

Project Subject/Title: WI DNR Good Neighbor Authority White Pine Aerial Seeding in a Paper Birch Stand

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Abstract: Stand goals were to convert a paper birch stand with an understory of balsam fir and soft maple into a white pine stand using a shelterwood harvest, scarification and aerial seeding. Aggressive regenerators such as aspen were not harvested to reduce regeneration competition while large leaved trees such as maple and basswood were discriminated against to prevent leaf litter from smothering seedlings. Harvest occurred in 2017 along with scarification, and aerial seeding of white pine was conducted in the spring of 2018. It is still too early (only year 3 since direct seeding occurred) to determine the efficacy of the treatment, but preliminary results indicate that undesirable species such as sugar maple, as well as raspberry and blackberries may be preventing regeneration of desirable white pine seedlings in the desired densities. Recommendation for future entries would be to do a shrub reduction treatment to reduce the density of undesirable species and give desired species such as white pine a chance to get above the shrub layer.

Trial Location: Sawyer County, near Clam Lake, WI

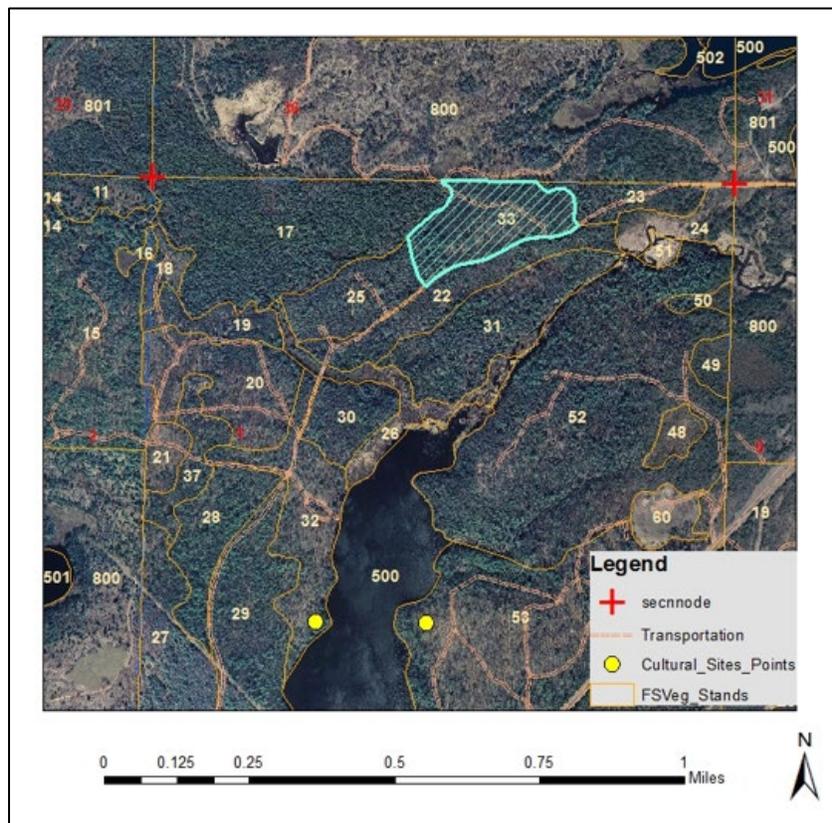
Township: 42 North

Range: 5 West

Section: 1

GPS: Lat:46.153566N

Long: -90.933331



Baseline Stand Data:

- **Cover Type (primary, secondary, understory)**
 - Small saw size Paper Birch overstory with small pole size balsam fir filling in in the midstory and understory, also contain minor components of white spruce, soft maple, and white pine.
- **Acres**
 - 20
- **Habitat Type**
 - PArVVa
- **Soil Type**
 - Karlin-fine sandy loam
- **Year of Origin**
 - 1911
- **Site Index Species and Site Index**
 - Birch, 59
- **Mean Stand Diameter**
 - 8
- **Total Basal Area per acre**
 - 158

Prescription and Methods:

- **Type of prescription:**
 - Shelterwood harvest, reducing stand crown closure to 40% of original. Cut all trees 2 inches in diameter or larger. Refrain from cutting any aspen, block or white spruce, tamarack, cedar, white pine, red pine, oak, yellow birch, hemlock, butternut or any other tree marked with orange paint. Discriminate against maple, basswood or other large, leafed hardwoods to prevent leaf litter from covering up white pine seedlings regenerating. Final overstory removal will be deferred and will likely not occur.
- **Year initiated:**
 - Cut in the fall of 2017 along with scarification, seeding occurred spring of 2018
- **Establishment methods (timing, equipment etc):**
 - Site preparation occurred through soil disturbance from equipment during the harvest, and aerial seeding of ¼ lb. of white pine seeds/acre
- **Data collection methods:**
 - 1/300th acre regeneration FRM survey plots, 3rd, and 5th year following direct seeding establishment

Results

In the fall of 2021, three years after initial seeding, eighteen 1/300th acre FRM plots were surveyed across the stand. The predominant species regenerating was sugar maple with approximately 1400 stems per acre followed by red maple with 600 stems per acre. White pine was the third most abundant

species sampled occurring in 14/18 plots and had a little over 500 stems per acre. There were a little over 330 red oak seedlings as well. In total there were approximately 3700 seedlings per acre within the stand.

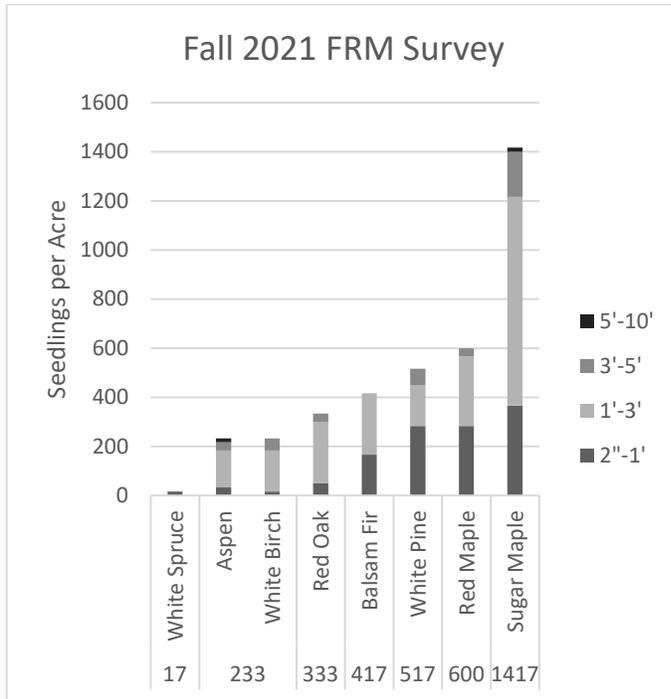


Figure 1 Stacked bar chart of species regeneration 3 years following initial seeding.

Table 1 Seedling stems per acre for species regenerating following initial treatments.

Species	2" to 1' per acre	1'-3' per acre	3'-5' per acre	5'-10' per acre	Trees Per Acre
White Spruce	17	0	0	0	17
Aspen	33	150	33	17	233
White Birch	17	167	50	0	233
Red Oak	50	250	33	0	333
Balsam Fir	167	250	0	0	417
White Pine	283	167	67	0	517
Red Maple	283	283	33	0	600
Sugar Maple	367	850	183	17	1417

Due to the increased light availability within the stand shrub species such as raspberry and blackberry were abundant with 75% of plots having over 50% shrub cover. Herb cover did not appear to be impeding regeneration to the same extent that shrub cover was.

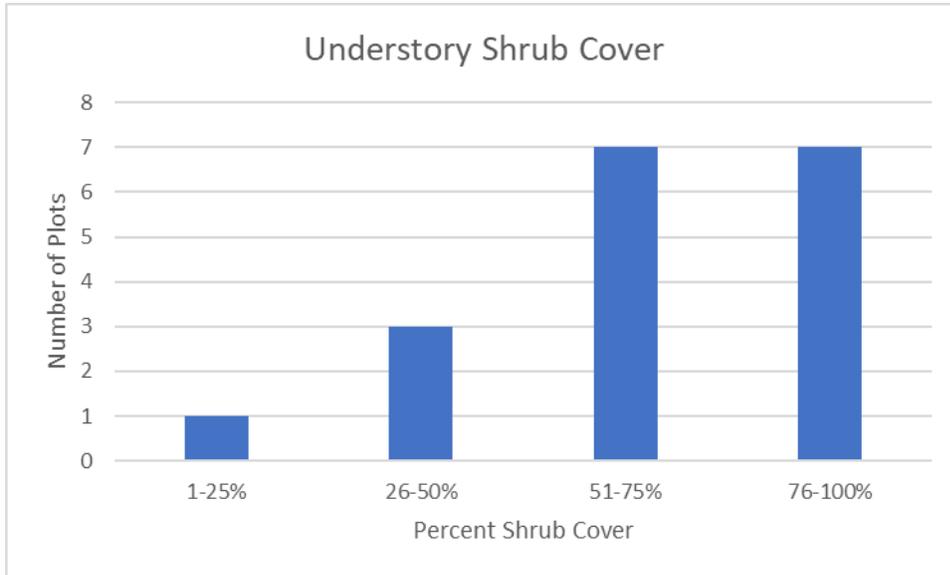


Figure 2 Bar chart of percent cover of shrubs that are competing with tree regeneration.

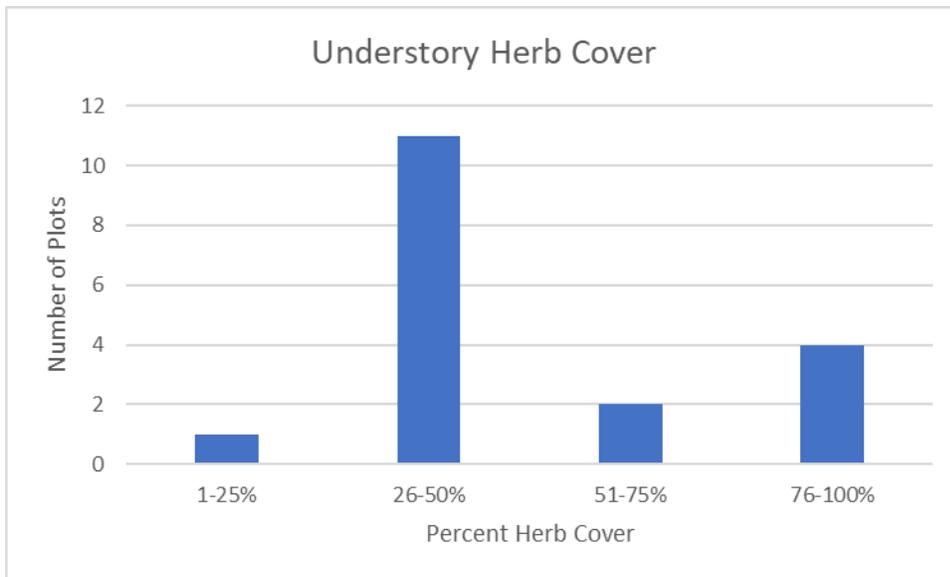


Figure 3 Bar chart of percent cover of herbs that are competing with regeneration.

Discussion/ Recommendations

Three years following the direct seeding of white pine within the stand there are a little over 500 seedling per acre. The U.S.F.S. uses a minimum stocking density of 800 stems per acre to certify a white pine stand after year 5, which may make certifying this stand as fully stocked with white pine difficult. The species with the highest density of seedlings is sugar maple. The white pine that are regenerating within the stand range in sizes with some reaching the three-to-five-foot size class, and others that were observed but not sampled exceeding that size range. The white pine is there but they are sparse, and many are stuck below a dense shrub layer. Recommendations for future entries may be supplemental planting as well as a shrub reduction treatment to knock back the advancing maple regeneration as well as the raspberry and blackberries that are abundant within the stand. There is also a modest number of oak seedlings regenerating within the stand as well that would benefit from such a treatment and create a good mixed stand of red oak and white pine in the future should those seedlings be able to take hold and get above the competition.

Supplemental figures:



Figure 4 2015 pre-harvest aerial imagery. Source: WI DNR Surface Water Data Viewer



Figure 5 2020 post-harvest aerial imagery. Source: WI DNR Surface Water Data Viewer



Figure 6 Photo from within the stand, showing current overstory, and density of competing vegetation.

Table 2 Average percent of deer browse observed in each plot by species.

Species	Average Browse
Aspen	20
White Birch	10
Balsam Fir	0
Sugar Maple	19.5
Red Maple	14.07692
Red Oak	33.27273
White Pine	0
White Spruce	0



Figure 7 Photo from within the stand showing scattered advanced regeneration of white pine. Pine were patchy and occurred in clumps