

Scarification Trial in Red Oak

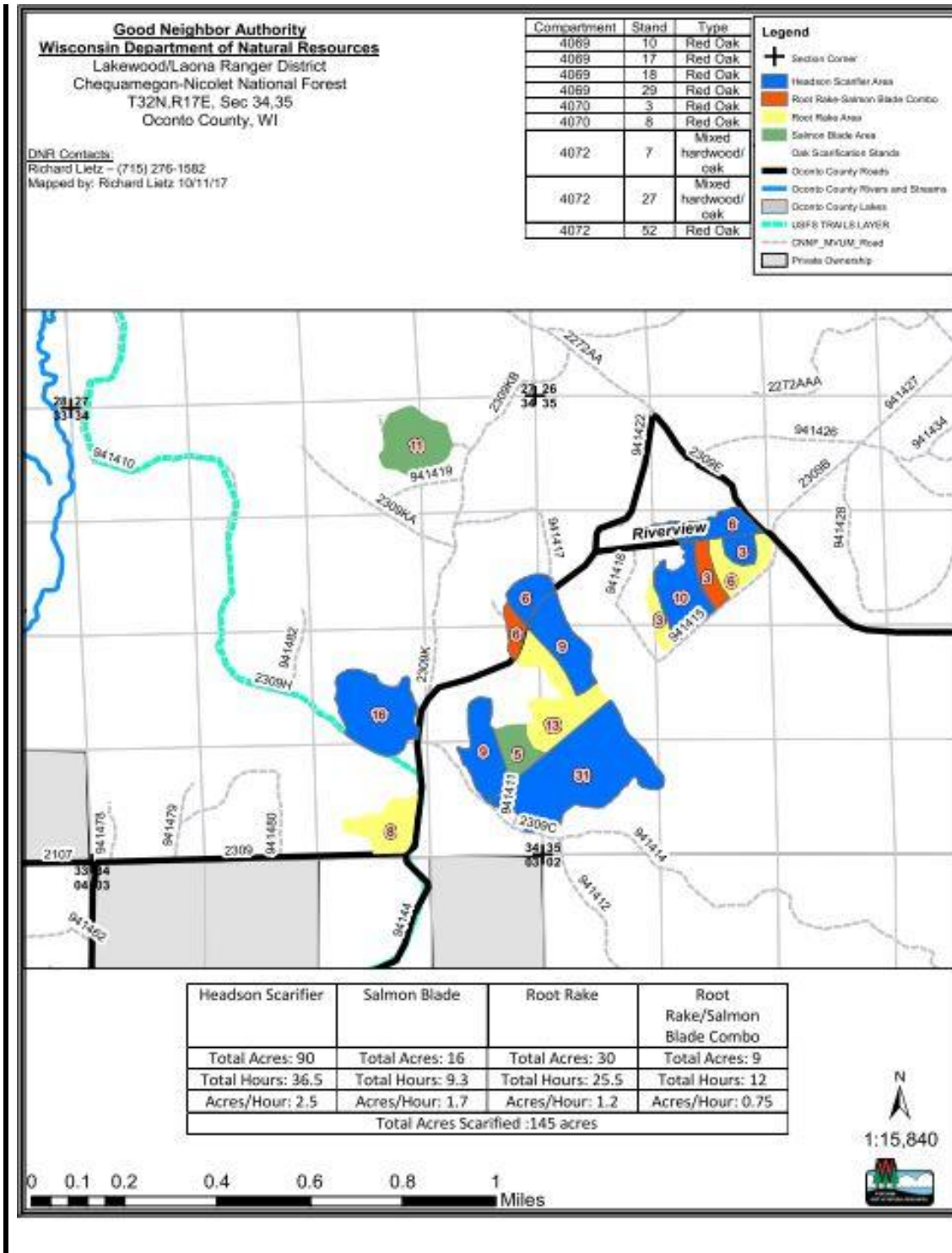
Project Subject/Title: Oak Scarification Trial in Good Neighbor Authority

Contact Person: WDNR Greg Edge & Rich Lietz

Abstract: The prescriptions for the nine stands involved in this trial were developed and implemented through the Good Neighbor Authority partnership between the U.S. Forest Service and Wisconsin Department of Natural Resources. All stands were primarily red oak dominated with various mixtures of white pine, red pine, red maple, and aspen. The shelterwood regeneration method was prescribed for all stands to begin the regeneration process and promote conditions favorable for the establishment of red oak, white pine, and red pine. The trial included three different pre-sale mechanical scarification techniques, utilizing a root rake, Headson scarifier, and Salmon blade. This report is an initial summary of the scarification treatments. Additional information will be provided on treatment results as future regeneration surveys are conducted

Trial Location:

<p>County: <u>Oconto</u></p> <p>—</p> <p>Township: <u>32N</u> Range: <u>17E</u> Section: <u>34,35</u></p> <p>GPS Coordinates: Lat: _____ Long: _____</p> <p>Property Name: <u>Lakewood District, Chequamegon Nicolet National Forest</u></p> <p>Site Map:</p>



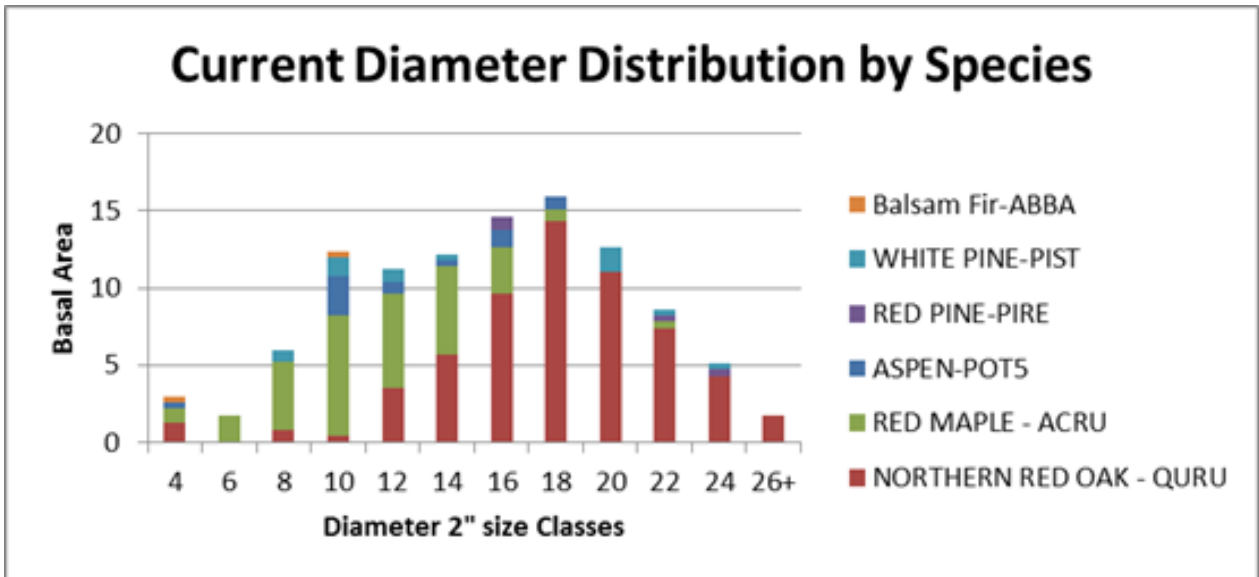
Baseline Stand Data:

- *Cover Type – Red Oak*
- *Acres – 145 of 225 ac*
- *Habitat Type - PArVAo, PArVAa-Vb, AVb*
- *Soil Type- Menahga sand, Keweenaw loamy fine sand*

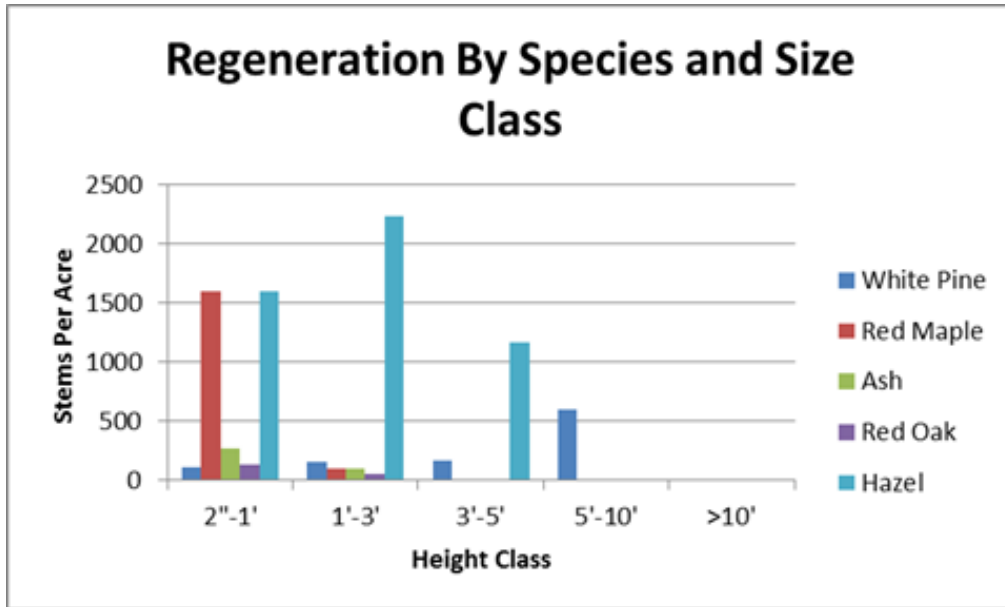
- *Year of Origin - 1918*
- *Total Height*
- *Site Index Species and Site Index – 61-75 (red oak)*
- *Mean Stand Diameter*
- *Total Basal Area per acre:*
 - Stand 4069-010 – 130 ft²/acre*
 - Stand 4069-017 – 123 ft²/acre*
 - Stand 4069-018 – 115 ft²/acre*
 - Stand 4069-020 – 150 ft²/acre*
 - Stand 4070-003 – 105 ft²/acre*
 - Stand 4070-008 – 127 ft²/acre*
 - Stand 4072-007 – 100 ft²/acre*
 - Stand 4072-027 – 109 ft²/acre*
 - Stand 4072-052 – 99 ft²/acre*

Other stand conditions - Understory – Most stands contain an abundant layer of hazel (*Corylus* spp.), along with small advance regeneration of red maple, red oak, and white pine.

Stand 4070-003



Stand 4070-003



Prescription and Methods:

Since northern red oak, eastern white pine, and red pine are the desired dominant tree species across all nine stands, the focus of this trial was to test different mechanical scarification techniques to control interfering vegetation (e.g., hazel) and to create a favorable mineral soil seedbed for germination of these species. Mechanical scarification using small dozers with various attachments has become increasingly common in Wisconsin, especially to promote oak regeneration by uprooting vegetation, exposing mineral soil, and incorporating acorns. This trial compared three different scarification attachments (i.e., root rake, Headson scarifier, and Salmon blade) to evaluate operating costs and effectiveness.

Pre-harvest scarification was conducted in late September to early October of 2017, treating a total of 145 acres. All scarification was conducted pre-harvest in early fall prior to or just after seed fall. The prescription called for shallow scarification of at least 50% of the ground area. Scarification was limited to a portion of most stands, due to the presence of adequate advance regeneration in some areas that were protected and left unscarified. Wisconsin DNR fire dozers and operators were used to work the three scarification attachments.

Following scarification treatments, all stands will be harvested using a 2 or 3-cut shelterwood, with an initial seeding cut to a 50% crown cover to improve light conditions for developing seedlings. Designated seed trees will favor red oak, followed by white pine and red pine. Once adequate regeneration is established, the overstory will be mostly removed in stages. Long term objectives include managing on an extended rotation and promoting uneven-aged cohorts within the stands, so reserve trees and reserve patches will be maintained in subsequent harvests.

Results: Initial assessments determined that all three scarification methods successfully exposed mineral soil and uprooted or damaged interfering vegetation, but with varying degrees of disturbance and operational efficiency. The Headson scarifier had the best production rate of 2.5 acres/hour, or nearly twice as fast as the other methods. The Headson was also very maneuverable and being a rear attachment meant that the dozer blade could be used in tandem to move debris and shear/root-spring vegetation in front of the dozer. One pass did not yield the best results however, so multiple passes were needed to remove much of the hazel (see Photo 2).

The Salmon blade was the second fastest production rate at 1.7 acres/hour. Operators had difficulty with this attachment due to the lack of visibility of the forks/blades, which were somewhat hidden behind the main dozer blade (see Photo 5). Maneuverability was also difficult due to the plow attachment on the back of the dozer. Operators felt the Salmon blade was less prone to getting clogged with debris and did a good job of exposing mineral soil.

The root rake had a somewhat slower production rate at 1.2 acres/hour. Operators felt the root rake was maneuverable, visible and effective at uprooting the hazel, but was more easily clogged with debris due to the multiple teeth and generally exposed less mineral soil (see Photo 4).

Post-treatment regeneration data are not yet available. Regeneration surveys will be conducted at years three and five post-treatment. USFS natural regeneration standards for the Chequamegon-Nicolet will require a minimum of 550 red oak or 800 white pine stems per acre by year five in these stands.

Discussion/Recommendations: The shelterwood seed cuts have been established within the nine stands and will be harvested in the years 2018 and 2019. Regeneration surveys will be conducted in the years 2021 and 2023. Photo points taken prior to treatments will also be used to evaluate treatment impacts to the interfering vegetation. Comments from the equipment operators included suggestions to remove some of the standard fire dozer equipment prior to scarification operations. With the root rake and Salmon blade, removal of the fire plow would improve overall maneuverability within the stand. Removal of fire curtain would improve visibility for the operator.

Photographs



Photo 1 - Headson scarifier. Developed at the WDNR Forestry Equipment Research and Development Center in Tomahawk, WI



Photo 2 – Headson scarifier in operation



Photo 3 - Root rake attachment



Photo 4 – Root rake in operation



Photo 5 - Salmon blade attachment



Photo 6 – Salmon blade in operation