

REPORT OF THE IMPLEMENTATION PANEL ON THE CCCC PROGRAM

The CCCC/IP Panel met on Tuesday, October 21, 1997, at 1:30PM. Agenda for the meeting is attached. The Panel heard and accepted reports from the MODEL, REX, and BASS Task Teams. The proposals developed by REX, BASS, and MODEL for symposia and workshops to be held during 1997/1998 were discussed and accepted. The Panel received information about the current status of cooperation with other programs such as IPHC, ICES, IGBP, and NPAFC. The proposed terms of reference, statement of purpose, and structure for the Implementation Panel were discussed, revised and accepted by the group. A proposal for a new MONITOR Task Team and its terms of reference were discussed, revised, and accepted by the group. It was decided that a TCODE representative should be on the new task team. The group decided that CCCC/IP should contribute regularly to the PICES newsletter. The CCCC/IP heard a report from Robin Brown (TCODE) regarding data management and exchange issues of IGBP GLOBEC. It was decided that Robin Brown and one of the CCCC/IP Co-chairmen would draft a letter to each of the national GLOBEC programs in the PICES area to determine the status of their data management and exchange policies.

BASS Task Team Report

Co-Chairmen: Dr. R.J Beamish and Prof. M. Terazaki

The BASS Task Team report for the 1997 meeting consists of a summary of the annual meeting and a summary of the symposium. Our major activity in 1997 was the symposium which we will finalize for publication in 1998. The final publication will be a comprehensive summary of the physical and biological components of the ecosystems of subarctic Pacific gyres. It is our expectation that this summary will provide a background for research that identifies the important information needs. The subarctic Pacific gyres tend to receive less attention than the coastal areas. Yet they are an extremely productive component of the North

Pacific. Bass members expect that the symposium proceedings will stimulate scientists to study the subarctic Pacific gyres and will encourage more scientists to participate in future BASS meetings. The annual BASS meeting was held on October 19, 1997. The following are the minutes of the meeting.

Symposium - BASS members reviewed the structure of this year's symposium. It was agreed that the panel review be replaced by a panel facilitated discussion of the major recommendations for research and coordination from the authors of the papers. Immediately following the symposium, the organizing committee will summarize the discussion in the form of recommendations from BASS. BASS members feel that the papers in the symposium should be published in a reviewed journal if possible, but there is value in keeping the papers together in one volume.

El Niño - BASS members felt strongly that PICES ensure that attention is given to the 1997/1998 El Niño event by 1) Facilitating collaborative open ocean data collection, 2) Holding a symposium that will allow a preliminary identification of impacts and that BASS participate in the planning of the symposium. PICES should consider holding a joint symposium with NPAFC at a mutually convenient date and location. BASS recognized that there will be a need for more detailed analyses of the El Niño event that could be a topic for future PICES meetings.

Coordination of existing and future high seas field studies and work plan

There was an extensive discussion of the role of BASS in the development of high seas sampling programs. It was agreed that national contacts and a representative from NPAFC would be identified by the co-chairs and the PICES Secretariat will collect, update, and distribute the information. BASS will use the results of the symposium to

identify research issues and key east-west comparisons. Recommendations for future research resulting from the symposium will be summarized in a discussion paper prepared by the organizers and will be the basis for the development of a long-term work plan for BASS.

Intercalibration of plankton data

Intercalibration studies of plankton and nutrient sampling methods should be encouraged. It was noted that intercalibration may be more feasible that specification and enforcement of “standard” methods.

Air Sea interaction

The Task Team discussed air-sea interaction research and its relevance to BASS objectives. Points included:

- Recent technological developments for large scale observation (satellite scatterometry for wind speed, satellite altimetry for evolving surface current fields).
- Potential application to core BASS research topics such as seasonality of mixed layer dynamics, water properties, biological productivity, and transport.
- Recognition that the large spatial scale of some atmospheric phenomena provides a possible coupling and integration mechanism among PICES regions.

Highlights of discussion session at close of BASS Symposium: Ecosystem Dynamics in the Eastern and Western Gyres of the Subarctic Pacific

The following highlights were recorded from the comments of the speakers and participants at the session held to conclude the BASS Symposium.

Modeling and Physical Oceanography

More small scale examination of the mixed layer is needed including information on changes over

short time intervals and dynamics of the mixed layer to improve understanding and consideration in ecosystem models; Models need to be improved which consider day to day variability in the mixed layer, and we need better information on regional, seasonal and interannual variation of mixed layer depth. Also, there is no systematic large scale appreciation of how the stability of the water column is changing. Existing data can be re-analyzed as maps based on temperature may be misleading.

We also need to look at climate effects on mixed layer depth and then consider biological effects, incorporate them in our models, and add bacterial, iron and other components;

It will be important for BASS to understand how climate variations cause interannual and decadal changes and also how they affect East and West gyres. There is a need to understand climate forcing and consider its effects;

Ocean Chemistry and Primary Productivity

Iron plays a major role in productivity although interactions of Fe, light, photosynthesis are not understood in winter.

We do not understand why large diatom species become important in winter despite high Fe requirements and light limitation and we need to understand Fe chemistry and have Fe profiles at different seasons. Information on Fe sources is needed and we need to explain temporal changes in NO_3 and SiO_4 . The effects of Fe limitation on bacteria is not understood and the dynamics of bacterial/heterotrophic production need study. Finally, information on the biogeochemical dynamics of particulate matter.

Transport mechanisms such as dust transport from the Gobi desert and other aerial transport phenomena need study in order to determine how substances enter the ocean. High productivity in the Western gyre is also influenced by macronutrient addition and ocean mixing - processes such that in years when surface temperature is low due to mixing zooplankton

production is enhanced. Influx of northern waters and expansion and shrinking of dominant ocean currents appear important in determining production; The Gulf of Alaska, off Sitka, may be a useful place to study process fluxes and see how nutrients enter the area; Application of satellite technology for study, monitoring species composition of zooplankton, examination of macrocrustacea that have a single annual breeding season and the role played by fast growing gelatinous salps, and study of episodic events may be very important research topics;

Important basin scale zooplankton research topics include expanding the comparisons between Eastern and Western Gyres to include zooplankton species composition, seasonal timing and study of life history strategies. We need to understand what eats different species of zooplankton and understand the relationship between production of fish and micronecton. We also need to try to observe oceanic as well as El Niño events, oceanic and coastal effects and see how they propagate offshore and affect zooplankton;

Fish Species

We need to examine seasonal variability in surface fish data as much of the current information results from summer catch records. Winter data needs to be incorporated and perhaps can be obtained by trawl, seine or other survey methods including the application of acoustics and telemetry; There is a need for reliable biomass estimates using the above and other techniques. In addition we need to understand small scale variability in fish distribution and abundance in relation to spatial, temporal and vertical considerations; More information is needed on surface fishes of the Eastern Pacific to fill in gaps in knowledge; Mid-water fish communities provide good opportunities for scientific discovery and possibly offer commercial possibilities due to the very large biomass of fishes about which relatively little is known. Standard methods and standard gear types need to be adopted and tested and there is a need for a workshop on this topic, possibly at Vladivostok. Collaborative sampling

programs could provide fish specimens that could be analyzed at low cost by students to gain needed information;

Seabirds and Marine Mammals

Although a considerable seabird data base exists, it needs to be updated and expanded to incorporate other sources of information that are available. Some areas of the North Pacific are not well surveyed and data tends to be more coastal than offshore in the gyres. There is a need to expand the data base to see how things vary with season, time and area. Observations and recommendations from the working group dealing with seabirds and marine mammals need to be considered along with these findings; Bird and mammal scientists need to be part of the planning of major studies as there is a possibility that top level organisms may be important indicators of changes in the ocean. Higher trophic level organisms may respond quickly to changes in conditions but may exhibit more instability than other trophic levels. Organisms such as birds may be useful to study changes in North-South conditions.

Overall Considerations

It is difficult to sort out the interactions of all the trophic levels. Perhaps a good approach is to try to understand things on a small scale basis and then use this information to try to solve large scale problems through application of the information.

The symposium summary was prepared by Dr. John Davis and we thank him for his careful and thorough report. Following the symposium the authors of the papers agreed to revise their manuscripts to ensure there was a balanced comparison of eastern and western subarctic gyres. The revised drafts will be reviewed by coordinators from the organizing committee and papers are expected to be published in the reviewed literature. A summary paper will be included that will be authored by Drs. R. Beamish and W. Wooster.

MODEL Task Team Report

Co-Chairmen: Dr. Sinjae Yoo (Korea) & Dr. Ian Perry (Canada)

The general objective of the MODEL Task Team is to advance the development of the conceptual, theoretical and modeling studies needed to achieve the goals of the PICES CCCC program. The specific roles of the MODEL Task Team are:

1. to encourage, facilitate, and co-ordinate modeling activities within the member nations with respect to the goals and objectives of the program;
2. to promote and facilitate linkages among the modeling activities taking place at the component levels, for example, to promote linkages among physical, lower trophic level, and upper trophic level models;
3. to identify and encourage modeling activities in areas or subjects which may be important but not yet well studied or integrated into existing models of the North Pacific;
4. to interact with the field programs to provide an integrating context for planning these programs, for analysing results, and for comparisons among regions.

The MODEL Task Team recognised that many modeling activities are already taking place regarding North Pacific physics and biology, for example, Japan, U.S., Canada, and China all have funded GLOBEC and/or GLOBEC-like modeling studies. Many of these countries also have active JGOFS programs, each with their own modeling studies regarding plankton production. However, what seems to be lacking is awareness and communication among these activities, and the possible linkages among physical and biological modelers and linkages with field programs, all of which are necessary to improve the entire modeling effort in the North Pacific. Therefore, the MODEL Task Team has taken as its primary roles to:

- facilitate communication among modeling

studies, and with field programs, regardless of whether they are formal activities associated with the CCCC program;

- identify and stimulate areas of modeling that are significant to the CCCC program but which are not presently being addressed; and
- assist the field programs of the CCCC program (e.g. REX, BASS) with their model-related requirements.

The following represents a summary of the activities of the MODEL Task Team as agreed during PICES V (in Nanaimo, October 1996), and the actions taken during 1997 to accomplish each of these activities. Also included are the proposed activities for 1998.

1. ***Provide an opportunity to explore simple mass-balance models***, as a means to develop a framework to compare the various Regional ecosystems as defined in the CCCC Implementation Plan. Dr. Daniel Pauly (University of B.C. and ICLARM, Manila) made an invited presentation on the ECOPATH modeling framework at the Implementation Panel meeting of PICES V.
2. ***Convene a topic session at PICES VI to compare and contrast results from regional applications of these mass-balance models***. A session titled "Models for linking Climate and Fish" was convened at PICES VI in Pusan, Korea. It did not include any presentations of mass-balance models, but did include other models, including individual-based models, statistical models, recruitment models, and coupled physical - biological models.
1998 Workplan: Develop a proposal for a workshop (to be held in 1999, possibly in association with REX) on ecosystem comparisons, using modeling approaches as conceptual frameworks.
3. ***Contact North Pacific circulation modelers to explore making their model results widely available to the PICES community***. Circulation modelers have been contacted, and all were enthusiastic about making their

models and results more widely available. Inventories and descriptions of these North Pacific circulation models have been prepared, including contacts for access to results. This will be available on a page within the PICES web site shortly. The MODEL Task Team will encourage modelers and observationalists in the North Pacific who may need model outputs to visit and contribute to this web page.

1998 Workplan: Expand this web page to include biological models and modeling activities within the PICES areas, so as to serve as a “Clearing House” for modeling activities in the North Pacific. For example, there are now a number of funded national GLOBEC programs which have modeling studies operating in the North Pacific, some of which are not now involved in PICES. The intent of the web page is to get them involved in the CCCC Program. The page will include GLOBEC and non-GLOBEC modeling activities associated with physical and biological processes at all trophic levels in the North Pacific. .

4. ***Convene a small workshop in 1998 to compare lower trophic level physiological models.*** This workshop is planned for early spring, 1998, in Tiburon, California, hosted by San Francisco State University (Convenors: Sinjae Yoo and Dick Dugdale). Its primary objectives are
 - a. to review recent findings and conceptual issues in lower trophic level processes;
 - b. to identify critical issues and differences of various process models;
 - c. to inter-compare the leading process models that are likely to be used within the CCCC program;
 - d. to identify when divergent model results are due to difference in the process models used rather than difference due to ecological processes.

1998 Workplan: A short follow-up workshop to the above was proposed. Reason: As a result of the workshop in spring 1998,

changes and further comparisons to these lower trophic level models may be needed. This follow-up workshop provides and opportunity to examine and compare these changes, plus complete the publications arising from the workshops. Proposed place: Two days in association with PICES VII.

1998 Workplan: Develop (likely on the new web page) an inventory of important but often missing components of models, for example: parameterization of vertical mixing and vertical diffusion; representations of vertical migration by zooplankton, etc. This could also include recognition and development of inter-changeable sub-models that could be exchanged among various larger models.

The MODEL Task Team also endorsed the following statement:

The MODEL Task Team recognises the need for better understanding of causes and characteristics of decadal-scale ocean – atmosphere variations of the North Pacific – to recognise and predict possible “regime shifts”, and urges PICES (through POC and other relevant bodies) to take steps to improve this understanding.

REX Task Team Report

Co-Chairmen: Drs. Anne B. Hollowed, Vladimir I. Radchenko, and Tokio Wada

The REX Task Team convened a workshop October 17-18, 1997. The purpose of the workshop was to review the status of national research programs and to identify areas for cooperative research experiments in support of the CCCC Program. Over 50 scientists participated in the workshop representing approximately 40 research institutions.

In the REX workshop, we examined the possibility of applying the comparative approach to answering the scientific questions posed in the Climate Change and Carrying Capacity Implementation Plan. Participants were asked to consider the possibility of designing experiments

that could be conducted in distant regions of the North Pacific with the expressed intent of testing hypotheses regarding climate impacts on the carrying capacity.

The symposium began with a review of the GLOBEC and GLOBEC like research programs planned or on-going in each of the six PICES member nations. Subsequently, participants discussed coastal research programs in breakout sessions targeting forcing, lower trophic level response, higher trophic level response and ecosystem response. The higher trophic level response breakout sessions were further divided into four major species groups: salmon, mid-water and demersal fish, pelagic fish, and crustaceans.

Participants were asked to review the four key scientific questions presented in the CCCC Implementation Plan:

1. What are the characteristics of climate variability, can interdecadal patterns be identified, how and when do they arise?
2. How do primary and secondary producers respond in productivity, and in species and size composition, to climate variability in different ecosystems of the subarctic Pacific?
3. How do life history patterns, distributions, vital rates and population dynamics of higher trophic level species respond directly and indirectly to climate variability?
4. How are subarctic Pacific ecosystems structured? Do higher trophic levels respond to climate variability solely as a consequence of bottom up forcing? Are there significant intra-trophic level and top down effects on lower trophic level production and on energy transfer efficiencies?

The participants were asked to develop hypotheses related to the four CCCC questions as they related to the topic of the breakout session. Participants were also asked to discuss existing or potential research approaches to test these hypotheses. The regions and target species that would be best suited for comparative research experiments were identified. Finally, the barriers to implementing the experiment were discussed.

REX Task Team Recommendations

1. We recommend that the REX workshop report should be published in the PICES annual report or the PICES scientific report series. This report will contain a master list of all of the recommendations stemming from the workshop breakout sessions.
2. PICES member nations should compile a catalog of historical samples and data sets which are not yet analyzed or readily available. This activity will be conducted by the REX Task Team.
3. The REX Task Team supports the establishment of a monitoring task team within the CCCC program. We hope that this task team will address standardization of sampling and analysis methods for comparative studies suggested by REX.
4. We recommend that a two-day symposium and workshop on climate effects on small pelagic species should be convened prior to the PICES VII Annual meeting in Fairbanks, Alaska.
5. We recommend that a scientific session that highlights research findings of GLOBEC and GLOBEC-like programs in the North Pacific should be convened as part of the PICES VII Annual Meeting.