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Understanding the effects of channel modification and flow alterations on riparian biodiversity in braided rivers

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Most braided rivers which were once widespread in mountain regions are channelized and impacted by flow regulation. Recently, elaborate attempts are underway to restore riverine habitats and to balance ecological restoration efforts with continued hydropower production. However, our understanding of the ecological consequences of morphological and hydrological river alteration is limited. One component of riverine systems often overlooked when assessing the effects of river regulations are riparian arthropods, although they contribute significantly to overall riverine biodiversity and represent a functionally important component of riverine ecosystems. To evaluate the effects of flow regulation (hydropeaking) and river channelization on riparian arthropod density and diversity, we used large-scale comparisons of twelve differently impacted gravel banks in eight mountain rivers. We simulated inundation dynamics for each gravel bank using digital elevation models and mapped substrate composition of the gravel banks. Hydropeaking significantly reduced overall arthropod abundance, and hydropeaking and channelization reduced species richness. Riparian arthropods were predominantly controlled by the availability of gravel habitat above the average high water level and substrate embeddedness. Based on our results, we developed guidelines for future restoration projects in mountain rivers.