

REPORT OF THE SECTION ON ECOLOGY OF HARMFUL ALGAL BLOOMS IN THE NORTH PACIFIC



The Section on *Ecology of harmful algal blooms in the North Pacific* (hereafter HAB-S) met from 08:30–17:30 hours on October 15, 2006, under the chairmanship of Drs. Hak-Gyoon Kim and Vera L. Trainer. The meeting was attended by 8 members from Canada, Japan, Korea, and the U.S.A. (*HAB-S Endnote 1*). While there were 5 observers from China, none from Russia attended the meeting. The proposed agenda for the meeting was reviewed and approved (*HAB-S Endnote 2*).

Scientific presentations (Agenda Item 3)

Presentations were given by several HAB-S members and observers (see *HAB-S Endnote 2*). Topics ranged from HAB monitoring to information on the development of new projects.

HAE-DAT database (Agenda Items 4 and 5)

Current status

Area codes have been finalized for all PICES member countries except for Canada, and its codes are being entered. In the summary of HAE-DAT since 2000, it is important to note that incomplete or missing data is not the same as no HABs present, which must be made clear on the website. Dr. Monica Lion and Mr. Benjamin Sims presented the new on-line version of the IOC/ICES/PICES database. National reports have been entered from the ICES area from 1987 to 2004 (1681 reports). At present, there are changes from the old form (10 questions) to the new form in a user-friendly format that now uses ISO country codes. PICES is the first group of countries to submit data in the new format.

Next steps

The new HAE-DAT system allows: (1) input of data by national representatives – an on-line

input form is ready for use; (2) one to view and search existing data on-line (90% done); and (3) to get maps (via a UMN map server). The development of the on-line system (<http://www.iode.org/haedat>) is currently being funded by NOAA/NOS/CSCOR. This system will be open for direct access of data and for comments within 1 month after PICES XV. Potential users will have about 2 months to comment before it is revised into its final format. PICES members have been asked to:

- join the HAE-DAT mailing list by getting a password/name;
- test the system to see what is wrong, and inform HAE-DAT staff;
- check the existing reports and correct them where necessary; and
- enter new records.

Suggested revisions by PICES members to HAE-DAT include:

- creating a general map of area codes in each country for reference, or a pop-up window with area codes (need a visual tool);
- using the depth of maximum cell or toxin concentrations;
- collaborating with NOWPAP (their bibliography of HAB references and their database);
- stating clearly on the website what each country is actually reporting and which areas are actually being monitored for HABs and for what species or toxin.

All PICES member countries were requested to:

- re-check their country monitoring descriptions to ensure they are correct and as comprehensive as possible;
- participate in a month trial period for suggestions and improvements to HAE-DAT (ICES members also will be contacted);
- input HAB event data to HAE-DAT for 2003 directly to the on-line database.

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The further development of HAE-DAT will also benefit from establishing links with MON-DAT (shellfish monitoring program, currently not very user friendly) and with HAB-MAP (to compile information on occurrence of toxic species from gray literature, websites and databases (thru ISSHA) to make maps).

Discussion focused on HAE-DAT effectiveness, possible modifications and future data efforts followed by a practical exercise on entering national HAB data for the year 2002 in the database.

National reports (Agenda Item 6)

Canada: No report.

China: In 2002, bi-weekly sampling was carried out in 19 red tide monitoring zones. 453 red tides occurred in China from 2001-2005, most frequently in June. These are discoloration of water events so economic losses are not necessary, but there appears to be a trend toward more HAB species in China in recent years. Most red tides are found in the East China Sea. Red tides are found in all months in the South China Sea (more species due to its tropical nature), most frequently in spring. There is an increasing trend of elevated N:P ratios (> 100 or more) in some places like the Pearl River estuary.

Japan: There are 7 HAE area divisions in Japan (area codes: JP-01 to JP-07). In 2002, a total of 301 events were reported, 32 with damage. Most of them occurred in Kyusyu (JP-05) which had 123 events and 19 with damage. In the Seto Inland Sea (JP-04), there were 89 events and 8 with damage. The major species of concern are *C. antique*, *C. marina*, *H. akashiwo*, *K. mikimotoi* and *H. circularisquama*. *C. polykrikoides* was found in JP-06 (San-in area) for the first time. The first attention to PSP in Japan occurred in 1978. It used to be found only in northern Japan, but now it is also occurred in southern Japan. There was a US \$60 million loss to the finfish aquaculture industry in 1972. This stimulated the introduction of the Seto Inland Sea Law in 1973 to curb eutrophication.

Japan reports red tides separately from PSP and DSP events.

Korea: An overview on recent East Asian regional cooperation efforts was provided, including:

- IOC/WESTPAC HAB workshops;
- PICES HAB Section activities;
- NOWPAP activities since 1994;
- EAST-HAB (Japan, Korea and China) since 2004;
- MOMAF(NFRDI)/NOAA workshop on *Cochlodinium* in May 2006

Russia: No report.

U.S.A.: The U.S. National HAB Office takes charge of all the reports to be submitted to HAE-DAT from the country. Agencies responsible for HAB incidence reporting on the U.S. West Coast are: Alaska Department of Fish and Game, Washington Department of Health, Oregon Department of Agriculture, and California Department of Health.

Planning for PICES XVI (Agenda Item 7)

Since 2005, the HAB Section has been holding an annual series of workshops to document the existing knowledge on the eco-physiology of harmful algal bloom species that impact all, or most, countries in the North Pacific. For PICES XVI, the Section recommends a 1-day MEQ workshop on “*Review of selected harmful algae in the PICES region: III. Heterosigma akashiwo and other harmful raphidophytes*”, co-convened by Drs. Ichiro Imai and Charles Trick (*HAB Endnote 3*). A product from the workshop will be a list of recommendations to help guide collaborative HAB research priorities in PICES countries over the next 5 years. The workshop will be preceded by a ½-day laboratory demonstration on *Heterosigma* cell and toxin detection. Drs. Trainer, Trick and Mr. Robin Brown have agreed to co-lead the demonstration. Travel funds are requested for 2 invited speakers to attend the workshop. The suggested experts are: Atsushi Ishimatsu and Tatsuya Oda (Nagasaki University, Japan), Theodore Smayda (University of Rhode Island,

U.S.A.), and Carmelo Tomas (University of North Carolina, U.S.A.)

The Section also proposes a 1-day MEQ Topic Session on “*The relative contributions of off-shore and in-shore sources to harmful algal bloom development and persistence in the PICES region*”, co-convened by Drs. Hao Guo and Trainer (HAB-S Endnote 4). Travel funds are requested for 1 invited speaker to attend the session. The suggested experts are: Barbara Hickey (University of Washington, U.S.A.), Andy Thomas (University of Maine, U.S.A.) and a *Cochlodinium* expert from the western Pacific.

A 1-day HAB-S meeting is recommended, which includes country reports for HAB events in 2005–2006 and discussion of HAE-DAT use. To strengthen and ensure the success of HAE-DAT, the Section requests stronger participation by a delegate from Russia and funding for this delegate, if needed.

Other business (Agenda Item 8)

The results of the annual HAB workshops on *Alexandrium* and *Pseudo-nitzschia* (2005) *Cochlodinium* and *Dinophysis* (2006), and *Heterosigma* (2007) are expected to be published as a PICES Scientific Report or other publication. The lead authors and sections of this publication will be outlined at PICES XVI.

HAB Endnote 1

Participation list

Members

William P. Cochlan (U.S.A.)
 Ichiro Imai (Japan)
 Shigeru Itakura (Japan)
 Hak-Gyoon Kim (Korea, Co-Chairman)
 Vera L. Trainer (U.S.A., Co-Chairman)
 Charles Trick (Canada)
 Yasunori Watanabe (Japan)
 Mark L. Wells (U.S.A.)

Observers

Robin M. Brown (Canada)
 Rongshuo Cai (China)

Hao Guo (China)
 Janice Lawrence (Canada)
 Xuezheng Lin (China)
 Monica Lion (Spain, IOC)
 Kazumi Matsuoka (Japan)
 Kazutaka Miryahara (Japan)
 Satoshi Nagai (Japan)
 Tatsuya Oda (Japan)
 Beatriz Reguera (Spain)
 Jack Rensel (U.S.A.)
 Theodore Smayda (U.S.A.)
 Jinhui Wang (China)
 John E. Stein (U.S.A.)
 Lijun Wang (China)
 Takafumi Yoshida (Japan)

HAB Endnote 2

HAB-S meeting agenda

1. Welcome, goals of HAB Section meeting
2. Approval of agenda
3. Scientific presentations:
 - “*The monitoring system on HABs in China*” by H. Guo
 - “*A regional U.S. west coast observing system for toxigenic Pseudo-nitzschia*” by V.L. Trainer, B. Hickey and M.G. Foreman
 - “*An international paralytic shellfish poisoning project*” by B. Wright
4. Progress in the development of an international collaborative harmful algal event database: The joint IOC/ICES/PICES HAE-DAT
5. Discussion and assistance in entering year 2002 data into HAE-DAT
6. National reports/HAE-DAT (year 2002)
7. Planning for PICES XVI
8. Other business

HAB Endnote 3

Proposal for a 1-day MEQ workshop and ½ day laboratory demonstration at PICES XVI on “Review of selected harmful algae in the PICES region: III. *Heterosigma akashiwo* and other harmful raphidophytes”

This workshop is the third of an annual series in which Harmful Algal Bloom (HAB) species that impact all or most countries in the North Pacific are discussed in detail. In 2007, we will focus on one species of raphidophytes, in particular, *Heterosigma akashiwo*. This species is distributed throughout the PICES region and has caused serious damage to finfish aquaculture, resulting in severe economic losses in PICES member countries. The integration of information from each country will advance our understanding of this organism. Topics will include modes of toxicity, distribution, impact

(differences between toxic and nontoxic strains), as well as physiology and ecology in each of the member countries. In particular, we would like to identify additional studies needed specifically to define *H. akashiwo*'s mode of toxicity. Comparison with similar raphidophytes, namely *Chattonella* and *Fibrocapsa*, will also be included. The workshop will be preceded by a half-day laboratory demonstration on *Heterosigma* cell and toxin detection.

Recommended convenors: Ichiro Imai (Japan) and Charles Trick (Canada).

HAB Endnote 4

Proposal for a 1-day MEQ Topic Session at PICES XVI on “The relative contributions of off-shore and in-shore sources to harmful algal bloom development and persistence in the PICES region”

There is increasing recognition that some harmful algal blooms (HABs) affecting coastal waters may not have local origins but are advected from offshore waters. This session will highlight recent advances in studying the processes involved in near-shore versus off-shore development and transport of harmful algal blooms in the coastal waters of the PICES region. Of particular interest are field studies where the relative importance of local versus

remote development of HABs has been assessed. The session convenors are soliciting papers describing known off-shore and near-shore initiation sites, seedbeds, and the physical factors that facilitate transport of HABs to coastal sites where they may impact fisheries.

Recommended convenors: Hao Guo (China) and Vera L. Trainer (U.S.A.).