

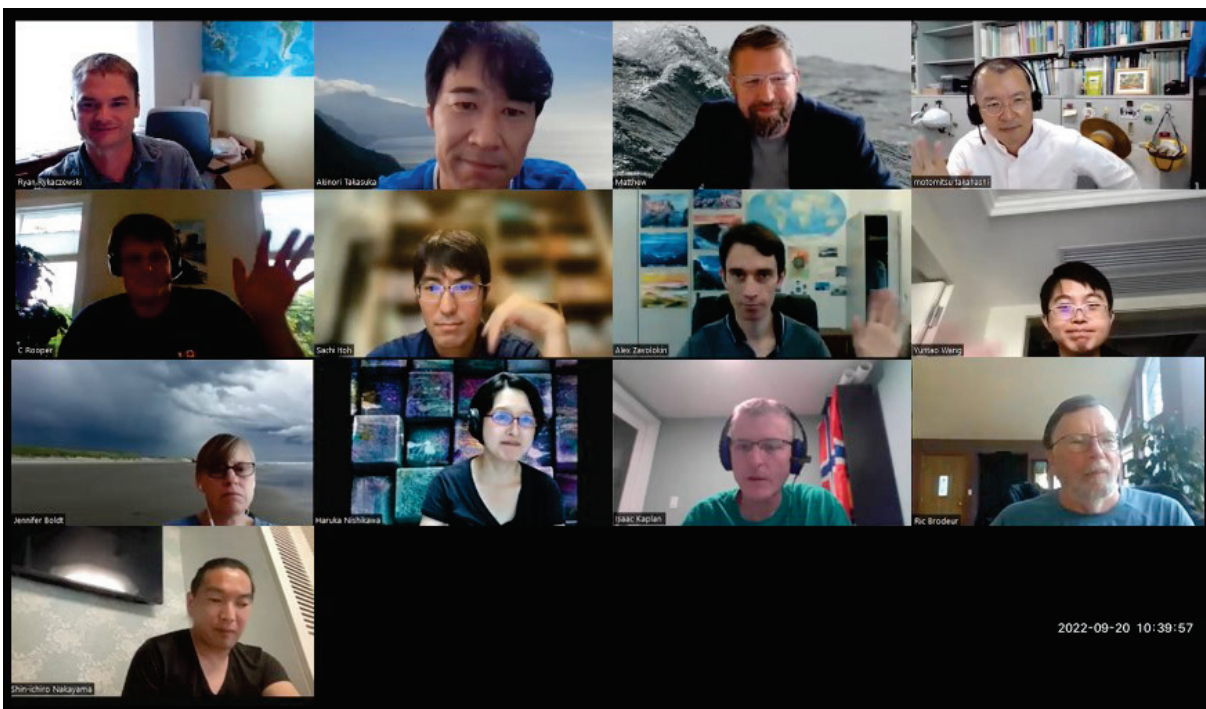
2022 Report of Working Group on *Small Pelagic Fish* (WG 43)

Working Group (WG 43) on *Small Pelagic Fish* held its 2022 meeting for two hours during September 19, 2022 (in Eastern Pacific time zones; September 20 in Western Pacific time zones). PICES WG 43 is one component of the joint PICES-ICES Working Group on Small Pelagic Fish (WGSPF). Dr. Ryan Rykaczewski and Dr. Akinori Takasuka presided over the meeting as co-chairs of the PICES portion of this Working Group. There were 13 participants (*WG 43 Endnote 1*) in the meeting; some of the absent members emailed to indicate conflicting meetings.

In 2021, the WG 43 meeting was preceded by a joint ICES-PICES WGSPF annual meeting. In 2022, however, a joint ICES-PICES WGSPF meeting was scheduled to be held immediately after the small pelagic fish symposium (November, Lisbon). Several meetings among the symposium convenors and the scientific steering committee were held prior to the WG 43 meeting. These meetings included many PICES members.

The WG 43 meeting agenda (*WG 43 Endnote 2*) focused on updates from different “activity groups” and the status of preparation for the PICES/ICES/FAO symposium on “Small Pelagic Fish: New Frontiers in Science and Sustainable Management” that was delayed until November 2022 in recognition of the continuing restrictions on international travel and gatherings due to COVID-19. After the meeting, the symposium was successfully held in Lisbon, Portugal, during November 7–11, 2022 (*WG 43 Endnote 3*). The WGSPF meeting was held during November 12–13, immediately after the symposium.

Below are notes summarizing key points from the agenda items of the WG 43 meeting (*WG 43 Endnote 2*).



A screenshot of the WG 43 meeting prior to PICES-2022 via ZOOM (panels from different snapshots are compiled for a few participants).

AGENDA ITEM 1

Welcome and introduction with brief updates on the members

The members in attendance briefly introduced themselves and their interests in small pelagic fish. In addition to the members, an observer joined from NPFC. The members shared information on their roles and activities in WG 43.

AGENDA ITEM 2

Review of WG 43 terms of reference

The terms of reference (TORs) and expected deliverables of WG 43 were briefly discussed.

1. Review recent progress on understanding how various drivers (environmental and/or anthropogenic) impact the population dynamics of SPF in different ecosystems and whether and how potential drivers shift with changes in ecosystem state.
2. Create a networking environment for international and multidisciplinary collaboration to foster the establishment of similar study frameworks and comparative analyses of SPF across different social-ecological systems based on updated time-series data sets of climate indices, environmental factors and tipping points, fisheries biology and ecophysiological information (feeding, growth and survival), and inter-model comparisons.
3. Identify, prioritize, and coordinate research most needed to advance our knowledge and capacity to predict the population dynamics of SPF at both short (seasonal to inter-annual) and long (decadal to centennial) time scales.
4. Provide recommendations for strategies of marine ecosystem monitoring and fisheries management of SPF which will contribute to sustainable ecosystem-based fisheries management, through biophysical, ecosystem and/or socio-economic models.
5. Organize a joint ICES/PICES symposium on SPF, tentatively scheduled for late 2021, that builds upon the 2017 symposium in Victoria, Canada, and showcases integrative analyses of this working group. Additionally, working group members will propose, coordinate, and convene topic sessions at PICES Annual Meetings and ICES Annual Science Conferences focused on key questions and recent advances in SPF science.

The activities and achievements in 2022 were summarized, as follows.

Regarding TOR No. 5: The WGSPF and WG 43 members dedicated substantial effort toward preparation for the joint PICES/ICES/FAO symposium on “Small Pelagic Fish: New Frontiers in Science and Sustainable Management” (November 7–11, 2022, Lisbon Portugal) and the post-symposium meeting (November 12–13, 2022, Lisbon, Portugal). The symposium had received a total of 312 abstracts and 367 registrations as of the early September. The post-symposium meeting was intended to summarize the symposium, expand the network, and identify key issues to achieve the terms of reference. Special issues are expected to be published in *Marine Ecology Progress Series* and *Canadian Journal of Fisheries and Aquatic Sciences*.

Regarding TORs No. 2 and No. 3: Through the processes of preparation for the symposium/meeting, the WG has been expanding a networking environment for international and multidisciplinary collaboration and identifying, prioritizing, and coordinating research most needed to advance our knowledge and understanding the environments, biology, and management of small pelagic fish.

Regarding TOR No. 3: The group discussed the potential role of small pelagic populations as components of the ecosystem that mediate the influence of climate extreme events on the socioeconomics of coastal

communities. A joint WG 43 and WG 49 (Climate Extremes and Coastal Impacts in the Pacific) topic session proposal was prepared for PICES-2023 (*WG 43 Endnote 4*).

AGENDA ITEM 3

Report of the activities and achievements from the activity groups

Dr. Richard Brodeur presented a summary of Task Force 1: Ecological Process Knowledge – Activity 4: Food-web dynamics. This summarized progress in Activity 4 on multiple topics: Testing the wasp-waist hypothesis, analyzing/compiling information on temporal and spatial variability of predation pressure, study of small pelagic fish through predators’ diets, investigation of how changes in zooplankton affect small pelagic fish, changes in the flow of energy and organic matter (trophic transfer efficiencies) through food webs dominated by small pelagic fish, and the roles of intraguild predation as a factor influencing small pelagic fish and spatial scales of these interactions. Then, the status of the session “*Trophodynamic processes*” proposed for the symposium was introduced. The other activity groups were not reported at the WG 43 meeting because they were not necessarily well represented by the limited number of participants at this time.

AGENDA ITEM 4

Update from FUTURE SSC

Dr. Ryan Rykaczewski and Dr. Jennifer Boldt, FUTURE liaisons to WG 43, presented a summary of update information from FUTURE SSC. This included membership changes, the “product matrix,” a new version of the FUTURE schematic, a potential FUTURE Open Science Meeting, and future of the FUTURE program. Lastly, four contributions to the program of PICES-2022 were highlighted.

AGENDA ITEM 5

Report of the current status of preparation for the symposium and the post-symposium meeting

The status of preparation for the joint PICES/ICES/FAO symposium on “Small Pelagic Fish: New Frontiers in Science and Sustainable Management” (November 7–11, 2022, Lisbon Portugal) and the post-symposium meeting (November 12–13, 2022, Lisbon, Portugal) was reported to the WG 43 members. The WG 43 Co-Chairs are two of the symposium convenors. The scope and structure of the symposium were briefly summarized. This included an introduction of the 5 convenors, 17 scientific steering committee members, 2 symposium coordinators (from PICES and ICES), 8 general plenary speakers, 7 session plenary speakers, and 7 session invited speakers. As of the mid-September, the symposium received a total of 312 abstracts and 369 registrations from 51 countries/regions. The 7 theme sessions and 6 workshops were listed. The symposium schedule was overviewed. The post-symposium meeting was intended to summarize the symposium, expand the network, and identify key issues to achieve the terms of reference. As of the mid-September, the post-symposium meeting received a total of 79 registrants. Special issues are expected to be published in two primary journals.

AGENDA ITEM 6

EG Report/Request to Science Board and Report to FIS and HD

EG Report/Request to Science Board was summarized and introduced by the Co-Chairs to the participants. The slides of the reports to FIS and HS were arranged and prepared based on the reviewed contents. The major

points were summarized in Agenda Items 2 and 5. A potential topic session for PICES-2023 was proposed by members of the WG (*WG 43 Endnote 3*)

AGENDA ITEM 7

Issues to discuss at the post-symposium meeting

The major objectives of the post-symposium meeting were identified as follows:

- Expand the networking environment for international and multidisciplinary collaboration;
- Identify, prioritize, and coordinate research themes based on the issues raised during the symposium;
- Discuss future directions of the groups and studies.

The challenges of conducting simultaneous discussions of multiple activity groups at the plenary meeting was noted, and the strategy of parallel meetings was discussed. Unfortunately, given the limited amount of time available for in-person meetings, some discussions will have to occur in parallel. With regard to the future directions, the difference in membership appointments between PICES and ICES was noted as a potential issue in expanding the network of members. The network was also limited because of lack of in-person meetings during the last few years after the kickoff meeting was held in Copenhagen (mainly by ICES members). Another issue was how to extend the network to non-ICES/PICES member countries. The post-symposium meeting is expected to provide an opportunity of re-uniting the global community.

WG43 Endnote 1

WG43 participation list

Members in attendance

Ryan Rykaczewski (USA, Co-Chair/PICES)
Akinori Takasuka (Japan, Co-Chair/PICES)
Jennifer Boldt (Canada)
Chris Rooper (Canada)
Yuntao Wang (China, as a representative for Fei Chai)
Sachihiko Itoh (Japan)
Shinichiro Nakayama (Japan)
Haruka Nishikawa (Japan)
Motomitsu Takahashi (Japan)
Matthew Baker (USA)
Richard Brodeur (USA)
Isaac C. Kaplan (USA)

Members unable to attend

Canada: Francis Juanes
China: Fei Chai, Xianshi Jin, Yongjun Tian, Hui Zhang, Kui Zhang
Japan: Toshihide Kitakado
Korea: Sukyung Kang, Dohoon Kim, Jung Jin Kim
Russia: Oleg N. Katugin
USA: Noelle M. Bowlin

Observers

Aleksandr Zavolokin (NPFC)

PICES

Vera Trainer (Science Board Chair)
Alex Bychkov (past Executive Secretary)
Lori Waters (Administrative Assistant)

WG 43 Endnote 2**WG43 meeting agenda**

1. Welcome and introduction with brief updates on the members
2. Review of WG 43 terms of reference
3. Report of the activities and achievements from the activity groups
4. Update from FUTURE SSC
5. Report of the current status of preparation for the symposium and the post-symposium meeting
6. EG Report/Request to SB & Report to FIS and HD
7. Issues to discuss at the post-symposium meeting

WG 43 Endnote 3

**Symposium on
 “Small Pelagic Fish: New Frontiers in Science and Sustainable Management”
 November 7–11, 2022, Lisbon, Portugal**

The PICES/ICES/FAO symposium on “Small Pelagic Fish: New Frontiers in Science and Sustainable Management” was held at Calouste Gulbenkian Foundation in Lisbon, Portugal, during November 7–11, 2022. This in-person event had 288 attendees from 39 countries and 6 continents. In total, 44% of the attendees were early career scientists, and the symposium was nearly gender balanced (46.5% she/her, 53.5% he/him). The symposium had plenary sessions, 7 theme sessions (S1–S7), 6 workshops (W1–W6), and poster session to cover a wide range of topics addressing the science and management of small pelagic fish (SPF). These included 278 presentations (194 talks and 84 posters) in total. The workshops were held on November 7; the plenary and theme sessions were held from November 8 to 11.

- S1: Trophodynamic Processes
 S2: Life Cycle Closure: Advances in Process Understanding
 S3: Understanding Population- and Ecosystem-level Shifts: From Seasonal Timing to Tipping Points
 S4: Responses to Climate Variability and Change at Decadal to Centennial Scales
 S5: Progress in Pelagic Surveys: From Biomass Estimates to Monitoring Ecosystems
 S6: Reconciling Ecological Rules and Harvest Goals: Development and Testing Management Strategies to Enhance Marine Ecosystem Services
 S7: Advancing Social-ecological Analyses and Sustainable Policies for Dependent Human Communities
- W1: Application of Genetics to Small Pelagic Fish
 W2: The Devil’s in the Details of Using Species Distribution Models to Inform Multispecies and Ecosystem Models
 W3: Small Pelagics for Whom? Challenges and Opportunities for the Equitable Distribution of Nutritional Benefits
 W4: Evaluating Inter-Sectoral Tradeoffs and Community-Level Response to Spatio-Temporal Changes in Forage Distribution and Abundance
 W5: Recent Advances in the Daily Egg Production Method (DEPM): Challenges and Opportunities
 W6: Small Pelagic Fish Reproductive Resilience

The post-symposium WGSPF meeting was held at Jupiter Lisboa Hotel during November 11–12 immediately after the symposium. The WGSPF meeting had about 60 participants who discussed products from the

symposium topics, including the compilation of world-wide data sets, integrative analyses, and peer-reviewed manuscripts. The meeting also provided an opportunity of broadening the network of working group members, including many early career scientists. Future issues of the WGSPF were discussed and identified.

The report of the symposium, including summaries of theme sessions and workshops will appear in the future issues of PICES Press.

WG 43 Endnote 4

**Proposal for a Topic Session on
“Responses of Small Pelagic Fish to Extreme Events in Pacific Ecosystems”
at PICES-2023**

Co-Convenors: Ryan R. Rykaczewski (USA), Haruka Nishikawa (Japan), Sukgeun Jung (Korea)

Corresponding convenor: Ryan R. Rykaczewski

Duration: 1 day

Populations of small pelagic fish are valuable resources for human communities around the Pacific Rim and an important forage base for higher predators in marine food webs. Describing the relationship between patterns of decadal scale ocean-atmosphere variability and these important fish populations has been a long-standing goal of the scientific community. Oceanographic conditions in recent years, however, have been marked by some notable “extreme events” that exhibited characteristics that differ from the lower-frequency patterns of change previously investigated. Coastal marine heatwaves, hypoxia, harmful algal blooms, and other types of episodic events can have severe socioeconomic consequences and have become the target of ecosystem prediction efforts. To improve our understanding of the mechanisms through which extreme climate events can influence important coastal resources, we invite presentations that investigate the responses of small pelagic fish populations to extreme conditions. Topics might include ecological responses to intense, episodic events in comparison to lower-frequency patterns of change; shifts in population distributions and habitat compression; change in prey or predator abundance; and impacts on coastal fisheries and human communities.