Temporal and spatial patterns of fish response to hydromorphological processes (Wolter et al. 2015) [1]

This paper relates life cycle characteristics of fishes, their environmental tolerances, habitat requirements, and resilience against hydromorphological disturbances to a recently developed river typology providing a hierarchy of spatial units. It aims to identify the most relevant spatiotemporal scales for river restoration and environmental assessment.

Most fish species, except diadromous and some potamodromous species, can complete their life cycle within a river reach and form sustainable populations within a river segment. They typically move within the spatial scale of river segments and have their home range within the river reach. By comprising heterogeneous patterns of different geomorphic and hydraulic units, the reach provides habitat complexity and heterogeneity that supports river-type-specific fish assemblages. The single units are often used temporarily or by specific life stages only underpinning the need for habitat diversity. Further, they might be only temporarily available. River fishes have evolved several life cycle adaptations to improve their resilience against stochastic disturbances, as high fecundity, multiple spawning, batch-spawning, a protracted annual spawning season, and long life-time fecundity with multi-cyclic spawning. Therefore, they are well adapted to environmental variations driven by hydromorphological processes.

Considering the home range of most species, representative sampling at the reach scale will cover all functional river elements, hydraulic, and geomorphic units, while accounting for their temporary or sporadic use by fish. Therefore, the reach scale appears as practicable and sufficient scale for fish-based assessments and as highly relevant planning unit in hydromorphological river restoration practise. Nonetheless, reach-scale characteristics are largely inherited from large-scale geomorphic processes and multiple pressures at the catchment scale that may impact aquatic communities and river restoration success at the lower spatial scales.

Keywords: hydromorphology; river fishes; resilience; spatial scale; temporal scale

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[1] https://reformrivers.eu/temporal-and-spatial-patterns-fish-response-hydromorphological-processes-wolter-et-al-2015
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