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The Third Annual Meeting

Well here we are gearing up for the Third Annual Meeting in Nemuro Japan 15-24 October 1994. It seems only yesterday that we held our very first annual meeting in Victoria B.C. Canada. This is the last Newsletter before the meeting and we have circulated our final announcement for the meeting in early June.

Our Japanese hosts have gone to great lengths to work with the Secretariat to make the meeting memorable. All those involved with the organization of the meeting are looking forward to seeing you, as the success of the meeting can only be fulfilled by you and others coming to contribute.

See you in Nemuro.

Call for Papers

PICES-GLOBEC Workshop (See page 2)

PICES-STA Monitoring Workshop (See page 3)

Nemuro flights update

Most of us flying to Nemuro from North America would love to dream of the benefits (money-wise and time-wise) of being able to connect with the domestic flight from Tokyo the same day without having to stay over one night in the notoriously expensive Tokyo. While the possibility is still unclear now, JTB Sapporo has indicated that All Nippon will either add flights or arrange a larger aircraft to fly the same (one) flight if the demand is overwhelming on certain days. Chances that they will just fly a larger aircraft is larger than additional flights, but they will need to see a sufficient demand to add an extra

flight. So please everybody, book your flights NOW.



Annual Meeting Program

1. **Structure, trophic linkages and ecosystem dynamics of the subarctic Pacific.**

(Science Board) Conveners: Dr. Kazuya Nagasawa (Japan) & Dr. William G. Percy (U.S.A.)

This session will focus on biological and coupled physical-biological studies of species distributions, productivity and abundance trends, trophic structure and dynamics, feeding studies, and predator-prey interactions in the subarctic Pacific ecosystem, including anthropogenic influences. Papers concerning both the high-seas, and coastal sea ecosystems bordering the subarctic Pacific will be presented.

2. Physical processes and modelling of the subarctic North Pacific and its marginal seas.

(POC) Conveners: Prof. Yutaka Nagata (Japan) & Prof. David L. Musgrave (U.S.A.)

This session will focus on modelling efforts in the subarctic North Pacific Ocean and their relation to global climate prediction. In recognition that models must incorporate critical physical processes, this session will also address present gaps in our knowledge of the subarctic North Pacific and identify key processes to be included in future models of the subarctic North Pacific Ocean. Therefore, papers on theoretical approaches, data analysis, observational results, and new observational techniques are encouraged. Disciplines other than physical oceanography may have research interests that are related to physical models of the subarctic North Pacific. Papers addressing the relationship between physical models and other disciplines will be welcome.

3. Structure and ecosystem dynamics of the subarctic transition zone North Pacific - is the east like the west?

(BIO) Conveners: Prof. Akira Taniguchi (Japan) & Dr. Richard D. Brodeur (U.S.A.)

This session will focus on east-west comparisons of physical and biological processes determining trophic structure, seasonal (and longer period) production cycles, life history strategies, distribution patterns, and biomass changes of key species in the subarctic transition zone. This session will explore environmental and biotic differences, and how the life history strategy patterns of plankton, fish, and high-trophic level species respond to differences in the physical climate in the eastern and western North Pacific.

4. Recruitment variability of clupeoid fishes and mackerels.

(FIS) Conveners: Dr. Tokio Wada (Japan) & Dr. Anne B. Hollowed (U.S.A.)

Processes influencing recruitment variability of clupeoids have been studied throughout the last century. This long history of research provides unique time series from which hypotheses regarding processes underlying year class success of marine fish can be evaluated. This session will include studies of recruitment variability of clupeoid fishes

and mackerel (such as herring, sardine, anchovy and mackerel) including trend analysis, process analysis and modelling. Papers discussing comparisons of recruitment responses of species from different regions of the Pacific and the effect of physical processes on recruitment success or failure are encouraged.

5. Interdisciplinary methodology to better assess and predict the impact of pollutants on structure and function of marine ecosystems.

(MEQ) Convener: Prof. Makoto Shimizu (Japan)

Anthropogenic stressors to marine ecosystems include not only chemical contaminants but also excess nutrients, harmful algal blooms, exotic species, and causes of habitat destruction. These stressors are transported by atmospheric and oceanic circulation, in ballast waters etc. The MEQ session will focus on approaches to assessing and predicting the responses to such stressors of ecosystems in the ocean and in coastal and marginal seas.

Scientific sessions will include invited and contributed papers on these topics as well as contributed papers on other subjects of interest to the Committees. Contributed papers will be selected for oral or poster presentation.

PICES-GLOBEC Workshop

A PICES-GLOBEC Workshop will be held during 15-17 October 1994 in Nemuro, Japan, in conjunction with the PICES Third Annual Meeting. This Workshop is sponsored by PICES and the Japan Fisheries Agency, and hosted by the Japan Fisheries Agency. The tentative schedule of Workshop activities is shown below.

The main objective of this Workshop is to discuss and develop a Science Plan for a PICES-GLOBEC International Program on Climate Change and Carrying Capacity (CCCC). This new CCCC Program will focus on determining how changes in ocean conditions and ocean climate affect the productivity of key species in the North Pacific ecosystem and the carrying capacity for salmon and other high trophic level pelagic carnivores.

A draft Science Plan has been developed by the PICES-GLOBEC Workshop Steering Committee and is currently being widely circulated in the interna-

tional science community. All interested persons are invited to participate, both in the further development of this Science Plan prior to the PICES-GLOBEC Workshop, and in the open discussions and revision of the Science Plan which will occur during this Workshop. Copies of the draft Science Plan can be obtained from the PICES Secretariat.

Contributed papers for poster displays are invited from participants attending this PICES-GLOBEC Workshop. Several contributed papers will be selected by the Workshop Steering Committee for oral presentation. Additional contributed papers received by the PICES Secretariat by 31 August 1994 will be accepted for poster presentations at this Workshop, or for oral presentation at the PICES Third Annual Meeting.

If you plan to attend this Workshop please pre-register by sending to the PICES Secretariat the form which was included with the second announcement of the PICES Third Annual Meeting. Copies of the pre-registration form and additional detailed information (travel routes and arrangements, local accommodation, etc.) can be obtained from the PICES Secretariat. There is no registration fee for the PICES-GLOBEC '94 Workshop. The registration deadline is 31 August, 1994, which is the last day rooms at designated hotels in Nemuro, Japan will be guaranteed for Workshop participants.

Brent Hargreaves
Chair, Workshop Steering Committee
Pacific Biological Station
Nanaimo, British Columbia
Canada. V9R 5K6
Phone: 1-604-756-7035
Fax: 1-604-756-7053
Internet: hargreavesb@pbs.dfo.ca

Tentative Schedule for PICES-GLOBEC '94 Workshop

Saturday 15 October:
0800-0830 Registration
0830-0845 Welcome/Opening Addresses
0845-0900 Message from Host Agency (Japan Fisheries Agency)
0900-1000 Keynote Lectures
1000-1230 Summary of PICES-GLOBEC Science Plan

1230-1330 Contributed Papers presentations
1330-1730 Open Discussion of PICES-GLOBEC Science Plan
Evening: Workshop Reception (hosted by JFA)

Sunday 16 October:
0830-1030 Open discussion (continued)
1030-1230 Poster Session
1230-1330 Contributed Papers presentations
1330-1730 City of Nemuro Official Festivities

Monday 17 October:
0930-1030 Distribution of revised Science Plan
1030-1230 Summary of Science Plan revisions
1230-1330 Lunch
1330-1530 Open Discussion of revisions



PICES-STA (Science & Technology Agency of Japan) Monitoring Workshop

The PICES Science Board and the Science and Technology Agency of Japan are convening a Workshop on Monitoring Subarctic North Pacific Variability, to be held October 22-23, 1994, in Nemuro, Hokkaido, Japan, in conjunction with the PICES Third Annual Meeting.

The principal question that the Workshop will address is: What are the responses of the subarctic Pacific to forcing by climate variations and human activities? The time scales of interest are seasons to centuries.

The Workshop Objectives are to:

- A. Suggest current and future long-term monitoring programs to describe the significant forcing and responses;
- B. Suggest scientific, technological and other factors that affect the above monitoring programs; and

C. Summarize the Workshop and the Recommendations in a written report to PICES that advises on a strategy for developing a monitoring program, by 31 January 1995.

A preliminary report and recommendations are to be provided to the PICES Science Board at the conclusion of the Workshop.

The Workshop is not intended to discuss process studies or to review the science of the subarctic Pacific, but rather to focus on the long-term monitoring programs required for assessment of the physical and ecological responses to long-term forcing, both natural and man-made. It is expected that much of the monitoring might occur under the auspices of the Global Ocean Observing System and the Global Climate Observing system.

The Workshop is structured around two themes and several subthemes:

- * Subarctic Pacific Climate Variability
 - External forcing: Global Climate Change
 - Subarctic North Pacific
 - Ice-Covered Marginal Seas
 - Space and Time Scales: Sampling Problems:
- * Ecosystem Response (tentative)
 - Subarctic Large-Scale Variability
 - Lower Trophic Levels
 - Higher Trophic Levels

Each of the seven topics will address the outstanding uncertainties, the observational basis for current understanding, and any observational shortcomings for long-term monitoring. Invited speakers will present working papers for each of the seven topics. Contributions are encouraged for a poster session, to run concurrently during the meeting. Abstracts for contributions for the poster session should be sent to the PICES Secretariat, to arrive by September 15, 1994. All abstracts will be accepted if the contributed poster is on one of the seven Workshop topics and discusses long-term monitoring.

Questions may be addressed to the PICES Secretariat, or to any of the Workshop Steering Committee members.

PICES Secretariat
Institute of Ocean Sciences
P.O. Box 6000

Sidney, British Columbia, Canada V8L 4B2
Tel: 604-363-6366 Fax: 604-363-6827
Internet: pices@ios.bc.ca

Workshop Convener: Y.Hayashi, Science and Technology Agency, Japan

Steering Committee: Co-Chairmen
Y.Sugimori, Tokai University, Japan
Internet: sugimori@simizugw.cc.u-tokai.oc.jp
M.Briscoe, NOAA, USA
Internet: mbriscoe@noaa.gov

Members

W.Wooster, PICES
T.Royer, University of Alaska, USA
G.Stauffer, NOAA, USA
M.Fukasawa, Tokai University, Japan
S.Ishii, JAMSTEC, Japan
T.Yamagata, Tokyo University, Japan
J.Garrett, IOS, Canada
R.Wilson, MEDS, Canada
D.Q.Yang, IO, China

Observers

A.Bychkov, Pacific Oceanological Institute, Russia
V.Navrotsky, Pacific Oceanological Institute, Russia
H.D.Ahn, KORDI, Korea

SWIM IN NEMURO IN OCTOBER!!

We were told of a possible arrangement for PICES Third Annual Meeting participants to use the indoor swimming pool and facilities across the road from our venue for FREE!!! Bring your swimwear!!



Day and night, aloof, from the high towers
And terraces, the Earth and Ocean seem
To sleep in one another's arms, and dream
Of waves, flowers, clouds, woods, rocks, and all
that we
Read in their smiles, and call reality.

Mary Wollstonecraft Shelley (1797-1851)

Recent stock decline of Japanese sardine -Recruitment of poor year-classes in succession from 1988 to 1991-

Tokio Wada
Hokkaido National Fisheries Research Institute
116 Katsurakoi, Kushiro, Hokkaido 085, Japan*

*present affiliation:
National Research Institute of Fisheries Science
2-12-4 Fukuura
Kanazawa-ku, Yokohama
Japan 236
Internet: wadat@ss.nrifs.affrc.go.jp
Phone: 81-45-788-7603
Fax: 81-45-788-5001

Japanese sardine stock around Japan has recovered from mid-1970s and reached a peak in mid-1980s. However, due to poor recruitment from 1988 to 1991 year-classes, the stock has been declining rapidly. In this report, I will describe the process of this sharp stock decline of Japanese sardine on the Pacific coast of Japan.

Historically, the Japanese sardine has shown large stock fluctuation like the California sardine, and the sardine off Peru and Chile. In 20th century, there were two periods of high abundance in 1930s and 1980s. Figure 1 shows the annual sardine catch in Japan and the catch along the Pacific coast of Honshu and Hokkaido, which was a main sardine fishing ground in these two decades. In Japan, there is no special regulation for the sardine fishery, therefore, the catch trend reflects the stock fluctuation. The annual catch has increased from the later half of 1970s with the stock increase, and reached a peak of 449 million mt in 1988. Since then, the catch has declined sharply to about 200 million mt in 1992. This serious decline reflects the drop in catch along northern Pacific coast, and suggests that the abundance of sardines migrating into northern waters decreases first in the stock declining phase. In the southern Pacific coast, East China sea and Japan sea, the recent catch decline has been more moderate.

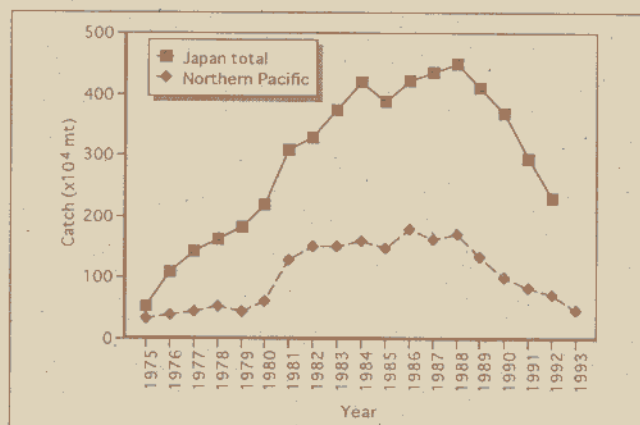


Figure 1. Annual catch of Japanese sardine in Japan and along the Pacific coast of northern Japan from 1975 to 1993.

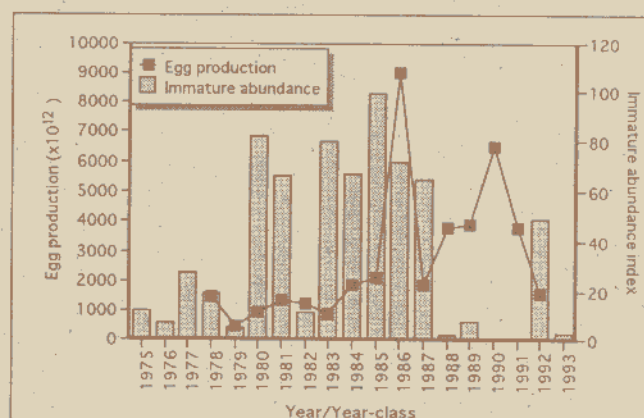


Figure 2. Annual egg production of sardine along the Pacific coast of Japan from 1978 to 1992, and abundance index of immature sardine along the Pacific coast of northern Honshu from 1975 to 1993.

The stock decline at the end of 1980s was caused by a recruitment failure from 1988 to 1991. This failure was more pronounced along the Pacific coast than other waters around Japan. Figure 2 shows the annual egg production along the Pacific coast (calculated by National Research Institute of Fisheries Science) and the stock abundance index of immature sardine along the Pacific coast of northern Honshu about one year after hatching (calculated by Chiba Prefectural Fisheries Experimental Station). This abundance index agrees with abundance of one year old sardine on the fishing grounds off Hok-

kaido, so we can use this as a index of year-class strength. From 1978 to 1985, the annual egg production along the Pacific coast was relatively stable from 853 to 2,081x10¹² eggs (ave. 1,272x10¹²). However, since 1986, egg production has widely fluctuated from 1,555 to 8,985x10¹² eggs (ave. 4,339x10¹²). On the other hand, the abundance index of immature sardine, which is expressed as a percentage of the 1985 value only fluctuated from 60 to 100 excluding an outlier of 11 in 1982. The immature abundance index has remained at a low level from 0 to 8 from 1988 to 1991, but recovered to 49 in 1992.

We can consider that the ratio of egg production to the immature abundance index is a measure of the reproduction rate. The time series of the immature abundance index was divided into four periods corresponding to the stock status; growing (1975-1979), high (1980-1987), declining (1988-1991), and low (1988-). Average values of the reproduction index in these periods are shown in Table 1. From 1980 to 1987, the average reproduction index was 4.6x10⁻²; the average reproduction index 1988 to 1991 declined sharply to 6.5x10⁻⁴ and indicated a serious recruitment failure. In 1992, the reproduction rate index recovered to 3.2x10⁻². However, the migration range of the 1992 year-class is smaller than previous year-classes before 1987. Consequently, its actual abundance is probably smaller than the relative size indicated by the abundance index of the immature stage. Therefore, the reproduction index must be smaller than the value in Table 1, and may be similar to the value of the year-classes produced in the 1970s.

Table 1. Average reproduction rate index of Japanese sardine along the Pacific coast by the periods corresponding to the stock status.

Period	Ave.	SD	Stock status
1978-1979	1.2 x 10 ⁻²	9.6 x 10 ⁻⁴	growing
1980-1987	4.6 x 10 ⁻²	3.0 x 10 ⁻²	high
1988-1991	6.5 x 10 ⁻⁴	8.4 x 10 ⁻⁴	declining
1992	3.2 x 10 ⁻²	--	low

This prolonged succession of poor year-class before the stock collapsed was also observed in 1930s. A similar phenomenon was also observed in the California sardine. At present, we can not explain why

the 1988 to 1991 year-classes in the Japanese sardine were poor. However, there are some hints. Figure 3 shows the relationship between annual egg production and abundance of prelarvae and postlarvae at 10 mm total length (PL10; after Kuroda 1991). Figure 4 shows the relationship between abundance of PL10 and the immature abundance index. Abundance of prelarvae and PL10 are positively correlated with egg production. In contrast, there is no relation between abundance of PL10 and immature abundance index. This result suggests that mortality from postlarvae to juvenile stage determines year-class strength in Japanese sardine.

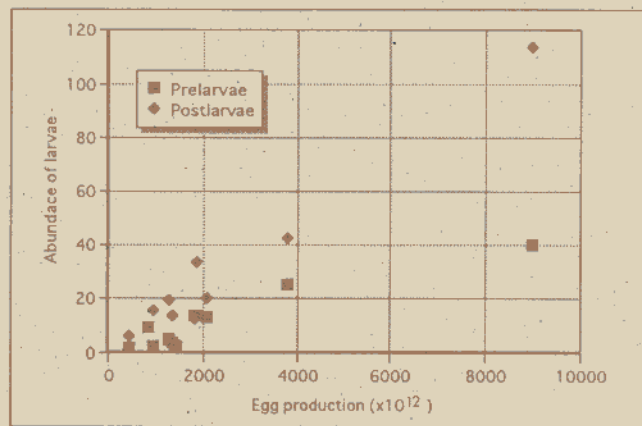


Figure 3. Relationships between annual egg production and abundance of sardine prelarvae and postlarvae at 10mm in total length (PL10) along the Pacific coast of Japan from 1978 to 1988.

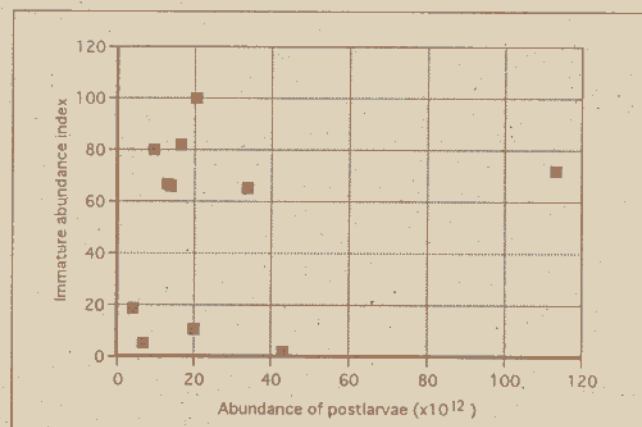


Figure 4. Relationship between abundance of PL10 and abundance index of immature from 1978 to 1988.

PICES has a working group for small pelagic fishes, Working Group 3; Dynamics of small pelagics in coastal ecosystems. One of the purposes of this working group is to identify the common factors controlling the population fluctuations of small pelagics in the eastern and western Pacific through comparative studies. One of the effective methods for comparative studies is a life table analysis. I expect that these comparative studies will be the first step in constructing a matrix model of the life cycle of small pelagics. When these models are finished, we must focus on elucidating the important causes of pelagic fish population fluctuations in the coastal ecosystems along the Pacific rim.

Recent work on life table analysis of California sardine using a matrix model suggests that survival in prelarvae and postlarvae stages is more effective in determining year-class strength than the survival rate in other life history stages. The results are slightly different between California and Japanese sardines. However, it appears in both populations that survival during the postlarvae stage is very important in determining sardine population fluctuations.

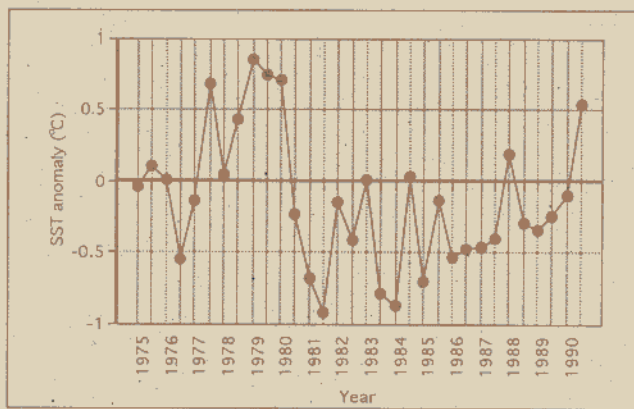


Figure 5. Semi-annual SST anomalies in the transition area (35° -40°N, 140°-150°E) from 1975 to 1990.

Warm streamers created by the Kuroshio Current transports sardine larvae into the transition area between the Kuroshio and Oyashio fronts. In this area the larvae grow from postlarvae to juveniles. The sea surface temperature (SST) anomaly of this area was mostly negative through the 1980s. However, from the beginning of 1990s, the anomaly has changed to plus (Figure 5). The negative anomaly period corresponds to the high abundance

period of sardine (Figure 1). Apparently, such oceanographic changes at decadal time scales influences sardine population fluctuations. However, there is no clear relation between the survival from the PL10 to immature and the SST anomaly. We have yet to discover what abiotic and biotic environmental changes cause the fluctuation of in mortality after PL10.

The Climate State of the North East Pacific in the First Half of 1994

Howard Freeland

Ocean Physics, Inst. of Ocean Sciences

P.O. Box 6000, Sidney

B.C., CANADA V8L 4B2

Omnet: IOS.BC

Internet: hjfree@ios.bc.ca

In my last article I described the development of the 1993 El Niño which surprised everyone concerned because it should not have happened in the first place. The tool that is best able to forecast upcoming El Niño events is a computer model developed, and run in an operational forecast mode, by Mark Cane of the Lamont-Doherty Earth Observatory. It has several successes to its credit, firstly it successfully predicted the 1986/87 El Niño. In 1990/91 the Cane model was successful in the sense that even when equatorial conditions developed to a point that it was widely believed that an un-predicted El Niño was under way, it still insisted that there would not be one. The oceanographers in this case were wrong, and the model was right. The third success occurred in 1991/92 as a major El Niño developed as forecast. Finally, the model failed to predict the 1992/93 El Niño. In fact, the pattern fits as hindcast experiments indicate that the model has about a 70% skill level.

Figures 1, 2 and 3 show the distribution of the sea-surface temperature anomaly for the N.E. Pacific in January, March and May of 1994. These show a pattern of anomalies that are highly characteristic of El Niño conditions in the N.E. Pacific. The pattern to look for is the warm band running along the coastal region of the Americas from the southern regions of the map, Baja California, around to the

Aleutian Islands. In the central Pacific we see a cold pool, i.e. temperatures slightly below normal that seems remarkably persistent. This does appear to be one of the persistent features of the El Niño in this part of the world.

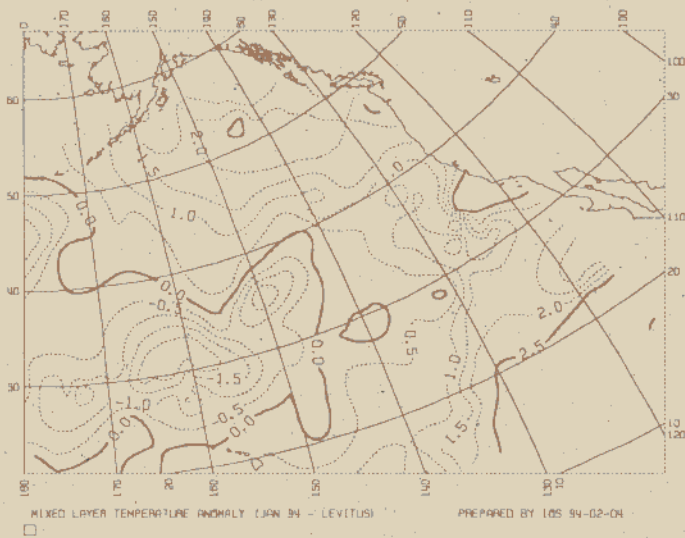


Figure 1. Distribution of sea-surface temperature anomaly for the N.E. Pacific in January of 1994.

Recent modelling studies by Jim O'Brien, at the Florida State University, using a coupled atmosphere and ocean model show clear evidence of oceanic signals travelling northwards in the form of trapped waves (Kelvin Waves) and raising temperatures at the coast as observed here. At lower latitudes the perturbation disappears quickly, but is persistent in the Alaska Gyre system. This is because the signal is lost physically by westward propagating oceanic Rossby Waves. The speed of these waves is determined by a parameter usually called β which is the rate of change the Coriolis parameter with distance north. This parameter is much larger in equatorial regions than at high latitudes, and this accounts for the slowness with which the waters of the Gulf of Alaska recover from an El Niño.

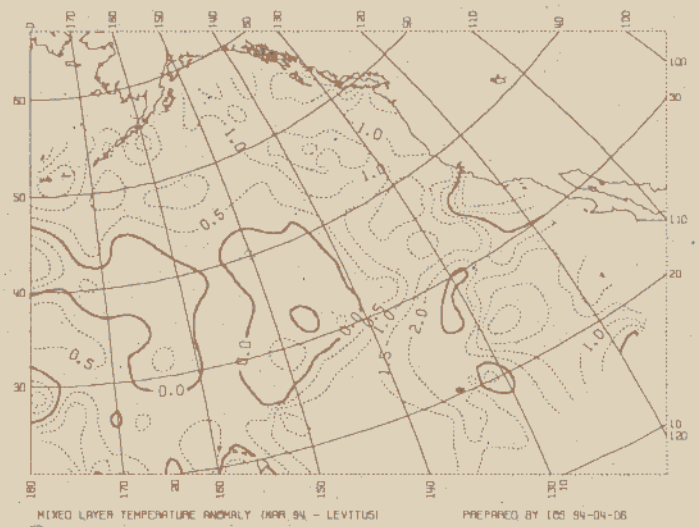


Figure 2. Distribution of sea-surface temperature anomaly for the N.E. Pacific in March of 1994.

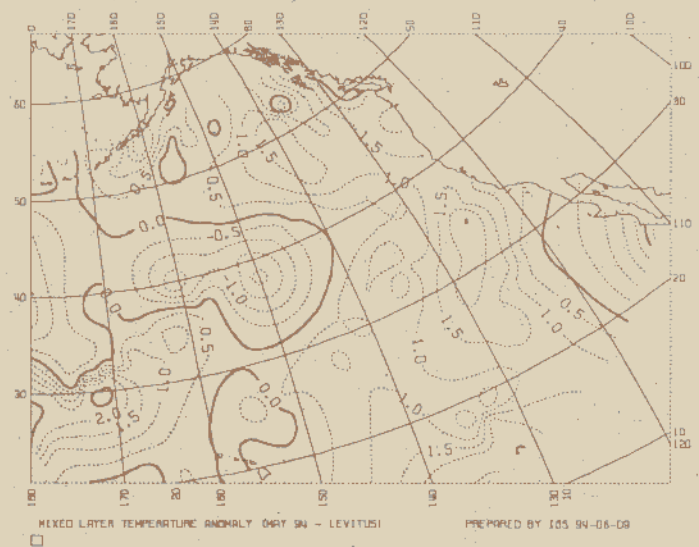
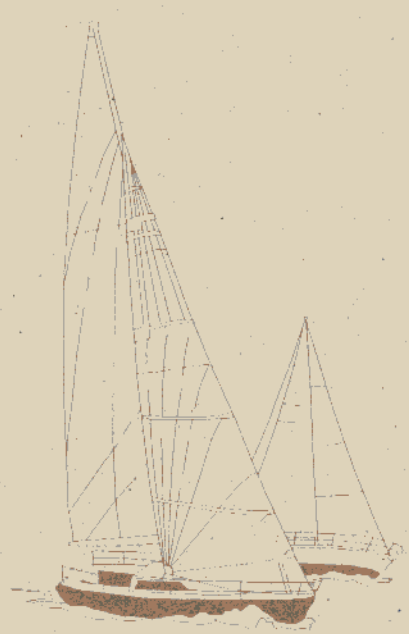


Figure 3. Distribution of sea-surface temperature anomaly for the N.E. Pacific in May of 1994.

So, where are we going from here? The Cane model predicts that conditions on the equator will remain near normal through the next 3 to 4 seasons, i.e. there will be no El Niño developing within the next 12 months. That represents the forecast limit of this model. However, I have received another forecast. The U.S. Dept. of Commerce releases a document put together by the NWS/NMC Climate Analysis Center titled, "Experimental Long-Lead Forecast Bulletin". At the back of this document is a short report by C.L. Keppenne and M. Ghil entitled "Singular

Spectrum Analysis followed by the maximum Entropy Method (SSA-MEM) to Predict the SOI to 1999." They compute a maximum entropy spectrum of the Southern Oscillation Index and use this to create a forecast. This suggests that the Southern Oscillation Index will steadily move away from the present "near El Niño" conditions and move towards an el viejo which will peak in November 1996. Thereafter, the Index will slowly move back towards weak El Niño conditions in 1999. The nature of this analysis precludes hindcasting to determine the level of skill, so this forecast should be watched for the sake of interest, but don't bet the family farm on it.

Finally I would like to make one comment on nomenclature. It is well known that a strong negative phase of the southern oscillation index is known as an "El Niño", but what should we call a strong positive phase. A term that has derived some popularity is "La Niña". This isn't a very good term. The Spanish "el niño" means "little boy" and spelled with capital letters means the famous little boy who arrived at Christmas, the Christ Child. So what does "La Niña" mean? The capitals make no sense as there was no christ girl. If we ignore the baggage that comes with capital letters we are left with the idea that in some sense little boys and little girls are opposites. Jim O'Brien has suggested that the positive phase should be called "el viejo", or, in English, the old man. I find that more satisfactory and it is the term that I used above.



Ship Schedule

At the Second Annual Meeting of PICES in Seattle the Governing Council agreed that the member states should provide a contact person in order for the Secretariat to circulate schedules of activities by member research ships in the North Pacific (Decision 93/A/1).

The following persons have been appointed as contact persons:

Canada:

Dr. John F. Garret, Director
Physical & Chemical Sciences
Institute of Ocean Sciences
P.O. Box 6000
Sidney, BC
Canada V8L 4B2
Phone: (1-604)363-6574
Fax: (1-604)363-6479
Email: IOS.BC

China:

Mr. Shu-Ping Chen, Project Officer
Bureau of Fisheries
Ministry of Agriculture
11 Nongzhanguan Nanli
Beijing
People's Republic of China, 100026
Phone: (86-1)500-3366 x2920
Fax: (86-1)500-2448

Japan:

Dr. Shin Tani, Deputy Director
Planning Division, Hydrographic
Department
Maritime Safety Agency
5-3-1 Tsukiji, Chuo-ku
Tokyo, Japan, 104
Phone: (81-3)3541-3813
Fax: (81-3)3545-2885
Email: T.MORI(Omnet)

USA:

Dr. Thomas C. Royer
Institute of Marine Sciences
University of Alaska

P.O. Box 757220
Room 200, O'Neil Bldg.
Fairbanks, AK, 99775-7220
USA
Phone: (1-907)474-7835
Fax: (1-907)474-7204
Email: royer@ims.alaska.edu

In the future please send your research ship schedules to the contact person of your country. He will send the information to the Secretariat, who will compile and circulate it to all the contact persons. If you would like to have the ship schedules mailed to you personally, please request us.

PICES Secretariat



Working Group Activities

WG2 (Development of Common Assessment Methodology for Marine Pollution) is scheduled to meet in Tokyo, Japan, on Oct. 13-14, 1994.

WG3 (Coastal Pelagic Fish) met in La Jolla, California, USA, on Aug. 3-5, 1994. The main topics discussed were as follows:

- GLOBEC Program
- CCCC Program
- Trophodynamic Model
- Inventory and comparisons of life table parameters
- Inventory of scientists
- Visiting PICES Scholar Program
- Airborne remote sensing of coastal pelagic fish

Participants:

John Butler, Ichiro Hara, Doug Hay, John Hunter (Co-chair), Larry Jacobson, Nancy C.H. Lo, Brenda

Norcross, Yasunori Sakurai, Naonobu Shiga, Paul Smith, Tokio Wada (Co-chair), Vidar Weststad

WG4 (Data Exchange) met in Seattle, USA, on June 20-22, 1994. The main topics discussed were as follows:

- The 1993 PICES Annual Report
- The status of the data inventory project
- State of databases at institutions in Vladivostok
- The role of the Secretariat in distributed and/or centralized data management
- PICES/GLOBEC + PICES/Monitoring
- U.S. GLOBEC/JGOFS Data Policy
- Vladivostok Workshop on the Okhotsk and adjacent seas
- Catch statistics - Database and data quality

Participants:

Lev N. Bocharov, William Karp, Sidney Levitus, Loh-Lee Low, Skip McKinnell (Chair), Motoyasu Miyata Igor D. Rostov, Sydney Stillwaugh, Robert Wilson.

A meeting is planned in Nemuro, on Oct. 18, 1994.

WG5 (Bering Sea) met in Seattle, USA, on July 14-15, 1994. The main topics discussed were:

- Inventory of data relating to the Bering Sea, and current monitoring of the Bering Sea
- Develop the Bering Sea Review monograph
- Planning for the 1995 PICES Symposium on the Bering Sea
- Synopsis on general productivity in the Bering Sea

Participants:

Vera Alexander, R.J. Beamish, Robert Francis, Sergei Gladyshev, Thomas Loughlin, Richard Methot, Kie-ichi Mito, Kiyotaka Ohtani, James Overland, Jake Rice, Al Tyler (Chair), Terry Whitley, Warren Wooster.

WG7 (Modelling of the Subarctic North Pacific Circulation) met in Vancouver, Canada, on June 22-24, 1994. The main topics discussed were:

- Reasons for subarctic circulation modelling
- Surface circulation, wind-driven gyre, marginal seas, Kuroshio/Oyashio, air-sea fluxes, inter-decadal variability, model types, success, problems
- NPIW formation and circulation salinity minimum

- Southern ocean bottom water, deep boundary currents
- Process modelling, marginal sea water mass formation, winter convection, dia-iso pycnal mixing
- Data requirements to improve models
- Knowledge of physical processes/marginal seas required to improve models
- Effect of incompleteness on other modelling efforts, climate, material exchanges (CO₂, freon) ecosystem
- Bibliography

Participants:

Kenneth Denman, Roland de Szoeko, Masahiro Endoh (Co-chair), Dale Heidvogel, Harley Hurlburt, Paul LeBlond (Co-chair), Motoyasu Miyata, Stephen Riser, Nobuo Suginozawa, Lynne Talley, Andrew Weaver, Ichiro Yasuda.

Meetings of Interest

The following is a sample of future meetings that might be of interest. Your help in making a more comprehensive list would be greatly appreciated.

1994

Aug. 21-25: American Fisheries Society Annual Meeting, Halifax, Nova Scotia, Canada

Aug. 21-27: International Association for Hydraulic Research: Symposium on Waves, Modelling and Scale Effects, Vancouver, British Columbia, Canada

Aug. 23-26: 12th International Symposium on Ice, Trondheim, Norway

Sept. 1-4: International Symposium on North Pacific: Hydrometeorology, Environment Protection and Geography, Vladivostok, Russia

Sept. 7-9: Marine Technology Society Conference and Exposition, Washington DC, USA

Sept. 12-15: Arctic Opportunities, Rovaniemi, Finland

Sept. 13-16: OCEANS '94 OSTATES, Brest, France

Sept. 15-16: NAFO Symposium on Impact of Anomalous Oceanographic Conditions at the Beginning of the 1990s in the Northwest Atlantic on the Distribution and Behavior of Marine Life

Sept. 19-20: Third Thematic Conference on Remote Sensing for Marine and Coastal Environments, Seattle, Washington, USA

Sept. 18-22: Workshop on Mass Balance of Arctic Glaciers, Wisla, Poland

Sept. 19-23: Hydroinformatics '94 Meeting, Delft, Netherlands

Sept. 20-23: Coastal Zone Canada '94, Halifax, Nova Scotia, Canada

Sept. 22-30: ICES Annual Meeting, St. John's, Newfoundland, Canada

Oct. 2-7: International Association for Water Pollution Res. and Control, Adelaide, Australia

Oct. 10-15: NPAFC 2nd Annual Meeting, Vladivostok, Russia

Oct. 10-14: International Symposium on the Assessment, Yield and Long-term Sustainability of Large Marine Ecosystems of the Pacific, Qingdao, China

Oct. 15-24: PICES 3rd Annual Meeting, Nemuro, Hokkaido, Japan

Oct. 17-21: SCOR Annual Meeting, Dunsmuir Lodge and IOS, Sidney, Canada

Oct. 23-28: International Conference on Coastal Engineering, Kobe, Hyogo, Japan

Oct. 25-27: CALCOFI Annual Meeting, Lake Tahoe, California, USA

Oct. 26-28: International Symposium on North Pacific Flatfish, Anchorage, Alaska, USA

Nov. 7-10: Dynamics of the Arctic Climate System, Gothenburg, Sweden

Nov. 7-12: IOC's International Conference on Marine Scientific Research and Integrated Coastal and Ocean Management for Sustainable Development, Lisbon, Portugal

Nov. 28-Dec. 1: International Symposium on Coastal Ocean Space Utilization COSU '94 for Sustainable Development, Buenos Aires, Argentina

Dec. 7-9: XVII Symposium on Polar Biology: Sea Ice Ecology, Tokyo, Japan

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Jan. 10-12: PSC Workshop on Hatchery Methodology, Pacific Salmon Commission, Seattle, Washington, USA

Feb. 6-10: IOC BORDOMER '95 Coastal Change, Bordeaux, France

Feb. 15: Canadian Hydrographic Symposium HYDROCOMM 95, Satellite will be used to broadcast the presentations simultaneously to Victoria, Vancouver, Calgary, Toronto, Ottawa, Montreal, Quebec, Rimouski, Fredericton, Halifax & St. John's, Canada, and Washington, DC, USA

March 6-10: North Pacific Symposium on Invertebrate Stock Assessment and Management, Nanaimo, British Columbia, Canada

May 17-19: West European Conference on Marine Technology, Copenhagen, Denmark

June 5-12: Pacific Science Congress, Beijing, China

July 2-7: Fifth International Polychaete Conference, Qingdao, China

Sept. 6-8: Symposium on the Role of Marine Mammals in the Ecosystem, Dartmouth, Nova Scotia, Canada

**The week of 16th, October (To be confirmed)
PICES 4th Annual Meeting**

Nov. 6-11: NPAFC 3rd Annual Meeting, Seattle, USA



Roll on, thou deep and dark blue Ocean ---- roll!
Then thousand fleets sweep over thee in vain;
Man marks the earth with ruin ---- his control
Stops with the shore.

George Gordon Byron (1788-1824)

Note From Editor

The editor would be pleased to receive any contributions that you may wish to make. Articles received will be published in the next edition of PICES PRESS

In the first edition of PICES PRESS it was indicated that quarterly editions would be produced. We now find this is too ambitious and we intend to reduce publication to semi-annual.

PICES PRESS

Published and produced by:

PICES Secretariat
c/o Institute of Ocean Sciences
P.O. Box 6000, Sidney,
B.C. Canada V8L 4B2
Phone: (1-604)-363-6366
Fax: (1-604)-363-6827
Omnet: PICES, SEC
Internet: pices@ios.bc.ca

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