

## Theme Session D – Comparative marine ecosystem structure and function: descriptors and characteristics

**Convenors: Bernard A. Megrey (USA), Jason S Link (USA), Webjørn Melle (Norway), and Ian Perry (Canada)**

### Summary

This session was split between two days. From 8:30–13:00 on 19 September 2007 and from 10:00–12:30, 20 September 2007. A total of 22 oral presentations were made and 7 poster presentations were made. Posters were integrated into the oral session using a short poster presentation by one of the convenors. An agenda can be found in the Appendix. The session was co-sponsored by PICES, and travel expenses for some participants were supported by the Research Council of Norway and PICES.

The ecosystems compared were very diverse in their geographic scope. System comparisons were made for the eastern Bering Sea, Gulf of Alaska, Georges Bank, Gulf of Maine, Norwegian Sea, Barents Sea, Mediterranean Sea, British Columbia coast (Canada), the North and South Gulf of St. Lawrence, Scotian Shelf, and Newfoundland Shelf of Atlantic Canada, the East (Japan) Sea, Yellow Sea and East China Sea of South Korea, North Sea, Bay of Biscay, Gulf of St. Lawrence and Soerfjord Norway, Southern New England, Adriatic Sea, Irish Sea, Northern and Southern Bengula, Celtic Sea, Bay of Biscay, Tyrrhenian Sea, Aegean Sea, Vistula Lagoon, Gulf of Finland and Baltic Sea.

The recent Research Council of Norway program MENU (Marine Ecosystems of Norway and the US) contributed 9 papers to the overall symposia.

The session was very well attended and often approximately 140 people were present in the audience.

Common structures and functioning of marine ecosystems were identified throughout the presentations in the session. Common responses of marine ecosystems to human and climate induced pressures were also identified. It was clear that the influence of fishing and climate on marine ecosystems are both prominent; ascertaining the relative importance of both as they continue to influence marine ecosystems merits continued examination.

**Publication Plans:** Plans are underway to publish a set of papers from the session in a dedicated issue of Progress in Oceanography.

**Discussion:** Following the presentations a lively discussion period took place where several general observations were made and many provocative questions were posed.

### General Observations

- It appears as though deeper ocean systems are more strongly influenced by bottom-up forcing, while shelf systems are more strongly influenced by top-down forcing (probably including fisheries).
- In many examples, it appears as if fisheries landings have shifted in emphasis from groundfish to pelagic and/or invertebrate species.
- In some shelf systems, it appears that recent changes in the fish community have shifted from demersal to pelagic dominated groups.

### Questions

- What is the value, if there is value, in marine ecosystem comparisons?
- How do fisheries and climate interact to influence an ecosystem?
- Both top-down and bottom up processes impact all marine ecosystems. How can we tease apart their relative importance?

- Have there been synchronous events around the world's oceans?
- How can we tell if there have been concurrent and/or contiguous regime shifts?
- Do community organizational rules change with regime shifts?

Several presentations used network (e.g. ECOPATH type) models to structure comparisons of food web properties among different regions. In discussion, it was recognized that these models do not incorporate many features such as changes in behavioral characteristics of fish (as might occur if the age-distribution of the spawning stock were reduced by fishing), fronts, vertical stratification, etc. Discussion concluded that understanding the effects of these features and processes on food webs, how they may vary in time, and how they might be incorporated into such network models should be a high priority for research.

#### **Other Ecosystem Comparison Opportunities**

On 20–28 October 2008, in Yokohama, Japan, a similar session titled **Material Cycling in Aquatic Ecosystems Linking Climate Change and Fisheries will be held at the 5<sup>th</sup> World Fisheries Congress in Yokohama Japan**. Conveners are Akihiko Yatsu, Kazuhiro Kogure, Kimio Fukami, Hiroaki Saito and Bernard A. Megrey. A sub-theme is this session, **Ecosystem structure and food-web dynamics, will be convened by** Bernard A. Megrey (USA), Jason S. Link (USA), Chang Ik Zhang (Korea). The abstract deadline is 29 February 2008

On 2–7 March 2008, the Ocean Sciences Meeting will take place in Orlando, Florida. A session at this meeting, called **Comparing Aquatic Ecosystems will be held and the Organizers are** Jason S. Link, NOAA/NMFS/NEFSC, Anna-Stiina Heiskanen, European Commission DG Joint Research Centre, Bernard A. Megrey, NOAA/NMFS/AFSC and Angel Borja, AZTI–Tecnalia Marine Research Division. The abstract deadline is 02 October 2007

#### **Conclusions**

The attendance and frequent follow-up questions outside the session and meeting venue provide good evidence that the topic of session D was of high and keen interest to ICES participants and delegates. Further validation of our observations and examination of the questions posed are warranted. We propose that, because developments are taking place so rapidly, ICES consider holding a similar session in 2 years time so that the ICES community can have the opportunity to keep abreast of this important research area.