

Review of reintroduction of Atlantic salmon (*Salmo salar*) in tributaries of the Rhine River in the German Federal States of Rhineland-Palatinate and Hesse

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Summary

The reintroduction of Atlantic salmon in to tributaries of the Rhine River in the German Federal States of Rhineland- Palatinate and Hesse is implemented by the fisheries authorities of the two States (Länder). Stocking is conducted in Rhineland-Palatinate since 1994 and in Hesse since 1995. In phase I (1994–2003) various strains were tested in parallel. In phase II (since 2003/2004) only the Swedish Ätran strain was imported. It was hypothesized that the strain Ätran would perform particularly well because of a similar spawning time to the original stock of River Sieg and a comparable Multiple-Sea-Winter ratio to many original stocks in the Rhine River. Returning salmon were monitored annually since 1996 in Rhineland-Palatinate and since 2002 in Hesse. Between 1996 and 2008 a total of 533 returners were recorded in the two programmes, with 52.9% being males and 38.4% females (sex unknown: 8.7%). 2007 and 2008 yielded the highest ratio of Multiple-Sea-Winter (MSW) salmon so far. In 2008 74% of the individuals with known length had spent two or more winter in the sea, thus raising the average length to 80.3 cm. Overall trends show an increase in the total number of recordings and MSW salmon ratio, together with an increase of mean length correlated with the latter. The percentage of female MSW returners increased by 10–77% compared to 2007. Until 2008 natural reproduction was recorded in five river systems (total: 11 streams). In 2008 reproduction was demonstrated in 11 tributaries, an increase of three compared to 2007. The density of juvenile 0+ salmon found in immediate vicinity of several spawning sites in the rivers Saynbach, Wisper, Nister and Sieg exceeded 100 individuals per 100 m². In 2008 approximately 85% of the suitable and accessible habitat in rivers Nister and Saynbach (Rhineland- Palatinate) were inhabited by wild 0+ salmon, followed by River Wisper (Hesse) with 80%. As a consequence of an increasing shortage of available stocking material a brood- stock programme was established in the Atlantic Salmon Centre „Hasper Talsperre“. The rearing-programme started in 2006 and aims to become independent from further imports by the year 2011. The brood-stock consists (almost) exclusively of the strain Ätran (Sweden). „Wild“ juveniles make up around 30% of the brood-stock. The wild juveniles were sampled from several spawning areas in nine streams with documented natural reproduction. A genetic examination of the brood- stock generation 2004 and 2005 and of the offspring of Ätran returners to River Sieg indicated no loss of genetic diversity and revealed a similar genetic structure of the brood-stock and the offspring of Ätran returners to River Sieg. It is concluded that the high reproductive success of the non-native strain Ätran observed here corroborates the hypothesis of timing of spawning and Multiple-Sea-Winter ratio being key factors in the selection of a successful donor strain for reintroduction.