REPORT OF CFAME TASK TEAM

The first meeting of the CFAME (**C**limate **F**orcing **a**nd **M**arine **E**cosystems) Task Team was held from 10:30-12:30 hours on October 17, 2004. The acting Co-Chairmen, Drs. Kerim Y. Aydin and Akihiko Yatsu, called the meeting to order and welcomed participants (*CFAME Endnote 1*). For this meeting, as members had not been appointed yet, attendance was open to all, with input from BASS and REX Task Teams. The proposed agenda was reviewed and adopted (*CFAME Endnote 2*).

Nomination of Co-Chairmen (Agenda Item 1)

BASS nominated Drs. Kerim Y. Aydin (U.S.A.) and Akihiko Yatsu (Japan) as potential Co-Chairmen. REX did not offer nominations. There were no objections to the nominations.

Terms of reference (Agenda Item 2)

A substantial discussion of the proposed terms of reference (*CFAME Endnote 3*) was conducted, focusing on CFAME's role in CCCC synthesis and in looking towards post-CCCC Programs. Both BASS and REX felt that as written, the terms of reference are overly general and provide limited guidance on CFAME activities.

Discussion of membership (Agenda Item 3)

All membership nominations will be made through member countries. There was general agreement that CFAME would be best served by drawing from REX and BASS expertise, but with the addition of members from outside the former Task Teams.

Activities of CFAME in relation to the PICES Strategic Plan (Agenda Item 4)

It was suggested that the addition of a PRIMARY GUIDING HYPOTHESIS for CCCC synthesis would provide more extensive guidance. The wording of the hypothesis was extensively discussed, and the consensus hypothesis is included in this report (*CFAME Endnote 4*). While the workshop on "Linking open ocean and coastal ecosystems II" at PICES XIII provided initial guidance for scientific work within CFAME (the summary of the workshop is included elsewhere in this Annual Report), it was felt that a more extensive planning meeting with core participants would be necessary (*CFAME Endnote 5*). It is expected that this interim workshop will be held at a to-be-determined location in winter or early spring of 2005, and will lead to the recommendation of a series of workshops through 2006.

Interactions with MODEL (Agenda Item 5)

MODEL members were unable to attend the CFAME meeting due to their own Task Team meeting running concurrently. A suggestion was raised for a CFAME/MODEL collaborative workshop on "Scaling bottom-up modeling to population-level production and recruitment controls through the linking of multiple models", but the decision was postponed pending further discussions with MODEL.

Session topics for PICES XIV and potential science themes for PICES XV (Agenda Item 6)

The following two Topic Sessions and one Workshop are proposed to be convened at PICES XIV:

- a 1-day CCCC/CFAME Topic Session on "Comparative response of differing life history strategists to climate shifts" (*CFAME Endnote 6*); selected papers from this session to be published in an international scientific journal;
- a 1-day FIS/CFAME Topic Session on "Evidence of distributional shifts in demersal fish in relation to short and long term changes in oceanographic conditions" (*FIS Endnote 3*), FIS will take the lead on this session;

- a 1-day CCCC/CFAME workshop (leading to a PICES XV Science Board Symposium) on "East-west comparison of community structure, productivity and biodiversity under climate change scenarios" (*CFAME Endnote 7*). This workshop is contingent on identifying co-conveners.

Additionally, CFAME encouraged the development of sessions or workshops on the role of euphausiids in ecosystems, possibly to be pursued by other committees.

PICES Capacity Building (Agenda Item 7)

CFAME noted that a project on "Euphausiids capacity building and awareness" would be an important endeavor to move forward.

CFAME also encouraged the broader use of models developed within PICES (NEMURO and ECOPATH/ECOSIM) to facilitate hypothesis exploration and test climate change scenario. Possible interaction with ESSAS on this issue was mentioned.

Travel requests (Agenda Item 8)

CFAME requests support for the following travel:

- 2 invited external scientists for the CCCC/CFAME interim workshop (*CFAME Endnote 5*), to provide multiple examples of synthesizing life-history data into climate change scenarios for diverse species types;
- 1 invited speaker for the CCCC/CFAME Topic Session on "Comparative response of differing life history strategists to climate shifts" at PICES XIV (*CFAME Endnote 6*);
- 1 invited speaker for the CCCC/CFAME workshop on "East-west comparison of community structure, productivity and biodiversity under climate change scenarios" at PICES XIV (*CFAME Endnote 7*).

CFAME web page (Agenda Item 9)

It was agreed that the CFAME Co-Chairmen would coordinate the provision of materials once membership of the Task Team is finalized.

Topics for the next major integration program (Agenda Item 10)

Potential topics were discussed extensively as part of developing synthesis Terms of Reference (Agenda Items 2 and 4) and were tabled to be taken up at the proposed interim workshop.

Other business

<u>Coordination</u>

- CFAME encouraged joint cruises for the study of higher trophic levels;
- CFAME endorsed the development of longer-term east/west exchange of research through postdoctoral support.

CFAME Endnote 1

Participation List

Christine Abraham (U.S.A.)
Vera Agostini (U.S.A.)
Kenji Asano (Japan)
Kerim Y. Aydin (U.S.A.)
Harold P. Batchelder (U.S.A.)
Richard J. Beamish (Canada)
Richard D. Brodeur (U.S.A.)
John Field (U.S.A.)
Douglas E. Hay (Canada)
Russ Hopcroft (U.S.A.)
Masahide Kaeriyama (Japan)
Hyung-Ku Kang (Korea)
Sukyung Kang (Korea)
Jin-Yeong Kim (Korea)
Suam Kim (Korea)
Tatsu Kishida (Japan)
Jae-Bong Lee (Korea)
Andrew Leising (U.S.A.)
Alec MacCall (U.S.A.)
Gordon A. McFarlane (Canada)
Brenda L. Norcross (U.S.A.)
James E Overland (U.S.A.)
William T. Peterson (U.S.A.)
Vladimir I. Radchenko (Russia)

Rolf R. Ream (U.S.A.)
Yoshiro Watanabe (Japan)
Yutaka Watanuki (Japan)
Patricia A. Wheeler (U.S.A.)
Akihiko Yatsu (Japan)

CFAME Endnote 2

CFAME Task Team Meeting Agenda

1. Introductions/nomination of Co-Chairmen
2. Discussion of Terms of Reference
3. Membership, with emphasis on geographic and scientific balance
4. Activities of CFAME in relation to the PICES Strategic Plan, and the development of an Action Plan
5. Interactions with the MODEL Task Team
6. Session topics for PICES XIV and potential science themes for PICES XV
7. PICES Capacity Building
8. Travel requests for 2005
9. Discussion and preparation of related materials to be included on the CFAME web page
10. Topics for next major integration program

CFAME Endnote 3

CFAME Draft Terms of Reference

Objective:

- To synthesize regional and basin-wide studies and provide a forum for the integration of CCCC-related hypotheses and data.

Terms of Reference:

1. The CFAME Task Team is responsible for the promotion, coordination, integration and synthesis of research activities related to the CCCC Program among member nations. This goal could be accomplished by convening meetings, periodic scientific symposia or workshops, or by distributing information designed to foster cooperation and integration among existing or developing programs;
2. The CFAME Task Team should provide the scientific body for hypothesis testing of model experiments, by providing a forum for interaction between data-gathering and distribution programs (MONITOR) and theoretical experimentation and development (MODEL and NEXT) as related to climate change impacts on marine ecosystems;
3. Particular emphasis is placed on testing ecosystem-level hypotheses, through review and examination in a collaborative environment, of (i) comparisons between regional and/or basin ecosystems, (ii) linkages in time, space, or seasonality between climate and ecosystems, and (iii) responses of regional ecosystems to basin-scale forcing;
4. The CFAME Task Team should encourage establishment of component activities as needed to facilitate synthesis of the CCCC Program.

CFAME Endnote 4

Primary CFAME guiding hypothesis for CCCC synthesis

PRODUCING A CCCC SYNTHESIS – a "two-year" project: "What is carrying capacity, and how is it affected by climate in the North Pacific?"

THE WRAP-UP of CCCC may be to report the synthesis which underlies accepting the following hypothesis (H_O):

H_O: CARRYING CAPACITY for an ecosystem is embedded in species with varying life history strategies, moderated by climate REGIMES.

SUB-HYPOTHESES TO EXAMINE

H(a) This is primarily true for FORAGE SPECIES but not large predators;

H(b) The succession is
- (Hi) a relatively predictable
- (Hii) in a repeating sequence
- (Hiii) with some Pacific-wide synchrony.

There are periods of relative stability and of extremely rapid change;

H(c) The magnitude and control of production (top-down vs. bottom-up) varies throughout this sequence;

H(d) Succession patterns are linked to ecosystem type as defined by biophysical processes (*e.g.*, upwelling vs. broad shelf);

H(e) Succession patterns are linked to interannual (regime-scale) climate drivers;

H(f) Stewardship: Fishing, habitat change and broader climate shifts affect the pattern of succession, and expectations are better managed by considering climate and regimes (*e.g.*, the consideration of autocorrelation structure over time).

We can create a synthesis, and produce recommendations for CCCC successor Programs, by describing and disseminating our current state of knowledge: historical data with extensive gaps covered by models, either mathematical or conceptual. However, linkages between modeling regions and across time scales are yet to be performed.

The scale to which these models has developed is sufficient, or may be sufficient within two years, to describe many climate/fish interactions, both direct and surprising, as well as document our key, specific uncertainties, provided these linkages between currently-existing models can be created.

CFAME Endnote 5

Proposal for a 2-day CCCC/CFAME inter-sessional workshop to develop a CFAME work plan and hypothesis set for CCCC synthesis

The synthesis of CCCC knowledge of climate change and carrying capacity may focus on developing a work plan based on the proposed CFAME guiding hypothesis (*CFAME Endnote 4*). To facilitate this synthesis, CFAME recommends an interim workshop for a core group of CFAME participants, in order to develop FERRRS/WG 16 recommendations into a concrete program for progress and the development of a CFAME work plan.

The scientific focus of this workshop will be **the time scales of response mechanisms to specific climate shifts**. It will approach the question: "Is there a sufficiently general conceptual model which may relate each life history strategist to patterns in lower trophic-level production?" It is hoped that tractable hypotheses may be outlined, for example the "flow hypothesis" for Pacific sardine, as discussed in the PICES XIII CCCC workshop on "Linking open ocean and coastal ecosystems II". Two invited scientists will aid in providing current hypotheses.

The development of the work plan will center on the comparison of the response of multiple life-history strategists in relation to climate. The preliminary list for discussion is: euphausiids, pollock, squid, sardines, pink salmon, saury, capelin, and anchovy.

It is expected that preliminary results from the work initiated at this workshop will be submitted as one or more CFAME presentations at the 2006 CCCC Synthesis Symposium.

Duration and size: 2-day workshop to be held at a TBD location in winter or early spring of 2005, for approximately 15 attendees.

Recommended convenors: Kerim Y. Aydin (U.S.A.) and Akihiko Yatsu (Japan).

CFAME Endnote 6

Proposal for a 1-day CCCC/CFAME Topic Session at PICES XIV on "Comparative response of differing life history strategists to climate shifts"

In recent years we have come to accept that regime shifts are real and produce species and ecosystem-level responses, however not all species and ecosystems are equal. In particular, there is the need to move beyond correlative indices between climate variables and species indicators, and consider the temporal and spatial scale of the mechanisms, especially as they may differ between different life history strategists within an ecosystem. In this session, we invite contributions which examine the scale of response of species to climate, especially from an east/west comparative perspective. We especially encourage papers investigating the underlying mechanisms of responses, with an emphasis on targeting critical life history stages and differences in sensitivity to climate for different life history strategists (for example, between equilibrium and opportunistic strategists). It is intended that selected papers (oral and poster) will be published in an international scientific journal.

Recommended conveners: Gordon A. McFarlane (Canada) and Hyung-Ku Kang (Korea).

CFAME Endnote 7

Proposal for a 1-day CCCC/CFAME workshop at PICES XIV or XV on "East-west comparison of community structure, productivity and biodiversity under climate change scenarios"

In the waters of the North Pacific Ocean, total primary, secondary and fisheries production appears to be much greater in the west compared to the east. The eastern side of the North Pacific is characterized by narrow continental shelves and, in general, a gradual transition from sub-tropical waters off the coast of southern California to the sub-arctic waters of the Gulf of Alaska. The California Current is particularly productive due to coastal upwelling and Ekman pumping which enhances new production. In contrast, the western Pacific is characterized by broad continental shelves but a rapid transition from sub-tropical to sub-arctic waters. Rates of new production are probably lower there. The situation in the North Atlantic is roughly, but not exactly, similar. As a consequence, the temporal and spatial patterns of plankton and fish distribution and production, and fish migration differ between each side of the North Pacific. These differences need to be considered when comparing community structure and biodiversity, especially in the context of climate change. It is probable that the short- and long-term effects of climate change will produce different responses on each side of the Pacific that could differ in both spatial scale and duration. This workshop will solicit and invite contributions that examine and compare different aspects of new production, community structure and biodiversity, within and among species, communities and ecosystems, relative to climate change. The number and duration of talks will be restricted to ensure adequate time for discussion.