

Theme Session E

Stocks in flux: From selection pressures via phenotypic and genetic adaptive responses to impacts on ecosystem services

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Recognition is mounting that fishing and climate change are impacting aquatic ecosystems more broadly than just by changing the abundance, age structure, and spatial distribution of stocks. By transforming the environments stocks are experiencing, these drivers can also cause adaptive phenotypic and genetic responses: salient examples include altered growth trajectories, maturation schedules, or migration patterns. Whereas adaptive responses realized through phenotypic plasticity may arise and revert on short time-scales, responses modifying a stock's genotypic composition accumulate over time and are slow to reverse.

Assessing, monitoring, and managing adaptive responses necessitate new elements to be integrated with standard protocols and practices. Evolutionary impact assessments (EvoIAs; Laugen et al., 2012, *Fish and Fisheries*) help account for adaptive responses in an ecosystem approach to the management of fisheries and related ecosystem services. In particular, shifts of standard reference points caused by fishing or climate change (Heino et al., 2013, *ICES Journal of Marine Science*) need to be considered in precautionary management.

Novel findings on genetic correlates of adaptive responses to anthropogenic drivers suggest that relatively small genetic changes in fish genomes may be associated with possibly large phenotypic changes in life history or behavior. It is only recently that such gradual allelic shifts at selected loci and in the associated genomic regions are becoming amenable to measurements, thanks to corresponding progress in genomics and tank experiments.

Continuing a successful tradition of ICES ASC theme sessions convened at four-year intervals in 2002, 2006, and 2010, the 2014 session will bring together a lively mix of research on the wide range of approaches to adaptive stock responses, including stock-specific studies and overarching perspectives from life-history theory, behaviour, recovery, evolutionary ecology, genetics and genomics, vulnerability assessments, and management-strategy evaluation. Supported by the ICES Working Group on Fisheries-induced Evolution (WGEVO), this theme session is also planned to showcase the group's newest methodology for, and results on, evaluating fishing-induced selection pressures for a wide range of key stocks.