

Long-term responses of the herbaceous layer to different harvesting disturbances

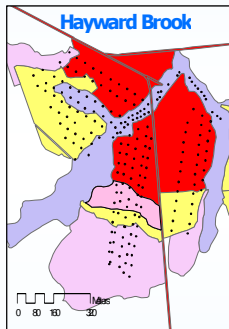
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Introduction

The main goal of this project is to determine the effects of different disturbance severities resulting from forest harvesting on herbaceous layer composition over 10 years. We compared species composition and disturbance conditions in two harvesting treatments (clearcutting followed by natural regeneration and clearcutting followed by mechanical site preparation and planting) and two unharvested controls (riparian buffer strip and upland forest).

Study area



- 56 ha watershed
- 161 permanent plots (5m²)
- Sampled before (1995) and after (1996, 1997, 1999, 2004) harvesting.

Treatment

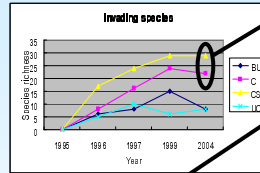
- riparian buffer strip (BU): 14 plots
- clearcut (C): 63 plots
- clearcut and site prep (CS): 49 plots
- upland forest (UC): 41 plots
- PLOT

Objectives & Preliminary results

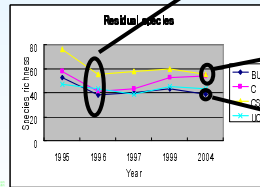
Objective 1: Examine the abundance patterns of species following two harvest treatments over the long-term compared to two unharvested areas.



Compositional changes in forest understory



The species richness of invading species (species which did not appear in the predisturbance plots) was greatest C and CS treatments.

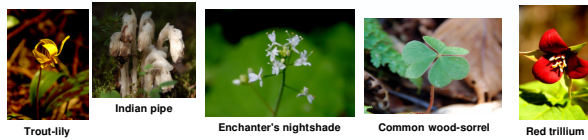


The species richness of residual species (species which already existed in the predisturbance plots) declined on all treatments in the first year following disturbance.

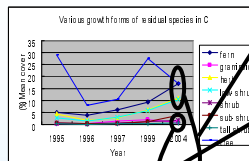
In C, richness recovered by the ninth year after disturbance.

In CS and BU, richness did not recover by the final year of sampling.

Some disturbance-sensitive species that were eliminated over the study period.

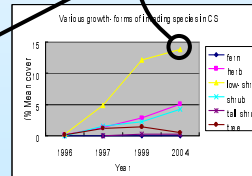
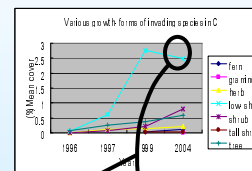
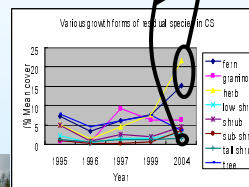


Structural changes in forest understory



Both C and CS treatments showed increases in residual species' abundance of ferns, herbs, and sub-shrubs.

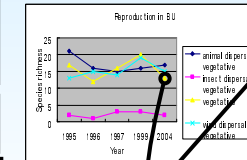
Total canopy cover of tall shrubs and trees recovered slowly.



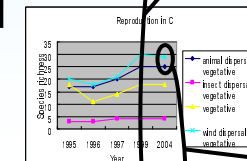
Canopy cover of invading low-shrubs (*Rubus allegheniensis*, *Rubus idaeus*, and *Diervilla lonicera*) expanded dramatically following disturbance and remained prominent throughout the study period.

Objective 2: Determine the relationship between the abundance patterns and life history traits of herbaceous species in response to disturbance.

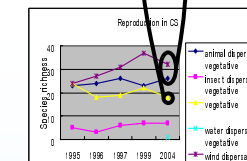
Changes in reproduction strategies in the forest understory



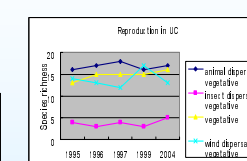
The richness of vegetative species declined in BU and CS.



This may be because neither location can provide sufficient protection against disturbance.



The species richness of wind-dispersed and animal-dispersed species increased in both C and CS.



This is due to increases of species with palatable fruits as well as of weedy species with light, easily blown seeds.

There were no major changes in the uncut controls.

Future research

- Further examine the influence of life history traits and disturbance on the timing and magnitude of individual species' abundance over the study period.
- Examine relationships between environmental features and disturbance-sensitive species, and make management guidelines for these species.