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Migration in Anadromous Brown Trout

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Opponent är Dr. Martyn Lucas, School of Biological and Biomedical Sciences, Durham University, UK

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Abstract

This thesis investigates the anadromous migration of brown trout (*Salmo trutta*) with the overall aim to improve stock management within the region. Several field studies were conducted in different streams and coastal areas on the west coast of Sweden specifically aimed to evaluate environmental triggers for migration (**Paper I)**, migration pathways and strategies (**Paper III and IV**) as well as the genetic differentiation of anadromous populations of brown trout (**Paper V**). In order to evaluate the effect of increasing air temperatures on sizes and abundances of different year classes (**Paper II**), observational data from the Swedish electrofishing database and scientific reports were used.

These studies show that downstream migration is triggered both by discharge and temperature, but that these environmental cues may act differently between years (**Paper I**). Downstream migration was found to be primarily nocturnal in the river and in the estuary, often occurring in mixed species shoals (**Paper I and III**). The downstream migration was observed to occur in two main clusters, one early and one late migration group (**Paper IV**). The level of discharge was also found to affect mortality rates, where lower discharge caused increased mortality (**Paper III**). Migration speed decreased further out from the river, probably reflecting an initial navigation phase towards the sea followed by a subsequent foraging phase in the sea (**Paper III and IV**). When investigating the genetic differentiation on the west coast of Sweden we found four distinct genetic clusters in the rivers, whereas a total of nine genetically different clusters where present in the sea on the Swedish west coast (**Paper V**). The analysis of data from the Swedish electrofishing database SERS revealed that recruitment has remained constant over the last 30 years, whereas the density of older cohorts has decreased. However, the size of the individuals in the young-of-the-year cohort has increased whereas the size of smolts has decreased over the same period indicating that the proportion of brown trout parr that smoltify and migrate to the sea as 1yr smolts has increased (**Paper II**).

My results indicate a large variation in migration tactics between years, rivers, as well as within rivers (**Paper I, III and IV**). This variation makes it difficult to establish general conservation measures and regulations for threatened populations in certain rivers. On the other hand most rivers contain sea trout that belong to a larger genetic cluster, with seemingly little or no local adaptation (**Paper V**). Consequently, management actions and conservation measures should be adopted for each specific genetic cluster, and only for individual rivers when large survival bottle necks (e.g. weirs, dams and wetlands) are identified.

KEYWORDS: Downstream migration, temperature, discharge, genetics, growth rate, climate change, *Salmo trutta*, *Salmo salar*, sea trout, salmon