

Theme Session E – Marine Biodiversity: A fish and Fisheries perspective

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Marine biodiversity (with the term biodiversity representing habitat, species and genetic diversity) fluctuates in space and time, and can be affected by many factors, including climate, fishing impacts or invasion of non-native species. The Parties to the Convention on Biological Diversity (CBD) have committed to “*achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level*”, and hopefully this theme session on biodiversity was a timely reminder to the ICES community.

The theme session originated from studies being undertaken under the EU Network of Excellence on Marine Biodiversity and Ecosystem Functioning (MarBEF; www.marbef.org) (E:25). This network has more than 50 marine and fisheries institutes as partners, with 18 fisheries institutes and universities focusing on issues concerning fish biodiversity, with many of the partners also active in various ICES Working and Study Groups.

Overall, theme session E hosted 25 oral and 7 posters presentations, with contributions from 15 nations. There were talks on various aspects of diversity, including genetic (E:16), functional (E:19) and habitat diversity (E:18), as well as the diversity within feeding guilds (E:01) and size-spectra (E:21). These talks covered offshore as well as coastal and estuarine fish assemblages, and although most of these discussed adult fish stages, there were welcomed contributions on ichthyoplankton (E:24) as well. The talks addressed a variety of the factors affecting ‘diversity’, such as climate change, impacts of non-native fish species, and several talks focused on ‘fisheries-induced change’. There were also contributions on the survivorship of net-caught fish (E:22) and on discard survivorship (E:13), and clearly such studies are needed to better inform managers about the efficacy of various management measures.

Although many early ecologists studying diversity looked at marine systems, today marine scientists are to some degree trying to catch up with the progress that has been made in terrestrial ecosystems. With CBD and other policy drivers (e.g. OSPAR) now firmly on the agenda, marine scientists and managers need to have objectives for conserving marine biodiversity, which as noted above encompasses a variety of issues. Additionally, we have to be able to measure the resilience, functionality or other properties of biodiversity/ecosystem service, and to understand how anthropogenic pressures affect such properties, in order to identify what rates of impact are sustainable (E:07).

In terms of mostly climate change, long-term ichthyoplankton surveys in the Baltic Sea (E:08, E:14) have shown a general decline in several of the cold-water taxa (e.g. butterfish and cottids). Other changes in relation to climate have been seen in adult fish populations (E:06, E:11), with red mullet increasing in abundance in the Belt Sea/Kattegat and recent vagrants including swordfish and gilthead sea bream. Predicted climate change scenarios in the Baltic Sea may lead to warmer, less saline, and oxygen poor conditions, which will have implications for several of the commercially-important fish in the area.

In addition to climate change, fishing impact is one of the key factors affecting marine diversity. Size selective harvesting of target species not only reduces their density, but can also affect their genetic diversity. In recent years, more and more has been said about fisheries-induced changes, such as changes in growth strategy and earlier maturation. Clarifying whether such changes are phenotypic, which may also be partly influenced by environmental drivers, or are a result of evolutionary change is an area of increasing interest (see E:04, E:17, E:23).

One presentation (E:05) and one poster (E:30) discussed the invasion of the Baltic Sea by round goby *Apollonia melanostomus*, with this species seeming to have a high plasticity in various life-history traits in relation to habitat type, which may have facilitated its establishment outside its native range. The wider implications on the establishment of round goby and other non-native species, such as the American comb jelly *Mnemiopsis leidyi*, on the structure, functioning and diversity of the Baltic will be better understood in the coming years.

Although many talks examined the traditional elements of species diversity, a framework for examining functional diversity was also presented (E:19). Analyses of functional traits, although well established in freshwater ecosystems, have not been widely used in marine systems. To some extent progress in this field has been restricted by the lack of some basic biological knowledge for many non-target fish and invertebrates.

In terms of long-term change, human society can sometimes have a short memory, and scientists can restrict their data collation and literature searches to what is available electronically for the recent decades. Hence, it was wonderful to see talks that have used variety of sources of historical information. Given the concern as to whether increases or decreases in certain fish stocks are symptoms of climate change, and whether or not such events are new, as well as many parts of the scientific community trying to identify what baseline conditions for the unexploited ecosystem were like, such historical information is invaluable. Archaeological sites across Europe can yield fish bones from human settlements, indicating which species were locally abundant (or traded, depending on the time period). Even 7 000–3 900 BC, the north coast of Denmark was subject to “warm conditions”, and although flatfish and gadoids (including cod) dominated, there is evidence of seabass, anchovy, swordfish and black sea breams all being important food species (E:03). Another talk gave a fascinating narrative of tuna in the North Sea (E:12), and highlighted that, with scholarly research, a diverse array of qualitative and quantitative data can be collated from a wide variety of sources which provides for a much more complete picture of long-term change.

Overall, the various talks covered many aspects of marine biodiversity, such as the importance of fully understanding the implications of changes in hydrography and climate, fisheries and invasion of alien species on the diversity (and structure and function) of several marine ecosystems. Globally, there is a commitment to reduce biodiversity loss and the ICES community is well placed to provide advice on many facets of this. In terms of commercial fish, these species lend themselves to ongoing and future studies on genetic diversity, with non-target fish most often included within studies of the wider fish community (including species diversity, as well as in terms of the size spectra and functionality of the fish assemblages). The majority of papers originated from study areas with a well-documented ichthyofauna, but we should not overlook the fact that taxonomic studies for fish and other marine taxa are still vitally important if we are to fully appreciate and understand biodiversity. Furthermore, the role of habitat in structuring fish communities and supporting biodiversity still needs to be better understood in many offshore areas.

The conveners reiterate their thanks to the many participants in the session for either their oral and poster contributions, or their active and stimulating discussions.