Report of the Marine Environmental Quality Committee

The meetings of the Marine Environmental Quality Committee (MEQ) were held on October 28 (18:00–20:00) and October 31 (14:00–18:00), 2018 in Yokohama, Japan. Six member countries except the USA sent members to the meetings. A total of 26 participants, including one invited guest, attended (***MEQ Endnote 1***).

Experts Groups (S-HAB, AP-NIS) reported their progress and requests, observers from NOWPAP introduced the development of relevant areas with PICES. Based on a review of the main achievements of MEQ in 2018, ideas/proposals of new topics and direction, items with financial implications for 2019 were discussed. The details were reported as follows.

AGENDA ITEM 1
Welcome and adoption of agenda

MEQ Vice-Chair Dr. Thomas W. Therriault and MEQ Chair Dr. Chuanlin Huo chaired the MEQ meeting on day 1 and day 2, respectively. MEQ members and observers were asked to give self-introduction and to provide a brief statement about their interests and expertise. All participants reviewed the agenda with members. It was adopted without revisions (***MEQ Endnote 2***).

AGENDA ITEM 2
Implementation of PICES-2017 decisions

The progress of each expert group since PICES-2017 was reported by S-HAB Co-Chair, Dr. Douding Lu, and AP-NIS acting Chair, Dr. Therriault (see the details in Agenda Item 7).

AGENDA ITEM 3
MEQ Best Oral Presentation award and Best Poster award for PICES-2018

In the MEQ meeting, selection criteria and judging panel for MEQ Best Oral Presentation and Poster Presentation was identified. After the MEQ-P and poster session, the winner list was confirmed based on the judgement results. Dr. Seongbong Seo from Korea won the Best Oral Presentation award of MEQ-P, the title is "*Fate of floating debris released from Major rivers around Korea*". The Best Poster Presentation award was given to Dr. Su-Hyun Kim from MEQ-P, the title is "*Atmospheric long-range transport of microplastic: A preliminary result of atmospheric fall-out samples from a remote island (Dacheong Is.), South Korea*".

AGENDA ITEM 4
Review of the main achievements of MEQ in 2018

Dr. Thomas W. Therriault introduced the main work and achievements of MEQ in 2018. At PICES-2018 MEQ sponsored or co-sponsored the following topic session:

- *MEQ Contributed Paper Session*
  Convenor: Chuanlin Huo (China), Thomas W. Therriault (Canada)
  A total of 19 oral presentations were made during two ½-day sessions and covered contaminants such as persistent organic pollutants, floating debris, radioactive nuclide and anthropogenic nitrogen and mercury, as well as present environment problems and related monitoring and assessment methods.

AGENDA ITEM 5

Update on "Disbanded" MEQ Expert Groups

WG 30 (*Assessment of Marine Environmental Quality of Radiation around the North Pacific*) and WG 31 (*Emerging Topics in Marine Pollution*) were originally scheduled to end in December 2016, but were granted an extension to 2017 (GC Decision 2016/S/11) to complete their respective final report. WG 31 Co-Chair Wonjoon Shim and WG 30 representative Wu Men reported on the progress of their respective working groups at the MEQ meeting. WG 31 submitted its report to the MEQ Committee for review in March 2018 noting that the report can only be completed after Japan has supplemented its responsible part. However, a WG 30 brochure was submitted to MEQ (***MEQ Endnote 3***).

AGENDA ITEM 6

Other business

None

AGENDA ITEM 7

Reports from MEQ Expert Groups

All expert groups under MEQ attended the MEQ committee meeting during PICES 2018 Annual Meeting, Co-Chair from each group reported their work and progress in 2018. Proposals of new topics and direction were discussed for the development of MEQ.

1. Section on *Ecology of Harmful Algal Blooms in the North Pacific (S-HAB)*

- Vera Trainer participated in the GlobalHAB Scientific Steering Committee Meeting, Villefranche sur mer, France, April 9–13, 2018;
- Four S-HAB members attended a Symposium on "*Harmful algal blooms and hypoxia in a changing ocean*", May 25–26, 2018, Hangzhou, China;
- Four S-HAB members participated in a Symposium on "*Causative species of harmful algal blooms and mechanism of their migration dynamics in the Asia-Pacific region*", October 9–10, 2018, Hangzhou, China;
- Members attended the International Conference on Harmful Algae, Nantes, France, 21–26 October 2018;
- S-HAB held its meeting on October 30 at PICES-2018, with 30 participants from all PICES member countries in attendance.

S-HAB requests:

- ½-day S-HAB meeting at PICES-2019;
- 2½-day Workshop on "*Economic effects of HABs: Recommended practices*" at PICES-2019
- Travel support for 1 PICES member (contributor) to attend the Global HAB Scientific Steering Committee meeting in 2019
- Travel support for 1 PICES member to attend the joint S-HAB workshop at PICES-2019 in Victoria, Sidney
- Travel support for 1 speaker to attend the ICES Symposium on "*Shellfish – Resources and invaders of the North*" in Tromsø, Norway

2. Advisory Panel on *Marine Non-indigenous Species* (AP-NIS)

- AP-NIS membership needs to be populated and chairmanship determined;
- AP-NIS is incorporating WG 21 NIS data into the ICES database.

AP-NIS request:
- 1-day AP-NIS meeting at PICES-2019;
- 1-day Workshop on "*Monitoring non-indigenous species in PICES member countries: Towards Best Practices*".

MEQ reviewed 18 proposed Topic Sessions and 20 proposed Workshops for PICES-2019 and gave the highest ranking for MEQ sponsorship of Topic Sessions on:
- *The impacts of marine transportation and their cumulative effects on coastal communities and ecosystems*;
- *Environmental indicators of plastic pollution in the North Pacific*;
- *Linking changes in climate, nutrient distribution, phytoplankton ecology, and production of algal exudates in the North Pacific*;
- *The impacts of mariculture on coastal ecosystems*;
- MEQ Paper Session;
- *Habitat restoration of marine ecosystems* [medium-high ranking].

Workshops:
- *Monitoring non-indigenous species in PICES member countries: Towards Best Practices*;
- *Economic effects of HABs: Recommended practices*;
- *PICES contribution to Central Arctic Ocean (CAO) ecosystem assessment (Third)* [medium-high ranking].

MEQ reviewed the proposals for inter-sessional workshops and gave the highest ranking to:
- NPESR3 Synthesis Workshop

September 27, 2017

AGENDA ITEM 8
Election of Chair and Vice-Chair of MEQ

Dr. Chuanlin Huo and Dr. Thomas Therriault stepped down as the Chair and Vice-Chair. Dr. Guangshui Na from China was elected as MEQ Chair, and Dr. Andrew Ross from Canada was elected as MEQ Vice-Chair. Dr. Huo will still remain as a MEQ member.

AGENDA ITEM 9
Relations with other groups/organizations

Study Group on *Marine Microplastics* (SG-MMP) Chair Dr. Wonjoon Shim presented SG-MMP recommendations to establish a new Working Group on *Marine Microplastics* (***MEQ Endnote 4***). The working group would have strong linkages to NOWPAP, ICES, GESAMP and IOC WESTPAC that PICES collaborates with.

Dr. Takafumi Yoshija (NOWPAP *ex officio*) presented activities of NOWPAP and discussed the arrangement of representation at NOWPAP and other organizations' schedule of meetings in 2019, to promote the participation in and the increasing exchange at each other's meetings and workshops.

AGENDA ITEM 10
Other business

The US representative has not attended the MEQ meeting for two consecutive years. It is recommended to select new members as the US representative.

MEQ Endnote 1

MEQ participation list

Members

Minkyu Choi (Korea)
Seongjin Hong (Korea)
Toyomitsu Horii (Japan)
Chuanlin Huo (China, Chair)
Weol-Ae Lim (Korea)
Olga Lukyanova (Russia)
Hideaki Maki (Japan)
Guangshui Na (China)
Andrew Ross (Canada)
Thomas Therriault (Canada, Vice-Chair)

Members unable to attend

Canada: Peter Ross
China: Chunhou Li
Russia: Tatyana A. Belan, Elena Maximovna Latkovskaya
USA: Staci Simonich, Gina Ylitalo

Observers

Zhengguo Cui (China)
Jeannette Davis (USA)
Jinqiu Du (China)
Ryosuke Fujita (Japan NUS)
Dong-Woon Hwang (Korea)
Masaya Katoh (Japan)
Hyun Woo Kim (Korea)
Qiufen Li (China)
Douding Lu (S-HAB, Co-Chair)
Wu Men (China)
Yumi Okochi (Japan NUS)
Wonjoon Shim (Korea, Chair SG-MMP)
Vera L. Trainer (USA)
Pengbin Wang (China)
Taichi Yanezawa (Japan NUS)
Takafumi Yoshida (NOWPAP)

MEQ Endnote 2

MEQ meeting agenda

Sunday, October 28, 2018

1. Welcome and adoption of agenda (Thomas W. Therriault)
2. Implementation of PICES-2017 decisions (Thomas W. Therriault)
3. MEQ Best Oral Presentation award and Best Poster award for PICES 2018 (Thomas W. Therriault)
4. Review the main achievements of MEQ-2018 (Thomas W. Therriault)
5. Update on “Disbanded” MEQ Expert Groups (WG 30 and WG 31) (Thomas W. Therriault)
6. Other business (All)

Wednesday, October 31, 2018

7. Reports from MEQ Expert Groups and discussion (S-HAB, AP-NIS)
   - New topics and direction should be discussed for the development of MEQ
8. Election of the new Chairman and Vice Chairman of MEQ (All – Secretariat)
9. Relations with other groups/organizations (All)
10. Other business (All)

MEQ Endnote 3

WG 30 brochure

1 Executive Summary of WG30

In 2013 the North Pacific Marine Science Organization (PICES) approved the formation of an interdisciplinary Working Group on Marine Radioactivity in the North Pacific Ocean (WG30). This Working Group was designed to engage the PICES scientific community in an effort to discuss and assess the impact of the 2011 Fukushima Dai-Ichii Nuclear Power Plant (FDNPP) accident on the marine environment of the North Pacific Ocean. This was an unusual mandate for a PICES working group because it addressed a very specific event whose impacts and consequences were unfolding in real time as WG30 undertook its deliberations. As a result, the annual meetings of WG30 became a forum for the timely exchange of new information among the PICES member countries in documenting and evaluating environmental changes associated with the FDNPP accident.

Participants at WG 30' s first meeting, at PICES-2013 in Nanaimo, Canada. The first row (left to right): Peter J. Kershaw, Tomowo Watanabe, Yusheng Zhang, Kathryn A. Higley, Suk Hyun Kim, John Smith; the second row (left to right): In-Seong Han, Hiroyuki Shimada, Jinqiu Du, Wu Men, Delvan Neville.

WG30 was extremely focussed and very collaborative in the sharing of current information as it was acquired during seasonal cruises undertaken by each member country around the North Pacific, thereby expediting the international dissemination of Fukushima monitoring data. The products of this working group include one PICES WG30 Final Report, two major Workshops, an invited, PICES-SCOR collaborative review article and over 30 scientific articles in international, peer reviewed journals.

WG30' s primary accomplishments and research findings are described in this brochure, and detailed information is given in the Final Report of WG30. The group promoted research through coordinated communications, exchanges of sampling and analytical methodologies, laboratory visits and the organization of meetings to discuss and publish results. The principal thrust of the collaborative research was on radionuclide transport in the ocean, ocean-atmospheric exchange of radioactivity, radionuclide uptake in sediments and marine biota and impacts on marine food webs and ecosystems.

A range of different types of modeling studies were also reported including radionuclide transport models, fate models and radiological dose and risk assessment models. Model testing and evaluation was enhanced by the fact that the FDNPP accident represents the largest point source discharge of radioactivity that has ever occurred into the marine environment, thereby providing an unusually strong input signal whose far field features were particularly amenable to model validation using experimental data provided in WG30.

As the 4-year term for WG30 approached, it became clear that the Working Group members had profited significantly from the international cross-fertilization of ideas, data sharing and cultural exchanges that are supported and encouraged under the auspices of the PICES program. It also became clear that the FDNPP accident is unlikely to be the last nuclear related incident in the Pacific Ocean with potentially deleterious impacts on marine ecosystems. Within the next decade dozens of new nuclear power plants will begin operations in Asia. Furthermore, nuclear weapons tests are a likely prospect in the western Pacific and there are numerous other possible sources and mechanisms for the discharge of large quantities of radioactivity into the environment that may emerge in future. The research results and products of WG30 can be used as a guide for the quick establishing of radioactivity monitoring and assessment programs and the efficient development of international research collaborations in the event of a future nuclear accident or large-scale radioactivity discharge in the North Pacific region.

2 Research highlights

FDNPP Coastal Area

The FDNPP accident was characterized by the swift and direct release of water to the ocean highly contaminated in ^{131}I and radioactive cesium (^{137}Cs and ^{134}Cs). The direct leakage of ^{137}Cs was estimated as 3.5 PBq and the highest seawater concentration (> 6 × 10^6 Bq/L) was observed in early April 2011 at the coast near the FDNPP. This value was seven orders of magnitude higher than the pre-accident levels. Seawater concentrations of ^{137}Cs declined rather quickly following the accident owing to ocean mixing and transport in the dynamic coastal regime off eastern Japan and within several years ^{137}Cs levels began to approach pre-accident levels.

Marine organisms monitoring data of 51,978 inspection results for Fukushima Prefecture by the end of March 2018 showed that more than 40% of inspected samples were over the Japanese regulatory limit (100 Bq/kg-wet for radioactive Cs) in the period immediately following the accident (April-June 2011).

This percentage gradually declined and has remained at 0% since April 2015. On the other hand, radiocesium concentrations in demersal fishes declined much more slowly, possibly owing to continuing contamination of their food source (benthic infauna) from sediments.

Ongoing sources of radioactive cesium from the FDNPP to the ocean are known to be the direct discharge from the FDNPP site, river run-offs, and groundwater etc. The ongoing releases of ^{137}Cs from the FDNPP harbor were estimated to be 3 TBq·y^{-1} for the summer of 2012 while the concentration of ^{137}Cs in the harbor decreased by a factor of 5 between 2013 and 2016 and the present releases of ^{137}Cs from the FDNPP harbor were estimated to be about 0.6 TBq·y^{-1}. However, the monitoring results outside of the harbor have shown a continuing decrease in the concentration of radioactive Cs in marine organisms.

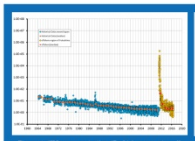


Figure 1. ^{137}Cs concentration (Bq/L) in sea water off Fukushima Prefecture (1964-2017) at stations in red circle on map (Data are obtained from http://search.kankyo-hoshano.go.jp/servlet/search.top).

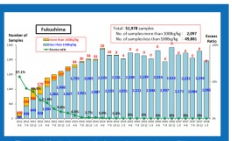


Figure 2. Monitoring results for marine organisms off the coast of Fukushima Prefecture from March 2011 to March 2018 (http://www.jfa.maff.go.jp/e/inspection/index.html).

Korean Sea

The levels of concentrations of radionuclides (^{3}H, ^{137}Cs, ^{90}Sr and $^{239+240}Pu$) in the surface seawater of the Korean Sea since 2011 are consistent with the radionuclide level obtained over 5 years (2006 - 2010) prior to the FDNPP accident. The concentrations of ^{137}Cs, ^{90}Sr and $^{239+240}Pu$ in ocean sediments and marine biota, including fish, shellfish and seaweed, collected in Korean waters during 2011 - 2016 were also similar to those determined before the FDNPP accident. However, the concentration of ^{137}Cs in the mullet (Mugil cephalus) from the eastern coast in 2012, was found to be 2,432±32 mBq/kg-wet, which was 10 times higher than annual average concentrations in fish measured during 2006–2011. The activity ratio of $^{134}Cs/^{137}Cs$ determined in the mullet coincided with that at cesium emitted from the FDNPP. This fish may have been contaminated in the blackish water where Cs precipitated via atmosphere flowed from land.

Coastal sea of China

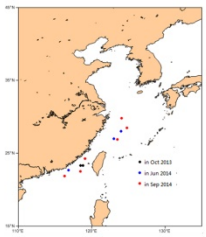


Figure 3. Locations for the collection of seawater samples containing detectable ^{134}Cs from 2013 to 2014.

Seawater, marine organisms and sediment samples were collected in Chinese coastal waters in 2011-2015 and analyzed for a wide range of radionuclides discharged during the FDNPP accident.
Detectable levels of ^{134}Cs were found at 11 sampling sites, with the highest activity of 0.98 Bq/m^3 indicating that a small amount of ^{134}Cs was transported from the FDNPP accident site to the coastal waters of China.

2 Research highlights

NW Pacific Area

The monitoring results show that the activity of ^{137}Cs and ^{134}Cs measured in the Northwest Pacific in May – June 2011 was two orders of magnitude higher than fallout background levels before the accident, while the activity of ^{90}Sr was 25 times higher than the background level. Levels of ^{137}Cs, ^{134}Cs and ^{90}Sr in the northwest Pacific decreased quickly with time after the accident, but until 2016 they were still elevated compared to the background. Radioactivity levels in marine organisms reached maximum levels in 2012 and decreased with time thereafter. The radiological dose assessment results showed that the radiological dose to pelagic fish and cephalopod species in NW Pacific was far below the recommended dose limits, indicating that there were no significant harmful radiological effects on these species.

The monitoring results showed that the Fukushima-derived radiocesium in the surface seawater was transported eastward at a speed of 8 cm sec^{-1}. Part of the Fukushima-derived surface radiocesium was subducted in Subtropical Mode Water (STMW) and Central Mode Water (CMW) formation regimes and transported southward along subsurface pathways to lower latitudes.

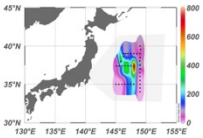


Figure 4. Distribution of ^{134}Cs (Bq/L) in surface seawater of NW Pacific in June 2011

NE Pacific Area

Time series measurements of ^{134}Cs and ^{137}Cs in seawater on Line P documented the initial arrival of the Fukushima signal by ocean current transport at a location 1500 km west of British Columbia, Canada in June, 2012, about 1.3 years after the accident. Between 2012 and 2015 the Fukushima radioactivity signal continued to increase in surface water on Line P and eventually began to level off at probable maximum values in 2016-2017 as documented by biannual monitoring surveys. Although radioactivity contamination of fish off Fukushima was initially severe, analyses of biological samples performed under the auspices of the InFORM (International Fukushima Ocean Radionuclide Monitoring Network) monitoring program off British Columbia have revealed little evidence of elevated radioactivity levels in fish or other biota. These results, based on both measurements and biological modeling studies are a consequence of the low Fukushima radionuclide levels in NE Pacific seawater and the low biological half-lives of several months for Cs in fish.

Although the ecosystem impacts off British Columbia associated with radioactivity releases from FDNPP accident have been minimal, the communication of these results to the public and general community acceptance of their veracity has been a challenge requiring many public lectures, scientific publications and considerable media outreach, thereby providing a cautionary note for studies of future ecosystem threats associated with grim anthropogenic drivers.

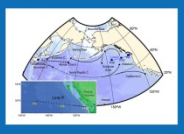


Figure 5. Primary INFORM sampling stations on Line P in the NE Pacific.

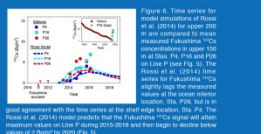


Figure 6. Time series for model simulations of Rossi et al. (2014) for upper 200 m are compared to mean measured Fukushima ^{137}Cs concentrations in upper 150 m at Stas. P4, P16 and P26 on Line P (see Fig. 5). The Rossi et al. (2014) time series for Fukushima ^{137}Cs slightly lags the measured values at the ocean interior location, Sta. P26, but is in good agreement with the time series at the shelf edge location, Sta. P4. The Rossi et al. (2014) model predicts that the Fukushima ^{137}Cs signal will attain maximum values on Line P during 2015-2016 and then begin to decline below values of 2 Bq/m^3 by 2020 (Fig. 5).

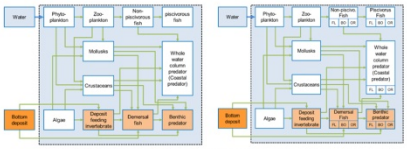


Figure 7. Marine food webs for the prediction of radionuclide transfer to marine species in: left) Extended-BURN-POSEIDON with a single target tissue, right) Multi-BURN PPOSEIDON with three target tissues (flesh, bone and organ) for fishes.

Radionuclide transfer model for pelagic and benthic food chains

The fate model was developed to predict the transfer of radionuclides to marine species since 2012. Following the implementation of the BURN-POSEIDON model equipped with a pelagic food web in 2014, the Extended-BURN-POSEIDON model equipped with pelagic and benthic food webs was thereafter developed and provided an explanation as to how the concentration of ^{137}Cs in benthic fishes remained at a level significantly higher than pelagic fishes. In 2016, the development of the Multi-BURN-POSEIDON model (ver. 1) with three target tissues for fishes was underway to improve the estimates of accumulation of radionuclides in marine fishes, especially for ^{90}Sr.

2 Research highlights

Voxel models of marine species for radiological dose assessment

The realistic model of the Dungeness crab, was produced using CT (computed tomography) imaging, which allows for the production of a 3D set of images of an organism in the form of individual x-ray slices calculated via a Radon transformation. For the crab, this method produced sufficient contrast between the tissues of interest to allow segmenting them slice-by-slice. The resulting model, which is termed a voxel model, is pictured in the below figure. A 'voxel' is essentially the 3-dimensional equivalent to the 'pixel' , where each individual voxel is uniform within itself. Voxel models for several marine species, such as flatfish, Pacific albacore, flying neon squid and brown seaweed were also established by the members of WG30.

Figure 8: Full 3D voxel model of the Dungeness crab, with the heart, gills, gonads and hepatopancreas identified separately from the exoskeleton and muscle tissue. The stomach was deflated, and thus not able to be segmented.

3 Recommendations

The results generated by WG 30 indicate that radioactivity levels in the North Pacific Ocean are presently declining in most phases of the marine ecosystem. However, there are still continuing releases through rivers and ground water into the ocean of radioactivity both directly from the FDNPP site and from terrestrial regions in which accident-derived radioactivity has been temporarily sequestered.

1. Post-FDNPP monitoring of radionuclides (^{134}Cs, ^{137}Cs) should be continued in the North Pacific for seawater and biota until levels have reached pre-2011 baseline fallout levels.

The complex hydrodynamic current regime of the western north Pacific has resulted in the injection of much of the FDNPP accident radioactivity inventory into CMW and STMW mode waters that are being dispersed southward and eastward by subsurface transport. It is important to keep track of the marine dispersal patterns for this large quantity of artificial radioactivity.

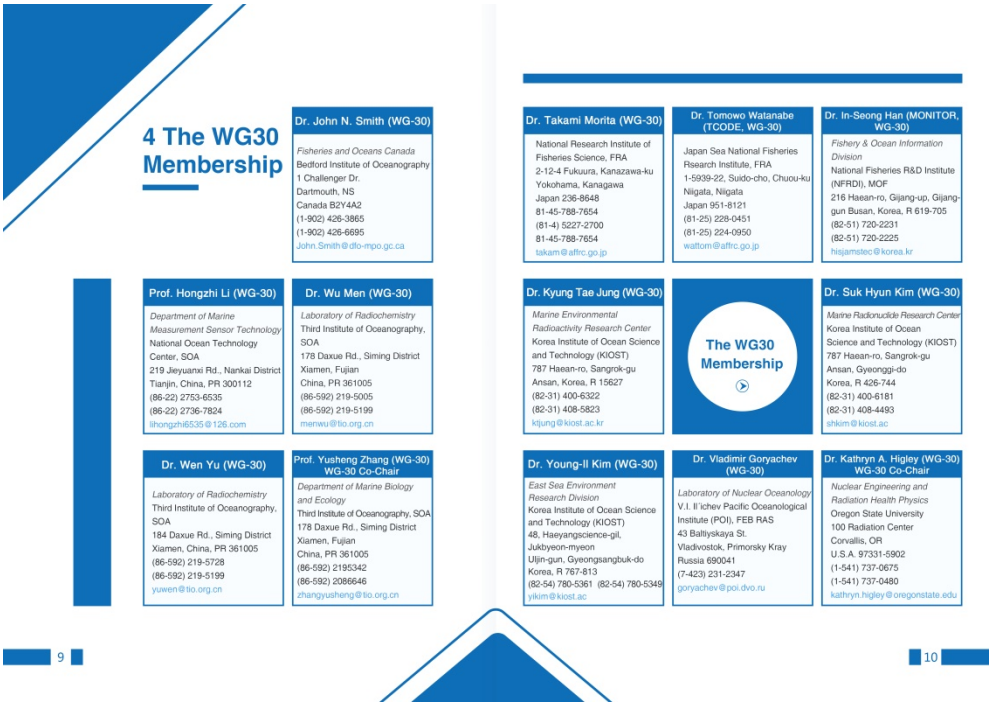
2. Oceanographic surveillance should be maintained of the FDNPP radionuclide inventory in North Pacific mode waters both from environmental radiological and ocean tracer perspectives.

Existing radiological policy standards are different in PICES member countries, especially with regards to the long-term environmental and health effects of low radioactive wastes released into the marine environment. With the anticipated, continuing development of the nuclear power industry in the North Pacific, the effects of radioactivity releases on fisheries and the marine ecosystem will become an important environmental issue.

3. A PICES Working Group should be established to examine the influence of long-term, low-level, radioactive waste releases from coastal nuclear facilities on fisheries and marine ecosystems.

The Canadian InFORM program enlisted citizen scientists to collect environmental samples that were analysed for radioactivity through government funding with the results posted to publically available websites. The direct engagement of the public in the environmental monitoring was effective in public outreach and in diminishing the spread of false information about environmental threats.

4. Environmental monitoring for radioactivity can be made significantly more effective in terms of public outreach and education if efforts are made to directly engage the public in some aspect of the surveillance operations.



4 The WG30 Membership

Dr. John N. Smith (WG-30)
Fisheries and Oceans Canada
Bedford Institute of Oceanography
1 Challenger Dr.
Dartmouth, NS
Canada B2Y4A2
(1-902) 426-3865
(1-902) 426-6695
John.Smith@dfo-mpo.gc.ca

Dr. Takami Morita (WG-30)
National Research Institute of Fisheries Science, FRA
2-12-4 Fukuura, Kanazawa-ku
Yokohama, Kanagawa
Japan 236-8648
81-45-788-7654
(81-4) 5227-2700
81-45-788-7654
takam@affrc.go.jp

Dr. Tomowo Watanabe (TCODE, WG-30)
Japan Sea National Fisheries Rsearch Institute, FRA
1-5939-22, Suido-cho, Chuou-ku
Niigata, Niigata
Japan 951-8121
(81-25) 228-0451
(81-25) 224-0950
wattom@affrc.go.jp

Dr. In-Seong Han (MONITOR, WG-30)
Fishery & Ocean Information Division
National Fisheries R&D Institute (NFRDI), MOF
216 Haean-ro, Gijang-up, Gijang-gun Busan, Korea, R 619-705
(82-51) 720-2231
(82-51) 720-2225
hisjamstec@korea.kr

Prof. Hongzhi Li (WG-30)
Department of Marine Measurement Sensor Technology
National Ocean Technology Center, SOA
219 Jieyuanxi Rd., Nankai District
Tianjin, China, PR 300112
(86-22) 2753-6535
(86-22) 2736-7824
lihongzhi6535@126.com

Dr. Wu Men (WG-30)
Laboratory of Radiochemistry
Third Institute of Oceanography, SOA
178 Daxue Rd., Siming District
Xiamen, Fujian
China, PR 361005
(86-592) 219-5005
(86-592) 219-5199
menwu@tio.org.cn

Dr. Kyung Tae Jung (WG-30)
Marine Environmental Radioactivity Research Center
Korea Institute of Ocean Science and Technology (KIOST)
787 Haean-ro, Sangrok-gu
Ansan, Korea, R 15627
(82-31) 400-6322
(82-31) 408-5823
ktjung@kiost.ac.kr

The WG30 Membership

Dr. Suk Hyun Kim (WG-30)
Marine Radionuclide Research Center
Korea Institute of Ocean Science and Technology (KIOST)
787 Haean-ro, Sangrok-gu
Ansan, Gyeonggi-do
Korea, R 426-744
(82-31) 400-6181
(82-31) 408-4493
shkim@kiost.ac

Dr. Wen Yu (WG-30)
Laboratory of Radiochemistry
Third Institute of Oceanography, SOA
184 Daxue Rd., Siming District
Xiamen, China, PR 361005
(86-592) 219-5728
(86-592) 219-5199
yuwen@tio.org.cn

Prof. Yusheng Zhang (WG-30) WG-30 Co-Chair
Department of Marine Biology and Ecology
Third Institute of Oceanography, SOA
178 Daxue Rd., Siming District
Xiamen, Fujian
China, PR 361005
(86-592) 2195342
(86-592) 2086646
zhangyusheng@tio.org.cn

Dr. Young-Il Kim (WG-30)
East Sea Environment Research Division
Korea Institute of Ocean Science and Technology (KIOST)
48, Haeyangscience-gil, Jukbyeon-myeon
Uljin-gun, Gyeongsangbuk-do
Korea, R 767-813
(82-54) 780-5361 (82-54) 780-5349
yikim@kiost.ac

Dr. Vladimir Goryachev (WG-30)
Laboratory of Nuclear Oceanology
V.I. Il'ichev Pacific Oceanological Institute (POI), FEB RAS
43 Baltiyskaya St.
Vladivostok, Primorsky Kray
Russia 690041
(7-423) 231-2347
goryachev@poi.dvo.ru

Dr. Kathryn A. Higley (WG-30) WG-30 Co-Chair
Nuclear Engineering and Radiation Health Physics
Oregon State University
100 Radiation Center
Corvallis, OR
U.S.A. 97331-5902
(1-541) 737-0675
(1-541) 737-0480
kathryn.higley@oregonstate.edu

PICES

A BRIEF INTRODUCTION OF PICES WG30

PICES

MEQ Endnote 4

Proposal for new Working Group on *Marine Microplastics*

Parent Committee: MEQ

Linkage(s) to previous PICES Expert Groups or activities (if any):

- SG-MP Study Group on Marine Pollutants

Linkage(s) to other organizations and programs (if any): SCOR, GESAMP, ICES, WESTPAC

Motivation and Goals and/or Background

Marine debris is increasingly recognized as a threat to biota in the ocean, and especially North Pacific and its marginal seas are reported as 'hot spots' for its abundance. However, organismal and non-organismal indicators, which are consistently available across the North Pacific region, for plastic pollution status and trend and ecological impacts are not established.

Terms of Reference:

1. To review micro- and mesoplastic pollution (e.g. abundance, distribution, composition, and potential impacts) in North Pacific and its marginal seas;
2. To identify multiple organismal and non-organismal indicators of plastic pollution and its environmental impacts including associated chemicals in North Pacific and its marginal seas;
3. To recommend guidelines for monitoring environmental indicators and a target improvement goal for the established indicators;
4. To convene a topic session and/or workshop on environmental indicators and impacts of plastic pollution and coordinate a special issue in an international peer-reviewed journal;
5. Contribute to FUTURE by publishing a final report summarizing results of Working Group deliberations.

Proposed membership:

Proposed leadership:
Co-Chair Jennifer Lynch (USA)
Co-Chair Chengjun Sun (China)

Canada
Sarah Dudas (Fisheries and Oceans Canada)
Chelsea Rochman (University of Toronto)
Peter Ross (Coastal Ocean Research Institute)
S. Avery-Gomm (University of British Columbia)

China
Chengjun Sun (First Institute of Oceanography)
Daoji Li (East China Normal University)
Juying Wang(National Marine Environmental Monitoring Center (NMEMC))
Connie Ng (City University of Hong Kong)
*another potential member, Qiufen Li, Yellow Sea Fisheries Research Institute, CAFS

Japan
Hideshige Takada (Tokyo University of Agriculture and Technology)
Haruhiko Nakata (Kumamoto University)
Shuhei Tanaka (Kyoto University)
YutakaWtanuki (Hokkaido University)

Korea
Wonjoon Shim (Korea Institute of Ocean Science and Technology)
Sanghee Hong (Korea Institute of Ocean Science and Technology)
Seung-Kyu Kim (Incheon National University)

Russia
Nikolai Kozlovskii (Pacific Geographical Institute)

USA
Jennifer Lynch (National Institute of Standards and Technology)
Matthew Savoca (Stanford University)
David Hyenbach (Hawaii Pacific Universty)
Michelle Hester (Oiknos)
Amy Uhrin (NOAA)