

Technical University of Denmark



## **A holistic ecosystem approach for marine management and conservation: Opportunities through the application of genetic and genomic approaches**

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*Publication date:*  
2015

*Document Version*  
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

*Citation (APA):*  
Martinsohn, J. T., Volckaert, F., & Bekkevold, D. (2015). A holistic ecosystem approach for marine management and conservation: Opportunities through the application of genetic and genomic approaches. Paper presented at ICES Annual Science Conference 2015, Copenhagen, Denmark.

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## Theme session I

### A holistic ecosystem approach for marine management and conservation: Opportunities through the application of genetic and genomic approaches

Conveners: Jann T. Martinsohn, Filip Volckaert, Dorte Bekkevold

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The session titled 'A holistic ecosystem approach for marine management and conservation: Opportunities through the application of genetic and genomic approaches' addressed how genetic approaches can improve our understanding of marine ecosystem processes, and how this knowledge can underpin the sustainable exploitation of marine resources within existing management and policy frameworks.

Convener Jann Martinsohn introduced the session by describing some of the challenges facing us, such as with respect to implementing European Union (EU) Marine Strategy Framework Directive (MSFD), which commits EU Member States to develop a programme of measures by 2015 and ensure good environmental status of European seas by 2020, and also the recently reformed EU Common Fisheries Policy, which puts major emphasis on the ecosystem approach to fisheries management. In both cases there is a clear shift in focus from individual commercially exploited 'stocks' to 'ecosystem', and Jann pointed to the importance of developing robust approaches that integrate population, species and ecosystem information fully into existing fisheries and marine living resource data collection schemes, such as the EU Data Collection Framework. The session aimed at addressing a broad range of questions, ranging from 'how can genetic tools promote fisheries management?' over 'what are the biological units we need to manage?' to 'Can we integrate inference from aquaculture genomics into ecosystem health assessment?' The first keynote speaker Gary Carvalho provided an overview of the possibilities and applications and pointed to the fact that genetics offer a robust and cost-efficient set of tools that in several cases are just begging to be lifted from a research into an applied setting. The second keynote Friederike Ziegler gave a thought-provoking perspective on the application of genetic markers from a seafood production angle, emphasizing the importance of understanding the links between the different stakeholders in the seafood production chain, and implications to how seafood is produced and regulated. Eleven oral presentations then elaborated on various aspects, ranging from the development of genetic markers for assessing effects of aquaculture escapees in the Mediterranean (I Coscia *et al.*), over genetic marker based evaluation of Supplementary stocking (G Charrier *et al.*), recruitment patterns (S Delerue-Ricard *et al.*), stock-specific fisheries exploitation (EE Nielsen *et al.*, NH Hassan *et al.*, J Hemmer-Hansen *et al.*, G Puncher *et al.*, M Limborg *et al.*) and regulation (T. Johansen *et al.*), and not least determination of the genomic basis for local adaptation and life history evolution (C Primmer *et al.*, A Saha *et al.*). Examples around the world thus show that the rapid progress in fisheries and marine genetics and genomics provides major opportunities to strongly support an ecosystem-based marine resource management, particularly when integrated with other approaches. An example from the Greenland cod fishery presented by EE Nielsen clearly showed direct positive economic benefits of applying genetic tools in fisheries monitoring and management. However, although such local examples are emblematic, there remains the need to systematically and coherently underpin existing management schemes with genetic/genomic information and to integrate such

information fully into existing fisheries and marine living resource data collection schemes. The discussions in Session I demonstrated that in many cases tools based on genetics and genomics are readily available. There is thus ample scope for integrating them to a much larger extent into management and conservation schemes thereby addressing major current and future marine policy needs.