2025 Report of PICES Section on Marine Plastic Pollution

Last year was the first full year of our new Section on Marine Plastic Pollution. Our year's accomplishments started with having section members selected and confirmed by their home nation. In the fall we held two business meetings. One on Zoom on October 14, 2025 and the other in person at the PICES meeting in Yokohama on November 9, 2025.

Online Business Meeting (14 October 2025)

The S-MPP Section held an online preparatory meeting on 14 October 2025 via Zoom to introduce members to the Section's Terms of Reference (TOR), provide background on the role of S-MPP within PICES, and identify priority themes for discussion at the upcoming in-person business meeting.

AGENDA ITEM 1: Review of PICES structure and S-MPP ToR
The co-chairs reviewed the organizational structure of PICES and emphasized that S-MPP reports to the Marine Environmental Quality (MEQ) Committee. The Section's TOR were discussed in detail, with particular emphasis on: (1) characterizing sources, sinks, and impacts of plastic pollution in the North Pacific, (2) developing and harmonizing abiotic and biotic indicators, and (3) coordinating with other intergovernmental and international science bodies.

AGENDA ITEM 2: On-going global projects relevant to S-MPP
Several brief presentations highlighted ongoing projects of direct relevance to S-MPP. These included the Global Plastic Ingestion Bioindicators (GPIB) initiative, which aims to identify globally distributed species suitable for harmonized ingestion monitoring, and emerging work on modeling mortality risk from plastic ingestion to inform management thresholds. Participants also discussed opportunities for engagement with global coordination efforts such as the Integrated Marine Debris Observing System (IMDOS) and UN-affiliated initiatives.

AGENDA ITEM 3: Discussion of priority topics of in-person meeting
The meeting concluded with discussion of priority topics for the in-person meeting, including indicator standardization, data harmonization across member countries, integration with Early Career Ocean Professionals (ECOPs), and planning toward a future PICES workshop or topic session.

In-Person Business Meeting (9 November 2025, Yokohama, Japan)

SLIDES

Participants at the S-MPP in-person business meeting in Yokohama, Japan

The S-MPP in-person business meeting was held on 9 November 2025 in Yokohama, Japan, with broad participation from PICES member countries. After introductions, we went over our Session (S9) Marine Plastic and Microplastic Pollution in the North Pacific, scheduled for Wednesday, November 12th.

The primary objective of the meeting was to clarify the strategic role of S-MPP within the global landscape of marine plastic pollution research and to identify concrete pathways for coordination with other regional and international initiatives.

A central theme of the meeting was harmonization. Members discussed the need to move toward standardized or interoperable monitoring approaches for plastics across environmental matrices (water, sediment, shorelines) and biota. Emphasis was placed on leveraging existing protocols and databases rather than creating new ones, including alignment with platforms such as AOMI for water and established bioindicator programs (e.g., northern fulmars). The group highlighted the importance of clearly defining monitoring endpoints, policy-relevant questions, and indicator species that are broadly distributed across the PICES region.

The Section reviewed ongoing and emerging S-MPP-relevant projects, including:

- Global efforts to identify and standardize plastic ingestion bioindicators for marine wildlife;
- Development of quantitative risk assessment tools linking plastic exposure to wildlife mortality and sublethal effects;

- Research on macro- and megaplastics sourcing, transport, and accumulation in the North Pacific, including the Great Pacific Garbage Patch; and
- Initiatives to integrate modeling, field observations, and necropsy data to better translate environmental concentrations into ecological risk.

Considerable discussion focused on engagement with external organizations, including ICES, AMAP, GESAMP, IMDOS, SCAR, and UN-affiliated monitoring and treaty processes. Members emphasized that S-MPP can serve as a North Pacific hub for sharing methods, data, and best practices, while ensuring that PICES science contributes meaningfully to global assessments and policy processes.

The group also discussed future activities, including the potential organization of a PICES workshop focused on data harmonization and indicator development, possibly complemented by lightning talks and student poster sessions. Opportunities to co-sponsor activities with other PICES expert groups and to strengthen ECOP participation were highlighted as priorities.

The meeting concluded with agreement on the importance of clearly communicating S-MPP accomplishments to MEQ, maintaining active engagement with international plastic pollution initiatives, and positioning S-MPP as a key contributor to harmonized, policy-relevant plastic pollution science in the North Pacific.

Next Steps and Priorities for 2026

Looking ahead, S-MPP identified several priority actions for 2026:

1. Indicator and Data Harmonization: Develop a structured repository of existing indicators, methodologies, and national monitoring efforts across PICES member countries, with the goal of identifying a core set of comparable abiotic and biotic indicators.
2. Integration with ECOPs: Strengthen engagement with ECOPs through mentorship, targeted invitations to meetings and workshops, and co-sponsored activities at PICES annual meetings.
3. Coordination with Global Frameworks: Continue formal and informal linkages with ICES, AMAP, GESAMP, IMDOS, and treaty-related scientific groups to ensure S-MPP contributes effectively to global synthesis and policy-relevant science.
4. Toward a 2026 PICES Workshop: Use 2026 to advance planning for a focused S-MPP workshop or session at the 2026 PICES Annual Meeting, potentially centered on indicator standardization, data harmonization, and translating plastic pollution measurements into management-relevant guidance.

These steps will position S-MPP to play a central role in advancing coherent, policy-relevant plastic pollution science across the North Pacific and beyond.

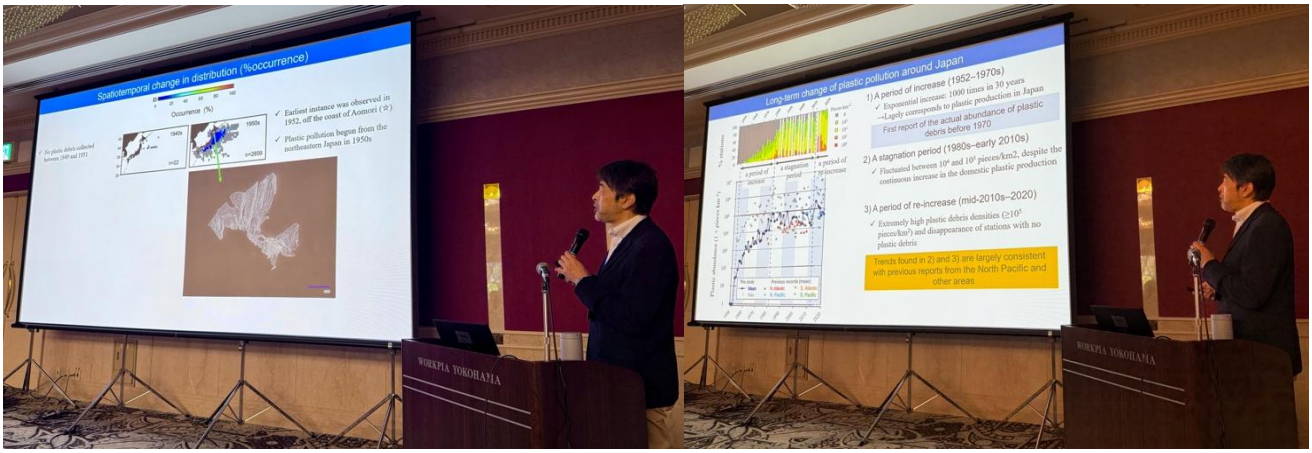
Summary of Scientific Session S9: *Marine Plastic and Microplastic Pollution in the North Pacific*

Convened by the Section on Marine Plastic Pollution (S-MPP) and TCODE

The 2025 PICES Annual Meeting featured a full-day session (S9) on *Marine Plastic and Microplastic Pollution in the North Pacific*, co-sponsored by S-MPP and TCODE.

With 17 oral presentations (including one invited) and four posters, this year's session represented one of the most diverse, interdisciplinary, and engaging discussions of plastic pollution in the history of PICES. Notably, ten early career ocean professionals (ECOPs) participated as presenters, underscoring the growing engagement of the next generation of scientists tackling this global challenge.

The session opened with an outstanding invited keynote from Dr. Kazutaka Takahashi (Japan Fisheries Research and Education Agency), who presented long-term trends in plastic concentrations based on archived and cruise-collected samples spanning from 1950 to 2025. Dr. Takahashi's analysis revealed a clear increase in plastic contamination through time, demonstrating the value of decades-long sampling programs. The day concluded with an innovative study using salps as biological samplers to detect smaller microplastics (<5 mm) often missed by traditional water sampling. Both presentations highlighted the importance of integrating new technologies with legacy datasets to quantify long-term environmental change.



An excellent invited talk from Dr. Takahashi showing what may be the first known marine plastic item from 1952 (on left) and the results from their group's long-term dataset (on right)

Across talks, the session encompassed a remarkable breadth of topics and approaches, spanning laboratory, field, and modeling studies; micro- to megaplastics; and samples collected from the sea surface to the seafloor. Presentations included cruise-based surveys (Takahashi, Chengjun Sun, and Takahito Ikenoue), citizen science initiatives (Pierpaolo Consoli), and baseline monitoring such as Brian Hoover's Continuous Plankton Recorder study in the Bering Sea. Several talks focused on distribution, flux, and fate of plastics (Hoover; Youna Cho) and ecological risks (Xiaoxia Sun, Byeongyong Park). Collectively, these studies illustrated the increasing sophistication and geographic coverage of plastic monitoring across the North Pacific.

Several talks moved beyond documentation toward solutions and mitigation frameworks. Mafalda de Freitas and Katie Stevens presented the CMDR "plastic bounty" program, which incentivizes the removal of marine debris through economic mechanisms. Erin Murphy expanded on this theme, outlining economic and policy frameworks that could guide regional mitigation. Together, these contributions bridged natural science and socioeconomics—an essential step toward actionable management.

Bringing the discussion to the global policy arena, Dr. Susanne Brander (Oregon State University) gave an overview of international negotiations on the UN Plastics Treaty, emphasizing the need to include plastic-associated chemicals in treaty language. Dr. Jennifer Provencher (Environment and Climate Change Canada) connected efforts within the PICES region to parallel initiatives in the Arctic, underscoring opportunities for cross-regional

Dr. Provencher presents on Canada's Arctic plastic monitoring program (on left), and Dr. Brander discusses the UN Plastics Treaty negotiations (on right).

coordination and knowledge sharing.

The session fostered vibrant discussions, with recurring themes including the need for data harmonization, open repositories, and standardized QA/QC protocols to enable synthesis across nations. Participants also emphasized integrating social and ecological dimensions to better capture the full scope of plastic pollution impacts. The engagement of ECOPs and cross-

disciplinary experts alike made for a dynamic exchange of ideas and fostered several new collaborations that will strengthen future PICES initiatives.

In summary, Session S9 was a resounding success—demonstrating both the scientific maturity and collaborative spirit of the marine plastics research community within PICES. The talks

The presenters and conveners of PICES 2025 S9: ***Marine Plastic and Microplastic Pollution in the North Pacific***

collectively advanced our understanding of plastic pollution sources, transport, fate, and effects, while charting a clearer path toward coordinated monitoring, policy relevance, and long-term solutions across the North Pacific.

To help fulfill our ToR, we also proposed a workshop for PICES-2026 in Nanaimo, Canada:

Title: Toward Harmonized Plastic Pollution Indicators for the North Pacific: Data, Methods, and Action

Lead convening group: S-MPP – Matthew Savoca (msavoca13@gmail.com); Chengjun Sun (csun@fio.org.cn)

Co-sponsoring groups: MEQ, AP-UNDOS (SmartNet), S-MBM, MONITOR

Time and support requested: **Full day** at the PICES 2026 meeting; full support for invited speaker travel, and full support for an ECOP travel to participate

Workshop description:

The North Pacific Ocean is the epicenter of the global marine plastic crisis, yet the scientific data needed to inform management and mitigation remains fragmented. Across the PICES region, extensive monitoring is underway, but differences in methodology, metadata, and QA/QC standards still limit how these datasets can be compared or combined to support large-scale inference. With major PICES member nations investing in monitoring infrastructure and data repositories (e.g., Japan's AOMI portal and NOAA's NCEI microplastics database in the U.S.) now is a critical moment to align our efforts.

This workshop will identify and prioritize existing monitoring efforts, collaboratively defining a clear path toward harmonized plastic-pollution indicators across the North Pacific. By working directly with representative data, participants can assess QA/QC constraints, identify interoperability needs, and reveal spatial trends across the North Pacific basin.

After an invited presentation and lightning talks, the majority of the full-day workshop will be dedicated to breakout sessions in which participants collaboratively evaluate how harmonization might operate for their respective data types and metrics, focusing on questions such as:

- What are the objectives of monitoring programs? Whose objectives are we prioritizing?
- What metadata fields are essential versus "nice-to-have"?
- What QA/QC thresholds are required for inter-comparability?
- Which methodological differences present major incompatibilities?
- How do different QA/QC filters influence spatial assessments at the PICES scale?
- What existing databases exist for reporting and compiling data?

Workshop outcomes will include agreement on initial priority indicators (up to two biotic and two abiotic), a preliminary set of harmonized methods and reporting requirements for those indicators, and a plan for post-workshop data synthesis. These products will form the basis of a white paper, with a subsequent full report and peer-reviewed publication outlining indicator selection, recommended protocols, and interoperable data platforms to support long-term, coordinated plastic pollution monitoring across the North Pacific.

Potential invited speaker: Dr. Win Cowger, Research Director, Moore Institute for Plastic Pollution Research, USA

S-MPP Terms of Reference

1. Work collaboratively to characterize and understand the flow and impacts of plastic pollutants within the PICES region (i.e., sources and sinks), including, but not limited to, the Great Pacific Garbage Patch.
2. Continue to develop abiotic and biotic indicators of plastic debris and pollutants in the PICES region and develop monitoring plans to assess temporal trends in plastic pollutants as new legislation takes effect (e.g., High Seas Treaty, UN Plastics Treaty). Provide scientific guidance towards the international harmonization of plastics monitoring data within and beyond the PICES region.
3. Plan workshops/sessions/symposia related to plastic pollution and associated toxins, and maintain a community of scientists within PICES that will work together to evaluate and recommend strategies for PICES member nations to engage on plastic pollution issues.
4. Engage professionally with other intergovernmental science organizations (e.g., ICES for the North Atlantic, AMAP in the Arctic, APN in the western and subtropical Pacific, SCAR in the Southern Ocean), International Projects (e.g., SmartNet, GPIB), and entities (e.g., SCOR, GESAMP) to accomplish these Terms of Reference.
5. Publish reports on Section accomplishments.

S-MPP Endnote 1

S-MPP participation list (online and in-person)

Members

Chengjun Sun (China, Co-Chair)

Matt Savoca (USA, Co-Chair)

Sarah Dudas (Canada)*

Patrick O'Hara (Canada)

Jennifer Provencher (Canada)*

Connie Ng (China)

Huahong Shi (China)

Kai Zhang (China)

Mana Ito (Japan)

Masashi Kodama (Japan)*

Yuka Murayama (Japan)*

Shuhei Tanaka (Japan)*

Takafumi Yoshida (Japan)*

Sang Hee Hong (Korea)

Taewon Kim (Korea)

Byeongyong Park (Korea)*

Susanne Brander (USA)

Mafalda de Freitas (USA)

Lauren Kashiwabara (USA)*

Erin Murphy (USA)

Katie Stevens (USA)*

*in-person only

S-MPP Endnote 2

S-MPP meeting agenda

AGENDA