

## Workshop Descriptions and Agendas

**Sunday, 11 June**

### **WKS1: Paleo-Ecology of Subarctic and Arctic Seas (PESAS) Planning Workshop**

Room: Prostneset

Convenors: Ben Fitzhugh, U. of Washington, USA, [fitzhugh@uw.edu](mailto:fitzhugh@uw.edu)  
Lester Lembke-Jene, AWI, Germany, [Lester.Lembke-Jene@awi.de](mailto:Lester.Lembke-Jene@awi.de)

The PESAS WG's 3<sup>rd</sup> working group meeting is organized to accomplish two goals. The first is to finalize a publication plan for a guest-edited issue of a peer-reviewed journal. The intention is to have papers finalized and submitted in Fall 2017 with the issue published within the following year. Several papers presented in PESAS sessions over the past two years and at the PESAS OSM in Tromsø lay the foundation for an edited volume that, in total, represents the potential – and in some cases, the realization – of inter-disciplinary and comparative study of basin and sub-basin scale paleoecological integration from climate and oceanographic dynamics to ecological and anthropological articulation. Through a series of Skype meetings, participants in the PESAS WG have developed an outline of the volume and paper topics have been proposed by prospective authors. The first portion of the WG meeting will formalize the plan and identify gaps to be filled through targeted solicitations.

The second goal of the WG meeting is to plan the next phase of the PESAS WG. The development of PESAS collaborations in the past few years raised a number of themes not anticipated in the first PESAS TOR visioning document. For example, PESAS has evolved with ESSAS to include more engagement with marine paleoecology of the Arctic (not just Subarctic), and PESAS participants have started new collaborations in the higher latitudes. Members of PESAS are also now engaged in projects developing comparative data sets on Subarctic and Arctic marine systems using revolutionary new molecular techniques on such materials as cod, walrus, and whale tissues. As the WG has expanded, we now have a more robust participation of historical archaeologists, historical climatologists and environmental historians focused on the last millennium of change in fisheries ecology and economics. Additionally, members of PESAS have grown increasingly focused on the need to preserve rapidly disappearing paleoecological/archaeological archives imperiled by rapid warming, ice loss, and coastal erosion. These and other topics provide fertile ground for a renewed PESAS mission. Participants of the ESSAS meeting are welcome to attend and participate actively in any or all of the PESAS WG meeting.

#### **Agenda**

09:00-12:30 – PESAS Edited Special Issue planning session. Topics of discussion to include:

09:00 Welcome and participant introductions

09:20 Review of PESAS activities and discussion to the present

- 10:00 Publication venue. (Update on communications with journals).
- 10:10 Coffee/Tea Break
- 10:30 Review of Draft Table of Contents  
-Discussion of integrative themes, organizational priorities, gaps and how to fill them.  
-Bridging the paleo – contemporary ecosystem divide.
- 12:30 **Lunch (at the Hotel Restaurant covered by registration fee)**
- 14:00-18:00 – The Future of Paleoecosystems of Subarctic *and Arctic* Seas: Where to take the Working Group next and what to produce
- 14:00 ***Distributed long-term observation networks of the Past: the recovery of deep paleoecologies in the Subarctic North Atlantic***  
**George Hambrecht**, Cecilia Anderung, Seth Brewington, Andrew Dugmore, Ragnar Edvardsson, Francis Feeley, Kevin Gibbons, Ramona Harrison, Megan Hicks, Guðbjörg Ásta Ólafsdóttir, Marcy Rockman, Konrad Smiarowski, Richard Streeter, Vicki Szabo, and Thomas McGovern
- 14:20 ***Managing zooarchaeological data to address shifting baselines: the NABO Experience***  
**Thomas McGovern**, Thomas Ryan, Colleen Strawhacker, Anthony Newton, Richard Streeter, Ramona Harrison, Frank Feeley, Megan Hicks, Seth Brewington, George Hambrecht, and Grace Cesario
- 14:40 Emerging issues in integrative paleoecological systems research
- 15:30 Coffee/Tea Break
- 15:45 PESAS intersections and leveraging opportunities (NABO, IHOPE, Oceans Past/ NorFish, PAGES, ...)
- 16:30 Setting directions and goals for future PESAS collaborations and concrete products.
- 18:00 End of Workshop

## WKS2: Climate change impacts on nearshore fish habitats in the Arctic

Room: Tromsøsal 1

Convenors: Benjamin J. Laurel, NOAA-AFSC, [ben.laurel@noaa.gov](mailto:ben.laurel@noaa.gov)  
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Alexei Pinchuk, UAF-CFOS, [aipinchuk@alaska.edu](mailto:aipinchuk@alaska.edu)

### Agenda

- 08:30 *Welcome and opening remarks from conveners*  
Ben Laurel, Ron Heintz, Trond Kristiansen, Alexei Pinchuk
- 09:00 *Predicting Barents Sea fish stocks from upstream hydrographic variability*  
Anne Britt Sandø, Marius Årthun, Ute Daewel, Corinna Schrum, Noel Keenlyside and Bjarte Bogstad
- 09:20 *Arctic cod in the Russian Arctic: new data from the Siberian seas*  
Natalia Chernova
- 09:40 *Towards a process based understanding of climate change consequences on ecosystems*  
Trond Kristiansen, Charles Stock, Michael Alexander, Øystein Varpe, Anne Hollowed, Kirstin Holsman, Ken Drinkwater and Elizabeth Selig
- 10:00 *A decade in review: Physical conditions structuring annual variation in nearshore Arctic forage fish communities*  
Johana Vollenweider, Ron Heintz, Mark Barton, Kevin Boswell, Leandra Sousa, Alexei Pinchuk
- 10:20 **Break**
- 10:50 *Seasonality in nearshore habitats near Pt. Barrow, AK*  
Ron Heintz, Mark Barton, Kevin Boswell, Seth Danielson, C. Li, Brenda Norcross, Alexei Pinchuk, Leandra Sousa and Johana Vollenweider
- 11:10 *Thermal growth conditions determines the productivity of coastal nursery habitat for juvenile cod*  
Benjamin Laurel, David Cote, Robert Gregory, Lauren Rogers, Halvor Knutsen, and Esben Moland Olsen

11:30 *A comparison of temporal trends in fish community structure of three sub-Arctic coastal areas*

David Cote, Caren Barcelo, Benjamin Laurel, and Robert Gregory

12:00 **Lunch (at the Hotel Restaurant covered by registration fee)**

13:30 *Heterogeneity in zooplankton communities near the Alaskan Arctic coast and the resulting effects on planktivorous fish feeding habits*

Alexei Pinchuk

13:50 *TBA*

Xénia Weber

14:10 *Tissue turnover rates and trophic discrimination in Arctic sculpin (*Myoxocephalus scorpioides*): A new perspective on Arctic trophic dynamics*

Mark Barton, Kevin Boswell, Ron Heintz, Johanna Vollenweider, and Brenda Norcross

14:30 *The interaction of temperature and diet quality in determining the condition of juvenile saffron cod (*Eleginus gracilis*) and Arctic cod (*Boreogadus saida*): results from combined laboratory and field based approaches*

Louise Copeman and Benjamin Laurel

14:40 *Trophic vulnerability of 0-group Atlantic cod (*Gadus morhua*) and saithe (*Pollachius virens*) A case study investigating the juveniles' feeding pattern and identifying valuable nursery habitats in the Icelandic Westfjords*

Anja Nickel

15:00 **Break**

15:20 Lightning talks on posters

15:40 Discussion and summary

17:00 End

## **WKS3: Using natural analogues to investigate the effects of climate change and ocean acidification on northern ecosystems**

Room: Tromsøsal 3

Convenors: Samuel Rastrick, IMR, Norway, samuel.rastrick@imr.no  
Tina Kutti, IMR, Norway, tina.kutti@imr.no  
Melissa Chierici, IMR, Norway, melissa.chierici@imr.no  
Marco Milazzo, U. of Palermo, Italy, marco.milazzo@unipa.it  
Jason Hall-Spencer, U. of Plymouth, UK, jason.hall-spencer@plymouth.ac.uk  
Agneta Fransson, NPI, Norway, agneta.fransson@npolar.no

This workshop will investigate the effects of climate change and OA in Subarctic and Arctic ecosystems by bring together international experts with experience in monitoring carbonate chemistry across spatial and temporal gradients at high latitudes, using natural analogues to assess the effects of predicted OA at different levels of biological organisation and the effects of elevated pCO<sub>2</sub> and low carbonate saturation on high latitude species. The primary objectives of the workshop will be to:

- 1) Document the importance of using natural analogues to investigate the effects of climate change and OA in subarctic and arctic ecosystems, and how such frameworks may be developed in the future.
- 2) Identify suitable natural analogue sites for future research into climate change and OA in the Subarctic and Arctic waters of the Atlantic, Pacific and Polar Oceans.
- 3) Form a strong cross disciplinary group of experienced researchers to support future applications for funding work on this topic.

The workshop will consist of some initial presentations and then discussions working towards a manuscript related to objective 1 above. In addition, a report on the results of the discussions on objectives 2 and 3 will be produced.

### **Agenda**

9:00 Welcome and Introduction to the Workshop  
Samuel Rastrick

10:00 *Investigating local and regional adaptation using natural analogues of climate change*  
Peter Thor

Discussion

11:00 Coffee break

11:20 *Applying CO<sub>2</sub> seep approaches to other natural analogues of ocean acidification*  
Jason M. Hall-Spencer and Marco Milazzo

Discussion

12:20 **Lunch (at the Hotel Restaurant covered by registration fee)**

14:00 *Monitoring pteropods and carbonate chemistry along natural gradients to investigate OA effects in Arctic waters*  
Melissa Chierici and Agneta Fransson

Discussion

15:00 Summary of the main objectives of the workshop and panel discussion  
Samuel Rastrick, Piero Calosi, Jason M. Hall-Spencer, Melissa Chierici, Fransson, and T. Kutti

17:00 End of Workshop

## **WKS4: Arctic and sub-Arctic climate change impacts: a transdisciplinary perspective**

Room: Tromsøsal 2

Convenors: A. Sofia A. Ferreira, U. Washington, USA, [asofiaaferreira@gmail.com](mailto:asofiaaferreira@gmail.com)  
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### Workshop Program

The main purpose of our workshop is to explore the relationship between interdisciplinary research and adaptation to climate change in the Arctic and Subarctic systems. Our overarching goal is to obtain an overview of general patterns and regional differences and similarities in the Arctic and Subarctic seas (e.g. North Atlantic and North Pacific) in regards to the effects of climate change, the challenges for society and the adaptation strategies in place or required, using an interdisciplinary approach. We aim to assess regional specificities and global patterns of potential challenges to the ecosystems and the socioeconomic systems relying on them, and to investigate how different nations and regions are approaching the upcoming challenges. Are the same challenges expected everywhere? How will different countries address them? How much adaptation to climate change is in place already and to what extent is it geographically biased? These are the types of questions we will try to answer. We will propose the case of international fisheries agreement as a case study, but will search for other relevant examples to discuss during the workshop.

### Objectives

We preliminarily identified three potential objectives, which we will present and discuss. Two of them will be explored in more detail, and will result in working papers. Decision on which objectives to focus on, as well as potential changes or additional objectives, will be undertaken through collective discussion and brainstorming.

Our potential objectives are to:

- a. understand geographic patterns of challenges and threats: how are oceanographic and ecological changes affecting social and economic equilibria in different regions of the Arctic and Subarctic? We will further discuss the state-of-the-art, future trends and needs of interdisciplinary research in Arctic and Subarctic regions (addressing climate change), with a comparative approach between geographic areas (e.g. Northeast Atlantic, Northwest Atlantic, North Pacific). We plan to use published and ongoing papers and datasets (1, 2) as starting point and leverage tool to compare the Northeast Atlantic with other sub-Arctic areas. This will result in a short review/ opinion paper about the geography of climate change trans-disciplinary challenges, and of developed adaptation strategies, in the Arctic and Subarctic areas.
- b. investigate whether interdisciplinary research is a valuable tool for management, by exploring other cases and sectors where interdisciplinary research provided an effective tool for managing natural resources in the face of changes to the system. We will investigate the role of interdisciplinarity in management through a brainstorming exercise and literature review: why do researchers consider it important to be interdisciplinary? Can interdisciplinary science work in

practice? Are there successful examples of interdisciplinary work (papers, projects) and of effective and successful applications to management? What can we learn from them? This will result in another opinion paper.

c. focusing on upcoming threats: what will be the next decade's threats to trans-disciplinary management of marine ecosystems in the Arctic? What will drive the upcoming threats, what will be their potential consequences, and how we could address them. We could start talking about the present challenges (e.g. using the international agreement case, for which there is much expertise at the workshop) and reflect and brainstorm on the next, upcoming issues. This will result in a review/opinion paper.

This workshop will start collaborations toward one or two review/opinion piece papers stemming from objectives a), b) and/or c). The objectives will be subject to discussion and brainstorming during the workshop and potentially drift from the intended goals. We expect that the planned papers will be finalised after the end of the workshop.

## **Agenda**

8:30 - Welcome and presentation of the workshop by the convenors

9:00 - contributions from participants

9:30 - plenary discussion about objectives

10:00 - split into working groups focusing on the objectives

11:30 - reconvene in a plenary discussion before lunch

12:00 – 13:00: Lunch break (at the Hotel Restaurant covered by registration fee)

13:00 - reconvene after lunch and split in groups for further group work

15:30 - break

17:00 - Final plenary with discussion on achieved results and drawing a plan for the remotely-based collaborations to meet the proposed outcomes.

18:00 - Closure of the workshop

## **References**

1. Pedersen et al. 2015. Trends in marine climate change research in the Nordic region since the first IPCC report. *Climatic Change*, 134(1-2): 147-161.
2. Ferreira et al. To be submitted. Drivers of spatial distribution of climate change research in the Northeast Atlantic basin by basin.