REPORT OF ADVISORY PANEL ON MICRONEKTON SAMPLING INTER-CALIBRATION EXPERIMENT

A subset of the Advisory Panel on *Micronekton Sampling Inter-calibration Experiment* (hereafter MIE-AP) and several observers (*MIE-AP Endnote 1*) met on the evening of October 28, 2007, immediately after the BIO workshop on "*Lessons learned during MIE-1 and MIE-2: Reconciling acoustics and trawl data*". Details of this workshop (W1) can be found in the *Session Summaries* chapter of this Annual Report. Discussion topics of the MIE-AP meeting are listed in *MIE-AP Endnote 2*.

Developments in micronekton quantification (Agenda Item 1)

Models were developed to predict backscattering volume to allow for comparisons between acoustic data and the net data. The new system, J-QUEST, was shown to quantify the epipelagic micronekton and nekton but appeared to be inefficient in detecting the mesopelagic fishes, and myctophids in particular. The discussion revolved around the possibility of using a red light or another part of the light spectrum to which myctophids are less sensitive. Experimental trials indicated that myctophids were able to detect and avoid J-QUEST while it used red light.

After briefly reviewing current sampling gears, present information points to the Matsuda–Oozeki–Hu Trawl (MOHT) gear as being among the most reliable and cost effective micronekton gears to date. It provides high quality and quantity micronekton sampling. Dr. Hiroya Sugisaki reported that the development of a closing/opening mechanism is underway (trials are to be conducted within months). Equipping MOHT with the opening/closing mechanism on the codend could put this gear in the position to become a standard micronekton gear world-wide, and in the North Pacific, in particular.

Comparison between ICES and PICES inter-calibration experiments (Agenda Item 2)

After a brief review of both ICES and PICES micronekton inter-calibration experiments, the Panel concluded that it is generally impossible to undertake a comparison of these experiments due mainly to incomparable gears used for sampling, and because the ICES experiment concentrated on mesozooplankton in a fjord system in Norway.

Progress on acoustic data analyses (Agenda Item 3)

Acoustic data from the MIE-2 cruise (Oyashio waters off Japan, September 27–October 3, 2005) are mostly analyzed and reconciled with the trawl data. Acoustic data collected during the MIE-1 cruise (off the west side of Oahu Island, Hawaii, October 6–13, 2004) still require some work and cleaning. Data collected during the MIE-3 cruise (the eastern Bering Sea, September 18–27, 2007) have yet to be released by the U.S. colleagues who provided the vessel. The data will be analyzed jointly by Japanese and U.S. scientists.

Compatibility of acoustic and trawl data (Agenda Item 4)

Preliminary results indicate that the comparability of the trawl and acoustic estimates is low. This points to problems associated with both sampling techniques, which have been discussed. The closest results were obtained between MOHT and acoustics. MIE-AP felt that research to improve the acoustics estimates should be continued.

Overview of MIE-3 (Agenda Item 5)

The third micronekton inter-calibration experiment (MIE-3) was carried out onboard the

R/V *Oscar Dyson* in the eastern Bering Sea, from September 18–27, 2007. The ship was engaged in the BASIS (Bering-Aleutian Salmon International Surveys) program under NPAFC, (North Pacific Anadromous Fish Commission) operated by the Auke Bay Laboratory, NOAA/NMFS. Dr. Jim Murphy kindly donated the ship time for the micronekton experiment. This experiment was led by Dr. Orio Yamamura (Hokkaido National Fishery Research Institute, Japan). Other participants included: Drs. Hiroki Yasuma (Hokkaido University, Japan) and Andrey Suntsov (Northwest Fisheries Science Center, U.S.A.).

The sampling gears planned to be compared were the 1.8-m Isaacs–Kid mid-water trawl (IKMT), MOHT and Cantrawl 300/262 rope trawl. However, due to the limited time available for the experiment, only IKMT and MOHT were used. A comparison between IKMT and MOHT was essential because there are so much historical data collected with an IKMT. Aside from the sampling gears, backscattering data were recorded using a Simrad EK-60 echosounder with 15, 38, 70, 120 and 200 kHz transducers.

Due to rough seas, the ship time assigned for the experiment was reduced to 24 hours. Therefore, the nets were deployed at a 60-m depth station near St. Paul Island instead of near the shelf break of the eastern Bering Sea. The sampling was in a day/night sequential design, with different gears towed sequentially at each location, with triplicate samples collected during daylight and night at the same ship speed (3 knots).

The catch was exclusively dominated by age-0 walleye pollock (>99%), offering a good opportunity for gear comparison. The nets showed similar catchability during daytime (1.1 times larger for MOHT in density estimate), but MOHT showed significantly higher catchability in night sampling (2.8 times higher). In the comparison of body length frequency distribution, MOHT caught slightly larger fish than IKMT, suggesting net avoidance from the latter net.

The echo sounding data are yet to be released by the U.S. colleagues and will be analyzed jointly by Japanese and U.S. scientists.

Future activities (Agenda Item 6)

The members of MIE-AP felt that there will be no further inter-calibration experiments. It appears to be extremely difficult to obtain ship time, and the Panel expressed its gratitude to the member countries that donated the ship time to conduct three experiments. The participants also concluded that much of the data have been worked up at this point, and some encouraging results were obtained.

There was unanimous agreement for the suggestion that it was time to prepare the final MIE-AP report and to write related publications in the peer-reviewed literature. It was suggested that some travel funds should be requested to facilitate the data analysis. In particular, the identification of fish and crustaceans collected during the MIE-1 cruise should be completed before writing the final report. In this regard, MIE-AP requested PICES to cover travel expenses for Dr. Suntsov to come from the Northwest Fisheries Science Center (Newport, Oregon) to the University of British Columbia (Vancouver) for 7–10 days to assist with fish identification. Furthermore, the MIE-3 cruise data need to be worked up.

Realistically, an advanced report on the MIE-AP activities could be available at the next PICES Annual Meeting in Dalian, China. Most of the work has been divided between groups of experts, and MIE-AP Co-Chairmen were charged with the task of overseeing the progress. To facilitate the development of the final report, MIE-AP requested financial support for one of Co-Chairmen (Dr. Evgeny Pakhomov) to travel to Dalian.

Below is a preliminary draft of the MIE-AP final report structure (the names listed in parentheses are responsible for writing each section):

1. Introduction, background, major idea of micronekton inter-calibration experiments (Brodeur, Pakhomov, Yamamura)

2. MIE-1
   - Description of the experiment
   - Composition and diversity indices of the samples: crustaceans (Pakhomov, Brodeur), fish (Suntsov), squid (Seki)
   - Abundance and (biomass) of the micronekton
   - Size structure (Pakhomov)
   - Acoustic data (Domokos)
   - Inter-comparison between gears and between gears and acoustics (All, lead: Pakhomov, Domokos)
3. MIE-2
   - Description of the experiment
   - Composition and diversity indices of the samples: crustaceans (Yamamura), fish (Yamamura), squid (Yamamura)
   - Abundance and (biomass) of the micronekton
   - Size structure (Yamamura)
   - Acoustic data (Yasuma)
   - Inter-comparison between gears and between gears and acoustics (lead: Yamamura)
4. MIE-3
   - Description of the experiment
   - Composition and diversity indices of the samples: crustaceans (Yamamura), fish (Suntsov, Yamamura), squid (Yamamura)
   - Abundance and (biomass) of the micronekton (Yamamura)
   - Size structure (Yamamura, Suntsov)
   - Acoustic data (Yasuma)
   - Inter-comparison between gears and between gears and acoustics (lead: Yamamura)
5. General conclusions and recommendations.

MIE-AP Endnote 1

Participation list

Members

Richard D. Brodeur (U.S.A.)
Kazushi Miyashita (Japan)
Evgeny A. Pakhomov (Canada, Co-Chairman)
Orio Yamamura (Japan, Co-Chairman)

Observers

Seok-Gwan Choi (Korea)
Reka Domokos (U.S.A.)
Yasuzumi Fujimori (Japan)
Hideki Hamaoka (Japan)
Julian A. (Tony) Koslow (U.S.A.)
Todd W. Miller (U.S.A.)
A. Jason Phillips (U.S.A.)
Hiroaki Saito (Japan)
Hiroya Sugisaki (Japan)
Andrei V. Suntsov (U.S.A.)
Hiroki Yasuma (Japan)

MIE-AP Endnote 2

MIE-AP meeting agenda

1. New developments in the field of micronekton quantification: Could acoustics be the way forward?
2. Is it possible to undertake a comparison between ICES and PICES inter-calibration experiments?
3. How far are we in the acoustic data set analyses?
4. Compatibility of acoustic and trawl data: Caveats, problems and solutions
5. Lessons from the MIE-3 cruise
6. An inter-sessional workshop to look at the data from 3 inter-calibration experiments and to discuss drafting of the MIE-AP report (schedule, contents and allotment of writers)