Progress Report (July 1, 2015 – November 9, 2015)

Title: Top-down effects of wildlife and bottom-up drivers of soils and productivity in intensively managed forest plantations.

Investigators: PI (point of contact): Jeff Hatten (Forest Engineering, Resources & Management)

Co-PIs: Matt Betts and Thomas Stokely (Forest Ecosystems and Society)

Project duration: July 1, 2015 – June 30, 2017

Objectives:

1. Determine the quantity and quality of O-horizon available to arthropod detritovore communities and detrital arthropod prey to songbirds.

2. Characterize the interacting effects of IFM and bird abundance on detrital arthropod communities and relative decomposition rates.

3. Characterize the impact of IFM on cervid use and the subsequent effects on relative decomposition rates.

4. Characterize role of top-down and bottom-up processes on soil fertility and conifer growth.

Summary of accomplishments toward objectives over past 6 months:

- Graduate student (Dave Frey (FERM)) has been hired and funded for his first year of graduate school from a FERM department AOC fellowship. His second year of funding will be paid from this project.
- Re-attached bird netting to the tops of the bird exclosures.
- Stand regeneration competition (cover, height, richness) was measured by life form (Aster, Forb, Graminoid, Legume, Shrub, Tall Shrub/Hardwood Trees, and Conifers).
- Stand biomass collection conducted by species on all blocks, treatments, and exclosures.
- Two big-leaf maples were planted in each exclosure plot in the summer of 2014. In the fall of 2015, we measured bole diameter at base, bole diameter at 10 cm, height, crown diameters, number of browsed petioles out of the total number of petioles and percentage of foliage with arthropod herbivory damage.
- All forest floor and mineral soil samples have been collected from each block, treatment, and exclosure. We expanded the soil sampling effort to include two mineral soil horizons (0-15cm and 15-30cm).
- All soil samples have been dried and weighed and are awaiting sorting and sieving. Currently, due to variable quantities of decomposing wood in O-horizon samples among sites and blocks, O-horizons are in the process of being sorted to remove decomposition class four and five materials.
- All soil samples' bulk density and moisture content have been determined.

- Three blocks of mineral soils have been sieved and total C and N have been determined.

Problems, barriers, proposed changes to objectives:

- Burlese funnel analysis was unproductive, most likely due to disturbance of the O-horizon collection area when removing biomass. The process was aborted after completing a full block without successfully collecting arthropods.

Planned work:

- Sort O-horizons (sorting into decayed wood from previous stand and forest floor material from regrowing stand)
- Sieve mineral soils.
- All samples will be ground and analyzed for total C and N and stable isotopes. Total C and N analysis will be complete this Winter 2016, while stable isotopes will be completed by this Spring, 2016.
- pH will be determined on all samples this winter, 2016
- Foliar samples of Douglas firs will be collected December, 2015 and will be analyzed for total N and ^{15}N Spring, 2016.
- Integration of soil and Douglas-fir foliar N characteristics will take place during the Spring and Summer of 2016.

List of names and brief overview of graduate and/or undergraduate engagement in project:

Dave Frey has taken the lead on all soil sample collection, processing, and laboratory analysis. Dave will be taking the lead on all data analysis and manuscript/thesis preparation. He will also work with Thomas Stokely and other members of the research team to integrate these results into the efforts of the entire project.

Thomas Stokely is working with Dave to collect soil and vegetation samples and the assist the integration of soils and vegetation data into the overarching goals of the project.

List of presentations, posters, etc.:

None to report

List of publications, thesis citations:

None to report