Effects of a 100-year flood on flying Hymenoptera in riparian zones along a braided river
（100年確率洪水が網状河川河畔域におけるハチ目に与える影響）

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Disturbance is one of the most important factors which affect ecosystem function and community structure in riparian zones. Under global warming, understanding response of organisms to a high-magnitude flood is necessary. Riparian zones are important habitats (e.g. overwinter refuge) for Hymenopterans, which generally play important roles in predator-prey interactions within ecosystems. However, there are few studies that focus on response of different groups of Hymenoptera in riparian zones to an exceedingly high-magnitude flood. This study aims to clarify effects of a 100-year flood on flying Hymenoptera, and the mechanism of their response from the perspectives of community structure. We hypothesized that a flood would decrease the abundance of flying Hymenoptera, their community structure would differ among habitat types within riparian zones, and the recovery patterns from the impacts of the flood could be explained better by habitat preferences of different taxa.

The field study was conducted in the Satsunai River, a tributary of the Tokachi River in eastern Hokkaido. During August 17th to 23rd 2016, three typhoons landed in Hokkaido, recording the highest precipitation and discharge in the Satsunai River. Communities of flying arthropods were captured using Malaise traps set in different parts of riparian zones before and after the flood. Abundance of flying arthropods in the edges of riparian forests was calculated by individuals captured from June to July in 2014, 2017 and 2018. Community structure of flying Hymenoptera in three other habitat types (gravel bar, gravel bar with woody debris, and riparian forest) was determined by individuals captured in July, 2018.

Total abundance in riparian zones decreased significantly in 2017 after the flood, and remained still lower in 2018 compared with the pre-flood level in 2014. Abundance of Braconidae, Ichneaumonidae, Proctotrupidae and Scelionidae increased significantly over 2017 to 2018. However, other taxa such as Diapriidae and Drynidae remained unchanged or even decreased. Community structure differed among habitat types, with taxa such as Ichneaumonidae and Proctotrupidae characterizing the forest habitats. Overall, it was suggested that the slow recovery of community in the riparian zones after the flood was attributable to the relatively long-lasting negative effects of floods on communities in habitats, such as gravel bars with large woody debris. Higher recovery of community in riparian forests might be related to a fast recovery of their host arthropods such as Coleoptera.