Long Term Effects of re-instating Spawning Gravel in Danish Lowland Streams

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S1_24 Long term effects of re-instating spawning gravel in Danish lowland streams

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Spawning of brown trout (Salmo trutta L.) has been hampered as a consequence of straightening and culverting 90% of the Danish watercourses. Subsequent excess sediment transport has further led to the destruction of spawning sites by siltation. Natural trout reproduction therefore decreased during most of the 20th century. Re-establishing the natural spawning sites in the streams has been a priority for the Danish stream authorities for the past 10 years. However, spawning gravel has been re-introduced into the streams by means of trial and error methods and no effect studies of the spawning site restorations have been carried out. This project has focused on evaluating a number of restoration projects carried out between 1989 and 1994 in a number of streams of varying sizes. The primary objective of the study was to evaluate spawning ground restoration and to investigate the limiting factors for reproduction of trout on re-introduced gravel. We aimed at testing the following hypotheses: The restoration of spawning sites enhances: (1) Spawning success of trout and (2) survival of the fry during summer

Spawning activity during winter, abundance of fry in May and August, and physical conditions (depth, velocity, macrophyte coverage and substrate) were measured in 3 streams (Stensbæk, Ryds å & Gels å) on 2-3 reaches per stream and on an equal number of upstream control reaches during 2000. The effects of re-instating spawning gravel in streams on spawning; fry emergence and survival were analysed as were the habitat preferences of the surviving fry changed during summer.

We found significant differences in fry density were only found in Stensbæk in May. The percentage of gravel used for spawning is very high on the restored compared to the control reaches, despite the generally higher coverage of gravel on the control reaches. Gravel on the control reaches is mixed with large amounts of sand and seems therefore not suitable for spawning. The young of the year trout primarily prefer depths of 20 to 40 cm (60%) and velocities of 0 to 4 cm s-1 (36%) in august. The empirical depth and velocity distributions preferred by the trout were tested against the overall distribution in the streams. Both the preferred velocity and depth distributions were significantly different from the distributions in the streams studied. (Kolmogorov-Smirnoff Goodness of fit test, 5%-level).

This study indicates that re-instating spawning gravel into Danish streams enhance the spawning success for trout. Significant increases in fry densities were only found in one stream in May. Therefore no general conclusions can be drawn from the results. The results do however indicate that the introduced gravel has a better potential for spawning success. A larger percentage of the introduced gravel is actually used for spawning activity. The most significant parameter to explain the number of fry in May was the total area of spawning redds in the stream. The young of the year trout density in August was primarily influenced by the number of fry in May and the current velocity and depth in the stream margin. Microhabitat selection by the young of the year trout indicated clear preferences with respect to depth and velocity.