



www.sefs2013.de

Symposium for European Freshwater Sciences

JULY 1-5, 2013 | MÜNSTER, GERMANY | ABSTRACT BOOK



R14

SHORT TERM BEHAVIOURAL RESPONSES OF BENTHIC COMMUNITIES TO THERMOPEAKING WAVES

Maiolini B., Bruno M. C.

Fondazione E. Mach Sustainable Agro-Ecosystems and Bioresources Department, Via E. Mach 1, I-38010 S. Michele all'Adige (Tn), Italy

Hydropower represents a primary and strategic renewable energy source in the Alps and, more in general, in mountain areas. Though hydropower is ecologically sustainable at a global scale, being gas-free, at the local scale it is frequently a major stressor for aquatic ecosystems. Among its advantages is the possibility to respond immediately to peak demands, but in the case of storage plants, the sudden releases of turbinated waters in receiving water bodies (hydropeaking) causes well-known severe consequences on the benthic community and on the whole ecosystem.

In particular, for hydropower plants fed by high elevation reservoirs with hypolimnetic release, hydropeaking is not only a repeated and sudden change in discharge and velocity but also in the thermal regime and in other physical-chemical properties of the water body.

Due to their different physical nature, the thermal waves associated to hydropeaking propagate downstream with different velocities in respect to the hydrodynamic ones. Thus downstream of storage plants, the biota experience a first disturbance caused by the hydropeaking wave (catastrophic drift), followed by a second one caused by sudden and repeated temperature changes (behavioural drift). The time lag between the two events increases with distance from the power station and the magnitude depends on the relative position of the reservoir and the receiving water body. In the Alpine streams studied by the Authors the thermal alterations on an annual scale range from plus 3-4 C° in winter to minus 5-6 C° in summer.

In order to separate the effects of the short-term effects of the hydro and thermal waves, a series of experiments were planned from 2008 to 2012 in a set of five artificial flumes (20 m long, section 0.30 x 0.30 m) fed by a near-to-pristine Alpine stream. Hydro and thermo peaking waves were imposed to the benthic community in different combinations and the drift caused by each event was measured. Results indicate that both cold and warm thermopeaking waves cause behavioural drift with differences among taxa.