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TITLE: Effects of Hydropeaking and Substrate Type on Periphyton Nutritional Quality in an Alpine Stream

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ABSTRACT BODY: Hydropeaking is well known for its direct, physical impact on river systems through the effect of scour causing catastrophic drift in aquatic communities. Moreover, river regulation with daily hydropeaking may persistently alter periphyton abundance and nutritional quality (e.g. nutrient ratios and essential fatty acids) compared to reference conditions, resulting in an indirect and potentially overlooked limiting effect on the aquatic communities in hydropower-impacted streams. Periphyton nutritional quality, especially fatty acids, have been suggested to be a fundamental limiting resource in aquatic systems, and have been demonstrated to be an important control on consumer growth rates, energy assimilation, reproduction, and other physiological responses.

We simulated daily 8-hour hydropeak events over the course of 5 days in an in situ, open air, experimental flume system naturally fed by a pristine 2nd order Alpine stream. The effect of two different hydropeak magnitudes (2x and 3x baseflow) were examined on both wood and tile substrates in both spring and summer seasons. Hydropeaking resulted in decreased periphyton biomass growing on tiles, but there was no corresponding decrease in periphyton growing on wood. Changes in periphyton C:N stoichiometry, but not C:P, also varied with substrate type. We will also discuss the change in diatom and total algal species composition and total, polyunsaturated, and $\omega 3/$ $\omega 6$ fatty acid composition. These results suggest that substrates respond differently to the scour effects of hydropeaking, and that the overall nutritional quality of periphyton downstream of hydropeaking dams may be dependent on the relative availability of wood substrates.

KEYWORDS: 1845 HYDROLOGY Limnology, 1808 HYDROLOGY Dams, 1803 HYDROLOGY Anthropogenic effects, 1880 HYDROLOGY Water management.

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