

To remain in the natal stream or migrate to the ocean-density-dependent growth of juvenile salmonids could lead to fluctuating populations and evolutionary bistability

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Male juveniles of several species of salmonids spawning in fresh water streams migrate to the ocean and return to their natal stream when they mature (migratory tactic); others stay and mature in the stream (resident tactic). Large individuals become residents and small ones become migrants. This is an evolutionary outcome according to the status-dependent strategy model, which assumes that the juveniles exhibit the optimal tactic based on their status. In this study, we consider the case in which the density of adult residents suppresses juvenile growth, and explore the dynamics of alternative tactics and the evolution of threshold size. We show that a fraction of the migratory tactic that might converge into a stable state or continue to fluctuate wildly, and that the evolutionary outcome may be evolutionarily bistable, resulting in a clearly different threshold size. In the case of evolutionary bistability, two threshold sizes differ in ecological dynamics: a stable fraction of migratory tactic in one and two-year periodic fluctuation in the other.

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