

Comparative analysis of iron hydroxide contaminated river sections of the Spree above and below the Talsperre Spremberg

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Abstract

The rise in groundwater due to the closure of former mining areas since 1990 means that local rivers like the Spree in Brandenburg in this example are heavily contaminated with iron hydroxide (and sulfate) leading to „acid mine drainage ". The regional change in the environmental parameters has an impact on the aquatic vegetation, the benthic invertebrate fauna and the fishcoenosis of the Spree and appears as iron ocher (iron hydroxide) above the Talsperre Spremberg (Koryak et al. 1972; Letterman & Mitsch 1978; Greenfield & Ireland 1978; Scullion & Edwards 1980; McKnight & Feder 1984; Rasmussen & Lindegaard 1988). The comparative analysis is done by investigating three iron hydroxide contaminated and three non-iron hydroxide contaminated river sections using electrofishing, ground samples and water samples. The results show a significant alteration in iron content, pH-Value, turbidity and water temperature mainly due to the congestion effect of the Talsperre Spremberg. The high iron hydroxide content leads to impairment of the metabolism and osmoregulation of lotic organisms, inhibits the visual perception of certain fish species due to the resulting turbidity, and impairs the spawning opportunities of fish above the Talsperre Spremberg (Vuori 1995; Kruspe et al. 2014). A lower proportion of abundancies and biomass in fish was detected there in comparison to below the Talsperre (see figure 1). Furthermore, it was also possible to verify reduced growth and reduced condition for various fish species above the Talsperre (see figure 2). Concerning the biodiversity there was a slight reduction in the Shannon-index from 1,65 above to 1,73 below the Talsperre although the evenness does not vary decidedly. Overall, the iron hydroxide content leads to incisive alterations concerning condition, abundancies and diversity of freshwater fish. However the direct and indirect effects and hazards of iron contaminated water on fishcoenosis needs more wide researches to follow up on oncoming „acid mine drainages" due to increasing closure of pit mines.

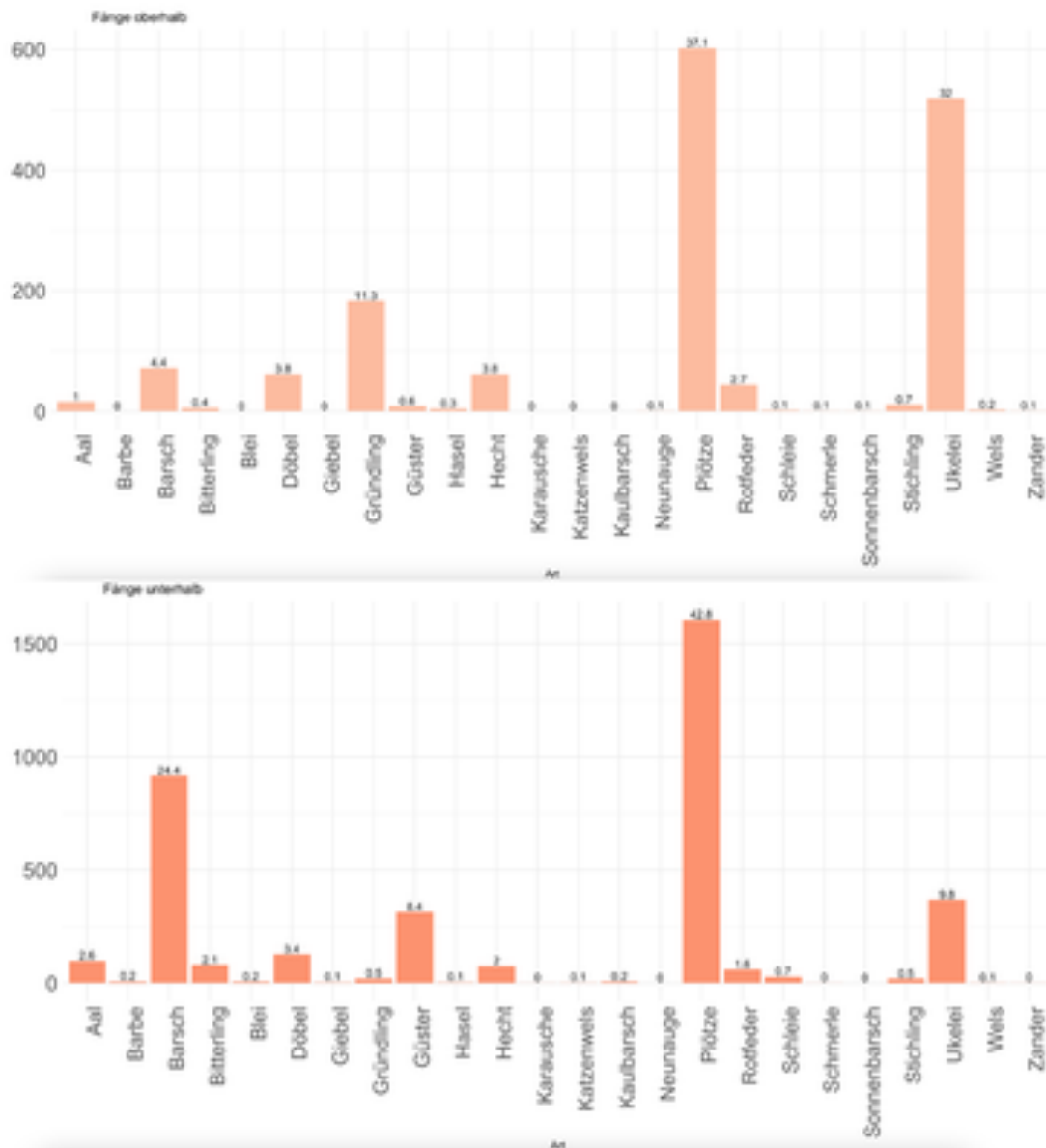


Figure 1 Abundancies of the detected fish species above and below the Talsperre Spremberg at the 3 fishing sections within 3 fishings over 500 meters.

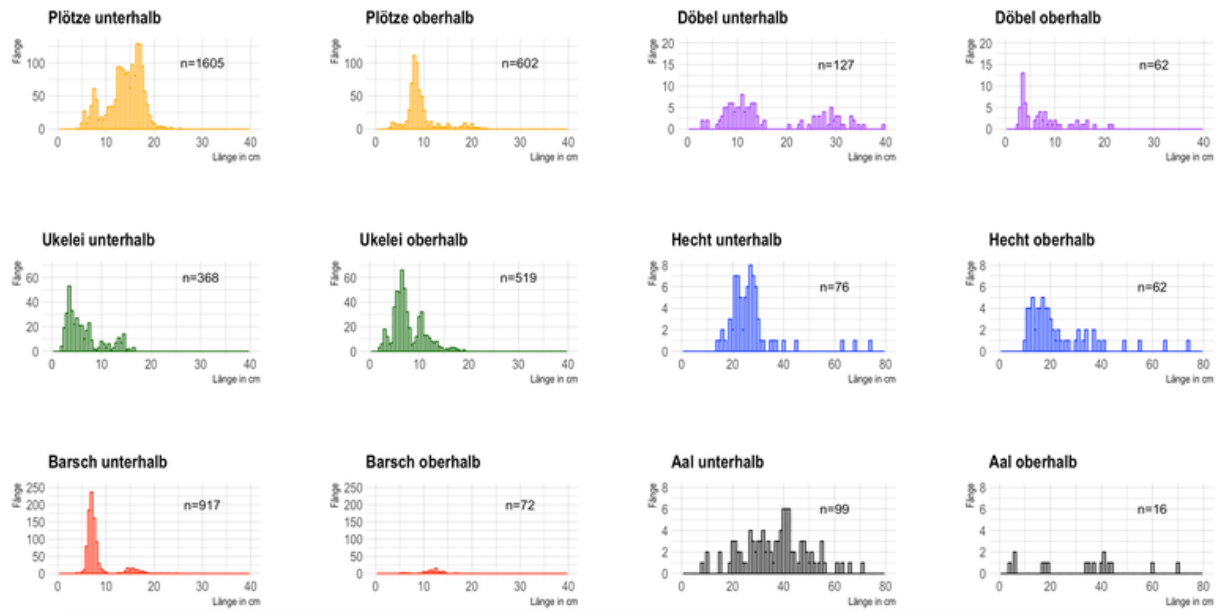


Figure 2. Length frequency diagrams of detected dominant fish species above and below the Talsperre Spremberg.