

Thesis for the degree of Doctor of Philosophy

INDIVIDUAL VARIATION IN BEHAVIOUR

personality and performance of brown trout in the wild

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The oral defence of this thesis will take place at 10:00 am on Friday the 28th of May 2010, at the Department of Zoology, Medicinaregatan 18A, Gothenburg, Sweden. The opponent is Assistant Professor Alison M. Bell from the University of Illinois, Department of Animal Biology, School of Integrative Biology, Urbana, IL 61801, USA

DISSERTATION ABSTRACT

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Individuals from the same population often show very different behaviour. These differences, when consistent across time, are referred to as animal personality or behavioural syndromes. Explaining the occurrence of animal personality from an evolutionary perspective has however proven a difficult issue to tackle. This thesis studies aspects of individual behavioural variation and personality in brown trout (*Salmo trutta*). More specifically, I investigate (1) to what extent variation in behaviour is consistent within and across contexts, (2) environmental and genetic effects on behaviour, (3) how this affects performance in the wild, and (4) whether this understanding can be used to improve rearing methods of supplementary hatcheries.

I found brown trout to express a wide variation of behaviours and provide evidence that much of this behavioural variation is associated in bigger behavioural syndromes. As a result, separate behaviours of brown trout cannot be considered as isolated units, but combine into clusters that sometimes are associated with non-behavioural measures such as body size or growth rate. Variation was further influenced by both inherited and environmental effects. *First*, individuals from different maternal and paternal origin differed in size, aggressiveness and response to novel prey or novel food. These results suggest that maternal and/or genetic effects influence behaviour and growth in brown trout (**I**). *Second*, reduced rearing densities in a hatchery increased the response to novel prey, food search ability in a maze and predator response (**II**). And *third*, hatchery trout were more successful foragers than wild conspecifics, yet showed less repeatable explorative behaviour across time (**III**). Personality traits were generally poor predictors of growth and survival upon release, suggesting that several behavioural strategies can be successful in nature. Nevertheless, in paper **IV**, slow exploring individuals grew faster than more bold trout. Furthermore, parr reared at reduced densities were twice as likely to survive in the stream as trout reared at high densities.

In conclusion, my results contradict simple associations between risk taking behaviour and growth-mortality tradeoffs under natural conditions. This challenges the recent view that individual differences in growth strategies can explain variation in behaviour and suggests more heterogeneous links between personality and life-history in nature (**V**). In addition, I show that reduced rearing hatchery densities facilitate the development of adaptive behaviour in brown trout, a finding that may have implications for current rearing methods in supplementary hatcheries.

Keywords: behavioural syndromes, personality, life-history, boldness, hatchery, survival, growth, foraging, anti-predator behaviour, learning, brown trout

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