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NEWSLETTER

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President's greeting

The ICES Annual Science Conference and 89th Statutory Meeting took place in Oslo from 23 September to 3 October 2001. Both events were very successful thanks to the hard work and generous hospitality of our Norwegian hosts, high quality presentations during the conference, and the dedicated labours of the ICES Secretariat.

The Statutory Meeting is where the activities for the following year are agreed, budgets are adopted and officers are elected. During the course of the meeting, the Council (that means the national Delegates of ICES) adopted the final draft of the Strategic Plan. This is a major document, which establishes clear goals for ICES in the service of science and society. Beyond the vision of "an international scientific community that is relevant, responsive, sound, and credible, concerning marine ecosystems and their relation to humanity", our mission is "to advance the scientific capacity to give advice on human activities affecting, and affected by, marine ecosystems". The Strategic Plan can be accessed on the ICES website (www.ices.dk/hl/ices_news.htm) and it will be widely circulated in the two official languages of ICES, English and French.

Council also endorsed another forward-looking document, the report of the Bureau Working Group on International Programmes. Chaired by former President Scott Parsons, this Working Group made a number of recommendations concerning what I might term "ICES foreign policy". As an intergovernmental body, ICES has many active working relationships with similar organisations throughout the world and we have established formal relationships—through Memoranda of Understanding—with several scientific and regulatory agencies and commissions (for example FAO, IOC, NASCO, OSPAR, HELCOM, EC, to name just some of them). We also have informal working links with many other international scientific organisations. The Bureau Working Group pointed out that some of the formal relationships could be revitalised, while several of the informal connections deserve to be invigorated and possibly upgraded to a more formal status. The report of the Bureau Working Group on International Programmes is available on CD-ROM as Document CM 2001/Del:12 and can be ordered from info@ices.dk

ICES can accomplish more through collaboration than it can alone, as we emphasise in our newly adopted Strategic Plan. I am particularly glad, therefore, to draw attention to these policy decisions from the 2001 Statutory Meeting

I wish you all every success and happiness in the coming year.

Pentti Mälkki
ICES President.

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541 Tryksag 016

ICES
Palægade 2-4
DK- 1261 Copenhagen K
Denmark

telephone
+45 / 3315 4225
telefax
+45 / 3393 4215

www.ices.dk

Editor: Neil Fletcher

Graphic design:
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Comparing the North Sea with the Caribbean?

There is widespread agreement that modern fisheries management needs to work with the marine ecosystem as a whole, rather than focusing only on species of commercial interest.

We have tried to improve our understanding of Large Marine Ecosystems (LMEs) by comparing the number of fish, birds, marine mammals, and cephalopods at each level in the food chain (or trophic level) in five different LMEs.

Large Marine Ecosystems are distinct marine areas such as the Baltic Sea or North Sea and for the study we chose the following:

- The Baltic and the Black Sea—as presumably similar brackish, temperate, and species-poor ecosystems.
- The Caribbean and the South China Sea—as examples of tropical, species-rich ecosystems.
- The North Sea—as an example of an intermediate ecosystem in the sense that it is marine, temperate, and more species-rich than the Baltic or the Black Sea.

Calculating the number of species at each level in the food chain enabled us to produce a foodweb "signature" for each group of animals. The position of each species in the food chain was worked out using either diet composition data or from reported food items using a Monte-Carlo routine (statistical simulation technique) to estimate the trophic level. If food information was not available for a given species, the average trophic level of other species in the same genus or family was assumed. Diet, food, and trophic-level data for fish can be seen in Fish-Base (www.fishbase.org).

What is a trophic level?

The trophic level indicates where the organism is in the foodweb. Primary producers such as seaweed, and other photosynthetic organisms are on the first trophic level. Organisms that consume the primary producers belong to the second trophic level; organisms that eat second trophic level organisms are considered to be third trophic level and so on. Each trophic level has approximately 10 times less biomass than the trophic level directly below it. This means that there are more fish at lower trophic levels than higher ones. However, lower trophic level fish tend to be smaller. At the top of the marine food web, i.e. trophic level 5, are predators such as killer whales and sharks.

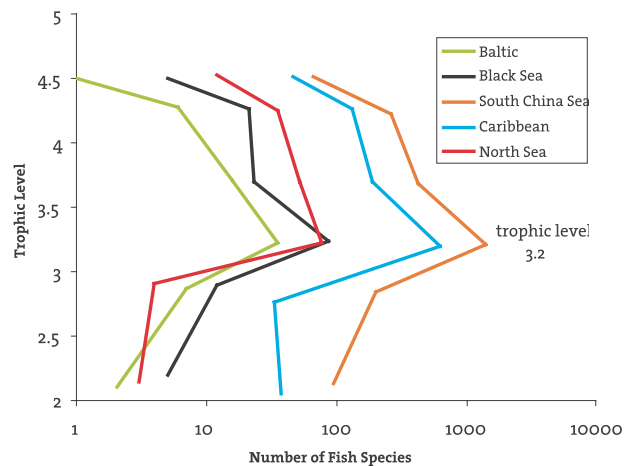


Figure 1. Foodweb signatures of fishes in five Large Marine Ecosystems. Note that all signatures have similar shapes and a maximum around trophic level 3.2.

This shows the number of fish species at each level in the food chain in the Baltic, the Black Sea, the North Sea, the Caribbean and the South China Sea, with total number of species increasing in this sequence. Despite the considerable difference between these ecosystems in terms of salinity, size, temperature, and species numbers, the signatures are strikingly similar: in all ecosystems fishes cover the whole range of levels in the food chain, from herbivores near 2.0 to top predators at above 4.5.

Highest species numbers are always present around the level 3.2, i.e., which is where first-level predators are feeding mainly on herbivorous organisms.

The signatures of the brackish, species-poor Baltic and Black Sea are more similar to each other than to the marine, more species-rich North Sea. The North Sea has more top predators and fewer lower-level species, thus resembling more the structure of the tropical systems.

The Caribbean signature is the only one where the lower leg is bent to the right, indicating a relatively higher number of herbivorous fishes than in the other systems.



By Rainer Froese, Uwe Piatkowski, Stefan Garthe, and Daniel Pauly

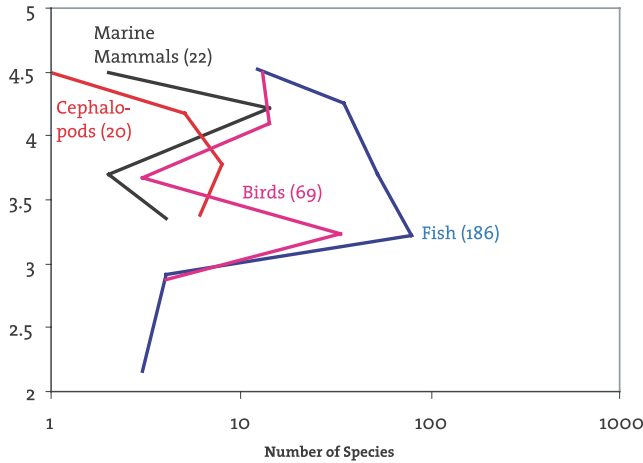


Figure 2. Number of species at each level in the food chain: for four groups of organisms in the North Sea.

This shows a comparison of the foodweb signatures of cephalopods, marine mammals, birds, and fish in the North Sea. Only birds and fish species occupy all levels of the food chain. At the higher levels, birds and fish provide similar numbers of top predators, but birds have strikingly few species of second-order predators at levels between 3.5 and 4.0, a result that needs confirmation from other ecosystems.

Cephalopods and marine mammals are restricted to the higher levels of the food chain between 3 and 5. The peak at 4.2 for marine mammals confirms their role as top predators in the North Sea. Fish clearly contribute the highest number of species above trophic level 3.

In conclusion, trophic signatures appear to be a useful tool for better understanding of the role different groups of organisms play in different ecosystems. The nearly exclusive domination of higher trophic levels by vertebrates and lower trophic levels by invertebrates is nicely shown by this approach. Trophic signatures represent long-term characteristics of ecosystems and thus cannot be used directly for year-to-year management purposes. However, we believe that they can be used to create a classification of Large Marine Ecosystems, which could then form a basis for applying similar management regimes in similar ecosystems. We are looking for partners to improve the data on the lower trophic levels, including using other methods such as isotope ratios.

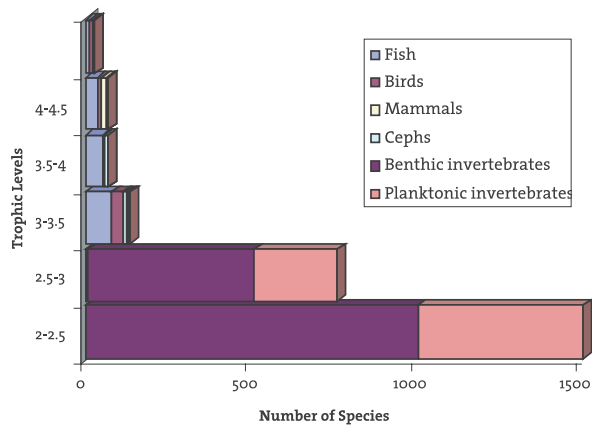


Figure 3. Numbers of North Sea species per trophic level. About 1500 benthic invertebrates and 1000 planktonic invertebrates are assumed, with most being mainly herbivores, fewer being omnivores, and very few being first-level predators.

This chart shows the total species numbers at each trophic level for the North Sea, resulting in the typical pyramid structure that is well known from biomass studies. Looking at the chart from an evolutionary perspective it becomes evident that the four groups (fish, birds, marine mammals, cephalopods) that together dominate the upper levels of the food chain are absent or exceptions at the lower trophic levels (< 3), which are dominated by large numbers of invertebrate species.

For more information on Large Marine Ecosystems please see www.edc.uri.edu/lme/data.htm or contact:

R. Froese or U. Piatkowski
 Institut für Meereskunde Universität Kiel,
 Düsternbrooker Weg 20
 24105 Kiel,
 Germany
 Tel: +49 431 600 4579
 E-mail:
rfroese@ifm.uni-kiel.de or upiatkowski@ifm.uni-kiel.de