

Modin, Johan 2000. Growth and mortality of juvenile plaice (*Pleuronectes platessa* L.) along the Swedish Skagerrak coast.

Abstract: Growth and mortality of post-settled plaice, *Pleuronectes platessa* L., was assessed from field studies along the Swedish Skagerrak coast. Quantitative and accurate sampling techniques were employed at varying temporal and spatial scales. Age composition, settlement dates and growth was estimated from validated otolith microstructure analysis.

Post-settled plaice was monitored in a single nursery bay (eastern Skagerrak) bi-weekly during 1991 and 1992 from the time of settlement in spring until emigration in late summer. In 1991, peak densities amounted to 1.4 ind. m⁻², but in 1992 peak densities was extremely high, 10.0 ind. m⁻². Analysis of individual cohorts based on settling dates demonstrated lower mean growth in 1992 than in 1991, but instantaneous mortality rate did not differ between years mainly due to large seasonal variation in mortality between cohorts in both years. It was estimated that growth and not instantaneous mortality was density-dependent.

In May 1998, 32 bays in the Skagerrak archipelago were sampled to estimate the spatial variability in densities from a range of nearby bays to four large regions along the 200 km long coast-line. Peak densities in bays varied from 0.1 to 74.3 ind. m⁻² with lower abundances in the southern and inner archipelagos. The observed distribution was considered as a result of variability in larval supply rather than post-settlement mortality. Nine bays that represented low, intermediate and large plaice densities in May were revisited in August 1998. Both density dependent growth and mortality was recorded.

The date of first arrival and the spatial distribution was compared between plaice and flounder, *Platichthys flesus* L., within a single nursery bay. During seven years plaice settled earlier than flounder, and before the peak immigration of predatory *Crangon crangon* (1-group). In 1991 and 1992 plaice occupied the outer part of the bay, while flounder preferred the shallow inner part. A later study in 1995 confirmed similar distribution patterns by both direct observation (video-camera) and traditional sampling. Plaice occupied the outer part of the bay at daytime but moved upshore at dusk and returned at dawn. Piscivore 1-group cod, *Gadus morhua* L., appeared in the outer part of the bay but only during dark hours. Plaice behaviour was considered as a result of temperature preferences and predator avoidance.

Juvenile growth was estimated from otoliths of 2 to 5 year old plaice, sampled in the central Skagerrak during the spawning season in 1999, and its relation to fecundity was investigated. Otolith growth during the 0-group stage (mean 6.7 $\mu\text{m d}^{-1}$) was correlated to fish size at age 2 and 3 for females but not for males. Female fish size at age 2 to 5 was correlated to fecundity. Therefore, fast growth during the 0-group stage will result in a larger size at maturity and indirectly increase individual fecundity.

In summary, growth and mortality rates were density-dependent at high plaice densities. Growth and behaviour during the 0-group stage was influenced by the seasonal and daily variation in predator abundance and environmental factors. However, the overall 0-group growth of individual plaice was correlated to the size at maturity, implying that juvenile growth will influence the reproductive investment at maturity.

Key words: *Pleuronectes platessa*, *Crangon crangon*, *Carcinus maenas*, Skagerrak, density dependence, fecundity, growth, migration, mortality, nursery, predation, otolith, settlement, spatial scale.

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