North Pacific Marine Science Organization
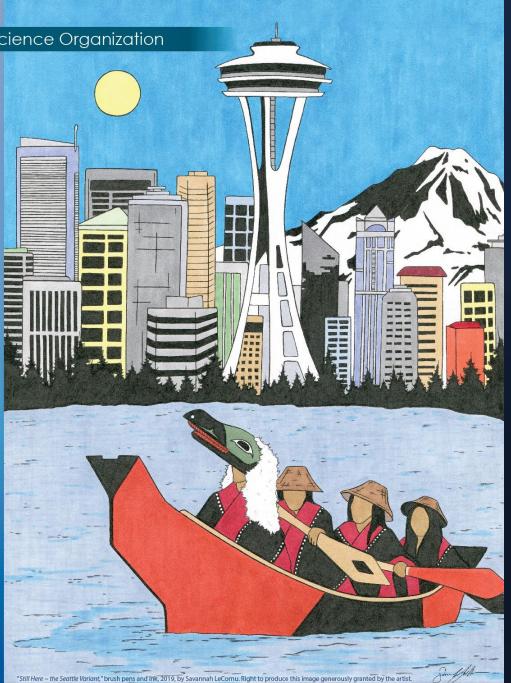
PICES-2023

Connecting Science and Communities for Sustainable Seas

Oct 23–27, 2023
• Seattle, USA •

with pre-meeting workshops Oct 20–22

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

"*Still Here ~ the Seattle Variant,*" brush pens and ink, 2019, by Savannah LeCornu. Right to produce this image generously granted by the artist.

Topic session on VME's and seamount biodiversity

Report to the NPFC SC 2023

Devon Warawa

S14: <u>BIO</u> Topic Session - Seamount biodiversity: vulnerable marine ecosystems (VMEs) and species associated with seamounts in the North Pacific Ocean

Co-sponsor:

NPFC

Duration:

1 day

Convenors:

Janelle Curtis (Canada)

Mai Miyamoto (Japan, ECOP)

Devon Warawa (Canada, ECOP)

Sam Georgian (USA, ECOP)

Akash Sastri (Canada)

Chris Rooper (Canada)

Invited Speaker:

Ashley Rowden

Victoria University of Wellington, School of Biological Sciences, New Zealand

https://meetings.pices.int/meetings/annual/2023/PICES/program#s14

S14: <u>BIO</u> Topic Session - Seamount biodiversity: vulnerable marine ecosystems (VMEs) and species associated with seamounts in the North Pacific Ocean

Methods and challenges for identifying VMEs and monitoring biodiversity on seamounts: a personal perspective from the South Pacific Ocean.	Ashley Rowden
Association analysis of Seamount benthos for identifying the validity of VME indicator taxa based on scientific sampling survey	Mai Miyamoto
Using visual surveys and distribution models to identify vulnerable marine ecosystems on seamounts in the North Pacific Fisheries Commission Convention Area	Devon R. Warawa
Patterns of deepsea coral and sponge monitoring groups on Northeast Pacific seamounts: Management Implications	Megan A. Davies
Distribution, abundance and size structure of deep-sea corals and sponge communities on seamounts in international waters of the NE Pacific Ocean	Christopher N. Rooper
Monitoring cold-water corals and sponges in changing ocean conditions: a case study in the Canadian Pacific	Lindsay Clark
Bathyal biogeography of North Pacific seamounts	Les Watling
Bathyal megafaunal assemblages of the Musicians Seamounts	Caroline Edmonds
Spatial distribution and community structure of benthic megafauna from two seamounts in the northwest Pacific	Chailinn Park
Environmental DNA as a potential tool for the understanding of demersal ichthyofauna in seamounts: a case study from the Emperor Seamounts area	Kota Sawada
Coral biodiversity and genetic resources of West Pacific seamount, Godin Guyot	Seonock Woo
Application of environmental DNA metabarcoding approach to reveal biodiversity of seamounts in the northwestern Pacific Ocean	Eun-Bi Kim
Fish biodiversity monitoring in extreme environments: a case study of fish in the Southern Ocean	Yehui Wang
Flow around seamounts and larval retention: revisiting the Taylor cone	Tetjana Ross
Variability in zooplankton biomass and nutritional quality above Northeast Pacific seamounts, with application to marine conservation efforts	Daniel M. Labbé

Wrap up discussion

Methods and challenges for identifying VMEs and monitoring biodiversity on seamounts: a personal perspective from the South Pacific Ocean
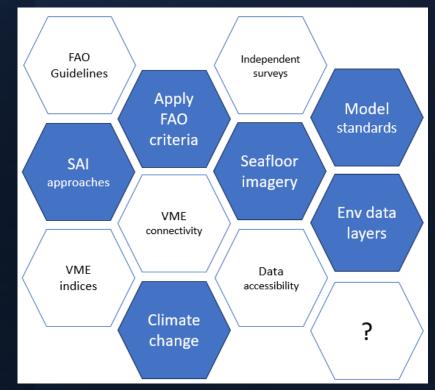
Ashley A. Rowden

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PART 1: VMEs
- Identifying VMEs
- Interaction with threats
- Challenges and future research

S14: <u>BIO</u> Topic Session - Seamount biodiversity: vulnerable marine ecosystems (VMEs) and species associated with seamounts in the North Pacific Ocean

Methods and challenges for identifying VMEs and monitoring biodiversity on seamounts: a personal perspective from the South Pacific Ocean

Ashley A. Rowden

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PART 1: Seamounts
- Assessing biodiversity
- Predicting response to impacts
- Informing management

Goode (2023), Goode et al. (in prep)

Association analysis of Seamount benthos for identifying the validity of VME indicator taxa based on scientific sampling survey

Mai **Miyamoto**[1] and Masashi Kiyota[2]

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[2]Nagasaki University, Nagasaki, Japan

We analyzed the benthos samples collected by R/V Kaiyo-maru to identify effective indicators of benthic community diversity in the Emperor Seamounts area. The benthos samples were identified to family or order levels, and their occurrences in sampling locations were determined. Using the occurrence frequencies of benthic taxa in sampling locations as multivariate data, we calculated Jaccard index as a metric of the co-occurrence tendencies of pairs of taxa. Then, we classified the benthic taxa into clusters according to Ward's method based on the Jaccard distance (1 – Jaccard index) to characterize the benthic community in the study area. Finally, association analysis, which is commonly used for discovering hidden relationships among purchased items in market transaction data, was applied to the haul-by-haul occurrence data to explore the association rules for benthic taxa that represent strong relationship like "A habitat where taxa **A** occur is also inhabited by taxon **B**" are extracted. It has not been applicate to ecological studies.

S14: BIO Topic Session - Seamount biodiversity: vulnerable marine ecosystems (VMEs) and species associated with seamounts in the North Pacific Ocean

Using visual surveys and distribution models to identify vulnerable marine ecosystems on seamounts in the North Pacific Fisheries Commission Convention Area

Devon R. Warawa[1], Janelle M. R. Curtis[1], Chris N. Rooper[1], Samuel Georgian[2], Jessica Nephin[3], Jackson W. F. Chu[3], Sarah Dudas[3] and Anders Knudby[4]

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[2]Marine Conservation Institute, Seattle, WA, USA

[3]Fisheries and Oceans Canada, Sidney, BC, Canada

[4]University of Ottawa, Ottawa, ON, Canada

The United Nations General Assembly called upon States to manage fisheries sustainably and protect vulnerable marine ecosystems (VMEs) from destructive fishing practices when they adopted Resolution 61/105 in 2006. The North Pacific Fisheries Commission (NPFC) identifies four taxa of corals and two taxa of sponges as indicators of potential VMEs. The NPFC has yet to use these taxa to develop quantitative methods to identify VMEs, but it does support the use of the best available data to identify them. To date no VMEs have been identified in the northeast part of the NPFC Convention Area in part due to the sparse information available, including limited visual data and coarse resolution predictions of the suitable habitat for VME indicator taxa. We propose a quantitative method for VME identification that maximizes the value of existing data, integrating both visual data and model predictions in a manner that aligns with the precautionary approach, the Convention, and the research plan of the NPFC's Scientific Committee. We use data from Cobb Seamount to illustrate our proposed methodology. This preliminary application of our approach identified 58 areas of 50 m^2 that are VMEs on Cobb Seamount based on visual data. We further predict areas likely to be VMEs in the Cobb–Eickelberg Seamount chain using distribution models of VME suitability.

S14: BIO Topic Session - Seamount biodiversity: vulnerable marine ecosystems (VMEs) and species associated with seamounts in the North Pacific Ocean

Distribution, abundance and size structure of deep-sea corals and sponge communities on seamounts in international waters of the NE Pacific Ocean

Christopher N. **Rooper**[1], Pamela Goddard[2], Christina Conrath[2], Cynthia Wright[3], Kim Rand[2], Vanessa Lowe[2]

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[2] Alaska Fisheries Science Center, National Marine Fisheries Service, 7600 Sand Point Way NE, Seattle, Washington, 98115, USA

[3] Institute of Ocean Sciences, Fisheries and Oceans Canada, 9860 W Saanich Road, Sidney, British Columbia, V8L 5T5, Canada

Many seamounts in international waters are unexplored due to their remoteness and relative inaccessibility. Seamount communities face threats from historical and on-going fishing activity, as well as climate change impacts. In 2022, Canada and the USA conducted a survey of five seamounts in the Cobb Seamount chain using an underwater stereo camera system. Oceanographic data, eDNA and bird and mammal observations were also collected. This joint survey was designed to study deep-sea coral and sponges and their associated taxa. In total 77 camera transects were completed, with a high proportion of them observing glass sponges and corals, particularly those transects below 600 m. Species distribution models were developed predicting both presence and abundance of coral and sponge taxa. Densities of sponges and corals were relatively low and appeared to be related to the oceanographic and geological conditions at the sites. The sizes of sponges and corals were generally large indicating a mature community. The fish fauna was dominated by rockfishes and pleuronectids that are found in the adjacent shelf and slope ecosystems. The communities appeared to be largely organized by depth. Evidence of both historical and present day fishing activity was observed on most of the seamounts. Comparisons were made with shelf and slope systems around the Gulf of Alaska to gauge the uniqueness of the seamount ecosystems. The data collected during this survey will be useful for the regional fisheries management organization responsible for assessing the risks and sustainability of the Canadian sablefish fishery conducted at these seamounts.

Environmental DNA as a potential tool for the understanding of demersal ichthyofauna in seamounts: a case study from the Emperor Seamounts area

Motoomi Yamaguchi[1], Kota **<u>Sawada</u>**[1], Yumiko Osawa[1], Mai Miyamoto[2] and Bungo Nishizawa[1]

[1] Japan Fisheries Research and Education Agency, Yokohama, Japan. E-mail: sawada_kota27@fra.go.jp

[2] Japan NUS CO., LTD., Tokyo, Japan.

Environmental DNA is increasingly becoming popular as a tool to investigate biological communities in a wide range of habitats. In this study, we conducted an environmental DNA survey in the Emperor Seamounts area, an international fishery ground located in the high seas of North Pacific, to examine its effectiveness as a tool to investigate distributions of demersal animals in oceanic seamounts, using R/V Kaiyo-maru. By conducting environmental DNA and visual (drop camera) surveys at the same localities, we were able to compare the results of the two methods. In addition, there are a plenty of information on the fauna in this area owing to scientific surveys by research vessels and scientific observer programs on fishing vessels, providing the basis to evaluate the plausibility of detected species. In this presentation, we report the preliminary results on fishes, for which well-established sets of primers are available. By comparing species detected by environmental DNA against the list of species observed or collected, we demonstrated the possible effectiveness of environmental DNA survey as an efficient and non-invasive method to complement visual surveys and sample collection.

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PICES Working Group 47 on Ecology of Seamounts

Co-Chair: Dr. Janelle Curtis
Co-Chair: Dr. Mai Miyamoto

- Discussed TOR
- Exchange information and ideas about participants seamount research activities
- WG 47 is well on its way to achieving most if it's terms of reference☺
- It will meet one more time in 2024

Thank-you!