Strategies for partition between body growth and reproductive investment in migratory and stationary populations of spring-spawning Atlantic herring (Clupea harengus L.)

In this study the reproductive investment of six populations of Atlantic herring (Clupea harengus) in Norwegian waters was contrasted in relation to trade-offs with body growth (relatively slow-relatively fast) and migration distance (stationary-migratory). Down-regulation of fecundity through the process of atresia as well as standardisation of fecundity to the prespawning stage were included as process-oriented reproductive factors, applying both histological and image analysis techniques. The further analysis included historic information on body growth as well as published information on fecundity from several stocks in the North Atlantic. The Norwegian spring-spawning (NSS) herring could be split into three sub-components: migratory (oceanic), likely semi-stationary (coastal) and stationary. The latter one as well as three other populations were sampled in relatively isolated semi-enclosed areas (pond, “lake” or fjord). The study documented clear signs of trade-offs: migratory herring had a significantly higher growth rate and lower relative fecundity while stationary populations grew slower and presented higher values of relative fecundity. So these traits appeared highly plastic and for the first time explicitly demonstrated in the three types of NSS herring: stationary NSS herring had high fecundity and body condition while the truly migratory counterpart was low in both while the intermediate version was low in fecundity but high in condition. The literature-based analysis of other Atlantic spring-spawning herring populations seemed to corroborate the finding that slow-growing herring is relatively more fecund than the faster-growing populations.