Pettersson, J. C. E. 2002. Migration in brown trout *Salmo trutta* – causes and consequences

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Abstract
In brown trout (*Salmo trutta* L*)*, migration is common, and migratory and resident (non-migratory) adults often coexist (partial migration). A large proportion of males often stay as residents in their natal stream, whereas resident females in migratory populations (seatrout) appear to be rare, and their occurrence in smaller watersheds has not been studied to the same extent as in males.

Three main questions form the basis of this thesis:
1) Is selection for sea migration opposed by a migration cost related to the altitude of the spawning area? 2) Which are the consequences of migration at the population level? 3) Why do not all individuals choose the same migratory strategy?

Multipopulation comparisons between sea-migratory and resident trout populations in SW Sweden supported the hypothesis that the juvenile density is larger and declines more rapidly with altitude in migratory than in resident populations. This is the first direct evidence that migration costs reduce population density in anadromous salmonids.

Multipopulation comparisons also showed that underyearlings are smaller in migratory than in resident populations, and that the variation in body-length is larger. In annual time-series in these populations there was a negative relation between autumn body-length and density, and a positive relation between body-length variation and and density. These results suggest that migration, and thereby larger underyearling density, affects body-size and size-density relations through density-dependence.

There were no differences in aggression and social dominance between juveniles from migratory (high density) and stream-resident (low-density) populations. These results did not support the hypothesis that selection for aggression is density-dependent. By comparing egg sizes from three female types in one stream, the hypotheses that increased juvenile interference competition selects for (1) larger propagules, and (2) a uniform propagule size regardless of female resources, were tested. Both hypotheses were supported, but egg size was also positively related to female size, which is not in accordance with theory.

Resident females in six migratory populations were rare in relation to resident males (0 to 17 %), and tended to mature later and at larger size than males. By comparing microsatellite and mtDNA data, I tested the hypothesis that resident females in sympatry with migratory females is the result of down-stream dispersal from trout populations land-locked above waterfalls. The result did not support the hypothesis as I found that sympatric forms were similar and significantly different from the land-locked population suggesting a common gene pool for the sympatric migratory and stream-resident forms.

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