agriculture, forestry and fishing (AFF) professionals, practitioners and researchers move their health and safety solution from a great idea to widespread adoption by AFF industries. A key goal is to create and test an r2p blueprint to guide AFF health and safety innovators in scaling up their work.

Methods: As a first step to developing the r2p blueprint, staff are conducting a dual-arm literature review, scheduled for completion in September 2023. The first arm involves a scoping review of peer-reviewed literature related to the scale-up or implementation of AFF innovations. The second arm involves web scraping to identify existing incubators that feature AFF health and safety innovations. The results of these two searches will be combined to develop an initial blueprint that will be trialed in the next four years. The Northeast Center has assembled an advisory board of experts in manufacturing, entrepreneurship, user-centered design, marketing, engineering, standards, patent law, venture capital investment, and other fields related to successful navigation of the research-to-practice phase. The advisory board provides input on the incubator development, assists in the selection of two projects over the next four years, and provides mentorship to the two projects. In addition to expert advice, each project will receive two years of funding and referrals to additional resources. In this presentation, we will discuss the potential impacts of the Incubator on commercial fisheries operations.

Results: The components and results of the r2p incubator – literature review, initial blueprint, the advisory board, and the competitive selection process for the first project – were presented.

Public-private partnership: A proposal to enhance preparedness for maritime disaster in Indonesia: A case study of Tulungagung Regional Government by Setyawati Fitriangraeni, Anggraeni and Partners, and GISLI, Indonesia

An accident in Gladak Beach, Tulungagung involving two fishing boats causing them to be overturned by the waves and hit the reef. This accident resulted in four fishers missing and four others managed to survive. As a nation boasting 636 seaports and 446 river and lake ports, Indonesia continues to experience a considerable number of maritime accidents. The primary issue persists because of inadequate oversight in ensuring compliance with safety regulations for boats. According to the National Transportation Safety Committee (KNKT), inadequate supervision continues to be the primary contributing cause to marine accidents. Consequently, the incidence of marine accidents remains substantial, resulting in fatalities and inflicting bodily harm upon many individuals. Our preliminary finding shows that Indonesia has shifted its focus on disaster preparedness from government-centered to public-private partnerships. This can be seen from the fundamental principles and Article 28 of Law Number 24 of 2007 on Disaster Management that allow private actors to play part in disaster management. This shift of approach enables private entities and communities to become active participants rather than passive recipients of information or instruction. This essay proposes that the implementation of Public-Private Partnerships (PPPs) as a proactive, collaborative, and multifaceted strategy that engages many stakeholders, particularly corporate companies and regional government authorities, can serve as one of the ways to tackle the systemic problems causing maritime disasters. Through a collaborative effort, the regional government of Tulungagung and the private sector may use their respective knowledge, resources, and expertise to develop comprehensive projects aimed at enhancing maritime safety and preparedness.

Developing community health workers that understand the fishing community by J.J. Bartlett, Fishing Partnership Support Services, United States of America

Community health workers (CHWs) are essential to improving the health outcomes of fishing communities by addressing social determinants of health and connecting families with programmes and services. Fishing Partnership Support Services (FPSS) has built

a team of certified CHWs called “Navigators” with the unique understanding of the experience, language and culture of the fishing population. Through this presentation, we shared the effectiveness of our Navigator programme, including the professional core competencies of our CHW’s, training through a lens of cultural competency, the health impacts of our programmes, and the ways Navigators develop new services to address emerging needs. The FPSS programme can serve as a model for other fishing communities and public health programmes that are looking to serve fishing families.

Session 2 A Harnessing local knowledge and technology to improve safety in small-scale fishing (Red Room)

This abstract session was moderated by Ken Keene, with presentations from the following:

Commercial diving in the Gulf of California, Mexico: safety considerations in a high-risk fisheries by Carlos Acevedo, Comunidad y Biodiversidad A.C., Mexico

Hookah diving has historically been an important small-scale fishery in the Gulf of California in Mexico. It represents a source of food and employment for coastal communities that rely mostly on fishing for their livelihoods. The high risk of the activity, the use of poorly maintained equipment, and the growing demand for fishery resources has resulted in an increase in cases of decompression sickness and death in the region. However, studies addressing this problem are non-existent. Our goal was to evaluate the technical, safety, and health aspects of divers in this fishery to establish a baseline that would allow us to identify problems and define priority actions to address them. Between June and July 2023, we applied semi-structured surveys to 113 divers between the ages of 17–66 in five communities in the Gulf, two of them indigenous. The results showed that 59 percent of the respondents lacked formal diving training, and only 27 percent had an official certification. The fishers dive for up to six hours and to depths that exceed the 30 m recommended by Mexican legislation, following very rudimentary safety techniques based entirely on their empirical experience. Fifty-two percent have suffered decompression injuries, 27 percent with permanent injuries, and 89 percent know someone in the community who has died from diving injuries. Ninety-eight percent of fishers are aware of the risks involved in their activity, but they do not consider leaving the fishery because it represents an important source of income and is part of their cultural identity. However, they do show interest in training to avoid future accidents. The hookah diving fishery is vital to local communities, but its sustainability is uncertain. We recommended a participatory approach to address the issue, starting with a training programme to improve standards.

Knowledge shared by Alaska Native salmon set gillnetters in Norton Sound to reduce marine fatalities by Leann Cyr, Alaska Marine Safety Education Association (AMSEA), United States of America

Objectives: The goal of this exploratory pilot study was to reduce marine fatalities in Norton Sound using knowledge shared from Alaska Native salmon set gillnetters in Unalakleet, AK. The following objectives addressed this goal: 1) to identify factors that influence safety for this fishery and population, 2) to use findings to improve commercial fishing training, education, and resources, and 3) to disseminate and communicate results to commercial fishers and partners.

Methods: Ten semi-structured interviews with Alaska Native commercial set gillnetters in Unalakleet, AK utilize knowledge shared to identify factors that influence safety for their fleet. Using an Interpretative Phenomenological Analysis Methodology, ten interviews were recommended for a homogenous sample.

Results: Most participants learned to fish at a young age from family with safety lessons passed on by family. Fishing is a lifestyle interconnected with harvesting and way of living. Set gillnetters in Norton Sound use open skiffs and have limited access to workable Personal Flotation Devices (PFDs) and safety training. Participants reported health benefits but also negative long-term physical effects, financial stress, and difficulty fishing with age. Respect and awareness of the ocean was reported as the most important strategy to reduce risk. Stories were shared of falls overboard, capsizing, and local fatalities and hazards such as being overloaded with fish, entanglement, and maneuvering a small boat in big waves. Stronger winds and shifting weather patterns were experienced from climate change.

Conclusion: This exploratory pilot study identified factors that influence safety for Alaska Native commercial set gillnetters. Findings should be used to 1) determine best methods to influence behaviours to reduce risks in this hazardous fishery; 2) increase awareness and promote expanded application of best practices, equipment, and resources; 3) encourage and promote outreach initiatives targeted for this unique population; and 4) develop tailored training programmes for commercial fishing in an open skiff.

Governing climate resilience of Philippine fisheries by Elirozz Carlie Labaria, Food and Agriculture Organization of the United Nations, Italy

The Philippines is a top fishing producing nation, ranking eighth in the global production of capture fisheries and eleventh in terms of aquaculture production in 2019. The fishing sector significantly contributes to domestic economy and provides livelihoods to more than 2 million small-scale fisherfolk. Meanwhile, the country consistently tops disaster and climate risk indices. Current and predicted effects of climate change to Philippine fisheries manifests as impacts from extreme weather events, such as typhoons and flooding that endanger lives of fishers at sea, destroy fisheries production areas, including boats, gears, and community facilities, leading to massive losses of aquaculture stock, and wrecking of fishing villages and fisheries value chain infrastructure. Slow onset impacts from climate variability like El Niño-Southern Oscillation (ENSO), warming waters, sea level rise, changes in ocean circulation and water stress, have been changing the distribution range of exploited fisheries stocks, consequently increasing the degree of uncertainty in estimating stocks for fisheries management, and affecting aquaculture productivity. These impacts have driven climate adaptation policy and interventions from government, civil society and development partners. These actions span adaptation of institutions and livelihoods, as well as interventions that tackle disaster risk reduction and management. The Philippines' National Climate Change Action Plan includes in its strategies for food security the enhancement of climate resilience of fisheries production and distribution systems and fishing communities. Fisheries is also now included in the country's National Adaptation Plan. Further, the government has developed a strategic framework and plan for the disaster risk reduction and climate change action for fisheries. Among the priority adaptation options, in terms of long-term planning for aquaculture development, are the strengthening of early warning systems for fisheries and safety at sea capacities, the protection of coastal and marine ecosystems and the improvement of

extension services to increase adoption of climate-smart interventions. The Philippine example showcases the complexities of and opportunities for improving fishing safety in the face of climate change and extreme events in the fisheries sector.

Despite the dangers, fish for a prosperous life: A case study from the Southeastern coast of Sri Lanka by Ganesan Nishanthan, South Eastern University of Sri Lanka, Sri Lanka

Despite the dangers of the sea, Sri Lankan fishers continue to fish to meet market demand while maintaining a steady living. The goal of this study was to determine the hazards that Southeastern coast fishers face at sea, as well as ways to mitigate those risks. The study included 40 fishers, three fisheries inspectors from the Department of Fisheries and two representatives from the Ampara district disaster management and was carried out from June to December 2022. Data was collected through focus group discussions on common occupational risks, causes of risks and methods used to overcome them, awareness of risk-mitigating tactics and safety precautions, training needs of fishers, and available technologies with authorities to avoid risk at sea. Hazards faced by fishers include collisions with other boats, engine repairs in the middle of the ocean, the unintentional crossing of country boundaries, harsh weather conditions, fish assaults, minor injuries while fishing and the lack of mobile networks to inform risk on the sea. According to officials, fishers' inexperience and lack of understanding in using global positioning system (GPS) equipment, conducting basic engine repairs in the event of failure, and performing first aid and lifesaving skills in the event of injuries are important contributors to causing injuries. Establishing vessel monitoring systems (VMS), providing satellite telephone and installing navigation units on board, as well as designing and conducting training for fishers on life-saving tactics, basic first-aid and rescue, basic boat repairing skills, operating GPS and fishery-related devices, regulations and DO's and DON'Ts at sea, were identified as mitigation strategies.

Session 2 B: Psychosocial hazards and promising health interventions in fishing

Abstract session moderated by Krishnan Paulpandian, with presentations from the following:

Influence on work as a fisher by Sisse Grøn, Center for Maritime Safety and Society, University of Southern Denmark and the National Research Center for the Working Environment, Denmark

The fishing industry in Denmark has seen an increased number of regulation changes in the last ten years; for example, the reduction of fishing quotas, different kinds of bans, electronic monitoring of trawlers in the Kattegat and landing obligation. These changes have had negative effects on the fishers' influence on their work life. This project investigates how fishers' psychosocial work environment has been affected and develops recommendations for safeguarding their well-being through future transitions. We use qualitative and participatory co-creation methods. The methods include interviews, workshops and design thinking. To learn about fishers' experiences, we conducted four chronicle workshops with a broad selection of fishers, representing different kinds of fishing methods, boats and communities. The workshops provided us with stories and perspectives on their lives as fishers and their working conditions. We conducted interviews as well. The two forms of data sources provided the basis for five ethnographic stories that illustrate fishers' current work lives and psychosocial work environment issues. The ethnographic stories and the themes from the chronicle workshops informed the work of a group of industry partners, policy makers and

stakeholders. In three workshops we co-created a set of recommendations to safeguard fishers' psychosocial work environment moving forward. The project finished by the end of 2023. The planned outputs were: ethnographic stories to illustrate fishers' work lives, a report about the psychosocial work environment of fishers and a set of recommendations to safeguard fishers' psychosocial work environment.

Lines of support: Tackling stress at sea by Amanda Roome, The Northeast Center for Occupational Health and Safety, United States of America

The commercial fishing industry is known for its grueling work conditions and unpredictable nature, which can take a toll on the mental health of fishers. However, despite the evident need, the industry has historically been underserved in terms of compatible mental health care resources. The commercial fishing industry has one of the highest suicide rates in the country, with an average of 80 deaths per 100 000 fishers, over ten times the national average. A recent study from the Northeast Center for Occupational Health and Safety showed clinically assessed post-traumatic stress disorder (PTSD) rates in male fishers (12 percent) to be three times higher than the national average for men (4 percent). Fishers also face numerous barriers to accessing mental healthcare, such as the ability to schedule appointments given chaotic schedules, stigma, and a lack of understanding among mental health providers of fishers' unique stressors. Prioritizing the mental health of commercial fishers is essential for this high-risk occupation, as is the provision of industry-appropriate services. The Northeast Center for Occupational Health and Safety, Maine Coast Fishermen's Association, and Man Therapy have teamed up to create a campaign that specifically targets commercial fishers. Man Therapy is an innovative approach that uses humour and relatable content to raise awareness about mental health care and to destigmatize health-seeking behaviour among fishers. The Northeast Center has designed a website to provide fisheries-appropriate resources for fishers and those living or working with fishers. The presentation covered website components, resources, and metrics, as well as lessons learned in the provision of online resources for fishers' mental health.

Fishers as first responders to the opioid epidemic by Lauren King, Fishing Partnership Support Services, United States of America

In the United States, commercial fishing is a physically demanding job with high injury rates, long hours, productivity pressures, weak job security and challenges accessing health care. Workers that endure these conditions are at higher risk of being prescribed an opioid and subsequent substance use. Opioid Education and Naloxone Distribution (OEND) can save lives. However, there are significant barriers to providing OEND in the fishing community because of stereotypes and stigmas. Some fishers do not want to address drug use in their community out of fear that it will reinforce the stereotype that they are alcoholics and addicts – which many members of the fishing community view as unfair, outdated, or ignorant. Fishing Partnership Support Services (FPSS) Community Health Workers provide education around substance use disorder as a disease and engage with fishers to better understand their perceptions of opioid use. FPSS shared information about how it had overcome stigmas and stereotypes and provided OEND to over 2 000 fishers on the East Coast of the United States of America. By recognizing that fishers are first responders at sea, FPSS has reframed the purpose of the training and overcome traditional barriers surrounding substance use disorder.

Sleep deprivation and associated health and cognitive impacts in commercial fishers by Julie Sorensen, The Northeast Center for Occupational Health and Safety, United States of America

It has long been understood that lack of sleep impacts the overall health of workers, including brain health, and their risk for on-the-job injuries. The connection between sleep deprivation and worker health and safety has been examined in various industries, however few studies have examined the impact among commercial fishers. To assess sleep patterns and risk factors among commercial fishers, we recruited fishers in four fisheries and three coastal regions of the United States of America (scallop and lobster [Massachusetts], crab [Oregon] and salmon [Alaska]). Surveys were completed by 262 fishers covering a wide range of topics relevant to lifestyle choices, work, sleep, physical and emotional health. Our team facilitated health assessments for 162 fishers which included medical history, cardiac health, PTSD screening, and a thorough physical exam with the clinic provider. Results showed that two out of five fishers reported having pain so severe that it interfered with their sleep. Almost a third of fishers said they had trouble going to sleep and nearly half said they had trouble staying asleep. Nearly half of the fishers with health assessments had blood pressure readings trending towards hypertension. PTSD screenings showed 12 percent of male fishers likely had PTSD, three times higher than the national average for men (4 percent). Sleep, exercise, social support, medical health, mental health and diet are all critically important pillars of brain health. Due to the nature of their work, fishers often have interrupted sleep that in sum is well under 8 hours per 24 hour period. Understanding the factors that impact brain health and providing guidance on ways they can reduce neurological risk may provide the best opportunity for intervention. The authors recommended developing practical solutions that fishers can use to improve any pillar of brain health they can control in their work environment to reduce the negative effects of sleep deprivation.

Session 2 C: Occupational safety and health in fisheries and aquaculture: What can we learn from new research?

Abstract session moderated by K.C. Elliott, with presentations from the following:

Predicting commercial fishing vessel disasters through a novel application of the theory of man-made disasters by Samantha Case, National Institute for Occupational Safety and Health, United States of America

Introduction: Vessel disasters (e.g. sinkings, capsizings) are a leading contributor to fatalities in the US commercial fishing industry. Primary prevention strategies are needed to reduce the occurrence of vessel disasters, which can only be done by developing an understanding of their causes and risk factors. If less serious vessel casualties (e.g. loss of propulsion, fire, flooding) are predictors of future disasters, then reducing vessel casualties should in turn reduce vessel disasters and the accompanying loss of life.

Methods: A case-control study design was employed. Cases were defined as commercial fishing vessels that were involved in vessel disasters in Alaskan waters during 2010–2015, identified from the National Institute for Occupational Safety and Health (NIOSH) Commercial Fishing Incident Database (CFID). These were compared with controls, defined as commercial fishing vessels active in Alaska during the same time period but not involved in disasters. Vessel casualty history was the primary risk factor of interest. Other vessel characteristics were also examined: age,

length, hull material, safety decal, and documentation. Logistic regression was used to calculate odds ratios (OR) and 95 percent confidence intervals (CI) to measure the association between the exposure variables and the outcome (disaster).

Results: Seventy cases and 210 controls were included. Twenty-five percent of cases had a history of reported vessel casualties, compared to only 9 percent of control vessels. The multivariable analysis revealed that vessel casualty history was a significant predictor of a vessel disaster (OR=2.98; 95 percent CI=1.29–6.89). Other significant predictors included having an expired safety decal (OR=2.41; 95 percent CI=1.09–5.30) and steel hull (OR=3.29; 95 percent CI=1.12–9.68).

Conclusions: The results of this analysis emphasized the importance of implementing vessel-specific preventive maintenance plans. At an industry level, specific prevention policies should be developed focusing on high-risk fleets to identify and correct a wide range of safety deficits before they have catastrophic and fatal consequences.

Analysis of reported injuries in Norwegian aquaculture by Siri Holen, Norwegian University of Science and Technology, Norway

The work in the Norwegian aquaculture industry includes several known hazards for the employees, and historically the injury rates in this industry are high. The work, which is characterized by exposure to natural forces from wind, waves and the cold, in combination with manual labour and use of heavy machinery, requires a systematic approach to safety management. This presentation provided an updated overview of reported injuries in Norway's aquaculture sector, one of the world's main actors in production and export of Atlantic salmon and trout. The data are based on reported injuries to two separate authorities, (i) serious occupational injuries reported to the Norwegian Labor Inspection Authority (NLIA); and (ii) personal injuries reported to the Norwegian Maritime Directorate (NMD). All employers for land and sea-based aquaculture companies are required to report serious injuries and fatalities to the NLIA, while all employers in the maritime industry related to aquaculture report to the NMD. The two different datasets are somewhat different with regard to the factors registered for the occupational injuries, due to the authorities having different regulatory requirements for reporting. The two datasets are thus presented and analyzed separately. The analyzed data is discussed considering historical reported injuries in the aquaculture industry and the industry changes. Some challenges regarding the official reporting systems are also discussed, e.g. the limited data available for root causes of accidents, and under-reporting in the official systems. In conclusion, the presentation covered reported injuries in Norway's aquaculture and the associated data which is essential for understanding the risk landscape in the industry. These insights into incidents and fatalities inform stakeholders about injury dynamics and is input to systematic safety management and risk analysis in this important industry.

Occupational accidents in the Norwegian fishing fleet – an updated analysis for the years 2000–2022 by Ingunn Marie Holmen, SINTEF Ocean, Norway

Commercial fishing is a risk-exposed profession. The incident rate per person-labour year of occupational fatalities and injuries are considerably higher than in any other industry in Norway. The Norwegian parliament has adopted a zero vision that no fishers should die at sea. To find effective and targeted measures, a broad understanding of the risk picture on board fishing vessels is required. Updated knowledge about direct and indirect causes of accidents and strain injuries is needed to support the authorities' and fishing industry's efforts to prevent and mitigate occupational injuries

and fatalities. The aim of this study is to establish knowledge about direct and indirect causes of occupational accidents in the Norwegian fishing fleet, based on updated and systematized accident statistics from available sources. The time series of occupational accidents for the Norwegian fishing fleet, limited to the years 2000–2022, are updated based on registrations of occupational accidents by the Norwegian Maritime Authority (NMA). The accident data are analyzed according to, e.g. geographical region, time of year, vessel group, mode of operation and mode of injury. Newspaper articles about severe occupational accidents are searched for additional information on conditions influencing the chain of events. Investigation reports from the Norwegian Safety Investigation Authority on vessel disasters and fatalities in the fishing fleet are a valuable source for details on causal chains. Previous analyses by McGuinness *et al.* (2013)¹ showed that vessel disasters, man overboard and drowning in port were the most frequent fatality modes. Work operations on deck had the highest risk in terms of personal injuries, and the trawler fleet reported the highest rate of non-fatal injuries. Up-to-date findings were presented at IFISH 6. The presentation is based on results from the project “Serious occupational accidents in coastal fishing”, financed by the Norwegian Seafood Research Fund (project number 901828).

Weather and marine aquaculture workers’ safety in Atlantic Canada by Lissandra Cavalli, Memorial University, Ocean Frontier Institute and Department of Geography, St. John’s, Canada

Marine aquaculture workers are at high risk of injury and fatalities. Weather contributes to risk both directly and indirectly. Understanding the role of weather in occupational safety in aquaculture is important for work design, planning and for safety management and hazard reduction. This presentation presented findings on weather-related hazards mitigation strategies in Atlantic Canadian marine finfish and shellfish aquaculture. Data were derived from a literature review; six semi-structured confidential interviews on aquaculture safety with Atlantic Canada key informants and from two roundtable discussions with 16 regional aquaculture industry and weather forecasting stakeholders. Findings indicate most literature research on weather and aquaculture focuses on impacts to production, animal health and infrastructure, with limited attention to safety. Furthermore, there has been no prior research focusing on this issue in Atlantic Canada, a major aquaculture-producing region. Weather-related hazards include sun and cold exposures, working on and under surface ice, strong winds, waves, currents, reduced visibility, and ice build-up. Weather-related risk is mediated by location, aquaculture type, weather-forecasting, infrastructure design and other factors. Freezing temperatures can result in hypothermia, affecting reaction times and ability to respond to risky situations. Working on ice is associated with drowning risk; working under ice contributes to diving hazards. Ice build-up on infrastructure can affect stability; ice removal can be hazardous. Operating a vessel in rough sea conditions is associated with a risk of falling overboard and vessel capsizing. Weather and aquaculture locations and design are changing with potential occupational health and safety (OHS) impacts. Improved monitoring of weather-related injuries in administrative data; incorporation of weather-related hazards and risks in risk assessments; mechanization including increased use of remote operation technologies on farm sites; improved forecasting capacity; and improved infrastructure standards and design including in shellfish operations could help reduce risk.

¹ McGuinness, E., Aasjord, H. L., Utne, I. B., & Holmen, I. M. 2013. Fatalities in the Norwegian fishing fleet 1990–2011. *Safety Science*, 57: 335–351. <https://doi.org/DOI.10.1016/j.ssci.2013.03.009>

Safety in the new Norwegian fish farming: Stories about current organizational conditions by Kristine Vedal Størkersen, SINTEF Ocean, Norway

Norwegian fish farming is undergoing major concept change yet continues to be Norway's second most hazardous occupation. Going from mostly open net pens along the coast, to also semi-closed and submerged units offshore and on land, the workplaces have transformed. There is need for a qualitative study of safety conditions in Norwegian salmon farming in 2023. The previous knowledge on safety conditions is a valuable starting point. Norwegian aquaculture is still dominated by traditional fish farms, open for forces from wind, current, equipment, etc. Limited time and personnel in operations give stress, long hours, lack of rest, inadequate working positions, etc. Many organizations and vessels need to cooperate, sometimes without sufficient experience or training. Conflicting objectives can lead personnel to prioritize production and fish welfare over personnel protection. Safety management has led to more systematic safety measures but may also remove attention from safety. Some conditions will be different in the new production forms, that are big, with new and unfamiliar infrastructures, collaborations, and operations. On the one hand, fish farming in exposed areas will give harsher weather conditions, and involve personnel from more organizations, several vessels, and with heavier equipment. On the other hand, the larger concepts give more stable working platforms, and the more exposed areas give conditions pressuring for awareness on risk considerations. What these changes mean for occupational safety, is still in the blue. This fall, we study the occupational safety in all existing fish farming concepts, as part of the project "Occupational health and safety (OHS) in aquaculture – risk management in different production forms" (financed by the Norwegian Seafood Research Fund, project number 901801). At IFISH, we presented results from interviews of personnel describing conditions for safety at their workplaces, in each corner of the new industry. Fishery observers are independent specialists who are deployed to monitor vessels at sea. Traditionally their role can range from science (collecting data on target and bycatch species) to compliance (monitoring a vessel's compliance with national or international requirements) and is often a mixture of both. While they may report on general vessel safety, and in most cases have the right to refuse boarding if a vessel is considered unsafe, they rarely report on human rights as part of their standard protocols. This presentation looked at how at sea observer programmes have evolved and could better be used to monitor vessel safety, ensuring certain conditions are met, and recent developments in some fisheries allowing observers to provide advice on good safety practices and crew welfare while at sea. This improves conditions for both the observer and more widely for the crew.

Session 3 A: Preventing falls overboard and drowning

Abstract session moderated by Derek Archer, with presentations from the following:

Improving the usage of personal flotation devices and personal locator beacons by professional fish harvesters in Newfoundland and Labrador by Kerri Ann Ennis, Fisheries and Marine Institute of Memorial University of Newfoundland, Canada

A personal flotation device (PFD) is the most critically important piece of personal protective equipment (PPE) for fishers who are at risk of entering the water, because it helps prevent drowning. However, if the individual is lacking sufficient thermal protection when they enter cold water, it also becomes critically important that they are rescued as quickly as possible to reduce their exposure time. One of the most versatile and reliable methods available for alerting rescuers is a personal locator beacon (PLB). While there have been improvements in wear-rates in places where PFD use is

mandatory, it is still voluntary in most regions of Canada, including Newfoundland and Labrador (NL). Unfortunately, as evidenced by incident reports, many fishers choose not to use PFDs or PLBs. To improve the rate of PFD and PLB use by fishers in NL, it is critically important to understand why they choose to use or not use PFDs and PLBs and then focus on how to encourage fishers to regularly use PFDs and PLBs. To encourage the use of PLBs by NL fishers, the NL Fish Harvesting Coalition has launched an intervention which subsidizes the purchase of PLBs for fishers. To determine the effectiveness of the PLB intervention we are conducting a survey study. The survey will also be used to ascertain the usage rate, and barriers and incentives associated with PFD and PLB use. To assess the long-term effectiveness of the PLB intervention, we will conduct several time series check-ins with fishers over the three-year duration of the project. This will give us insight into how effective the PLB intervention has been over the long term, and whether similar approaches might work for other aspects of safety, such as the use of PFDs. Our paper presented our research design and any results collected to date.

Changing fishers' attitudes and behaviours towards man overboard (MOB) by Frankie Horne, Royal National Lifeboat Institution, United Kingdom of Great Britain and Northern Ireland

Man overboard (MOB) is now the main cause of fatalities in the United Kingdom of Great Britain and Northern Ireland fishing industry. Despite improvements in many areas of fishing safety, too many United Kingdom of Great Britain and Northern Ireland fishers remain ill-equipped and unprepared for MOB survival/recovery, and too few are modifying their vessels to mitigate the risk of MOB. Mandatory sea survival training may be effective at the time, but with no requirement in the United Kingdom of Great Britain and Northern Ireland for refresher training it is not having the desired long-term impact on fishers' attitudes and behaviours towards the danger of MOB. Efforts to reduce the number of MOB fatalities in the United Kingdom of Great Britain and Northern Ireland have focused on the provision of funded safety equipment (personal floatation devices [PFDs] and personal locator beacon [PLBs]), the provision of funded voluntary refresher training and making the wearing of PFDs mandatory in 2019. These interventions have not been universally successful in changing fishers' attitudes and behaviours towards MOB, as evidenced by the fact that in 2021 six of the ten United Kingdom of Great Britain and Northern Ireland fisher deaths were classified as fatal MOBs and only two were known to be wearing a PFD at the time. In 2020, Seafish and the Royal National Lifeboat Institution (RNLI) started delivering a voluntary programme of MOB Awareness events for fishers, putting fishers through a challenging and realistic MOB experience, to help them better appreciate the danger and fully appreciate the need for wearing a PFD. Funded by the United Kingdom of Great Britain and Northern Ireland's Maritime and Coastguard Agency, 43 events have been delivered at environmental pools across the United Kingdom of Great Britain and Northern Ireland, with 511 fishers participating. In this presentation, the aim of the programme was explained and what happens during an MOB Awareness event was described, reflecting on the observed impact the events have on participants, some of the post-event feedback received from participants shared and the effectiveness of the events at changing fishers' behaviours was considered.

A human-centred design approach to identifying and addressing drowning risks for small-scale fishing communities in Tanzania by Rebecca Sindall, Royal National Lifeboat Institution, United Kingdom of Great Britain and Northern Ireland

Artisanal fishing communities in Tanzania experience high drowning rates, but the uptake of existing interventions such as lifejackets is low. This study used a Human-Centred Design (HCD) approach to understand why existing interventions are ineffective, identify key drowning risks, and to support communities to develop suitable interventions. Three fishing communities on the shores of Lake Victoria were invited to participate in the HCD process. Key stakeholders involved in the small-scale fishing industry joined a series of design workshops, which incorporated participatory methods, including co-creative mapping, roleplay, ideation, and prototyping. The process produced a good understanding of the problems fishers face and the varied risks and behaviours present in different types of artisanal fishing. The process and results were captured in illustrative and video form and translated into Swahili, which proved invaluable for sharing back to participants, stakeholders, and the wider drowning reduction community. Journey maps were developed for fishers, which identified the activities undertaken before, during, and after a fishing trip, highlighting points of risk. This led to insights, and opportunities for interventions. To be able to work safely, fishers need access to and education on good-quality safety equipment, with flexible payment models. They want opportunities to learn formal nautical skills, including navigation and emergency procedures, and better access to tailored weather forecasts. Prototyping workshops were conducted with fishers, designers, government agencies and drowning prevention experts. The participants developed an improved mechanism to provide relevant and timely weather forecasts to fishers, materials to support informed decision-making when purchasing buoyancy devices, and community-level emergency response plans. Prototypes of these interventions will be tested in the participating fishing communities before being introduced to other communities. Human-Centred Design (HCD) approaches enable communities to collaborate with stakeholders to identify drowning risks and develop sustainable solutions that align with the context and preferences of the intended recipients.

Crew overboard recovery in the Gulf of Mexico by Amanda Wickman, Southwest Centre for Agricultural Health, Injury Prevention and Education, The University of Texas at Tyler Health Science Center, United States of America

Occupational fatality rates in the commercial fishing industry in the US remain more than 20 times higher than the national average. The burden of commercial fishing fatalities due to unintentional falls overboard is highest in the Gulf of Mexico (GOM) shrimp fishery. This presentation described a quasi-experimental, pre-/post-test project design undertaken during the COVID-19 pandemic. A land-based simulation was used to train commercial fishers at three port locations in crew overboard (COB) recovery. A survey developed to assess attitudes, beliefs, and intentions of commercial fishers in COB recovery was administered immediately before and following dissemination of the recovery slings and training in their use. Fishers received one recovery sling per vessel and a task list of instructions for the sling. A third survey and task list questions were completed at 12–18 months. One hundred and nineteen slings and training in their use were provided to 123 commercial shrimp fishers along the Texas and Louisiana Gulf Coast. Data analysis showed that positive change in normative beliefs was significant for the importance of quickly and safely maneuvering the vessel to the crew member. This change was most significant over the period from the initial training and receipt of the recovery sling by the fisher, to the time of follow-up 12–18 months later. Regarding control beliefs, training was associated with immediate statistically

significant improved confidence that, with assistance, the fisher would be able to use the sling and other equipment to hoist the COB. However, this confidence waned over time. Attitudes and beliefs of commercial fishers in the GOM can be favorably influenced toward a COB recovery device, as well as their confidence and intention to use such devices. However, results showed that attitudes and beliefs may wane over time, emphasizing the importance of repeated training and survival drills in this industry.

Session 3 B: Connectivity among training organizations empowers fishers as medical first responders through wilderness-style first aid training: A case study in collaboration and capacity building

This panel session was moderated by Leann Cyr, Alaska Marine Safety Education Association with conversations from:

Leann Cyr, Alaska Marine Safety Association; John Roberts, Fishing Partnership Support Services (FPSS), United States of America; Shannon Eldredge, FPSS; Russell Kingman, FPSS; Ashleigh Palinkas, California Sea Grant, University of California, San Diego; Angee Doer, Oregon Sea Grant, Oregon State University (OSU); and Laurel Kincl, Oregon State University (for Amanda Gladics). Commercial fishing is a dangerous occupation. In the United States of America each fishing vessel has at least one crew member trained in cardiopulmonary resuscitation (CPR)/First Aid to meet United States Coast Guard requirements. However, in many regions of the United States, the available community-level CPR/First Aid trainings lack information and skill training applicable to work environment out at sea, which can be hours if not days away from emergency medical care. In this panel discussion, we bring together practitioners from four different organizations (OSU/Oregon Sea Grant, Alaska Marine Safety Education Association (AMSEA), FPSS, and California Sea Grant) to discuss their collaboration (2019–present) to develop, deliver, and build capacity for advanced first aid trainings based on the principles of austere medicine in three regions across the United States of America (Alaska, West Coast, East Coast). Each organization serves as a regional independent training hub, connecting commercial fishing communities to a variety of tailored safety training, workforce development, and other wellness programmes. A critical feature of the collaboration has been a supportive community of practice for fishing first-aid trainers and practitioners, which has synergized each individual organization's efforts through peer mentoring, sharing best practices, lessons learned, iterative refinements, and novel teaching approaches while retaining flexibility to customize training approaches and curriculum based on local needs and constraints. The collegial sharing of resources, regular exchange of ideas, and supportive acknowledgement of excellence has accelerated the team's success in developing regionally relevant, culturally specific trainings that reached over 488 commercial fishers during September 2022 to August, 2023. We presented this connected network as a model for other regions interested in advancing local safety training efforts and invite others interested in commercial fishing first aid training to join our community of practice.

Perspectives from the Programme Organizers – short presentations (20 minutes total)

Laurel Kincl moderated the panel and shared the origin and framework of the Fishermen First Aid and Safety Training (FFAST) course, resources provided to participants, required training for instructors, and how the community of practice functions.

Leann Cyr, Alaska Marine Safety Education Association (AMSEA): Leann Cyr discussed how AMSEA, an organization with a deep history in marine safety training, has utilized the partnership to increase capacity of their existing Mariner's First Aid Course and address emerging issues such as opioid overdoses, musculoskeletal disorders, and fishers' mental health.

John Roberts, Fishing Partnership Support Services: John Roberts discussed FPSS's efforts to update and greatly expand their fishers' first aid course, incorporating emergency medical communications, medical evacuation procedures and stress inoculation, as well as the key factors in their success in recruiting commercial fishers to participate in these voluntary trainings.

Perspectives from the Trainers – moderated Q&A (25 minutes total)

Shannon Eldredge and Russell Kingman, Fishing Partnership Support Services: Shannon Eldredge and Russel Kingman shared their perspectives as commercial fishers turned first aid and safety training instructors on the value of connectivity to the success of the FPSS Safety Training programme.

Ashleigh Palinkas, California Sea Grant: Ms Palinkas shared her perspective as the newest addition to the West Coast FFAST instructor team, and how FFAST training fits into California Sea Grant's existing efforts to advance a commercial fishing apprenticeship programme in California.

Angee Doerr, Oregon Sea Grant: Angee Doerr shared her perspective as a seasoned instructor on what makes the OSU/OSG FFAST training effective and her experience with the successful onboarding of new instructors.

Full panel open Q&A (15 minutes total).

Session 3 C: New frontiers in occupational safety and health (OHS) interventions

This abstract session was moderated by K.C. Elliott, NIOSH with presentations from the following:

Investigating occupational safety and health in East Coast shellfish aquaculture, a pilot by Caitlin Ceryes, Towson University, United States of America

Given US governmental intent to expand marine aquaculture operations in state and federal waters, a need exists for increased occupational health and safety research in this emerging sector. This pilot project used in-depth interviews and worksite observations to collect exploratory data about shellfish aquaculture work tasks, hazards and health impacts, and currently employed mitigation strategies from producers in the Chesapeake Bay coastal shellfish aquaculture industry. Interviews occurred in 2019–2020, and participants (n=9) were 100 percent male, Maryland and Virginia-based owner-operators, with 1–20 years' experience in the industry. Major preliminary findings include reports of injuries and illnesses ranging from mild to severe, and current risk mitigation strategies spanning the hierarchy of controls. Often, risk reduction is not implemented until a close call or injury/illness event, and respondents reported having very little guidance regarding setting safety priorities or implementing interventions. These data characterized potential risks from producers' perspectives, and highlighted urgent needs for guidance, risk reduction strategies, and further research in the US shellfish aquaculture production context.

Contextual and personal factors for participatory interventions for addressing chronic back pain in clam aquaculture workers in Florida by Kim Dunleavy, Southeastern Coastal Center for Agricultural Health and Safety, University of Florida Department of Physical Therapy, United States of America

Introduction: A critical component for implementation of interventions is accounting for the personal and contextual factors. Chronic back pain is highly prevalent in aquaculture workers who often face stressors of time-dependent production cycles, high physical demands, and limited medical care.

Methods: Contextual and personal factors impacting adoption of participatory ergonomic interventions in a pre-/post-study involving clam aquaculture farmers in the US were presented. The implications for interventions are compared to aquaculture and artisanal clam gatherer characteristics published in papers from Spain, Brazil and Tanzania.

Results: Contextual characteristics impacting choice of delivery, included size and structure of the work teams, processes and work tasks, business model, team culture, equipment, and internet availability. Personal factors differed considerably. Individualized choices of ergonomic modifications using both team and individual strategies accommodated personal preferences and characteristics. Introduction in the workplace matched time limitations with considerable buy-in from younger workers. The participatory approach and team support were received positively. In comparison to artisanal workers from Brazil and Spain, clam farmers had more access to equipment and higher educational levels. Consistent with other papers, environmental challenges, time constraints, lack of training, and technology limitations required modifications. Self-efficacy was high in the Florida clam farmers facilitating adoption, while pain anxiety and coping skills improved with the intervention.

Conclusions: The context of the work model differs considerably for small aquaculture operations. Individual choices tailored to work tasks and introducing concepts in the workplace accounts for time constraints, builds team support, and matches preferences for learning. However, wide dissemination of approaches is more complicated and requires attention at industry levels. Further investigation of individualized approaches to accommodate for varied characteristics is needed to establish if these approaches lead to longer-term benefits.

Testing of a fisher-developed ergonomic intervention for Dungeness crab harvesting by Jay Kim, Oregon State University, United States of America

Commercial fishing is one of the most dangerous occupations due to high injury rates. While numerous studies have investigated fatality preventions, limited research is available on non-fatal injuries. Recent studies have shown that many non-fatal injuries among commercial Dungeness crab (*Metacarcinus magister*) fishers are musculoskeletal disorders, which often occurs during crab pot handling. Therefore, there is an urgent need for effective interventions to reduce risks associated with musculoskeletal disorders. United States of America Pacific Northwest fishers developed an intervention, referred to as a “banger bar”; fishers tip and bang a crab pot against this bar so that the pot can be emptied with less effort and motion. Despite its expected benefits, including reduced awkward postures and forceful exertions, this fisher-developed intervention had not been scientifically evaluated. The aim of this study was to determine whether a banger bar would reduce musculoskeletal loads associated with commercial Dungeness crab (*M. magister*) harvesting tasks. Twenty-

five male participants were recruited to a laboratory study. Participants were selected based on demographics of the population of fishers and had no musculoskeletal pain or disorders. Each participant performed manual crab harvesting tasks in five different intervention conditions: no banger bar (control) and bars of differing heights and designs. The study results demonstrated that the banger bar significantly reduced joint angles and moments about the lumbosacral and shoulders, low back and shoulder muscle activity, and perceived exertion measures. The results indicated that the banger bar may have potential to reduce risks for musculoskeletal disorders, especially in the low back and shoulder regions during crab harvesting.

No innovation is neutral: Promoting seaweed farming innovation and occupational safety to simultaneously minimize health risks and empower the women seaweed producers of Zanzibar by Cecile Brugere, Sea PoWer, Zanzibar, URT; Director of Soulfish Research and Consultancy, York, United Kingdom of Great Britain and Northern Ireland

Seaweed farming using pegs and ropes in shallow water was introduced in Zanzibar over 30 years ago and became an important livelihood source for farmers, 80 percent of whom are women. Since then, however, the onset of climate change has worsened productivity and work conditions, which have taken their toll on women's health, economic and social benefits from the activity. To reverse this situation, Sea PoWer, a non-governmental organization (NGO) promoting seaweed farming innovation for women's empowerment, has been piloting the use of "tubular nets", a technique enabling the farming of seaweed in deeper water where sea temperature and salinity conditions are more favourable to seaweed growth than close to the shore. Tubular nets are showing promise over the traditional peg and rope technology in improving seaweed productivity, and in reducing the risks of feet injury from fish stings and stepping on sharp shells or corals, gynecological infections from long hours spent sitting in the water untangling ropes, or musculoskeletal pain from daily forward-bending to tend seaweed plots and carrying heavy weights of wet seaweed on the head. However, they also challenge current knowledge, practices and gender norms as they require swimming and boat handling skills that women do not have, but which are paramount for women to continue farming seaweed safely and remain in control of an income generating activity they have so far dominated (in numbers). Working hand in hand with local partners, as well as supportive men from the communities, Sea PoWer has so far successfully trained approximately 45 women to swim, hop on boats from the shore safely, wear life jackets systematically, and learn complementary organizational and seaweed processing skills, thus building their confidence to stay safely engaged in seaweed farming, to grow their recognition among their peers and inspire other women, and to assert their rights and voice as important players in the industry. As the Government of Zanzibar is handing out boats to encourage seaweed farming communities to farm further offshore to adapt to climate change, it is essential that a holistic approach is used to accompany this type of productivity enhancing initiative.

Community-based safety-at-sea solution for small-scale (artisanal) fishers by Jurgens Schoeman, South Africa

Artisanal (small-scale) fishers are responsible for a large percentage of the marine fish caught globally. They use small and sometimes old, primitive vessels, such as dug-out canoes, which are passed from father to son. The fishers often tend to fish alone in order to keep their fishing spots secret. The remoteness of fishing villages means traditional Search and Rescue services are not readily available. Artisanal marine fishing

therefore has always been and remains a high-risk occupation. German, Indian and South African partners pioneered a holistic solution which has been in operation in South Africa since 2013. It uses modern automatic identification system (AIS) tracking and very high frequency (VHF) radio technology to inform and connect a local, shore-based operator about and with the fishers at sea respectively. Other fishers and the community at large get involved in addressing and resolving any calamity at sea. The technology has been developed such that skills needed are easily taught in a few days. No on-going maintenance or technical intervention is required. No grid-power, cellphone or internet connections are needed. Extra benefits are geo-fencing, to warn fishers and the operator when a vessel approaches no-go areas, as well as traceability of all fish caught. The presentation detailed how the different needs of various fishing communities have been and are being met. It showcased the reliability of the solution and the beneficial effect it has on communities. The possible benefits of new features and technologies were touched upon.

Session 4 A: Does safety training make a difference?

Abstract session moderated by Amanda Roome, with presentations from the following:

Improving small-scale fisher safety through policy update and training: A Grenada case study by University, Grenada

Grenada has experienced significant changes within its small-scale commercial fishing fleet over the past three decades, including an exponential increase in the number of vessels and their operational range. Since 1990, national legislation has been established to provide for minimum requirements and safety standards of boats within the Fisheries sector. During this same period, several initiatives have been implemented to improve safety at sea for fishers to reduce the loss of life, livelihoods and property. These include advancement in shipbuilding, establishment of island-wide ship to shore communication network (e.g. VHF repeaters) and provision of safety equipment targeting small-scale fishers. Also, in 2012, a national Fisheries policy was developed, and one of its themes “Enhancing the status and capability of fishers” listed safety at sea for small-scale fishers as a high priority. More recently, the Government of Grenada, with support from FAO, has embarked on a programme to review and update the safety at sea policy and legislation, as well as provide the enhance safety training for small-scale fishers across the country, consistent with international instruments and standards catered for under organizations such as the IMO and FAO. As a result of these initiatives, there has been a considerable reduction in the loss of lives and property at sea among the fishing fleet. Concurrent to the updating of the minimum safety standards, there was a home-grown safety at sea programme being implemented using the training manual “Safety at sea for small-scale fishers in the Caribbean” developed by FAO. However, greater coordination of efforts is now required in enforcement, outreach, education and further improvements in infrastructure to eliminate the loss of life and property among the local fishing fleet.

Occupational health and safety concerns for small-scale fishers: fishSAFE2025 Safety Intervention Program in Bangladesh by Md. Sazedul Hoque, Patuakhali Science and Technology University, Bangladesh

In Bangladesh fishing, particularly artisanal small-scale sea fishing, has become one of the most dangerous occupations in the country, where safety standards and facilities are poor, and safety training is virtually non-existent. Small-scale fishing provides employment, income and livelihood to almost half million full-time fishers, who are

regularly exposed to hazardous conditions at sea. Thus, 'fishSAFE2025: Bangladesh Fishing Safety Intervention Programme' implemented by the FISH Safety Foundation in collaboration with Patuakhali Science and Technology University (PSTU), Bangladesh that was funded by Lloyd's Register Foundation, United Kingdom of Great Britain and Northern Ireland. The study purposely determined the small-scale fishing socio-demography, occupational safety and health hazards faced, and probable safety interventions for the small-scale fishers in the coastal district Patuakhali and Barguna, Bangladesh. The results revealed the natural, social, health, and anthropogenic safety hazards facing artisanal fishers encountered at sea, and the socio-economic impacts on their related communities. The study identified cyclonic storms in high seas as the major natural hazards due to which large numbers of fishers perish at sea every year. Safety intervention includes fishers and skippers training of trainers (ToT) on 'safety at sea' materials from FAO and BoBP. The significant output of fishSAFE2025 is the development of five graphics-based safety training modules on: Emergency First Aid, Emergency Preparation, Safety Risk Management, Vessel Engine Maintenance, and Fire Safety. Safety items (life jackets, buoy, sunglasses, first-aid kit box) were donated under the re-FISH initiative that emerged and wishes to continue these needed items. The project also identified the impact of COVID-19, knowledge, attitude and practices of the small-scale fishers. The fishSAFE2025 recommended that effective safety policy, training, input supplies, and social awareness could certainly contribute to improve the fishing safety culture, thus to save lives and reduce the devastating impact on the associated families and wider communities of the small-scale fishers in Bangladesh.

Safety training makes a difference by Hilmar Snorrason, Maritime Safety and Survival Training Center (MSSTC), Iceland

In 1985, the Maritime Safety and Survival Training Center (MSSTC) was founded by the National Lifesaving Association of Iceland for the purpose of educating seafarers on safety and survival. Now almost 40 years later we have seen how safety training among other actions have changed the industry. In 2008 it was the first time in Icelandic history that no fatal accident occurred in the fishing and merchant shipping, which has been repeated in subsequent years. Good cooperation between the government and stakeholders has led to a common understanding of the importance of action that will lead to a safer industry. In cooperation with partners, Icelandic Authorities have, over the years, put effort into measures to reduce accidents in the industry and have come up with strategic plans from 2024–2038. These include a mandatory ship reporting system, renewal of the fishing fleet, better weather forecasts and strong SAR operation and are among the vital factors, in addition to safety training, that have led to the reduction of fatality in the industry. During the pandemic the safety training providers had to take new steps in training with the help of distance learning, but that could not replace the practical training that is needed. Virtual training is, in some way, replacing practical training but that will not solve the necessary training needed for fishers and other seafarers. MSSTC managed to continue training throughout the pandemic with certain restrictions.

Does training improve fisher safety? by Simon Potten, Sea Fish Industry Authority (Seafish), United Kingdom of Great Britain and Northern Ireland

Does training improve fisher safety? The response to this question is invariably always 'yes', but what evidence is there to support this belief? Basic safety training is required to work on commercial fishing vessels, as it is in many other maritime industries. It is included in Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F) 1995, along with additional requirements (on certain

categories of vessels) for deck and engineer officers, watchkeepers, radio operators, etc. Yet to implement STCW-F, the United Kingdom of Great Britain and Northern Ireland has its own regulations with similar requirements. In addition, and for more than 25 years, Seafish has been administering government funding to encourage new entrant and experienced fishers to undertake additional voluntary training, confident in the belief that this will make them even safer. This paper presented results from an analysis of the training records of crew from fishing vessels involved in accidents reported to the United Kingdom of Great Britain and Northern Ireland's Marine Accident Investigation Branch. It assessed compliance with mandatory requirements and engagement with voluntary training opportunities, whilst also considering other factors such as the recency of training. Whilst it is impossible to isolate the impact of crew training on these incidents, the results provided a fascinating insight into attitudes towards training. The purpose of this paper was to prompt discussion and encourage further research into the links between training and fisher safety. This was considered vital to inform discussions at IMO on revisions to STCW-F 1995 and to inform domestic decisions on future funding for crew training.

Session 4 B: Get SeaFit: Dockside partnerships for health and well-being of fishers and their families

Panel session moderated by Carol Elliott, The Fishermen's Mission; Sandra Welsh, The Seafarers Hospital Society (Hampshire, United Kingdom of Great Britain and Northern Ireland), with presentation from Sandra Welsh, The Seafarers Hospital Society, Hampshire, United Kingdom of Great Britain and Ireland

SeaFit is an award-winning initiative providing easier access to services to improve the health and well-being of fishers and their families. We use collaborative partnerships bringing alternative models of healthcare to the quayside where fishers work. Studies confirm that commercial fishers face specific occupational health issues. United Kingdom of Great Britain and Northern Ireland fatality rates are 100 times higher than that of the general workforce and work-related injuries are common. The two most widespread issues being heart, high blood pressure, circulation problems (54 percent), and muscular or skeletal conditions (41 percent). Many fail to seek help and are unlikely to attend screening appointments, working through pain or injury, exacerbating their condition, and increasing poor, long-term health outcomes. Working conditions, and battle against a traditional 'man-up' culture means pre-booking appointments, when not being able to plan for time off is difficult, current health systems do not offer flexibility. The United Kingdom of Great Britain and Northern Ireland Chief Medical Officer's Annual Report 2021: Health in Coastal Communities acknowledged that coastal communities have been long overlooked. Dentists say the oral health of fishers generally consists of gross neglect, worse than those who are homeless. Suffering continual pain and infection, because they were too scared, or embarrassed by the state of their teeth. Others cannot find an NHS dentist or afford private care. One fisher used nail clippers to try to smooth a chipped tooth which resulted in him cracking the tooth and living in constant pain. ME: To increase engagement, health services needed to be taken to the quayside. Our Healthy Lifestyle and Mental Health Advisors spent time getting to know the fishers. The Fishermen's Mission port staff are invaluable in getting fishers to attend health events and report an increase in demand, picking up additional welfare needs afterwards. Staff are continually visible at the quayside, stopping for informal chats to help engagement. Most fishers know that support is available, but will not always ask, unless they see someone they trust on the quayside. We hear that fishers would eventually 'pop-in' for a health check with our Healthy Lifestyle Advisors, but never

make an appointment with their GP. SeaFit enables relationships to be built with many NHS Trusts and Public Health teams, including working with Bola Owolabi, NHSE Director of Health Inequalities and Improvement. As SeaFit gains recognition, NHS and Public Health providers now include quayside clinics in their core outreach teams, increasing our reach and reducing our costs. Some local authorities use the SeaFit model in other hard-to-reach communities such as the farming industry. Outcomes, we have literally saved people's lives. One event 11 percent had high blood pressure, 17 percent had a high risk of diabetes, and three of eight people were referred due to undiagnosed liver problems. It is not only physical health checks, but fishers have also said the mental health support they had received stopped them from taking their own lives. CE: Mental health issues are not spoken about, for fear of fishers being seen as weak by others. Financial worries, cost-of-living, increased regulations, environmental pressures and market demand, all lead to an increase in anxiety, stress, and greater strain on relationships. Fatal accidents at sea can have profound long-term effects on entire fishing communities. Even with 2 specialist counsellors working with SeaFit we needed to reach other areas and set-up the SHOUT service providing United Kingdom of Great Britain and Northern Ireland-wide, 24/7 confidential support. The project powered by Mental Health Innovations, uses pioneering technology to improve mental health, with the support of the Royal Foundation of The Prince and Princess of Wales. If a fisher is feeling anxious, stressed or depressed they can text the word 'FISH' to 85258 for free, confidential support any time, day or night. SW: The Seafarers Hospital Society has a well-established Physiotherapy Network offering free fast-track physiotherapy to working seafarers and fishers. Providing holistic and preventative treatment to help avoid injury caused by the physical demands and repetitive nature of work. Repetitive strain injuries, and musculoskeletal issues, often caused by heavy lifting, are common long-term health issues. SW: Defibrillators – The rising median age of fishers has shown a concurrent rise in heart attacks and other similar health-related incidents caused by high blood pressure. Having identified the growing prevalence, SHS has installed defibrillators in ports, seafarer centres, boats and run webinars aimed at preventing heart-related fatalities. Many of these deaths remain preventable; every minute without CPR or defibrillation reduces the chances of survival by up to ten percent. Maritime Minister, Baroness Vere, said: "These measures will help save lives and ensure our seafarers know their welfare is of paramount importance."

Session 4 C: Challenges and measures for improved occupational health and safety (OHS) in salmon farming

Workshop session moderated by Trine Thorvaldsen and Kristine Storkersen, SINTEF Ocean, Trondheim, Norway.

Background: Employees in the Norwegian salmon farming industry have many responsibilities. They must perform operations that keep the number of salmon lice below set limits, make sure the fish are well and do not escape from the fish farms. Statistics show that workers on farms and vessels are exposed to accidents in their work, and many worry that their work may affect their health and safety negatively. In the Norwegian context, sea-based net pens accessed by vessels has been the most prominent technology for decades (here referred to as traditional fish farms). However, new production systems including semi-closed sea-based concepts, offshore fish farms and land-based facilities are emerging as a solution to challenges with sea lice and lack of space along the coast and in the fjords. The occupational health and safety risks in these systems may differ from traditional farms and need to be understood to ensure good working conditions. The technology used affects the type of tasks and operations that need to be performed, and operations on traditional fish farms involve

several ergonomic risk factors, such as lifting with the upper body twisted or bent, repetitive and monotone work tasks and heavy lifts. Acute accidents are commonly caused by falls, blows by objects, crushing or cuts. Despite these risks, OHS has not been a key driver for technological development compared with challenges such as salmon lice, escape, and fish welfare. Looking at the company level, organizational factors also affect OHS. Research finds that long work hours, conflicting objectives and insufficient training may affect safety negatively. Furthermore, regulation of the Norwegian salmon farming industry has been described as fragmented with several authorities requiring companies to manage different types of risk related to fish, environment and OHS. The aim of this workshop was to discuss unique safety and health considerations for different production systems in salmon farming, as well as suitable measures that can reduce accidents and promote good health.

The following questions were discussed:

- What are the main challenges for occupational health and safety in different production systems for salmon farming/in different regions?
- What measures can help improve occupational health and safety in salmon farming?
- Where and how can measures be implemented (fish farm, company level, regulatory level)?
- Besides companies and regulators, who are key stakeholders that can make a difference locally, nationally, and internationally?

This workshop was a guided session led by Trine Thorvaldsen and Kristine Størkersen, both PhDs and Senior Research Scientists at the independent research institute SINTEF Ocean in Norway. They gave a short presentation of key findings from the on-going project “OHS in aquaculture – risk management in different production forms” as an introduction to the discussions. Methods used in the project were interviews, workshops, accident analysis, as well as an OHS-survey among employees in the industry. The project is financed by FHF (Norwegian Seafood Research Fund project number 901801).

3.4 KEYNOTE SPEECHES

Krishnan Paulpandian, Director, BOBP-IGO, India, delivered a keynote address called “Below the radar: safety aspects of small-scale fisheries in South Asia.” The keynote speech explored the unique challenges faced by small-scale fisheries in countries like Bangladesh, India, Maldives, and Sri Lanka. Highlighting the developing but low capacity of people and institutions, Krishnan Paulpandian said that it often led to a compromised solution for safety. He called for a wholesome safety measure that addresses all aspects of the working condition of fishers, including fisheries management, appropriate technology, economic incentives and enabling governance. He further informed the audience that BOBP-IGO will be implementing a Plan of action for enhanced safety, decent work and social protection in the fisheries sector of the Bay of Bengal Programme region (BOBSAFE,) a regional safety plan which will contribute to the improvement of the working conditions of fishers in the region.

Daryl Attwood, Senior Programme Officer, Lloyds Register Foundation, stressed that improving safety in the fishing industry requires a holistic approach, spanning all regions. The Lloyd’s Register Foundation strategy concentrates on areas where the problem is most acute, primarily in less wealthy countries, but significant problems also

exist in wealthier countries. Improvements will be most possible if they are tailored to the specific regional issues and can draw upon technical, governmental, auditing and on-the-ground training approaches.

Daryl Attwood announced the creation of a new International Fund for Fishing Safety (IFFS). It has been funded by an initial donation from the Lloyds Register Foundation and will be managed by The Seafarers' Charity. Working in partnership with the FISH Platform, who will use their technical expertise to advise on funding initiatives that are led by fishers and will make the greatest impact on improving fishing safety.

4. Day 2

4.1 KEYNOTE SPEECHES

Elda Belja gave a keynote speech on regional fishery bodies (RFBs) and their role in improving safety and decent work on fishing vessels. Recognizing that RFBs are key stakeholders in fisheries management and conservation at regional level, FAO carried out a study in 2021–2022 on their role in promoting safety and decent work in fisheries under their mandates. To this end, a survey was conducted amongst 37 Secretariats of various RFBs representing inland and marine small-scale and industrial fisheries across the globe. The survey showed that safety issues are a priority for 51 percent of these RFBs. For 35 percent of them safety is important but not a priority. On the other hand, decent working conditions are a priority only for 38 percent of the RFBs surveyed and important but not a priority for only 30 percent of them. RFBs draw their mandate to work on safety and decent work in fisheries mainly from their basic texts. Important to this mandate are also commission meetings and requests by members. The entry point to establish such mandate on safety and decent work standards is often the safety of observers. The survey indicated that the biggest challenge for many RFBs is the limited knowledge by their secretariats of key international instruments which address issues of safety and decent work in fisheries, such as C188, Cape Town Agreement, STCW-F and FAO/IMO/ILO Safety codes and guidelines. As in many other areas of international law, technical, financial and human capacity constraints within the secretariats also impede their attention to safety and decent work. It is for these reasons, that many RFB secretariats consider the development of action plans beneficial for the purpose of integrating safety and decent work in the management of the fleets under their mandate. FAO is supporting some RFBs with their action planning processes, with assistance from the European Commission Directorate-General for Maritime Affairs and Fisheries (DG Mare).

Trine Thorvaldsen gave a keynote on the impact of fisheries management on fishers' health and safety: A case study from Norway. She reported that there are approximately 11 000 commercial fishers and 4 700 active fishing vessels in Norway. The accident rate is high, and safety regulations have come late compared to other industries. Like many other countries, the responsibility for fisheries management and safety regulations are compartmentalized. Three cases can illustrate how fishers perceive the effects of fisheries management regulations on their health and safety:

- Case 1: Olympic fishing. Fisheries that close when the total group quota is reached may lead to a race for the fish that may compromise safety to secure a part of the catch.
- Case 2: Safety vs income. Activity requirements to receive quota may lead fishers to go to sea in bad weather to secure their income. Previous regulations (now changed) made it impossible for injured or ill fishers to secure their income by having someone else fish for them.
- Case 3: Co-fishing. Working alone is associated with high risk. In certain parts of the fleet fishers with vessels and quotas are allowed to bring with them all or part of their quota aboard another vessel to avoid working alone. This regulation does not apply however to the so-called “open group” where fishers have called for the opportunity to co-fish for safety reasons.

Interviews in an ongoing project on safety in fishing confirm the connection between fisheries management and safety illustrated in the three cases. As fishers often highlight common sense, taking precautions, evaluating the risks, considering the weather and taking care of each other as important, fisheries management may sometimes counteract or challenge the precautions and practices they rely on to stay safe. It is therefore important to consider the effects of fisheries management on safety and integrate safety into fisheries management.

The keynote speeches were followed by three concurrent breakout sessions, as follows:

4.2 BREAKOUT SESSIONS

Session 5 A: Changing personal flotation use behaviour: What can we learn from efforts to address the most important fishing safety technology adoption challenge of our time?

Workshop session moderated by Julie Sorensen, The Northeast Center for Occupational Health and Safety: Agriculture, Forestry and Fishing, New York, United States of America

In this double panel session (3 hours total), researchers from various coastal regions discussed progress on personal flotation devices (PFDs) adoption since the last panel, as well as their efforts to increase the use of PFDs in commercial fishing populations in both developed and developing countries. Falls overboard and vessel sinkings have been the primary cause of commercial fishing deaths since humans have taken to the water to harvest fish. Although PFD designs have greatly improved over the past decade, regular use of these life-saving devices by the commercial fishing population, have remained frustratingly low.

Panelists addressed the following topics in their presentations:

- the unique issues related to PFD use in both large and small-scale commercial fisheries in different global settings;
- the research and intervention development methods utilized to increase interest in PFD use;
- barriers and motivators to PFD adoption; and
- end-user engagement and uptake.

Following each 15 minute presentation (2 hours total with a 15 minute break halfway through the session), presenters and those in attendance were asked to consider what could be learned from these prior efforts to increase PFD use and how these might be applied in various fishing settings. Suggestions for building on the body of research discussed in this session included: 1) developing better PFD designs and monitoring sub-standard options that might currently be on the market to alert users about the reliability of these options; 2) developing improved PFD distribution channels; 3) bridging gaps in behaviour change research by removing barriers to PFD use which could be logistical, financial or motivational; 4) developing better methods for objectively tracking PFD use; and 5) finding opportunities for industry and health and safety researchers to work together to exchange ideas and evidence-based practices in order to collectively address global barriers to PFD use.

Session 5 B: Towards inclusive, equitable and climate-resilient occupational health and safety (OHS) for small-scale fishers – the supportive role of Social Protection (Mexico Room)

Panel session moderated by Daniela Kalikoski, Food and Agriculture Organization of the United Nations, Rome, Italy

The Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines), developed by FAO in collaboration with small-scale fisheries organizations from around the world and adopted in 2014, are the first global policy instrument dedicated entirely to the small-scale fisheries sector. Key elements focus on social development, employment and decent work (Guideline #6) and on responding to disaster risks and climate change (Guideline #9). With 2024 marking the 10-year anniversary of the SSF Guidelines and presenting an opportunity to reflect on lessons learned, progress and contributions to positive changes, this session explores the supportive role of social protection in connection with occupational health and safety (OHS) for resilient, sustainable small-scale fisheries and associated livelihoods in the context of climate change. Globally, more than 60 million people are employed in small-scale fisheries (SSF), representing 90 percent of people engaged in capture fisheries overall, while a further 53 million people are estimated to be active in subsistence fishing.² The sector makes significant and essential contributions to livelihoods, nutrition and food security, yet small-scale fishers at all points along fish value chains remain highly vulnerable to a broad range of interwoven social, economic and environmental shocks and stressors. Fishing, especially SSF, has long been recognized as one of the most dangerous occupations, with very high injury and fatality rates. The International Labour Organization (ILO) (1999), and FAO (2009) estimated 24 000 and 32 000 deaths per year, respectively; recent research finds significantly higher figures (more than 100 000 deaths per year), with many concentrated in small-scale fisheries, and associated with high rates of social, economic and environmental marginalization and vulnerability.³ Despite recognition as a fundamental labour right (ILO, 2022), attention to occupational health and safety (OHS), particularly in the context of SSF and climate change, has been limited so far. Greater attention to the sector, through policy and programmes to improve OHS and provide supportive measures, is clearly and urgently needed. In particular, there is a need for a more focused lens examining relationships between socioeconomic, occupational, and environmental hazards, risks and vulnerabilities that underlie many OHS issues (e.g. inequality, poverty and informality that prevent compliance with safety standards, increasing frequency and severity of covariate shocks associated with climate change, disproportionate impacts on marginalized groups, impacts of overfishing, etc.) and to identify entry-points and pathways to building resilience that can address these elements in a more integrated way. Social Protection acts to address key drivers of OHS issues, with the goals of reducing social and economic risk and vulnerability and alleviating extreme poverty and deprivation.⁴

² FAO, Duke University & WorldFish. 2023. Illuminating Hidden Harvests: The contributions of small-scale fisheries to sustainable development – Executive summary. Rome. <https://doi.org/10.4060/cc6062en>

³ Willis, S.& Holliday, E. “Triggering Death: Quantifying the True Human Cost of Global Fishing” (FISH Safety Foundation, 2022), <https://the-human-cost-of-fishing.org>

⁴ Winder Rossi, N., Spano, F., Sabates-Wheeler, R. & Kohnstamm, S. 2017. Social Protection and Resilience. Supporting livelihoods in protracted crises, fragile and humanitarian context. FAO Position Paper. Rome, Food and Agriculture Organization of the United Nations. Institute for Development Studies. [Social protection for resilience building: supporting livelihoods in protracted crises, fragile and humanitarian contexts \(fao.org\)](https://www.fao.org/publications/sozial-protection-for-resilience-building-supporting-livelihoods-in-protracted-crisis-fragile-and-humanitarian-contexts)

Social Protection programmes are designed to protect, promote and transform the livelihoods of the poor and vulnerable, including social assistance (cash and cash+ initiatives), social security (contributory programmes to protect people from shocks), and labour market interventions (aimed at economic inclusion and improved working conditions). Policy support at the global level for OHS is increasing (SSF Guidelines, ILO Social Protection Floors, ILO Fundamental Principles and Rights at Work, etc.), and many worthwhile examples of OHS initiatives and supportive social protection in small-scale fisheries exist. Documenting experiences and sharing lessons learned is important to building the evidence base that will support further improvements and the continuing spread of implementation uptake for both OHS and social protection. Presentations made by panelists included the following:

Occupational safety and health in integrated approaches to sustainable fisheries and aquaculture by Birgitte Krogh-Poulsen from the Monterey Bay Aquarium. This session explored the integration of occupational safety and health practices within sustainable fisheries and aquaculture frameworks.

- The global framework to advance occupational safety and health and decent work in small-scale fisheries: Elvis Betulayev from the International Labour Organization (ILO) provided insights into the global framework aimed at advancing occupational safety and health and promoting decent work within the small-scale fisheries sector.
- Prioritizing and addressing occupational health and safety concerns within the fisheries sector: Anna Carlson from the General Fisheries Commission of the Mediterranean (GFCM) discussed how the GFCM prioritizes and addresses occupational health and safety concerns within the fisheries sector.
- Occupational safety and health and social protection issues for small-scale fishers: Fabrizio de Pascale from UILA Pesca presented on occupational safety and health issues and social protection measures for small-scale fishers, shedding light on the challenges and potential solutions.
- The complementary roles of social protection in supporting occupational safety and health for more resilient small-scale fisheries: Daniella Salazar Herrera from FAO highlighted the preventive, protective and transformative roles of social protection in complementing and supporting occupational safety and health initiatives. Additionally, the results of a global assessment of social protection for fishers were shared.
- Occupational safety and health challenges facing young fishers and children in the sector: Eleonora D'Andrea from FAO delved into the specific occupational safety and health challenges faced by young fishers and children in the sector, emphasizing the need for targeted interventions.
- Accessible and inclusive occupational safety and health technology: Rita Franco from the Post-graduate programme in Health, Environment, and Work at the Federal University of Bahia (UFBA), Brazil, shared lessons from Brazilian clam fisheries on leveraging technology to improve the recognition and equitable treatment of female fishers in occupational safety and health measures.
- The transformative role of fisher organizations in advancing occupational safety and health policy and practices: Kirill Buketov from the International Union of Food, Agricultural, Hotel, Restaurant, Catering, Tobacco, and Allied Workers' Association (IUF) discussed the transformative role of fisher organizations in advancing occupational safety and health policy and practices within small-scale fisheries.

- Exposing and combating the culture of excessive working hours and identifying victims of forced labour and human trafficking: Michael O'Brien from the International Transport Workers' Federation (ITF) explored methods for exposing and combating the culture of excessive working hours and assessed exploited industrial fishers for possible identification as victims of forced labour and human trafficking.

These presentations provided valuable insights into the multifaceted aspects of occupational health and safety (OHS) within the context of small-scale fisheries (SSF), emphasizing the importance of collaborative efforts and evidence-based strategies for promoting resilience and sustainability in the sector.

Session 5 C: Seafood processing hazards and risk factors

Abstract session moderated by Mohamed Jeebhay, with presentations from the following:

Exposure assessment in the Alaskan fishing and seafood processing industries by Stephanie Carter, iWorkwise, United States of America

Seafood handling, processing, and packaging workers may be exposed to airborne particles, including particulate matter from seafood, food additives, cleaning agents, soot, and saltwater mist. Evaluations in the bony fish processing industry indicate that the parvalbumin protein is a small component of the particulate matter in the air, it must be specifically measured to determine its presence due to its association with respiratory illness in sensitive people. The amounts of allergens measured are extremely small, often measured in nanograms, such that parvalbumin may make up less than 0.1 percent of the inhalable particulate concentration. Higher particulate and allergen concentrations have been associated with the use of older processing equipment, the presence of hot processes and/or steam, and the use of pressurized water for cleaning. Currently, there are no established regulatory or health-based exposure limits for exposure to parvalbumin against which to compare sample results. However, air sampling results can be used to identify areas or tasks that have measurable parvalbumin levels, compare them to background values within the industry, and to define jobs with higher concentrations of exposure in order to focus control efforts. Continued assessments will be necessary to determine the impact of other airborne components that may be responsible for adverse health effects including endotoxin, protease enzymes (e.g. trypsin), histamine, and other allergenic proteins. Control measures include dilution ventilation, isolation of the equipment with curtains, plastic sheeting, and/or fixed enclosures as well as respiratory protection.

COVID-19 prevention among seafood processors: Workplace and social factors by Shannon Guillot-Wright, UT Health School of Public Health, Department of Environmental and Occupational Health Sciences and the Southwest Center for Occupational and Environmental Health, United States of America

As critical infrastructure workers in the food supply chain, seafood processors in the United States continued operations during the COVID-19 pandemic. This worker population consists of low socioeconomic status and immigrant and migrant workers who have been historically marginalized within research and society. Over the course of two years (2021–2023), our team visited six seafood processing factories in Texas and Louisiana to conduct semi-structured in-depth interviews (n=44) and workplace

observations. Demographics of participants included women (n=26) and men (n=18) who considered themselves Latino (n=21), American Indian (n=7), White (n=13), Asian (n=2), and Black (n=1). Interview questions centered on workers' experiences during the pandemic; our goal was to examine how workplace and social factors, including structural/social determinants of health (SDoH), impacted workers' risks and health outcomes. We conducted qualitative data analysis, using an inductive approach, and triangulated our findings with a focus group of seafood processing workers (n=10). Overarching themes, which directly and indirectly impacted workers' exposure to and treatment for COVID-19, included the following: housing arrangements; regulatory compliance; and sick leave, as well as one overarching theme specifically for immigrant and migrant workers, clinic access. Although we observed that some managers were ambivalent to workers' health needs or COVID-19 status, we also found larger systemic factors at play, such as limited access to paid medical leave or an investment in workplace hazard control measures. Based on this evidence, we provide suggestions in each of these areas for improving worker safety and health, which in turn could help to address the stark health disparities in the United States that were exacerbated by the COVID-19 pandemic.

Hazards associated with the processing of masmin (a traditional smoke-cured product from skipjack tuna) by fishers of Lakshadweep islands, India by S. Sabu, Cochin University of Science and Technology, India

The Union Territory of Lakshadweep, India, consists of 36 small islands (of which only ten are considered inhabited), with a total land area of 32 km². These islands are engulfed by protective natural lagoons (about 4 200 km²) and add 20 000 km² of territorial waters and 400 000 km² of Exclusive Economic Zone (EEZ). The primary tuna resources landed in the islands include *Katsuwonus pelamis* (86 percent), *Thunnus albacares* (12 percent) and *Euthynnus affinis*. Pole and line fishing methods account for 97 percent of the total landings, followed by troll lines. Masmin is a traditional smoked and dried product from skipjack tuna (*K. pelamis*) in Lakshadweep, India. Masmin production contributes significantly to the islands' economy through domestic trade and exports to neighbouring nations. Masmin is prepared from skipjack tuna fillets by cooking in seawater, followed by alternate drying and smoking to a less than 10 percent moisture content. Due to the heavy smoking practiced during its production, masmin may contain contaminants and health hazards. The fishers dedicate their remaining time after fishing to convert the bulk of their catch to masmin using the traditional crude method. This paper reviews the present processing methods, health risks associated with masmin processing in Lakshadweep Islands, India and the measures adopted in this direction to improve the traditional crude way of masmin processing. There is a need to continuously update the knowledge levels of small-scale tuna fishers of Lakshadweep islands, India, in hygienic handling, adopting improved fish smoking methods, minimizing the health hazards to achieve better health, economic returns and sustainable development of small-scale fisheries in the region.

Respiratory symptoms and allergenic proteins exposure in shrimp processing plants by Fikirte Debebe Zegeye, National Institute of Occupational Health and University of Oslo, Norway

Introduction: High prevalence of respiratory health issues such as allergies and asthma are observed among shellfish processing workers. This study examined the composition of aerosols generated during shrimp processing and respiratory symptoms in Norwegian shrimp processing plant workers.

Material and methods: The study included 44 shrimp processing workers and 21 administrative workers as controls. Personal exposure measurements were taken during different work tasks, and air samples were collected to measure total protein, proteases, and identify allergens using LC/MS. In addition, questionnaire data and information on differential blood cell count, inflammatory markers, and specific allergen-specific immunoglobulin E (IgE) levels against crab, shrimp and salmon were analyzed.

Result: Work-related respiratory symptoms were prevalent (24–29 percent) among production workers, and 11 percent of them showed elevated levels of shrimp and crab IgE. The highest total protein levels were measured in the cooking and peeling departments. Known shellfish allergens, e.g. tropomyosin, arginine kinase, myosin light chain, hemocyanin, and eight potential novel allergens were identified. Despite low total protein levels, all work processes showed high levels of the most common allergen, tropomyosin. The cooking and peeling department had the highest tropomyosin concentration (7.07 µg m³).

Conclusion: Norwegian shrimp processing workers exhibit frequent respiratory problems and elevated blood IgE levels to shrimp and crab allergens. Tropomyosin levels were notably high, especially in cooking and peeling processes, and were poorly reflected by total protein levels. This indicates that total protein measurement offers limited information into relevant exposure in work processes with a high allergen presence.

Session 6 A: (Continued) Changing personal flotation use behaviour: What can we learn from efforts to address the most important fishing safety technology adoption challenge of our time?

Workshop session moderated by Julie Sorensen, The Northeast Center for Occupational Health and Safety: Agriculture, Forestry and Fishing, New York, United States of America

(See Session 5 A for description).

Session 6 B: Advancing social justice and decent work for all in the aquaculture sector

Panel Session moderated by Elvis Beytullayev, International Labour Organization, Geneva, Switzerland, with Kirill Buketov, International Union of Food and Allied Workers' Associations (IUF), Geneva, Switzerland; Francisco Santos-O'Connor, International Labour Organization, Geneva, Switzerland; Lissandra Sauto Cavalli, Ocean Frontier Institute, Canada; Ingunn Marie Holmen, SINTEF, Norway

The conclusions adopted by the Sectoral Meeting on the future of work in aquaculture in the context of the rural economy (2021) requested the International Labour Office (ILO) to reinforce its cooperation with relevant multilateral organizations, particularly FAO, and regional organizations to promote decent and sustainable work in aquaculture aimed at mobilizing a strong and coherent global response in support of human-centered recovery, long-term development and growth of the sector that are inclusive, sustainable and resilient. The ILO had also been requested to conduct research on existing and emerging OHS risks with a view to guiding future action including the elaboration of a code of practice on OHS in aquaculture. As a follow-up to the conclusions of the 2021 sectoral meeting, the office organized a session on social

justice and decent work in the aquaculture sector at the International Fishing Industry Safety and Health Conference (IFISH 6), held at FAO headquarters on 8–12 January 2024.

Aquaculture is an important source of income and livelihood, especially for many rural communities, providing direct employment to more than 20 million people, with many more people employed along the supply chain. The sector's exponential growth in recent decades has significantly contributed to alleviating poverty in a number of developing countries, enabling millions of the rural poor to escape from social and economic exclusion. Despite its growing contribution to employment and decent work opportunities, food security and economic development, in many countries, aquaculture faces decent work deficits alongside other important social and environmental challenges. The ILO session focused on the sector's challenges from the employment and labour perspective. It drew on good practices and lessons learned from the work of the ILO and its tripartite constituents – governments, employers' and workers' organizations – in the development and implementation of policies, strategies and tools to promote decent jobs in the aquaculture sector; rights at work, especially fundamental principles and rights, including the right to a safe and healthy working environment; social protection; and, social dialogue. The session included the following speakers:

- Elvis Beytullayev, Rural Economy Specialist, ILO, who served as the moderator of the session, set the scene by outlining recent employment and labour trends and developments in the aquaculture sector and highlighted key decent work challenges. He gave an overview of ILO tools that can be used to advance decent work in the sector, namely [Policy guidelines on the promotion of decent work in the agri-food sector](#). He also mentioned new relevant ILO initiatives, including the development of a code of practice on occupational safety and health in the aquaculture sector.
- Francisco Santos-O'Connor, ILO Senior Specialist on OHS, gave an overview of international labour standards on OHS relevant to the sector. He explained how the recent decision of the International Labour Conference to include “a safe and healthy working environment” in the ILO framework of fundamental principles and rights at work, designating the Occupational Safety and Health Convention, 1981 (No. 155), and the Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187), as fundamental Conventions, could help to promote workplace safety and health in the sector.
- Kirill Buketov, representative of the International Union of Food and Allied Workers' Associations (IUF), discussed key challenges faced by workers in accessing their rights, in particular freedom of association and collective bargaining, occupational safety and health and non-discrimination, and the role of trade unions in addressing decent work deficits in the sector.
- Lissandra Cavalli spoke about the state of decent work in Brazil's aquaculture sector, with a focus on OHS. Lissandra Cavalli presented some of the findings of her research on occupational risks and hazards in the aquaculture industry and mentioned a number of projects and initiatives on safety and health in the sector, including the software Aquasafe.
- Ingunn Marie Holmen's presentation focused on decent work and occupational safety and health in Norway's aquaculture sector. She explained the national legal framework on safety and health in the sector and the inspection system, including the challenging facing the sector.

Session 6 C: Occupational hazards faced by fishers in the Indian fisheries and aquaculture sector

Abstract session moderated by Arpita Sharma, ICAR-Central Institute of Fisheries Education, Mumbai, India; with presentations by Suhas Wasave, Statistics and Extension Education College of Fisheries, Maharashtra, India; Rajiv Rathod, MAFSU, Nagpur, India; Shubam Soni, ICAR-Central Institute of Fisheries Education, Mumbai, India; Suchismita Prusty, ICAR-Central Institute of Fisheries Education, Mumbai, India

General description of the session: The fisheries' sector in India plays a significant role in the Indian economy and provides livelihood to millions of fisher folk. The Indian fisheries sector is set in a unique and diverse set of ecosystems. The Blue Revolution in India demonstrated the importance of the Fisheries and Aquaculture sector. To improve the quality of life and economic well-being of people in rural areas and to create more livelihood opportunities, a holistic approach has been adopted by the Government of India to meet the Sustainable Development Goals (SDGs). The Government of India is proactive in the development of the fisheries and aquaculture sector and has a number of schemes like Prime Minister Matsya Sampada Yojana's Blue Revolution Scheme, the development of fishing villages, the upgrading and creation of infrastructures such as fishing harbours and fish landing centres, to ensure sustainable and responsible development. In the IFISH 5 there were few research papers presented with reference to India. It was reported that hazardous working conditions, strenuous labour, long working hours, and harsh weather are the most common hazards faced in traditional as well as commercial fishing operations. In the Indian context, there are studies reported about the fishers and workers in the marine, inland and brackish water sector. In this session on "Occupational hazards faced by fishers in the Indian fisheries and aquaculture sector", we presented the research findings of the work done in the Indian context, with reference to coastal states like Maharashtra, Kerala, Odisha and a work about the occupational hazards faced by Indian shrimp farm workers. Suhas Wasave made a presentation on the 'Occupational hazards faced by fishers of Maharashtra state'. Suchismita Prusty presented her PhD research findings on 'Occupational hazards faced by women fish retailers of Odisha'. Shubam Soni presented the occupational hazards faced by workers engaged in fish waste management. Rajiv Rathod made a presentation on the occupational hazards faced by Indian shrimp farm workers. Arpita Sharma made a presentation on the policy recommendations for mitigating the occupational hazards faced in the Indian fisheries and aquaculture.

IFISH6

Poster session



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IFISH6

5. Day 3

5.1 KEYNOTE SPEECHES

Florence Poulain, Fishery Officer, FAO, introduced the FAO Committee on Fisheries (COFI), its purpose, and membership. The thirty-sixth session of the FAO Committee on Fisheries (COFI) will take place on 8–12 July 2024. IFISH 6 participants were invited to participate in the post-conference workshop on Friday morning to discuss insights and ideas generated by IFISH 6 to inform a COFI paper on the way forward.

Following the conference, attendees were asked to evaluate two things. The first involved evaluation of the conference proceedings, venue, promotions and logistics. This information is currently being combined and will be used to guide planning for the next IFISH conference. The second evaluation component involved gathering feedback from attendees on several questions that would be presented to the COFI. These questions included: 1) What emerging health and safety issues are you seeing in fisheries, seafood processing, and aquaculture?; 2) What is currently working (or not working) in fisheries, seafood processing, and aquaculture safety and health?; 3) In order to make the greatest impact on fisheries, seafood processing, and aquaculture safety and health, where should we focus our attention moving forward?; 4) How can we use the research we're all doing to inform policy?; and 5) What ways can IFISH attendees work together to improve safety and health in fisheries, seafood processing, and aquaculture globally?

5.2 BREAKOUT SESSIONS

Session 7 A: Fishing vessel safety and design: What can be done to improve stability and safety?

Abstract session moderated by Jennifer Lincoln, with presentations from the following:

Commercial fishing industry marine casualty causal factors by Joseph Myers, US Coast Guard Fishing Vessel Safety Division, Office of Commercial Vessel Compliance, United States of America

Commercial fishing continues to be one of the most hazardous occupations in the United States (US), and it is an industry of 36 000+ commercial fishing industry vessels. Coast Guard casualty data shows a high number of fishing vessel losses are a result of contributing conditions such as human factors, equipment failure, and poor system maintenance. Similarly, the International Maritime Organization (IMO) reports that globally, fishing is one of the most hazardous professions, resulting in thousands of fishers losing their lives every year. There has been a downward trend of US fishing vessel sinkings and crew fatalities over the past several decades. In the 1980s, the US fishing industry averaged 200+ operational vessel losses and 50+ crew fatalities (annually). In the period between 2002–2021, the US fishing industry averaged 59+ operational vessel losses and 29+ crew fatalities annually. These downward trends are influenced by advancing regulations and safety policies, Fishing Safety Advisory Committee recommendations, targeted outreach campaigns and Coast Guard partnerships with the fishing industry. Though certain casualty numbers have

declined over time, we recognize the need for a continued focus on vessel safety in an ever-evolving industry. Marine casualty investigations play a significant role to identify contributing causal factors. As such, safety recommendations are formulated to address relevant safety concerns. As a result, new safeguards and policies may be promulgated for adoption by fishing industry stakeholders.

The objectives of this presentation were to:

- provide an overview of fishing vessel marine casualty causal factors; and
- identify safeguards and best practices that influence vessel safety preparedness.

This presentation introduced a variety of contributing factors to fishing vessel marine casualties. Prudent decision-making actions to mitigate adverse safety conditions were presented, with an aim to reduce the likelihood of a marine casualty or loss of life due to unsafe conditions.

If lack of vessel stability causes the loss of commercial fishing vessels, why does it remain unregulated? by Michael Flynn, The Seaworthy Foundation, Inc. Flynn|Wirkus, P.C., United States of America

The Seaworthy Foundation is a non-profit, charitable organization. Our mission is to improve safety in the commercial fishing industry. We recently applied to NIOSH (National Institute for Occupational Health) for funding a research project through the NIOSH-United States Coast Guard (USCG) Cooperative Agreement. The project will analyze USCG data on commercial fishing vessel casualties, primarily the USCG's Investigation Reports of vessel losses, to determine the predominant causes of fishing vessel casualties, assess the USCG's recommendations for preventing future similar casualties and determine whether these recommendations have been adopted and, if not, why not. Our working theory is that lack of stability has been consistently identified as a cause of fishing vessel casualties, and that the USCG has consistently recommended the adoption of regulations requiring mandatory minimum stability testing of uninspected commercial fishing vessels, but these proposed regulations have not been adopted. The USCG has provided a "Letter of Support" pledging its cooperation and assistance with this project. In addition to analyzing USCG report, we also plan to have our researchers be provided with additional detail about the contents of the USCG's databases, how they were compiled and the fact-gathering process. Ultimately, we will be interviewing key USCG personnel about the cause determinations and recommendations, as well as insight into the rulemaking process and whatever constraints may be preventing the adoption of mandatory stability regulations. We hope to have our findings published, and that they will become a springboard for the adoption of mandatory stability regulations. The presentation gave an overview of this research project.

Why do fishing vessels capsize? by Kenneth Smith, Hook Marine Ltd., United Kingdom of Great Britain and Ireland

The continuing losses of fishing vessels and their crews through capsizing is a worldwide problem. Vessels will capsize when the stability of the craft and cargo is inadequate. Stability is a dynamic parameter which changes throughout a voyage, and so measurement of the stability at sea is vital for the safety of the vessel, the cargo and all on board.

The Wolfson Stability Method: empowering small-scale fishers to mitigate the risk of capsizing by Matteo Scarponi, University of Southampton, United Kingdom of Great Britain and Northern Ireland

Commercial fishing remains the most dangerous peacetime occupation in most countries. The accident fatality rate in developed countries exceeds 100 fatalities per 100 000 active fishers and is probably even higher in developing countries where no formal accident reporting systems are in place. The new United Kingdom of Great Britain and Northern Ireland Code of Practice (CoP) for under 15 m fishing vessels is an unprecedented effort to improve safety within the small-scale United Kingdom of Great Britain and Northern Ireland fishing industry. The CoP states that ‘vessels not required to hold a Stability Information Book must have a Wolfson Stability Notice posted on board the vessel, which gives information on the loading of the vessel and its effect on stability’. The Notice enables small-scale fishers to assess the limits for operating their own boats safely in relation to the prevailing sea state. The only information required to derive such limits are the vessel’s length and beam. The Method, consisting of a Stability Notice and a Freeboard Guidance Mark, was formulated by the Wolfson Unit in 2004–2006 and stems from model scale capsize tests. This presentation described the findings of a two year collaborative effort aimed at stress-testing the Wolfson Method in relation to the CoP. The key strands of this work include marine accident investigation work, re-analysis of vessel casualty data up to 2021, simplified stability assessments for vessels without approved stability information and model-scale capsize tests in the new 138 m Boldrewood Towing Tank, the largest University facility of this kind in the United Kingdom of Great Britain and Northern Ireland. These ongoing efforts involve the Wolfson Unit, the Public Policy Southampton team, the Marine Accident Investigation Branch (MAIB), the National Federation of Fishermen’s Organisations (NFFO) and the Maritime and Coastguard Agency (MCA). This contribution also presented evidence-based options for incorporating the Wolfson Stability Notice in the FAO/ILO/IMO Safety Recommendations for Decked Fishing Vessels under 12 m in Length and Undecked Fishing Vessels.

Safety and stability recommendations for small fishing vessels: FAO’s recent work in Sri Lanka by Derrick Menezes, Independent Consultant, India

This presentation on fishing vessel safety and stability introduced safety of small fishing vessels through strength in their design and construction. It also discussed some basic principles of small fishing vessel stability and provided guidance on the maintenance of adequate boat stability through good practices while operating at sea. Small-scale fishing boat safety measures promoted by FAO are based on design and construction standards laid down in the document “FAO/ILO/IMO Safety recommendations for Decked Fishing Vessels Under 12 m in Length and Undecked Fishing Vessels”. Several illustrations used in the presentation were based on FAO’s recent work in Sri Lanka. Hull strength and structure, built-in buoyancy and fiberglass working practices were addressed. The presentation explained some basic principles on the stability of small fishing vessels with information and excerpts from the FAO document “Safety practices related to small fishing vessel stability”.⁵ It depicted, through several sketches, good practices to be followed by fishers to ensure the stability and safety of their vessels while fishing at sea. The presenter also conducted a short practical session using a boat model to demonstrate the effects on stability when a fishing boat is loaded in

⁵ Gudmundsson, A. 2009. Safety practices related to small fishing vessel stability. FAO Fisheries and Aquaculture Technical Paper, No. 517. Rome, FAO..

various conditions. The presentation may serve as a guide for those concerned with training, research, construction, use and inspection of fishing vessels in matters of both vessel strength and safety.

Session 7 B: Commercial seafood industry's health, safety, and well-being from down under: A New Zealand context

Panel session moderated by Fatima Junaid, Massey University, New Zealand. Session presenters were: Shalaine Jackson, Guard Safety, New Zealand; Darren Guard, Guard Safety, New Zealand; and Fatima Junaid, Massey University, New Zealand.

New Zealand's seafood industry plays a key role in the country's economy, contributing USD 2 billion in export earnings and employing more than 16 500 people who provide New Zealand and the world with high quality, nutritious, and great tasting seafood. Commercial fishing is still one of the most dangerous occupations in New Zealand with a high average injury and fatality rate. To improve overall health and safety, and more recently well-being, the New Zealand industry has implemented the following programmes and research.

- Psychosocial risk factors research and Litmus Well-being Research.
- FirstMate (The Seafood Sector Support Network Trust). FirstMate supports the health and well-being of people across the commercial seafood sector. FirstMate goal is to offer seafood people and businesses the guidance, direction and support they need to better navigate the pressures and complexities that come with the job.
- MarineSAFE.
- New Zealand Fishing Health and Safety Forum (The Forum).

Recent seafood industry well-being research conducted by Litmus verified significant key stressors putting pressure on our seafood industry. The research found that 42 percent of fishers were significantly less happy than one year ago, and that one in three wanted to exit the industry. Based on this, it was agreed that current initiatives needed to continue and further initiatives developed to support New Zealand seafood people. Psychosocial Risk Factors research conducted by Massey University highlighted that ongoing regulatory change and the compliance burden may be adversely influencing our seafood people's well-being.

Working at sea can be very challenging – mentally, physically, legally, and financially. As things continue to change, it's vital that people in the industry, and their families, have the support they need to adjust and thrive. FirstMate develops online well-being videos and resources covering the seafood sector and provides free well-being counseling services. We consist of sixteen regionally based well-being trained Navigators who comprise actual fishers, marine farmers, and fisher's partners/siblings. Fishers supporting fishers.

MarineSAFE is a maritime dedicated modern online Learning Management System (LMS) providing free health, safety, and well-being training to support seafood people in their mobile work life. MarineSAFE uses technology to develop real life action videos with assessments (video footage shot at sea on fishing vessels) to break down the barriers common in classroom-based learning and address any potential literacy issues identified in our industry. MarineSAFE's goal is to provide a consistent approach to safe work practices for seafood people which will lead to an improved safety culture across the industry. The MarineSAFE project was funded by the government agency Accident

Compensation Corporation in 2020 as part of the Workplace Injury Prevention Grants Programme. It is a collaboration between the New Zealand Federation of Commercial Fishermen, a non-profit organization who represent the interests of owner-operator commercial fishers who work within the inshore fishing sector, and Guard Safety). The MarineSAFE LMS currently has 778 users and is actively promoted and supported by the New Zealand Maritime Health and Safety Regulator, Maritime New Zealand (MNZ).

The New Zealand Fishing Health and Safety Forum (the Forum) was incorporated in 2021. The ten member companies represent up to 90 percent of the New Zealand commercial fishing industry and are the key seafood supply chain influencers. The Forum brings together operational and health and safety managers to discuss health and safety issues, share ideas and learnings from incidents/accidents, and work together on projects to improve the health and safety performance within the sector. The Forum also collaborates with New Zealand's two main regulators; Maritime New Zealand and the Ministry for Primary Industries, to actively work on initiatives. This is the first for industry and is fully funded by members who have put aside their commercial competitiveness to work together on health, safety, and well-being initiatives. The Forum was recently formally recognised as a leader in the country by the 2023 annual NZ Health and Safety Safeguard Awards. The Forum's focus for 2023–2024 is to develop standardized health and safety training and guidelines for the industry.

Session 7 C: Aquaculture seafood processing bioaerosol exposure: Work-related asthma interventions

Abstract session moderated by Berit Bang, Department of Occupational and Environmental Medicine, University Hospital of North Norway, Norway, with presentations from the following:

Berit Bang, Department of Occupational and Environmental Medicine, University Hospital of North Norway, Norway; Mohamed Jeebhay, University of Cape Town, South Africa; and Dorothy Ngajilo, Inga Elda, Marte Thomassen and Anje Hoeper

Workers in the seafood production chain are at risk of developing airways disease related to the inhalation of bioaerosols generated during the handling and processing of seafood. This session follows on previous sessions hosted at the IFISH 5 conference, providing an opportunity for state-of-the-art exchange in knowledge since the last conference. The focus of this session was on: 1) Sources of and exposure to bioaerosols and their constituent bioactive substances in aquaculture and seafood processing workplaces; 2) Adverse health outcomes related to allergy and airways disease; and 3) Development of intervention strategies addressing workplace challenges related to implementation of risk reduction measures.

Presentations of original research in this session focused on two different forms of aquaculture-based production and processing related to the seaweed- and salmon industry, located in two different global regions of East Africa and Northern Europe.

Occupational health risks and airways disease in Tanzanian seaweed harvesting and processing environments by Dorothy Ngajilo

This presentation provided valuable insights into the nature of seaweed harvesting and processing and the specific occupational hazards identified during focused worksite health hazard evaluations performed across the three regions of Zanzibar, the epicentre

of seaweed farming. These findings were superimposed on the geospatial patterns of common work-related symptoms reported among seaweed farmers across these regions. This was followed by a focused presentation of the epidemiological survey findings of over 600 workers, outlining the prevalence of work-related asthma symptoms and airways disease identified through lung function tests. By examining the occupational hazards and their health impacts, this session contributed to a deeper understanding of the unique occupational health challenges in this sector. The information obtained from this session will aid in the design of interventions to improve workplace health and safety and promote the well-being of workers engaged in seaweed farming and processing activities.

Allergic sensitization to salmon among occupationally exposed salmon processing workers by Inga Elda

Allergic sensitization to fish represents an important health challenge to workers engaged in fish handling or processing, with the potential to exclude affected workers from their work. This presentation elaborated on allergic sensitization to salmon among salmon processing workers recruited in the Norwegian Effects of interventions to prevent work-related asthma, allergy and other hypersensitivity reactions in Norwegian salmon industry workers (SHInE) cohort. The workers were tested using extracts of various salmon tissues produced in the study laboratory. Each skin prick test (SPT) extract was characterized with respect to the presence of four known fish allergens. The frequency of positive test results was presented together with specific allergen-specific immunoglobulin (IgE) results and related to airway symptoms. The results gave insight into inhalation allergy to salmon experienced by workers in the salmon industry. Detailed information of the sensitization profiles of affected workers combined with knowledge about allergen distribution in different parts of the production line allows for target-oriented interventions to reduce exposure to relevant allergens.

Bioaerosol exposure among Norwegian salmon processing workers by Marte Thomassen

Seafood processing workers are exposed to bioaerosols containing bioactive agents associated with adverse health outcomes. However, little is known about the levels that elicit adverse health effects and which exposure-reducing measures have greatest impact. This presentation reported on personal exposure to inhalable total proteins and endotoxin levels of workers in nine Norwegian salmon processing plants, focusing variations between plants, departments and work tasks. The results provided an opportunity for evaluation of exposure-reducing measures, development of job exposure matrices and studies of exposure-response relationships. This will contribute towards improving the work environment through the development of focused risk-reducing measures, thereby preventing the development of adverse respiratory health outcomes.

Implementing exposure-reducing measures in the Norwegian salmon industry by Anje Hoeper

Challenges and opportunities: Salmon processing workers have an increased risk of allergy and airway disease associated with bioaerosol exposure. However, data on intervention studies in the seafood industry are scarce. This presentation reported on experiences of the SHInE study, a workplace intervention study aimed at reducing bioaerosol exposure in the Norwegian salmon processing industry. Nine salmon

processing plants were allocated to one of three intervention categories that involved technical or behavioural measures related to reduction of bioaerosol exposure. Various stakeholders in these plants were intensively involved in planning detailed intervention content to assure implementation and adherence during the one-year study period. The experiences throughout the study were presented, contributing towards detailed insights useful for planning and implementing workplace interventions in a highly dynamic industry. These approaches will be valuable for researchers and occupational health and safety personnel that focus on introducing changes in work behaviour and production processes to reduce occupational risks in the seafood industry.

Session 8 A: The Safest Catch: Fishers helping fishers on how to design and implement a fishing vessel safety programme

Workshop session presented and moderated by Barbara Howe, Fish Safe BC, Canada with John Krgovich, Ralph Roberts, Barbara Howe, and Harold Wulff, Fish Safe BC, Canada

Fish Safe is the commercial fishing safety association in British Columbia, Canada. In 2009, Fish Safe launched a comprehensive safety programme for the fishing industry called the Safest Catch – as opposed to the Deadliest Catch, at that time a popular Discovery Channel series. Today more than 1 370 vessels and 3 670 fishers have participated in the Safest Catch program. The vessels range in size from 14 feet aluminum skiffs to large offshore vessels. Fisheries include salmon gillnet, troll and seine, trap (prawn, black cod, crab), longline (halibut), herring (food and bait), trawl for various species and dive fisheries for geoduck, urchins and sea cucumbers. The fishers are as diverse as the fleet, all Canadians with ethnicities that include Scandinavian, Croatian, Vietnamese, Japanese and First Nations (Indigenous). Fishers are old, young, both genders, generational, families, full time, part time, experienced or new crew greenhorns. The Safest Catch vision is “Fishers helping fishers come home safely” and, at the heart and soul of that vision, are the fishers trained as Safety Advisors. The Safest Catch is a voluntary programme. By invitation, an Advisor attends a vessel and works with the skipper and crew doing a safety orientation, emergency drills, a muster list, and writing emergency procedures. Fire drills use a smoke machine in different compartments, man overboard drills include a dummy to be rescued with vessel equipment or by hand, and abandon ship drills are scenario based. Vessels who complete the Safest Catch receive programme branded hoodies and hats. Other awards are damage control equipment buckets or emergency abandon ship kits – and a distinctive Safest Catch decal for the vessel. Most countries, by regulation, require that fishers have some level of marine emergency duty training depending on vessel size and area of operation. Although that training is important, it is generic and lacks context. In contrast, the Safest Catch is vessel specific. The emergency drill debriefing “what worked and what didn’t” can reveal problems particular to that vessel – that can then be remedied. Transport Canada recognizes the Safest Catch programme as meeting the curriculum requirements of their Small Domestic Vessel - Basic Safety (SDV-BS) mandatory training for fishing vessels less than 15 gross tonnes. Fish Safe is authorized to issue Transport Canada training certification to skippers and crew who complete the Safest Catch programme. An important part of a vessel visit is the Advisor getting to know the skipper and crew, sitting at the galley table with a coffee or on deck and sharing fishing stories. Advisors frequently become the skipper’s “go to” resource person for crew certification or regulatory requirements, or other safety information. The Advisors have positive working relationships with Transport Canada and WorkSafeBC, the two regulatory agencies that have jurisdiction over commercial fishing. Both agencies recognize and respect the Safest Catch programme decals on

vessels. The Safest Catch is not a one-time event – skippers frequently ask Advisors to do shorter pre-season or refresher visits. These visits are often an opportunity to do a safety orientation for new crew, emergency drills again and to talk about vessel safety in general. The Safest Catch programme is complemented with regular safety events at community docks before fishery openings. Events can include activities like PFD cartridge replacement stations, on the fishing grounds “show us your PFD” challenges, life ring toss or immersion suit competitions, and draws for safety equipment prizes. Transport Canada has funded Fish Safe twice to introduce the Safest Catch programme and train Advisors on the east coast. This IFISH 6 Safest Catch workshop invited participants to work with Safest Catch Advisors and share what they have learned about designing and implementing a safety programme for a diverse fishing industry. There was a workshop folio for participants with activities, discussion points and tips on how to develop a Safest Catch programme - there were also stories about what didn't work! Safest Catch tools and materials were part of the workshop.

Session 8 B: Ensuring economic stability and welfare of fishers and processors through insurance (Mexico Room)

Abstract session moderated by Cor Blonk, Secretary of Labour Affairs, Pelagic Freezer, Trawler Association and Chair, FISH Platform

Livelihood security in the marine fisheries sector: evaluating human life value and insurance gaps in the Bay of Bengal by Rajdeep Mukherjee, Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO), India

Bay of Bengal (BOB) houses over two million marine fishers who are integral to the regional economy, providing both sustenance and employment. Yet, they face heightened occupational risks and poor economic security apart from increased exposure to cyclonic events. A concerning data void exists on fishers' earnings and the gap between their Human Life Value (HLV) and insurance coverage. This gap not only signifies a social security deficit but also underscores the risk of pauperization of fisher families in case of an adverse event. Therefore, given the region's climate vulnerabilities and the inherent dangers of fishing, understanding the disparity between HLV and their insurance coverage is of utmost importance. We conducted this study with the aim of establishing HLV of BoB fishers, particularly in India. The approach considers revenue distribution, pricing, catch consistency, active years, and risks for the calculation of HLV. It also equates book value against the replacement value for tangible assets, emphasizing safety equipment and vessel integrity. Preliminary findings project an Indian fisher's HLV at around USD 65 250, in stark contrast to the meagre insurance coverage of USD 6 050. In addition, despite a fully subsidized Group Accident Insurance Scheme being in vogue, the subscription by fishers is not universal. For assets, the replacement value of 1 558 fishing boats in Chennai is USD 128 million, while insurance coverage is about 10 percent only. In conclusion, the BoB's marine fisheries sector, particularly in India, is economically vital but at high risk. A stark HLV and insurance disparity exists, which concerns the safety of fishers. While the sector is profitable, fishers confront significant hazards. Comprehensive insurance schemes emphasizing safety and compensation for lost fishing opportunities are imperative. The presentation discussed the causes of gaps in insurance coverage among marine fishers in the region and possible ways of addressing them.

Expansion of offshore wind energy in the United States: safety and insurance cost implications for fisheries by Akbar Marvasti, National Oceanic and Atmospheric Administration, United States of America

Growing concerns about climate change and depletion of fossil fuel have encouraged pursuit of clean energy sources in the United States of America, including the current rapid expansion of offshore wind energy (OWE). However, OWE requires sharing ocean space with other uses such as commercial and recreational fisheries. As a result, the risk of accidents in operating fishing vessels is expected to increase due to increased vessel traffic, navigating longer routes to avoid wind turbines, gear entanglements, debris during the OWE development stage, and impairing effects of OWE noise on fishers' cognitive ability. Proper compensation needs to be made to overcome this spatial conflict. However, assessing the magnitude of the losses to fisheries require information, which can be obtained from experiences of European countries with OWE. This presentation focused on estimating the effects of coexistence of OWE and fishing activities on insurability and insurance premiums paid by the fishers. For this purpose, using a panel data from the United Kingdom of Great Britain and Northern Ireland, this research work employed the difference-in-difference statistical approach to estimate the effect of OWE on insurance premiums paid by fishers.

Governance of fisher safety and welfare interventions in Kerala, South India by Mini Sekbaran, Cochin University of Science and Technology, India

The fishing industry in India contributes to the Gross Value Added (GVA) of the national economy to the tune of Rs 212 915 crores (approximately USD 28.3 billion) constituting 1.24 percent of the total national GVA (GOI, 2021).⁶ The maritime state Kerala contributes significantly to the marine fisheries sector in India in terms of production, assets and skilled manpower. The fishing fleets operating in the fishery in Kerala consists of 3 800 mechanized, 13 868 motorized and 4 016 non-motorized fishing crafts (CMFRI-FSI-DOF 2020).⁷ Fishing is by far the most hazardous occupation as fishers are prone to accidents, injuries and fatalities and therefore welfare interventions by the governance bodies are essential for fisher health. The fisheries department of the state carries out governance of the sector through its agencies, one of which is the Kerala Fishermen Welfare Fund Board (KFWFB). It works under Fund Act, 1985 providing for the constitution of welfare of Fishers in the State. The board organizes interventions for safety of fishers in sea, the health and welfare of fishers and the insurance of active fishers in the state. Active fisher in the State are insured by the Kerala Fishermen Welfare Fund Board (KFWFB) of state fisheries, Kerala state in India. The Group Insurance Scheme of KFWFB is implemented at a premium for fishermen against accidental death, heart attack (while fishing at sea), missing, permanent and partial disability. A compensation is granted for death/missing/total disability and partial disability. The beneficiary contributes an amount and the Central Government and State Government contribute an equal share, and an amount is given to the beneficiary during the lean months. Fishermen Information Management System (FIMS) is a Web enabled workflow- based system for monitoring fishers' welfare schemes and transfer the contribution/benefit to the fishers. The study analyzed the existing regulatory frameworks, welfare interventions carried out by the fisheries governance bodies in Kerala towards protecting, health and safety of fishers at sea.

⁶ Government of India (GOI), 2021.

⁷ Central Marine Fisheries Research Institute (CMFRI) -Fishery Survey of India (FSI) – Department of Fisheries, (DoF), 2020. Marine Fisheries Census 2016 - India. ICAR-Central Marine Fisheries Research Institute, Indian Council of Agricultural Research, Ministry of Agriculture and Farmers Welfare; Fishery Survey of India and Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, Government of India.

The state of fisheries insurance in the world: options for increasing access of small-scale fishers to insurance services by Raymon van Anrooy, Senior Fisheries Officer, FAO, Italy

The Food and Agriculture Organisation of the United Nations (FAO) estimates that some 450 000 fishing vessels worldwide are covered by marine hull insurance. Nearly all of the estimated 67 800 large-scale industrial fishing vessels are covered by marine hull insurance, as well as 50–60 percent of the estimated 430 000 semi-industrial fishing vessels. However, over 95 percent of the approximately 2.3 million motorized small-scale fishing vessels operate uninsured. Most small-scale fishers do not have access to adequate insurance services. Between 2009 and 2019 underwriting experiences in fishing vessel insurance were generally reported as “Good”. What is more, access to accident, life and health insurance services for crew on fishing vessels and small-scale fishers in developing countries has improved in recent years (Van Anrooy *et al.*, 2022).⁸ This presentation shared the findings from the FAO *World review of capture fisheries and aquaculture insurance 2022*, as well as highlighted recent developments in the fishing industry and options for increasing access of small-scale fishers to insurance services. The role of insurance services in the Blue Transformation of the fishing industry were discussed, and how various barriers to development of successful fisheries insurance services could be lifted.

Session 8 C: Data collection, analysis and trends in accident and fatality reporting in fishing

Abstract session moderated K.C. Elliott, NIOSH, with presentations from the following:

Towards the establishment of a global database on accident and fatalities in fishing by Miguel Nunez, Maritime Regulatory Affairs and International Cooperation, Spain

Fishing is considered one of the most dangerous occupations in the world with a large occurrence of adverse outcomes (e.g. incidents, accidents, and casualties) intimately linked to safety. Statistics on fishing safety (including occupational safety) and health, face several major challenges, in particular relating to data availability, quality, timeliness, coverage and comparability. In addition to this, collecting data on occupational or safety accidents in the fishery sector has never received sufficient attention. At an academic level, there are limited initiatives to deal with this issue, although some research has been carried out. There are other initiatives like voluntary reporting using the web whose results are not known yet. At regional level, intergovernmental organizations such as the European Union (EU) have developed initiatives to combine information on accidents and fatalities in one database. This presentation reviewed existing initiatives (e.g. NIOSH, European Marine Casualty Information Platform [EMCIP]), explored collaboration among FAO, IMO and ILO and other agencies in establishing a global database, reviewed database components and discussed ways forward.

⁸ Van Anrooy, R., Espinoza Córdova, F., Japp, D., Valderrama, D., Gopal Karmakar, K., Lengyel, P., Parappurathu, S., et al. 2022. *World review of capture fisheries and aquaculture insurance 2022*. FAO Fisheries and Aquaculture Technical Paper No. 682. Rome, FAO. <https://doi.org/10.4060/cb9491en>

CHIRP (The Confidential Human Factors Incident Reporting Programme) by Adam Parnell, CHIRP Maritime, United Kingdom of Great Britain and Ireland

There is a paradox within the world of safety: while many organizations say that they want to learn from the experiences of others, and that they actively seek to identify and adopt ‘best practice’ from other parts of the industry, they are often unwilling to share their data with others for fear of adverse reputational or commercial reaction from others, particularly competitors and customers. As a result, incidents that could be averted through the timely sharing of knowledge across organizational boundaries are repeated elsewhere, and the number of potentially avoidable deaths, injuries and equipment damage remains stubbornly high. In this presentation, *CHIRP* challenged the barriers to cross-organizational reporting and proposed that a ‘safe space’ into which all organizations can report to, and draw on, their own and others’ experiences to improve safety across the sector.

Predicting commercial fishing vessel disasters through a novel application of the theory of man-made disasters by Samantha Case, National Institute for Occupational Safety and Health, United States of America

Introduction: Vessel disasters (e.g. sinkings, capsizings) are a leading contributor to fatalities in the US commercial fishing industry. Primary prevention strategies are needed to reduce the occurrence of vessel disasters, which can only be done by developing an understanding of their causes and risk factors. If less serious vessel casualties (e.g. loss of propulsion, fire, flooding) are predictors of future disasters, then reducing vessel casualties should in turn reduce vessel disasters and the accompanying loss of life.

Methods: A case-control study design was employed. Cases were defined as commercial fishing vessels that were involved in vessel disasters in Alaskan waters during 2010–2015, identified from the National Institute for Occupational Safety and Health (NIOSH) Commercial Fishing Incident Database (CFID). These were compared with controls, defined as commercial fishing vessels active in Alaska during the same time period but not involved in disasters. Vessel casualty history was the primary risk factor of interest. Other vessel characteristics were also examined: age, length, hull material, safety decal, and documentation. Logistic regression was used to calculate odds ratios (OR) and 95 percent confidence intervals (CI) to measure the association between the exposure variables and the outcome (disaster).

Results: Seventy cases and 210 controls were included. Twenty-five percent of cases had a history of reported vessel casualties, compared to only 9 percent of control vessels. The multivariable analysis revealed that vessel casualty history was a significant predictor of a vessel disaster (OR=2.98; 95 percent CI=1.29–6.89). Other significant predictors included having an expired safety decal (OR=2.41; 95 percent CI=1.09–5.30) and steel hull (OR=3.29; 95 percent CI=1.12–9.68).

Conclusions: The results of this analysis emphasized the importance of implementing vessel-specific preventive maintenance plans. At an industry level, specific prevention policies should be developed focusing on high-risk fleets to identify and correct a wide range of safety deficits before they have catastrophic and fatal consequences.

Session 9 A: Improving global fishing safety: FISH Platform's work to create a level playing field for international fishing vessel conventions

Panel session moderated by Robert Greenwood, FISH Platform, United Kingdom of Great Britain and Ireland; with contributions from Cor Blonk, FISH Platform; Nigel Blazeby, Maritime Consultants; Tina Barnes, The Seafarers Charity

In this session the Fish Platform described its work in creating a level playing field following the international conventions that apply to fishing vessels. This work is built around the principle of representative power, to ensure that fishers are involved in the development and implementation of international conventions. This session showcased the Fish Platform solutions to make a shift towards an improved safety culture.

Session segments included:

The Fish Platform: This 15-minute slot introduced the work of the FISH Platform, the world's largest group of fishing health and safety experts. Through the Fish Platform, we engage with and support like-minded people worldwide to share best practices and collectively find solutions to the biggest problems that have international and national impacts. By working together, we have already successfully influenced international policy and regulation. The Fish Platform with the co-operation of the Nautical Institute, has created the first-ever group of fishers to be represented at the International Maritime Organization. This was achieved by changing the membership rules of the Nautical Institute to include fishers. This move has many purposes, but the most important is professional recognition for fishers equal to their counterparts in military and merchant navies and a collective voice at an international level. The FISH Platform also extended to Asia, with a conference on fishers' health and safety. The event gathered much attention and led to the forming an Asian branch of the FISH Platform.

The Fishing Safety Management (FSM) Code: The FISH Platform has published the Fishing Safety Management Code, a document that gives guidance to fishing vessel owners and governments on how safety management should be organized. The FSM code was promoted by the IMO Maritime Safety Committee in 2023 and is included as guidance on the IMO Cape Town Agreement webpage. As a real-world example, Nigel Blazeby will discuss the work that he has been doing in the South Atlantic with the FSM Code and supporting vessels to gain compliance to C188 and the Cape Town Agreement. Alongside the FSM Code, the Nautical Institute developed an FSM Code Lead Auditor course, which has now trained over 30 auditors internationally. This is an important step towards great transparency and finally creating a visible difference between good fishing vessel operators and the bad actors.

The SafetyFolder: The SafetyFolder is the longest-running free safety management tool designed for fishing vessels. It has been in use since 2012 and has over 3 000 fishing vessels using the service internationally. In 2024, we intend to expand the service to more countries and with more features. The SafetyFolder includes innovative and easy-to-use tools to support ILO C188 compliance, as well as improved supply chain transparency on compliance with most Modern Slavery Acts.

Fishing Without a Safety Net: This study was commissioned by Seafarers United Kingdom of Great Britain and Northern Ireland in 2019 and took place prior to the COVID-19 pandemic. The intent was to explore the real financial difficulties inherent in earning a living from fishing. It aimed to identify and develop evidence-based

interventions that could support the financial health and resilience of fishers and their families. The research is based on the real financial problems experienced by 431 fishers and their families, as identified in the anonymized client and beneficiary data records of three maritime welfare charities: - SAIL (Seafarers' Advice and Information Line), the Shipwrecked Mariners' Society and Seafarers' Hospital Society. This analysis was augmented by interviews with fishers and representatives from maritime welfare charities and the fishing industry. With the FISH Platform this work is being promoted as an important element in the health and safety of fishers, which is often overlooked.

The Seafarers Charity and FISH Platform wish to share the solutions for these challenges with IFISH 6 participants.

Session 9 B: Efforts to improve the safety, health, and welfare through fisheries resiliency and sustainability initiatives

Abstract session moderated by Samantha Case, NIOSH, with presentations from the following:

Public management in maritime-fishery safety and social protection of the State of Chile by Sebastian Herra-Kasic, Dirección de Intereses Marítimos y Medio Ambiente Acuático (de DIRECTEMAR - Autoridad Marítima de Chile) y Organización de las Naciones Unidas para la Alimentación y Agricultura (FAO), Chile

The presentation analyzed occupational safety and health, social protection and decent employment in the maritime and fishing sectors of Chile. The aim was to propose improvements in public interventions and administrative systems that can enhance occupational safety and health standards in the maritime and fishing industry as well as the sustainable management of aquatic resources. The overall objective was to generate a paradigm shift and achieve efficient and effective governmental actions on these matters. The focus was on Chile, but proposed actions can be replicated in other Latin American countries.

Fishers' indigenous knowledge and practices to address occupational safety and small-scale fishing in the Bay of Bengal, Bangladesh by Md. Mahmudul Hasan, Patuakhali Science and Technology University, Bangladesh

Fishing is one of the world's oldest and most perilous professions. It poses significant occupational hazards for small-scale, sea-going fishers in Bangladesh. The present study was undertaken to assess the fisher's socio-economic status, occupational hazards, and indigenous knowledge to address occupational safety and fishing information in Patuakhali, Barguna and Bhola coastal districts of Bangladesh. A semi-structured questionnaire was used to collect data from 300 randomly selected fishers. The findings highlighted that majority of fishers (35 percent) were aged 31–40, over two decades of fishing experience (33 percent), and a concerning illiterate (59 percent) status. Available safety items were use of life jackets (16 percent) and radio (91 percent) for weather updates. The study revealed the indigenous knowledge of the fishers to predict weather conditions by observing cloud colors (100 percent), warm winds (88 percent), bubbling water (53 percent), and halos around the sun (14 percent) as indications of impending cyclones and storms. Cyclones, vessels collision and other means caused fishers overboard, who (84 percent) rely on poor flotation techniques like fishing gear floats, empty oil/water drums, and bamboo rafts to stay afloat and await assistance from strangers. For fishing operations, fishers observed water color (98 percent) and the presence of cormorants, gulls, and dolphins (96 percent) as an indication of fish

abundance. Conversely, bad odors (75 percent) and dark green water (23 percent) were considered signs of less availability of fish. Indigenous navigational knowledge referred by lunar phases (83 percent), star constellations (100 percent), white cloud formation (86 percent) and wave patterns (46 percent). The study revealed an alarming safety situation where 96 percent of fishers has experienced major or minor injuries specifically for natural disasters (46 percent), onboard working condition (35 percent) and pirate/robber attacks (19 percent). The study recommended that government safety inputs supplies, training to improve indigenous safety culture, thus to save the lives and livelihood improvement of the small-scale fishers of Bangladesh is emergent.

Revisiting fisheries management issues with SSF Guidelines: Implementing FAO voluntary guidelines for securing sustainable small-scale fisheries (SSF Guidelines) in Sri Lanka by Kaumi Piyasiri, Forum for Small Scale Fisheries, Sri Lanka

In Sri Lanka, as well as globally, the small-scale fisheries subsector is threatened by high rates of resource exploitation, unregulated technological change, increasing fishing pressure, use of environmentally unfriendly fishing practices, etc., leading to resource degradation, human ill-being and poverty. This has made sustainable management of fisheries resources an urgent need of paramount importance. The national consultations carried out in 12 out of 15 coastal districts, under the implementation of SSF Guidelines project during the 2018–2019 period, have made an effort to identify the issues related to sustainable management of small-scale fisheries resources and how they could be effectively addressed by implementing SSF Guidelines in Sri Lanka. The results revealed that the resource management issues are more location specific. However, illegal and destructive fishing practices, including trawling, have ranked top of all issues in almost all areas showing the pervasiveness of these practices. Moreover, increasing fishing pressure and high post-harvest losses were also highlighted as major resource management concerns. Under Sustainable resource management (section 5b), articles 5.13–5.20 call on states and other actors to adopt measures for long term conservation and sustainable use of fisheries resources, while ensuring effective monitoring to eliminate all forms of destructive fishing practices. They further emphasize that the states should encourage small-scale fishing communities to participate and take responsibility in the resource management systems. While the focus and coverage on sustainable resource management in the SSF Guidelines is inimitable, it could be asserted that the effective implementation of SSF Guidelines would be a critical step towards finding solutions for resource management issues and safety in Sri Lankan small-scale fisheries.

Occupational health status and constraints in fish marketing: A case study of women retailers in Goa, India by Bharat Yadav, Dr B. S. Konkan Agricultural University, Ratnagiri, Maharashtra, India

Goa, one of the smallest states in India, is located along the central west coast with coastline of 104 km. The state contributes about 1.85 percent of the total marine production of 61 219 tonnes. The present study was conducted at seven fish markets of the states, to access the socio-economic status, anthropometric measurement, morbidity status, hygiene facilities and constraints. Information was collected from 74 retailers comprising 71 female and 3 male retailers. The fish markets under study were namely Vasco fish market, Baina market, Mundvel fish market, Vaddem fish market, Dabolim fish market and Birla fish market. The result showed that the per capita income of the families of women retailers was ₹ 43 027.37 for an average family size of four members. The per capita income of women retailers was less than the per capita income at the state level. The maximum expenditure of retailers was on grocery

and savings was up to 13 percent of their total earnings. The majority of retailers used the loan for non-productive purpose. The annual turnover was 1 463 kg in terms of volume (₹ 288 374/-). The income inequality measurement with Lorenz curve resulted Gini coefficient of 0.4095, indicating a noticeable level of inequality. The study on occupational status indicated that 46 percent of the women retailers had a higher BMI and 39 percent were overweight. Twenty one percent of the retailers suffered from back pain followed by joint problems and blood pressure, obesity, stomach gas problems, headache and diabetes. Major constraints faced by retailers were spoilage during storage, high transportation cost, no proper facility for disposal of waste, no proper sanitary facility and unclean surrounding areas. Appropriate policy support and interventions are needed for economic upliftment and protect labour rights and promote safe and secure working environments of all the fish retailers, predominantly women, to achieve Sustainable Development Goals.

Session 9 C: Navigating regulatory and organizational uncertainties to address health and safety

Abstract session moderated by Ingunn Marie Holmen, SINTEF Ocean, Norway, with presentations from the following:

What can we learn from the Maine near-miss survey of commercial fishers and aquaculturists? by Ann S. Backus, Harvard Chan Education and Research Center, United States of America

The Maine Commercial Fishing Safety Advisory Council (CFSC), a state-legislated Council under the auspices of the Maine (US) Department of Marine Resources, developed and disseminated a survey to collect data on commercial fishing near-misses in the state of Maine. This survey falls under the rubric of citizen science, as it was developed by fishers for fishers and sent via the Maine Department of Marine Resources to commercial fishers and aquaculturists licensed in the state of Maine. The questions covered near-misses related to injury and property loss, incidence avoidance, presumed causes, and types of injuries sustained or avoided. The survey queried what types of training respondents had had and what training would be helpful in the future. Ann Backus, secretary of the CFSC, discussed the data and reported on the discussions that Janine Drouin, CFSC chairperson, led with Council members. Results include that 46 percent of the respondents reported having been involved in a near-miss incident and 28 percent reported having sustained a work-related injury. Forty-three percent of the reported injuries were to hands. Rope was reported as being the cause of 37 percent of the near-misses. Backus also discussed how teaming up with occupational medicine physicians, Vasileia Varvarigou, MD, and Saad Salman, MD, MPH, for a deeper statistical dive into the survey data provided additional insights into the near-miss incidents and produced recommendations for a more comprehensive survey that could be used by other researchers. The session included a discussion of the role of citizen science in fishing research.

Occupational health and safety (OHS) in United States aquaculture by Dave Love, Johns Hopkins Center for a Livable Future, United States of America

While attending IFISH 5, we saw knowledge gaps related to occupational health and safety (OHS) and aquaculture in the United States (US), which provided the stimulus for our work. This presentation described findings from a non-systematic review of OHS in the United States aquaculture sector. The objectives of our research and this presentation were to: i) describe the United States aquaculture sector; ii) summarize

statistics, peer-reviewed studies and reports focused on United States aquaculture OHS; and iii) describe the policy landscape specific to United States aquaculture OHS. Through the literature, we identified numerous physical, chemical, and biological OHS risks depending on production methods and settings. We also presented data on US violations observed by OSHA and injuries and fatalities reported to OSHA from 2009–2019. Continued OHS research is needed to inform policies related to the expansion of the aquaculture sector, particularly the move towards offshore aquaculture in US federal waters, which could bring new risks for workers.

Health, Safety and Environment (HSE) for contractors in Norwegian aquaculture by Trond Kongsvik, Norwegian University of Science and Technology, Norway

Fish farming companies in the Norwegian aquaculture industry rely heavily on services from contractors in relation to maritime transport of fish, fish related products (e.g. fodder), maintenance etc. There is little research on how health and safety management work across the organizational interfaces in the industry, and the general HSE situation for contractors. The regulatory framework might also be inadequate and not well adapted to how the industry is organized. Based on a major questionnaire survey (n=1283) involving personnel from companies and contractors, the HSE situation for contractors was addressed, as well as differences in hazards and accident exposure between the different actors. Measures for improving health and safety for contractors in the industry were discussed.

Occupational health and safety survey in Norwegian fish farming by Trine Thorvaldsen, SINTEF Ocean, Norway

Norway is a leading producer and exporter of Atlantic salmon (*Salmo salar*). Open, sea-based net cages near the coast and in fjords has been a key technology since the beginning of the industry in the 1970s. The Norwegian coastal zone is long and sheltered, and has suitable sea temperature for the salmon, which is an important advantage for Norwegian aquaculture. Production in these areas is curbed, however, by the lack of access to new production licenses and suitable sites, as well as environmental regulations. In recent years, new production systems for land based, closed and offshore locations have been emerging. A safe working environment for all employees is important for a sustainable aquaculture industry, and ambitions for growth and new production systems require companies, suppliers and regulators to prioritize occupational health and safety measures. Suitable measures must be based on knowledge about challenges that stand out in different production forms. This is the goal of the project “OHS in aquaculture – risk management in different production forms”, where interviews, workshops, accident analysis as well as a survey were conducted. This presentation shared findings from the “OHS-survey in aquaculture 2023”, where 1283 respondents have participated. Participants include fish farm workers, vessel crews and operative workers in the supplier industry. The survey was conducted digitally during the period May to August 2023. The survey design was based on a previous survey from 2016, and finalized after inputs from representatives from the industry, trade organizations and regulators. Findings show that most participants enjoy their work (88 percent), but many worry (62 percent) that their work may affect their health negatively. Furthermore, 62 percent of participants have experienced near misses in the last two years, and 17 percent have had work-related sick leave in the last year.

Session 10 A: Catching the Potential (CTP) – workshop about setting the standard for sustainable fisheries training (Red Room)

Workshop session presented and moderated by Tim Haasnoot, Director ProSea Marine Education, and Roos Swart, project manager and trainer ProSea Marine Education

The ProSea foundation conducted a session about the importance of training fishers to achieve the Sustainable Development Goals (SDG's). They presented the EU-project 'Catching the Potential' (<https://catchingthepotential.eu/>), presented the developed European standard on sustainable fisheries training, and discussed the importance of training fishers on safety, environment, economic and social aspects of fishing. We shared some experiences and best practices regarding the training of fishers and play several interactive games and quizzes that are used in the training.

The need for training of fishers

Being a fisher today is different than 10 or 20 years ago. The job has changed due to an increased focus on safety and health of fishers, more regulations, farmed fish products on the market, and a higher demand for responsible and sustainable fish products. In addition, our seas are used for more than fishing alone, so fishing grounds are under pressure. To continue to successfully operate in a changing society and the changing fishing sector, competences of those working in the sector need to evolve and grow.

For the fishing industry to develop sustainably, fishers need additional skills, knowledge and information. Sustainability education addresses marine ecology and the role of fishing in the marine ecosystem. It provides knowledge and understanding of current issues, such as fish stock assessment and management, marine litter, climate change, certification schemes, cooperation within the fish supply chain, social sustainability topics such as fair wages and a safe working environment and enhances communication skills.

Catching the Potential project

The Catching the Potential (CTP) project recognizes the importance of sustainable development of the fishing industry and the importance of training fishers to achieve this. Results of the CTP project include the organization of pilot trainings in seven EU countries (Latvia, Greece, Germany, France, Azores, Spain and Ireland), the establishment of a network of fisheries educators, the development of a European standard for sustainable fisheries training and the inclusion of sustainable fisheries training in the international training standard for fishers from the IMO (STCW-F).

This session

The session was a mix of sharing results of the project, discussing the approach to sustainable fisheries training and engaging the audience in (parts) of the training content, including playing a fishing game and a communication exercise, and addressing implementation issues in EU countries.

Session 10 B: The Danish story 2.0 – promoting social sustainability: Health and safety, education, social contract with collective financing in the Danish fishery

Panel session presented and moderated by Kenn Skau Fisher, Karsten Kristensen and Flemming Nygaard Christensen, Denmark

The presenters covered the following topics:

Introduction to the Danish Fishery including its fleet structure, fishery – types, areas, and turnover: The Danish fishery is among the largest in Europe, engaging in demersal, pelagic and industrial (for reduction into meal and oil) fishing. Vessels cover the range from coastal boats to large pelagic boats. The last 20 years have seen a concentration brought about primarily by the introduction of individual transferable quota (ITQ) management systems. New, better and safer boats have been built and older ones modernized.

Safety requirements for entry into the fishery: Anyone who wishes to enter fisheries has to complete a 3 week safety course (irrespective of whether he is 16 or 46).

Fishery education: The apprentice scheme: A two-year education leading to “The Blue Diploma” including its background, development, and collective financing through a national fishery levy. Put together in 1995 by the social partners (Danish Fishermen’s PO (DFPO) and the General Workers Union (3F)), the Blue Diploma education has educated hundreds of young fishers through practical training onboard fishing vessels alternating with periods at the Fishery School. The DFPO is a formal employer for all the apprentices (currently 80) and organizes the practical training period on the Danish fishing vessels. Because of the element of collective financing, the apprentices receive a good pay plus bonus at the same time as it is relatively cheap to have an apprentice on board.

Vocational and compulsory training for adults: Various courses also organized by the social partners.

Fisheries Health and Occupational Board (HOB): The HOB was established by the social partners in 1995. Its administrative board has members from DFPO and 3F. The HOB works in three main areas:

- General work in prevention of accidents and improvement of conditions for fishing vessels (noise, stability etc.).
- Leaflets, videos, courses. Free consultation work for individual vessels in connection with official inspections, modernization project and new building.
- Accident “follow-up” through a network of regional accident committees examining accidents in order to improve future advice.

The work of the HOB has resulted in the fishing industry going from one of the most dangerous occupations to one of the safest.

The work around ILO Convention 188 nationally and at EU level and The Social Contract between DFPO and 3F: We have had a social contract since the beginning of the 1970s. This contract regulates the pay principles (not the pay), working conditions, pension scheme etc. The contract is renewed every two or three years, normally without substantial disagreement.

The presenters individually or jointly covered the above topics and bound them together.

Session 10 C: Improving safety in commercial fishing: A discussion of risk-influencing factors and contributing causes to hazardous events, measures for prevention and mitigation of occupational accidents, and how to improve safety management in the coastal fishing fleet

Workshop session presented and moderated by Ingunn Mare Holmen and Cecilie Salomonsen, SINTEF Ocean, Norway

The fishing profession has long traditions in Norway. The fishers' efforts are essential in the wild catch seafood value chains, which contribute to significant ripple effects and export values for Norway. In 2022, 9 525 fishers were registered as full-time fishers, and 1 222 people had fishing as a secondary occupation. The Norwegian fishing fleet consists of approximately 4 800 vessels, with the vast majority (4 500 vessels) being less than 11 m in length. Norwegian fishers are exposed to several hazards in their work, both when it comes to occupational accidents and strain injuries. Analyses of previous accidents show that the most frequent fatal accidents have been vessel disasters, drowning after falling overboard and drowning in port. Many of these fatalities were fishers working alone on board smaller coastal fishing vessels. In 2022, a historical vision for zero serious occupational injuries at sea was passed by the Norwegian government. Prevention of accidents is crucial, and measures must be implemented to ensure healthy and safe working environments for all fishers. An analysis of accidents registered by the Norwegian Maritime Authority has shown that fishers often highlight undesired incidents or bad luck as the cause of accidents. Slips and lapses are categories that stand out in statistics on personal injuries in the fishing fleet today. However, the indirect or underlying causes of accidents may be complex and concern vessel stability, vessel movement, or organizational factors, such as inadequate training, long working hours, little sleep and high workload that affect fishers' performance. This may in turn be linked to regulations and other framework conditions that are important to consider. Goal of workshop: The purpose of the workshop was to discuss risk-influencing factors and contributing causes to hazardous events, measures for prevention and mitigation of occupational accidents, and how to improve safety management in the coastal fishing fleet. IFISH allows us to exchange knowledge across nations and regions and discuss measures that can improve occupational health and safety. We encouraged everyone to join the workshop and take part in the discussion. The workshop was a guided session led by Research Manager Ingunn Marie Holmen and Research Scientist Cecilie Salomonsen from the independent research institute SINTEF Ocean in Norway. The workshop was a part of the project "Serious occupational accidents in coastal fishing", where accident analyses, interviews and workshops are conducted with the aim to develop measures for improved OHS in fishing. The project is financed by the Norwegian Seafood Research Fund (project number 901828).

5.3 KEYNOTE SPEECH AND CLOSING REMARK

Lissandra Souto Cavalli, Memorial University, Canada, gave a keynote speech on "One health, one aquaculture – aquaculture under the one health umbrella". The One Health concept to aquaculture recognizes the interconnection between animal, human, and environmental health, as well as the political, economic, and social considerations that influence health. Lissandra Souto Cavalli advocated for the integration of the One Health concept into aquaculture practices to effectively prevent and control health and safety hazards for workers in the industry.

Raymon VanAnrooy, Senior Fishery Officer/Team Leader, FAO, closed the Conference. He thanked the participants for the lively presentations and officially closed the Conference.

6. Post-conference workshops

Post-Conference Workshop: The Path Forward for Fishing Safety and Health (Red Room)

After the conference, an evaluation was circulated to attendees to gather feedback on several questions that would be presented to the COFI. These questions included: 1) What emerging health and safety issues are you seeing in fisheries, seafood processing and aquaculture?; 2) What is currently working (or not working) in fisheries, seafood processing, and aquaculture safety and health?; and 3) In order to make the greatest impact on fisheries, seafood processing, and aquaculture safety and health, where should we focus our attention moving forward? Although further analysis of feedback is ongoing and will be included in the final COFI paper, initial review indicates, climate change, vessel standards, food safety, worker safety and health (in particular mental health, substance abuse, diet, aging workforce, etc.), conflicts relating to fisheries management and access to coastal resources. Responses to remaining questions revealed concerns about the ability of regulation to really create improvements, a lack of initiatives that are comprehensive and which consider the social determinants of health and the lack of resources to make improvements for these worker populations.

Post-Conference Workshop: IFISH Innovations Exchanges Workshop (Red Room)

A primary aim of the IFISH conference has always been to bring stakeholders together to achieve the long-term goal of a healthier, safer seafood industry. IFISH conferences are designed to offer opportunities for trans-disciplinary discussions and problem-solving that have often led to effective partnerships post-conference. In an effort to increase scientific collaboration and knowledge exchange in between conferences, the planning committee organized a workshop to get feedback on an initiative entitled “International IFISH Innovation Exchanges”.

The Innovation Exchange concept was created as a catalyst for encouraging knowledge exchange, transdisciplinary problem-solving, data publication, skills development and the dissemination of evidence-based health and safety solutions to different worker populations or geographic locations. To do this, the Innovation Exchange will be geared towards identifying opportunities for increasing partnerships between stakeholders in developing and developed countries to ensure that solutions are equitably disseminated to seafood workers in a variety of coastal communities. Another primary objective of the exchange is to identify high priority, important occupational safety and health issues to discuss, as well as innovative research methods, interventions and implementation solutions that could lead to improvements in worker safety and well-being. This type of collaboration on the international stage has occurred informally in the past. However, the Exchange mechanism seeks to further support and increase interactions between disciplines and regions in ways that catalyze the development and adoption of scalable solutions in the years ahead.

In discussing the concept with IFISH 6 attendees, there was widespread interest and support for the concept. However, the question of how to bring the Innovation Exchange concept from idea to execution is the primary challenge. During the Innovation Exchange workshop, participants were asked to consider and discuss four

key components that would be important to address in order to make the concept a reality. These were: a) how to pay for administration, programme promotion and associated participation costs; b) how to outline the basic the components of the programme and how it should function; c) should there be an application process for participating and if yes, what should this look like; and d) should the Exchange be governed by and advisory body and if so, who should be involved and how should it function. Ideas and suggestions were compiled and will be used to develop a path for implementing the Concept.

End of post-Conference day.

7. Poster session abstracts

The following posters abstracts are reproduced as submitted.

The challenge of whale-related regulations and windfarms for fishers in the North Atlantic by Ann S. Backus, Harvard Chan Education and Research Center, United States of America

How can fishers in the North Atlantic get their heads and hands around the various “emerging” challenges on the horizon? In addition to the long-standing challenges of a high-risk profession, which we are still grappling with – vessel fires, man overboard, sinkings, weather, etc. – the industry in the North Atlantic is facing pressures from stakeholders and situations that have made or may make fishing even riskier and perhaps less sustainable. Landings in Maine from 2018–2021 decreased 25 percent while the value of the catch increased 40 percent. The fisheries (non-aquaculture) experiencing a decrease in landings range from alewife and Atlantic herring to lobster and urchins. However, oyster landings showed a strong upward trend, while soft clam landings showed a modest increase. While trying to respond to the stress of decreases in the resource, fishers, and especially gear fishers such as lobstermen and gillnetters were required to make gear changes in order to protect the right whales. These gear changes had economic and safety implications. We will discuss the chronology and characteristics of the National Marine Fisheries Service (NMFS) Atlantic Large Whale Take Reduction Program (ALWTRP) from 2014 to the June 16 2023 ruling of US Court of Appeals for the DC Circuit in favour of the lobstermen. The lawsuit brought by the Maine Lobstermen’s Association argued that the ALWTRP regulations would destroy the lobster fishery, and the Court of Appeals stipulated that NMFS must not resort to “worst-case scenarios” when developing whale-take reduction regulations. Another stressor for the North Atlantic fisheries is the proposed windfarms. We sketched out the salient aspects of the USCG Navigation and Vessel Inspection Circular No. 01–19 that seeks to minimize disruption and ensure safe transit of marine traffic including commercial fishing in windfarm locations. We invited discussion of the “lived experience” of fishers and regulators.

Salmon aquaculture mass mortality events and occupational health and safety: a multinational risk analysis by Lissandra Souto Cavalli, Memorial University of Newfoundland, Canada

Introduction: Mass mortality events (MMEs) threaten the health of fish and are also a potential threat to the health and safety of aquaculture (AOHS) workers. MMEs involve the sudden death of thousands to millions of fish and are a type of major accident requiring rapid mobilization of workers, vessels and other supports and working under pressure to a) investigate the extent and cause of the die-off; b) remove, transport, and dispose of dead finfish; and c) adjust farm design and practices to reduce future risk. MMEs have the potential to cause injury or fatalities to aquaculture personnel.

Methods: An international AOHS research team performed a desktop exercise using information on definitions of MMEs, incident reports, legal and regulatory guidance and documentation and media coverage to generate five country profiles (Canada,

Chile, Ireland, Norway, Scotland) of potential AOHS hazards and risks associated with MMEs. Country profile findings were synthesized and incorporated into a multi-disciplinary, expert elicitation risk assessment process to identify causes and consequences of MMEs including from an OHS perspective.

Findings: Findings indicate variability in MME definitions, requirements for event reporting and AOHS-related contingency planning across countries. Key hazards and potential pathways between MME-prevention planning, monitoring and response and AOHS risks were mapped using a bow-tie risk analysis. The Chile case study found large numbers of MMEs and high injury and fatality risk. Of the countries profiled, only Chile had issued a health and safety circular related to diving and transport of dead fish associated with MMEs.

Conclusion: AOHS concerns need to be fully and effectively integrated into broader risk assessments, policy and surveillance systems to prevent MMEs and reduce their consequences in aquaculture. The Chilean OHS guidelines related to aquaculture MMEs may be adapted and used in other countries.

Improving the usage of floatation and emergency signaling devices by recreational fishers by Kerri Ann Ennis, Fisheries and Marine Institute of Memorial University of Newfoundland, Canada

Whether they realize it or not, recreational fishers in Canada are usually operating in water which is cold enough to impair their ability to perform self-rescue should they fall in. When a person unexpectedly falls into cold water, they immediately experience cold shock response followed by cold incapacitation and hypothermia. During unexpected cold-water immersion, wearing a personal flotation device (PFD) is critically important for ensuring a person's head is kept above water to prevent drowning. If the individual is lacking sufficient thermal protection, it also becomes critically important that they have a reliable means for signaling their need to be rescued. One of the most versatile and reliable methods for initiating a rescue response is a personal locator beacon (PLB). A PLB can reduce the search time and, when used with a PFD, increase the chance of survival in a maritime emergency. Our research aimed to reduce the number of boating related fatalities by increasing the usage rate of PFDs and PLBs during boating activities. To achieve this goal, we are conducting a multi-phase research project for recreational boaters in Newfoundland and Labrador (NL), Canada. Our research included: 1. a systematic review of previous work examining factors associated with the use of PFDs and PLBs by recreational boaters; 2. an observational study of PFD use by recreational boaters in NL; 3. a survey to further understand the barriers and incentives influencing the use of PFDs and PLBs; and 4. the design and delivery of an intervention that will target the use of PFDs and PLBs by recreational boaters. Our paper presented the findings of the systematic review and observational study, along with our research design and any results collected to date.

Underprivileged and ununited: situational analysis of fishing labour in Bangladesh by Mohammad Minhazul Islam, Vaasa University of Applied Sciences, Finland

The fishery sector of Bangladesh directly and indirectly employs approximately 17 million people, of which 1.4 million are women. Many of them are fishing labourers who perform a variety of jobs: operational crew members, engine drivers, and boat skippers in sea-going fishing boats, dry fish processing workers, shrimp and prawn post-larvae collectors, and workers in export-oriented fish processing industries.

Because of technological advancements, high riches in fisheries, the open access nature of common pool access, and better integration with foreign markets have increased fishing activity substantially, and so has the number of fishing laborers. Nevertheless, the livelihoods and well-being situation of fishing are precarious. The worker is hired at a predetermined sub-optimal wage rate imposed by the owner with rigid terms and conditions. These labourers, including children, work in very precarious workplace environments on land and on the sea with insufficient time for rest and leisure. Boat owners are often forced to disregard cautionary rough weather signals and continue fishing in stormy weather that often results in morbidities or even death. Without any formal job agreement, effective labour organization, or insurance coverage, any occupational accident will likely push fishing labour households into poverty and low well-being. Finally, this study calls for interventions to consider fishing rights as human rights. Thus, the rights of the fishing labour should be protected with sufficient wages and insurance for risky fishing ventures in the sea.

Addressing harm in distant water fishing: Liberia by Alvin Slewion Jueseah, University of Liberia, Liberia

Distant-water fisheries (DWF) – industrial fishing fleets that originate in one country but fish in the waters of other countries or in the high seas – are currently the focus of considerable attention in global research and policy arenas. They are emblematic case studies for contradictions, inequities, and wicked governance problems in the use of ocean spaces and resources. The extractive pressure exerted by these fleets also suggests they may have both direct and indirect impacts on local fisheries and coastal communities where they operate, which are important to understand to develop solutions that address the fundamental injustices, inequities and management dilemmas involved. This work analyzes socio-economic, and environmental tradeoffs of Liberia's current catch-based management system used for licensing DWF vessels operating in its exclusive economic zone (EEZ). Data were obtained from the SeaAroundUs Project, Liberia's National Fisheries and Aquaculture Authority (NaFAA), interviews, and secondary data from publications and reports. We found that the fish species assemblages targeted by small-scale fisheries are the same as those targeted by the distant-water trawl fleet operating in Liberia's EEZ. The quantity of fish landed by the small-scale operators have considerably declined over the last decade, while the catch by the distant-water trawl fleet has increased per unit effort over the same period. In addition, between 2010 and 2020, NaFAA's financial benefits derived from all DWF vessels was lowest for the trawl fleet, but the fleet's cost to society from the social and environmental standpoint appears to be the highest, pointing to the need for updated management measures. Focusing resources on capacity building for coastal community fisheries, rather than on licensing DWF, may serve to both safeguard the economic, social, and cultural rights of Liberian communities while also maximizing benefits for the government.

Bringing into service an underutilized safety resource: Fisheries Observers by Kenneth Keene, National Oceanic and Atmospheric Administration, United States of America

Humans are a key element in maintaining the safety of a vessel and crew while deployed at sea. All of the safety gear and resources involved are connected by one thing, the ability to identify, maintain, and utilize them when necessary. This makes people the most important safety asset on your vessel. Properly trained personnel, coupled with the appropriate safety equipment, resources, training, and knowledge of the vessel, is the key for increased success in avoiding or mitigating an at-sea emergency. This presentation will focus on the NOAA Fisheries Marine Safety training, deployed

safety gear, safety/health best practices, as well as how a fisheries observer can be an asset to the overall safety and health of a vessel and crew.

“By failing to prepare, you are preparing to fail.” – Benjamin Franklin. Moral hazard and self-selection in insurance markets: Evidence from commercial fisheries by Akbar Marvasti, National Oceanic and Atmospheric Administration, United States of America

Using a panel dataset of commercial fisheries in the Gulf of Mexico, we attempt to separately identify the moral hazard and self-selection effects of property insurance coverage among commercial fishers. We use captains’ propensity to take fishing trips under adverse weather conditions as a proxy for their private information; these data are available to us, but not to insurers. We find that vessels with higher long-term exposure to risk are significantly less likely to be insured, suggesting potential advantageous selection. However, this relationship dissipates once we control for information likely known to the insurer and it is reversed once we correct for unobserved factors. Finally, we find robust evidence of moral hazard.

Marine Casualty Prevention and incident information sharing by Adam Parnell, CHRIP Maritime, United Kingdom of Great Britain and Ireland

There is a paradox within the world of safety: while many organizations say that they want to learn from the experiences of others, and that they actively seek to identify and adopt ‘best practice’ from other parts of the industry, they are often unwilling to share their data with others for fear of adverse reputational or commercial reaction from others, particularly competitors and customers. As a result, incidents that could be averted through the timely sharing of knowledge across organizational boundaries are repeated elsewhere, and the number of potentially avoidable deaths, injuries and equipment damage remains stubbornly high. In this presentation, CHIRP challenges the barriers to cross-organizational reporting and proposes that a ‘safe space’ into which all organizations can report to, and draw on, their own and others’ experiences to improve safety across the sector.

IFISH Innovation Exchange by Julie Sorensen, Northeast Center for Agriculture, Forestry, and Fishing Safety and Health, United States of America

Based on feedback from past IFISH conferences, the Innovation Exchange concept was created as a possible catalyst for encouraging knowledge exchange, transdisciplinary problem-solving, data publication, skills development and the dissemination of evidence-based health and safety solutions to different worker populations or geographic locations. To do this, the Innovation Exchange will be geared towards identifying opportunities for increasing partnerships between stakeholders in developing and developed countries to ensure that solutions are equitably disseminated to seafood workers in a variety of coastal communities. Another primary objective of the Innovation Exchange is to identify high priority, important occupational safety and health issues to discuss, as well as innovative research methods, interventions and implementation solutions that could lead to improvements in worker safety and well-being. This type of collaboration on the international stage has occurred informally in the past. However, the Exchange mechanism seeks to further support and increase interactions between disciplines and regions in ways that catalyze the development and adoption of scalable solutions in the years ahead. In a post conference workshop

at IFISH 6, organizers will present the Innovation Exchange to IFISH 6 participants to refine the idea, outline mechanisms for collaboration, and document best practices for governance and oversight.

Transformation of seafood processing side-streams to chitosan: Worker's health and safety considerations by S. Sabu, Cochin University of Science and Technology, India

The seafood processing industry generates 30–70 percent of the raw material as processed discard. Seafood materials left after processing are considered as seafood side-streams and residuals, which comprise biologically and nutritionally significant high-value components, such as proteins, pigments, peptides, amino acids, collagen, gelatin, PUFA-rich fish oils, enzymes, chitin and minerals. These ingredients lead to the establishment of byproduct industries supplying high-value raw materials for developing pharmaceutical, nutraceutical, functional foods and cosmetic health products. The side streams generated from shrimp peeling yield 35–45 percent of the weight of shrimp as head or exoskeleton. Shell side-streams usually possess minerals (30–50 percent), proteins (30–40 percent), and chitin (20–30 percent), besides a minor quantity of fats and pigments. One of the prominent seafood side-stream processing industries established in various parts of the world, especially in Asian countries, is the chitin industry. Chitin preparation in the chitin industry generally includes treating the shell side-streams using hydrochloric acid (HCl) for demineralization and a sodium hydroxide (NaOH) solution for deproteinization. The washed chitin is then treated with concentrated solutions of NaOH (40–50 percent) at elevated temperatures to produce chitosan. Foul-smelling gases and chemical residual wash waters are generated during various processing stages. This paper gives insight into the present status of the manufacture of chitosan from seafood shell side-streams, particularly from the chitin industries located in India and Indonesia, duties and safety of workers employed in a chitin industry, precautions, protocols to be followed, etc. Suggestions to minimize the hazards, health and safety risks of the workforce employed in the chitin industry, one of the least studied industries in fisheries, are also discussed.

Health impacts of jellyfish blooms on fishers: A case study from Sri Lanka by Vishwa D. Samaraweera, Department of Zoology, University of Sri Jayewardenepura, Sri Lanka

A remarkable and rapid increase in jellyfish blooms is reported worldwide. The fishing industry, one of the main income sources of coastal communities, is affected severely due to seasonal aggregations of jellyfish blooms. This study aims to assess the health impacts of jellyfish blooms on fishers of Sri Lanka. Data and information were collected using semi-structured questionnaires (n=50), group discussions, and observational studies conducted at major fish landing sites along the western and northwestern coasts from July 2022 to June 2023. Among the reported six major jellyfish blooms, three were formed by *Cyanea* sp., *Chrysaora* sp., and *Chiropsoides buitendijki* primarily affected the physical health of fishers through stinging. Over 80 percent of fishers experienced jellyfish stings, resulting in symptoms such as redness (34 percent), itchiness (38 percent), rash (6 percent), swelling (2 percent), headache (5 percent), vomiting (1 percent), breathing difficulty (3 percent), and muscle pain (11 percent). Blooms formed by *Lychnorhiza malayensis*, *Acromitus flagellatus*, and *Marivagia stellata*, entangled in fish nets, resulting in low catch rates and insufficient income relative to the efforts of fishers. This situation contributes to the mental health challenges faced by fishers. Citizen Science Programs can effectively raise awareness among fishers about jellyfish blooming seasons, their health impacts, and potential treatments. Training fishers in the safe handling of jellyfish and implementing onboard safety measures are crucial solutions to mitigate the health impact of jellyfish.

An engine emergency stop-and-alert system in case of man overboard (MOB) events by Trine Thorvaldsen, SINTEF Ocean, Norway

Norwegian fishers are exposed to several hazards in their working environment. In the period 2000–2019 there were 143 accidents involving MOB, and 93 fishers consequently lost their lives. The majority worked on coastal vessels, many of them alone. Measures that can prevent such accidents as well as increase the chance of survival in the case of MOB, can make a significant improvement for safety at sea. Dimeq AS are currently developing a system that will automatically switch the engine of the vessel off, as well as send an alarm to the maritime radio that coordinates rescue services as well as nearby vessels. The solution is based on the patented EyeD technology, which has real-time positioning and automated real-time detection of MOB. It consists of a wristband with a sensor that activates when it is submerged in water. Signals are then sent to a receiver on the vessel which turns off the engine and alerts the chosen receiver on shore about the accident and the position of the vessel. The requirement specification for the system was first prepared by a team of researchers from SINTEF Ocean, based on interviews with active fishers and workshops with key stakeholders in the industry. It was developed further in collaboration with Dimeq AS. This solution is expected to increase the chance of saving lives at sea. Rescue operations can be started immediately in case of a MOB accident. If the fisher is not injured, stopping the engine may allow the fisher to re-enter the vessel. This project has been funded through the Norwegian Seafood Research fund (project 901712).

Self-help groups (SHGs): A step towards women empowerment and livelihood generation through fish culture in Maharashtra, India by Bharat Yadav, Dr B. S. Konkan Agricultural University, Ratnagiri, Maharashtra, India

Small-scale aquaculture is an emerging entrepreneurial activity for rural women and offers vast opportunity for socio-economic development and livelihood generation. In India, Maharashtra state had a scheme “Maharashtra State Rural Livelihood Mission” called “UMED” which was started to encourage rural self-help groups (SHG) for women to develop entrepreneurial skills for livelihood generation. The present study was conducted to analyze the extent of change in socio-economic status achieved by rural women through participation in aquaculture activities through SHGs. The respondents were selected using multi-stage stratified random sampling procedure. The livelihood interventions like fish culture in village ponds, community water tanks and other water bodies added contribution towards the nutritional well-being and increased livelihood of women SHG members. Data were collected from 80 SHG members in the Palghar district of Maharashtra. It was found that SHG members were from low socio-economic status. All SHGs had a perennial pond of an average of 2.25 ha which is taken on lease by Gram Panchayat (village level organization). Composite fish culture was practiced with Indian major carps and exotic carps. Women were involved in all fisheries activities. Fish production from the village ponds has seen to increase to 500–700 kg per ha of water area. Women members harvested fishes from ponds with the help of drag nets or cast nets. Empowerment through aquaculture leads to gains for women SHG members in terms of employment, income, fish as a food and livelihood. The study showed an increase in the empowerment in terms of confidence building, self-esteem, decision making and economic status and help in achieving the Sustainable Development Goals (SDGs) on poverty reduction and food and nutrition security.

IFISH6

ANNEXES

IFISH6

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Annex 2 – Programme

Monday, January 8, 2024	
8:30–12:00	Registration Desk Open
14:00–14:30	Welcome and Networking Coffee Mixer - Outside Red Room
14:30–16:30	Pre-Conference Workshop by United Nations Agencies (open to all attendees) - Red Room Global Instruments and Safety Initiatives Olivier Lebrun, IMO; Francisco Santos-O'Connor, ILO; David MEDDINGS, WHO; Florence Poulain, FAO
16:30–18:00	Poster Session - Flag Hall
17:30–20:00	Opening Reception - FAO Atrium

Tuesday, January 9, 2024				
8:30–12:00	Registration Desk Open			
8:45–9:00	Click for Video Conference Welcome - Red Room Manuel Barange (Assistant Director General (ADG)/Director, FAO Fisheries and Aquaculture Division)			
9:00–9:45	Click for Video IFISH Conference Introduction - Red Room History of IFISH Conference - Jennifer Lincoln (NIOSH) IFISH6 Conference Introduction - Florence Poulain (FAO)			
9:45–10:00	Coffee Break - Outside Red Room			
10:30–11:25	Session 1 (Concurrent) Session Location Session Title Session Presenter(s)	Red Room Social and regulatory approaches for implementing safety and health standards Abstract session - Shan (Canada/China), Wilwert (United States of America), Mackey (United Kingdom of Great Britain and Northern Ireland), Toussaint (FAO)	Mexico Room Decent fishery work in a changing climate Round table Session - Tigchelaar, Sparks, Selig, K. Elliott (United States of America)	Lebanon Room Success stories and lessons learned by programmes supporting training, innovation and interventions Abstract session - Garrett (United States of America), Hirabayashi (United States of America), Fitrianggraeni (Indonesia), Bartlett (United States of America)
11:25–11:35	Session Transition Break			

11:35–13:00	Session 2 (Concurrent) Session Location Session Title Session Presenter(s)	Red Room Harnessing local knowledge and technology to improve safety in small scale fishing Abstract session - Acevedo (Mexico), Cyr (United States of America), Hasan (Bangladesh), Nishanthan (Sri Lanka)	Mexico Room Psychosocial hazards and promising health interventions in fishing Abstract Session - Gron (Denmark), Roome (United States of America), King (United States of America), Sorensen (United States of America)	Lebanon Room OHS in fisheries and aquaculture: What can we learn from new research? Abstract Session - Holen (Norway), Holmen (Norway), Cavalli (Canada), Størkersen (Norway)
13:00–14:00	Lunch			
14:00–15:30	Session 3 (Concurrent) Session Location Session Title Session Presenter(s)	Red Room Preventing and fallsoverboard and drowning Abstract session - Ennis (Canada), Horne (United Kingdom of Great Britain and Northern Ireland), Sindall (Tanzania), Wickman (United States of America)	Mexico Room Connectivity among training organizations empowers fishers as medical first responders through wilderness-style first aid training: A case study in collaboration and capacity building. Panel Session - Gladics, Cyr, Eldredge, Roberts, Kingman, Palinkas (United States of America)	Lebanon Room New frontiers in occupational safety and health interventions Abstract Session - Ceryes (United States of America), Dunleavy (United States of America), Kim (United States of America), Brugère (Tanzania), Schoeman (South Africa)
15:30–15:45	Coffee Break - Outside Mexico and Lebanon Rooms			
15:45–17:15	Session 4 (Concurrent) Session Location Session Title Session Presenter(s)	Red Room Does safety training make a difference? Abstract Session - Baldeo (Grenada), Hoque (Bangladesh), Hilmar Snorrason (Iceland), Potten (United Kingdom of Great Britain and Northern Ireland)	Mexico Room Get SeaFit (Dockside partnerships for health and wellbeing of fishers and their families) Panel session - C. Elliott (United Kingdom of Great Britain and Northern Ireland), Welsh (United Kingdom of Great Britain and Northern Ireland), Evans (United Kingdom of Great Britain and Northern Ireland)	Lebanon Room Challenges and Measures for Improved Occupational Health and Safety (OHS) in Salmon Farming Workshop session - Thorvaldsen and Storkersen (Norway)
17:15–18:00	Keynote - Red Room Krishnan Pandian- Below the Radar: Safety aspects of Small Scale Fisheries in South Asia Daryl Attwood- Improving safety in the fishing industry: a global holistic approach			

Wednesday, January 10, 2024				
9:00–12:30	Registration Desk Open			
9:00–9:45	Keynote - Red Room Elda Belja- Regional fisheries bodies and their role in improving safety and decent work on fishing vessels Trine Thorvaldsen- The impact of fisheries management on fishers' health and safety: A case study from Norway			
9:45–11:45	Session 5 (Concurrent) Session Location Session Title Session Presenter(s)	Red Room Changing Personal Flotation Use Behavior: What can we learn from efforts to address the most important fishing safety technology adoption challenge of ourtime? Panel session - Sorensen <i>et al.</i>	Mexico Room Towards inclusive, equitable and climate-resilient Occupational Safety and Health for small-scale fishers – the supportive role of Social Protection Panel session - Kalikoski <i>et al.</i> (FAO)	Lebanon Room Seafood processing hazards and risk factors Abstract session - Carter (United States of America), Guillot-Wright (United States of America), Sabu (India), Zegeye (Norway)
11:15–11:30	Coffee Break - Outside Red, Mexico, and Lebanon Rooms			
11:30–13:00	Session 6 (Concurrent) Session Location Session Title Session Presenter(s)	Red Room Changing Personal Flotation Use Behavior: What can we learn from efforts to address the most important fishing safety technology adoption challenge of ourtime? Panel session - Sorensen <i>et al.</i> (Continued)	Mexico Room Advancing social justice and decent work for all in the aquaculture sector Panel Session - Beytullayev, Buketov, Santos-O'Connor (Switzerland), Cavalli (Canada), Holmen (Norway)	Lebanon Room Livelihood Opportunities in Fisheries and Aquaculture Regular Session - Sharma, Wasave, Rathod, Soni, Prusty, Mushkam (India)
13:00–14:00	Lunch			
14:00–17:00	Tour of the Colosseum (Self-Arranged) Tiqets Tourism Arrangements - linked here			
14:30–15:30	Tours of FAO (3 tours of one hour for 30 people max each)			

Thursday, January 11, 2024				
8:30–12:00	Registration Desk Open			
9:00–9:15	Evaluation Overview for IFISH Conference - Red Room Jennifer Lincoln (NIOSH) Florence Poulain (FAO)			
9:15–10:45	Session 7 (Concurrent) Session Location Session Title Session Presenter(s)	Red Room Fishing vessel safety and design: what can be done to improve stability and safety? Abstract session - Myer (United States of America), Flynn (United States of America), Smith (United Kingdom of Great Britain and Northern Ireland), Scarponi (United Kingdom of Great Britain and Northern Ireland), Menezes (India)	Mexico Room Commercial Seafood Industry's Health, Safety, and Wellbeing from down under: A New Zealand Context Panel Session - Jackson, Guard, Junaid, Massey (New Zealand)	Lebanon Room Work-related asthma and allergy in the aquaculture and seafood processing industry – new insights into exposures, health outcomes and designing intervention strategies. Regular Session Bang (Norway), Jeebhay (South Africa), Ngajilo (Tanzania), Elda (Norway), Thomassen (Norway), Hoeper (Norway)
10:45–11:00	Coffee Break - Outside Red, Mexico and Lebanon Rooms			
11:00–12:30	Session 8 (Concurrent) Session Location Session Title Session Presenter(s)	Red Room The Safest Catch - Fishermen Helping fishermen on how to design and implement a fishing vessel safety program Workshop - Howe (Canada)	Mexico Room Ensuring economic stability and welfare of fishers and processors through insurance Abstract session - Mukherjee (India), Marvasti (United States of America), Sekharan (India), VanAnrooy (FAO)	Lebanon Room Data collection, analysis and trends in accident and fatality reporting in fishing Abstract Session - Nunes (Spain), Case (United States of America), Parnell (United Kingdom of Great Britain and Northern Ireland)
12:30–13:30	Lunch			
13:30–15:00	Session 9 (Concurrent) Session Location Session Title Session Presenter(s)	Red Room Improving Global Fishing Safety: FISH Platform's work to create a level playing field for international fishing vessel conventions Panel session - Greenwood (United Kingdom of Great Britain and Northern Ireland), Blonk (Netherlands (Kingdom of the)), Blazeby (United Kingdom of Great Britain and Northern Ireland), Barnes (United Kingdom of Great Britain and Northern Ireland)	Mexico Room Efforts to improve safety, health, and welfare through fisheries resiliency and sustainability initiatives Abstract session: Herrera-Kasic (Chile), Labaria (Philippines), Piyasiri (Sri Lanka), Yadav (India)	Lebanon Room Navigating regulatory and organizational uncertainties to address health and safety Abstract session - Backus (United States of America), Love (United States of America), Thorvaldsen (Norway), Kongsvisck (Norway)

15:00–15:15	Coffee Break - Outside Red, Mexico and Lebanon Rooms			
15:15–16:45	<p>Session 10 (Concurrent)</p> <p>Session Location</p> <p>Session Title</p> <p>Session Presenter(s)</p>	<p>Red Room</p> <p>Catching the Potential, workshop about setting the standard for sustainable fisheries training</p> <p>Workshop - Haasnoot and Swart (European Union)</p>	<p>Mexico Room</p> <p>The Danish Story 2.0 -promoting social sustainability</p> <p>Panel Session - Fisher, Kristensen, Christensen (Denmark)</p>	<p>Lebanon Room</p> <p>Improving safety in commercial fishing: A discussion of risk-influencing factors and contributing causes to hazardous events,measures for prevention and mitigation of occupational accidents, and how to improve safety management in the coastal fishing fleet</p> <p>Workshop session - Holmen (Norway) and Salmonsén (Norway)</p>
16:45–17:30	<p>Keynote - Red Room</p> <p>Lissandra Souto Cavalli- One health, one aquaculture–aquaculture under one health umbrella</p> <p>Raymon Van Anrooy- Closing remarks for IFISH6</p>			

Friday, January 12, 2024

8:30–10:30	The Path Forward for Fishing Safety and Health - Red Room
10:30–10:45	Coffee Break - Outside Red Room
10:45–12:30	IFISH Innovations Exchanges Workshop - Red Room
12:30	Conference Ends - See you at IFISH7!

Annex 3 – Opening address

by
Manuel Barange

Dear Dr Jennifer Lincoln, colleagues from our UN sister organizations, ladies and gentlemen, good morning.

Welcome to FAO headquarters.

It is my honour to open the sixth edition of the International Fishing Industry Safety and Health Conference, which has been organized jointly by FAO, the US National Institute for Occupational Safety and Health (NIOSH) and the Northeast Centre for Occupational Safety and Health (NEC).

For those new to FAO, this agency was set up after World War II to provide technical solutions to fight hunger and poverty using natural resources sustainably, at a time when 56 percent of the world was living under extreme poverty, and 81 percent living in poverty.

As I often mention, scientific opinion at the time was that we could not feed a world of three billion people (incidentally, the global population in the year I was born).

It is also the function of FAO to promote research, education, and to spread public knowledge in its fields of expertise.

FAO is one of (15) specialized agencies of the United Nations. We employ around 4 000 people globally, and operate through our 163 national, subregional and regional offices worldwide.

In 1965, FAO was given the specific mandate to be the leading inter-governmental body in the field of fisheries.¹ Accordingly, FAO provides policy and technical assistance to its 195 Members (including 194 countries and the European Union) in support of sustainable fisheries and aquaculture activities across the value chain.

Since then, aquatic foods have been contributing to better our world.

Since the mid-1990s, the global volume of capture fisheries stabilized at around 92 million tonnes. Aquaculture continues to grow in all continents and, in 2021, reached an all-time record 91 million tonnes of animal products, plus around 30 million tonnes of algae. I am sure that in 2022 aquaculture will overtake capture fisheries as the main producer of aquatic animal products.

As a result of these trends the per capita consumption of aquatic products is now over 10 percent higher than 10 years ago, despite a growing population.

¹ Report of the 44th session of FAO, 1965.

Fisheries and aquaculture also contribute to local economies and international trade. In 2021 international trade of aquatic products was worth an all-time record of USD 176 billion.

Over 600 million people are today estimated to rely on fisheries and aquaculture for their livelihoods.

But the sector also has negative trends. Approximately 35 percent of commercially exploited fish stocks are overfished. Improving global fisheries management remains crucial to restore ecosystems to a healthy and productive state and to protect the long-term supply of aquatic foods.

In fact, we are cheating ourselves, because rebuilding overfished stocks would increase global fisheries production by about 18 percent, thus raising the contribution of fisheries to the food security, nutrition, economic growth and well-being of coastal communities.

As you well know, fishing remains one of the most dangerous occupations worldwide. In 1999 the International Labour Organization (ILO) estimated that 24 000 people died fishing every year (worldwide /capture fisheries). In 2019, FAO updated this number to 32 000. These are still very conservative numbers, as they were based on research undertaken in just a handful of countries. New research suggests that fatalities in fisheries are much higher and perhaps closer to 100 000 deaths per year. This should not have to be the case.

The safety of fishing vessels and fishers has been a matter of concern for FAO since its creation, and we have provided assistance in the establishment of fishery training institutions in a number of countries. The issue of fishing safety remains high on FAO's agenda and was raised yet again in 2022 at the thirty-fifth session of the FAO Committee on Fisheries (COFI).

I quote from the Committee of Fisheries 2022 report: The Committee “welcomed FAO's capacity building work on decent working conditions and safety at sea, with an emphasis on reducing accidents and fatalities amongst small-scale fishers, fishing vessel safety standards and promotion of insurance and social protection in fisheries, and requested FAO to increase its support to developing countries on fishing safety matters and to take a lead on the establishment of a repository for fisher safety data and accident and mortality information”.

Ladies and gentlemen,

Safety at sea is multi-faceted. It is not only a technological, awareness raising or capacity building issue. Factors like poverty, socio-economic development, overfishing of coastal resources, climate change or IUU fishing also affect safety in fisheries.

Most incidents and fatalities happen in small-scale fisheries. There are many reasons for this, such as: lack of safety training, unavailability or unaffordability of safer vessels. Safety equipment may not be carried on board, safety regulations may not be enforced, radio communications are not always adequate, among others.

In addition, fishers are often part of the informal labour sector and are frequently not protected by social and labour legislation.

Fisheries management and management decisions can also have unintended consequences in terms of safety at sea. Fisheries management may affect the number of fishers, the number and type of vessels, how and when they may fish, and may influence fishers' options and preferences.

Thus, fisheries safety cannot be separated from fisheries management, as recognized in the 1995 FAO Code of Conduct for Responsible Fisheries.

It is for this reason that I will use this opportunity to share with you that next week we will host the first meeting of a new FAO Sub Committee on Fisheries Management. Your conference could not have chosen a better time to ensure your messages echo through next week's intergovernmental discussions.

Dear colleagues

We live in an ever-changing world, perhaps never changing as rapidly as it is today. Climate change and extreme events put fishers – men and women - under increasing risks. Risks that can be catastrophic for Small Island Developing States (SIDS) and other vulnerable states where small-scale fisheries and farming communities are located.

Yet safety at sea issues are often not explicitly considered as a priority. Data on fishers' safety, casualties and accidents are lacking. Most fisheries legislations appear to be more concerned with the conservation of fisheries resources (a very laudable objective) than the safety of fishers themselves.

Administrative attention is often only given to safety of industrial fishing vessels and their crew. I started my career as a fisheries observer in the high seas fleets and can attest to that. But small-scale fisheries employ 90 percent of those working in the capture fisheries value chain, and they receive less attention in terms of vessel construction, safety standards and safety training programmes for crew.

This is why FAO, the International Maritime Organization (IMO) and the ILO have collaborated in the development or revision of a number of (binding and voluntary) instruments that address the safety of fishers and fishing vessels.²

For us safety is an integral part of our FAO Blue Transformation agenda, to ensure sustainable aquaculture continue to feed the demand for aquatic foods, to ensure all capture fisheries are placed under effective management, because management works, and to develop the value chains of aquatic foods to improve the impacts of the sector.

Within this Blue Transformation agenda, FAO aims to “Increase capacity and access to social protection, decent working conditions, and safety at sea” and to “Support and enhance safety standards for all fishing vessels”.

² These include: i) The 2005 Code of safety for fishers and fishing vessels; ii) the 2005 Voluntary guidelines for the design, construction and equipment of small fishing vessels; iii) the 2012 Safety recommendations for decked fishing vessels of less than 12 meters in length and undecked fishing vessels; iv) Implementation guidelines on Part B of the Code, the Voluntary Guidelines and the Safety Recommendations; v) the 2015 Technical guidelines for responsible fisheries: fishing operations: best practices to improve safety at sea in the fisheries sector; and vi) the 2001 FAO/ILO/IMO Document for guidance on training and certification of fishing vessel personnel.

In order to increase safety in fisheries and aquaculture, we need to work together to raise awareness and knowledge on safety and health issues, to innovate, train, and build safer vessels. There is no shortage of interventions that could and should be taken.

By virtue of your presence here this week, you are helping to advance safety and health in the global fishing industry and contributing to a blue transformation.

I wish all of us the determination to succeed in these much-needed endeavours, learn from each other's research and practical know-how and transfer our experiences for the safety of fishing.

Finally, I trust your presence in this global forum will also allow you some time to visit the eternal city of Rome, enlightening you professionally, and personally.

Wishing you good deliberations, I declare open the sixth edition of the International Fishing Industry Safety and Health Conference (IFISH-6).

Thank you very much for your attention.

Proceedings of the Sixth International Fishing Industry Safety and Health Conference (IFISH 6)

8–12 January 2024
Rome, Italy

The Sixth International Fishing Industry Safety and Health Conference (IFISH 6) was held to increase awareness of safety and health issues among researchers and fishing safety practitioners and help advance safety and health research in the industry, as well as within international fora, such as the FAO Committee on Fisheries. IFISH 6 was co-organized by the National Institute for Occupational Safety and Health (NIOSH), the Northeast Center for Occupational Health and Safety in Agriculture, Forestry and Fishing (NEC), and FAO. It was held at FAO, Rome.

The Conference started with a pre-conference workshop on 8 January 2024, devoted to global instruments and safety initiatives jointly organized by the International Labour Organization (ILO), the International Maritime Organization (IMO), the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO).

IFISH 6 officially started on 9 January 2024. The Conference was structured in three concurrent sessions covering many themes related to the successes and continued challenges associated with occupational health and safety for the fishing, aquaculture and seafood processing industries. Key topics included international safety norms and standards, safety gear and technologies, safety awareness and training, vessel design, risk management and insurance, the mental health and well-being of workers, the impacts of climate change and other emerging issues. There were over 100 presentations, 6 keynote speeches and 14 posters. The Conference brought a special focus on underserved populations, as well as promising interventions that bring workers safely home to their families.

The Conference concluded on 12 January 2024 with a post-Conference workshop to discuss insights and ideas generated by the IFISH 6 Conference and a second workshop to gather feedback on the concept of an IFISH Innovation Exchange.

