

[Contrasting the roles of section length and instream habitat enhancement for river restoration success: a field study of 20 European restoration projects \(Hering et al. 2015\) \[1\]](#)

Restoration of river hydromorphology often has limited detected effects on river biota. One frequently discussed reason is that the restored river length is insufficient to allow populations to develop and give the room for geomorphological processes to occur.

We investigated ten pairs of restored river sections of which one was a large project involving a long, intensively restored river section and one represented a smaller restoration effort. The restoration effect was quantified by comparing each restored river section to an upstream nonrestored section. We sampled the following response variables: habitat composition in the river and its floodplain, three aquatic organism groups (aquatic macrophytes, benthic invertebrates and fish), two floodplain-inhabiting organism groups (floodplain vegetation, ground beetles), as well as food web composition and land–water interactions reflected by stable isotopes.

For each response variable, we compared the difference in dissimilarity of the restored and nearby non-restored section between the larger and the smaller restoration projects. In a second step, we regrouped the pairs and compared restored sections with large changes in substrate composition to those with small changes.

When comparing all restored to all non-restored sections, ground beetles were most strongly responding to restoration, followed by fish, floodplain vegetation, benthic invertebrates and aquatic macrophytes. Aquatic habitats and stable isotope signatures responded less strongly.

When grouping the restored sections by project size, there was no difference in the response to restoration between the projects targeting long and short river sections with regard to any of the measured response variables except nitrogen isotopic composition. In contrast, when grouping the restored sections by substrate composition, the responses of fish, benthic invertebrates, aquatic macrophytes, floodplain vegetation and nitrogen isotopic composition were greater in sections with larger changes in substrate composition as compared to those with smaller changes.

Synthesis and applications. The effects of hydromorphological restoration measures on aquatic and floodplain biota strongly depend on the creation of habitat for aquatic organisms, which were limited or not present prior to restoration. These positive effects on habitats are not necessarily related to the restored river length. Therefore, we recommend a focus on habitat enhancement in river restoration projects.

Key-words: aquatic macrophytes, benthic invertebrates, fish, floodplain, flow patterns, food web, ground beetles, riparian vegetation, stable isotopes

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