# Do adult and YOY fish benefit from river restoration measures? (Lorenz et al 2013) [1]

We analyzed the effects of 36 river restoration projects on fish assemblages. We expected increased reproduction in restored river reaches leading to a sustainable increase in the total amount of fishes. The restored reaches are situated in small to medium-sized rivers in lowlands and lower mountainous areas in Germany. Restoration measures considerably changed river morphology and created more natural conditions by improving habitat diversity. For each restored reach, we sampled an upstream unrestored counterpart that resembled the restored reach before the restoration measures were implemented.

Restored and unrestored control reaches were sampled by electrofishing and parameters describing river morphology (e.g. width, depth, microhabitats) were recorded along ten equidistant transects. We investigated abundance and age structure of the fish species to reveal effects of hydromorphological changes. On average, restored reaches were wider, shallower and harbored a greater variety of water depths and current velocities. Abundance of adult and of young-of-the-year (YOY) fishes was significantly higher in restored reaches. In particular, small species such as the stone loach (Barbatula barbatula) and gudgeon (Gobio gobio) and species preferring shallow, slow-flowing areas in the juvenile stage increased significantly in abundance. Density of grayling (Thymallus thymallus) and brown trout (Salmo trutta) YOY, which prefer fast-flowing areas, increased less but significantly. Presumably, a higher number of species reproduced in restored reaches, as indicated by the presence of YOY, following the morphological restoration effects. Our results indicate that restoration measures that increase habitat diversity eventually increase richness, diversity and juvenile abundance of riverine fish communities. Consequently, river restoration measures should focus on the generation of a diverse, natural shoreline with shallow, slow-flowing marginal zones, which have particularly positive effects on fish assemblages.

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