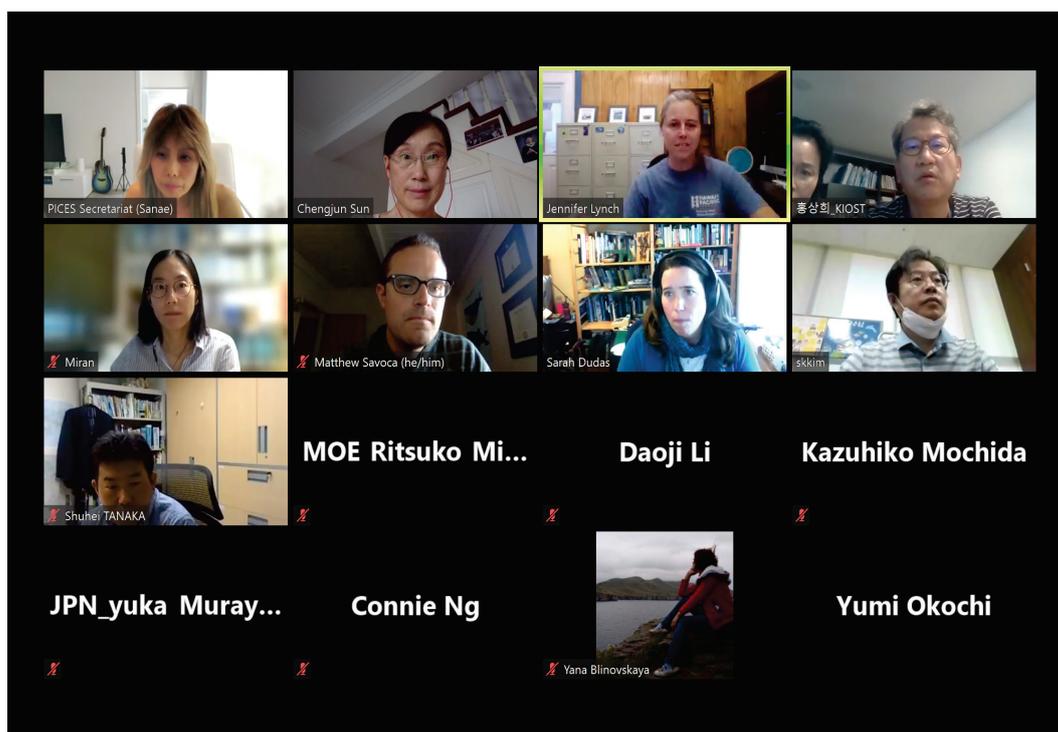


2021 Report of Working Group on *Indicators of Marine Plastic Pollution*

The Working Group on *Indicators of Marine Plastic Pollution* (WG 42) held its annual meeting virtually on September 23, 2021. Fourteen members and four observers were in attendance over the 3-hr zoom meeting hosted by PICES and monitored by Dr. Sanae Chiba (*WG 42 Endnote 1*). The meeting was co-chaired by Drs. Jennifer Lynch and Chengjun Sun who welcomed the participants. After calling the meeting to order, Dr. Lynch reviewed the meeting agenda. The agenda was adopted (*WG 42 Endnote 2*).



WG 42 virtual meeting participants during PICES-2021.

AGENDA ITEM 2

Achievements

Dr. Lynch reviewed the presentation prepared by Dr. Sun and herself to be submitted to parent committee MEQ. WG 42 is on track for 4 out of the 5 planned companion review articles for submission to *Environmental Pollution*. Working Group members participated in many international conferences (see table below for just a select few), including the International Symposium on “Plastics in the Arctic and Sub-Arctic Region. Members also hosted, co-hosted or chaired multiple workshops and conference sessions. Two Ocean Sciences Meeting 2022 sessions will be organized by WG 42 members: OS07 “Environmental indicators of plastic pollution in the North Pacific” by Savoca et al. and CT04 “Chemical methods to understand marine plastic pollution quantities, sources, transport, fate, impacts, and solutions” by Lynch et al. have been accepted. Dr. Sun participated in ICES Annual Science Conference 2021 representing PICES and co-hosted session J on “*Advances and challenges in marine litter pollution*”.

No.	Conference	Time	Place	Participants	Role
1	International Symposium on “Plastics in the Arctic and Sub-Arctic Region”	March 2–4, 8–9, 2021	Reykjavik, Iceland	Matt Savoca, Seung-Kyu Kim	Attendees
2	Global Microplastic Symposium	April 13–15, 2021	Virtual	Wonjoon Shim	Presenter
3	Europe SETAC 2021 (Society of Environmental Toxicology and Chemistry) Annual Meeting	May 3–6, 2021	Virtual	Wonjoon Shim	Presenter
4	3 rd National Microplastic Conference of China	June 7–9, 2021	Qingdao, China	Chengjun Sun	Organizer and Presenter
5	ICES ASC 2021	Sept. 6–10, 2021	Virtual	Chengjun Sun	Theme Session co-chair
6	PICES-2021	Oct. 25–29, 2021	Virtual	Chengjun Sun, Sanghee Hong, Matthew Savoca	Topic Session co-chairs



AGENDA ITEM 3

Review of TOR and Review article timeline

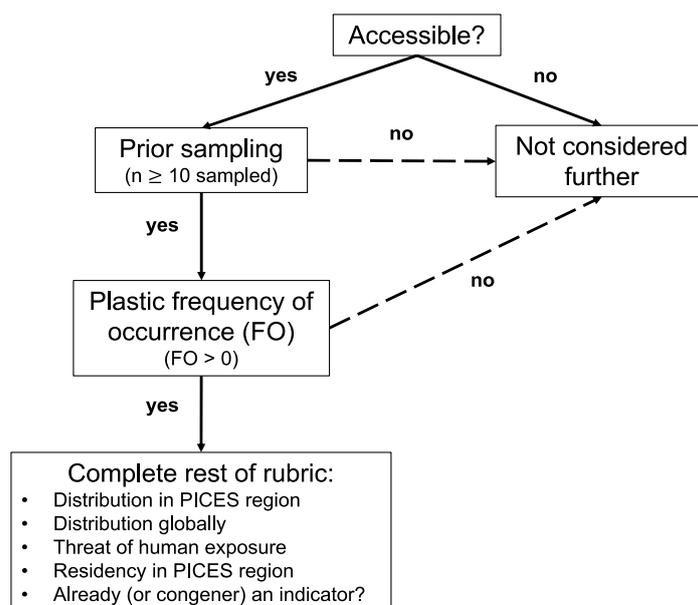
Jennifer Lynch reviewed the WG TOR. We are on track of our TORs. For the TOR on the review papers, we have made significant progress on four review articles for plastic pollution in seawater, shoreline, sediment and biota ingestion, and one overview summary paper. For the TOR on identifying indicators, methods for seawater, shoreline, sediment and biota ingestion have been proposed in each review. For the TOR on recommending monitor guidelines and target, we have begun to discuss target improvement goals, but may not make much progress on this in the review articles. For the TOR on convening meetings or special issues, we have convened 2019 and 2021 PICES topic sessions and are preparing 5 review articles for a Virtual Special Issue in *Environmental Pollution*.

We have set our timeline for the review articles. We are about two to three months behind schedule. Now we plan to finish the first draft of the papers by September 30, 2021 and then go through necessary internal review process before submitting before June 30, 2022.

AGENDA ITEM 4

Review article updates

1. Sea surface and water column – Dr. Wonjoon Shim presented progress on the review paper about marine plastics in the sea surface and water column. A total of 175 papers with 204 data sets on microplastics, 60 papers on meso- and macroplastics were reviewed. Review results show that the North Pacific is the most polluted ocean, but existing data are still limited to allow for analyzing the spatial trends and pollution trend in the region. We discussed the best way to present data. We also discussed sampling technique for long-term monitoring and the impact of proposing one. The presentation will be uploaded to Google docs for sharing among the group.
2. Shoreline – Dr. Amy Uhrin was not able to attend. Dr. Wonjoon Shim and Dr. Jennifer Lynch filled in on the progress of the paper. This group is trying to get raw data from the authors and it is taking longer than expected.
3. Sediment and seafloor – Dr. Shuhei Tanaka presented progress on the review paper on microplastics in sediment and seafloor globally, including freshwater and other ocean basins. The paper is about 80% finished. He presented a raw data sheet and all the comparisons that have been conducted. We also discussed microplastic extraction from the sediment. No target goal has been set yet. We also discussed how to assess the risk of microplastics. Dr. Lynch mentioned two papers on meta-analysis and risk assessment of microplastics in the ocean. The presentation will be uploaded to Google docs for sharing among the group.
4. Biota ingestion – Dr. Matthew Savoca introduced in detail the progress on the biota paper. The first draft of the paper has been sent to all the co-authors for review. Following suggestions from previous online discussion and last year's meeting, a rubric was created to score indicators, based on the following chart. Suggested indicators included invertebrates (*Mytilus edulis*, *Crassostrea gigas*, *Venerupis philippinarum*), sea turtles (*Caretta caretta*, *Chelonia mydas*), fish (*Alepisaurus ferox*, *Coryphaena hippurus*, *Engraulis* spp.) and seabirds (*Fulmarus glacialis*, *Oceanodroma leucorhoa*, *Phoebastria immutabilis*, *Phoebastria nigripes*). A draft of the paper is almost ready for agency internal review.



We discussed the FO (frequency of occurrence) data presented in the slides and also the rubric number assignment. We also looked into the paper format requirements from *Environmental Pollution*.

5. Biota entanglement – Dr. Lynch updated on the progress of this paper. It is falling a little behind. A new report on terrestrial migration animals provided by Jennifer Provencher was introduced. This report might be used for future reference in this paper. We discussed whether we really need to commit to this paper due to the complicated nature of entanglement. However, this paper will not hold up publishing of the other papers. As an alternative approach, we might consider a summary paper that summarizes the other four papers. This paper might use the OA fee requested from PICES.

AGENDA ITEM 5

Recommend indicators and target improvement goals

Covered in Agenda Item 4.

AGENDA ITEM 6

Plan for review article submission to *Environmental Pollution*

Each of the above papers will be submitted when they are ready. All of the papers will run as a virtual special issue which means each manuscript can be submitted individually when it is ready. After all the papers are in, we will ask the journal to bundle all the papers together in a virtual special issue and an announcement will be posted on the journal's website. More communications with the journal will be conducted.

The following timeline was agreed upon.

- Each paper will have a breakout group meeting by end of November 2022.
- The next WG 42 meeting will be in January 2022 where we will discuss paper progress, indicator selections, and target reduction recommendations. Literature beyond Jan 2022 will not necessarily be included.
- Co-author review will begin May 2022.
- WG42 review will start June 2022.
- Agency internal reviews will start in August 2022.
- Journal submission will be targeted for October 2022.

Environmental Pollution journal is interested in our companion review articles. There is no fee for regular submission, but the fee for open access is \$3550 per paper. Dr. Takada requested we look at submitting to *Environmental Monitoring and Contaminants Research* (EMCR), a new journal.

AGENDA ITEM 7

2021 topic session

Drs. Sun, Songhee Hong and Matthew Savoca are the convenors of this year's topic session S8 on *Using environmental indicators to assess baselines, targets, and risk of plastic pollution in the North Pacific* at PICES-2021. The session starts on October 27, Pacific Standard Time. We received 16 oral presentation requests. Since our session is only open for two hours, we tried to accommodate as many orals as possible. In the end, we fit 11 talks and 5 e-posters into the session. (It turned out to be a great success.)

AGENDA ITEM 8

Report of WG 42

Drs. Lynch and Sun have finished the report to the WG's parent committee MEQ. We prepared both .doc and .ppt formats of the report. Final report to PICES will wait for the outcome of how the WG go forward,

either being extended or changed to an Advisory Panel or Section. We briefly talked about presenting our review papers as a main part of the WG report at the end of our term.

AGENDA ITEM 9

Define future of WG 42

Dr. Lynch presented options as an Advisory Panel or a Section if we would like the WG to go forward. Dr. Sanae Chiba, PICES Deputy Executive Secretary, provided information on how PICES works and explained the options. With her help, the WG made the decision to ask Science Board for a one-year extension, through our parent Committee. We also discussed the focus on microplastics, whichever way we move. Dr. Lynch nominated Dr. Jennifer Provencher to take over the leadership of the proposed group, if it is accepted by Science Board and Governing Council.

AGENDA ITEM 10

PICES financial request

WG 42 will publish the group's papers in *Environmental Pollution*. There is no fee for regular submission, but the fee for open access is \$3550 per paper. The WG will request one open access fee to be covered by PICES. We have not decided on which paper will go with open access.

Dr. Savoca requested financial support to cover the registration fee for attending the Ocean Science Meeting 2022.

AGENDA ITEM 11

Other business

WG 42 will discuss PICES-2022 session proposals offline.

WG 42 Endnote 1

WG 42 participation list

Members

Jennifer M. Lynch (USA, Co-Chair)
 Chengjun Sun (China, Co-Chair)
 Sarah Dudas (Canada)
 Jennifer Provencher (Canada)
 Connie Ka-yan Ng (China)
 Sang Hee Hong (Korea)
 Wonjoon Shim (Korea)
 Mochida Kazuhiko (Japan)
 Kazuhiko Mochida (Japan)
 Shuhei Tanaka (Japan)
 Miran Kim (Korea)
 Daoji Li (Korea)
 Iana Blinovskaia (Russia)
 Matthew Savoca (USA)

Members unable to attend

Canada: Peter S. Ross
 China: Juying Wang
 Korea: Seung-Kyu Kim
 Russia: Nikolai Kozlovskii
 Japan: Hideshige Takada
 USA: Amy Uhrin

Observers

Sanae Chiba (PICES Deputy Executive Secretary)
 Murayama Yuka (Japan)
 Yumi Okochi (Japan NUS Co., Ltd.)
 Ritsuko Minaekishi (Japan, MOE)

WG 42 Endnote 2

WG 42 meeting agenda

1. Welcome and adoption of agenda (chairs)
2. Achievements of WG 42 (chairs)
3. Review of WG 42 Terms of Reference and Review article timeline (chairs)
4. Review article updates (leads)
 - a) Sea surface and water column – Wonjoon Shim
 - b) Shoreline – Amy Uhrin
 - c) Sediment and seafloor – Shuhei Tanaka
 - d) Biota ingestion – Matthew Savoca
 - e) Biota entanglement – Jennifer Lynch
5. Discuss recommended indicators and target improvement goals
6. Discuss plan for review article submission to Environmental Pollution
7. Announce 2021 topic session
8. Final report of WG 42 is due to PICES
9. Define future of WG 42
 - a) Advisory Panels or Section?
 - b) Term of Reference
 - c) Chair(s)
10. PICES financial request
 - a) Open access fees for one paper – which one?
 - b) Conference travel/registrations
 - i. PacifiChem
 - ii. Ocean Sciences Meeting
 - iii. Others
11. Other business (All)