December 22, 2006 (FINAL)

PICES Future Integrative Science Program – Work Plan

Introduction

This document describes the planning process and execution of a work plan that leads to a Science Plan for an integrative science program (FUTURE) that will replace the CCCC Program. This plan builds off of a number of discussions and planning activities that occurred at PICES XV in Yokohama, Japan, and addresses comments (Annex 1) from the US raised at the Governing Council that requested this work plan.

We agree with all of the US comments that major objectives are: 1) to make the next science program of PICES truly integrative of all committees and all member countries of PICES; 2) to maintain geographical balance during all steps in developing the Science Plan; 3) to make sure that in developing the plan we strive to have a balance in the expertise of the participants such that the key components of the next program (*e.g*., forecasting, communication, *etc*.) are well represented; and 4) to ensure that the next program be more "revolutionary" then "evolutionary" in building off of the successful CCCC Program (*e.g*., reach out to coastal scientists, scientists no longer involved in PICES, younger scientists). And while at the same time working to compress the timeline for completing the Science Plan and doing so at minimal cost. Nonetheless, while these are important goals, it is the conclusion of Science Board and SG-FISP that we cannot meet the goals of inclusiveness, reaching out to other scientists, being expansive in defining the objectives of FUTURE, while compressing the timeline and being cost conscience, and doing this all thru the volunteer efforts of our PICES colleagues. Thus, we recommend that rather then compress the timeline we will need to **expand the timeline slightly for completing the Science Plan**. If we could have made more progress in developing FUTURE between Vladivostok and Yokohama we might have been in a different position as far as needing to extend the timeline. However, the time between Vladivostok and Yokohama was necessary in our view to more explicitly set our targets and goals for what should comprise FUTURE.

The key steps in moving from the FISP outline we currently have to implementation of FUTURE as the next integrative science program of PICES (FUTURE) are:

1. Establish a Writing Team through GC approval process;
2. Engage the full Writing Team in drafting the Science Plan;
3. Hold a Writing Team meeting in February 2007, in Seattle (U.S.A.) to develop a more fully developed FISP outline;
4. Convene a FISP workshop in April 2007, in Yokohama (Japan), to review and further develop the FISP outline and initiate writing the Science Plan;
5. Submit the draft Science Plan to SB and GC in September 2007;
6. Discuss the near final draft of the Science Plan at the Open Forum during PICES XVI in Victoria (Canada);
7. Hold a 1-day WT/SB/GC workshop at PICES XVI in Victoria (Canada);
8. Revise Science Plan and get peer reviews in December 2007
9. Have the Science Plan available for approval at the 2008 SB/GC inter-sessional meeting;

10. Convene a workshop on the FISP Implementation Plan immediately after the 2008 SB/GC inter-sessional meeting;
11. Make the Implementation Plan available for review by the SB and GC by September 2008;
12. Have the Implementation Plan available for final approval by the GC at PICES XVII in Dalian (China).
13. FUTURE begins in October 2008.

Overview – Components and Timeline

Writing Team (WT)

The responsibility of this Team is to use the current description of FUTURE (Annex 2) and develop a draft Science Plan and then a final Science Plan after receiving comments from the PICES community at an Open Forum during the 2007 Annual Meeting in Victoria, Canada. A primary goal of the Team is to work to insure full consideration of views by all member countries and all Permanent Committees of PICES in formulating the draft Science Plan. The Team will use all available tools, including video-conferencing and web-enabled collaboration tools if needed, to insure full participation by members of the Team from both sides of the Pacific.

Candidates proposed to comprise the Writing Team, and willing to be members of the Team, are:

- John Stein (U.S.) [William Peterson to assist John Stein]
- Jake Rice (Canada)
- Anne Hollowed (U.S.)
- Hiroaki Saito (Japana)
- Sinjae Yoo/K.I. Chang (Korea)
- Jack Barth (U.S.)
- Shoshiro Minobe (Climatologist) (Japan)
- Jie Kong (aquaculture) (China)
- Oleg Katugin (Russia)
- Shinichi Ito (Modeler) (Japan)
- Dave Fluharty (U.S.) (ecosystem approach to management, science/policy interface)

We request that GC affirm these nominations or propose alternate members, by the earliest possible date.

For the Writing Team to be effective and efficient, it will be very important to have the Committee Reports regarding FISP/FUTRE (these reports have already been requested), which reflect the national perspective on the content and goals and objectives of FUTURE. National rather then individual views of Committee members are essential to insure that we have the balanced and inclusive Science Plan.

Writing Team Meeting (February 2007)

The Writing Team will meet for 1.5-2 days following the International Fisheries Symposium on “Future of Fishery Science in North America” that will be held on February 13-

15, 2007, in Seattle (U.S.A.). Prior to this meeting each member of the WT will prepare a 1-2 page outline of their views on the basic structure and key elements (*i.e.*, major themes, key questions) of the Science Plan. At the meeting, the differences and similarities among the outlines will be discussed to arrive at a final detailed outline. Between this meeting and the proposed FISP workshop in April, 2007 members of the Writing Team will further develop the outline by expanding on the major sections, such as writing short descriptions of the state of the science for a theme area, explaining why a proposed question should be part of the Science Plan, *etc*. This information will serve to stimulate discussion at the FISP workshop.

Workshop (April 2007)

We are proposing a FISP workshop in April 2007 (April 16-18, in Yokohama, Japan, immediately prior to the 2007 inter-sessional SB meeting) that involves the Writing Team and the study group on FISP and a limited number of invited scientists. At this workshop, a detailed outline of the Science Plan will be developed, the major themes of FUTURE will be discussed and refined, and WT members will be assigned to draft sections of the Science Plan. This approach is being taken to insure active engagement by all members of the Writing Team and representative from all member countries in developing the substance of the Science Plan.

The following describes the objective, goal, agenda and product from the FISP workshop.

Objectives –Insure participation by scientists from all PICES Committees and garner input from experts on major themes of FUTURE. Involvement of external experts who are not normally involved in PICES activities will help insure that we are not biased in our views of the major questions/themes proposed to be addressed in FUTURE.

Goals – Review the goals, objectives, organization and key elements of the Science Plan, define the key questions to be answered, and determine strategic approaches to answering the questions. Breakout groups may be used to make sure that we are considering the latest science and to define the key questions to be answered and the strategic approaches to answering the questions.

Proposed Agenda (FISP/SB need your input here if you have it)

1. Presentation of outline of the Science Plan;
2. Selected invited presentations on key themes/topics (presentations to be made available to the Writing Team);
3. Discussion and revision of the outline;
4. Breakout into groups by thematic/topic area to refine the revisions proposed in step #3;
5. Plenary session to review progress in refinement of theme/topic area by individual teams and combine into a final detailed outline of the Science Plan;
6. Writing assignments to individuals are made.

Planning Activities –Writing Team and SG-FISP establish detailed agenda; Council approves/affirms the list of participants for the workshop; Secretariat invites participants and makes arrangements for the workshop.

Product – A refined and fully developed detailed outline of the Science Plan and assignments to the Writing Team to draft the major sections of Science Plan.

Workshop participants will be determined as we proceed.

Open Forum at PICES XVI, Victoria, Canada (October – November 2007)

The draft Science Plan (near final plan, but not polished) will be presented and discussed at an Open Forum during PICES XVI in Victoria (Canada). We strongly believe that we need the full discussion of the plan in Victoria to provide an opportunity for any good ideas to come forward that could then be readily accommodated in the Science Plan. Also the Open Forum provides and opportunity to bring in even more types of science expertise and possibly make even more progress on a broader set of issues in the Plan. We believe in the imagination of the PICES scientific community and that when they see the Science Plan for the first time, some excellent ideas will be brought forward. This Open Forum will allow us to hear good ideas and suggestion and then to have time to respond to them and incorporate them into the final Science Plan.

WT/SB/GC Workshop at PICES XVI (November 2007)

The Writing Team, Science Board and Governing Council will meet for 1 day following PICES XVI to discuss the draft Science Plan and comments made during the Open Forum. The product of this workshop will be an agreement on steps and changes to the draft Science Plan to arrive at a final draft of the Science Plan.

Internal/External Peer review (December 2007 - ____)

Review of the plan is critical to insuring a high quality Science Plan. Peer review should include scientists very familiar with PICES, its objectives and the development and implementation of the CCCC Program, the first major science program of PICES, as well as scientists outside of PICES to bring an external review of the proposed science. It will be important that we establish clear guidelines for the peer review, because we do not want a review of whether we have chosen the right theme but rather that the science to address the underlying questions of the program is appropriate. The following are the current suggested reviewers:

PICES: Warren Wooster, Ian Perry, Vyacheslav Shuntov and Makoto Kashiwai

External: Mike Fogarty/Ted Smyda (East Coast of North America), Ken Drinkwater/Svein Sundby (ICES), Tony Smith (CISRO).

Implementation Plan

We conclude that we will need less time than previously anticipated to produce this plan. The reasoning is that FUTURE will be implemented at the national level. Thus, it is important to emphasize what we will need from each country is a list and description of the programs and projects that are or will be conducted to meet the goals of FUTURE. It is important to understand the structure and process that PICES will use to coordinate the new program. We have a great deal of experience and have learned much from the implementation of the CCCC Program, and will build on that experience.

A 1-day workshop will be held in conjunction with the 2008 inter-sessional SB/GC meeting to review list of programs and projects from each member country, develop a detailed outline of the Implementation Plan and make writing assignments to complete a draft Implementation Plan for consideration and review in September 2008.

Timeline

The attached timeline (Annex 3) shows the sequence of events leading from PICES XV to the implementation of FUTURE as the next integrative science program of PICES. The timeline is designed to be realistic about the amount of time it will take to develop a high quality Science Plan and to meet the Council's objective of maintaining good geographical balance of those participating in developing the Plan, and minimizing costs. Moreover, the proposed timeline aligns very well with completion of the CCCC Program and GLOBEC.

The following is a summary of the key steps in implementing the Science Plan for FUTURE.

1. GC considers approval of Science Plan at the 2008 inter-sessional SB/GC meeting (Apr. 2008)
2. A 1- or 1.5-day workshop on Implementation Plan in conjunction with the 2008 inter-sessional SB/GC meeting (Apr. 2008)
3. Final Implementation Plan to GC/SB for review (Sept. 2008)
4. Initiate FUTURE (Oct. 08)

Budget

Not to exceed $40,000 CAN.

[The exact budget cannot be determined until we have an agreed upon timeline and location of workshop/meetings.]

Annex 1 – US Comments, October 22, 2006

Annex 2 – Current Description of FUTURE

Annex 3 – Timeline for developing science and implementation plan for FUTURE.

Annex 1

U.S. comments on planning for the PICES Future Integrative Science Program as presented at the Governing Council – 22 October 2006, Yokohama, Japan.

> *The agreement at the October 22 GC meeting was that the United States would circulate these thoughts through the PICES secretariat and ask for additional recommendations from the other contracting parties. The GC suggested that input from the SB by mid-November 2006 would be important to prevent delays.*

We very much appreciate the hard work that has been put into FISP. There was an excellent discussion at the Open Forum on FUTURE, and both the drafters of the Prospectus and the committee chairs deserve congratulations for making this progress. We realize this is not an easy task, and it is a task that has substantial implications for PICES. So you will understand if the Governing Council is taking a careful look at the program's proposed Content as well the Process by which FISP moves forward.

Our questions on process focus on the Science Board's presentation to the Governing Council on October 21st. We realize that this is a work in progress, but we are also concerned that the time is shrinking in which to implement this program. We raised some of these concerns during the oral presentation on the SB's plan and discussed them further with the Science Board Chair the following day.

Without benefit of a write-up on the process, our understanding of the FISP planning process is somewhat sketchy but we believe we have the gist of it. Our understanding of the process is that the committees will provide input to FISP by the beginning of December, and the FISP team will compile this information plus that provided from this year's open forum for a meeting of the writing team in February 2006. We also think we heard that between December and February team members in the Seattle, WA USA area would get together to get a "head start." The writing team would generate a draft plan that would be further developed in a wider workshop including all of the Science Board and a number of scientists from within PICES to be held in April in Yokohama. The structure of the workshop was not well defined, but the objective, as we understood it, was to finalize the FUTURE science plan. The product from that meeting would receive external review comments from individuals largely outside PICES. The final draft would be posted for external review and PICES comments in August, with the final version available for GC review and approval in Victoria, BC Canada in October 2007. In the following year, an implementation plan for FUTURE would also be developed.

The GC did support the Spring 2007 workshop in Yokohama, Japan and authorized work to proceed on that workshop, subject to some constraints.

1. Overall process

Collaborative research is both exciting and frustrating, the latter from the difficulties of coordinating researchers in different institutions. There are several approaches to cooperative research planning, including use of planning consultants, expert researchers, inter-active research teams, and planning workshops, to name several. The FISP process seems to promise all of these approaches except the use of planning consultants. But the exact constellation of these approaches isn't at all clear.

We believe SB/FISP should provide a much more detailed write-up of each step of the planning process. For example, for the Workshop, we would like to see the objectives, proposed agenda, planning activities, and deliverables. We would like to see this kind of detail about each step in the process.

2. Geographical balance, including vetting by the contracting parties

The Science Board understands as well as any of us the importance of involving all components of PICES in its activities, and we recognize there has been an attempt to do so in the Writing Team and the Workshop. However this appears to have been incomplete and participation was not been vetted by the national delegates and Governing Council.

We believe that the SB/FISP should provide its nominations for participation in the Writing Team and the Workshop to the Contracting Parties, who will affirm these nominations to the Secretariat or suggest alternatives.

The SB/FISP should also identify methods for involving scientists from the western side of the Pacific in any informal meetings – using techniques such as tele-conferencing or direct contacts.

3. Methodological balance

We may be treading on the terrain of the SB to suggest that the gist of FISP is the kind of integrative modeling that ties together the components of PICES into a coherent perspective on the dynamics of the North Pacific ecosystem. It is this, plus the advice to management and communication of results, that differentiate FUTURE from the CCCC program. Thus, expertise in these areas is crucial.

We suggest that more attention be focused on the modeling aspect of the project, with top level modelers included in the process.

We are pleased to see that several policy advisors have been suggested for the planning process, but we would suggest that the Communication theme is really quite different and needs a specialist on that topic. We would also like to see a more complete strategy for involving both the human dimensions of the research component and the communications strategy from the beginning, particularly as pertains to different approaches across the member countries. .

4. New ideas

The SB and FISP team have dedicated a substantial amount of their professional time toward this project which we appreciate. Yet we have some concern that the project seems more like a roll-over of CCCC rather than a new project. We would suggest some explicit reaching out to people in this region who either have not been involved in PICES, such as coastal scientists, or who have been involved and are faded away, as well as to young scientists.

5. Timeline

We all appreciate that pulling this together by next Fall will be a major accomplishment, but we are concerned that the schedule is compressed toward the decision-making end of the timeline.

We would like to see a schedule that accelerates the drafting process from the point of committee input in December through the provision of the draft plan. If this schedule cannot be accelerated with the activities currently planned, then a reevaluation of the process would be warranted.

6. Cost

Frankly we were worried that the cost of the FISP planning process may absorb all of the flexibility in the PICES budget. We agree this is the highest priority for PICES, but we would like to see an explicit budget.

The United States suggests that the total cost of FISP science plan development in 2007 should not exceed one half of the PICES discretionary budget, i.e., less than $55,000. [The chair of F&A, Dr. Laura Richards, subsequently suggested a budget not to exceed $40,000 would be appropriate.]

We would like to see an explicit budget for the entire planning process, including best estimates for the implementation planning stage.

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Annex 2

FUTURE

Forecasting and Understanding Trends, Uncertainty and Responses of the North Pacific Marine Ecosystem

FISP Draft following Interim Science Board Meeting held in April 2006

Theme

To understand and forecast responses of North Pacific marine ecosystems to climate change and human activities at basin-wide and regional scales, and to broadly communicate this scientific information to governments, resource managers and the general public

FUTURE, a new scientific program of PICES, will build on the success of the Climate Change and Carrying Capacity (CCCC) Program and is motivated by three important societal issues in the North Pacific:

1) The loss of resilience and productivity of natural environmental capital, such as renewable resources and habitat, and irreparable damage to non-renewable resources.
2) The loss of socioeconomic opportunities due to natural and anthropogenic change in marine ecosystems, and
3) Increased uncertainty and risk in decision making faced by managers and policy makers due to climate change and irreversible ecosystem change.

These issues drive the need for improved scientific information to reduce uncertainty, to improve resource management and decision-making, and to better communicate that information to all facets of society. The implementation of FUTURE builds on the enhanced understanding of marine ecosystems gained through programs like CCCC and GLOBEC (Global Ocean Ecosystem Dynamics), the availability of the next generation of IPCC (Intergovernmental Panel on Climate Change) climate projections, improved biological, physical, and geochemical time series in the North Pacific, and substantially improved coupled models for synthesizing existing data and testing key hypotheses on the responses of North Pacific ecosystems to climate and human forcing.

FUTURE will move beyond these previous research programs by focusing on understanding the mechanisms underlying ecosystem response, by developing a forecasting capability, and by providing

estimates of the uncertainty associated with these forecasts. The challenge is not only to improve our scientific understanding of interactions between the North Pacific Ocean, climate, biological processes and human communities, but also to communicate this information effectively to governments and society at large so they can set 'wise-use' policy and management directions in anticipation of the changes we forecast. In short, we need to clarify, anticipate, and communicate the linkages between climate, ecosystems and societies.

Central Scientific Issues

- Marine ecosystem responses on seasonal, annual and decadal time scales.
- Climate forcing of physical, biological and biogeochemical processes at scales ranging from the entire North Pacific, to marginal seas and convergence zones, to coastal regions relevant to PICES member countries.
- Ecological interactions and linkages between coastal and offshore waters, western and eastern Pacific, northern and equatorial Pacific, and marine, estuarine and freshwater ecosystems.
- The direct and indirect effects of human activities such as fishing, aquaculture, species invasion, and pollution.
- The cumulative impacts of multiple ecosystem stresses on biological diversity.
- Forecasting in a policy environment which communicates the implications and uncertainties to decision-makers and the general public through risk-based ecological assessments.

Communication Issues

- The communication of PICES science to natural resource managers, groups interested in the outcome of management decisions and the general public.
- Partnerships with organizations that focus on the social and economic sciences to increase society's awareness of PICES science activities.
- Effective communication to differing constituencies in all PICES-member countries.

Range of Key Research Activities

- Develop integrated models and assessments.
- Investigate and improve our understanding of mechanisms underlying ecosystem response to change.
- Develop indicators of ecosystem status and condition to meet conservation and management objectives.

- Provide advice on the implementation of ocean observing systems.
- Simulate climate change and human impact scenarios through interaction with key conservation and management bodies in the North Pacific.
- Develop integration and visualization tools to communicate ecosystem knowledge and complexity.
- Assess and communicate uncertainty and its implications to managers, communities dependent on the ocean, and the general public.
- Develop integrated models and scenarios of ecosystem change and data management protocols to support this research.

Key Communication Activities

- Develop a PICES capability for the communication of complex scientific findings.
- Build partnerships with organizations already doing outreach successfully.
- Prepare and distribute press releases, newsletters, public workshops, flyers and videos.

The main challenge we face in developing FUTURE is in setting priorities among the scientific issues, identifying possible key research activities and communicating that science. We must ask ourselves the following types of questions:

- What are the time and space scales we should focus on in improving understanding of climate and anthropogenic forcing?
- What will be our primary foci for investigations of ecological interactions and linkages among ecosystems?
- Should we focus on a subset of human impacts; if yes which ones and why?
- What type of forecasts can and should we develop?

The answers to these and related questions will provide better clarity to science and resource managers in our member countries of the value of FUTURE as the next integrative science program of PICES. FUTURE will be of high value if it is complementary and synergistic with the science and management needs for understanding, forecasting, and communicating the linkages between climate, ecosystems, and societies.

Draft Agenda

Open Forum on FUTURE

Annual Meeting, Yokohama Japan

Overview of FUTURE – Status Report

Discussion to begin to increase the specificity of the key research activities of FUTURE

- Scientific Understanding – What are the highest priority research activities?
- Forecasts – What type of forecasts should we develop?
- Communication – What should be our focus to broaden the communication of PICES science?

Next Steps in developing the FUTURE Science Plan:

Establish a writing team to draft a Science Plan.

Hold a workshop in April 2007 to refine the draft Science Plan.

Review of the revised Science Plan within PICES.

Hold a workshop at next Annual Meeting to review and refine Science Plan.

Seek outside peer review of the Science Plan.

Annex 3
Timeline -- Science/Implementation Plans for FUTURE

See attached Excel file.