Report of the Human Dimensions Committee

The first meetings of the newly established Human Dimensions Committee (HD) took place from 18:00–20:00 h on Sunday, September 24, 2017 and 14:00–-18:00 h on Wednesday, September 27, 2017 in Vladivostok, Russia, under the chairmanship of Dr. Keith Criddle. Nine Committee members and several observers attended the meeting (**HD Endnote 1**). Attendees introduced themselves and provided brief overviews of their current projects. Below are the agenda items (**HD Endnote 2**) and related notes from the meeting.

Participants of the first meeting of the Human Dimensions Committee at PICES 2017, Vladivostok, Russia. Back row, from left: Tatiana Semenova, Lesley MacDougall, Mitsutaku Makino, Jingmei Li, Myeonghwa Jung, Suk-Jae Kwon, Ekaterina Kurilova, and Xu Changan. Front, from left: Keith Criddle, Oleg Katugin, and Ian Perry.

AGENDA ITEM 2
Background of HD and overview of key tasks

PICES' focus on human dimensions of marine systems can be traced back to its Working Group on *Ecosystem-based Management Science and its Application to the North Pacific* (WG 19; 2004–2009). In 2008, an International Symposium on "*Coping with global change in marine social-ecological systems*" (co-sponsored by GLOBEC, EUR-OCEANS, PICES, FAO, SCOR, IMBER, IRD) was held in Rome. Products from the meeting were a dedicated issue of selected papers in *Marine Policy* 34(4) (2010) and a book (World Fisheries: a Social-Ecological Analysis (I. Perry (Ed.) 2011). In 2009, a Study Group on *Human Dimensions* (SG-HD) was established (2009–2011), followed by the Section on *Human Dimensions of Marine Systems* (S-HD; 2011–2016) and Human Dimensions Committee (HD; 2016). These expert groups conducted inter-disciplinary research based on an array of social science disciplines, including, law, economics, sociology, psychology, and anthropology. In addition, these groups have collaborated with social scientists in ICES to organize

international symposia on marine social-ecological systems – PICES was a co-sponsor of the international symposium on "*Understanding Marine Socio-Ecological Systems: including the human dimension in Integrated Ecosystem Assessments*" (MSEAS 2016, Brest, France, May 30–June 3, 2016) and will host MSEAS-II in Yokohama, Japan, in 2020.

The HD Committee is intended to advance understanding of the human dimension of North Pacific social-ecological systems (SES). This will be accomplished through: baseline studies, development of time series observations (TSOs) of key indicators, development of behavioral models of the effects of change in key state and control variables, and studies that determine how North Pacific SES respond to exogenous forcing by physical, ecological, and social factors.

HD Committee Key Tasks

The HD Committee's area of responsibility is to promote and coordinate interdisciplinary research that leads to increased understanding of the relationship between North Pacific marine ecosystems and the people, communities, and economies that are part of those systems and rely on the resources and services they provide. Particular emphasis will be given to fostering research on:
a. Methodological and empirical challenges involved in integrating human dimensions into ecosystem analyses and
b. Exploration of development pathways that are sustainable from social, economic, and ecological perspectives.

The HD Committee's aim is to support the work of other PICES expert groups. Where those groups often consider the impact of human activities on ecosystems, the HD Committee will promote not only consideration of these impacts but also the consideration how biophysical changes impact the well-being of people, communities, and economies taking into account their values and characteristics. In addition, the Committee will engage with kindred 'human dimension' initiatives of other organizations (*e.g.*, ICES and IMBER).

The HD Committee will incorporate the S-HD terms of reference (**HD Endnote 3**) into a plan of work for the Committee. Specifically, the HD Committee will continue to support FUTURE and NPESR3.

AGENDA ITEM 3
Review accomplishments of S-HD

The subteams made considerable progress in addressing the TORs. Products include:
TOR-1
▪ Mitsutaku Makino, 2013. PICES-MAFF project on marine ecosystem health and human well-being: Indonesia workshop. PICES Press 21(2): 18–19;
▪ Ian Perry and Mitsutaku Makino, 2013. New PICES MAFF-sponsored project on marine ecosystem health and human well-being. PICES Press 21(1): 26–28;
▪ Grant Murray, Linda D'Anna, Patricia MacDonald and Michele Patterson, 2014. Navigating change: well-being, values, and the management of marine social-ecological systems. PICES Press 22(1): 15–19;
▪ Masahito Hirota, 2015. A good relationship between local communities and seafood diversity. PICES Press 23(2): 31 (cont. p. 40);
▪ Juri Hori, 2015. A psychological perspective on human well-being—an international comparison of the well-being structure. PICES Press 23(2): 28–30;
▪ PICES 2015: Topic Session S10 on "*The human dimensions of harmful algal blooms*" at PICES-2015;
▪ PICES Scientific Report No. 52, 2017. Marine ecosystems and human well-being: the PICES-Japan MAFF MarWeB Project

TOR-2 and TOR-4
- Keith Criddle, 2016. MSEAS 2016—Understanding marine socio-ecological systems: including the human dimension in integrated ecosystem assessments. PICES Press 24(2): 24–25;
- Link, J.S., Thébaud, O., Smith, D.C., Smith, A.D.M., Schmidt, J., Rice, J., Poos, J.-J., Pita, C., Lipton, D., Kraan, M., Frusher, S., Doyen, L., Cudennec, A., Criddle, K.R., Bailly, D. 2017. Keeping humans in the ecosystem. ICES Journal of Marine Science 74(7): 1947–1956 https://doi.org/10.1093/icesjms/fsx130

TOR-3
- Keith Criddle and Mitsutaku Makino, 2013. Social and economic indicators for status and change within North Pacific ecosystems. PICES Press 21(2): 12–13;
- Ronald Felthoven and Stephen Kasperski, 2013. Socioeconomic indicators for United States fisheries and fishing communities. PICES Press 21(2): 20–23.

AGENDA ITEM 4
Report on W2 and SG-MES meeting

Workshop (W2) on "*Coastal ecosystem services in the North Pacific and analytical tools/methodologies for their assessment*"

Dr. Wei Liu (on behalf of Dr. Shang Chen) reported on the success of the W2. Dr. Shang Chen chaired the ½-day workshop. Participants included: Shang Chen (China), Guangshui Na (China), Jingmei Li (China), Wei Liu (China), Hiroaki Saito (Japan), Taichi Yonezawa (Japan), Sukgeun Jung (South Korea), Kazumi Wakita (Japan), Kristina Markevich (Russia), Moskovtseva Alena (Russia), Olga Lukyanova (Russia), Semenkov Sergey (Russia), Shvedova Anna (Russia), and Keith Criddle (USA). Three oral presentations were presented with in-depth discussion (see 2017 Session Summaries and Workshops).

Report of Study Group on *Marine Ecosystem Services* (SG-MES)

Dr. Wei Liu (on behalf of Dr. Shang Chen) presented a brief summary of the SG-MES meeting held September 23, 2017. See the SG-MES webpage for a detailed report.

AGENDA ITEM 5
Report on 8/HD-Paper Session

A 1-day HD Topic Session (S8/HD-Paper) on "*Marine ecosystem health and human well-being: A social-ecological systems approach*" included 4 presentations about outcomes of the PICES-MAFF Project—Marine Ecosystem Health and Human Well-being (MarWeB) in the morning session and 8 presentations about a suite of human dimensions topics in the afternoon.

The morning presentations led to interesting discussions on how to incorporate the local stakeholder perspectives and needs in capacity development projects and the importance of addressing multiple stressors in social-ecological systems. The Sato-umi/Gampita concept is spreading from the demonstration site to other sites in Indonesia. In contrast to the top-down process with stakeholder consultation used in Indonesia, the Guatemala project emerged through a wholly bottom-up process. It too has introduced lasting change, particularly in the community that was under the greatest stress from over-exploited fisheries.
The eight afternoon presentations covered a wide range of topics and academic approaches and evidenced the breadth and growing depth of PICES human dimensions research. Topics included: Marine Spatial Planning; citizen science; increasing ecological awareness; science communications; ground-truthing community

vulnerability indices developed using secondary data; the costs, benefits, and outcomes of a buyback of limited entry permits; incentivizing the adoption of bycatch reduction practices in trawl fisheries; and, innovative approaches to monitoring non-AIS vessels and their effect on whale behavior.

The S8/HD posters addressed contamination loads from fish consumption and bioeconomic modeling through the value chain. See 2017 Session Summaries and Workshops for detailed report of this session.

AGENDA ITEM 6
Topic session, workshop, and expert group proposals

Review of topic session and workshop proposals for PICES-2018, Yokohama, Japan

The HD Committee reviewed two topic session proposals for PICES-2018. Both proposals address aspects of the S-HD TORs and the HD Committee key tasks. They were both recommended to Science Board as "High Priority".
1. *Integration of science and policy for sustainable marine ecosystem services* (***HD Endnote 4***)
2. *Science communication for North Pacific Marine Science* (***HD Endnote 4***)

Inter-sessional workshop proposals

The HD committee reviewed two proposals for inter-sessional workshops proposed by SG-MES:
1. *Taking Stock of Marine Ecosystem Services in the North Pacific—exploring examples and examining methods*. Convenors: Shang Chen, Dan Lew; 2 days, April 2018; Qingdao, China. (3—High priority)
2. *Regional ocean/climate forecasting and its application to HAB predictions in the North Pacific*. (Convenors: Fangli Qiao, Emanuele Di Lorenzo, Tom Therriault, Vera Trainer; 3 days, May 15–18, 2018; Qingdao, China (2—Medium priority)

Because (1) is an essential element of the proposed WG-MES (see below), the HD Committee recommended it to Science Board as "High Priority". Proposal (2) has HD implications and if approved, the HD Committee would like to encourage inclusion of social scientists. However, the HD Committee recommended it to Science Board as "Medium Priority". If Governing Council approves both of these inter-sessional workshop proposals, the HD Committee encourages the organizers to explore holding these workshops together, either currently or in sequence. Doing so will facilitate emergence of beneficial synergies as HABs are influenced by human uses of marine ecosystems and the occurrence of HABs affects the value of marine ecosystem services.

Expert group proposals

The HD Committee reviewed a proposal to establish a new Working Group on *Marine Ecosystem Services* (WG-MES; ***HD Endnote 5***). It is proposed that HD serve as the parent committee for WG-MES. Some details of the proposal were adjusted in response to comments from HD committee members. Additional details were modified at the recommendation of Science Board. What follows represents the WG-MES proposal as recommended by Science Board to Governing Council.

A<small>GENDA</small> I<small>TEM</small> 7
Work Plan for 2017–2018 and beyond

Upcoming meetings

- Ecosystem Service Partnership Conference, Session T7: *The role of social science in ecosystem services assessment*. December 11–15, 2018, Shenzhen, China;
- AGU/ASLO/TOS Ocean Science Meeting, Session 28595: *Transdisciplinary research to assess marine socio-ecological systems*, February 11–16, 2018, Portland, Oregon, USA;
- Natural capital symposium, March 29–22, 2018, Stanford University, California, USA;
- International PICES/CIBNOR/CICIMAR Symposium on "*Understanding changes in transitional areas of the Pacific*", Session 2: *Challenges in managing highly migratory and transboundary resources in Pacific transitional areas* and Session 6: *Transition zones in coastal habitats*, April 24–26, 2018, La Paz, BCS, Mexico;
- American Fisheries Society meeting, Western Division, May 21–25, 2018, Anchorage Alaska, USA;
- 4th International Symposium on "The Effects of Climate Change on the World's Oceans", Washington, DC, June 4-8, 2018.
- 19th International Institute for Fisheries Economics and Trade meeting, July 17-20, 2018, Seattle, Washington, USA;
- PICES-2018, HD-Paper Session and Committee meeting, October 25–November 4, 2018, Yokohama, Japan;
- PICES/ICES MSEAS II, May/June 2020, Yokohama, Japan.

WG 35: *North Pacific Ecosystem Status Report* (NPESR3)

NPESR3 will be a collection of electronic publications, one for each geographic region, one for human dimensions, and a summary. HD ETSOs may be at regional or national scale depending on available information and what makes most sense. ETSOs are now due. (Submitters are invited to co-author the HD chapter). The HD Chapter outline is due on November 30, 2017. See **HD Endnote 6** for HD Chapter outline and how to submit an ETSO)

A<small>GENDA</small> I<small>TEM</small> 8
New PICES-MAFF project

A new PICES-MAFF project on "*Building capacity for coastal monitoring by local small-scale fishers*" is being considered for Governing Council. The project is tentatively scheduled to run from April 2017 through March 2020 (see **HD Endnote 7**).

A<small>GENDA</small> I<small>TEM</small> 9
Engagement with ICES Strategic Initiative on the Human Dimension (SIHD)

The HD Committee discussed opportunities for formal and informal engagement with ICES-SIHD including:
1. ICES 2018 Annual Science Conference (Hamburg, Germany)
2. PICES-2018 (Yokohama, Japan)
3. MSEAS II (2020, Yokohama, Japan)

Miscellaneous

Addressing the incompleteness of the HD Committee roster

Current HD committee membership includes Canada (0), China (3), Japan (1), Korea (2), Russia (3), and USA (3). Incompleteness of HD Committee roster is an impediment to PICES science programs, especially NPESR3. Dr. Criddle brought this issue to the attention of Science Board.

HD Endnote 1

HD participation list

Members | Members unable to attend

Shang Chen (China)
Jingmei Li (China)
Myeonghwa Jung (Korea)
Mitsutaku Makino (Japan, Vice-Chair)
Suk-Jae Kwon (Korea)
Oleg Katugin (Russia)
Ekaterina Kurilova (Russia)
Tatiana Semenova (Russia)
Keith Criddle (USA, Chair)

Members unable to attend

Canada: Natalie Ban, Karen Hunter
China: Yang Han
USA: Ron Felthoven, Minling Pan

Observers

Ian Perry (Canada)
Lesley MacDougall (Canada)
Wei Liu (China)
Xu Changan (China)

HD Endnote 2

HD meeting agenda

1. Welcome and introduction
2. Background of HD and overview of key tasks
3. Review accomplishments of S-HD
4. Report on W2 and SG-MES meeting
5. Report on 8/HD-Paper Session
6. Topic session, workshop, and expert group proposals
7. Work Plan for 2017–2018 and beyond
8. New PICES-MAFF project
9. Engagement with ICES Strategic Initiative on the Human Dimension (SIHD)
10. Miscellaneous

HD Endnote 3

Section on *Human Dimensions of Marine Systems* (S-HD) TORs and
subteams formed to address them

1a. Clarify differences in societal objectives and needs among stakeholders in different sectors and countries.
1b. Develop an inventory of potential recipients, and their communication requirements for FUTURE and other PICES products.
2. Explore the consequences to and responses of marine social-ecological systems to global changes such as Climate Change.
3. Contribute to a Human Dimensions Chapter in the next North Pacific Ecosystem Status Report (NPESR3).
4. Facilitate academic cooperation with other international research initiatives such as ICES, IMBER, LOICZ, *etc*., and organize a symposium on the study of the human dimensions of marine ecosystems.

To address these areas of responsibility, the S-HD organized subteams:

ST-Wellbeing: Human wellbeing in marine social-ecological systems (TOR 1a). Juri Hori (Japan), Grant Murray (Canada), EunJung Kang (Korea)

ST-Communication: Develop an inventory of potential recipients, and their communication requirements for FUTURE and other PICES products (TOR 1b). Ekaterina Kurilova (Russia), Naesun Park (Korea), Mitsutaku Makino (Japan)

ST-Economy: Economic aspects of the consequences to and responses of human social systems to global changes (TOR 2). Minling Pan (USA), Sunny Chen (China), Masahito Hirota (Japan), Xu Wei (China), Ron Felthoven (USA), Keith Criddle (USA)

ST-Community: Community and societal aspects of the consequences to and responses of human social systems to global changes (TOR 2). Ron Felthoven (USA), Stephen Kasperski (USA), Ekaterina Kurilova (Russia), Mitsutaku Makino (Japan)

ST-NPESR: Contribute to NPESR-3 (TOR 3 and TOR 4). Keith Criddle (USA), Mitsutaku Makino (Japan), Emanuele DiLorenzo (USA), Stephen Kasperski (USA), Ian Perry (Canada)

HD Endnote 4

Proposal for a Topic Session on
"*Integration of science and policy for sustainable marine ecosystem services*" at PICES-2018

Duration: ½ day

Convenors: Shang Chen (China), Daniel K. Lew (USA), Jungho Nam (Korea), Mitsutaku Makino (Japan), Keith Criddle (USA)

Suggested Invited Speaker: Pushpam Kumar (UNEP)

The provisioning, cultural, regulating, and supporting services are the major benefits people obtain from the coastal and marine ecosystems. The identification, quantification, valuation, and management of ecosystem

services are key scientific questions that have attracted increasing concern from leading intergovernmental science organizations (such as PICES, ICES, IMBER, UNEP/IPBES, NOWPAP) and prominent nongovernmental environmental organizations(such as WWF, TNC, ESP). The goals of this session are to: (1) provide a venue for marine scientists and social scientists to exchange results from research on identification, characterization, quantification, valuation and management of ecosystem services; and (2) provide a forum to share and discuss the integration of ecosystem service science into policy-making for marine systems. This session will continue providing strong support to the key tasks of the HD committee, contribute a greater understanding of social and economic status of the North Pacific ecosystem, and contribute to the objectives of FUTURE.

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Proposal for a Topic Session on
"*Science communication for North Pacific Marine science*" at PICES-2018

</div>

Duration: ½ day

Convenors: Toyomitsu Horii (Japan), Ekaterina Kurilova (Russia) Mitsutaku Makino (Japan) Jacquelynne King (Canada)

Suggested Invited Speaker: Alan Haynie (USA) TBD (from the western Pacific)

Science communication between researchers and society is increasing in importance for PICES' integrated marine science. For example, natural scientific information about sustainable uses of ecosystems cannot be meaningful if the social and economic expectations of the users are not considered. The goal of ecosystem conservation activities, or sustaining "a good ecosystem", cannot be decided without deliberate discussions that include society. In addition, each country or society has a specific view of "a good ecosystem" which could benefit from larger-scale coordination and comparison within the North Pacific basin. Conducting multi-disciplinary integrated marine ecosystem studies , such as those supporting the FUTURE Science Program, requires close and effective interaction of concepts, methodologies, models, and data, from various disciplines are required and dissemination of that complex scientific information to society can be difficult. The PICES' scientific community would benefit from hearing examples of successful scientific communication. An example of communication to society includes providing scientific information about the fish stock sustainability and is often used by fish consumers with impacts on market demand which can ultimately decide the fishing pressure on the marine resources. A better understanding by stakeholders of the scenarios of future ecosystem states is an important step towards a society resilient and adaptable to global changes. This Topic Session invites studies about science communications such as those above. Theoretical studies, case studies, experiences, and perspectives for better science communication for the PICES activities are encouraged.

HD Endnote 5
Proposal for a Working Group on *Marine Ecosystem Services* (WG-MES)

Description

Marine ecosystems provide direct or indirect benefits to people. Ocean ecosystems provide human populations with ecological goods and services, such as seafood, climate regulation and air quality maintenance, storm damage prevention, waste purification, recreation and leisure opportunities, and biodiversity maintenance, among others. The accounting for anthropogenic values of marine ecosystem services (MES) in policy and management decisions has become an emergent issue recognized as critical from a social, economic, and cultural perspective, but also one that poses challenges both from a scientific and policy perspective. As a result, MES has become a hot topic of many international meetings and organizations. The United Nation (UN)'s Millennium Ecosystem Assessment focuses on the change of global ecosystem services' status and trends. Similarly, the ongoing World Ocean Assessment expresses urgent need for knowledge on marine ecosystem services. The United Nations Environmental Programme (UNEP) established the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) in 2012. The IPBES aims to develop and use knowledge about ecosystem services and biodiversity to improve ecosystem-based management at national, regional, and global scales. PICES has already contributed to these efforts but more substantial work is needed.

Since 1992, PICES as a scientific organization has become more important in promoting marine science and better understanding of the marine environment in the North Pacific, as well as in the world. One of PICES' strategic goals is to establish a scientific-policy integrated platform to provide sound scientific support to national and regional policy decision-making processes. To meet the demand of members from PICES, The Human Dimensions Committee (HD) was established under the PICES Science Board (SB) in November 2016. HD's area of responsibility is to promote and coordinate interdisciplinary research that leads to increased understanding of the relationship between North Pacific marine ecosystems and the people, communities, and economies that are part of those systems and rely on the resources and services they provide. In November, 2016, a Study Group on MES (SG-MES) was established by the SB to promote and coordinate research to improve MES assessment methodologies and to mainstream the MES in marine management and policy. SG-MES was also charged with developing the terms of reference for a working group that would continue these efforts.

HD and S-HD have organized several topic sessions/workshops on marine ecosystem services during PICES annual meetings. One of them also attracted support from IMBER as a co-sponsor. Consequently, the importance of ecosystem services in PICES' FUTURE program was recognized, so much so that "Ecosystem Services" was prominent in the title of the 2017 PICES annual meeting, "*Environmental Changes in the North Pacific and Impacts on Biological Resources and Ecosystem Services*."

Based on the SG-MES's one-year work, HD proposes the establishment of a working group (WG-MES) to promote studies related to science and policy of marine ecosystem services. WG-MES will facilitate exchange of information and share the experiences of case studies on MES in North Pacific waters in order to promote ecosystem service science and improve the consideration of MES in decision making related to marine integrated management. There are differences in methodology and practice of MES studies among North Pacific countries. Therefore, one of the goals of the WG-MES is to establish a set of regional technical guidelines on MES assessment and the integration and utilization of MES information in the policy process, as well as to provide technical support to national and regional bodies engaged in these activities. Formation of the WG-MES will allow PICES to attract more researchers with specific interest in MES.

Linkage to FUTURE Science Program
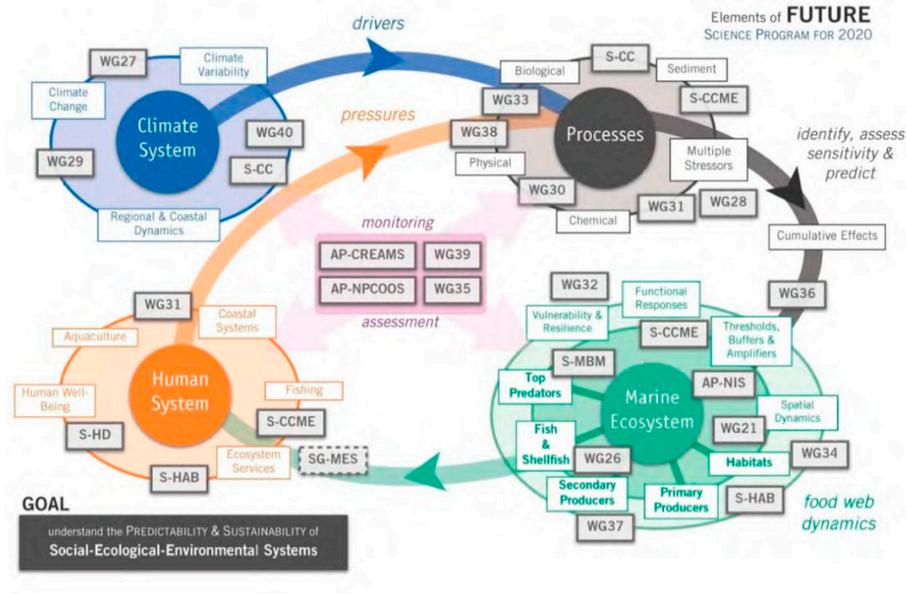
This proposed WG, like WG 36 and WG 40, addresses linkages between the Climate System, Marine Ecosystem, and Human System. The Science Board strongly encourages cooperation among these three working group with an aim to identify common state processes and drivers that may ultimately lead to the identification of emergent properties. The Science Board anticipates that exploration of such linkages and emergent properties will be a central function of the next PICES science program.

Linkages to other organizations

The WG-MES will be led by PICES and will focus on the MES issues in North Pacific Ocean. However, WG-MES could benefit from engagement with other intergovernmental organizations that include MES expertise. It is anticipated that WG-MES activities will attract participation from within PICES and from outside. These organizations besides PICES will have simply potential linkages to WG.

IMBER has expressed strong interest in the WG-MES if approved by PICES. It has indicated interest in serving as a co-sponsor of the group and may provide about $USD 3K to support the participation of young scientists in WG-MES meetings. If PICES agrees, WG-MES would like to accept IMBER's support, such as co-sponsorship of topic sessions, workshops, and intersessional meetings, sending group members, observers and/or sending experts to participate in WG-MES meetings. If PICES agrees, WG-MES would like to seek the similar support from ICES, IPBES because they have many experts in MES.

Terms of reference

1. Review MES studies of North Pacific marine ecosystems, identifying the scientific tools and methodologies employed, and the role these studies have played in policy analyses, management, or natural resource damage assessment.
2. Develop a typology of marine ecosystem services, tools and methodologies (*e.g.*, environmental accounting/natural capital, non-market values, replacement cost/Natural Resource Damage Assessment,

productivity change methods, *etc*.) that can be used to analyze marine ecosystem services, and the strengths and weaknesses of those tools and methodologies.

3. Illustrate (b) by applying two or more methods to the assessment of marine ecosystem services in identical case studies in multiple regions of the North Pacific.

4. Collaborate with WG 36 (Common Ecosystem Reference Points) and WG 40 (Climate and Ecosystem Predictability) to explore development of an indicator-based framework to study the resilience of SES and to advance integration envisioned in the FUTURE science program.

5. Complete a detailed technical report on the results of the analyses detailed in TORs (1), (2), and (3) and scoping requested in (4). The report should include practical recommendations for characterizing the status and trends of marine ecosystem services in the North Pacific. And, contribute articles on ecosystem services to PICES Press.

Proposed membership

Each member country recommends 3–5 members with backgrounds in marine ecology, marine economics, marine law, or management.

Two members will serve as co-chairs: One from the western North Pacific (Potential Candidate: Dr. Shang Sunny Chen, HD, SG-MES Chair) and the other from the eastern North Pacific (Potential Candidate: Dr. Dan Lew, SG-MES).

Canada
Ms. Miriam O (SG-MES, Fisheries and Ocean Canada)

China
Dr. Shang Chen (HD, S-HD, SG-MES Chair, FIO, SOA, China, schen@fio.org.cn)
Prof. Jingmei Li (HD, Ocean Univ. of China, jingmeili66@163.com)
Prof. Bengrong Peng (Xiamen Univ., China, brpeng@xmu.edu.cn)
Dr. Wei Liu (SG-MES, FIO, SOA, China, weiliu@fio.org.cn)
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Dr. Shion Takemura (SG-MES, National Research Institute of Fisheries Science, Japan, shiontakemura@affrc.go.jp)

Russia
Dr. Olga Lukyanova (S-HD, HAB-S, MEQ, WG-31, Pacific Scientific Research Fisheries Center (TINRO-Center, Russia, olga.lukyanova@tinro-center.ru)
Professor Elena Anferova (Far Eastern Federal University, Russia, anferova@mail.ru)

USA
Dr. Dan Lew (SG-MES, Alaska Fisheries Science Center, NOAA Fisheries, USA, Dan.Lew@noaa.gov)

Timeline

- October 2017: Working group approval from HD, SB, and GC.
- January 2018: Nominate/finalize membership and chairmanship.
- March 2018: Initiate work by correspondence
- April or May 2018: Hold a 2-day workshop in Qingdao to develop a work plan to address the TORs, including preliminary discussion of possible case study sites and methods. Review MES studies of North Pacific marine ecosystems (TOR-1). Submit the work plan to HD for approval.
- October 2018: Hold a 1-day business meeting and a ½-day topic session during PICES annual meeting in Yokohama. The business meeting will be used to draft a typology of marine ecosystem services, tools and methodologies that can be used to analyze marine ecosystem services, and the strengths and weaknesses of those tools and methodologies (TOR-2). Selection of case study sites and analytic methods will be finalized during this meeting (TOR-3). The WG-MES will meet with WG 36 and WG-40 to begin exploration of synergies (TOR-4).
- Fall 2019: Hold a 1-day business meeting during the PICES annual meeting. The meeting will review progress on case studies (TOR-3). The WG-MES will meet with WG 36 and WG 40 to continue exploration of synergies (TOR-4).
- May 2020: Hold a 3-day workshop (at an eastern Pacific location TBD) to review results of case studies (TOR-3) and to draft the technical report (TOR-5).
- Fall 2020: Hold a 1-day business meeting during PICES annual meeting to finalize the technical report (TOR-5).

Possible financial support

The State Oceanic Administration of China would like to support this working group's activities together with PICES, co-sponsors, and other partners, such as covering expenses related to meeting facilities, invited speakers' travel, *etc*.

Expected outcomes/outputs

- A technical report on the methods used for, and case studies of, the assessment of MES, and the integration of MES information in marine management and policy analytic frameworks.
- The ecosystem service section/paper to PICES Scientific Report series or PICES Press.

HD Endnote 6

HD ETSOs and NPESR3 timeline

Timeline

Task	Responsible
SG NPESR spreadsheet ETSOs submitted	WG-35 nation rep
confirm lead authors	co-chairs
invite and confirm contributing authors	lead authors
carryout analysis by authors	authors
PICES 2017 status report for regional assessments	lead authors
editorial board review of draft regional assessment	editorial board
revise regional assessment as required	authors
final regional assessments to Monitor, FUTURE	co-chairs
confirm lead authors of synthesis report, prepare workshop	co-chairs
publish regional assessments	PICES secretariat
NPESR-3 synthesis workshop at ISB	WG-35, authors
complete writing of synthesis report	WG-35, authors
revise synthesis report after review by editorial board	authors
submit final synthesis report to parent committees	co-chairs
publish NPESR-3	PICES secretariat
write and submit WG-35 report	co-chairs, WG-35

Timeline columns span 2017, 2018, 2019 (months J F M A M J J A S O N D).

Assessment Regions
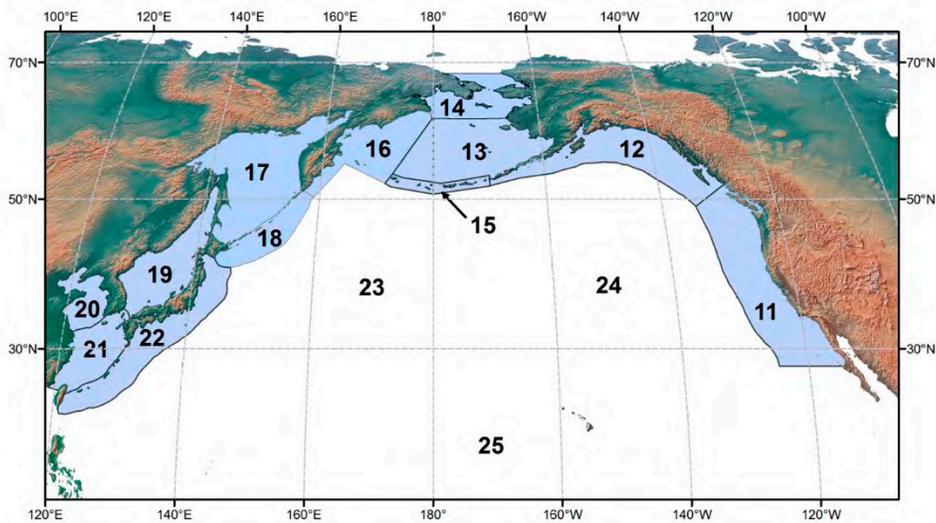
Proposed outline of NPESR3 Report

Highlights
Introduction
Atmosphere
    (temperature, sea level press, river inputs)
Physical Ocean
    (currents, hydrography/stratification, seasonal sea ice)
Chemical Ocean
    (oxygen, nutrients, OA)
Phytoplankton
    Biomass
    Productivity
    HABS
Zooplankton
    Microzooplankton
    Mesozooplankton
    Ichthyoplankton
    Gelatinous zooplankton
Fishes and Invertebrates
    Species Composition/Diversity
    Catch and Biomass
    Distribution
    Recruitment
Benthos
Biogenic habitat (e.g. eelgrass, coral)
Marine Birds
Marine Mammals
Pollutants/Contaminants
Human Dimensions
    Catch value
    Fisheries participation/employment
    Aquaculture (production volume, value)

Climate Change, Ecosystem Considerations & Emerging Issues

Notes:
- Include non-indigenous species
- Consider combining climate assessment for oceanic regions (23, 24, and 25) into one report
- A separate assessment for HD based on nation rather than geographic region

HD Tier 1 Indicators
1. Quantity and value of catches and landings of seaweeds, fish, shellfish, and other invertebrates from inside and outside national EEZs;
2. Quantity and value of mariculture of seaweeds, fish, shellfish, and other invertebrates;
3. Number and power of fishing vessels by gear type, length, and tonnage;
4. CPUE by gear type and target fishery;
5. Employment in commercial fishing;

6. Injury and mortality rates of commercial fishers (absolute and relative to national workforce averages);
7. Income to fishermen (absolute and relative to national workforce averages);
8. Number of fishing ports;
9. Number of fish processing plants;
10. Number of fishing villages or communities;
11. Number of fishing households;
12. Per capita consumption of seaweeds, fish, shellfish, and other invertebrates; and
13. Amount and value of seafood (seaweeds, fish, shellfish, and other invertebrates) exports and imports.
14. Number of sport fishers and quantity caught;
15. Fishing costs as a % of revenues;
16. Fishing subsidies;
17. Fishing effort by gear type; and
18. Value added multipliers for fishing and processing.

HD Derived Indicators
1. Exvessel price (by major product category)
2. Net revenues from fishing
3. Value added (by major product category)

HD Tier 2 Indicators
1. Employment in fish processing (numbers; full/part time)
2. Processed fish products (amounts by major category)
3. First wholesale value (value of processed products sold)
4. Health/contamination monitoring (relative to production)
5. Seafood price to consumers (% of food expenditures)
6. Seafood inventories (amount and value)
7. Subsistence/home-use fishing (number of fishers, catch)

HD Tier 3 Indicators
1. Fishing companies (number)
2. Commercial fishers (characteristics)
3. Wholesale markets (number)
4. Law and regulatory structure
5. International agreements
6. Value of ecosystem services
7. Environmental acct/natural capital
8. Nonmarket values
9. Replacement cost/NRDA
10. Eco-certification/market access

An Example—U.S. PICES Human Dimensions Indicators

The following example was provided by Steve Kasperski (USA). The example includes U.S. TSOs for four LMEs (12, 13, 14, and 15). Data on aquaculture production and value and the number of fishing households is not readily available for these regions and will not be included in NPESR3. The data series considered are listed below.

Catch
Ex-vessel value
Wholesale value
Aquaculture weight
Aquaculture value
Aquaculture wholesale value
CPUE (# of vessels)
Fishing households
Total horsepower
Seafood consumption
Processing employment
Harvesting employment
Number of processors

The following figures illustrate these TSOs.

Total Horsepower (in Millions) 2003-2016

LME 12

LME 13

LME 14

LME 15

Number of Processors 2000-2016

LME 12

LME 13

LME 14

LME 15

Alaska Harvesting Employment 1993-2016

LME 12

LME 13

LME 14

LME 15

Alaska Processing Employment 1990-2015

BSAI region

GOA region

U.S. Seafood Consumption Per Capita (lbs/year)
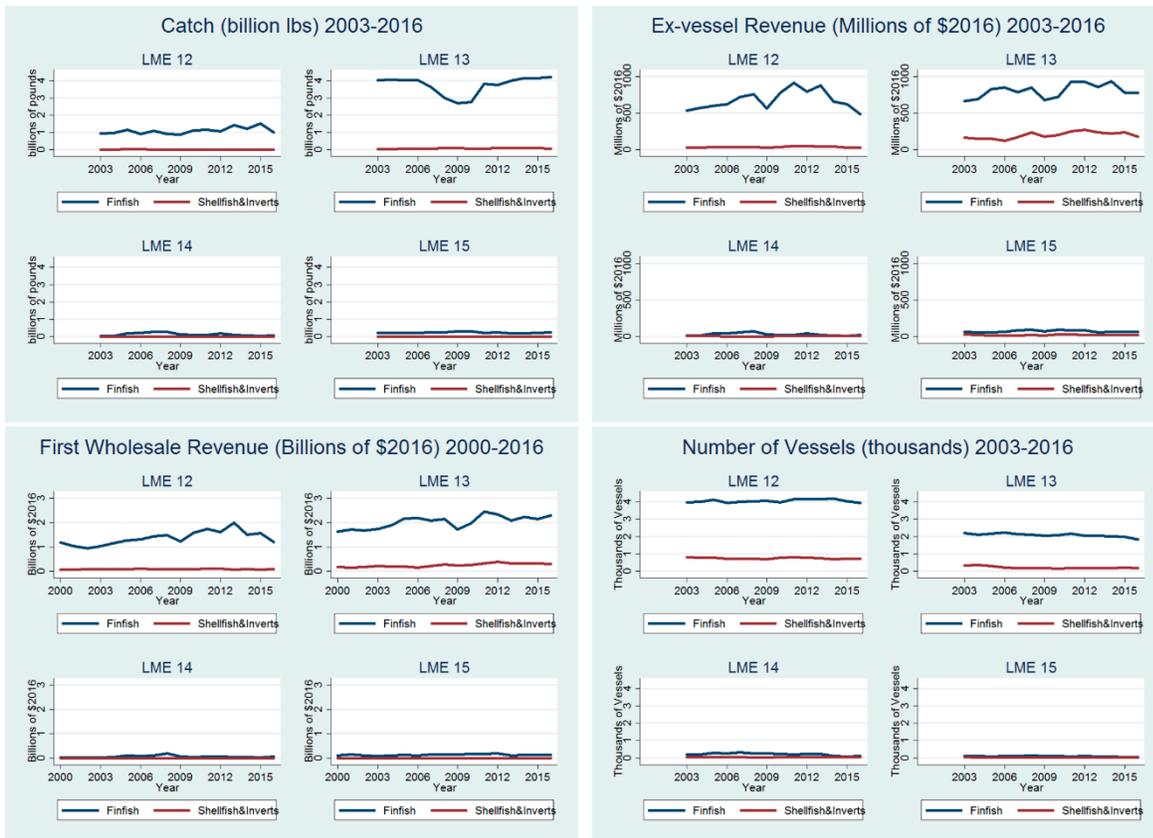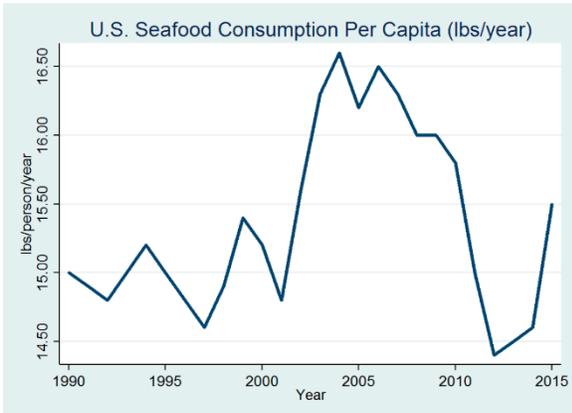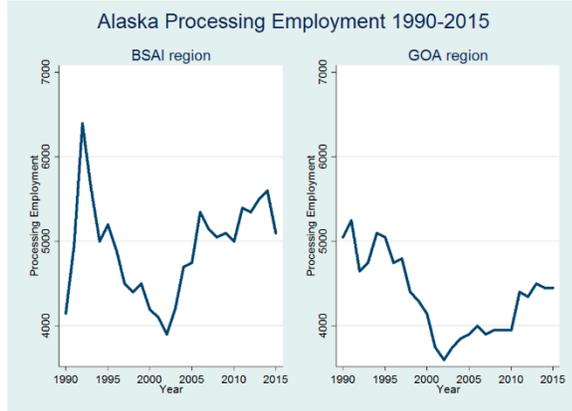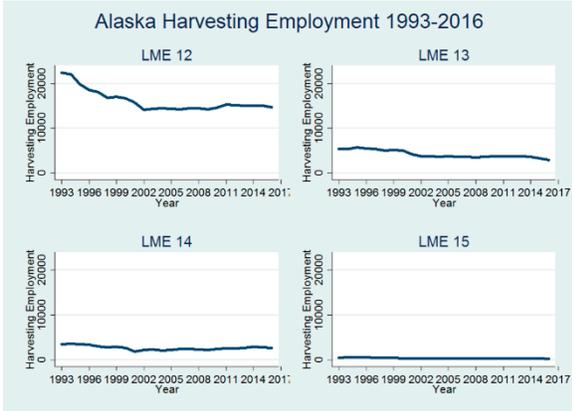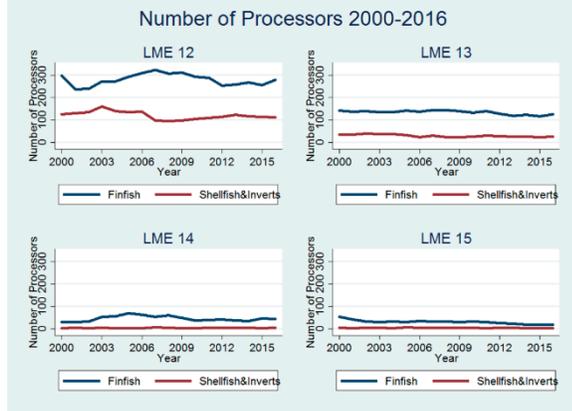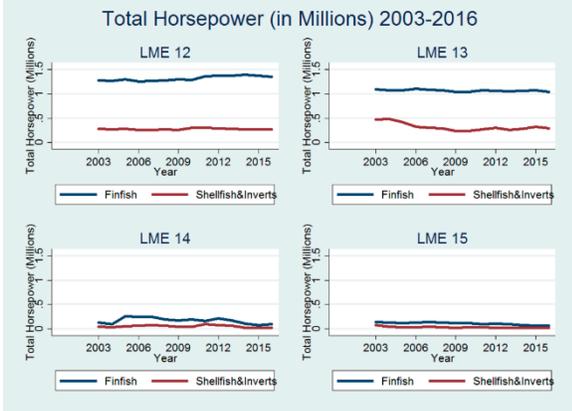
How to submit an ETSO

ETSOs are submitted through a web portal: https://pices.submittable.com/submit.

Instructions under 'more' from first page
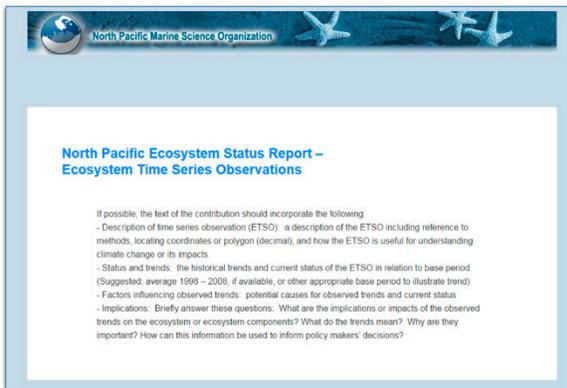
To submit and ETSO, you must first create an account on the portal.
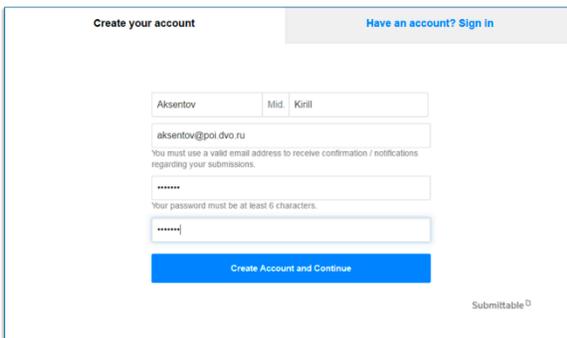
Once your account has been created, you can begin entering metadata for your ETSO.

Next, you must upload a file containing the ETSO.

You will receive confirmation that your ETSO is successfully uploaded.
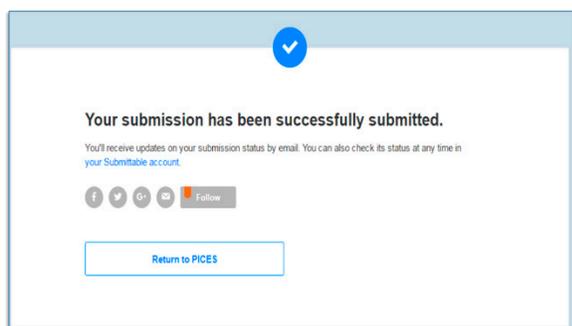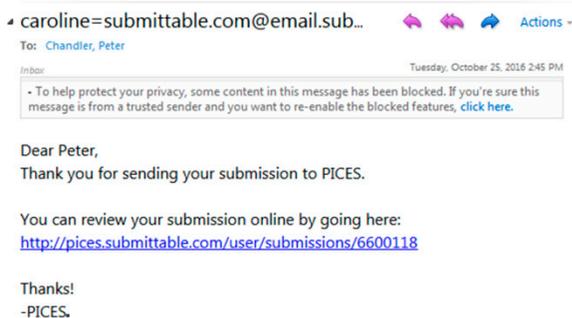
HD Endnote 7
Proposed PICES-MAFF project on "Building capacity for coastal monitoring by local small-scale fishers"

Project Key Questions and Goal

The project key questions are:
- How do global changes in climate and economy affect coastal ecosystems? and
- How do monitoring activities by local fishers change fisheries management in coastal areas?

The overall project goal is to build capacity to monitor coastal ecosystems and coastal fisheries by local small-scale fishers. It will lead to better fisheries management and more adaptive/resilient community.

Funding Agency

The Ministry of Agriculture, Forestry, and Fisheries (MAFF) will provide funding for the project through the Fisheries Agency of Japan (JFA). The budget for Year 1 is about CND$100K. The MAFF financial contribution is from the Official Development Assistance (ODA) Fund and therefore, involvement of developing Pacific Rim countries in project activities is required. The case study site is Indonesia.

Project Overview

Mobile phone-based technology will be introduced for ecosystem monitoring and fisheries monitoring by the small-scale coastal fishers in Indonesia. The objective is to achieve better enforcement of local fisheries rules (decrease of domestic IUU), and to increase understandings about ecosystem changes by local people (*e.g.*, HAB, new invasive species). Some of the proposed science team members have some experience in the citizen monitoring program for the mangrove forest in Japan. Participants will be invited to use mobile phones to take geo-positioned photos of plants, animals, and other ecosystem features. The photos will be emailed to the project PIs, uploaded to a database where they are automatically mapped, classified, and made available for user access on the web. For example,
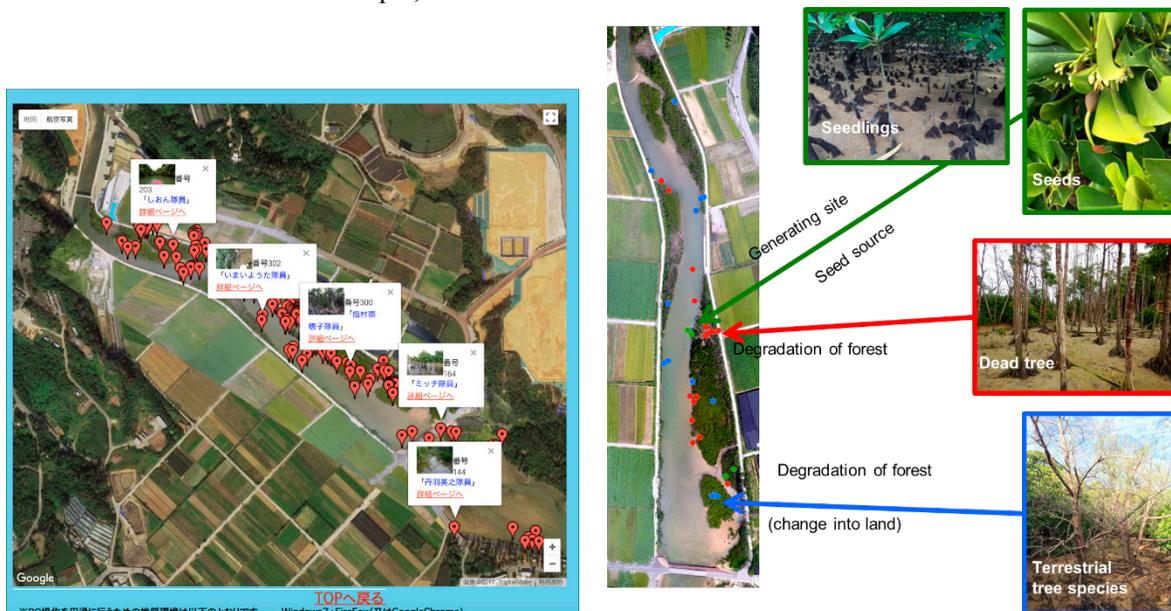
Anticipated information includes:

Changes in coastal ecosystems, such as invasive species, HABs, *etc*. The project team will use automatic plankton identification software and Chlorophyll *a* measuring software developed by the University of Maine. It is expected that this will result in better and quicker understanding of ecosystem changes. Occurrences of the local fisheries rule violation (domestic IUU fishers) to be shared with local government. In addition, the team will get data on fish caught by fishers or sold in the market. This should lead to better enforcement of the local rules and provide a basis for very simple stock assessment.

Proposed Project Science Team members

Mitsutaku Makino (Japan: HD): Co-Chair
Mark Wells (USA: S-HAB): Co-Chair
Shion Takemura (Japan: SG-MES): an expert of collaborative monitoring with GIS
Harold (Hal) Batchelder (PICES)