REPORT OF THE PICES INTERSESSIONAL WORKSHOP

North Pacific Ecosystem Status Report, Third Edition (NPESR-3)

Invitational Workshop: Evaluation and Synthesis North Pacific Time Series Observations

Study Group NPESR-3

June 28 – 30, 2016, Sidney, B.C., Canada

Co-Convenors: Phillip Mundy, J. Anthony Koslow, Peter Chandler*, Hiro Sugisaki

Table of Contents

Introduction

In an era of potential climate change and other increasing anthropogenic stressors of the ocean, timely and audience-focused environmental status reports are a high priority for the proper stewardship and management of the ocean environment. PICES is uniquely situated as an international organization to assess the status of the North Pacific; as such, developing the means to produce timely status reports on the ecosystems of the North Pacific has been and continues to be a high PICES priority. The approach taken to produce the first two North Pacific Ecosystem Status Reports (NPESR), which produced a high-quality hard-copy report at 5-year intervals, is being changed. The new approach for NPSER-3 differs from the original in that the constituent time series are to be assembled using an automated online acquisition process that permits timely and frequent updating and extension, with minimal additional effort and cost. The report of this workshop represents Task 5 in NPESR development (Table 1).

Results

Invited representatives from five member nations, including chairs and members of PICES standing committees, all major disciplines (physical, biological and fisheries oceanography, ecotoxicology, human dimensions) and other invited guests (appendix 1) met June 28 – 30, 2016, Sidney, B.C., Canada to review time series nominated by the PICES standing committees (see more details in the Invitation and Agenda, Appendices 2 and 3). Participants reviewed and evaluated more than 280 data sets nominated by PICES standing committees, Working Group-31 (Emerging Topics in Marine Pollution), and the Section on Human Dimensions. Details of the nominations submitted and the reviews and evaluations that were conducted at the workshop are captured in the workshop spreadsheet, linked here. Understanding and discussions were aided by presentations on the nominations from representatives of the standing committees and WG-31 (see Agenda below).

The workshop summarized the number of ETSO submissions by discipline and by the number of localities represented (Table 2). The analysis permitted recommendations to the NPESR-3 editorial board (see Task 6, Table 1) on where relevant additional ETSOs are known to exist, where more ETSOs are required, where there is adequate representation, and where broader geographic coverage is required (Table 2).

The report provides detailed recommendations to the NPESR-3 editorial board on geographic areas where more ETSOs in each discipline may be needed (Table 3). The analysis of the number of time series by discipline in each of the Large Marine Ecosystems and oceanic areas of the NPESR area demonstrates patterns that impact availability of suitable ETSOs. Numbers of ETSOs are concentrated in certain basic types of observations (chl-a, zooplankton, salinity, temperature) and located in intensively studied continental shelf areas (e.g. California Current, Sea of Japan/East Sea, Table 3).

Participants also considered and recommended how best to geographically organize ETSOs for reporting and syntheses. Consensus was reached that a combination of Large Marine Ecosystems and oceanic areas would best serve to categorize and organize locations of the ETSOs (Figure 1). In addition to LMEs, which are generally coastal, three oceanic areas (Open Ocean East [OOE], Open Ocean West[OOW], and Open Oean South [OOS]) were recommended based on scientific need and consistency with past

versions of NPESR. The Large Marine Ecosystems of the PICES area were drawn from the currently recognized Large Marine Ecosystems of the World (Figure 2).

Additional Recommendations

1. Modify ETSO submission template to:
    - Identify ETSO by LME geographic region and discipline/sub discipline.
    - Include tick box to confirm the provision of the data conforms to any licensing restrictions.
    - Identify and interpret highlights in the ETSO observations since 2009 in terms of climate change or other relevant trends.
2. SG-NPESR to identify lead author for each geographic region, and two co-authors for the synthesis chapter of NEPESR3 report, and submit list to Science Board.
3. SG_NPESR to request Editorial Board (committee chairs or designates) to fill gaps in ETSO geographic-disciplinary coverage.
4. Clarify PICES data policy in regards to publishing ETSO graphics (work with TCODE).
5. Review time line and modify depending on progress made by ETSO system data management contractor.
6. Develop draft presentation for PICES meeting in San Diego by end of summer.

Table 1. Schedule of tasks and responsibilities for producing NPESR

Task	Who?	2016 J	F	M	A	M	J	J	A	S	O	N	D	2017 J	F	M	A	M	J	J	A	S	O	N	D
1. ETSO System Development	Data Management Contractor																								
2. ETSO Maintenance	Data Management Contractor																								
3. ETSO Nominations	BIO_FIS_MEQ_POC_TCODE_MONITOR																								
4. ETSO Submissions	Authors																								
5. Interim Workshop on NPESR Time Series	SG-NPESR et al.																								
6. Ed Board Review & Adds Nominations	NPESR Editorial Board																								
7. Establish NPESR Synthesis Expert Group	Governing Council																								
8. Invitations &Confirmations to Authors	NPESR Editorial Board																								
9. Present selections to PICES 2016	SG-NPESR																								
10. Synthesis	NPESR SWG																								
11. North Pacific Synthesis Workshop	NPESR SWG et al.																								
12. Editing	NPESR SWG, NPESR Editorial Board																								
13. Formatting NPESR	Data Management Contractor																								
14. Review and Adoption NPESR	NPESR Editorial Board																								

Source: Table 1. Third Ecosystem Status Report Implementation Plan Revised 20 June 2016

Table 2. Summary statistics of ETSO categories by discipline

Discipline	Sub discipline	Number of ETSOs	Number of Regions represented	Notes
Biological	Benthos	2	1	1
	Chlorophyll a	33	9	2
	HABs	3	3	2
	Ichty	2	1	1
	Jellies	3	3	2
	Phyto	14	11	2
	Primary prod	4	1	
	Zooplankton	31	13	3
Physical	Temperature	31	10	4
	Salinity	30	10	4
	Mixed Layer Depth	1	1	
	Ice	8	4	3
	Currents	10	7	
	Air sea interaction	1	1	
Chemical	Carbon	9	4	1
	Nutrients	13	7	4
	Oxygen	10	5	2
	Ph	7	3	2
	Total Alkalinity	7	3	2
Climate			All regions	2
Fish	Invertebrates	8	4	
	Demersal	12	4	2
	Pelagic	19	7	2
	Salmon	6	3	2
Marine Birds		2	2	2
Marine Mammals		1	1	2
Marine Pollution		20	4	4

Notes:

1. Additional ETSOs are known to exist,
2. More ETSOs required
3. Pretty good representation
4. Broader geographic coverage required

Table 3. Disciplinary-geographic matrix with numbers of ETSOs by discipline in each of the Large Marine Ecosystems and oceanic areas of the NPESR area**.**

	1	2	3	47	48	49	50	51	52	53	54	65	All	OOE	OOW	OOS	**Total**
Bio-benthos							2										2
Bio-Chl a	1		6	3	3	1	9	1						1	2		27
Bio-HABs				1	1		1										3
Bio-Ichthy			2														2
Bio-Jellies				1	1		1										3
Bio-phyto	1	1	1	1	1	2	2	2		1		1		1	1		15
Bio-PP							4										4
Bio-Zoo	3	3	7	1	1	2	5	2	2	3		1		1	1		32
Chem			1														1
Chem-C			1				5							1	2		9
Chem-nutrients				1	1	1	6	1						1	2		13
Chem-oxygen			1				5	1						1	2		10
Chem-Ph			1				4								2		7
Chem-TA							4							1	2		7
Climate													1				1
Fis-demersal	3	5	2								1	1					12
Fis-inverts			1					1	4	2							8
Fis-pelagic	4	2	4				1	1	5	2							19
Fis-salmon	1	4	1														6
Marine Pollution		1	6			1	12										20
MMB-Birds		1	1														2
MMB-Mammals			1														1
Phys-ASI							1										1
Phys-Currents				1	1	1	3	1	1						2		10
Phys-ice	1						3		2	2							8
Phys-MLD														1			1
Phys-Sal	1	2	5	3	3	1	11	1						1	2	1	30
Phys-T	1	2	5	3	3	1	12	1						1	2	1	31
Total	**16**	**21**	**46**	**15**	**15**	**10**	**91**	**12**	**14**	**10**	**1**	**3**	**1**	**10**	**20**	**2**	**285**

Large Marine Ecosystems (LME);

(1) East Bering Sea (2) Gulf of Alaska (3) California Current

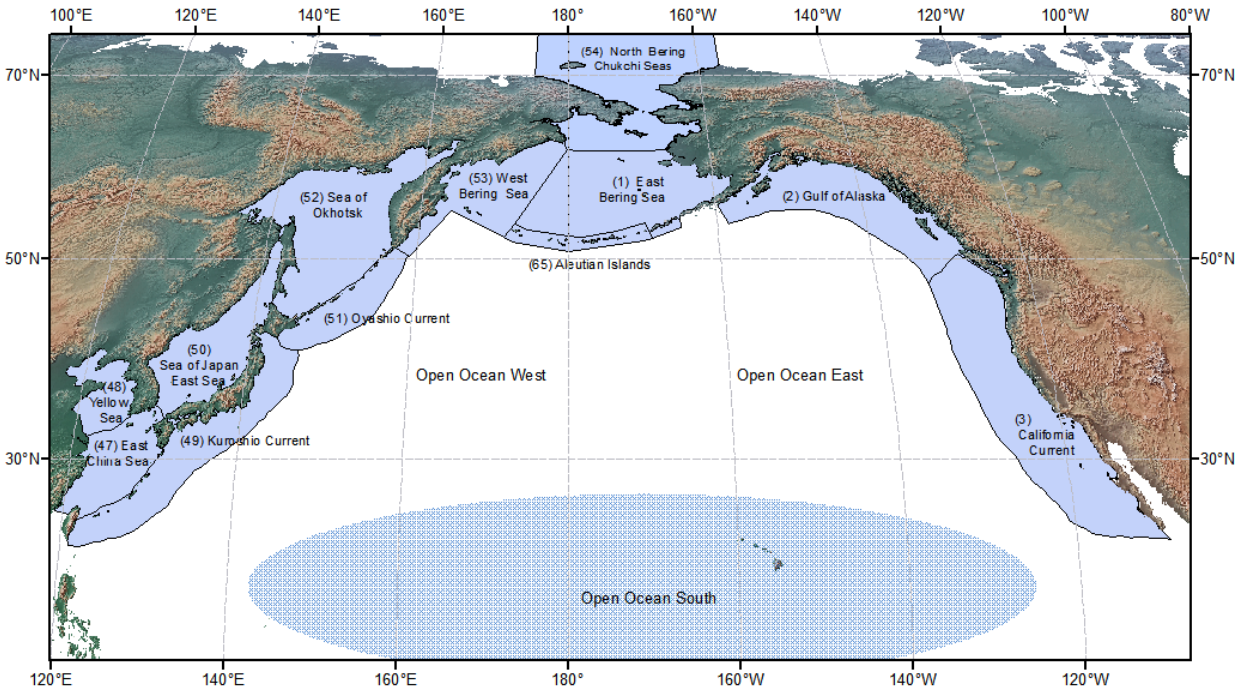
(47) East China Sea (48) Yellow Sea (49) Kurishio Current

(50) Sea of Japan/East Sea (51) Oyashio Current (52) Sea of Okhotsk

(53) West Bering Sea (54) Northern Bering-Chukchi Seas

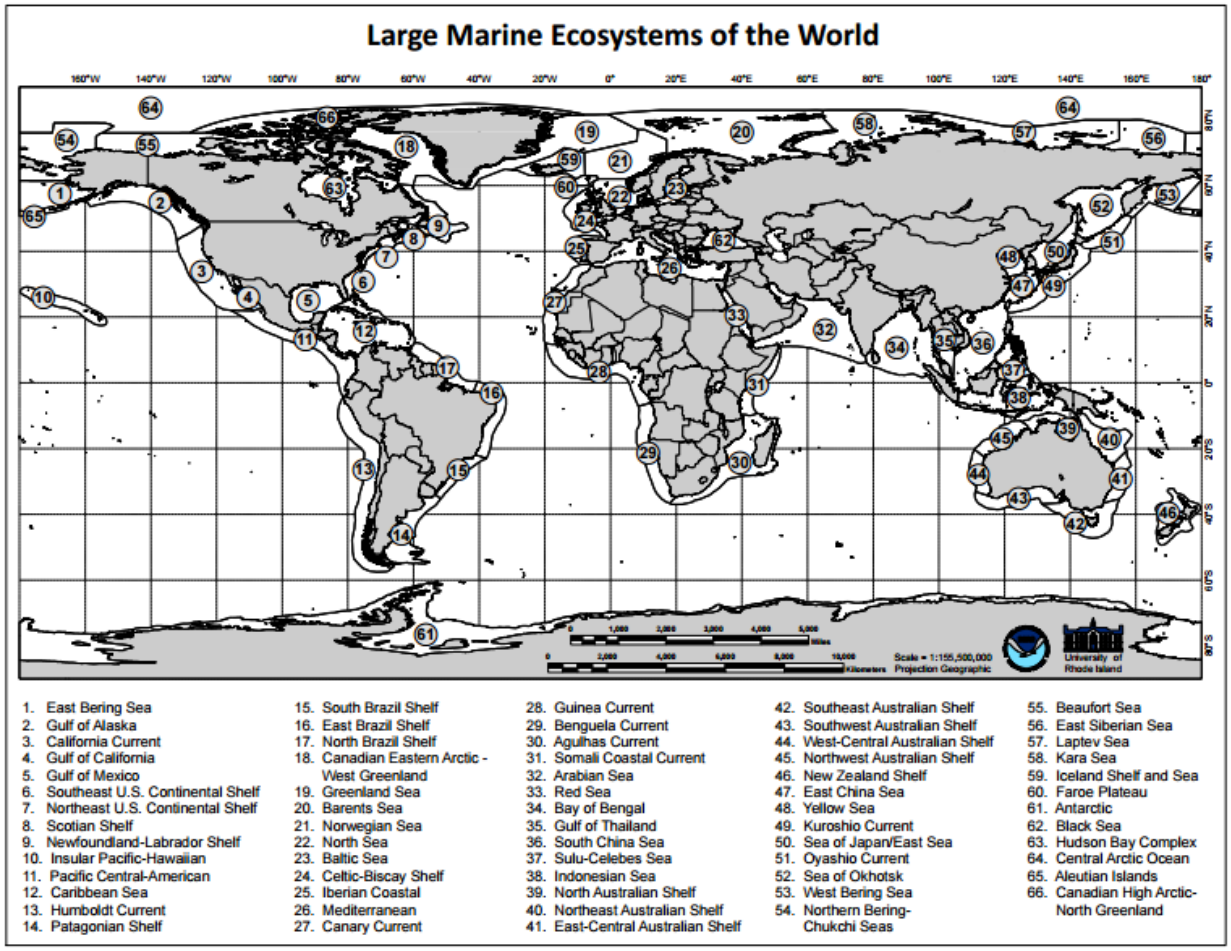
(65) Aleutian Islands **Note 1**: added regions OOE, OOW, and OOS (Open Ocean East, Open Ocean West, Open Ocean South); **Note 2**: boundary between California Current and Gulf of Alaska shifted to northern tip of Vancouver Island

Figure 1. Large Marine Ecosystems and oceanic areas used to categorize and organize locations of the ETSOs



Source: adapted from http://www.lme.noaa.gov/

Figure 2. Large Marine Ecosystems of the World.



Source: Sherman, K. and Hempel, G. (Editors) 2009. The UNEP Large Marine Ecosystem Report: A perspective on changing conditions in LMEs of the world's Regional Seas. UNEP Regional Seas Report and Studies No. 182. United Nations Environment Programme. Nairobi, Kenya.

Appendix 1

List of workshop participants

Name	Affiliation	email
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Appendix 2

Workshop Agenda

North Pacific Ecosystem Status Report, Third Edition (NPESR-3)
Invitational Workshop: Evaluation and Synthesis North Pacific Time Series Observations
Institute of Ocean Sciences, Sidney, B.C., Canada
June 28 – 30, 2016
Draft Agenda, June 13, 2016

Day 1 - June 28 – **Disciplinary Coverage**

09:00 Welcome, Introductions (Chandler, Sugisaki, Koslow)
09:10 Interim Science Board Report (Therriault, Brown)
09:20 Overview of Nominations (TBD, Conveners)
Disciplinary coverage
Geographic coverage (Introduce and discuss application of Longhurst provinces)
10:00 Disciplinary (Committee) Coverage – Developing advice and additional nominations; reference document disciplinary-national matrix
MONITOR (Kulik)
10:30 Break
11:00 BIO (Ju)
11:30 POC (Foreman)
12:00 Lunch (TBD)
13:30 TCODE (Koslow)
14:00 MEQ and WG-31 (Alava)
14:30 FIS (King)
15:00 Break
15:30 SG-HD (Criddle)
16:00 Updating and discussion of disciplinary coverage matrix (Conveners)
17:00 Adjourn for the day

Day 2 – June 29 – **Geographic Coverage and Introduction to Synthesis**

09:00 Review of updated disciplinary coverage matrix and assignments for additional nominations (Conveners)
10:00 Review and discussion of proposed geographic organization (Conveners)
Presentation of disciplinary by 'ecosystem' matrix.

- Review proposed organization of NPESR-3 (Mundy)
  - Are the geographic bins appropriate to an ecosystem status report?
  - Recommendations on alternative or additional approaches to organization
- How well are the disciplines of the PICES Committees represented in each geographic bin?

    - Need for additional nominations
    - Identifying sources of additional nominations
- Consensus on recommendations for geographic bins

10:30 Break

11:00 Resume discussion of proposed geographic organization

11:30 Extended lunch break – after lunch conveners and others modify geographic coverage by discipline matrices in preparation for geographic coverage discussions.

13:30 Geographic coverage discussions. Developing advice and additional nominations; reference document disciplinary-geographic matrices

Working from west northwest to south southwest develop a complete disciplinary-geographic matrix for each geographic bin (i.e. Californaia Current, Alaska Current, Bering Sea, Oceanic, …)

15:00 Break

15:30 Complete disciplinary-geographic matrices and begin discussion of disciplinary subgroups to conduct the synthesis

16:00 Identifying disciplinary subgroups to conduct the synthesis

- Consider the terms of the NPESR Synthesis work group approved at ISB
- Recommend synthesis products and associated teams

17:00 Adjourn for the day

Day 3 – June 30 Preparing for the synthesis (light schedule in provisional agenda because items from Days 1 and 2 may take longer than anticipated. Synthesis subgroups may also take this opportunity to plan.

09:00 Review of workshop products and recommendations (Conveners)

09:30 Review Assignments for follow-up

10:30 Develop Schedule of NPESR Synthesis to report to SB San Diego

Appendix 3

Workshop Invitation

INVITATION TO PICES INTERSESSIONAL WORKSHOP
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June 28 – 30, 2016, Sidney, B.C., Canada
Invited representatives from the six member nations and major disciplines (physical, biological and fisheries oceanography, ecotoxicology, human dimensions) and invited guests will review time series nominated by the PICES standing committees to make recommendations to the NPESR-3 editorial board on the most compelling time series to represent the status of the ecosystems of the North Pacific. In addition to nominated time series, workshop participants may consider other time series from the first two editions of the report and other sources.
Participants will also recommend how best to organize syntheses addressing the status of North Pacific ecosystems and explore possibilities of publications based on the time series considered.
The specific objectives of the proposed workshop are:

- To review submitted data sets
- To assess potential gaps and to identify steps to expand the number and quality of available time series that complement already submitted data sets
- To define disciplinary sub-groups to conduct syntheses across the data series and to carry out preliminary syntheses
- To communicate with PICES committees to improve the next iteration of the assessment
- To report to the NPESR-3 editorial board
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Convenors: Phillip Mundy, J. Anthony Koslow, **Peter Chandler***, Hiro Sugisaki

* Local Host, Peter Chandler +1 250-363-6750, Peter.Chandler@dfo-mpo.gc.ca . **If you require formal letter of letter of invitation addressed to you containing specific information, please contact the local host.**

Background
In an era of potential climate change and other increasing anthropogenic stressors of the ocean, environmental status reports are a high priority for the proper stewardship and management of the ocean environment. PICES is the only appropriate organization to assess the status of the North Pacific; as such, ecosystem status reports of the North Pacific have been and continue to be a high PICES priority. The approach taken to produce the first two North Pacific Ecosystem Status Reports (NPESR), aimed at producing a hard-copy report at 5-year intervals, is being changed. The new approach for NPSER-3 differs from the original in that the time series are to be assembled online and the acquisition process is being automated so they may be updated, and extended, with minimal additional effort.

Reviewing progress on this process and undertaking preliminary syntheses requires a multidisciplinary workshop that includes representative from all six PICES member countries.

Arrangements

Please consult the PICES website for information on the address of the meeting location, and advice on travel arrangements, choice of hotels and other logistic questions.