

REPORT OF MODEL TASK TEAM



The meeting of the MODEL Task Team (hereafter MODEL) was held from 14:30-18:00 hours on October 2, 2005. The Co-Chairmen, Drs. Francisco E. Werner and Dr. Shin-ichi Ito, called the meeting to order and welcomed the participants (*MODEL Endnote 1*). The Task Team reviewed the draft agenda, which was adopted (*MODEL Endnote 2*). During the meeting, participants:

- reviewed the accomplishments of MODEL over the past year;
- discussed proposals for the next major PICES scientific program;
- developed plans for 2006-2007;
- discussed the requests for travel to future meetings;
- discussed the maintenance of the MODEL web page; and,
- discussed the MODEL membership and the selection of a new MODEL Co-Chairman.

MODEL accomplishments in 2005 (Agenda Item 3)

The project “*Effects of climate on the structure and function of marine food-webs and implications for marine fish production in the North Pacific Ocean and marginal seas interaction and marine ecosystems*” (PIs: Drs. Francisco E. Werner and Bernard A. Megrey) was funded by APN (Asia Pacific Network for Global Change Research), and that allowed MODEL to hold a successful workshop on “*Climate interactions and marine ecosystems*” (co-sponsored by PICES and GLOBEC), from October 10-13, 2004, in Honolulu, U.S.A. Another meeting was held from March 5-10, 2005, in Baton Rouge, U.S.A. Among the main results of the workshop and meeting were:

- modeling differences in Pacific herring growth along the Northeast Pacific coast (from Vancouver Island to Alaska);
- implementation of an automatic parameter calibration system software PEST for the two target species, herring and Pacific saury;

- a comparison of differences in growth response between herring in the eastern and western North Pacific and saury under the same climate forcing derived from 3-D NEMURO model outputs.

The project “*Development of a model on the coupled response of lower and higher trophic level ecosystems to climate variability in the North Pacific*” (PI: Dr. Shin-ichi Ito) was funded by FRA (Fisheries Research Agency, Japan) for the April 2003 - March 2005 period. Under this project, MODEL held a workshop “*Summary and synthesis of contributions from NEMURO and NEMURO.FISH*” (co-sponsored by PICES) from December 15-18, 2003, at the National Research Institute for Fisheries Science, Yokohama, Japan. The project partially supported (together with PICES) a follow-up workshop of the same title as the project, “*Development of a model on coupled responses of lower and higher trophic levels to climate variability in the North Pacific*”, held from August 20-23, 2004, at the Alaska Fisheries Science Center, Seattle, U.S.A.. Originally the project was planned to be 3 years in duration, however, to develop and apply the model to sardine and anchovy problems and to hold a related international workshop, the project was revised and shifted to another FRA program “*International symposium/workshop support by FRA*”. The main results of the project were:

- improvement of model parameters for Pacific saury migration and spawning;
- showing the possible effect of sardine predatory pressure on prey zooplankton of Pacific saury; and
- the extension of NEMURO.FISH to sardine growth.

MODEL had agreed previously to publish the scientific contributions of NEMURO and NEMURO.FISH as a special issue of *Ecological Modelling*. Drs. Michio J. Kishi, Bernard A.

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Megrey, Shin-ichi Ito, and Francisco E. Werner are the guest editors of the special issue. The review process is ongoing and the current status is as follows:

- 10 papers have been reviewed by two anonymous reviewers and are now in revision by the authors;
- 3 papers are still in review;
- 4 papers are still in preparation;
- the final editorial meeting is planned for January 2006, in Seattle;
- the completed package is expected to be sent to *Ecological Modelling* in March 2006.

The project “*Software framework for integrating marine ecosystem models*” (PIs: Drs. Thomas C. Wainwright and Bernard A. Megrey) was funded by NOAA. The objectives of the project are:

- integrate NEMURO and NEMURO.FISH in the Earth System Modeling Framework (ESMF);
- provide a web-based interface for the NEMURO and NEMURO.FISH models;
- post user’s guides and documentation on the web.

ESMF will make the NEMURO code available for integration into the other U.S. Climate Change Research efforts and will also provide web-based tools to facilitate long-distance collaboration.

At PICES XIV, an IFEP/MODEL Workshop on “*Modeling and iron biogeochemistry: How far apart are we?*” was held on October 2, 2005, with Drs. Jun Nishioka and Yasuhiro Yamanaka as co-conveners. The workshop was a success, and IFEP and MODEL agreed to collaborate in building ecosystem models that include iron cycle effects. A CCCC/MODEL Topic Session on “*Modeling climate and fishing impacts on fish recruitment*” (Co-conveners: Drs. Yury I. Zuenko and Jacob Schweigert) was held on October 5, 2005. Summaries of the workshop and session are included elsewhere in this Annual Report.

Discussion of proposals for next major PICES scientific program (Agenda Item 4)

MODEL discussed the following 6 proposed

themes as potential candidates for the next major PICES scientific program:

- i) Ecosystem-based Fisheries Management and Sustainable Use
- ii) North Pacific Marine Ecosystem Response to the Global Change
- iii) A New Integrative Scientific Program Built upon the Foundations of CCCC
- iv) North Pacific Ocean Sustainability
- v) Coastal Ocean Ecosystems – The Human Dimension and Climate
- vi) Marine Biodiversity: Status and Trends

The main results of the discussion were:

- to involve all PICES member countries, the main scientific program should have broad scientific value,
- i), v) and vi) appear to be too narrow in scope and may not be appropriate programs for PICES,
- ii), iii) and iv) widely cover the scientific interests,
- climate change issues including global change is very important for PICES countries and the predictability of the ecosystem response will be needed,
- therefore, iii) seems the most desirable program, and model suggested the title of iii) as “*New Synthesis of Ecosystem Change and Forecast (NESCAFE)*”.

Planning for 2005-2007 (Agenda Item 5)

November 2005 inter-sessional workshop

Plans and arrangements were discussed for a FRA/APN/IAI/PICES/GLOBEC Workshop on “*Global comparison of sardine, anchovy and other small pelagics – building towards a multi-species model*” to be held from November 14-17, 2005, in Tokyo, Japan (*MODEL Endnote 3*).

The workshop was successfully convened, and details can be found in PICES Press (Vol. 14, No. 1). The focus of this workshop was on sardine and anchovy, and the participants:

- revisited the results of the 1989 symposium describing the inter-annual and inter-decadal variability of marine ecosystems in key regions in the world;

- discussed new factors and recent explanations regarding the cause of their variability;
- reviewed modeling capabilities; and
- proposed a common modeling approach to study the synchrony and asynchrony of sardine and anchovy populations, and discuss and compare their response to environmental or climate/global change factors in selected areas.

Workshops at PICES XV

A 1-day IFEP/MODEL Workshop on “*Modeling iron biogeochemistry and ocean ecosystems*” is proposed by IFEP (*IFEP-AP Endnote 5*).

Topic Sessions at PICES XV

The Task Team proposes a ½-day CCCC Topic Session on “*Modeling and historical data analysis of pelagic fish, with special focus on sardine and anchovy*” (*MODEL Endnote 4*).

MODEL supports a proposal to convene a 1-day CCCC/FIS Topic Session on “*Key recruitment processes and life history strategies: Bridging the temporal and spatial gap between models and data*” (*CFAME Endnote 5*).

MODEL also supports a 1-day Topic Session on “*Synchronous and asynchronous responses of North Pacific boundary current systems to climate variability*”, to be convened jointly by POC, MONITOR and CCCC (*POC Endnote 7*).

Requests for travel to future meetings (Agenda Item 6)

MODEL requests travel support for:

- 2 scientists to attend a workshop on “*Global comparison of sardine, anchovy and other small pelagics – building towards a multi-species model*” (November 14-17, 2005, Tokyo, Japan); these travel funds from PICES were already requested (and awarded) last year;
- Dr. Kenneth A. Rose (U.S.A.) to present MODEL contribution to the CCCC Symposium on “*Climate variability and*

ecosystem impacts on the North Pacific: A basin-scale synthesis” (April 19-21, 2006, Honolulu, U.S.A.);

- 1 invited speaker for the CCCC/MODEL Topic Session on “*Modeling and historical data analysis on pelagic fish, with special focus on sardine and anchovy*” at PICES XV;
- 1 invited speaker for the CCCC/FIS Topic Session on “*Key recruitment processes and life history strategies: Bridging the temporal and spatial gap between models and data*” at PICES XV.

MODEL web page (Agenda Item 7)

Dr. Bernard A. Megrey has maintained the MODEL Portal at a NOAA website. Using the portal site, MODEL members have exchanged Fortran model codes, drafts of manuscripts, presentation files at inter-sessional workshops, etc. This site archives all material related to the MODEL activities. MODEL members agreed to request that PICES maintain such a portal in the future. If the site cannot be hosted on the PICES website, MODEL requests PICES to consider funding for commercial hosting of the Task Team archive and the distribution of Task Team products.

Rotation of MODEL membership (Agenda Item 8)

Chairmanship: Dr. Francisco E. Werner rotated off as Co-Chairman of MODEL, and Task Team members enthusiastically agreed to have Dr. Thomas C. Wainwright as the new MODEL Co-Chairman. MODEL members offered great thanks to Dr. Werner for his strong leadership and efforts over the past years. Dr. Shin-ichi Ito agreed to remain as the other Co-Chairman for one more year.

Membership: MODEL needs two new members from Korea. One is to replace Dr. Sinjae Yoo and the other is to replace Dr. Jae-Hak Lee. Additionally, MODEL also needs another member from Canada, as presently the only Canadian member is Mr. Jacob Schweigert.

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MODEL Endnote 1

Participation list

Members

Irina Ishmukova (Russia)
Shin-ichi Ito (Japan, Co-Chairman)
Michio J. Kishi (Japan)
Bernard A. Megrey (U.S.A.)
Jake Schweigert (Canada)
Francisco E. Werner (U.S.A., Co-Chairman)
Sinjae Yoo (Korea)
Yury I. Zuenko (Russia)

Observers

Michael Schirripa (U.S.A.)
Yasuhiro Yamanaka (Japan)
Inja Yeon (Korea)
Naoki Yoshie (Japan)

MODEL Endnote 2

MODEL Task Team meeting agenda

1. Welcome and introduction of new members
(*F. Werner and S. Ito*)
 2. Review of agenda and inclusion of new items as needed
 3. Review of MODEL accomplishments after PICES XIII:
 - a. APN project “*Climate interaction and marine ecosystems*”, including meeting in Baton Rouge in March 2005 (*F. Werner*)
 - b. FRA project “*Development of a model on the coupled response of lower and higher trophic level ecosystems to climate variability in the North Pacific*” (*S. Ito*)
 - c. Special issue of *Ecological Modelling* (*M. Kishi*)
 - d. NOAA project “*Software framework for integrating marine ecosystem models*” (*T. Wainwright*)
 - e. Discussion/review/preview of upcoming
 4. Discussion of proposals for next major PICES scientific program (after CCCC) (*S. Ito and T. Wainwright*)
 5. Planning for 2005-2007 (*S. Ito, F. Werner and T. Wainwright*)
 - a. Joint FRA/APN/IAI/PICES/GLOBEC Workshop in November 2005 (*S. Ito*)
 - b. CCCC Symposium in April 2006 (*F. Werner*)
 - c. PICES XV (October 2006) - proposals for Topic Sessions and workshops
 - d. Theme for PICES XVI (October 2007)
 6. Requests for travel to future meetings
 7. MODEL web page (*B. Megrey*)
 8. Rotation of MODEL membership
- events at PICES XIV: CCCC/MODEL Topic Session (*J. Schweigert and Y. Zuenko*) and IFEP/MODEL workshop (*Y. Yamanaka*)

MODEL Endnote 3

Plan for a workshop on “*Global comparison of sardine, anchovy and other small pelagics: Building towards a multi-species model*”

Rationale: Large-scale, global fluctuations in populations of sardines and anchovies have been observed in the past century. The amplitude of their fluctuations is high and contributes a significant share of the total variability of the world’s harvest of fish. There are several intensive fishery grounds for sardine and anchovy that show asynchrony in their

abundance. At the same time, sardine shows synchrony in the Pacific (*e.g.*, the Humboldt Current, California Current and Kuroshio Current areas) suggesting a bottom-up, climate driven component. Finally, sardine populations do not show any clear systematic synchrony between Pacific and Atlantic. The out-of-phase asynchrony between sardine and anchovy may

reflect not only the differences of their life histories, but also a bottom-up process driven by climate shifts.

This climate-induced variability has attracted the attention of fisheries scientists worldwide and an international symposium on *Long-term variability of pelagic fish populations and their environment* was held in Japan more than 15 years ago, in 1989. In that symposium, the worldwide sardine variability was synthesized, and factors possibly causing the variability were discussed. At that time, global ocean circulation and marine ecosystem models were not available. However, in the past decade, the modeling of ecosystem responses to climate change, including enhanced computational capabilities, has evolved rapidly. For example, the PICES MODEL Task Team built a

community ecosystem model “North Pacific Ecosystem MODEL for Understanding Regional Oceanography (NEMURO)”, with an embedded fish bioenergetics model, and applied it to Pacific herring and saury, and compared their responses to climate scenarios.

Recommended convenors: Shin-ichi Ito, Michio J. Kishi (Japan), Bernard A. Megrey, Kenneth A. Rose and Francisco E. Werner (U.S.A.)

Venue: November 14-17, 2005, Tokyo, Japan

Organizer: Fisheries Research Agency, Japan

Sponsors: Fisheries Research Agency of Japan, Asia-Pacific Network for Global Change Research, Inter-American Institute for Global Change Research, GLOBEC and PICES.

MODEL Endnote 4

Proposal for a ½-day CCCC/MODEL Topic Session at PICES XV on “Modeling and historical data analysis of pelagic fish, with special focus on sardine and anchovy”

In the synthesis phase of the CCCC Program, comparisons of life-history strategies in relation to climate change are recommended for pelagic species such as pollock, pink salmon, capelin, sardines, anchovies, saury, euphausiids, squids, and others. The MODEL Task Team will hold a workshop in November 2005 on “*Global comparison of sardine, anchovy and other small pelagics – building towards a multi-species model*”, co-sponsored by FRA, APN, IAI, GLOBEC, and PICES. Modeling and historical data analysis of recruitment processes, and their relevance to scientific management of sardine and anchovy will be discussed during this

workshop. For the PICES Topic Session, we will call for papers on models and historical data analysis on the temporal and spatial variability of recruitment processes of sardine and anchovy, their linkages to changes in climate, human impacts and regional ecosystem structure. Advances in modeling fish population dynamics coupled with lower trophic ecosystems applied to pelagic fish are especially encouraged.

Recommended convenors: Shin-ichi Ito, Michio J. Kishi (Japan), Bernard A. Megrey, Kenneth A. Rose and Francisco E. Werner (U.S.A.).

