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Schmeeckle Oak Savanna Restoration

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Abstract:

Oak savannas historically represented 15% of Wisconsin's landscape. Due to both fire suppression and conversion to agriculture, savannas are now the most endangered ecosystem in the Lake States. Savannas provide a range of ecosystem services and support a number of threatened and endangered species. Savannas differ from both grasslands and woodlands by having only partial crown cover by trees. For restoration activities, meeting crown cover goals inherent to savannas is quite important to their success. A solution to meeting these crown cover goals can be found with the utilization of GIS and hierarchical ranking. For this project, every tree in the savanna restoration unit was identified, measured, and geo-referenced. The individual trees were ranked 0-10 based on their historic presence, size, and form. The higher the score the more desirable that individual tree is for retention on the site. Using ArcMap, each tree received a buffer which was calculated to represent the crown of a tree. Combined with the score, decisions could be made for which trees to keep or remove. The goal was to meet 25% crown closure and increase oak savanna biodiversity. Once the model was created, the site was marked and cut to meet those goals. This technique could allow managers to better model future crown cover with savanna restoration.

Methods:

- The species was identified for each tree in the plot, d.b.h. was measured, and the location was geospatially referenced using Avenza Maps. Each tree was ranked based on their species, size, and form displayed in (Table 1). The crown radius was then calculated using the crown area equation provided by (Demchik, 2017). The existing plot was represented by combining the score and crown area of the trees using Arc GIS. Individually, trees were selected for removal based on their score and crown area to reach the 25% crown cover goal. The removal was conducted by the S212 class and the Schmeeckle Reserve crew.

- In the quadratic regression, D was not significant ($p = 0.498$); however, D^2 was significant ($p < 0.001$). The following equation predicted crown are with an r^2 of .84 ($p < 0.001$). (Demchik, 2017)

  - $CA = -54.80 + 3.539(D^2)$
    - CA = Crown area

Literature Cited:

Demchik, M.C.; Virden, S.M.; Buchanan, Z.L.; Johnson, A.M. 2017. Maximum crown area equation for open-grown bur oak. In: Kabrick, John M.; Dey, Daniel C.; Knapp, Benjamin O.; Larsen, David R.; Shifley, Stephen R.; Stelzer, Henry E., eds. Proceedings of the 20th Central Hardwood Forest Conference; 2016 March 28-April 1; Columbia, MO. General Technical Report NRS-P-167. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station: 292-296.

Table 1. Hierarchical ranking for historic presence, size, and form.

Score System	Score
Tree Species	
White oak family	10
Red oak family	1
White pine	5
Other species	0
Diameter Size Class (Inches)	
0"-10"	0
10"-15"	1
15"-20"	2
20"-25"	3
25"-30"	4
30"+	5

* 2 points for multiple stem tree

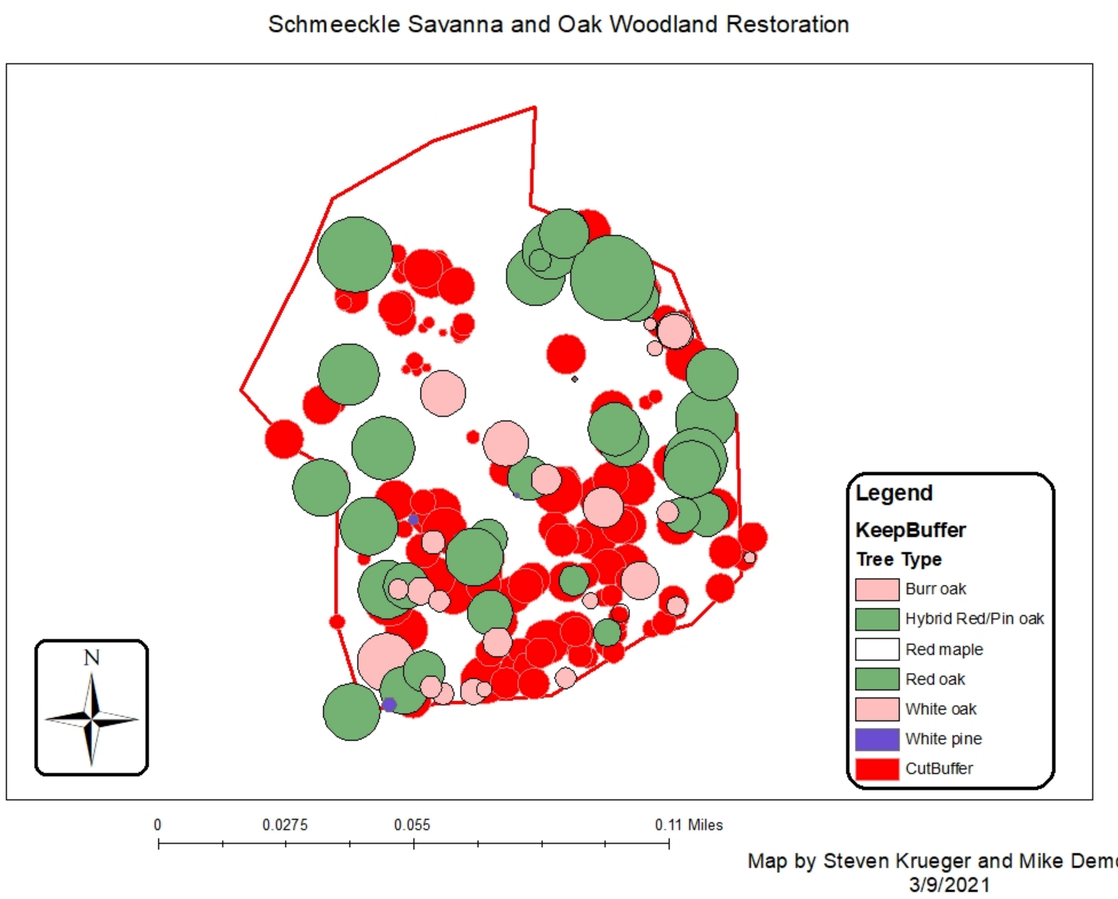

Figure 1. Depicts total crown cover in the plot before thinning.

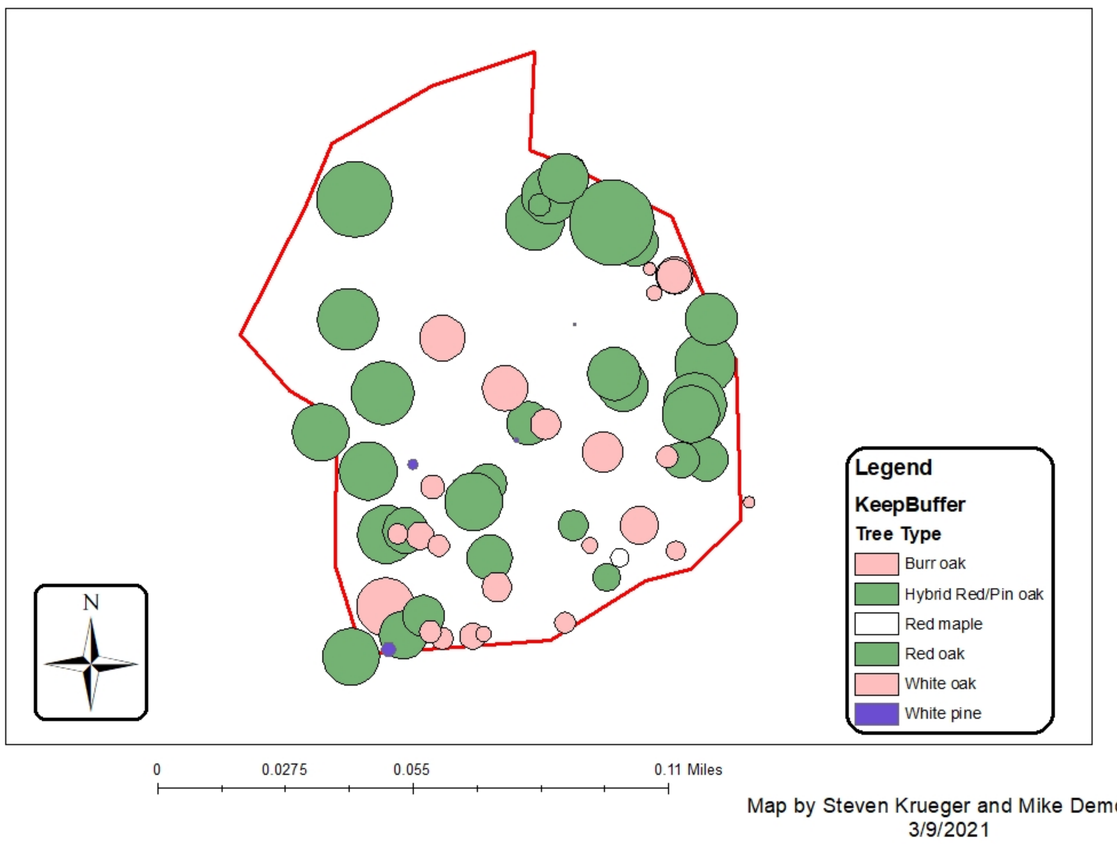

Figure 2. Depicts final crown cover in the plot after thinning.