



## The early life history of fish—there is still a lot of work to do!

Howard I. Browman\* and Anne Berit Skiftesvik

*Institute of Marine Research, Austevoll Research Station, 5392 Storebø, Norway*

\*Corresponding author: tel: +47 9886 0778; e-mail: [howard.browman@imr.no](mailto:howard.browman@imr.no)

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The themed set of articles that follows this introduction contains a selection of the papers that were presented at the 36th Annual Larval Fish Conference (ALFC), convened in Osøyro, Norway, 2–6 July 2012. The conference was organized around four theme sessions, three of which are represented with articles in this collection: “Assessing the relative contribution of different sources of mortality in the early life stages of fishes”; “The contribution of mechanistic, behavioural, and physiological studies on fish larvae to ecosystem models”; “Effects of oil and natural gas surveys, extraction activity and spills on fish early life stages”. Looking back at the main themes of earlier conferences about the early life history of fish reveals that they were not very different from those of ALFC2012. Clearly, we still have a lot of work to do on these and other topics related to the biology and ecology of fish early life stages.

**Keywords:** Growth, ichthyoplankton, oil pollution impacts, mortality, physiology, predator–prey interactions, recruitment, simulation modelling, survival.

The Annual Larval Fish Conferences (ALFCs) evolved from a series of informal, freshwater-oriented symposia that began with the “*First Symposium on Freshwater Larval Fish*”, convened in Charlotte, North Carolina, 24–25 February 1977 (a list of all the ALFCs can be found at: [www2.ncsu.edu/elhs/elhspubs.html](http://www2.ncsu.edu/elhs/elhspubs.html)). A long tradition of themed article collections on the early life history of fishes (ELHF) began with this first ALFC (Olmstead, 1978). In addition, there is a series of three seminal article collections on the ELHF that emanated from ICES Symposia (Blaxter, 1974; Lasker and Sherman, 1981; Blaxter *et al.*, 1989). The themed set (TS) of articles that follows this introduction contains a selection of the papers that were presented at the 36th ALFC, convened in Osøyro, Norway, 2–6 July 2012. The conference attracted 142 delegates from 33 countries. The program was diverse, with 110 oral and 40 poster presentations. The conference was organized around four theme sessions, three of which are represented with articles in this collection.

“Assessing the relative contribution of different sources of mortality in the early life stages of fishes” was a theme session organized by Richard Nash, Audrey Geffen and Guðrún Marteinsdóttir. Rates and drivers of mortality have been a central theme of many ALFCs, and was a prominent part of the three ICES Symposia mentioned above. Clearly, a detailed knowledge and understanding of the sources and stage-specific rates of mortality, and of the relative roles of density-independent versus density-dependent processes, remains elusive. Reduction in abundance during the ELHF, from

eggs through to settlement by juveniles on nursery grounds, results from a range of causes. Losses can occur from physical transport mechanisms, whereby eggs and larvae are advected to unsuitable habitats (articles in this TS that touch upon this are Lechner *et al.*, 2014; Myksvoll *et al.*, 2014a, b), and through predation, feeding-growth (or lack thereof), environmental factors, or other even more difficult-to-determine causes such as disease. Articles in this TS that touch upon these latter themes are Anderson and Scharf (2014), Kinoshita *et al.* (2014), Ohata *et al.* (2014), Paulsen *et al.* (2014), Polte *et al.* (2014) and Robert *et al.* (2014).

“The contribution of mechanistic, behavioural, and physiological studies on fish larvae to ecosystem models” was a theme session organized by Frode Vikebø and Geir Huse. Ecosystem and process modelling is a central component of the ecosystem-based approach to managing marine resources. Recent studies have emphasized the incorporation of flexible individual behaviour motivated through individual states and environmental cues, resulting in emergent rather than determined responses. However, an important limitation of these models is the scarcity of empirical observations to parameterize them. This session represented an attempt to bridge that gap. Articles in this TS that contribute to this are Jørgensen *et al.* (2014), Myksvoll *et al.* (2014a, b) and Staatterman and Paris (2014).

“Effects of oil and natural gas surveys, extraction activity and spills on fish early life stages” was a theme session organized by Sonnich Meier, Bjørn Einar Grøsvik and Erik Olsen. Fish embryos and

larvae are sensitive to low concentrations of dissolved oil compounds that result not from major spills but from everyday leakage or operational discharges of water from offshore platform activity. There is a need for more research on how oil and oil dispersants at low concentration affect the ELHF, and that was the focus of this theme session. The article in this TS by Vikebø *et al.* (2014) is a contribution to this topic.

Looking back at the main themes of the third ICES Symposium on the ELHF, held in Bergen, Norway, 3–5 October 1988, reveals that they were not very different from those of ALFC2012: (i) spawning studies; (ii) field investigations of distribution and transport, growth and feeding, late larvae and juveniles; (iii) recruitment; (iv) experimental studies on feeding, growth and metabolism, predation and locomotion; and (v) pollution studies. Clearly, we still have a lot of work to do on these and other topics related to the biology and ecology of fish early life stages.

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