

Environmental effects on ocean entry of Atlantic salmon (*Salmo salar*) smolt across its range of distribution

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The smolt transformation process is the change in morphology, physiology and behaviour that Atlantic salmon (*Salmo salar*) parr undergoes before migrating to sea in spring. Temperature and photoperiod are the primary environmental cues regulating this process. Previous studies have identified water temperature and water flow as the main factors controlling the smolt downstream migration. These factors vary with geographical location and habitat characteristics suggesting that the pattern of downstream migration could differ within and among rivers. Survival appears to be dependent on a precise alignment with 'optimal' conditions when entering the sea, thus making timing of smolt descent a critical life history event. Moreover, there is heritability for timing of smolt migration. However the importance of genes and environmental conditions might be spatio-temporal dependent allowing for local adaptation and evolution. Whereas most of the previous research has focused on analyzing single or only a few populations, here we present a meta-analysis that compiles information on downstream smolt migration covering much of the distributional range of this species within the North Atlantic basin. Using different modelling approaches and population-specific sampling we aim at exploring how local environmental conditions affect the spatio-temporal patterns of Atlantic salmon smolt run.

Keywords: Atlantic salmon, *Salmo salar*, smolting, river temperature, runoff, sea surface temperature, North Atlantic basin

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