Report of the Annual Meeting

ESSAS (Ecosystem Studies of Sub-Arctic Seas)
Science Steering Committee

St. Petersburg, Russia
15-16 June 2006

Members in Attendance: Erica Head, Canada; Ken Drinkwater, Co-Chair, Norway; George Hunt, Co-Chair, USA; Jim Overland, USA; Egil Sakshaug, Norway; Yasunori Sakurai, Japan; Kai Wieland, West Greenland

Members unable to Attend: Olafur Astthorsson, Iceland; Astrid Jarre, Denmark; Hyung-Cheol, Republic of Korea, Kurt Tande, Norway

Guests: Manuel Barange, GLOBEC IPO; Bern Megrey, USA; Clarence Pautzke, USA; Vladimir Radchenko, Russia;

I. Introduction:

This was the second meeting of the ESSAS SSC, the first having been held in Victoria, BC in conjunction with the GLOBEC Symposium on Climate Variability and Sub-Arctic Marine Ecosystems. George Hunt opened the meeting and introduced the members and guests. After the adoption of the Agenda (See Appendix 1), reports were heard from each of the presently-funded or expected national programs. These were followed by a recap and discussion of the ESSAS Workshop that had been held over the preceding three days. On the second day of the SSC meeting, members discussed future activities and the formation of Working Groups.

II. Presentations by National Programs formally endorsed as a part of ESSAS:

NORCAN: Erica Head:

Canadian and Norwegian scientists are involved in a Norway/Canada comparative study of the ecosystems of the Labrador/Newfoundland Shelf/Sea and the Barents /Norwegian seas (NORCAN). Initiated by 1 year (spanning 2005-2006) of funding from the Research Council of Norway, the object was to develop a joint science research plan. Later supported by funding from Fisheries and Oceans Canada, Newfoundland Region, scientists from both countries attended 2 workshops, one in Bergen in December 2005 and one in St. John's, Newfoundland, in May 2006. The research plan consists of 4 modules: retrospective analysis, comparative field studies, comparisons with other sub-

arctic seas and predictions of responses to climate change. The first step in the implementation of the science plan involves scientists from both countries writing collaborative, comparative papers using existing data. Ongoing ecosystem monitoring programs in both countries will continue to provide data that will be important to future assessments of the effects of climate change and efforts are underway to coordinate sampling where possible to facilitate ease of comparisons. In addition, it is hoped that IPY projects will fund some data collections that could be used for comparisons although it is expected that most of the Canadian IPY projects that will be funded will be in more northern waters. Included in the latter is a planned comparison of hydrographic and plankton conditions in the Davis Strait region with those of 30 years ago and to establish a series of baseline ecosystem indicators in previously un- or under-sampled northern regions against which future changes can be assessed under Erica Head. The comparison of the Labrador/Newfoundland and Barents/Norwegian seas areas with other sub-arctic regions will be carried out through ESSAS activities. It is also planned to coordinate and compare ecosystem responses to future climate changes.

NESSAS - Norwegian ESSAS: Ken Drinkwater

NESSAS is a 4-year project that began in 2005 with goals to quantify and predict the impact of climate variability on the Barents Sea marine ecosystem. The research within NESSAS has 5 major tasks: to better understand the climate forcing of the physical oceanography of the Barents Sea; to quantify the biological response of the ecosystem to climate variability; to predict the ecosystem response to future climate change; to investigate their possible economic impacts of future changes in fish stocks; and to compare the Barents Sea ecosystem responses to climate variability and change with the responses in other Sub-Arctic Seas. An interdisciplinary team that represents 6 Norwegian institutions is carrying out the research through a combination of retrospective analyses and state-of-the-art modeling of the atmospheric forcing, the physical oceanography, the biology and their interactions. The comparative studies will be done principally through ESSAS. A major recent effort has been the generation of global physical oceanographic current and temperature, salinity fields beginning in the late 1950s to present using ROMS (Regional Ocean Model Systems).

J-ESSAS - Japan-ESSAS: Yasunori Sakurai

The overall goal of J (Japan)-ESSAS is to quantify the impact of climate variability on the structure and function of the Oyashio marine ecosystem including seasonal ice sea areas in the northern Hokkaido to predict the ecosystem response to possible future climate change and its possible economic impact. J-ESSAS is intended to link and cooperate with the international and regional ESSAS and is part of Japan-GLOBEC in which the following projects are already funded and ongoing:

"Predicting of stock fluctuations of marine key species around Japan related to climate change and human activity" (funded by JFA and JSPS,

2004-2008)

"The Shiretoko World Natural Heritage including marine and land ecosystems: Towards coexistence with marine diverse and fisheries" (funded by JSPS and Agency of Ecology, 2005-2010).

Collaborative research cruises are planned using the *T/S Oshoro-Maru*, Hokkaido University in the Arctic Sea and the Bering Sea during the summers of 2007 and 2008 as an IPY collaborative research program.

BEST - Bering Ecosystem Study: George Hunt

The Bering Ecosystem Study (BEST) is intended as a broadly-based integrated ecosystem study that will cover issues from climate variability to energy flow through the eastern Bering Sea ecosystem to subsistence and commercial users. It will therefore have a social science component. Although BEST is expected to be primarily funded by the Arctic Section of NSF, it is also expected that there will be close collaboration between the many agencies and programs working in the Bering Sea. It is hoped that, eventually, these different programs will develop a well-integrated research program. BEST had its first call for proposals from NSF in September 2005 and five studies have been funded in this first competition: with a total of about $ 3.2 million. This first cruise, on the icebreaker Healy, is expected to start in early April 2007 and will run for about 40 days. There may be space for interested scientists to join the cruise. A second call for proposals for work to start in spring 2008 is expected.

III. Status of National Programs that may join ESSAS:

EIS – Ecology of the Iceland Sea: Ken Drinkwater (written summary provided by Olafur Astthorsson)

The main goal of the Ecology of the Iceland Sea (EIS) project is to identity and evaluate inorganic and organic production processes in the Iceland Sea as a means to obtain a holistic picture of the function of its ecosystem. The second main goal is to measure and link together the processes that determine the life history pattern of the capelin stock in time and space. The project involves interdisciplinary work on hydrography and currents, nutrients, phytoplankton, zooplankton and fish (capelin). The final goal is to define the ecological position of the capelin stock and try to explain what has caused marked changes in its distribution and biology during recent years. So far the project has been financed mainly by the Marine Research Institute through funds coming from the ministry of fisheries. A project committee has written a detailed evaluation of the current knowledge and a science plan. The first cruise specifically serving the project was undertaken during 11 July to 3 August 2006 on RV Bjarni Saemundsson. Other related fieldwork this year was carried out in connection with ongoing biological oceanographic monitoring work in February and May/June and on capelin surveys in January/February. Further fieldwork is planned for this autumn and over the next two years.

It was suggested that it would be advantageous to have bird watchers on the EIS cruises. **George Hunt will approach O. Astthorsson to enquire about the possibility of putting bird watchers on the EIS cruises.**

ECOGREEN- West Greenland: Kai Wieland

The goal of the ECOGREEN (Ecosystem West Greenland) program is 'to establish a scientific base for a long-term ecosystem approach to the management of natural resources'. A EU proposal by Denmark in 2003 was not successful, despite a positive scientific evaluation. Since then, the ECOGREEN idea has served as a framework for several of the activities of the Greenland Institute of Natural Resources (GINR), e.g. in the decision process for supporting projects with funding from the regular budget and to promote proposals for external funds. Examples of such activities are described in more detail below.

GINR supported a PhD project 'Lipids and stable isotopes in marine food webs in West Greenland' conducted by the Danish National Environmental Research Institute including sample collection, data analyses and interpretation. Within that project, a food web model for West Greenland was derived from stable isotope analysis for 34 species ranging from copepods to marine mammals.

Funds obtained in connection with an updated fisheries agreement between Greenland and the EU were used to charter an Icelandic research vessel for an acoustic / pelagic trawl survey for capelin and polar cod in 2005. The studies on capelin and polar cod were combined with zooplankton sampling, CTD casts and counting of whales and marine birds along regularly spaced transects.

Comparative studies on Northern shrimp in the Northwest and the Northeast Atlantic was initiated in 2006 and GINR is among the participants in the IPY CLIMP (Climate and Northern Shrimp) proposals.

GINR received a 5-year research professorship related to ECOGREEN in 2005 (external national funds). The Center of Marine Ecology and Climate Effects at GINR was established in 2006 with widespread actual and planned activities in both arctic and sub-arctic areas. A major project established by the research professor, Søren Rysgaard, and run by him and his group, is a monitoring program in the Nuuk fjord area. Monthly sampling of the physical environment and of the lower trophic levels in the pelagic and benthic part of the ecosystem is conducted throughout most of the year. These activities are supplemented by frequent observations of fish, birds and marine mammals. It is currently expected that the project will seek affiliation with ESSAS.

A proposal covering a major part of the original ECOGREEN activities was

submitted to the International Polar Year (IPY) steering committee and has been selected as a lead project in the IPY cluster #122 “Arctic Marine Changes and Implications for Arctic Societies”. Cooperation with the ESASS component in the IPY, ESSAR (Ecosystem Studies of Sub-arctic Regions) is planned, but so far no concrete decisions on funding for the IPY component of ECOGREEN have been made.

IV. Other Affiliated Programs:

ECONORTH (Symposium on the Norwegian and Barents Seas): George Hunt

Conveners, Doctor Torstein Pedersen and Professor Kurt Tande of Tromsø, Norway, during the interim between the 2005 and 2006 ESSAS SSC meetings, requested and were grated sponsorship of a symposium, Ecosystem Dynamics in the Norwegian Sea and Barents Sea”, planned for 12-15 March 2007. Although this is primarily a regional project, it was believed that the aims of the symposium fit well within the aims of ESSAS, especially since the Barents Sea is a focal area of ESSAS interest.

While ESSAS was not able to offer direct financial support, it did endorse the symposium such that it could be listed as an ESSAS-affiliated event and supported their application for funds to the GLOBEC SSC.

V. Other Related Activities

ESSAS Symposium Volume: Ken Drinkwater

About 55 papers were submitted for publication in the ESSAS Symposium Volume on Climate Variability and Sub-arctic Marine Ecosystems to be published in Progress in Oceanography by the end this year. Guest editors include George Hunt, Skip McKinnell, Dave Mackas and Ken Drinkwater. Almost all have completed their reviews and it appears that 35-40 will be published.

Note: Subsequent to the SSC meeting, the guest editors learned that Prof. Miller, Co-Editor of Progress in Oceanography had decided not to go through with publication of the volume. The guest editors then arranged with Dr. John Milliman, Editor of Deep-Sea Research II for the ESSAS Symposium Volume to be published in that journal. We foresee little or no change in the timing of final publication.

MENU (Comparisons of Marine Ecosystems of Norway and the United States): Bern Megrey

Originating from a meeting held in March 2006 in Woods Hole on cooperative research between Norway and the US, a proposal was submitted to the Research Council of Norway to fund a workshop comparing the marine ecosystems of Norway, the Bering and Georges Bank/the Gulf of Maine. If successful, the workshop would likely be held in the spring of 2007. It is planned

to examine spatial and temporal scales of the ecosystems, their structure and function, ecosystem indicators, teleconnections between the regions and develop energy budgets for the different systems. The funding decision on this proposal is expected in the autumn of 2006. In addition, a theme session at the 2007 ICES Annual Science Conference, jointly sponsored by PICES and ICES, has been proposed on *Comparative ecosystem dynamics studies and impacts of loss of sea ice on marine ecosystems (Bering Sea, Gulf of Maine and Barents Sea)*. This is under consideration and a decision on whether it will be accepted will occur later this year.

It was brought to the attention of the SSC that Russia and Japan have had annual meetings on the Sea of Okhotsk for the last 20 years. While not affiliated with ESSAS, these are within the ESSAS framework and objectives.

VI. ESSAR-IPY (Ecosystem Studies of Sub-arctic and Arctic Regions-International Polar Year): Ken Drinkwater

An IPY Expression of Intent (EoI) was submitted on behalf of ESSAS in January of 2005 and was subsequently chosen by the IPY International Committee to lead an ecosystem-based consortium of other EoIs. Called ESSAR, its objective is to determine how climate variability and change affects the marine ecosystems of the polar (Sub-arctic and Arctic) seas and their sustainability. This will be carried out primarily by field studies with support through retrospective studies and modeling. The fieldwork will be undertaken in 2007 and 2008, the designated IPY years. This consortium presently includes 20 EoIs covering all aspects of the ecosystems including physics, phyto- and zooplankton, fish and invertebrates, marine mammals and seabirds. It covers most of the sub-arctic and much of the Arctic, with over scientists leading or participating from Canada, China, Denmark, Greenland, Japan, Korea, Iceland, Norway, Poland, Russia, Ukraine, United Kingdom, and the USA. The money for the research must come from national funding agencies. While a couple of the projects have funding in place, most national proposals are presently being reviewed with expectations that the announcement of which proposals will be funded will occur between the summer and end of 2006. Each of the EoIs within ESSAR has been asked to participate in comparative studies. This hopefully will increase participation in ESSAS activities.

VII. Relations with PICES (North Pacific Marine Science Organization): George Hunt

Since the inception of ESSAS, PICES has taken an active interest in, and has been a strong supporter of, our activities. This included hosting our initial GLOBEC symposium, *Climate Variability and Sub-arctic Marine Ecosystems*, held in Victoria in May 2005 and providing travel support for several of the speakers. PICES also helped to organize the St. Petersburg ESSAS Workshop on *Developing Comparative Studies of Sub-Arctic Seas*, and provided travel

support for Russian Scientists to participate in the Workshop.

Just prior to the June 2006 SSC meeting, PICES extended a formal invitation to ESSAS to attend the PICES annual meeting in Yokohama, Japan, with Observer status.

After a brief discussion, the SSC agree that this was an excellent opportunity to strengthen the ties between ESSAS and PICES and the **SSC agreed that Ken Drinkwater should attend the PICES annual meeting in Yokohama as the Observer from ESSAS.**

The SSC then discussed the merits of developing more formal ties with PICES and the idea that PICES might be approached to share sponsorship of ESSAS workshops with GLOBEC was broached. The SSC saw merit in formalizing our current relationship with PICES. ESSAS workshops could gain the support of a strong international organization that shared ESSAS interests in climate impacts on marine ecosystems and the effects of these impacts on the sustainability of sub-arctic marine fisheries. The connection with PICES would strengthen ESSAS's position in the North Pacific and would facilitate our ability to develop comparative studies there. In return, it was seen that ESSAS could provide PICES with a strong connection to the North Atlantic marine community, provide an entry to IPY activities through the lead role played by ESSAS in ESSAR, and could complement the activities of the PICES CCCC program and potentially that of the new Integrative Science Program to be undertaken by PICES. Support at the Committee level would help.

The SSC decided to ask Manuel Barange, on behalf of GLOBEC, to approach PICES with a plan for joint sponsorship of ESSAS workshops by PICES and GLOBEC.

Those ESSAS members who are PICES Committee members were requested to inform their respective committees of the outcome of the workshop and what PICES can gain from ESSAS. They should contact the chairs of the committees to request ESSAS be placed on the agendas for their upcoming meetings at the PICES ASC.

VIII. Results of the ESSAS St. Petersburg Workshop:

Since all of the SSC members attending the SSC meeting also attended the ESSAS Workshop, there was no formal report on the workshop to the meeting. However, there was considerable discussion of the Workshop's progress in developing approaches for comparing the ways in which climate variability affects sub-arctic marine ecosystems. In particular, though very difficult to fill out, the exercise of trying to tabulate the principal components of food chains leading from primary production to commercial fish populations forced participants to focus on those species presumed to be of greatest

importance and the mechanisms by which climate forcing might interrupt the flow of energy up the proposed food chains. The tables were seen as a first step in a qualitative comparison of the different ecosystems and a possible foundation for the development of conceptual models of process linkages necessary before more quantitative modeling efforts could move forward.

The ESSAS SSC also discussed at length the recommendations of the Workshop, which included:

a) To hold an annual workshop, that would vary in location to facilitate attendance by all members of the ESSAS community;

b) To focus these annual workshops around different themes appropriate to the ESSAS goal of comparing climate impacts on the ecosystems of the sub-arctic seas;

c) To request funds to cover the travel expenses of one or more experts on the focal area of the workshop;

d) To establish three Working Groups on: i) ecosystem modeling that would follow the impacts of climate from atmospheric processes through the ecosystem to fisheries and social and economic impacts on people; ii) prediction that would work from the climate models to provide future climate scenarios for the modeling group to incorporate; and iii) the mechanisms of biophysical coupling and how these processes might be vulnerable to the impacts of a changing climate;

e) To require that the incipient Working Groups develop terms of reference and a life expectancy plan in cooperation with the ESSAS SSC;

f) A request that the Working Group on Biophysical Coupling (WGBC) develop a strategy with regards to working with PICES on the Marine Ecosystems of the North Pacific Report, and report back to PICES and the ESSAS SSC.

g) A request that the ESSAS SSC review the ESSAS Science and Implementation Plans and lay out a long-term (5 year) set of objectives (See Appendix 2, Strategic Plan);

h) That members of the Workshop undertake to write one or more review papers comparing aspects of the ecosystems of the four regions discussed in the Workshop (Barents Sea, Bering Sea, Sea of Okhotsk/Oyashio region, Newfoundland/Labrador Shelf) and how present climate variability is affecting them. Paul Wasserman and Egil Sakshaug agreed to take the lead in this project.

See section **IX, Future Directions,** below, for a summary of the decisions taken by the ESSAS SSC.

IX. Future Directions:

The ESSAS SSC agreed that:

1) ESSAS will form three Working Groups, on Prediction, Modeling, and Biophysical Coupling.

a) **Working Group on Prediction** (WGP): Jim Overland to lead. Others to be decided later. The plan is to have 1-day workshops in conjunction with the WGBC at each of the next two annual meetings of ESSAS with the object to present climate and physical oceanographic scenarios for each of the various sub-arctic regions as a means of generating discussion by all meeting participants on the potential ecosystem impacts. Emphasis will be on quantitative projections. This information would also be provided to the working Groups on Modeling and Biophysical Coupling for input into modeling and understanding ecosystem consequences of climate change. It is expected that the WGP will require annually $21,000 for technical support and $5,000 for travel to workshops.

b) **Working Group on Modeling** (WGM): Bern Megrey, lead, with Lorenzo Ciannelli, Shin-ichi Ito, and Wieslaw Maslowski as initial members. The WGM considered conceptual, statistical and mechanistic models and will determine if the approach should be to use each of these towards particular problems or if each should be used separately on different problems. The WG will determine the need to co-ordinate with the several groups currently working on modeling the effects of climate variability on marine ecosystems, including the PICES Modeling Task Team, to ascertain their interest in partnering with ESSAS. There will also be a need to develop ties with the anticipated modeling efforts to be supported by the North Pacific Research Board through their anticipated Integrated Ecosystem Study of the Bering Sea project.

c) **Working Group on Biophysical Coupling** (WGBC): George Hunt, lead, with Ken Drinkwater, Erica Head, Franz Mueter, Vladimir Radchenko, Yasunori Sakurai and Kai Wieland as initial members. The WGBC will be responsible for organizing a workshop in 2007 on the Role of Sea Ice in Marine Ecosystems.

2) Working Group leaders with the help of other initial participants will develop Terms of Reference (TOR) for their WG to be reviewed and decided upon by the ESSAS SSC. The TOR will include a statement of the goals of the WG, a time table for meeting those goals, a sunset date, and an estimate of annual budget requirements.

3) The possibility of a WG on Top-Down Forcing was discussed but it was felt that ESSAS should not consider more than 3 WGs at this time. Further discussion on such a WG will be left for future meetings.

4) ESSAS will sponsor at least one annual workshop, and that these would each have a focal theme. Funds would be sought to support the invitation of one or more invited speakers who are leading scientists in the focal area of the workshop. It was felt that while the workshops should not be too big, allowances should be made to ensure that some younger scientists could attend.

5) The focus of the 2007 workshop will be the Role of Sea Ice in Marine Ecosystems. Yasunori Sakurai graciously extended an invitation to hold the workshop in Hakodate Japan in June 2007. The Co-Conveners will be Sei-ichi Saito, Egil Sakshaug and a person working on higher tropic levels- to be named. The Co-Conveners are to decide on an invited speaker(s). It is estimated that the workshop will require about $30,000 to be raised.

6) The next Annual Meeting will be held in Hakodate, Japan, in June 2007. It will consist of:

1 ½ days of Workshop on the Role of Sea Ice in Marine Ecosystems (WGBC)
1 day of presentations and discussion on Climate Scenarios (WGP)
1 day of discussion of WGBC
½ day on WG business
1 day SSC business

7) The SSC should begin planning for:

a) Developing a Project Office, possibly in Bergen, Norway (**Action: Ken Drinkwater to enquire as to the likelihood of support from the Research Council of Norway**);

b) A workshop on the Role of Advection in Sub-arctic Seas (Halifax or in Gijon, Spain, in conjunction with the Climate Change Meeting to be held there; 2008) ($20K US to be raised);

c) Annual Meeting, 2009, in Seattle, Washington; **George Hunt to work on this;**

d) Develop a Mini-symposium or Theme Session for Comparison of Sub-Arctic and Antarctic Marine Ecosystems at an Open Science Meeting (2009/2010);

e) Develop a position paper on the future of ESSAS for when an IMBER-GLOBEC Task Team is ready in late 2007 to discuss the future of ESSAS once GLOBEC sunsets;

f) A Workshop on Large Fishery Collapses (e.g., West Greenland- seals to cod to shrimp; Labrador- cod decline; eastern Bering Sea- crabs?).

8) ESSAS will use the IPO GLOBEC website as its official website. The IPO has offered their services to help update the website. The site should include, in addition to the present listings, SSC presentations, workshop presentations, IPY activities, endorsement procedure, endorsed programs, publications, etc. **Ken Drinkwater to work with IPO office on the ESSAS website.**

X. Acknowledgments:

The SSC wishes to thank our Russian hosts, the State Scientific & Projecting Institute "GIPRORYBFLOT" in St. Petersburg, and in particular Ludmila Zaslavskay, Head of the International Division of "Giprorybflot" for providing a warm welcome to St. Petersburg and for making a myriad of local arrangements that made our visit both very productive and extremely pleasant. We thank the Secretariat of PICES, in particular Alex Bychkov, for arranging for the wonderful venue in St. Petersburg, and especially Julia Yazvenko for her tireless efforts to provide a communication link between the participants and our Russian hosts as we prepared for travel. We thank our co-sponsors of the Workshop and SSC meeting, PICES and GLOBEC for financial support for these meetings.

Appendix 1: **Agenda**

Agenda
ESSAS SSC Meeting
15-16 June 2006

15 June 2006
08:30: Introductions and adoption of Agenda (George Hunt)

08:45: Reports form each program or country (please bring an extended abstract in digital form)
Canada (NORCAN) (Erica Head),
09:15: Greenland (ECOGREEN) (Kai Wieland),
09:45: Iceland, Korea (would the representatives from Korea and Iceland please send me a few words about their ESSAS activities that I can pass along?)
09:30: Japan (Sakurai-san),
10:00: Break
10:30: Norway (NESSAS) (Ken Drinkwater)
11:00: USA (BEST) (George Hunt)
11:30: New Programs; Invitation from PICES to send an Observer (George Hunt)
12:00: LUNCH
13:00: Report and Discussion of the ESSAR/IPY activities (Ken Drinkwater)
14:00: Results of the ESSAS St. Petersburg Workshop (All))
15:00: Break
15:30: continue discussion
17:00: End of session

16 June
08:30: Plans for Future Activities- what is the best way forward? (Ken and George)
10:00: Break
10:30: continue discussion
11:00: Administration/governance of ESSAS; need for a Project Office (where, how funded?) (Ken and George)
12:00: Lunch (?), Adjourn

Appendix 2: ESSAS Implementation Plan and Activities

The following 5 components were laid out for the ESSAS Implementation Plan as part of the overall Science Plan (GLOBEC Scientific Report #19, May 2005). For each component, a list of activities that have taken place or are expected in the future is included.

1. Ecosystem Summaries

-Science Plan Background volume (GLOBEC Scientific Report # 20, May 2005)

-Victoria Symposium (May 2005)

-Symposium Volume (publication expected in late 2006 or early 2007)

-ECONORTH Symposium to be held in Tromsø 12-15 March 2007 focusing on the Barents/Norwegian Seas

-There remains the need to develop reviews/overviews of the marine ecosystems of the Gulf of St. Lawrence, Hudson Bay, West Greenland, and the Western Bering.

2. Regional Studies

These are the nationally funded regional research programs. To date these include:

-**J-ESSAS** (Japan- ESSAS): Oyashio, and to a lesser extent the Sea of Okhotsk; 2006-2010.

-**NESSAS** (Norwegian ESSAS): Barents Sea; 2005-2008

-**ISEP** (Iceland Sea; 2006-2008 (?) Not yet formally a part of ESSAS

-**BEST** (Bering Ecosystem Study), USA: Eastern Bering; 2007-2010

These also include the IPY Activities which will also be funded nationally.

-**ESSAR** (Ecosystem Studies of Sub-arctic and Arctic Regions)

-IPY Field years 2007-2008

-Proposals written or being writing with funding decisions during 2006

-Expect ESSAR Planning Meeting early 2007 (IPY funds)

3. Comparative Studies

-**NORCAN** (Norway–Canada Comparisons of Marine Ecosystems): 2005-2006: Labrador/Newfoundland-Barents/Norwegian seas

- Workshops (Bergen, Dec. 2005; St. John's, May 2006)
- Writing Meetings (Tentative Dec. 2006)

-**MENU** (pending funding): Bering, Georges Bank/Gulf of Maine, Barents Sea

- Theme session at ICES ASC 2007 (Proposed)

-**Workshop on Role of Sea Ice in Marine Ecosystems** (Hakodate, Japan, June 2007) ($30K US to be raised)

- Co-Conveners: Sei-ichi Saitoh, Egil Sakshaug, Higher Trophic Level person

- Invited Speakers: Co-Conveners to decide

-**Workshop on the Role of Advection in Sub-arctic Seas** (Halifax or in Gijon, Spain, 2008) ($20K US to be raised)

-**Workshop on topic yet to be defined** (Seattle, 2009) ($25K US to be raised)

4. Prediction

-**Working Group on Prediction** (WGP) formed.

- ToRs to written by Jim Overland (Chair) and circulated;
- 1-day Workshops planned for next two annual meetings (WGP will organize physical information and bring to WGBC and WGM for input on biological consequences) ($20K US to be raised for technical support, $5K US for travel support)

5. Synthesis Activities

-**Working Group on Modeling** (WGM) formed

- ToRs to be written by Bern Megrey (Chair) and circulated; suggested annual meetings associated with workshops ($25K US/yr to be raised).

-**Working Group on Biophysical Coupling** (WGBC) formed

- ToRs to be written by George Hunt (Chair) and circulated; suggest annual meetings associated with workshops.
- Comparison with Antarctic at the GLOBEC Open Science Meeting (2009/2010)

Appendix 3: Members of the ESSAS SSC and Guests

Dr. Olafur S. Astthorsson*****
Marine Institute of Iceland
Skulagotu 4
Reykjavik, Iceland
Phone: 355 5520240
Fax: 355 5623790
E-mail: osa@hafro.is

Dr. Manuel Barange******
GLOBEC IPO
Plymouth Marine Laboratory
Prospect Place
Plymouth PL1 3DH
UK
Phone: +44 (0)1752 633160
Fax.: +44 (0)1752 633101
Mobile: +44 (0)781 8285754
E-mail: m.barange@pml.ac.uk

Dr. Ken Drinkwater, Co-Chair
Institute of Marine Research
P. O. Box 1870 Nordnes
5817 Bergen, Norway
Phone: 47-55-23 69 90
Fax:: +47 5523 8584
E-mail: ken.drinkwater@imr.no

Dr. Erica Head
Ocean Sciences Division
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, B2Y 4A2
Nova Scotia, Canada
Phone: (902)-426-2317
FAX: (902)-426-9388
E-mail: HeadE@mar.dfo-mpo.gc.ca

Dr. George L. Hunt, Jr., Co-Chair
School of Aquatic and Fishery Sciences
Box 355020
University of Washington
Seattle, WA 98195
USA
Phone: (206) 441-6109
Fax: (206) 616-8689
E-mail: glhunt@uci.edu

Dr. Astrid Jarre**
Danish Institute for Fisheries Research
North Sea Centre
PO Box 101
DK-9850 Hirtshals
Denmark
Phone: +45 3396 3255
Fax: +45 3396 3260
E-mail: ajt@dfu.min.dk

Dr. Bern Megrey**
National Marine Fisheries Service
Alaska Fisheries Science Center
7600 Sand Point Way NE
Seattle, WA 98115
Phone: 01-206-526-4147
FAX: 01-206-526-6723
email: bern.megrey@noaa.gov

Dr. Jim Overland
PMEL/NOAA bldg. 3
1600 Sandpoint Way NE
Seattle, WA 98115
Phone: 206-526-6795
E-mail: James.E.Overland@noaa.gov

Dr. Clarence Pautzke**
Executive Director
North Pacific Research Board
441 West 5th Ave., Suite 500
Anchorage, Alaska
USA 99501-2340
Phone: 1-907-278-6772
Fax: 1-907-276-7178
E-mail: cpautzke@nprb.org

Dr. Egil Sakshaug
Biological Station
Norwegian University of Science and Technology
N-7491 Trondheim
Norway,
Phone: +47 7359 1583
Fax: +47 7359 1597
E-mail: egil.sakshaug@bio.ntnu.no

Dr. Yasunori Sakurai
Laboratory of Marine Ecology
Department of Marine Biological Sciences
Faculty of Fisheries, Hokkaido University
3-1-1, Minato-cho, Hakodate, Hokkaido 041, Japan
Phone: 81-138-40-8863
FAX: 81-138-40-8860
E-mail: sakurai@fish.hokudai.ac.jp

Dr. Hyung-Cheol Shin**
Polar Research Center (KORDI) of Korea
Ansan
P.O. Box 29
425-600
Korea
Phone: +82 (31) 400-6440
FAX: +82 (31) 408-5825
E-mail: hcshin@kordi.re.kr

Dr. Vladimir Radchenko**
Sakhalin Research Institute of Fisheries and Oceanography (SakhNIRO)
Yuzhno-Sakhalinsk
Russia
E-mail: vlrad@sakhniro.ru

Dr. Kurt Tande**
Norwegian College of Fishery Sciences
University of Tromsø
9037 Tromsø
Norway.
Tel +47 77 64 45 24 (office); 913 56610 (mob)
Fax +47 77 64 60 20
E-mail: kurtt@draugen.nfh.uit.no
kurtt@nfh.uit.no
http://www.nfh.uit.no/projects/basecoex/

Dr. Kai Wieland
Greenland Institute of Natural Resources
PO Box 570
DK-3900 Nuuk
Phone: + 299 361248
Fax: + 299 361212
E-mail: wieland@natur.gl

* Members unable to attend
** Guests