

**University of South Bohemia
Faculty of Science**

**Effects of hydropeaking on the attached eggs of a rheophilic
cyprinid species**

RNDr. thesis

Mgr. Daniel Bartoň

České Budějovice 2023

Bartoň. D., 1999 Effects of hydropeaking on the attached eggs of a rheophilic cyprinid species. RNDr. Thesis, in English. – 12 p., Faculty of Science, University of South Bohemia, České Budějovice, Czech Republic.

Anotace: Ability of eggs of asp (*Leuciscus aspius*) to survive an increased water velocity was tested in experimental condition as well as in situ. Hydropeaking occurs on the study site and can cause detachment of most spawned eggs.

Prohlašuji, že jsem autorem této kvalifikační práce a že jsem ji vypracoval(a) pouze s použitím pramenů a literatury uvedených v seznamu použitých zdrojů.

Místo, datum.

Podpis studenta

Author contributions of the manuscript of the thesis:

Daniel Bartoň, Marek Šmejkal, Allan T. Souza, Petr Blabolil, Zuzana Sajdlová, Lukáš Vejřík, Tomáš Kolařík, Felipe Bretón and Jan Kubečka participated in the field work. Marek Šmejkal and Daniel Bartoň designed the study. Felipe Bretón did the hydraulic model. Daniel Bartoň, Allan T. Souza and Marek Šmejkal contributed to the statistical analysis. Daniel Bartoň and Marek Šmejkal graphically presented data. Daniel Bartoň wrote the first draft.

Overall procentual contribution:

Daniel Bartoň: 60%

Marek Šmejkal: 25%

Felipe Bretón: 5%

Allan T. Souza: 2%

Petr Blabolil: 2%

Zuzana Sajdlová: 2%

Tomáš Kolařík: 2%

Jan Kubečka: 2%

Effects of hydropeaking on the attached eggs of a rheophilic cyprinid species

Daniel Bartoň^{a,b}, Felipe Bretón^{b,c}, Petr Blabolil^{a,b}, Allan T. Souza^a, Lukáš Vejřík^a, Zuzana Sajdlová^a,
Tomáš Kolařík^a, Jan Kubečka^a, Marek Šmejkal^{a*}

^a Biology Centre of the Czech Academy of Sciences, Institute of Hydrobiology, České Budějovice, Czech Republic

^b Faculty of Science, University of South Bohemia, České Budějovice, Czech Republic

^c Biology Centre of the Czech Academy of Sciences, SOWA, České Budějovice, Czech Republic

* Corresponding author: marek.smejkal@hbu.cas.cz

Biology Centre of the Czech Academy of Sciences, Institute of Hydrobiology, České Budějovice, Czech Republic, Na Sádkách 7, 370 05

Citation: Bartoň, D, Bretón, F, Blabolil, P, et al. Effects of hydropeaking on the attached eggs of a rheophilic cyprinid species. *Ecohydrology*. 2021; 14:e2280. <https://doi.org/10.1002/eco.2280>

Abstract

Human-induced changes in the hydrological regimes of lotic waters such as hydropeaking have significant negative impacts on riverine life. However, the impacts of dynamic changes in water flow on adhesive fish eggs are not very well known. We focused on the effects of hydropeaking on the spawning ground of a rheophilic cyprinid fish, the asp (*Leuciscus aspius*). We tested whether a sudden increase in water velocity caused by hydropeaking may have negative effect on the adhesive eggs by the combination of field observations and laboratory experiments. The main objectives of the study were to: i) investigate abiotic characteristics of an asp spawning ground, ii) monitor egg densities in relation to hydropeaking events and iii) test detachment rates of the asp eggs in laboratory conditions in relation to water velocity. The asp spawning ground was associated with shallow water depths (0.2–0.4 m) and flowing water (0.1–0.4 m.s⁻¹) during base flow. The water velocity that occurred on the spawning ground during the hydropeaking event was measured to be from 0.7–1.2 m.s⁻¹. Asp eggs nearly disappeared from the spawning ground before their hatching time probably due to several hydropeaking events. The laboratory experiments showed the significant dependency of egg detachment rates on the water velocity and substrate type with a critical value of 0.7 m.s⁻¹. Our data suggested that eggs may be negatively impacted by flow alterations. Avoiding hydropeaking or keeping water velocity below critical values is recommended for the management of rheophilous fish spawning grounds.

Keywords: fish reproduction, *Leuciscus aspius*, wildlife conservation, river ecology, habitat alternation

Running head: Effects of hydropeaking on the attached eggs of a rheophilic fish