

Executive Summary

D1.1 Metadata overview on fish response to disturbance

Aim

Environmental assessment of hydropower facilities commonly includes means of fish assemblage impact metrics, as e.g. injuries or mortality. However, this hardly allows for conclusion at the population or community level. To overcome this significant knowledge gap and to enable more efficient assessments, this task aimed in developing a fish species classification system according to their species-specific sensitivity against mortality. As one result, most sensitive fish species were identified as suitable candidates for in depth population effects and impact studies. Another objective was providing the biological and autecological baseline for developing a fish population hazard index for the European fish fauna.

Methods

The literature has been extensively reviewed and analysed for life history traits of fish providing resilience against and recovery from natural disturbances. The concept behind is that species used to cope with high natural mortality have evolved buffer mechanisms against, which might also foster recovery from human induced disturbances. In contrast, species with very low natural mortality lack such buffering traits and thus, are more sensitive against human-induced mortality. The following life history traits have been identified reportedly indicating the species' biological sensitivity against natural mortality: natural adult fish mortality, maximum length, maximum age, age at first maturity, fecundity (egg number), annual number of offspring per female, and migration behaviour.

Existing species trait databases (e.g. FishBase) as well as the primary literature has been extensively reviewed to gather as much as possible information on each trait for all fish species occurring in European waters. A respective trait database has been compiled. When possible, missing data have been completed using analogues from closely related species or calculated values. Depending on the metric, multiple entries per species and trait were either averaged or the maximum value used for scoring. Scores were assigned at a scale of 1 (lowest sensitivity) to 7 (highest sensitivity). The classes were set trait specific based on the traits respective data distribution among all species. For each species, the scores of all metrics were averaged and rounded to the next integer. Because the two extreme classes 1 and 7 remained empty the final classification of species was adjusted to five classes. The resulting scores were used to align species according to their sensitivity against mortality and also to arrange them in a two-dimensional matrix of sensitivity classes and the IUCN Red List classification status to account for their conservation value.

Results

The compiled metadata overview comprises 192 fish and lamprey species. Of the 192 investigated species, 3 were assigned to class 5 (highest sensitivity), 37 were assigned to class 4 (high sensitivity), 82 taxa were assigned to class 3 (average sensitivity), 67 were assigned to class 2 (moderate sensitivity) and 3 taxa were assigned to class 1 (low sensitivity). The result allows for an objective and comprehensible comparison of the inherent biological sensitivity of fish and lamprey species and identified in total 40 taxa of high susceptibility to disturbance covering all biogeographic regions of Europe, which might serve as candidate species for developing novel assessment tools and for further analysing population effects.

For the full deliverable, please click [here](#)

