

# CHARACTERIZATION OF LOW-FLOW PERIODS AND THEIR INFLUENCE ON FISH COMMUNITIES IN LARGE RIVERS THROUGH THE ANALYSIS OF LONG-TERM TIME SERIES

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Abstract

The number and severity of droughts are expected to increase in the coming decades, with major impacts on freshwater ecosystems and fish fauna. The wide spectrum of possible biological responses to a period of low-flows, whether or not concurrent with high water temperatures, makes the characterization of its effects on fish fauna particularly complex. A better understanding of the biological responses to changes in water discharge and temperature is therefore needed to quantify the ecological effects of low-flow periods on hydrosystems already undergoing various anthropogenic pressures. First, we used hydrological metrics and long-term data of water discharge from 11 stations located in the main large rivers of France over the past four decades to identify low-flow events and characterize their severity. A similar work was done on water temperature time series to determine whether or not these low-flow events were concurrent with abnormally warm periods. Second, we analyzed electrofishing data sampled at the same stations once or several times a year over the same time period to compare the structure and composition of fish communities before and after the low-flow events previously identified. Analyses were conducted at both the taxonomic and functional level, using a set of ecological traits (e.g. thermal preferences, affinity for high flow velocity, trophic level) to describe the different fish species. This study provides new insights into the responses of fish fauna to low-flow events in large rivers, which are hydrosystems that have been overlooked so far on this topic, while they are the focus of outstanding economic and societal issues as well as complex and vast challenges regarding the conservation of their biodiversity.

Keywords

drought, heat wave, global change, ecological traits, hydrological metrics