



Effects of Timber Harvesting on the Wetland Ecology of Northeastern Lowland Forests

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Project Abstract

The Northern Forest is a working forest that provides benefits, including timber production, from a range of ecological community types broadly classified as lowlands and uplands. Northern Forest lowlands, including forested swamps and seeps, contain regionally important commercial tree species such as northern white cedar, balsam fir, and red spruce. Though widely harvested, impacts of forestry operations on these ecosystems are poorly understood. Yet, demand is strong for products such as softwood pulp, stud wood, and shingles from tree species common in seasonally wetted lowlands. These intermittent waters are increasingly recognized for supporting water quality, biodiversity, and critical wildlife habitat and may encounter increased regulation as the jurisdictional definition of “Waters of the United States” is revised.

Researchers will quantify ecological impacts in these lowlands and develop standardized measurement methods for assessing wetland habitats to help guide planners and forest managers. Researchers will develop a better understanding of intermittent wetland habitats and ecological processes associated with northern white cedar forests. They will compare wetland processes related to decomposition and insect populations across timber harvesting treatments and develop standard quantification methods for aquatic leaf litter processing, wood decomposition, and insect biodiversity in seasonally wetted lowlands that can be applied throughout the Northern Forest.

To aid forestry practitioners in lowland forest management planning, researchers will share tradeoffs in wetland ecosystem condition and biodiversity associated with tree harvesting methods. By understanding these ecosystems and how they respond to harvest, this study will inform sustainable management and prepare stakeholders for questions regarding ecological tradeoffs in management of intermittent waters throughout Northern Forest lowlands.

Progress in 2022

In 2022, MS student Stevie Benson, was brought onto the project, and plans for fieldwork were detailed. Field work was conducted from July through December 2022 and will resume in spring of 2023, once sites are accessible. Pilot macroinvertebrate sampling indicates high abundance of fingernail clams (*Sphaeriidae*) in leaf litter. 268



M.S. student Stevie Benson entering GPS points of leaf litter bags in the field. Photo credit: Sarah Clements



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cedar wood stakes were deployed at Penobscot Experimental Forest to measure decomposition and will be retrieved beginning in 2024; cedar stakes for the other two sites will be deployed in 2023. A total of 604 leaf litter bags were placed to measure decomposition rates between pit and mound microclimates. Deployment occurred in early November along transects between piezometer locations at harvest and control stands of each site. A meter stick and camera were also deployed at each stand to capture images to measure site conditions over winter. Initial colonizers of leaf bags collected to date have included grazers from the wholly aquatic order Plecoptera (stoneflies); additional information will be available as analyses continue.

Plans for 2023

A finalized field plan in the form of a master's thesis proposal will be finished in spring 2023. Field work will resume in March and continue through November 2023. Invertebrate sampling will be conducted in the spring and summer of 2023, with sample processing occurring concurrently. Invertebrates will be picked from each sample and identified down to the lowest reasonable taxonomic level. From these data, we plan to create a reference collection and compare between harvest and control stands at each study site.

Collaboration

Site access to cedar lowland forest at the Penobscot Experimental Forest is possible because of collaboration with the US Forest Service, with whom water table and other data is also being shared. Access to the other two sites, including harvest sites, is made possible through collaboration with Wagner Forest Management Ltd and Baskahegan company. This site will inform an understanding of these temporarily wetted habitats and potential harvest impacts.



Deployed leaf litter bags on pit (left) and mound (right) microclimates. Photo credit: Stevie Benson



Stonefly (Plecoptera) and freshwater clam (Sphaeriidae) collected from leaf litter bags in December 2022. Photo credit: Stevie Benson