# Clever Woodland

Bio-Inventory Report

Submitted to
MSU Campus Natural Areas Classroom, Curriculum and Conservation
Committee Submitted February 2024 by Sean Ward

**Executive Summary and Recommendations**

Clever Woodland is a low-quality representation of a southern mesic forest. It has been degraded by human disturbances and its consequences can be seen throughout its canopy, understory, and regeneration layers. A total of 61 species of vascular plants were identified in this woodland. Of these, 36 were native species to Michigan. Based on a Floristic Quality Assessment, the plant diversity represented here is low, which is likely due to its small size, isolation from other forest patches, and surrounding agricultural areas. Many non-native species were found, and abundance will likely increase within the woodland. Being connected to Elsesser East, the invasive species will likely proliferate throughout both woodlands in the coming years. Most of the invasive species occur within a once wooded area that now seems to be either grazed or felled. There is little evidence of past and ongoing research here, and it is not clear that any is currently active.

There are no notable features from a conservation perspective within Clever Woodland. Instead, this woodland is an exemplar of degraded forest fragments surrounded by agricultural land. It will be important to remedy the disturbance that has destroyed the understory and regeneration layers in some parts of Clever to ensure the canopy will remain. Clever Woodland is surrounded by the MSU Swine Teaching and Research Center and University Farms Service Center, requiring clearance for access. In addition, from the parking area, you can only access

Clever by walking along the edge of an agricultural field. Access is restricted by the fence that separates Elsesser East. This aspect makes this woodland more difficult to access for the public. However, this could benefit researchers who wish less public access. This woodland was surveyed during June 2023.

*Recommendations*

1. The cause of the disturbed area should be found and addressed to prevent further losses.
2. Non-native and invasive species that have invaded the interior of this woodland should be managed while they are relatively non-abundant to prevent spreading and a subsequent loss of biodiversity.
3. Completely enclosing Clever from Elsesser East might protect the latter woodland from becoming similarly degraded.

**Forest Inventory**

*Overstory*

Twelve tree species were found in the overstory (>4" dbh) within Clever Woodland. Of these, only 2 were encountered in a fixed-area plot inventory and the other 10 were encountered during a meandering survey of the woodland. Living overstory (>4" dbh) trees had a total basal area of 215 $ft^2\ ac^{-1}$ and a stem density of 90 trees per acre. Sugar maple (*Acer saccharum*) is this woodland's most important overstory species as it has the highest relative density, dominance, and frequency. However, black walnut was also found throughout the woodland and within the fixed plots.

The 10 other overstory species which were identified during a meandering survey include red oak, American beech, white and green ash, and eastern hackberry.

**Table 1.** Overstory stand composition. Relative dominance is the percentage of the total stand basal area made up by each species, relative density is the percentage of total individuals and relative frequency is the percentage of plots in which a species was found. Importance Value (IV) is a summary statistic that averages across relative dominance, density, and frequency.

| Species | Rel. Dominance | Rel. Density | Rel. Frequency | Importance Value |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| *Acer saccharum* | 88.9 | 100.0 | 93.2 | 90.8 |
| *Juglans nigra* | 11.1 | 50.0 | 23.4 | 9.2 |

*Understory*

Clever Woodland supports an estimated 100 sapling stems per acre (at least 4.5 feet tall and </= 4" dbh). The dominant species in the sapling class is sugar maple, with a 50% relative frequency. These saplings were found in 1 of 2 plots and throughout the rest of the woodland. This species was the only such identified in the fixed-area plots. What is this due to?

**Table 2.** Composition and size class distribution of the sapling layer in Clever Woodland. Relative density and relative frequency for each species are expressed as a percentage of the total number of saplings, whereas individuals within each sapling size class are expressed as trees per acre.

| **Species** | **Rel. Dens.** | **Rel. Freq.** | **1" TPA** | **2" TPA** | **3" TPA** | **4" TPA** |
|---|---|---|---|---|---|---|
| *Acer saccharum* | 100 | 50 | 0 | 2 | 0 | 0 |

*Regeneration Layer*

Four tree species were identified in the seedling layer within the fixed-area plots (<4.5 feet tall): black maple, sugar maple, butternut hickory, and white ash (Table 3). The main species in the seedling layer is sugar maple, which occurs in all plots and has an average estimated ground coverage of 26.5%. Black maple seedlings were found in one plot at a 37.5% coverage.

**Table 3.** Coverage and relative frequency of tree species in the seedling layer. Coverage is an estimate of the ground area of the plot covered by that species and relative frequency is the percentage of plots in which that species was found.

| **Species** | **Average % Coverage** | **Rel. Frequency** |
|---|---|---|
| *Acer nigrum* | 37.5 | 50 |

| | | |
|---|---|---|
| *Acer saccharum* | 26.25 | 100 |
| *Carya cordifolia* | 2.5 | 50 |
| *Fraxinus americana* | 2.5 | 50 |

*Stand Condition, Snags and Coarse Woody Debris*

All the inventoried overstory trees were assigned to one of three Risk Classes based on structural integrity and evidence of disease/pest issues: RC1 = very low probability of dying during the next 20 years, RC2 = moderate probability of dying over the next 20 years, and RC3 = high probability of dying over next 20 years. Of the total stand basal area of 215 $ft^2$ $ac^{-1}$, 90% (195.3 $ft^2$ $ac^{-1}$) was in Risk Class 1, and 10% (19.7 $ft^2$ $ac^{-1}$) was in Risk Class 2. On an individual tree basis, 88% (80 trees per acre) were in Risk Class 1, and 12% (10 trees per acre) were in Risk Class 2. No standing dead (snags) trees were found within the fixed area plots.

Due to a small sampling size within Clever Woodland, no coarse woody debris (CWD) was identified.

*Forest Inventory Summary and Conclusions*

Clever Woodland contains a poor representation of a mesic southern forest as defined by the Michigan Natural Features Inventory (Cohen et al. 2020). The overstory is dominated by a few native species. Clever Woodland has a poorly stocked sapling layer lacking species capable of recruiting into the canopy as gaps form above them. The biggest cause of this is likely the woodland's position surrounded by the Swine Teaching and Research Center and University Farms Service Center. In some parts, the woodland seems more like a grazed land than a wooded land. While it isn't clear what is causing a heavy disturbance to Clever, the lack of fencing is likely allowing this woodland to become quickly degraded. This is not only destroying all three strata, the canopy, understory, and regeneration layers, this is facilitating the spread of invasives deeper into Clever and Elsesser East Woodlands. Without the removal of this stressor, these woodlands will continue to degrade.

**Botanical Assessment**

Due to the intertwined nature of Clever and Elsesser East Woodlands, they were surveyed and analyzed together for their botanical assessment. Overall, 61 different species of vascular plants were found in the joined woodlands. Of these, 36 were native and 25 were non-native. Very few of the native species have a high C value, which suggests low quality native habitats. This species

list resulted in a Total Floristic Quality Index (FQI) of 19.5 for Clever Woodland and Elsesser East. The FQI measures the botanical quality of a site from a biodiversity conservation perspective, an FQI score less than 20 indicates that the site is of insignificant value in terms of plant biodiversity, a score greater than 35 indicates an important site for plant biodiversity, and a score greater than 50 indicates a site with outstanding plant biodiversity value.

**Table 4**. Listing of all vascular plants identified to species in and around Clever Woodland in June and July of 2023.

| **Scientific Name** | **Family** | **Native** | **Physiognomy** |
|---|---|---|---|
| *Abutilon theophrasti* | Malvaceae | non-native | forb |
| *Acer nigrum* | Sapindaceae | native | tree |
| *Acer saccharum* | Sapindaceae | native | tree |
| *Actaea pachypoda* | Ranunculaceae | native | forb |
| *Alliaria petiolata* | Brassicaceae | non-native | forb |
| *Amaranthus retroflexus* | Amaranthaceae | non-native | forb |
| *Arctium minus* | Asteraceae | non-native | forb |
| *Arisaema triphyllum* | Araceae | native | forb |
| *Berberis thunbergii* | Berberidaceae | non-native | shrub |
| *Carex albursina* | Cyperaceae | native | sedge |
| *Carya cordiformis* | Juglandaceae | native | tree |
| *Caulophyllum thalictroides* | Berberidaceae | native | forb |
| *Celtis occidentalis* | Cannabaceae | native | tree |
| *Centaurea stoebe* | Asteraceae | non-native | forb |
| *Cichorium intybus* | Asteraceae | non-native | forb |
| *Circaea canadensis* | Onagraceae | native | forb |

| | | | |
|---|---|---|---|
| *Comarum palustre* | Rosaceae | native | forb |
| *Datura stramonium* | Solanaceae | non-native | forb |
| *Daucus carota* | Apiaceae | non-native | forb |
| *Epifagus virginiana* | Orobanchaceae | native | forb |
| *Euonymus obovatus* | Celastraceae | native | shrub |
| *Fagus grandifolia* | Fagaceae | native | tree |
| *Fraxinus americana* | Oleaceae | native | tree |
| *Fraxinus pennsylvanica* | Oleaceae | native | tree |
| *Geum canadense* | Rosaceae | native | forb |
| *Hesperis matronalis* | Brassicaceae | non-native | forb |
| *Juglans nigra* | Juglandaceae | native | tree |
| *Leonurus cardiaca* | Lamiaceae | non-native | forb |
| *Liriodendron tulipifera* | Magnoliaceae | native | tree |
| *Lonicera maackii* | Caprifoliaceae | non-native | shrub |
| *Lotus corniculatus* | Fabaceae | non-native | forb |
| *Maianthemum racemosum* | Convallariaceae | native | forb |
| *Ostrya virginiana* | Betulaceae | native | tree |
| *Oxalis stricta* | Oxalidaceae | native | forb |
| *Parthenocissus quinquefolia* | Vitaceae | native | vine |
| *Phalaris arundinacea* | Poaceae | native | grass |
| *Phytolacca americana* | Phytolaccaceae | native | forb |
| *Pilea pumila* | Urticaceae | native | forb |
| *Plantago lanceolata* | Plantaginaceae | non-native | forb |

| | | | |
|---|---|---|---|
| *Poa pratensis* | Poaceae | non-native | grass |
| *Podophyllum peltatum* | Berberidaceae | native | forb |
| *Polygonatum pubescens* | Convallariaceae | native | forb |
| *Prunus serotina* | Rosaceae | native | tree |
| *Prunus virginiana* | Rosaceae | native | shrub |
| *Quercus rubra* | Fagaceae | native | tree |
| *Rhamnus cathartica* | Rhamnaceae | non-native | tree |
| *Ribes cynosbati* | Grossulariaceae | native | shrub |
| *Rubus occidentalis* | Rosaceae | native | shrub |
| *Rumex obtusifolius* | Polygonaceae | non-native | forb |
| *Sambucus racemosa* | Adoxaceae | native | shrub |
| *Sanguinaria canadensis* | Papaveraceae | native | forb |
| *Silene latifolia* | Caryophyllaceae | non-native | forb |
| *Smilax hispida* | Smilacaceae | native | vine |
| *Solanum dulcamara* | Solanaceae | non-native | vine |
| *Torilis japonica* | Apiaceae | non-native | forb |
| *Trifolium pratense* | Fabaceae | non-native | forb |
| *Trifolium repens* | Fabaceae | non-native | forb |
| *Trillium grandiflorum* | Trilliaceae | native | forb |
| *Verbascum blattaria* | Scrophulariaceae | non-native | forb |
| *Verbascum thapsus* | Scrophulariaceae | non-native | forb |
| *Verbena urticifolia* | Verbenaceae | native | forb |
| *Viola odorata* | Violaceae | non-native | forb |

Many species of non-native plants were identified within Clever Woodland with most growing in its seemingly grazed section. Non-native species are very likely amplified by the heavy agricultural land surrounding Clever Woodland. The invasive species consistently observed in the forest interior were mainly herbaceous agricultural weeds rather than woody shrubs like honeysuckles and buckthorns. Treatment for more competitive invasive species like reed canary grass would be recommended for the grazed area to prevent its rapid take over.

**Concerns, Threats, and Human Impacts**

*Research/Teaching Artifacts*

There is little evidence of research and/or teaching activities within Clever Woodland.

*Trash, Structures or Other Human Disturbance*

Non-research trash was evident within Clever Woodland. Part of this woodland has obviously been degraded by human or human induced activity. One area seems to be grazed, which is supported by manure or feces present on the ground in this part. Stone building materials are present in the middle of the woodland, although the moss growing on these suggests these have been present for many years.

**Figure 1. Human Disturbances:** The left image shows the shocking difference between understory layers between Clever (on left) and Elsesser East (on right) on opposite sides of the fence. Elsesser East's is much more developed than that of Clever. The middle image shows the stone building materials. The image on the right shows the degraded area which lacks all four strata, except for a weed infested regeneration layer.

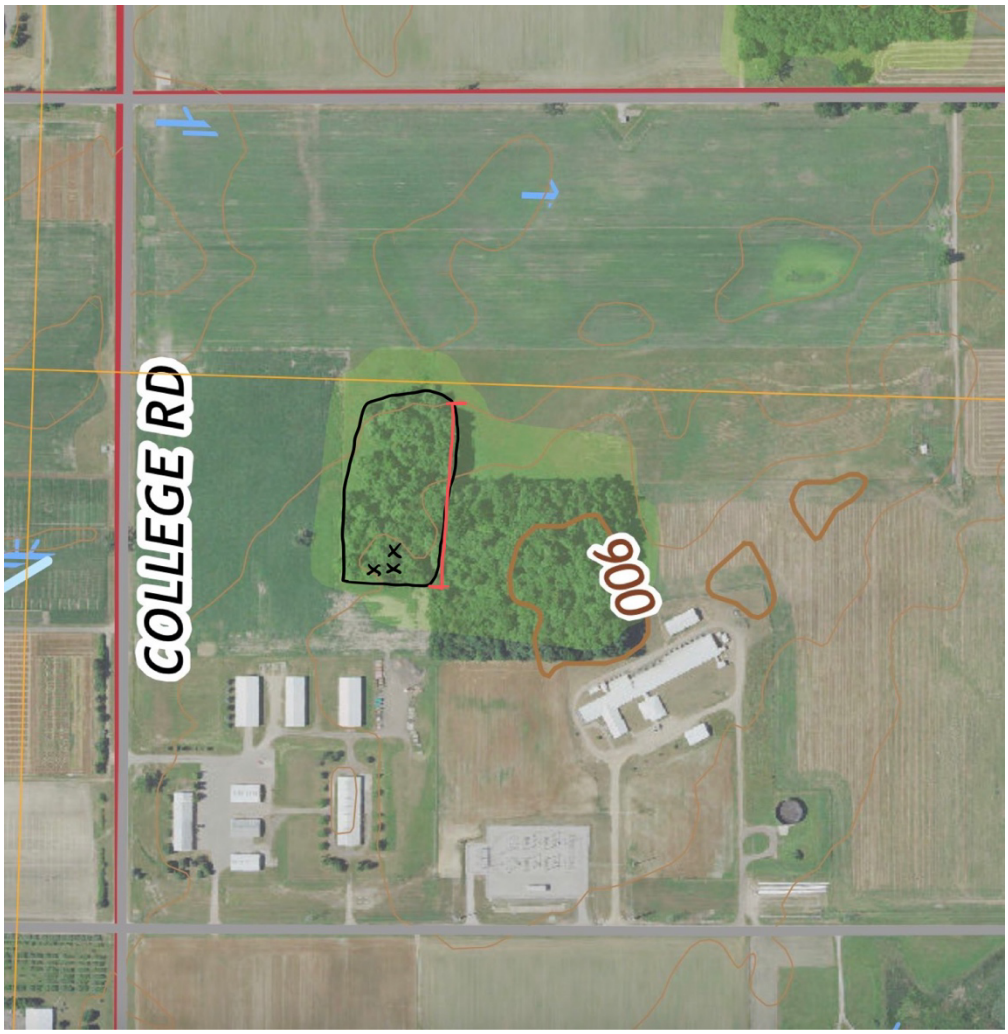
*Biotic Concerns*

The rest of Clever and Elsesser East Woodlands are threatened by the expanding change to more open land. Whether occurring by grazing or other human disturbance, this will amplify the invasion of non-native species and their likely establishment. The fence that separates Clever and Elssesser East is obviously preventing the degradation of the latter as seen by a more developed understory and herbaceous layer.

*Water Features*

Wet depressions and intermittent wetlands are absent in Clever Woodland.

**Figure 2. Map of Clever Woodland.** The black outline reflects the approximate boundaries of Clever. The black "X" symbols represent degraded areas outlined above. The red line represents the location of the fence separating these two woodlands.



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References

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