

## **Report of Working Group 44 on Joint PICES/ICES Working Group on Integrated Ecosystem Assessment for the Northern Bering Sea - Chukchi Sea**

The Joint PICES/ICES Working Group on the *Integrated Ecosystem Assessment for the Northern Bering Sea - Chukchi Sea* (WG 44) held its second meeting on September 23, 2021, virtually. Twenty-one members were present, representing all member countries (*WG 44 Endnote 1*). The meeting was co-chaired by Drs. Elizabeth (Libby) Logerwell (USA) and Yury Zuenko (Russia). After self introductions, Dr. Kim Rand (NOAA) volunteered to act as rapporteur. The meeting agenda was reviewed by members and adopted (*WG 44 Endnote 2*).

### AGENDA ITEM 3

#### **Metadata status**

The 2021 Work Plan specifies that WG 44 will “Compile an inventory of scientific metadata and of institutions and programs. Deliverable: Metadata, knowledge, institutions and programs relevant to the Northern Bering Sea-Chukchi Sea LME”. Dr. Rand reported that a metadata workbook with multiple spreadsheets by data type (with DATA LINKS when available) called “Arctic\_Metadata” is housed on the WG 44 Google drive. Metadata continues to be added on a continuous basis by many scientists as part of several working groups. The spreadsheets are:

- Environmental Variables
- Pelagic Ice Algal Prod
- Process links
- Zooplankton
- Forage Fish
- Adult fish
- Benthic Infauna
- Benthic Epifauna and Crab
- Marine Mammals
- Seabirds
- Data Not Public

### AGENDA ITEM 4

#### **Approach and methodology, status and upcoming milestones**

Dr. Kirstin Holsman reported on the status of developing the IEA approach and methodology. In 2021 Drs. Holsman, Raychelle Daniel, and Diana Stram completed the draft outline of “Scoping the NBS and Chukchi Sea Integrated Ecosystem Assessment”. The outline listed 6 activities to support scoping the IEA:

- 1) Identify participants in and beneficiaries of IEA activities and products,
- 2) Identify goals for the regional IEA,
- 3) Develop conceptual models,
- 4) Identify key indicators and metrics for each goal and objective for the 5) Identify management advice and products, and
- 6) Identify the timeline and future steps of the IEA.

## WG 44 – 2021

The upcoming milestones are:

- 2022–2023: Complete sections within the document
- 2023: Conceptual models
- 2023–2024: Finalize IEA outline and identify next steps

### AGENDA ITEMS 5 AND 6

#### **Including multiple ways of knowing the ecosystem and revised timeline**

This activity was formally called “Indigenous knowledge sharing”. R. Daniel, H. Huntington, R. Ingram, M. Johnson, S. Wise and E. Zdor reported on this activity.

A document describing the “Lay of the Land” has been drafted, containing the following information:

- Key entities
- Specific participants for goal setting and Indigenous Conceptual Models (ICM)
- Workshop protocols
- Opportunities for inclusion

During winter 2021 the group will identify best practices for collaborative goal setting and prepare a shareable draft report.

The upcoming milestones for Year 2 are:

- Coordinate with partners for workshops (January)
  - Bering Strait Festival (August)
  - RAC meetings
  - Arctic Council (October)
  - PAME (September)
  - LKTKS (April)
- Conduct Workshops
  - Conduct a minimum of 3 workshops, 1 virtual and 2 in person. (Spring and summer)
- Collaboratively set goals
- Develop ICM

The preliminary milestones for Year 3 are:

- Synthesize results (January)
- Communicate science
  - Submit journal article on methods (February)
  - Final Report for communities (December)
  - Presentation (s)

### AGENDA ITEM 7

#### **NOAA IEA proposal**

Dr. Holsman reported that there is travel funding (\$15,000) for the FY22-24 plan.

## AGENDA ITEM 8

**ICES ASC IEA topic session**

Dr. Logerwell reported on a proposed topic session for the ICES ASC in September 2022. The proposed title is “Integrating Ecosystem Assessments”<sup>1</sup>, and proposed conveners are Libby Logerwell, Paulina Ramirez-Monsalve and Benjamin Planque. The topics of the session would be:

- 1) how to set IEA objectives (ESEI),
- 2) how to perform IEAs (methods and tools),
- 3) how to translate IEAs into advice and
- 4) how to complete the full IEA cycle.

Talks would be invited on:

- practical aspects and method development
- stakeholder engagement
- inclusion of Indigenous knowledge
- communication of best practices
- progress on moving towards integrated socio-ecological assessments

## AGENDA ITEM 9

**WG 39/WG 44 joint workshop**

A joint WG 39 (*Integrated Ecosystem Assessment for the Central Arctic Ocean* )/WG 44 workshop on “*Integrated Ecosystem Assessment (IEA) to understand the present and future of the Central Arctic Ocean (CAO) and Northern Bering and Chukchi Seas (NBS-CS)*” (postponed from PICES-2021 due to COVID-19), was resubmitted for PICES-2022 (*WG 44 Endnote 4*) and later approved by Governing Council. It will be 1.0 day (0.5 day + 0.5 day). There will be two sessions with focus on CAO and NBS-CS, and a session for joint deliberation will be prepared. The objectives are to discuss present ecosystem processes in the CAO and the NBS-CS based on achievements from existing and future research programs such as MOSAiC and SAS, numerous NBS-CS programs, and Indigenous Knowledge.

## AGENDA ITEM 10

**WG 44 workshop**

A 1-day workshop for PICES-2022 has been proposed (and approved) on “*Bridging multiple way of knowing within an Integrated Ecosystem Assessment (IEA) to understand the social and ecological changes in the Northern Bering and Chukchi Seas (NBS-CS)*” (*WG 44 Endnote 5*). The main objectives for the workshop are to 1) describe linkages and knowledge pathways among regional organizations across scale (*e.g.*, Indigenous communities, government agencies, NGOs, research networks, academic institutions) in the NBS-CS, and 2) document meanings, relationships, processes, and values associated with the NBS-CS ecosystem using a framework rooted in Indigenous Knowledge and designed to coordinate diverse perspectives. The results of the workshop will inform the regional NBS-CS IEA process while offering an innovative model for broader knowledge synthesis and co-production.

---

<sup>1</sup> This topic session was not approved by ICES to be included in the ASC

## WG 44 – 2021

### AGENDA ITEM 11

#### **2022 Work Plan**

The WG members reviewed the Terms of Reference and agreed on a Work Plan for 2022 (*WG 44 Endnote 3*).

### AGENDA ITEM 12

#### **Proposals for inter-sessional meetings/co-sponsored events**

Not discussed.

#### ***WG 44 Endnote 1***

#### **WG 44 participation list**

##### Members

Elizabeth A. Logerwell (USA, PICES Co-Chair)  
Yury I. Zuenko (Russia, PICES Co-Chair)  
Andrea Niemi (Canada)  
Nadja Steiner (Canada)  
Zhongyong Gao (China)  
Changan Xu (China)  
Takafumi Hirata (Japan)  
Shigeto Nishino (Japan)  
Hyoung Sul La (Korea)  
Kirill Kivva (Russia)  
Matthew Baker (USA)  
Lee Cooper (USA)  
Raychelle Aluaq Daniel (USA)  
Lisa B. Eisner (USA)  
Kirstin Holsman (USA)  
Henry P. Huntington (USA)  
Katrín Iken (USA)  
Mellisa Johnson (USA)  
Kathy Kuletz (USA)  
Diana Lynn Stram (USA)  
Sarah Wise (USA)

##### Members unable to attend

China: Qi Shu  
Japan: Kohei Matsuno, Yutaka Watanuki  
Russia: Aleksei Somov  
USA: Megan Ferguson

##### Observers

Becky Ingram (USA)  
Kim Rand (USA)

**WG 44 Endnote 2****WG 44 meeting agenda**

1. Welcome, adoption of agenda, appointment of rapporteur
2. Introduce ourselves and guests
3. Metadata, status and upcoming milestones (Kim Rand)
4. Approach and methodology, status and upcoming milestones (Kirstin Holsman)
5. Indigenous knowledge sharing, status and upcoming milestones (Sarah Wise)
6. Revised timeline due to COVID restrictions
7. NOAA IEA proposal (Kirstin Holsman)
8. ICES ASC IEA topic session
9. WG39/WG44 joint workshop
10. WG 44 workshop
11. 2022 Work Plan
12. Proposals for inter-sessional meetings / co-sponsored events

**WG 44 Endnote 3**

**Integrated Ecosystem Assessment of the Northern Bering Sea – Chukchi Sea (NBS-CS) (WG 44)  
2021–2022 Work Plan**

1. Determine approach and methodology for conducting an IEA in the Northern Bering – Chukchi Sea LME.
  - a. Activities
    - i. Identify participants in and beneficiaries of IEA activities and products
    - ii. Identify goals for the regional IEA
    - iii. Intersessional Conceptual Model workshop (if funding can be secured from NOAA IEA Program). May need to delay to Year 3.
  - b. Deliverable: Scoping document
  - c. WG member leads: Wise, Daniel, Huntington, Heflin
  - d. Target date: Fall 2022 PICES Annual Meeting
2. Including multiple ways of knowing the ecosystem
  - a. Activities
    - i. Coordinate with partners for workshops (January)
    - ii. Conduct workshops (Spring, Summer and Fall)
    - iii. Collaboratively set goals
  - b. Deliverable: Indigenous Conceptual Model (October 2022)
  - c. WG member leads: Wise, Daniel, Huntington, Heflin
  - d. Target date: Fall 2022 PICES Annual Meeting
3. Describe the key physical, biological and human elements of the ecosystem
  - a. Activities
    - i. Develop shared conceptual models including both Indigenous Knowledge and science (see 1. and 2. above)
      1. Review of hypotheses for ecosystem dynamics
      2. Identify potential indicators of the above key elements
  - b. Deliverables: Outline of Ecosystem description from both Indigenous world views and science, indicators and hypotheses
  - c. WG member leads: Holsman, Daniel, Stram, Wise, Daniel, Huntington, Heflin
  - d. Deadline: Fall 2022 PICES Annual Meeting (finalize Report in Year 3, delay due to COVID restrictions)

*WG 44 Endnote 4*

**Proposal for a WG39/WG44 joint Workshop on  
“Integrated Ecosystem Assessment (IEA) to understand the present and future of the Central Arctic Ocean  
(CAO) and Northern Bering and Chukchi Seas (NBS-CS)”  
resubmitted for PICES-2022**

PICES sponsors: SB and FIS

Duration: 1.0 day (0.5 day + 0.5 day). There will be two sessions with focus on CAO and NBS-CS, and a session for joint deliberation will be prepared.

Convenors: Sei-Ichi Saitoh (Japan), Hyoung Chul Shin (Korea), Libby Logerwell (USA), Yury Zuenko (Russia)

Suggested invited speaker: Lis L. Jørgensen (Norway/PAME)

The target LMEs of WG 39 and WG 44 are the Central Arctic Ocean (CAO) and the Northern Bering Sea-Chukchi Sea (NBS-CS) respectively. These two regions are geographically and dynamically connected. The CAO is in rapid transition, driven by North Pacific environmental changes. The rapid loss of sea ice cover has opened up the CAO to a range of activities, including potential fishing opportunities. In this context, the agreement to Prevent Unregulated High Seas Fisheries in the CAO has been signed and will be soon entered into force, which will necessitate joint research and monitoring. The NBS-CS is also experiencing unprecedented warming and loss of sea ice as a result of climate change. Declines of seasonal sea ice and warming temperatures are prominent in the northern Bering and Chukchi seas as in most regions of the Arctic. Chronic and sudden changes in climate conditions in this Arctic gateway are clearly altering the system and its food-webs, and enlarging opportunities for commercial activities (shipping, oil and gas development and fishing), with uncertain and potentially wide-spread cumulative impacts. An integrated ecosystem assessment (IEA) is a useful approach in this circumstance, particularly with substantial science and policy challenges emerging in the Arctic, and thus a coordinated IEA of the CAO and NBS-CS should be a priority. WG 39 has published IEA Report No.1, which provides a description of the ecosystem in the CAO and is beginning to prepare IEA Report No.2, which will deal with impacts from human activities as well as vulnerability characterization. WG 44 was formed in spring 2020 and is just beginning its work. The communication and interaction between WG 39 and WG 44 are warranted to promote overall understanding of the Arctic and neighboring oceans. The main objectives for the workshop are to describe and discuss present ecosystem processes (sources, signals, significance) in the CAO and the NBS-CS based on achievements from existing and future research programs such as MOSAiC and SAS, numerous NBS-CS programs, and Indigenous Knowledge. In addition, it will help to explore and develop future approaches for IEA and jointly organized monitoring in both regions.

**WG 44 Endnote 5**

**Proposal for a Workshop on**  
***“Bridging multiple ways of knowing within an Integrated Ecosystem Assessment to understand the social and ecological changes in the Northern Bering and Chukchi Seas***  
**at PICES-2022**

Duration: 1 day

Convenors: Sarah Wise (USA), Mellisa Johnson (USA), Nadia Steiner (Canada), Yutaka Watanuki (Japan)

Invited speakers: Elder Richard Slats (USA), Lauren Divine (USA)

The target LME of WG 44 is the Northern Bering Sea-Chukchi Sea (NBS-CS) which is undergoing rapid transition caused by climate change. Declines in seasonal sea ice, increased storm events, and warm temperatures are driving substantial changes in socio-ecological systems. New commercial opportunities such as shifting fisheries, oil and gas exploration, increased vessel traffic (shipping and access to land-based natural resources), and Arctic tourism will have uncertain cumulative impacts on coastal communities in the Northern Pacific and beyond. The NBS-CS Integrated Ecosystem Assessment will improve understanding of critical interconnected systems processes and inform decision-making and management. Including Indigenous Knowledge in the IEA provides best available expert knowledge to understand the past, present, and future socio-ecological conditions of the region. Indigenous Peoples across North Pacific communities have relied on marine resources for food security, social cohesion, economic livelihood, and cultural continuity for millennia. Including Indigenous Knowledge in the IEA process will enhance understand of changing social-ecological conditions while offering a longitudinal perspective across generations of ecological experience and observations. Employing a co-production approach, this workshop will generate a collaborative understanding of the multiple ways of knowing, experiencing, using, and valuing the North Pacific ecosystem. The main objectives for the workshop are to 1) describe linkages and knowledge pathways among regional organizations across scale (*e.g.*, Indigenous communities, government agencies, NGOs, research networks, academic institutions) in the NBS-CS, and 2) document meanings, relationships, processes, and values associated with the NBS-CS ecosystem using a framework rooted in Indigenous Knowledge and designed to coordinate diverse perspectives. The results of the workshop will inform the regional NBS-CS IEA process while offering an innovative model for broader knowledge synthesis and co-production.