Disentangling the responses of boreal stream assemblages to low stressor levels of diffuse pollution and altered channel morphology (Turunen et al. 2016) [1]

Non-point diffuse pollution from land use and alteration of hydromorphology are among the most detrimental stressors to stream ecosystems. We explored the independent and interactive effects of morphological channel alteration (channelization for water transport of timber) and diffuse pollution on species richness and community structure of four organism groups in boreal streams: diatoms, macrophytes, macroinvertebrates, and fish. Furthermore, the effect of these stressors on stream condition was evaluated by Ecological Quality Ratios (EQR) from the national Water Framework Directive (WFD) assessment system.

We grouped 91 study sites into four groups that were impacted by either diffuse pollution or hydromorphological alteration, by both stressors, or by neither one. Macroinvertebrate richness was reduced by diffuse pollution, whereas other biological groups were unaltered. Hydromorphological modification had no effect on taxon richness of any of the assemblages. Community structure of all groups was significantly affected by diffuse pollution but not by hydromorphology. Similarly, EQRs indicated negative response by diatoms, macroinvertebrates and fish to diffuse pollution, but not to hydromorphological alteration. Agricultural diffuse pollution thus affected species identities and abundances rather than taxonomic richness. Our results suggest that channelization of boreal streams for timber transport has not altered hydromorphological conditions sufficiently to have a strong impact on stream biota, whereas even moderate nutrient enrichment may be ecologically harmful. Controlling diffuse pollution and associated land use stressors should be prioritized over restoration of in-stream habitat structure to improve the ecological condition of boreal streams.

Highlights

Streams are affected by many simultaneously operating anthropogenic stressors.

Both diffuse pollution and hydromorphological alteration may affect stream biota.

Assemblages responded to diffuse pollution but not to low morphological alteration.

No stressor interactions were detected across the studied stressor gradients.

Mitigation of diffuse pollution should be prioritized over in-stream restoration.

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http://www.sciencedirect.com/science/article/pii/S0048969715311852 [2]

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[1] https://reformrivers.eu/disentangling-responses-boreal-stream-assemblages-low-stressor-levels-diffuse-pollution-and-altered
[2] http://www.sciencedirect.com/science/article/pii/S0048969715311852

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