

**The Effects of Sugar Maple and Red Elm Removal on Macrofungi  
in Baber's Woods Nature Preserve**

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**Introduction**

Baber's Woods Nature Preserve is located in the southwest corner of Edgar County, Illinois (NW 1/4 Sec 18, T12N, R13W), just north of the Shelbyville Moraine at the southern edge of the Grand Prairie Section of the Grand Prairie Division (Schwegman 1973). The topography is gently rolling and relatively well drained by three small streams. Except for a few small depressions in the northwestern section of the preserve no standing water is present, even during wet periods. When first surveyed in 1965 by Ebinger and McClain, three vegetation zones were reported in Baber's Woods: 1) a sugar maple dominant zone along the western and northwestern edge of the preserve; 2) a disturbed zone in the southwestern corner where two cabins once stood; and, 3) an oak-hickory zone that encompassed the majority of the preserve. Vegetation surveys completed in 1986 (Ebinger) demonstrated that major changes have occurred in the composition of Baber's Woods and that the woods are now dominated by mesic, shade-tolerant taxa including sugar maple (*Acer saccharum*) and red elm (*Ulmus rubra*). The explosive increase of sugar maple and red elm is due to changes in land use patterns that began more than 150 years ago when European settlers arrived in the Midwest and suppressed periodic fires in prairies and oak savannas. The concerted effort to cut and/or girdle sugar maples and red elms and the reintroduction of periodic fires in Baber's Woods that began in 1999 presents a unique opportunity to continue an ongoing assessment of macrofungi in Baber's Woods.

The purpose of this study is to examine changes in macrofungi community structure in Baber's Woods relative to changes in forest composition. Specific objectives include:

- Resume post-cutting and post-burning inventory of macrofungi in Baber's Woods Nature Preserve.
- Expansion of a macrofungi database to monitor changes in macrofungi that occur in Baber's Woods following forest alteration.
- Use Estimate S to generate species accumulation curves of macrofungi and NSMS statistics to assess differences in macrofungal community structure along each of four transects to compare pre- and post-cutting and post-burning inventory of Baber's Woods to data gathered in 2001-2002 and 2002-2003 studies supported by the Illinois Wildlife Preservation Fund.
- Assess the ecological role of macrofungi in Baber's Woods.

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## Methods

Collecting trips were made to Baber's Woods on April 19, May 17, June 2, June 9, June 23, July 12, July 26, August 9, August 23, September 6, September 20, October 4, October 18, November 1, November 15, and December 6, 2013. Macrofungi encountered in ten 25 m<sup>2</sup> circular plots along each of four 100 m long, randomly arranged transects in Baber's Woods (a total of 40 plots representing a total sample area of 1000 m<sup>2</sup>) were recorded on transect data sheets (Appendix A, Sample Transect Data Sheet; each number represents a circular plot along a single transect, in this case, Transect A). Unknown and previously unrecorded taxa were collected with minimal disruption of soil and vegetation for inclusion in the database.

Digital images of individual taxa were taken in the field or on return to the mycology laboratory at Eastern Illinois University. Macroscopic characteristics of unknown or previously unreported taxa were recorded and unknown taxa were identified using pertinent mycological literature. Voucher specimens were dried, and stored along with notes in the cryptogamic herbarium at Eastern Illinois University.

## Results

A survey of macrofungi in Baber's Woods is presented in Appendix B. A total of 135 taxa have been recorded from Baber's Woods. Of these, 27 are cup fungi (Phylum Ascomycota), 96 are mushrooms and polypores (Phylum Basidiomycota, Class Holobasidiomycetes), 6 are jelly fungi or rusts (Division Basidiomycota, Class Phragmobasidiomycetes), and 6 are slime molds (Phylum Myxomycota). Thirty two (32) taxa not previously reported from Baber's Woods were recorded. As a result of the drought experienced in Summer and Fall 2014, not as many macrofungi were collected as originally anticipated. The paucity of data generated precluded Estimate S from generating meaningful species accumulation curves. However, the number and diversity of taxa collected is comparable to the number and diversity of taxa recorded in similar forests in Clark, Douglas, and Coles Counties (Methven, unpublished data). No significant differences were recorded in macrofungal community structure within and between transects using NDMS statistics. A no cost extension of the project, submitted after the November 30, 2013 deadline, was not approved.

## Discussion and Summary

Research completed to date is part of a long-term monitoring project initiated several years ago. The project should be continued on an annual basis for several more years before trends in presence/relative abundance of individual taxa and their ecological role can be accurately assessed. The eastern half of the woods has been burned periodically since Fall 2000 and selective cutting that began in the northwest section of the woods in 2000 is complete. One of the four, randomly selected transects in Baber's Woods lies within the burn area in the eastern section of the preserve and one lies within the northwest section where selective cutting has been introduced. The remaining two transects lie in the southwestern section of Baber's Woods that has not been burned or selectively cut but were previously disturbed by the presence of an old homestead.

Preliminary data indicates that the taxa collected in Baber's Woods is saprobic and non-mycorrhizal. Since oaks are obligately ectomycorrhizal trees, and should be accompanied by ectomycorrhizal fungi which sporulate sporadically, I hypothesize that the dominance of sugar maples and red elms in the forest has suppressed the development of ectomycorrhizal fungi in Baber's Woods and the subsequent production of sporocarps. Removal and girdling of sugar maple and red elm in the northwestern section of Baber's Woods may release this suppression and result in the re-appearance (and subsequent collection) of ectomycorrhizal fungi in this section of the preserve. The addition of woody debris to the forest floor in this section also provides additional substrata for litter decomposing fungi and may yield additional saprobic mushrooms and polypores that have not been recorded from the preserve. Reintroduction of fire to the eastern half of Baber's Woods may also result in the appearance of fungi that have not previously been recorded from the preserve. Periodic burning of woody debris and litter in the forest releases nutrients to the soil that may induce the growth and sporulation of fungi not previously encountered in the preserve. Likewise, since the spores of some macrofungi require a "heat treatment" to germinate, the reintroduction of periodic fires may cause spores that have remained dormant for long periods of time to germinate, grow, and produce sporocarps. As a result, I predict that over the next several years, the number and diversity of taxa in Baber's Woods will increase and diverge significantly from those previously recorded.

#### Literature Cited

- Ebinger, J.E. 1986. Sugar maple, a management problem in Illinois forests? *Transactions of the Illinois State Academy of Science* 79: 25-20.
- McClain, W.E., and Ebinger, J.E. 1968. Woody vegetation of Baber Woods, Edgar County, Illinois. *American Midland Naturalist* 79:419-428.
- Schwegman, J. 1973. Comprehensive Plan for the Illinois Nature Preserves System. Part 2. The Natural Divisions of Illinois. Illinois Nature Preserves Commission, Rockford.

## **Final Budget Report**

### **Student help - \$129.18**

An undergraduate student, Marci Gallagher, was hired to assist in collecting, identifying and processing specimens during Summer 2013. Due to the limited rainfall, I was able to complete most of the survey work alone and Marci worked only 12 hours during the project.

$(\$10.00/\text{hour}) (12 \text{ hours}) = \$ 120.00$  (Plus \$9.18 in Fringe Benefits)

### **Travel - \$395.50**

14 round trips between Charleston and Baber's Woods – 50 miles/trip

$(50 \text{ miles/trip}) (\$.565/\text{mile}) (14 \text{ trips}) = \$395.50$

### **Commodities - \$7.98**

Tert-butanol for preservation of fungal specimens

### **Total - \$532.66**











Appendix B.  
Baber's Woods Species List 2013

*Agaricus placomyces*  
\* *Arachnopeziza aurata*  
*Arachnopeziza aurelia*  
\* *Arcyria cinerea*  
*Armillaria gallica*  
*Ascocoryne cylichnium*  
*Auricularia auricula*  
*Bisporella citrina*  
*Bjerkandera adusta*  
*Calvatia bovista*  
*Ceratiomyxa fruticulosa*  
\* *Ciboria peckiana*  
*Clitopilus prunulus*  
*Collybia acervata*  
*Collybia cookei*  
*Coprinus lagopus*  
*Coprinus micaceus*  
*Coprinus radians*  
*Coriolopsis gallica*  
\* *Crepidotus appalachiensis*  
\* *Crepidotus vukgaris*  
\* *Crucibulum laeve*  
*Daedaleopsis confragosa*  
*Daldinia concentrica*  
\* *Dasyyscyphus virgineus*  
*Ductifera puluhuana*  
*Entoloma abortivum*  
*Exidia glandulosa*  
*Exidia recisa*  
*Flammulina velutipes*  
*Fuscocerrera portoricensis*  
*Galerina marginata*  
\* *Galiella rufa*  
*Ganoderma applanatum*  
*Grifola frondosa*  
*Gymnopilus liquiritae*  
\* *Gymnopus dichrous*  
\* *Gymnopus semihirtipes*  
*Gymnopus subnudus*  
*Gymnopus subsulphureus*  
*Gyromitra fastigiata*  
\* *Hapalopilus nidulans*  
\* *Helvella macropus*  
\* *Helvella stevensii*  
\* *Hemitrichia calyculata*  
*Hericium coralloides*  
*Hohenbuehelia atrocaerulea* var.  
*grisea*  
*Hydnochaete olivaceum*  
\* *Hygrocybe psittacina*  
*Hygrophorus subsalmoneus*  
*Hymenochaete ferruginea*  
*Hymenoscyphus fructigenus*  
\* *Hypocrea gelatinosa*  
\* *Hypocrea rufa*  
*Hypoxylon "atropunctulatum"*  
\* *Inocybe calospora*  
*Inocybe sororia*  
*Irpex lacteus*  
*Ischnoderma resinosum*  
\* *Laccaria ohiensis*  
*Lentinellus omphalodes*  
*Lentinellus ursinus*  
*Lenzites betulina*  
*Lepiota cristata*  
\* *Lycogala epidendrum*  
*Lycoperdon pyriforme*  
\* *Marasmiellus nigripes*  
\* *Marasmiellus opacus*  
*Marasmius capillaris*  
*Marasmius pyrrocephalus*  
\* *Marasmius rotula*  
\* *Marasmius sullivantii*  
*Meripilus giganteus*  
\* *Metatrachia vesparium*  
*Microstoma floccosa*  
*Mollisia cinerea*  
*Morchella angusticeps*  
*Morchella semilibera*  
\* *Mycena acicula*  
*Mycena corticola*  
*Mycena flavoalba*  
*Mycena galericulata*  
*Mycena haematopus*  
*Mycena idiolens*  
*Mycena inclinata*  
*Mycena leaiana*  
*Mycena luteopallens*  
*Mycena pullata*  
*Mycena roseipallens*  
*Naematoloma sublateritium*  
*Omphalotus illudens*

Appendix B.  
Baber's Woods Species List 2013

*\* Orbilia luteorubella*  
*Panellus stypticus*  
*\* Panus conchatus*  
*Perenniporia ohiensis*  
*Peziza repanda*  
*Peziza varia*  
*Phaeomarasmium erinaceus*  
*Phanerochaete chrysorhiza*  
*Phellinus gilvus*  
*Phlebia incarnata*  
*Phlebia radiata*  
*Phlebia tremellosa*  
*\* Pholiota polychroa*  
*Pluteus admirabilis*  
*Pluteus cervinus*  
*\* Pluteus longistriatus*  
*Polyporus arcularius*  
*Polyporus badius*  
*Polyporus elegans*  
*Polyporus melanopus*  
*Polyporus radicans*  
*Polyporus squamosus*

*Polyporus varius*  
*Psathyrella echiniceps*  
*Psathyrella psammophila*  
*Puccinia claytonii*  
*Puccinia podophylli*  
*Sarcoseypha occidentalis*  
*Schizophyllum commune*  
*Schizopora paradoxa*  
*Scutellinia scutellata*  
*Steccherinum ochraceum*  
*\* Stemonitis axifera*  
*Stereum complicatum*  
*Stereum ostrea*  
*Trametes conchifer*  
*Trametes elegans*  
*Trametes versicolor*  
*Trichaptum bifforme*  
*Urnula craterium*  
*Xerula megalospora*  
*\* Xylaria longiana*  
*Xylaria polymorpha*  
*Xylobolus frustulatus*