2022 Report of Working Group 47 on *Ecology of Seamounts*

Dr. Janelle Curtis and Dr. Mai Miyamoto, the Co-Chairs of Working Group on Ecology of Seamounts (WG 47) convened an in-person meeting at PICES-2022 in Busan, Korea. The business meeting focused on introductions of national representatives and observers, discussions of WG 47's terms of reference and exchange of information and ideas about participants' seamount research activities.

The meeting was held on September 28, 2022 from 9:00am to 12:30pm (UTC+9). The meeting had a similar agenda to the two business meetings in 2021 (*WG 47 Endnote 1*). Seven participants (WG 47 Endnote 2), including five WG-47 members, and two colleagues from other PICES expert groups attended the meeting. Unfortunately, this was not a hybrid meeting, but one member who was unable to participate in PICES-2022 circulated some thoughts on one of the agenda items before this year's meeting.

AGENDA ITEM 3
Update from the FUTURE SSC

Dr. Thomas Therriault, on behalf of FUTURE SSC liaison, Dr. Jennifer Boldt, provided updates from the SSC, which is committee for the FUTURE integrative Scientific Program to understand how marine ecosystems in the North Pacific respond to climate change and human activities, to forecast ecosystem status based on a contemporary understanding of how nature functions, and to communicate new insights to its members, governments, stakeholders and the public. WG 47 falls within the Marine Ecosystem element of their integrative schematic: see Scientific-Programs - PICES - North Pacific Marine Science Organization.

AGENDA ITEM 4
Introductions and review of members' expertise and research interests

Members from WG 47 and other PICES expert groups introduced themselves, their expertise and their research interests. WG 47 had a few changes in membership in 2022. Mr. Tatsuki Oshima, representing Japan, is a newly appointed member who replaced Dr. Hidetada Kiyofuji. Dr. Chris Rooper, representing Canada, has replaced Dr. Cherisse DuPreez who stepped down. Some participants of WG 47 shared an interest in the work of regional fisheries management organizations (RFMOs) on the identification of vulnerable marine ecosystems (VMEs) on seamounts. Dr. Seonock Woo gave an overview of her research on genomic assessment of deep-sea corals on seamounts in the West Pacific. Mr. Tatsuki Oshima gave an overview of his research on demersal and pelagic fish ecology. Dr. Patrick O'Hara (S-MBM) is actively engaged in research related to birds and mammals associated with seamounts, and expressed interest in collaborating with WG 47 members. Other participants were also interested in the spatial ecology of benthic organisms.

AGENDA ITEM 5
Review of WG 47 terms of reference

There has been a bit of a COVID lull and relatively slow progress on WG 47's terms of reference the past couple of years. At its meeting during PICES-2022, WG participants discussed their research interests and anticipated contributions to WG 47's terms of reference.

In Year 1, WG 47 proposed to: (1) gather data on the distribution and life history of species associated with seamounts in the North Pacific Ocean and facilitate their submission to appropriate biodiversity databases (*e.g.*, OBIS), (2) gather data on key environmental variables hypothesized to influence the distribution and diversity of species associated with seamounts, (3) convene a 2-day workshop on modelling the distributions of seamount taxa and (4) convene a business meeting.

(1) Some participants anticipate contributing to the submission of life history and distribution data to biodiversity databases, including the Ocean Biodiversity Information System (OBIS) during the coming years. Dr. Curtis (Canada) specifically expressed an interest and ability to do so with data from two seamounts in the Northeast Pacific Ocean.

(2) Participants recognized the World Ocean Atlas data used by WG 32 (Biodiversity of Biogenic Habitats) have been updated and are available to WG 47, which will help members identify environmental and ecological predictors of the distribution and biodiversity of seamount taxa in the North Pacific Ocean and develop one or more species distribution models for seamount taxa. Those data may also be used to predict climate-induced changes in the distribution of seamount taxa during the coming years.

(3) WG 47's 2-day workshop (W1) on "*Distributions of pelagic, demersal, and benthic species associated with seamounts in the North Pacific Ocean and factors influencing their distributions*" was convened from September 24–25, 2022 by Dr. Janelle Curtis, Dr. Mai Miyamoto, Dr. Akash Sastri, Dr. Chris Rooper, and Dr. Samuel Georgian (PICES-2022). Some of the highlights of that workshop included discussions about the importance of considering bentho-pelagic coupling when predicting distributions of benthic taxa, including deep-sea corals and sponges. There was also considerable discussion of methods to identify vulnerable marine ecosystems (VMEs), and how best to model climate-induced changes in the distribution of seamount taxa.

(4) WG 47 held a business meeting at PICES-2021 on September 20, 2021.

In Year 2, WG 47 proposed to (1) identify environmental and ecological predictors of species associated with seamounts, (2) apply one or more modelling approaches to predict seamount species distributions, (3) use available climate projections to describe anticipated changes in species distributions, (4) convene a topic session on pelagic, demersal, and benthic seamount species, and (5) hold a business meeting.

(1) WG 47's 2-day workshop (W1) on "*Distributions of pelagic, demersal, and benthic species associated with seamounts in the North Pacific Ocean and factors influencing their distributions*" which was convened in September 2022 identified and discussed environmental and ecological predictors of species associated with seamounts and…

(2) reviewed a few case studies of modelling approaches to predict seamount species distribution. Some of the highlights of that workshop included discussions about the importance of considering bentho-pelagic coupling when predicting distributions of benthic taxa, including deep-sea corals and sponges. There was also considerable discussion of methods to identify VMEs, and…

(3) how best to model climate-induced changes in the distribution of seamount taxa.

(4) WG 47 proposed to convene a 1-day topic session on "*Seamount biodiversity: pelagic, demersal, and benthic species associated with seamounts in the North Pacific Ocean*" at PICES-2023 in Seattle, USA (*WG 47 Endnote 3*).

(5) WG 47 held its annual meeting associated with PICES-2022. Participants also discussed WG 47's terms of reference for year 3.

AGENDA ITEM 6
Review of key scientific outputs

Participants discussed WG 47's anticipated scientific outputs and recognized that these would begin to take shape when the terms of reference in Years 1, 2, and 3 were completed. Dr. Alexei Orlov communicated by email before PICES-2022 to share links to two recently published papers dealing with descriptions of new fish species from the Emperor Seamounts. https://www.mdpi.com/2077-1312/10/1/65 and https://link.springer.com/article/10.1134/S0032945222020151. Dr. Orlov suggested that one significant output of WG 47 regarding fish diversity might be publishing an ichthyofauna overview of the Emperor Seamount area based on published literature and unpublished data. Dr. Orlov also suggested the WG members share information about upcoming research cruises as well as opportunities for members to take part in these participations.

WG 47 Endnote 1

WG 47 participation list

Members

Janelle Curtis (Canada, Co-Chair)
Mai Miyamoto (Japan, Co-Chair)
Tatsuki Oshima (Japan)
Seanock Woo (Korea)
Samuel Georgian (USA)

Members unable to attend

Canada: Anders Knudby, Chris Rooper
China: Jinhui Wang, Zijun Xu
Japan Kenji Taki,
Korea: Hye-Won Moon, Sung Yong Kim
Russia: Tatiana Dautova, Alexei Orlov
USA: Amy Baco-Taylor, Les Watling

Observers

Patrick O'Hara (Co-Chair, S-MBM)
Thomas Therriault (Chair, AP-NIS)

WG 47 Endnote 2

WG 47 meeting agenda

1. Welcome and opening remarks
2. Adoption of agenda and appointment of rapporteur
3. Update from the FUTURE SSC
4. Introductions and review of members' expertise and research interests
5. Review of WG47 terms of reference
6. Review of key scientific outputs (papers)
7. Other business

WG 47 Endnote 3

Proposal for a Topic Session on
"*Seamount biodiversity: pelagic, demersal, and benthic species associated with seamounts in the North Pacific Ocean*"
at PICES-2023

Co-Convenors: Janelle Curtis (Canada), Mai Miyamoto (Japan), Akash Sastri (Canada), Chris Rooper (Canada)

Suggested Co-sponsor: North Pacific Fisheries Commission

Duration: ½ day

There are approximately 100,000 seamounts worldwide and their abundance is greatest in the North Pacific Ocean. The ecology of only a few has been studied, in part because of how deep and remote most seamounts are. The difficulty in studying the ecology of seamounts means that they are poorly understood habitats in terms of the pelagic, demersal, and benthic species that they support. These are unique habitats for deep-sea organisms and many seamounts are biodiversity hotspots with relatively high rates of endemism. They can host diverse communities of benthic filter feeders, including corals and sponges. The biodiversity of fishes is also high; almost 800 species of fish have been recorded from seamounts, representing half of the orders of fishes. As such, seamounts are important sources of food. New and readily available data can be integrated to better understand factors that influence the distribution and trends in seamount biodiversity, including those related to oceanic fronts and eddies and to future climate-change scenarios. This proposed topic session will focus on improving our understanding of seamount biodiversity. As such, it will lay the foundation for WG 47's activities to identify potential indicators for assessing and monitoring the biodiversity of pelagic, demersal, and benthic taxa associated with seamounts.