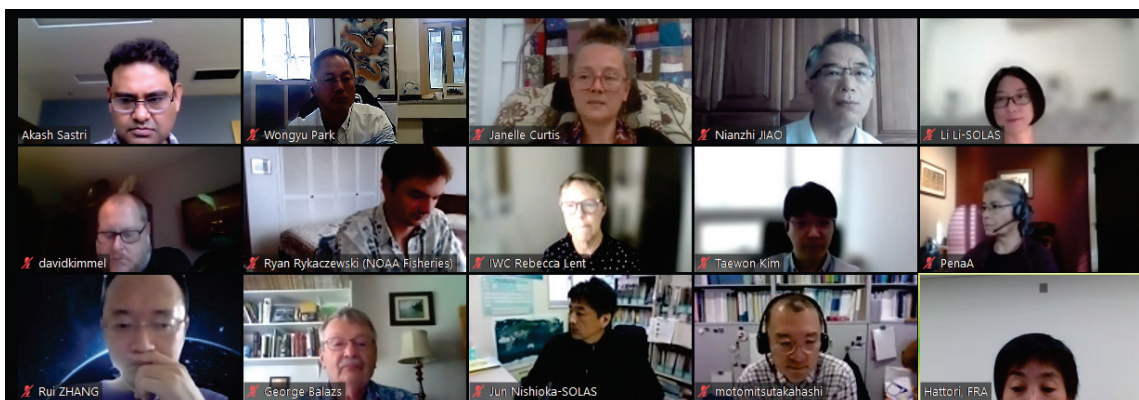


## 2021 Report of the Biological Oceanography Committee

The meetings of the Biological Oceanography Committee (BIO) took place from 17:00–22:00 h on October 4, 2021(PDT) and on October 4, 2021 Pacific Daylight Time via Zoom. The Chair, Dr. Akash Sastri, called the meeting to order and welcomed members and observers. All members in attendance introduced themselves and absent members were noted (*BIO Endnote 1*). The Chair reviewed membership changes and noted that there was no official representation from Russia. Members from all other PICES member countries were present. The draft agenda was circulated. Additions were offered and the agenda was adopted (*BIO Endnote 2*). Dr. Wongyu Park agreed to act as a rapporteur.



BIO meeting participants (pictured only) at PICES-2021, Top row from left: Akash Sastri, Wongyu Park, Janelle Curtis, Nianzhi Jiao, and Li Li. Middle row from left: David Kimmel, Ryan Rykaczewski, Rebecca Lent, Taewon Kim, and Angelica Peña. Bottom row from left: Rui Zhang, George Balazs, Jun Nishioka, Motomitsu Takahashi, and Kaoru Hattori.

### AGENDA ITEM 3

#### Membership changes

- WG 47: New membership currently includes formal appointment of Co-Chairs, Drs. Janelle Curtis (Canada) and Mai Miyamoto (Japan), and twelve members representing all PICES member countries (please see <https://meetings.pices.int/members/working-groups/wg47> for full membership for full membership)
- WG 48: New membership currently includes formal appointment of one co-chair, Dr. Hongsheng Bi (USA), five members representing Canada, Japan, Korea, and USA (please see <https://meetings.pices.int/members/working-groups/wg48>).
- Dr. Youhei Yamashita (Japan) is a newly appointed member of the WG 46.
- Dr. Pavel Tishchenko (Russia) is a newly appointed member of the WG 46.
- Dr. Debby Ianson and Prof. Curtis Suttle are newly appointed members of the WG 46, representing Canada.
- Drs. Lihini Aluwihare and Galen McKinley are the newly appointed members of the WG 46, representing USA.
- Drs. Jihua Liu, Jianfang Chen, Jingfeng Fan, and Rui Zhang are newly appointed members of the WG 46, representing China.
- Dr. Kirsten Holsman (PICES) was elected as a S-CCME Co-Chair, replacing Dr. Jackie King.
- Prof. Samantha Siedlecki and Dr. Simone Alin are new members of S-CC, representing USA.

## BIO – 2021

### AGENDA ITEM 4

#### **Annual review of BIO activities**

Not discussed at the meeting.

### AGENDA ITEM 5

#### **Publications**

- PICES Special Publication 7: Marine Ecosystems of the North Pacific Ocean 2009–2016: Synthesis Report. Chandler, P.C. and Yoo, S. [Eds.] 2021
- Climate, Zooplankton, and Salmon. *Progress in Oceanography*. Bill Peterson Special Commemorative Issue. (<https://www.sciencedirect.com/journal/progress-in-oceanography/special-issue/10QPWQRFKQ6>)

### AGENDA ITEM 6

#### **Selection of Best ECS presentation for BIO**

Judges for BIO-sponsored topic sessions, workshops, and the general e-poster session were assigned during the BIO Committee meeting. The best ECS presentation was awarded to Dr. Minako Kurisu presenting her paper on “*Estimation of the contribution of combustion Fe in marine aerosols over the North Pacific using Fe stable isotope ratios*” in BIO/POC Topic Session S5: *Atmospheric nutrient deposition and microbial community responses, and predictions for the future in the North Pacific Ocean*).

### AGENDA ITEM 7

#### **Progressive reports and future plans of BIO active groups**

##### **a) WG 37: Working Group on Zooplankton Production Methodologies, Applications and Measurements in PICES Regions**

Dr. Akash Sastri (WG 37 co-chaired with Dr. Toru Kobari) updated BIO on WG 37 activities. WG 37 has developed an interactive website for exchange of information on zooplankton production measurements for regional and/or global mapping. Implementation of a secondary production calculator on the NOAA Copepodite time series toolkit and a FigShare raw data repository are in progress. WG 37 completed its final report draft (ToR7), received two positive reviews, and submitted to BIO and Science Board for approval/recommendation.

##### **b) WG 46: Joint PICES/ICES Working Group on Ocean Negative Carbon Emissions (ONCE)**

Dr. Nianzhi Jiao presented an update on Ocean Negative Carbon Emissions (ONCE). WG-ONCE is co-chaired by Drs. Nianzhi Jiao and Doug Wallace (PICES) and Drs. Carol Robinson and Louis Legendre (ICES). Four meetings were convened in 2021. The WG 46 kick-off meeting was held on July 8, 2021. At the meeting, Task Teams were created, and logo design and website were constructed. Also, missions were given. A subgroup meeting of Chinese members was held on September 20, 2021. During this meeting, the members shared their progress toward each task and the scientific objectives of the WG as well as preparation facilitating effective discussion for business meetings. The WG Co-Chairs convened a business meeting on September 17, 2021. A PICES WG 46 business meeting in conjunction with an ICES WG-

ONCE workshop was also convened on September 24, 2021. Three task teams were assigned in relation to each ToR. Five action items were assigned to each subgroup. One ONCE experimental site was decided.

Two papers were published: Jiao et al., (2020) *Microbes mediated comprehensive carbon sequestration for negative emission* in the Ocean. National Science Review 7, 1858-1860; Jiao et al., (2021) *Technical roadmap and strategic thinking of ocean negative emission aiming carbon neutrality*, Bulletin of Chinese Academy of Sciences: Special Issue 2021.

#### **c) WG 47: Working Group on Ecology of Seamounts**

Dr. Janelle Curtis updated the BIO Committee on WG 47: *Ecology of Seamounts*. WG 47 had two meetings in 2021: 1) Inter-sessional business meeting on 15 June 15 and 2) annual business meeting on September 20, 2021. WG-47 resubmitted their workshop proposal on “*Distribution of pelagic, demersal, and benthic species associated with seamounts in the North Pacific ocean and factors influencing their distributions*” for PICES-2022. WG 47 requested a one-year extension to complete its ToR and recommend that Drs. Chris Rooper and Jackson Chu be added as Canadian members because of their knowledge, expertise, and interest in developing models to predict the distribution of seamount taxa and climate-induced changes to their biogenic habitats. Dr. Jackson Chu would also represent a second WG 47 Early Career Ocean Professional (ECOP), in addition to Dr. Mai Miyamoto (WG 47 Co-Chair).

#### **d) WG 48: Working Group on Towards best practices using Imaging Systems for Monitoring Plankton**

Dr. David Kimmel updated the BIO Committee on WG 48 “Towards best practices using imaging systems for monitoring plankton” activities. The goals of WG 48 are to summarize the strengths, limitations, and recent progress of imaging systems and deployment platforms which could facilitate the deployment of imaging systems for plankton monitoring; to establish standard libraries and protocols to compare different automated plankton recognition and enumeration procedures; and to develop sampling methods that are routinely applicable to natural plankton populations and communities across a wide range of phyla and trophic levels. WG 47 currently has seven members and expects a group membership of ~15. WG 47 recommends that Russian and early career scientists take part in the WG. Two co-chairs have yet to be confirmed and Dr. Kimmel requested a review by Science Board and Governing Council. Dr. Piotr Margonski has been confirmed as *ex officio* member and representative from ICES. WG 48 held its annual business meeting on September 7, 2021 and convened an inter-sessional Zoom meeting March 30, 2021 to discuss schedules, plans, and assignment of contributors for ToR and deliverables. WG 47 will convene a scientific session, *Towards best practices for using imaging systems for plankton monitoring*, at the Ocean Sciences Meeting, February 2022 and another for the PICES annual meeting in 2022. Developing a listing of experts on plankton imaging systems and plankton monitoring among PICES member countries is ongoing. Previously published articles need to be reviewed for preliminary review of the advantages and limitations of different imaging systems for plankton monitoring and for case studies.

#### **e) S-CCME: Section on Climate Change Effects on Marine Ecosystem**

Dr. Angelica Peña provided an update on Climate Change Impacts on Marine Ecosystems (S-CCME/SICCM) 2021 activities and accomplishments. Drs. Kirstin Holsman (USA) and Xiujuan Shan (China) act as Co-Chairs from PICES. Drs. Kathy Mills (USA) and Alan Baudron (Scotland) are the new ICES strategic initiative members. S-CCME has progressed with regional advancements in coordination and implementation of integrated coupled ocean-biological-social economic modeling. Two S-CCME members

(Drs. Shin-ichi Ito and Kirstin Holsman) represented authorship for IPCC WGII AR6. Members are currently engaged in multiple ongoing ICES/PICES collaborative working groups (WG 45/WGGRAFY, WKCLIMAD, SNAPP) and UN Decade working groups (SMARTNET, SUPREME, Fish SCORE, SG-UNDOS, IPOD). The S-CCME examples of regional activities are: The development of an integrated forecasting system in Korean waters during 2018–2022; an integrated research program for advancing climate models (TOUGOU project) in Japan; a prototype regional MOM6 + BGC model configurations in the USA; Climate smart decision support tools in the USA; and the Alaska climate integrated modelling project (ACLIM).

**f) S-CC: Section on *Carbon and Climate***

Dr. Tsuneo Ono gave an update on S-CC (Section on *Carbon and Climate*) activities to BIO. Dr. Akihiko Murata (Japan) stepped down and was replaced by Dr. Masahide Wakita (Japan). The ISO/DIS 5667-26 “Guidance on sampling for the parameters of the oceanic carbon dioxide system” was prepared by reproduction of PICES Special Publication 3, “Guide to best practices for Ocean CO<sub>2</sub> measurements.” S-CC has started a collaboration with the IOC/UNESCO sponsored program “Global Ocean Oxygen Network (GO2NE)” toward publication of the Global Ocean Oxygen Atlas (GO2AT). Two international sessions were held by S-CC. An ICES ASC 2021 theme session, “*Taking stock on ocean acidification research for provision of future efforts*” was held on September 9, 2021 (Dr. Ono was a Co-Convenor). The PICES- 2021 Topic Session, S6, “*Connecting knowledge of ocean deoxygenation in coastal and offshore regions of the North Pacific*” will be held on October 27, 2021. Upcoming activities of the S-CC are: Construction of coastal pH and oxygen metadatabase (ongoing from 2020); and science sessions proposed for 2023. The ToR of S-CC was partially revised to coordinate and encourage ongoing and planned national international syntheses of research regarding biogeochemical cycles of carbon, oxygen, and nutrients in the North Pacific for the larger Pacific basin, and a new item was added as enhancing cross-disciplinary collaboration across climate, ocean biogeochemistry, biology and fisheries on issues such as the biological effects of ocean acidification and deoxygenation.

**g) S-MBM: Section on *Marine Birds and Mammals*, planned activities and proposals for 2022**

Dr. Hattori (S-MBM Co-Chair) summarized the Section’s 2015–2020 S-MBM project and updated its annual activities. S-MBM completed data acquisition, analyses, and model validation needed to finalize its report on “Food requirements for marine mammals in the North Pacific” to be tabled and presented at PICES-2022. An ICES theme session titled “*Top predators, food webs, and ecosystem-based fisheries management*” and co-convened by Dr. Andrew Trites was held on September 10, 2021., S-MBM members (K. Morgan and P. O’Hara) also participated in WG 47’s business meeting, identifying a number of common interests with respect to terms of reference and work/activity plans. S-MBM co-convenor (O’Hara) has proposed a session for the Ocean Sciences Meeting of February 27 to March 4, 2022. Planning activities for S-MBM during 2021–2025 includes workshops: Anthropogenic stressors (Yutaka Watanuki, Miran Kim, Patrick O’Hara), Climate changes (Bill Sydeman, Kaoru Hattori, Patrick O’Hara), Forage fish changes (Hyun Woo Kim, Elliott Hazen), and MBMs as indicators (Rolf Ream, Bill Sydeman). S-MBM requires participants from Russia and China. Dr. Tamura reported 2021 IWC Scientific Committee meeting as the PICES observer. International symposia related to S-MBM include the World Seabird Conference, the Pacific Seabird Group Meeting, and the Marine Mammal Conference.

**h) SEAturtle: Special project on *Sea turtle ecology in relation to environmental stressors in the Northwest Pacific regions***

Dr. Taewon Kim (Korea, Co-Chair) updated the BIO Committee on the Special Project on Sea Turtle Ecology (SEAturtle). The SEAturtle Project Science Team convened an inter-sessional meeting online on March 1, 2021. SEAturtle conducted dive research on the correlation between the frequency of sea turtle strandings and the number of derelict fishing gears on the northwest coast of Jeju island from August 17 to September 5, 2020. SEAturtle published an article on “Seven sea turtle released with Iridium tags of PICES SEA turtle project in 2019–2020” in PICES Press Vol. 29, No. 2.

AGENDA ITEM 8

**FUTURE update**

Dr. Ryan Rykaczewski, FUTURE SSC liaison, updated the BIO Committee on FUTURE activities, including transitioning from Phase II to a new Phase III in 2021. He introduced the Phase III Implementation Plan intended to utilize recent accomplishments. Revised Future SSC liaison assignments were presented. Dr. Rykaczewski is now also liaison to S-CCME. FUTURE SSC 2020–2021 activities included: finalizing FUTURE Phase III Science and Implementation Plans in April 2020; completing a joint PICES/ICES proposal for a Study Group on the *UN Decade of Ocean Science* in August 2020; and a virtual FUTURE SSC 2020 annual meeting in October 2020. An inter-sessional virtual SSC meeting was convened in April 2021. The FUTURE Product Matrix was also completed in April 2021. Finally, progress on the FUTURE Phase II final report in October 2021, and progress on the 2023 Open Science Symposium were also discussed. A Working Group proposal on *Climate Extremes and Coastal Impacts in the Pacific* to be parented by the FUTURE SSC was presented. The second FUTURE Open Science Meeting (OSM) is planned for February 2023. FUTURE SSC will serve as OSM organizing committee.

AGENDA ITEM 9

**PICES data policy and inventory**

Not discussed.

AGENDA ITEM 10

**Relation with other international organizations/programs**

Dr. Rebecca Lent (International Whaling Committee, IWC Executive Secretary) updated BIO on IWC activities and its celebration of 75 years of science. Many participants representing many countries from around the world took part in the 2nd IWC Scientific Committee meeting. Topics on trends of whale populations, health and threats were communicated at the meeting. A poster was presented addressing key threats to cetaceans today. The next IWC Scientific Committee meeting will be held in Bled, Slovenia, from 26 April to 8 May 2022.

IWC poster (I. Staniland: <https://meetings.pices.int/Publications/Presentations/PICES-2021/IWC-2021.jpg>)

Drs. Li Li and Jun Nishoka updated the BIO Committee on behalf of Surface Ocean Lower Atmosphere Study (SOLAS). Core themes of SOLAS include greenhouse gases and the oceans, air–sea interface and fluxes of mass and energy, atmospheric deposition and ocean biogeochemistry, interconnections between aerosols, clouds, and marine ecosystems, and ocean biogeochemical controls on atmospheric chemistry. The

virtual PICES-2021 SOLAS Topic Session (VS5), *Atmospheric nutrient deposition and microbial community responses, and prediction for the future in the North Pacific Ocean* was convened by Drs. Jun Nishioka (Japan), Guiling Zhang and Huiwang Gao (China), Santiago Gasso (USA), Kitack Lee (Korea), and Maurice Levasseur (Canada), and included three live oral, three recorded oral, and four E-Poster presentations. SOLAS has had new governance structure since 2021 with co-chairs and dual international project offices (IPO): Kiel, Germany and Xiamen, China. Cliff Law (New Zealand) and Minhan Dai (China) co-chair SOLAS. A new SOLAS structured research Master's Program was established in Galway, Ireland. Courses of the Master's Program includes four core modules and two optionals and research projects conducted with leading SOLAS scientists worldwide. First admission will be allowed in September 2022. The SOLAS implementation team meeting was held on October 11, 2021 to discuss the idea of a UN Decade proposal, in collaboration with other international organisations and to build a scientific collaborative and governance body to facilitate and guide input from the scientific community to policy decisions online and the 2nd SOLAS meeting will be held in 2022. Special issue on SOLAS research in the Indian Ocean will be published. The 8th SOLAS summer school will open in Cape Town, South Africa on September 25–30, 2022.

SOLAS Poster (L. Li: <https://meetings.pices.int/Publications/Presentations/PICES-2021/SOLAS-2021.pdf>)

Dr. Janelle Curtis updated BIO on behalf of the North Pacific Fisheries Commission (NPFC) on activities during the past year and presented the [NPFC-PICES framework](#) developed in 2019 for enhanced scientific collaboration in the North Pacific. In it, NPFC and PICES identified three top priorities: Support for stock assessment of priority species; Vulnerable marine ecosystems (VMEs); and developing an ecosystem approach to fisheries management. Joint activities of NPFC during 2020–2021 were that NPFC and PICES representatives attended each other's Annual Meetings (PICES-2020 and NPFC's Scientific Committee Meeting). Also, NPFC representatives took part in the joint PICES/ICES Working Group on Small Pelagic Fish (WG 43). The joint PICES/NPFC international course/workshop on VME indicator taxa identification, with a financial contribution of 15,000 USD from each organization was postponed to 2022. NPFC requested a recommendation for 2022 workshop on biodiversity of seamounts and proposed research which aligns with the NPFC-PICES framework for enhanced scientific collaboration in the North Pacific.

NPFC Poster (J. Curtis: <https://meetings.pices.int/Publications/Presentations/PICES-2021/NPFC-2021.pdf>)

#### AGENDA ITEM 11

##### **Review proposals of new Expert Groups**

There were no new expert group proposals for BIO to review.

#### AGENDA ITEM 12

##### **Planning for PICES-2022**

The following PICES-2022 (Busan, Korea; Sept. 23–Oct. 2, 2022) topic session and workshop proposals were discussed following presentations by expert group representative.

- WG 48: Proposed 1-day Session: “*Application and best practice of imaging technologies for plankton and ecosystem monitoring*”.
- WG 47: Proposed 2-day Workshop: “*Distributions of pelagic, demersal, and benthic species associated with seamounts in the North Pacific Ocean and factors influencing their distributions*”.
- S-MBM, WG 33: Proposed 1-day Workshop: “*Anthropogenic stressors, mechanisms and potential impacts on Marine Birds and Mammals*”.

- S-CCME: Proposed 1-day Topic Session: “*Forecasting and projecting climate variability and change on northern hemisphere marine ecosystems using coupled next generation biophysical models*”.
- S-CCME: Proposed 1-day (2 × 0.5) virtual inter-sessional workshop: “*Integrated climate modeling to identify thresholds, limits, and tipping points in marine ecosystems: current progress and future needs*”.
- WG 37: Proposed 1-day Topic Session: “*Recognizing the importance of zooplankton to fisheries research*” (BIO Endnote 3).

AGENDA ITEM 13

**PICES-sponsored conference/symposia in 2021 and beyond**

- December 2021, MSEAS-2021 (2nd PICES/ICES International Marine Socio-Ecological Symposium). Postponed due to COVID-19.. Yokohama, Japan;
- May 9–12, 2022, ECS Conference (*4th ICES/PICES Early Career Scientist Conference*). St. John’s, Newfoundland, Canada;
- November 7–11, 2022, SPF-2022 (PICES/ICES/FAO International Symposium on *Small Pelagic Fish: New Frontiers in Science and Sustainable Management*). Lisbon, Portugal;
- April 17–21, 2023, ECCWO5 (5th ICES/PICES/IOC/FAO International Symposium on *The Effects of Climate Change on the World’s Oceans*). Bergen, Norway.

AGENDA ITEM 14

**Capacity building**

Not discussed.

AGENDA ITEM 15

**Documenting meetings, topic sessions and workshops**

Dr. Sastri reminded BIO expert group Co-Chairs that summary reports should be submitted to the Secretariat within one month of the Annual Meeting.

AGENDA ITEM 16

**Other business**

None

AGENDA ITEM 17

**Adoption of BIO report and recommendations**

All proposed sessions/workshops were supported by the BIO Committee and recommended to Science Board.

*BIO Endnote I*

**BIO participation list**

Members

Akash Sastri (Canada, Chair)  
Wongyu Park (Korea, Vice-Chair)  
Janelle Curtis (Canada)  
Angelica Peña (Canada)  
Kaoru Hattori (Japan)  
Motomitsu Takahashi (Japan)  
Taewon Kim (Korea)  
Julie Keister (USA)  
David Kimmel (USA)

Members unable to attend

China: Jinhui Wang, Zijun Xu, Ping Zhuang  
Japan: Atsushi Tsuda  
Korea: Se-Jong Ju  
Russia: Alexei M. Orlov  
USA: M. Debora Iglesias-Rodriguez

Observers

Julia Yazvenko (PICES Secretariat)  
George Balazs (USA, SEAturtle Co-Chair )  
Nianzhi Jiao (China, WG 46 Co-Chair)  
Alexander Kozyr (USA, S-CC Co-Chair)  
Rebecca Lent (IWC)  
Li Li (SOLAS)  
Jun Nishioka (SOLAS)  
Patrick O'Hara (Canada, S-MBM Co-Chair)  
Tsuneo Ono (Japan, S-CC Co-Chair)  
Ryan Rykaczewski (USA, WG 43 Co-  
Chair/PICES; FUTURE SSC liaison)  
Rui Zhang (WG 46)



**BIO Endnote 2**

**BIO Committee meeting agenda  
PICES 2021, Virtual Meeting**

Monday, October 4, 2020, 17:00-21:00 (Sidney, BC, PT)

Thursday, October 7, 2020, 17:00-20:00 (Sidney, BC, PT)

Location/Time Zone	Dates	Local Time
West Coast North America [PDT,UTC-7]	October 4, October 7	Day 1: 1700-2100 Day 2: 1700-2000
Russia [Moscow, MSK, UTC+3]	October 5, October 8	Day 1: 0300-0700 Day 2: 0300-0600
China [CST, UTC+8]	October 5, October 8	Day 1: 0800-1200 Day 2: 0800-1100
Japan [JST, UTC+9]	October 5, October 8	Day 1: 0900-1300 Day 2: 0900-1200
Korea [KST, UTC+9]	October 5, October 8	Day 1: 0900-1300 Day 2: 0900-1200
Russia [Vladivostok, VLAT, UTC+10]	October 5, October 8	Day 1: 1000-1400 Day 2: 1000-1300

1. Welcome, introductions, opening remarks
2. Adoption of agenda and appointment of rapporteur
3. Membership changes:
4. Annual review of BIO activities
5. Publications
6. Selection of Best ECS presentations for BIO
7. Progressive reports and future plans of BIO active groups
8. FUTURE Program: Science Program update (R. Rykaczewski)
9. PICES data policy and inventory (<https://meetings.pices.int/about/PICES-Policy>)
10. Relation with other international organizations/programs.
11. Review proposals of new Expert Groups (if any proposals submitted)
12. Planning PICES 2022 Annual Meeting (Busan, Korea; Sept. 23 –Oct. 2, 2022)
13. (submitted online as of September 27th)
14. PICES-sponsored conference/symposia in 2021 and beyond
15. Capacity Building
16. Documenting business meetings, topic sessions and workshops
17. Other business
18. Adoption of BIO report and recommendations to Science Board

**BIO Endnote 3**

**Proposal for Topic Session on “*Recognizing the importance of zooplankton to fisheries research*”  
for PICES-2022**

Duration: 1-day Session

Conveners:

Karyn Suchy, Canada

Hui Liu, USA

Lidia Yebra, Spain

Toru Kobari, Japan

Zooplankton play a key role in the transfer of energy from primary producers to higher trophic levels and are thus highly relevant to fisheries dynamics and to the overall function of ocean ecosystems. Despite their key role, routine estimates of zooplankton production remain rare, resulting in a knowledge gap with respect to how variations in zooplankton may impact the growth and survival of larval and juvenile fishes. Further, the current development of ecosystem based management of fisheries may benefit from the incorporation of zooplankton data. Built upon the recent effort of PICES WG37, the main goal of this session is to bring diverse researchers together on topics ranging from zooplankton to fisheries management in order to better understand the knowledge gap of the critical link between secondary producers and fisheries dynamics in light of climate change. Studies linking zooplankton productivity to fish larvae and recruitment dynamics are especially encouraged. Contributions from experimental, observational, and modeling approaches are welcomed.

Suggested invited speaker:

Jennifer Boldt, Canada – Pacific herring, ecosystem indicators, zooplankton in Strait of Georgia, BC, Canada