

## **DRAFT Theme Session F – What plankton are fish really eating? Species and diets, availability and dependency**

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An ecosystem approach to fisheries management requires understanding of the trophic linkages in the ecosystem. Despite very many studies and a widespread literature, uncertainties remain associated with estimating the transfer of secondary production to fish (or other) predators. Recently, climate change has been shown to strongly influence long-term trends, species composition, and distribution of dominating zooplankton species. To evaluate the importance of changes in the food supply on fish population dynamic processes, e.g. growth and recruitment, reliable information on their feeding ecology is required. This information is further important for reliably parameterizing ecosystem models. The Theme Session aimed at summarizing earlier as well as encouraging new studies on trends and dependencies in the diet of fish species at all stages of the life-cycle. We especially invited contributions which relate trends in feeding ecology to the ambient food supply, i.e. composition and size of the zooplankton community.

A first set of papers (F:05, F:15, F:02, F:03) dealt with feeding ecology of especially herring larvae in the Baltic Sea. Studies presented showed differences in the quality of different copepod species as food for herring, the importance of the hydrographic environment for zooplankton-fish interactions, differences in feeding strategies of herring and perch larvae as well as bottom-up and density-dependent effects on herring larval growth and survival.

A next part of the Theme Session comprised studies from the Barents Sea (F:06, F:04), the North Sea (F:07, F:13) and the Irish Sea (F:14, F:16). Both Barents Sea 0-group herring and capelin seem to rely to a large degree on the availability of the copepod *Calanus* spp. Also Irish Sea cod and whiting were dependent on *Calanus* abundance, while haddock had a considerably different diet composition at a comparable developmental stage. The difference in the prey size selection strategy of haddock compared to cod and whiting continues through metamorphosis and is maintained into the juvenile stage, a mechanism which may reduce interspecific competition for food between these closely related gadoid species. In contrast, larvae of whiting and cod in a North Sea frontal region showed different diets with cod selecting the copepod *Pseudocalanus* spp. and whiting having a broader diet. A study on spatial variability in the diet of North Sea fishes, demonstrated that differences in diet are potentially due to local differences in food availability even on a small spatial scale.

The final part of the session comprised studies of the feeding ecology of a variety of species from different areas of the world ocean. Post-smolts of Northeastern Atlantic salmon are demonstrated to rely to a large degree on herring (F:10). Atlantic mackerel in the Norwegian Sea feed mainly on *Calanus finmarchicus* and *Limacina retroversa*, while herring prey mainly on euphausiids and amphipods, which is explainable by different water masses occupied (F:12). An investigation on the Iberian sardine demonstrated the importance on the diet of copepods and fish eggs (F:17). The numerical dominance of dinoflagellates and chain-diatoms in bloom areas however suggests alternate feeding modes. Mesopelagic fish and anchovy of the Kuroshio-Oyashio Transition Zone of the western North Pacific were found to display different feeding niches thus avoiding competition (F:11). A modelling study on the planktonic food web of the Bay of Biscay demonstrated finally that pelagic fish populations were not food limited (F:09).

In summary, the session provided a broad range of studies addressing feeding and trophic ecology for various species and areas. A major result of these studies is, that there is pronounced variability in diets and thus in the linkages in food webs. This is a result of high spatio-temporal variability in the prey populations relative to the occurrence of the predators, often mediated by the hydrographic environment. Evaluating the importance of changes in the

food supply on fish population dynamic processes, e.g. growth and recruitment, needs therefore studies on appropriate spatio-temporal scales and cannot be based on anecdotal information. Hence, the session emphasized the importance of a continuation of feeding ecology studies.