

2023 Report of the Biological Oceanography Committee

The 2023 Biological Oceanography Committee (BIO) meetings took place from 18:00-21:00 PDT on 4 October 2023 online and from 18:00-20:30 PDT on 21 October 2023 in person at PICES-2023 in Seattle, USA. The Chair, Dr. Akash Sastri, called the meeting to order and welcomed members and observers at both meetings. At the in-person meeting, all individuals attended in person, with Dr. Curtis Suttle attending via Zoom (*BIO Endnote 1*). All members in attendance introduced themselves and absent members were noted. The chair reviewed membership changes and noted there was no official representation from Russia. Members from all other PICES member countries were present. The draft agenda was circulated and the agenda was adopted (*BIO Endnote 2*). Dr. David Kimmel agreed to act as rapporteur.

AGENDA ITEM 2

Membership changes since PICES 2022

- Prof. Toru Kobari (Japan) is a new member of BIO replacing Prof. Atsushi Tsuda.
- Prof. Xuelei Zhang is a new member of BIO representing China.
- Dr. Kota Sawada (Japan) new member of WG47 replacing Mr. Tatsuki Oshima.
- Dr. Kuidong Xu is a new member of WG47 representing China

AGENDA ITEM 4

Annual review of BIO activities

Not discussed.

AGENDA ITEM 5

Publications

- PICES Sci. Rep. No. 63. Toru Kobari, Akash Sastri and Lidia Yebra (Eds.) 2022. Report of Working Group 37 on Zooplankton Production Methodologies, Applications and Measurements in PICES Regions

AGENDA ITEM 6

Selection of best ECOP presentations for BIO

Judges for BIO-sponsored topic sessions, workshops, and poster sessions were assigned during the online BIO committee meeting and finalized at the in-person meeting. The best ECOP BIO oral presentation was awarded to Anna McLaskey (Canada) presenting in the BIO Paper Session: *Inter-specific differences outweigh seasonal variability in zooplankton trophic markers, revealing distinct roles within a complex food web*. The best ECS BIO Poster Presentation was awarded to H. William Fennie (USA) presenting in the S11 Poster Session: *Increased temperature decreases starvation resiliency in first feeding Sablefish* (*Anoplopma fimbria*)

AGENDA ITEM 7

Progress reports and future plans of BIO active groups

a) WG46: PICES/ICES Ocean Negative Carbon Emissions (ONCE) (N. Jiao/ D. Wallace/R. Zhang) Dr. Nianzhi Jiao presented an update on Ocean Negative Carbon Emission (ONCE) at the in-person meeting. This group will also report to the Physical Oceanography Committee. The Terms of Reference were reviewed and the WG has established eight locations along the Chinese coast to observe the carbon geochemical cycle. The Global ONCE has been endorsed by the UN Decade Program. A new working group proposal was introduced. WG46 was largely theoretical and the goal was to identify knowledge gaps and future research

directions. The new working group proposes to link scientific theories with techniques, improve activities to remove more carbon from the ocean. Key topics will include: integrated theoretical framework of the carbon cycle; synergistic effects on climate change of the oceanic carbon pumps under anthropogenic impacts; innovative technologies for oceanic eco-engineering; sustainable coastal aquaculture and carbon negative emissions; and feasibility of ocean carbon negative emissions approaches. Deliverables will be: an international network of collaboration/communication; co-designed research strategy and technical protocols; develop an assessment framework for ONCE approaches; facilitate capacity building, equitable policy, governance, and societal understanding. The new working group will be a joint one with PICES and a prospective member list was presented.

b) WG 47: Ecology of Seamounts (J. Curtis/M. Miyamoto)

Co-chair Dr. Janelle Curtis updated the BIO Committee during the online meeting. WG 47's annual business meeting was held on 14 Sep 2023. Five of the 16 members were present and the in-person meeting was scheduled for 25 October 2023. An update on the WG member expertise, research interests, and anticipated contributions to WG 47 TOR was presented. The WG sponsored a session at PICES 2023: S14: Seamount diversity: vulnerable marine ecosystems (VMEs) and species associated with seamounts in the North Pacific Ocean. An update on progress towards the TOR was presented. Most TOR will be completed by 2023, primary efforts have been to gather data on key variables hypothesized to influence seamount species, much of this done during a 2-day workshop held at PICES 2022. The workshop outcome was the identification of environmental and ecological predictors of patterns in benthic taxa and the discussion of modeling approaches to predict distributions of biodiversity. Work needs to be done to address the outstanding TOR including: applying modeling approaches to predict distribution; using data to predict climate-induced changes in the distribution of seamount fauna; identifying potential indicators for assessing and monitoring the biodiversity of pelagic, demersal, and benthic taxa associated with seamounts; using cluster analysis to review and document ecological interactions among seamount taxa. Dr. Curtis made a request to the Science Board to change TOR to exclude: 1) predicting climate-related changes to species distributions; 2) undertaking analyses to document ecological interactions among seamount taxa; and 3) Changing its TOR from a focus on “pelagic, demersal, and benthic” to “pelagic, demersal, or benthic.”

c) WG 48: Towards best practices using Imaging Systems for Monitoring Plankton. (H. Bi/ X. Cheng/D. Kimmel)

Co-chair Dr. Hongsheng Bi updated the BIO committee on WG48's activities during the online meeting. The annual business meeting will be held on 17 October 2023. The TOR were presented and two, new ECOP members were proposed for membership: Sabrina Groves (University of Maryland) and Junbai Ye (Tsinghua University). Activities during the past year were presented. Work is underway drafting a review paper: “A primer on underwater plankton imaging systems.” This is a full review on different types of underwater plankton imaging systems based on the fundamental properties of light behavior in water. Paper is in draft and additional writing duties were assigned to specific group members at the online business meeting. The WG sponsored Session 2 Applications of Deep Learning Systems in Marine Science at PICES 2023. A session proposal was also submitted for PICES 2024: Rapid Plankton Assessment for Ecosystem Assessment. The WG also sponsored a special issue in the journal *Frontiers in Marine Science* that handled over 50 submissions. Finally, the WG has co-sponsored a session with several others at the 7th International Zooplankton Production Symposium, co-sponsored by PICES, to be held in Hobart, Australia in March 2024.

d) S-CCME: Section on Climate Change Effects on Marine Ecosystems (K. Holsman)

Co-chair Dr. Kirstin Holsman updated the BIO committee on S-CCME's activities during the in-person meeting. An overview of S-CCME membership was presented as well as the goals of S-CCME. Goals of S-CCME are to: coordinate and integrate the research activities for climate change impacts; plan strategies for sustaining delivery of ecosystem goods and services; define and quantify the vulnerability and sustainability of marine ecosystems to climate change; build global ocean prediction frameworks through international collaboration and research. In the past year, S-CCME sponsored Session 7 at PICES 2022 in Busan, Korea: Forecasting and projecting climate variability and change on northern hemisphere marine ecosystems using coupled next-generation biophysical model. Workshop 5 at Effects of Climate Change on the World's Ocean 5 in Bergen, Norway: S-

CCME/SICCME Workshop on integrated modeling to identify climate change tipping points in marine ecosystems. Workshop 10 at PICES 2023 in Seattle, USA: Towards climate-informed ecosystem-based fisheries management by building international collaborators and standardizing indicators. S-CCME has also sponsored a session at ICES 2023 and has proposed a session for ICES 2024. S-CCME has also contributed to WKCLIMAD workshop report (<https://www.ices.dk/community/groups/Pages/WKCLIMAD.aspx>), the US 5th National Climate Assessment (<https://nca2023.globalchange.gov/>), and FISHSCORE aimed at climate change adaptation for fisheries and fishing communities (<https://oceandecade.org/actions/fisheries-strategies-for-changing-oceans-and-resilient-ecosystems-by-2030/>).

e) S-CC: Section on Carbon and Climate (T. Ono /A. Kozyr)

Co-chair Dr. Tsuneo Ono updated the BIO committee on S-CC activities at the online meeting. Achievements in the past year include correction of metadata for domestic coastal ocean acidification/deoxygenation monitoring sites are almost finished (delayed by TCODE catalog HP shutdown). Session 7 at PICES 2023: Ocean acidification and deoxygenation in ocean margin ecosystems: causes and consequences for ecosystems and fisheries. Proposed a new session for PICES 2024: Changing ocean carbon cycle and its consequences for the ocean environment: detection, prediction, and mitigation. Several S-CC members have also proposed a new Japan-China joint research program for ECS oxygen trend analysis.

f) S-MBM: Section on Marine Birds and Mammals (M. Kim / P. O’Hara)

Co-chair Dr. Patrick O’Hara updated the BIO committee on S-CC activities. The S-MBM business meeting was held on 18 September 2023 with 9 attendees from China, Korea, Japan, US, and Canada. No Russian representation was present. In-person meeting will be held on 20 October 2023. There was no change in membership and Dr. O’Hara will remain co-chair until a replacement is identified. T. Tamura presented to the group a report on behalf of the International Whaling Commission (IWC). S-MBM was well represented at the Pacific Seabird Group Annual Meeting in La Jolla, USA in February 2023. S-MBM has also been involved with many other PICES groups: S-CCME, BIO, WG42, WG44, and WG47 observers, and providing at-sea survey expertise. Planning activities for the coming year include: changes in forage species and response of MBM, MBMs as ecological indicators, and synthesis activities. S-MBM sponsored a workshop at PICES 2023: Bio-indicators of meso to global scale marine pollution: techniques for integration and standardization and topic session 11: Anticipated and realized effects of climate change on predatory fish, birds, and mammals of the North Pacific. For PICES 2024, S-MBM has proposed a workshop on puffin diet samples as indicators of forage nekton and community structure in the Aleutian marine ecosystem and a topic session: social, economic, and ecological implications of recoveries, range expansions and shifting distributions of marine birds, mammals, and fish. S-MBM made two requests to BIO: 1) a full-day meeting in 2024, but again divided into 2 half days and 2) enlist new members and replace O’Hara as co-chair.

g) SEAturtle: Special project on Sea turtle ecology in relation to environmental stressors in the Northwest Pacific regions (T. Kim/ G. Balazs)

Co-chair Dr. Taewon Kim updated the BIO committee on SEAturtle. SEAturtle is in its final year. Highlights of the project include a total of 16 individual turtles tagged and some of the results of these tags were presented. Three publications were presented on: marine debris ingestion by a fin whale stranded on Jeju Island; the link between derelict fishing gear and sea turtle strandings, and microplastics in sea turtles. Three posters that presented work from SEAturtle were given at PICES 2023. Two students will finish with their MS degrees by the end of the project.

AGENDA ITEM 8

FUTURE Program update

Liaison to BIO, Dr. Ryan Rykaczewski, updated the BIO committee on FUTURE. Phase III Priorities were presented and included the goal of maintaining a Flagship Science Program (such as FUTURE) to integrate PICES science. FUTURE wishes to maintain the momentum of FUTURE and proceed with Phase III tasks (not wind down). FUTURE would like to increase ECOP membership across PICES as well as facilitate cross-pollination across FUTURE, AP-UNDOS, AP-ECOP, AP-SciComm. FUTURE would like to have a renewed

focus on science-based solution activities and operational products. FUTURE suggests a rethink around a new Science Program for PICES informed by emergent themes identified in UNDOS occurring around 2025-2027. FUTURE has sponsored an ECOP SEES award to encourage recognition and application of SEES (interdisciplinary approach) to engage early career scientists in PICES activities. The reward provides funds to support travel funds, and this year's awardee was Vivitskaia JD Tulloch from the University of British Columbia, Canada. FUTURE is currently drafting a review paper that focuses on lessons learned from the FUTURE program. Finally, FUTURE will sponsor a one-day symposium at PICES 2024 focused on near-term forecasts of conditions in the North Pacific.

AGENDA ITEM 9

PICES data policy and inventory (<https://meetings.pices.int/about/PICES-Policy>)

Not discussed.

AGENDA ITEM 10

Relation with other international organizations/programs

a) International Whaling Commission (IWC; T. Tamura)

Dr. Tsutomu Tamura presented a written summary of the IWC 2023 Scientific Committee Meeting, convened from April 24 to May 26, 2023, in Bled, Slovenia. This was the first post-COVID in-person meeting of the IWC Scientific Committee attended by 255 participants and saw the establishment of ten sub-committees, three working groups, and three ad hoc working groups. Dr. Tamura provided BIO committee members with details of the comprehensive assessments of common minke, humpback and sei whales in the North Pacific by the assessment (IA) sub-committee. For North Pacific sei whales, the committee was unable to identify a population model which consistently integrated all available information and recommended an intersessional WG to further address this challenge. An intersessional working group was also established to run sensitivity analyses on five stock structure and bycatch models for North Pacific minke whale populations. Analyses of North Pacific humpback whale abundance and genetic data started in 2016 continue and are currently two stock structure hypotheses. Dr. Tamura also updated BIO on activities of the International Cruises (ASI): Working Group; and the IWC-POWER collaboration between IWC and Japan. Both programs provide estimates of cetacean abundance and stock status based on observational programs. The IWC Scientific Committee report is available at <https://archive.iwc.int/pages/view.php?ref=20108&k=>. The next Scientific Committee (SC/69B) will be held in Bled, Slovenia, from April to May. Due to budgetary constraints, biennial meetings will be scheduled after 2024.

b) North Pacific Fisheries Commission (NPFC; J. Curtis)

Dr. Janelle Curtis presented an update on the North Pacific Fisheries Commission's Activities. NPFC is a regional fishery management organization, similar to PICES. The main priorities are to support stock assessment of 8 priority species, identify vulnerable marine ecosystems, and apply the ecosystem approach to fisheries management. Joint activities with PICES include attending each other's meetings and NPFC has representation on the WG focused on small, pelagic fishes. NPFC co-sponsored and participated in the PICES-ICES-FAO Small Pelagic Fish Symposium in Lisbon, Portugal in 2023. Co-convened a session during PICES 2022 on Environmental variability and small pelagic fishes in the North Pacific Ocean. PICES and NPFC held a joint international course/workshop on VME indicator taxa identification. NPFC expressed interest in PICES WG47 and support for development and implementation of the BECI (Basin Scale Events to Coastal Impacts) in line with the NPFC-PICES Framework for Enhanced Scientific Collaboration.

c) Surface Ocean Lower Atmosphere Study (SOLAS; R. Stanley)

Dr. Rachel Stanly presented an update on SOLAS. SOLAS aims to connect scientists working in the same areas, both the five core themes and two cross-cutting themes dedicated to quantitative understanding of the key biogeochemical physical interactions between the ocean and atmosphere. A list of things SOLAS has done

recently was given and included: an early career scientist committee, southeast Asia regional panel, development of a regional panel in Latin America, SOLAS fire initiative, eddy-covariance initiative, modeling initiative, post-doc program on marine carbon dioxide removal, 8th SOLAS open science conference, and 9th SOLAS summer school. A host of upcoming events under the SOLAS program were presented. SOLAS is planning its future, i.e. what to do over the next 10 years. A new science plan is being drafted focused on science to solutions with an eye to development skills within the community that includes toolboxes and data. To join SOLAS, please go to the website: <https://www.solas-int.org/>

AGENDA ITEM 11

Review proposals of new Expert Groups

- Prof. Nianzhi Jiao (WG46) presented the new working group proposal and asked BIO for support of the proposal.

AGENDA ITEM 12

Planning for PICES-2024

Expert Group co-chairs presented the planning of PICES-2024 Workshops and Sessions organized by the respective groups at the online meeting on October 4. Those Workshops and Sessions were held as planned at PICES-2024.

- **S-MBM:** 0.5-day Workshop on “*Puffin diet samples as indicators of forage nekton availability and community structure in the Aleutian marine ecosystem*” (proposed by W. Sydeman)
- **AP-NCOOS:** 1-day Workshop on “*North Pacific plankton time-series data analyses and synthesis*” (proposed by A. Sastri)
- **S-CC:** 1-day Topic Session on “*Changing ocean carbon cycle and its consequences for the ocean environment: Detection, prediction and mitigation*” (proposed by T. Ono)
- **WG48:** 1-day Topic Session on “*Rapid plankton assessment for ecosystem assessment*” (proposed by H. Bi)
- **S-MBM:** 1-day Topic Session on “*Social, economic and ecological implications of recoveries, range expansions and shifting distributions of marine birds, mammals and fish*” (proposed by A. Trites)
- **S-CCME:** 1-day Topic Session on “*S-CCME/SICCME session on innovation in using integrated approaches to detect and manage for the effects of climate change tipping points and critical thresholds in marine ecosystems*” (proposed by K. Holsman)

AGENDA ITEM 13

PICES-sponsored conferences and symposia in 2024 and beyond

Dr. Sastri shared the information on PICES-sponsored conferences and symposia completed in 2024.

- 7th International Zooplankton Symposium. March 17-22, 2024. Hobart, Tasmania.
Sponsors/Organizers: ICES, PICES, AAPP
- 2nd Marine Socio-Ecological Symposium (MSEAS-2024). June 3-7, 2024. Yokohama, Japan.
Sponsors/Organizers: PICES, ICES, NOAA Fisheries, Japan FRA

AGENDA ITEM 14

Capacity Building

Not discussed.

AGENDA ITEM 15

Documenting business meetings, topic sessions, and workshops

Dr. Sastri reminded BIO children Expert Group Co-Chairs that their 2024 Annual reports should be submitted to the Secretariat within one month of the Annual Meeting.

AGENDA ITEM 16

Other business

Dr. David Kimmel (USA) concluded his term as BIO Vice-Chair and Dr. Toru Kobari (Japan) was elected to replace him.

AGENDA ITEM 17

Adoption of BIO report and recommendations to Science Board

Activity reports and requests from BIO children Expert Groups were supported by the BIO Committee and recommended to Science Board.

BIO Endnote 1

BIO participation list

Members

Akash Sastri (Canada, Chair)
David Kimmel (USA, Vice-Chair)
Janelle Curtis (Canada)
Angelica Peña (Canada)
Zijun Xu (China)
Xuelei Zhang (China)
Ping Zhuang (China)
Kaoru Hattori (Japan)
Toru Kobari (Japan)
Motomitsu Takahashi (Japan)
Se-Jong Ju (Korea)
Taewon Kim (Korea)
Wongyu Park (Korea)
Alexei Orlov (Russia)
Julie Keister (USA)
Debora Iglesias-Rodriguez (USA)

Members unable to attend

Canada:
China: Ping Zhuang
Japan:
Korea: Wongyu Park
Russia: Alexei Orlov
USA: Debora Iglesias-Rodriguez

Observers

Patrick O'Hara (Canada)
Curtis Suttle (Canada)
Nianzhi Jiao (China)
Yanli Lei (China)
Qian Li (China)
Mengqi (Evie) Pei (China)
Xilin Xiao (China)
Tsuneo Ono (Japan)
Tsotumu Tamura (Japan)
Keyseok Choe (Korea)
Miran Kim (Korea)
David Checkley (USA)
Kirstin Holsman (USA)
Ryan Rykaczewski (USA)
Rachel Stanley (USA)

PICES

Sanae Chiba

BIO Endnote 2

BIO meeting agenda

Day 1: Wednesday, 4 October 2023, 18:00-21:00 (Online, PDT)

1. Welcome, introductions, opening remarks
2. Membership changes since PICES 2022
3. Adoption of agenda and appointment of rapporteur
4. Annual review of BIO activities
5. Publications
7. Progress reports and future plans of BIO active Expert Groups
12. Planning PICES 2024 Annual Meeting

16. Other business

Day 2: Saturday, 21 October 2023, 18:00-20:30 (Seattle, USA, PDT)

6. Selection of best ECOP presentations for BIO
7. Progress reports and future plans of BIO active groups
8. FUTURE Program Update
9. PICES data policy and inventory
10. Relation with other international organizations/programs
11. Review proposals of new Expert Groups
13. PICES sponsored conferences and symposia in 2024 and beyond
14. Capacity building
15. Documenting business meetings, topic sessions, and workshops
16. Other business
17. Adoption of BIO report and recommendations to Science Board

