# Investigating the dynamics of a partially migratory fish population

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**Abstract**

In a context of global change, phenotypic plasticity is considered an advantage in dealing with environmental variability. Partially migratory populations, which reflect plasticity in migration, should take advantage of positive environmental changes and better buffer negative conditions compared to solely resident populations. The intraspecific diversity in migratory tactics could be the key element driving a stronger resilience in these populations. Brown trout (*Salmo trutta*) is a typical example of a partially migratory fish, where both resident and migratory tactics coexist. Migrant fish benefit of the highly productive marine habitat to achieve higher body growth and fecundity than fish residing in freshwater for their whole life. This advantage is counter-balanced by a high mortality risk in migrant fish due to physiological changes upon entry to the sea and predation in the marine environment. We analyzed 18 years of capture-mark-recapture data from brown trout (*Salmo trutta*) in the river Oir (Normandy) to study the role of this phenotypic plasticity and its consequence on the dynamics of this partially migratory population. Firstly, we investigated whether ecological factors may trigger migration in juvenile trout and highlighted the key role of density dependence. Secondly, we compared the reproduction success of both resident and migrant trout on the same spawning ground and found that body size mattered more than migration decision. Finally, we combined these trait-based approaches into a joint population model to quantify the influence of resident and migratory tactics on the population growth rate. Using simulations, we investigated how changes in the environment may affect the proportion of migrant and the population growth rate.

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