Fisher Farm Biodiversity Report December 2023

A follow-up report to the Summer 2023 Assessment of Biodiversity at Fisher Farm.

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A summary of the completed management activity of Fall 2023 and recommendations for continued management in the Davidson Lands Conservancy-managed Fisher Farm's approximately 18 acre forest stand.

Contents:

Introduction

This report serves as a follow-up to the Summer 2023 report "Assessment of Biodiversity at Fisher Farm" by Kevin G. Smith and his lab students at Davidson College. The findings and recommendations of that report are based on comprehensive biodiversity surveys conducted over the summer of 2023 and a wide review of relevant literature. That report is still the most comprehensive resource regarding the biodiversity at Fisher Farm and current management recommendations. This report focuses on summarizing the work done by student Lauren Collver in the fall of 2023 and adds additional context and recommendations.

Invasive Species Removal

Completed Management:

During October and November of 2023, approximately 40 hours of manual work were conducted by Lauren Collver with the sole purpose of controlling invasive shrub species in the southern section of Fisher Farm's 18 acre forest stand. Main target species were autumn olive (*Elaeagnus umbellata*), winter honeysuckle (*Lonicera fragrantissima*), and Chinese privet (*Ligustrum sinense*). Additional species that were removed if encountered included trifoliate orange (*Citrus trifoliata*), multiflora rose (*Rosa multiflora*), and winged Euonymus (*Euonymus alatus*).

The majority of the manual removal was accomplished by a cut-and-paint method using a recommended herbicide mixture of Garlon 3A (Triclopyr) and Arsenal (Imazapyr). Some foliar application was utilized near the completion of the project in order to effectively reduce large spreads of small individuals and specifically to target winter honeysuckle.

The invasive species removal work was focused on the lower (southwestern) region of the forest plot, which was determined based on density levels and recommendations outlined in the Summer 2023 biodiversity report as well as a necessary balance of work and time constraints. The area managed during this phase of work makes up approximately 6 acres.

In the area where management was conducted, large thickets of autumn olive and winter honeysuckle were removed creating a visible improvement in density and sunlight availability to the forest floor. Where dense thickets were not present, small patches and individuals were also killed in order to reduce the potential for the establishment of future high density areas.

Figure 1: The approximately 6 acres in which removal was conducted.

Recommendations:

Removal work is expected to have a significant impact on reducing the extent to which target species dominate and out-compete other species on a short-term scale. Where removal did not occur, dense thickets of invasive shrubs remain in patches throughout and potentially continue to out-compete native shrubs and herbaceous species via dense shading of the forest floor. Should continued support of diverse native species' ability to compete with the dominant invasive species be desired, efforts should be made to continually implement control methods both in the area where management has already occurred and throughout the plot. Invasive species such as autumn olive and winter honeysuckle are well established in the area and thus, as stated in the Summer 2023 report, permanent removal and eradication of these species is highly unrealistic. Despite this, maintenance of invasive shrubs at low densities is possible with continued management.

One possible avenue for continued removal work, both in the studied forest patch and throughout Fisher Farm, could be volunteer work. While handling herbicides may be a risk in terms of safety and environmental responsibility, there may be some individuals capable of helping to pull out small plants and cut and treat larger ones. Autumn olive is especially abundant along the walking trail that runs through the forest patch and is easily accessible in those areas without having to walk through the more uneven and steep areas of the forest.

Autumn Olive Response to Fire:

Most likely, autumn olive cannot be controlled by a single prescribed burn. Evidence suggests that autumn olive responds to fire by resprouting, potentially in a vigorous manner. Prescribed burning can be effective if used in conjunction with herbicide treatment, or if multiple burns are conducted. Burning could be effective to reduce large autumn olive shrubs as long as follow-up treatment occurs. Resprouts post-fire could be treated with herbicide or with subsequent burns.

Forest Stand Improvement Recommendations

As presented in the Summer 2023 report, understory sunlight levels in the forest patch are very low. Each area of the plot has less than 5% available sunlight reaching below the canopy. Increasing these light levels by reducing the tree canopy density could contribute to a more diverse understory and forest floor ecosystem. This approach should include killing and/or removing select trees based on light levels and tree density in the area.

Figure 2: Areas of recommended forest stand management

Section 1:

- This area has the lowest sunlight levels and a very dense midstory. It is likely much of the midstory will be killed via the recommended prescribed burn. Following this burn, selective thinning of canopy trees that are currently growing in patches could support the growth and canopy release of favored canopy trees. For example, some patches are found in this area where canopy sized hickories or oaks grow in close proximity to canopy sized sweetgums. Killing select sweetgums and either allowing them to remain as snags to provide wildlife habitat or removing them completely could support the growth of nearby hickories or oaks.

Sections 2 and 3:

- These sections represent a ridge in the center of the plot where mature trees are abundant.
- In the southwestern region of this ridge (Section 2), there is a highly dense midstory where thinning of some smaller trees in the midstory could improve light levels and support a diverse understory. This area has few mature canopy trees in general, and so thinning to reduce competition and to select a few trees to become the future canopy could help ensure a diverse canopy in the future. Additionally, thinning trees growing in close proximity to large mature oaks in this region could allow for canopy release of select oaks and lead to a larger and more acorn productive canopy to increase food availability in the plot.
- In the northeastern region of this ridge (Section 3), the midstory is not as dense but mature trees would still benefit from thinning to increase sunlight levels in this area.

Section 4:

- This section represents a ridge between two large ravines. The ravines themselves are difficult to navigate and would make management difficult, so focusing on the more accessible upland region is recommended. This area has one of the lowest sunlight levels in the plot and notably very high coverage of vines on the forest floor.

Other sections:

- Canopy thinning could be applied throughout the forest patch, but the sections highlighted here are specifically chosen based on their sunlight levels, density of midstory and canopy, presence of large mature trees, and overall physical accessibility. Forest management should aim to create diverse habitat rather than managing each area in the same way, and so leaving some areas alone while managing those that would benefit most from it could support a more diverse range of habitat while allowing for flexibility in the time and scale of management activity.

Prescribed Burn

Overall, a prescribed burn is highly desirable and would result in significant changes to both support biodiversity and reduce tree litter loads. There are options in terms of location and scale of a burn. One option is to implement an experimental approach by burning about 50% of the area, which would create the opportunity for future research on the effects of a burn and could create an opportunity to demonstrate the benefits of prescribed burning to the park visitors. Alternatively, a larger area and potentially the full area could be burned to achieve full management without having to establish fire break within the forest. One potential challenge for a full-area burn is the physical topography of the area, which consists of many steep hills that could make directing the fire difficult. The eastern edge of the forest patch has high priority for management with a burn due to high densities of small diameter ash and elm trees.

A burn would help to decrease density of small trees, which would both support diversity of the future canopy and increase light levels on the forest floor. Additionally, it would reduce tree litter which will both reduce the risk of high intensity wildfire and support understory growth by exposing the seedbank. It could lead to an increase in invasive species but overall herbaceous cover would increase while it is currently suppressed by low light levels and high tree density. Overall, a prescribed burn can perform a variety of functions for the forest ecosystem in a more efficient and effective manner than people.

Literature Cited:

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