An experimental field evaluation of winter carryover effects in semi-anadromous Brown trout (Salmo trutta) - DTU Orbit (31/07/2017)

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For semi-anadromous brown trout, the decision whether or not to smoltify and migrate to the sea is believed to be made at the end of the preceding summer in response to both local environmental conditions and individual physiological status. Stressors experienced during the fall may therefore influence their propensity to migrate as well as carry over into the winter resulting in mortality when fish face challenging environmental conditions. To evaluate this possibility, we artificially elevated cortisol levels in juvenile trout (via intracoelomic injection of cortisol in the fall) and used passive integrated transponder tags to compare their overwinter and spring survival, growth, and migration success relative to a control group. Results suggest that overwinter mortality is high for individuals in this population regardless of treatment. However, survival rates were 2.5 times lower for cortisol-treated fish and they experienced significantly greater loss in mass. In addition, less than half as many cortisol-treated individuals made it downstream to a stationary antenna over the winter and also during the spring migration compared to the control treatment. These results suggest that a fall stressor can reduce overwinter survival of juvenile brown trout, negatively impact growth of individuals that survive, and ultimately result in a reduction in the number of migratory trout. Carryover effects such as those documented here reveal the cryptic manner in which natural and anthropogenic stressors can influence fish populations.

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