

Managing Change in an Illinois Oak Woodland

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Introduction

Oaks and the forests and grasslands they have historically dominated in northern temperate and subtropical zones are important for biodiversity. Their conservation is a global issue, as evident on many of the field trips and excursions of the IOS.

IOS members on the Yunnan, China trip in 1998 witnessed the recent loss of oaks and serious erosion due to deforestation. Wholesale timbering of Madrean oak forests in northern Mexico [Fisher 1994] a few decades ago led to the extinction of the Imperial Woodpecker (*Campephilus imperialis* Gould). Forest destruction has eliminated our own Ivory-billed Woodpecker (*Campephilus principalis* L.), Carolina Parakeet (*Conuropsis carolinensis* L.) and Passenger Pigeon (*Ectopistes migratorius* L.). Oaks are keystone species in the forests of Illinois. Oaks comprise a diverse genus, kings and commoners of their realm, a passion and challenge for all quercophiles. We venerate the few ancient giants, the kings that remain and their place in history, as attested by many a journal paper. This paper deals with the commoners that remain at the Henry Eilers Shoal Creek Conservation Area (HESCCA) near Litchfield in Montgomery County, Illinois.

Location and Description

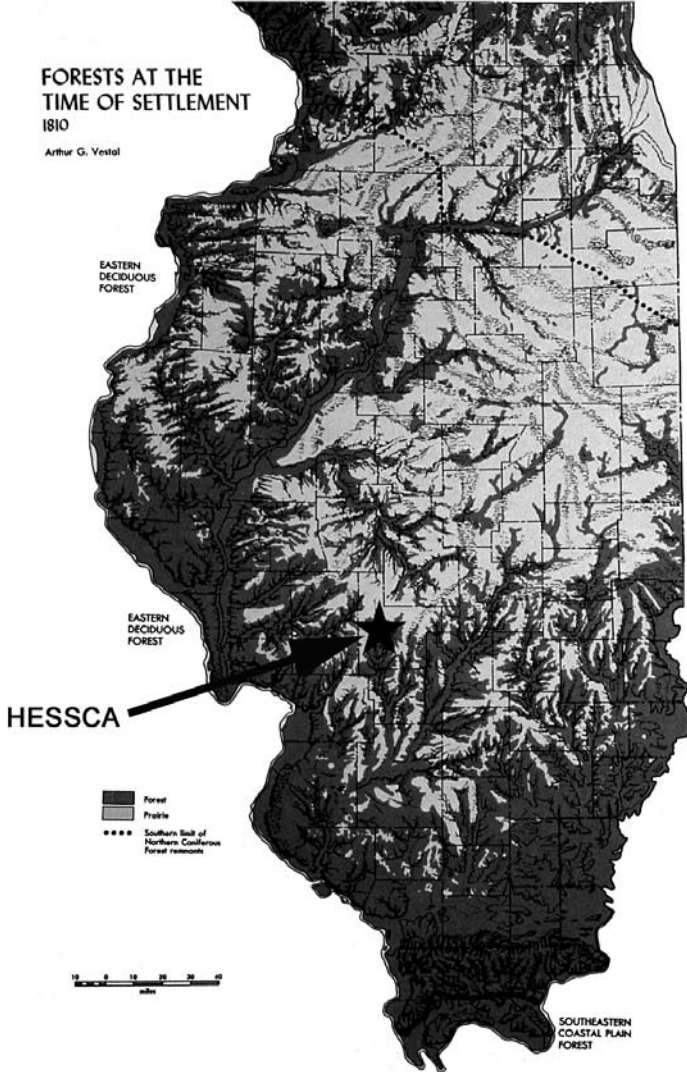
HESCCA is located in the very northwest sector of the Effingham Section of the Southern Till Plain Natural Division. [Schwegman 1973]. It was shaped primarily by Illinoian glaciation several hundred thousand years ago. Only a few miles to the north is the Grand Prairie Division laid down by Wisconsinian glaciation some ten thousand years ago. Its soils are far more productive than the much older leached till plain soils to the south. Just to the west is the Western Forest Division with its own distinctive natural elements. The preserve consists of a strongly dissected till plain segment on the east side of Lake Yaeger, located near Litchfield, Illinois. Elevation at the preserve ranges from 195 m to 230 m. The impoundment was built in the early 1960's by damming the west fork of Shoal Creek. Steep slopes, primarily west facing, occur next to the lake and in the complex interior ravine systems. They grade into gently sloping or relatively level broad ridge tops.

Pennsylvanian age sandstone and shale outcroppings are common, resulting in occasional steep bluffs and intermittent waterfalls. The Shoal Creek Limestone formation is now submerged by the lake but may continue to influence the soil pH locally. Bedrocks are overlain with poorly drained acid glacial till soils of Hickory and Hosmer clay loams and some loess. The original General Land Office Survey Notes reveal a narrow band of forest bordering Shoal Creek, terminating a few

STATE OF ILLINOIS

FORESTS AT THE TIME OF SETTLEMENT 1810

Arthur G. Vestal



miles to the north. The site is in a former forest – prairie transition zone and at the juncture of three different natural divisions, a geographic position that has undoubtedly contributed to its exceptional biodiversity.

Resource

The HESCCA is owned by the City of Litchfield and was set aside by council resolution in 1990 following previously failed attempts at protection. Prior preservation efforts had focused on the protection of rare species which was rather typical at the time.

We changed our tactics by emphasizing recreation, tourism and nature education in our outreach to the local community. All of our local news media became consistent supporters. This proved to be an effective way to work with elected officials whose primary focus is on economic growth. An early supporter, the Litchfield Rotary Club sponsored a nature trail; the club continues to update our trail guides. They also maintain a series of Bluebird boxes that have fledged over 700 birds. From the very onset of this project much guidance and help came from the Illinois Chapter of the Nature Conservancy with its science driven approach to natural lands management. Their support continues to this day with funding for management activities provided through their partnership in the Illinois Volunteer Stewardship Network. In 1992 local community leaders and supporters from nearby communities formed the Shoal Creek Volunteers, a 501(c)3 chartered corporation. It is dedicated to natural areas preservation at the local level with a focus on HESCCA. An occasional newsletter and news releases in the local media are means of keeping the public informed.

The organization's mission statement and action plan have served us well. They were written with a focus on management activities that enhance biodiversity. It has been said if you don't know where you are going, any road will take you there.

From the beginning it was deemed important that biological and historical research at the local level on forest communities in this part of the Midwest, where oaks are keystone species, should form the basis of all our activities. Ongoing documentation and inventory of the site's natural resources has resulted in impressive species lists. In addition, efforts to utilize the site as a last refuge for species and genotypes that are becoming increasingly rare or virtually extirpated in this part of Illinois have met with considerable success.

We have also been beneficiaries of various researchers who continue to conduct studies at the site. In addition the efforts of local citizen biologists have resulted in impressive species lists. The number of plant species recorded and vouchered so far is well over 700, with over 600 of them native, including several state listed species. A total of 65 fungal species were documented in 1994. 75 breeding bird species have been recorded, including the American bald eagle (*Haliaeetus leucocephalus* L.). Reptiles are reclusive, but approximately 10 species have been seen. This extraordinary biological richness remains despite nearly 200 years of intense resource pressure. It is a testimony to the resiliency of a healthy oak-hickory woodland community.

Historical and Ecological Notes

Native Americans influenced the land everywhere since the ice ages. Numerous archeological sites were inundated by the impoundment of Shoal Creek. The first maps indicated a large treeless area in its floodplain that may well have been a farming site of the aboriginal inhabitants. Arrowheads and stone axes found along lake shore lines are indications of a sizable population at various times. As European diseases and warfare decimated their numbers, Native American influence on the local landscape may have already been diminished at the time of local settlement [Mann 2005].

Fire, their primary land management tool, continued well into the early settlement decades and is documented in reminiscences by settlers in local newspapers and from the first history of the county. These accounts corroborate a long list of similar reports in nearby Missouri [Ladd 1991]. In a story published in the *Montgomery News*, 3-20, 1908, the writer E. C. Cline reminisced on his boyhood, no date given: 'The old time prairie fire usually at night that swept from Staunton [just south of here, ed.] northward past Zanesville [just north of here and long gone, ed.] and through the boundless prairies east and north of Springfield was a spectacle the grandeur of which the present generation can have no conception'. Change came quickly, as in one generation the prairie disappeared forever. This local account from D. Jackson's 'Break Time' account in the *Litchfield News Herald*, 10-25-1996 cites a letter from the grandson of one of the first settler families in N. Litchfield Township. J. Crawford: 'It was settled mostly between 1850 and 1860. That was the time that the prairie grass and rosinweed vanished.'

At the same time the European immigrants and their descendants used the woods heavily for pasturage as they had for millennia in their old countries. A



Prescribed fire in an upland forest ravine system at HESCCA photo©Henry Eilers

German immigrant, Adolphus Ammann, wrote: 'They could find enough grass in the woods (in the winter). The cattle and the pigs live through summer and winter, and day and night, in the woods' ["The Passing Frontier; Pioneer Life; Travels in Illinois, 1819"]. Another account: 'Hogs will live & get fat in the Woods and Prairies. I have seen some as fat upon Hickorynuts, Acorns, Pecons & Walnuts, as ever I did those that were fattened on corn.' A local resident reminisced: 'Our house was on one of the regularly traveled roads to St. Louis. People from Christian County [to the north] had to travel that road and our house was a regular stopping place. I have seen hundreds of droves of hogs go by our house that were being driven to St. Louis. [P. Walter, 1844].

We have collected numerous other local accounts pertaining to hogs (*Sus domestica* L.) during that time. The Shoal Creek region is mentioned numerous times as it was apparently crossed by the Vincennes – St Louis Trace that was frequented by the earliest travelers. Hogs [pigs] were the most important free range livestock in the early 1800's. Over 400,000 head were driven annually in the late fall from nearby Effingham County to the Markets in St. Louis, Missouri [History of Effingham County]. It can be assumed that the numbers for our county would have been similar. Soon thereafter as wire fencing became available, it spelled the end of the free range. Cattle (*Bos taurus* L.) and hogs were then segregated at some time in the woods, with hogs largely occupying the most heavily dissected terrain. Until very recently this was a common practice. Barbed wire and wire mesh fence remnants remain to this day, mostly imbedded in our largest trees.

'Reading the Landscape of America', [Watts 1957] helps us interpret what we see today. Hogs in this area until the rather recent emphasis on confinement feeding, were preferably 'run' on rough terrain for at least two reasons. One, that land was otherwise of low economic value; second, hog waste would easily wash off the site. This was important as hogs are quite disease prone. The legacy has been severe erosion, still very much visible. Alien to the American landscape, hogs would have been especially hard on ground flora with underground storage structures. This is borne out by the nearby Roberts Cemetery Savanna Nature Preserve, which is covered with a carpet of wild hyacinth (*Camassia scilloides* Lindl.) in the spring, and other geophytes that are comparatively uncommon at HESCCA.

Consisting primarily of early successional species some of the native flora has reestablished itself here over the decades. In the flood plain some of the dominant woody species today are sycamore (*Platanus occidentalis* L.), box elder (*Acer negundo* L.), soft maple (*Acer saccharinum* L.), cottonwood (*Populus deltoides* Marsh), shingle oak (*Quercus imbricaria* Michx.) and river birch (*Betulus nigra* L.). Of these shingle oak is especially abundant. A few very large trees of several species survive below the dam in what was a major part of the construction staging area. Here also remnants of the rich mesic floodplain shrub and ground flora have survived. They serve as a restoration guide for this community. I remember a huge river birch over 3 feet across on the steep creek bank. Only the stump remained as a mute testimony for many years later. It may have been, if my memory serves me correctly. The degradation and folly of this specific 'improvement' project has been eloquently described by a renowned writer [John Madsen 1973].

Below the dam are also some of the largest *Quercus alba*, *Q. velutina* and *Q. stellata*. They occur on the first ridge in a more or less straight line. On close examination one encounters heavy gauge wire remnants deeply imbedded in the trees. This is most likely the oldest fence remnant at HESCCA. It saved the trees as they would have been unacceptable at the saw mills. Abundant massive stubs remain where excessive shading has occurred by more recent tree recruitment. Some trees still have a few very large remaining low branches mostly on one side. Here also is a significant linear soil depression. In attempting to ‘read the landscape’, our conclusion is that this erosional feature was caused by cattle. They like to walk fence lines as they look for shade or that greener grass on the other side. Elsewhere remnant fence lines are associated with noticeable broad ridges. These may be partially due to deposition by wind blown soil but primarily severe erosion caused by plowing patterns and animal overstocking.

Plant Communities

Upland Forest

HESCCA is actually a microcosm of several woodland categories representative of the Central Hardwood Region. Oak-Hickory woodland constitutes by far the far the most common community type. As such it exhibits considerable diversity, often differing from one ridge or ravine to another [Roberts 1995]. This may be due to subtle changes over the last two hundred years in soils, aspect or past land use practices or a combination of all of these factors. By far the most dominant trees are hickories (*Carya cordiformis* Koch, *C. ovata* Koch and *C. tomentosa* Nutt.) and oak species. White oak (*Quercus alba* L.) is the most wide spread species and exists in a wide variety of age classes. It also occurs with varying frequency in all other communities. Black oak (*Quercus velutina* Lam.) is similarly widely distributed, but is a more efficient invader of disturbed agricultural sites. Red oak (*Quercus rubra* L.) is also common on slopes of the dendritic ravine systems, including a few large trees. Chestnut oak (*Quercus muhlenbergii* Engelm.) is less frequent and scattered throughout the valleys. Bur Oak (*Quercus macrocarpa* Michx.) occurs locally, as do other oak species covered in more detail elsewhere.

Floodplain

A remnant floodplain stretches along the low-gradient Shoal Creek south below the lake dam. During dam construction and creek channelization it was severely disturbed [Line 1973]. In spite of that it has retained a large number of mesic species not found elsewhere at HESCCA; it has responded well to restoration activities. Early successional species dominate, including large numbers of shingle oak (*Quercus imbricaria* Michx.). Most seem to have been recruited since the construction of the dam and are uniformly small in size. A few medium sized bur oaks exist. Large numbers of spindly small red, white, pin and bur oak trees 2-10’ tall exist in the under-story. The occurrence of swamp white oak (*Quercus bicolor* Willd.) is notable. This species barely escaped extirpation on HESCCA. A very few individuals exist here and are found nowhere else on the preserve.



Flatwoods community



Upland oak forest



Floodplain forest (during high water)

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Flatwoods

Barrens and flatwoods have been considered by numerous researchers as sub-categories of savannas [Madany 1981]. Except for earlier records by Meade and Short, the floristic record for barrens has remained meager until recently. In this most northern location of a southern flatwoods community the soils are seasonally wet and even inundated at times due to its argyllic soils, locally referred to as 'hard pan'. It becomes a rather xeric community during the hot, dry summer. The ground flora includes a remarkable blend of wetland and drought tolerant species. A unique feature is the dominance of pin oak (*Quercus palustris* Muenchh.), often in close proximity to black oak (*Quercus velutina* Lam.), post oak (*Quercus stellata* Wagh.) and blackjack oak (*Quercus marilandica* Muenchh.). The latter two are at the northern limits of their range here. The state listed Buffalo Clover (*Trifolium reflexum* L.) occurs here sporadically, apparently depending on fire disturbance.

Barrens

A shallow layer of soil caps sandstone bedrock on dry ridge tops above the former Shoal Creek Valley on south and west facing slopes. The woody vegetation is sparse and consists mostly of stunted xerophytic oaks. These trees with their sinuous trunks may be some of the oldest trees at HESCCA [Pederson 2010]. White and black oak are present here in addition to dominant post and blackjack oaks. The ground layer is rich in prairie grasses, other graminoids and forbs. It includes a number of species with Ozarkian affinities [Schwegman, personal communication].

Two such areas at HESCCA were recognized as some of the best remaining samples of this community type in the state by the Illinois Natural Area Inventory conducted by the Illinois Nature Preserves Commission. We have photos from around 1900 showing local families in their Victorian finery at these two sites. These INAI sites were at that time local excursion destinations for picnic outings. The Rocky Hollow Barrens site once sat above a limestone quarry but is now under the water of the lake. The Central Barrens site is situated high above 'The Cave,' a rock shelter also submerged. Maybe occasional weekend recreational use over multiple decades kept these areas open enough to retain their unique diversity. Is this an explanation or just speculation? It certainly sounds plausible.

Old Fields

Most of these former croplands and pasturelands had been long abandoned by the time the lake was built. Today they are a mix of shrub expanses, consisting of *Salix humilis* Marsh., *Corylus americana* L., *Rhus glabra* L. and *Rhus copallina* L., *Viburnum prunifolium* L., *Prunus americana* Marsh. and *Prunus mexicana* Wats., *Cornus drummondii* Mey., vines and brambles. They include prairie-like areas. I speculate that this site was a flatwoods community in pre-settlement times because most tree species typical for this community are present nearby. Black cherry (*Prunus serotina* Ehrh.), white ash (*Fraxinus americana* L.), slippery elm (*Ulmus rubra* Muhl.), sassafras (*Sassafras albidum* (Nutt.) Nees) and shingle

oak have been the major invaders. Hickories and several other oaks, such as black, post and pin oak, are also recruiting in small numbers. This successional community is the most species rich with invasive and listed native species often growing side by side. One of the latter is the state endangered savanna blazing star (*Liatris scariosa* var. *niewlandii* Lunell) that triggered the protection effort for this site over 30 years ago.

Wetlands: seep and sedge meadow

A small treeless seep occurs on a south facing slope. The lime rich water precipitates out as a layer of tuff. This area has its own unique assembly of species, including the very rare swamp metal mark butterfly (*Calaphelis mutica* McAlpine), which has been proposed for federal listing. A sedge meadow depression is part of a much larger area that extends into a neighboring farm field. The ground layer is dominated by a coarse rhizomatous sedge (*Carex hyalenolepis* Steud.) and blue-joint grass (*Calamagrostis canadensis* Michx.). Out of this meadow-like expanse rises a stand of pin oak having huge buttressed bases. Some of them are over 107 cm dbh.

Invasive Species

In hindsight, not all plant introductions were beneficial. Today silky lespedeza (*Lespedeza cuneata* [Dum.-Cours.], Don) is one of our most noxious weeds in open areas. It must have seemed like a miracle plant as it established easily on the most impoverished sites. Only a few years ago wildlife management professionals expressed to me that it was a great plant. Never mind that its high tannin content prevents both foliage and its abundant seed from being consumed by our wildlife. Honeysuckles (*Lonicera japonica* Thunb., *L. mackii* Rupr. Maxim. and *L. × bella* Zabel), autumn olive (*Eleagnus umbellata* Thunb.) and multiflora rose (*Rosa multiflora* Thunb.) were also deemed good for wildlife. As one senior official wrote in a rebuttal: 'even multiflora rose has its redeeming value'. Crown Vetch (*Coronaria varia* L.) was introduced along Shoal Creek during the channelization project and is a problem only in open areas. There it dominates along with the native but equally aggressive Canada goldenrod (*Solidago altissima* L.).

Many parts of our woodlands, often the ones with better soils, are dominated by a few species that are unpalatable to farm animals. Black Snakeroot (*Sanicula gregaria* Bickn.), May apple (*Podophyllum peltatum* L.) and several boneset species (*Eupatorium* spp.) have formed monocultures. In areas with heavier leaf cover woody vines prevailed, primarily poison ivy (*Rhus radicans* L.) and Virginia creeper (*Parthenocissus quinquefolia* (L.) Planch.). A thick, slowly decaying leaf layer can be detrimental to low growing species. In the early days of our management efforts we would often discover a small island of herbaceous diversity on the slightly mounded base around old oak trees. These had been kept free of leaf accumulation by winds funneling up the ravine systems.

Elsewhere, species of blackberry and black raspberry (*Rubus* spp.) form thickets. Gooseberry (*Ribes missouriense* L.), certainly a disturbance species and common in nearby woodlands, is represented by only a few individuals. A



Communities at HESCCA - Top: Upland ravines, Center: Barrens
Bottom: Pin oak pothole, sedge meadow all photos©Henry Eilers

major presence in many areas is sassafras. It also an enigma, as we have seen no information as to how it might have fit into pre-settlement communities.

New Threats

Today we are facing a whole new set of influences. We have lost all large elm trees due to Dutch elm disease. Only two Butternut trees (*Juglans cinerea* L.) remain and both have cankers. Dogwood (*Cornus florida* L.), with limited numbers to begin with, has become seriously infected by anthracnose in the last few years. Japanese beetle (*Popillia japonica* Newman) is present in huge numbers. Most of the abundant shingle oak trees in the successional communities are loaded with gouty oak gall. The weight of the galls increases the species' susceptibility to limb breakage in ice storms, such as one that occurred in 2008. Numerous trees, even small ones are declining in vigor or have died. Pin oak is becoming infested with the similar horny oak gall in the last few years.

What is the role of these pathogens in the woodland scheme? Where is the balance? What is the balance?

In the last twenty years we have seen varying degrees of damage by drift from agricultural herbicides. It has been expressed as oak leaf tatters and foliar distortion on every grape vine, redbud and certain herbaceous species. One year all goat's-rue colonies (*Tephrosia virginiana* (L.) Pers.) failed to flower, and the foliage was chlorotic with sclerotic margins. It is a fairly safe assumption that nutrient loading from volatilizing heavy nitrogen applications is a negative factor also. Railroad prairie remnants, where 50 years ago white and purple prairie clovers (*Petalostemum* spp.) thrived, have completely disappeared for just that reason. Whippoorwill (*Caprimulgus vociferous* A. Wilson), a commonly heard bird just a few years ago, seems to have disappeared. During the same period luna and giant silk moths seem to have disappeared as well. It used to be difficult to find an oak leaf without herbivory, as I remember from assisting school children with their biology leaf collection projects. Not so today— intact foliage is now the norm. All three observations may be tied together. It has been suggested that a predatory fly introduced for gypsy moth control may be the reason, as it changed its food preference to native moths. [Bouseman, Sternburg 2002]. Talk of potential cascading effects.

The last logging event occurred when the often reluctant land owners were forced to sell to the City of Litchfield the land needed for the new lake in the late 1950's. They must have logged all salable timber. A few stumps and one tree top, most likely from a scruffy blackjack oak in the flatwoods, remain to this day. It must have yielded a very small saw log. The latter survived initial burns because of low fuel loads there. We have since protected it and other such survivors during our prescribed burns. Other stumps are associated with still living and mostly multiple trunked white and black oak trees. Most of the time only a central cavity remains today in lieu of the stump. Logging on at least one property occurred in 1931, according to an obituary, that listed death due to a logging event.

The first Montgomery County atlas from 1889 shows a series of 10 acre sized woodland tracts to the north of Rocky Hollow Trail. One of the owners was J. B. Turner, a famous land owner with large holdings from the nearby Butler

'flats'. This small tract ownership was an enigma for me until I received a pioneer account from John Heaton, a friend from Palatine, Illinois. It was written by an ancestor in Iowa and detailed the importance of just such a tract to their family on the prairie, where trees were lacking. Such woods were a source of building material, fencing and fuel, all vital to their survival. Certainly that could explain the above ownership anomaly. Here, at the edge of the treeless prairie, ownership of timberlands meant a steady source of income. No doubt the resource was heavily exploited and early on, along with grazing pressure led to changes in forest structure.

Numerous local accounts from around 1900 bemoaned the quick decline in game species during their life time, from passenger pigeons and wild turkeys (*Meleagris gallopavo* L.) to whitetail deer (*Odocoileus virginianus* Zimmerman) and beaver (*Castor canadensis* Kuhl). Of these, beaver, turkey and deer have since then made a major comeback. The latter have, due to excessive numbers, become a major pest for us. Too much of a good thing can be bad. We have attempted to protect rare species with fencing, with partial success. The palatable early spring flora, liliaceous plants in particular, are being devastated by deer herbivory. Beaver and turkey so far appear to have positive effects. It's all in the numbers.

After cessation of grazing and/or logging, massive recruitment of trees occurred in many areas. This often resulted in dense even aged stands of spindly oak and hickory trees on the relatively flat uplands. Some of these have been measured at over 12 m tall, with only 5-10 cm dbh trunks. A large number are multiple trunked. Some grew from logging stumps; most were released from grub sprouts in the shrub and ground layer.

The current tree quality of our surviving larger trees widely scattered through ravines and uplands may reflect past high grading practices. Many of these older trees have sinuous trunks or are otherwise misshapen. [Pederson 2010]. Elsewhere the knobby trunks and remaining low branches may identify individuals that had little shade competition during many decades of intense grazing. That could make them well over 100 years old.

Extrapolating from the position and condition of wire remnants protruding from their trunks, similar open grown fence line oaks may be of the same age category. They are certainly some of our largest trees. The largest white oak has a circumference of 312 cm; a post oak trunk from a cluster of three, 184 cm; a black oak 262 cm. A solitary blackjack oak elsewhere measured only 160 cm. We have done no coring of trees. In attempting to count rings of felled trees, most of the oaks and maple trees seem to date to the early 1900's. This was a surprising result as the diameter of the cut surfaces ranged widely from 10 cm to nearly 60 cm. Sugar maple (*Acer saccharum* Marsh) invaded uplands in huge numbers at various times. Due to their shade tolerance and faster growth rate they have been out-competing the oaks and hickories.

To our surprise we have seen no seedling recruitment in 20 years of monitoring, not even one, in spite of occasional large seed crops. Elsewhere I have observed maple seedlings forming a dense ground cover in previously pastured woodland. White oaks experienced a similar germination event a few years ago in numerous locations at HESCCA, with populations averaging 100 seedlings per



Young maples dominate the understory below an old *Quercus alba* wolf tree at HESCCA. photo©Henry Eilers

1/sq.m. They had thinned out to 25/sqm three-fourth two years later. Their size in the ground layer remained about the same. No other oak species has exhibited similar recruitment. Even in years of heavy mast production, other oak species and hickories, too, have recruited consistently but in relatively small numbers. Occasionally there will be a cluster of seedlings where blue jays or rodents had cached acorns or nuts.

Management and Restoration

The loss of diversity in our woodland community continues today [Taft 1999]. From the beginning our goals were to recapture as much as possible the elements and structure of the pre-settlement landscape. This is, of course, a rather elusive reference point. Some resulting criticism forced us to consider some of those arguments: 'there has always been change'; 'let nature take its course'. 'Man is a part of nature, not apart from it.' We can hurt or we can heal. Sometimes that goes together in the real world where we operate. All disturbance regimes involve some degree of 'harm', whether caused by climate, weather events, disease, parasites or other biological agents. Only man can choose some degree of short-term 'harm' to achieve greater long-term good. A bur oak may be a bur oak from a taxonomic view, but certainly varies widely across its continent wide range. At the local level the only stand of sky-blue aster (*Aster laevis* L.) at HESCCA is visually quite distinct from prairie populations elsewhere. Its survival depends on us.

Considered the father of wildlife management, Aldo Leopold spoke rather eloquently to land management issues. In his books: 'Land Ethic' and 'Sand County Almanac', 1949, he caught succinctly the framework in which we should operate. The sudden arrival of Europeans on the continent led to many drastic and irreversible changes on the continent. Most important in restoration has been the reintroduction of fire. Other major activities are the control of invasive species, growing plants and harvesting seeds for biodiversity enhancement, selective thinning of woody plants, photo documentation and maintaining journal entries.

Prescribed Burns

A great body of scientific literature about fires in natural systems exists. Sediment records in neighboring Fayette County, going back 130,000 years, indicate the frequent nature of fire even in interglacial periods [Teed 2002]. Lightning caused ignition is still occurring today. Most fires in the mid-west historically were anthropogenic in nature. Fire's reputation in land management is only slowly being restored. 'Smokey Bear' was great PR, but poor science. It was a convergence of poor timbering practices, excessive grazing and certainly misuse of fire that led to catastrophic fire events. The scapegoat became fire. Fire frequency, season of the year, intensity and scale have always varied greatly over time and space.

Our first attempt at fire in the woods was a small scale burn in the late 1980's on the Central Barrens ridge under the direction of W. McClain from the Illinois Department of Natural Resources [Schwegman 1995]. The results were amazing. Based in part on this experience, we, the Shoal Creek Volunteers, included all of the 260 acre area in our burn plan. We attempt to burn some portion of the preserve

every year either in the spring or fall. Some years weather conditions make any burn impossible. The intensity of burns has varied much, depending on the time of year, wind direction and velocity, ambient air temperature and humidity

Multiple trunked trees often have a dead member or basal cavity, which is an entry point for fire. Logging damage persists to this day. Heavy woody fuels had accumulated at the base of many trees over the years. Major droughts in past decades, often two years back to back, set trees up for fungal attacks, usually first visible at their bases. The partially decayed remnants of bark and fungal bodies create highly flammable tinder. A severe ice storm in the winter of 2008 contributed additional material, especially from black oaks, which have relatively brittle wood. Large pin oaks form skirts of short branches that accumulate around the base as they die. Pin oaks have relatively thin bark at maturity and are therefore vulnerable to damage from such accumulations. These are just some of the reasons that predispose trees to fire injury. By comparison, even much younger healthy post and blackjack oaks with their thick, blocky bark are very fire resistant.

Historic burn frequency for similar woods has been reported as every 1-4 years [Johnson, Guyette 1994, 1997]. Under such a burn regimen in a less damaged ecosystem such damage would be minimal. Fire may also aid oak recruitment by influencing rodent feeding [Lorimer 1985]. More frequent burns lead to an increase in the ground flora and its diversity which in turn may increase carbon sequestration [Wilhelm, personal comm.]. Excessive stocking rates predispose many oaks to root rot infections. Root rot (*Armillaria* spp.) is quite common in black oak and to a lesser degree in other species [Jacobs 2002]. This combination of thinning factors is a good thing for long-term ecological health of woodlands.

Flame length during a back burn is often only 15-50 cm (6-18") in open woods, with primarily leaves and short graminoids as a fuel. That can however become a brief wall of flame as a head fire races on strong air currents through the convoluted ravine systems. Here we often find large areas that are covered with species of mosses and lichens to the exclusion of higher plants. These exposed slopes and ridges are usually kept free of major fuel accumulations by the same winds. Barrens areas and others dominated by prairie grasses will burn explosively under favorable conditions. The larger trees here survive fires readily due to the rather brief exposure. The very abundant oak and hickory grubs are top killed. Vigorous new shoots arise in abundance from the base and can flush several times during a favorable growing season. White, black, post and blackjack oaks all show a remarkable range of red colors during this flushing period. Their fall colors are even more spectacular. Grown as cutback shrubs these oak species would do justice to any horticultural setting.

The grassland forbs and prairie grasses in this area have thrived on the fire regimen. We have identified more barrens type areas along some of the lake inlets by the presence of a few prairie grasses, conservative forbs such as puccoon (*Lithospermum canescens* (Michx.) Lehm.), butterfly-weed (*Asclepias tuberosa* L.) and others. Here fire management has been combined with canopy reduction [McCarty 1998]. Fire in the various old fields at times will not carry and at other times be a 20' tall roaring wall of flames. That is an interesting degree of variability, and we have not made any decision as to the future of these areas. A good tree cover would help us manage the relatively shade intolerant silky lespedeza. We

would, however, likely lose a number of introduced but conservative species and also birds that favor shrub-lands. Habitat for certain butterflies is also an issue.

The floodplain forest has burnt well only a few times and then rather erratically. It lacks a good fuel matrix in most areas, as the flat and very hygroscopic leaves of most of the species here burn well only under the driest conditions. Even though the foliage of other oak species provides a good fuel base, shingle oak does not and therefore fits in well with the other floodplain species. Woodland annuals germinate in fall and winter and these species would not survive frequent burns. It is likely that occasional burns do favor the recruitment of species, especially graminoids. Orchids have done well under the burn regime. Hawks, owls and even eagles have been seen patrolling the fire lines and indicate that animals also benefit.

Invasive Species Control

“Invasives, whether native or introduced, function like cancer to the ecosystem. They grow uncontrollably and drive many other species to extinction. Burning, using herbicides and other forms of vegetation management are tools to return natural communities to better health” [quote: Packard 2007]. It is unlikely that multiflora rose, the three honeysuckle species or autumn olive were planted intentionally. Even after 20 years of effort to control them, they continue to be a factor in the more disturbed border areas. Fire is not a very effective control once they are well established. The thin canes of the rose do kill back, but can re-grow from an often massive base to well over 10' in length in just one season. Japanese honeysuckle stays green into the winter, but will top kill under ideal conditions. It is easily suppressed but not eliminated. The others will top kill only in juvenile growth stages. Several major populations were pulled years ago by work camp trustees of the Vandalia Correctional Facility.

By far the most progress has been made by a one day Earth Day project in each of the last four years by Susan Shelton's biology classes from the Litchfield High School. It involved digging out honeysuckle and rose, but not the tough rooted autumn olive. That has been fairly easy to eliminate by a basal spray application of Garlon – 4. It is a surefire control method and also works well on roses. Honeysuckle shrubs especially in older sizes are far more resistant and some have required multiple applications over the years for a complete kill. Many thousands have been eliminated, but recruitment from abundant seed dispersal by birds will be a continual problem. Treated areas are priority sites for reintroduction of conservative species, especially woodland grasses and forbs.

An overabundance of shingle oak still needs to be reduced. We started by double girdling the trunks by chainsaw and treating the cuts with Garlon – 4. Without this additional step the cuts will often heal over. Some cottonwood trees have also been girdled in order to liberate much smaller desirable trees in the under-story. Dense local colonies of white ash and a rather persistent infestation of Black locust (*Robinia pseudacacia* L.) have been nearly eliminated.

The major native invader of our oak forests by far is sugar maple (*Acer saccharum* Marsh.) [Ebinger 1986]. Some years over one thousand trees were girdled or felled. We retained three stands and a number of old individuals. Dead



Native herbaceous plants and oak seedlings establish where overstory maples have been girdled (foreground) photo©Henry Eilers

maples fall over and disintegrate in only a few years. This is in contrast to the oaks that we have girdled in incipient barrens sites that needed to be opened up. Many of these trees are still standing after some fifteen years. Other oak remnants go back over 50 years as reported above. The result has been a far more open woodland and a still recovering ground layer. The remaining maple stands have a



A good mast year for *Quercus alba* may result in strong recruitment where the dense shade of maples has been removed. photo©Henry Eilers

woodland floor nearly devoid of vegetation and continue to be subject to erosion. They are stark reminders of a tree in the wrong place.

The control of our most invasive species, silky lespedeza, with herbicides is not an option for us as much of the stands are associated with desirable species. We have seen noticeable reduction where the hemi-parasitic wood betony (*Pedicularis canadensis* L.) had vigorous populations and where dodder (*Cuscuta* spp.) entwined them. Introducing both species may have merit, but our results have been mixed so far.

Seeding and Planting

Seeds of forbs and grasses are annually collected on site, as well as in native plant gardens by volunteers. They have been planted everywhere in HESCCA as the need arose. The only exceptions have been the two barrens INAI sites. The most disturbed sites have been the major recipients of seed and plants. Some species have been introduced successfully from elsewhere especially wetland plants. We planted garden raised one year seedlings of red, bur, blackjack and post oaks in the old fields some fifteen years ago. Some red and bur oaks are now well over 10' tall. The slower growing post and blackjack oaks are still less than 1' tall, spindly and hard to find. Planting additional seedlings of *Salix humilis* and *Corylus americana* has also been successful.

We failed to establish southern black haw viburnum (*Viburnum rufidulum* Raf.), which occurs elsewhere in the county. Several pawpaw (*Asimina triloba* (L.) Dunal) seedlings have been added for genetic diversity in the Shoal Creek floodplain near a large clonal population that has never produced fruit. It is hoped that garden raised seedlings of swamp white oak will add to its population. The acorns are being collected from a site nearby. Nuts of shellbark hickory (*Carya laciniosa* (Michx.) Loud.) have been collected in the nearby Cahokia Creek drainage. The seedlings produced have also been introduced here as the species is disappearing locally.

Conclusion

Recovery in twenty years has been remarkable and is a source of pride for the community. The oaks are all regenerating well and assure good structural and species diversity for the future. The woods are more open in appearance. There is a rich dense herbaceous cover. Erosion has essentially stopped. Very little run-off is observed, even in major rain events. Most ravine rivulets run crystal clear and more consistently. Places such as HESCCA are the last refuges for local biological diversity.

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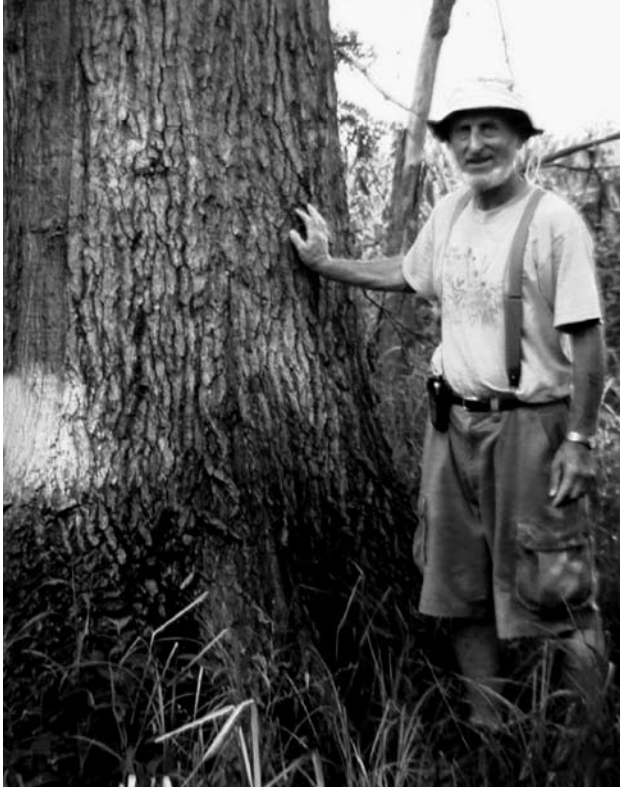
Editor's note: Author and IOS member Henry "Weeds" Eilers is famous in Illinois for his conservation efforts and ecological knowledge. The Henry Eilers Shoal Creek Conservation Area (HESCCA) was named for him in honor of his work with the site and with natural areas region-wide.

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Henry "Weeds" Eilers with *Quercus palustris* at HESCCA
photo by Eike Jablonski