

# CWJ JOURNAL



## BEST PRACTICES IN CONSERVATION AND RESTORATION

Volume 3 • Number 3  
November, 2005

### In This Issue

#### Perspectives in Conservation

The Spirit of St. Louis: Cooperative  
Conservation as a Public Value  
By Debra Shore .....2

#### Features

Assessment of Bird Populations in a  
High Quality Savanna/Woodland: A  
Banding Approach  
By Sandra Wilmore,  
Gary A. Glowacki, and  
Ralph Grundel .....5

Smoke: Promoting Germination of a  
Tallgrass Prairie Species  
By Marcello Pennacchio,  
Lara V. Jefferson, and  
Kayri Havens .....14

Accepting Flood Management  
Strategies: Public Perceptions of  
Rain Gardens in Chicago  
By Chivia Horton .....20

The Ash Tree Population in the  
United States is Under Attack;  
What Are We Doing About It?  
By Tom Dilley,  
Katie Armstrong, and  
Edith Makra .....27

Birds and Buildings Conference  
By Christine Williamson .....35

#### Book Review

*Nature Friendly Communities*  
By Christopher Duerksen and  
Cara Snyder  
Reviewed by Jon Voelz .....40

#### Web Site Review

Web Resources for North  
American Bird Identification  
Reviewed by Robert Sullivan  
and Kirk LaGory .....42

Guidelines to Authors .....48



*Travel to St. Louis  
with Debra Shore as  
she remarks upon  
proceedings from the  
first White House  
conference on the  
environment in four  
decades.*

---

## The Spirit of St. Louis: Cooperative Conservation as a Public Value

Debra Shore

Chicago WILDERNESS Magazine

In 1908 President Theodore Roosevelt called together a dozen governors for the first presidential conference on conservation. Presidents John F. Kennedy and Lyndon Johnson sponsored similar high-level gatherings focused on conservation. And this August a delegation of six Chicago Wilderness representatives headed to St. Louis to attend the first White House Conference on the environment in four decades. Passing the Gateway Arch on the way to the America Center convention hall, these Chicago Wilderness representatives joined more than 1,000 other people from across the country—federal agency representatives (though their numbers were held to 200 or so), state and local officials, tribal representatives, ranchers, farmers, corporate, foundation and conservation activists—who gathered to represent “an upwelling of citizen stewardship in our nation.” So said Gale Norton, Secretary of the Interior, in her welcoming remarks.

Norton led with four questions:

1. How can we better foster innovation?
2. How can we better draw upon local insights and information so that management decisions take local knowledge into account?
3. How can we inspire people to join together as citizen stewards?
4. How can we generate more integrated, less fragmentary decisions?

“Stewardship,” Secretary Norton said, “is a public value.” Participants in the conference had a chance to learn about 30 case studies—including Chicago Wilderness—highlighting the best examples of urban, rural, and species conservation initiatives selected from among hundreds of conservation efforts nationwide. Chicago Wilderness and the Calumet Initiative had been quickly identified as prime examples of cooperative conservation efforts and were nominated and championed by a number of federal partners, including the US Fish and Wildlife Service, the USDA Forest Service, and the Environmental Protection Agency.

Sessions devoted to presentations on each case study occupied the first day of the conference, punctuated by an early lunch speech by Secretary of Defense Donald Rumsfeld. As overseer of 30 million acres of federal lands, the Defense Department must maintain military readiness and train defense forces, but

---

also must protect hundreds of threatened and endangered species on those lands. "The best solutions to encroachment problems are partnerships with conservation organizations, public and private," Rumsfeld said, "to secure easements on private land that can protect habitat and forestall development."

Attendees had an opportunity to learn about efforts to save a salmon fishery in the Walla Walla watershed in Washington state requiring cooperation among tribal representatives, fishermen, apple growers and the county, to protect native oysters in the Pacific Northwest, to restore wildlife habitat along the Detroit River and the Bronx River, and to save the Palos Verde blue butterfly.

"Culture is the stories we tell ourselves about ourselves, so we held 'story gatherings,'" explained Kevin Schreiber from the Walla Walla partnership, which put water back into a river that had been dry since the 1920s due to agricultural drawdowns and urban growth. Schreiber, a salmon fisherman who decided to "give back" to salmon ("I figured I had a deficit in my Buddha points," he said), described "open space" meetings called "confluences" held annually in the Walla Walla basin as a way for people to share their stories and their passion. "If we had cultural traditions of effective stewardship," he said, "we might not need the Endangered Species Act." Nevertheless, apple grower Ron Brown admitted that had it not been for a letter from a federal agency notifying the growers that they were in violation of the Endangered Species Act, they would not have begun discussions to give back some of their water allocation. In the end, the farmers voluntarily gave up one-third of their state water rights, resulting in water flowing in the Walla Walla River for the first time in many years, sustainable fishery, and sustainable agriculture.

"To come to the table you have to sacrifice something," Schreiber added. "To actually achieve shared solutions, everyone has to give a little. A burden shared is a burden that's lighter."

Most groups faced similar challenges, with motivation outstripping mandates and cooperation overcoming coercion.

In panel discussions during the next two days, the Secretaries of Interior, Agriculture, and Commerce, the administrator of the EPA, and the chairman of the Council on Environmental Quality (CEQ) all testified to the importance of removing obstacles to cooperation among and between federal agencies, state and local agencies, and the private sector.

CEQ Chairman Jim Connaughton said, "The federal government owns and manages one of every five acres. This is about how to work out paths to engage in conservation on the other four-out-of-five acres."

Steve McCormick, director of The Nature Conservancy, said he was struck by the number of self-initiated partnerships represented at the conference. "That's as distinctly American as the landscape," he said. "We need a Cooperative Conservation Act that provides incentives, support and funds for these kinds of projects. Congress needs to be a partner."

Lynn Scarlett, assistant secretary of the Office of Policy, Management, and Budget for the Department of Interior, pledged that a variety of federal agencies will be crafting legislation on cooperative conservation and invited everyone to provide suggestions for it. "What needs to be in that package," she asked, "so that we can take the long

---

legacy of conservation and make it the fundamental way of doing business across these lands?"

"In the 1800s, we began to build the physical infrastructure of our nation," Connaughton said in his closing remarks. "The black lines crisscrossing were the railroads. We had brown infrastructure, the roads. We had social networks, clubs and associations and conferences. And then information networks. It's our task to find the way to develop for the 21st century landscape network so that we have emerging a full-color tapestry of greenways and blueways, flyways and historical byways. Chicago Wilderness," he said, "is filling out the green and filling out the blue as they work within the structure of their city. These are grand visions."

We thought so too.

Statements from and background on the conference are online at [www.conservaion.ceq.gov](http://www.conservaion.ceq.gov).

*Debra Shore is the editor for the Chicago WILDERNESS Magazine and Director of Development for Chicago Wilderness. Debra can be reached at [dshore@chicagowilderness.org](mailto:dshore@chicagowilderness.org)*

*As urbanization continues to degrade natural areas, our understanding of habitat use and population trends becomes increasingly critical. Sandra Wilmore, Gary Glowacki, and Ralph Grundel examine six years of monitoring data on migrating and breeding bird populations using a high-quality savanna/woodland complex surrounded by development.*

---

## Assessment of Bird Populations in a High Quality Savanna/Woodland: A Banding Approach

Sandra L. Wilmore

Formerly of Save the Dunes Conservation Fund

Gary A. Glowacki and Ralph Grundel

U.S. Geological Survey

### Abstract

Between 1999 and 2004, Save the Dunes Conservation Fund's Miller Woods Bird Banding Program monitored migrating and breeding bird populations within a high-quality black oak, dry-mesic sand savanna/woodland with ridge and swale topography. The objectives of this program were to collect consistent and reliable demographic and abundance data on the bird populations, to investigate long-term population trends, and to contribute to improved land management decisions at regional and national scales. The technique employed involved capturing birds in mist nets that were deployed for set periods of time at 17 net sites in two banding areas in Miller Woods. During the course of this six year study, the fall migration capture rate declined significantly, suggesting that reduced productivity may have occurred in bird populations. There was a positive response during the spring migration to earlier spring wildfires, indicated by high capture rates in 2000 and 2002 that corresponded with fires affecting most of the bird banding net locations. For several common species found at the Miller Woods site, the ratio of juveniles to adults was compared to ratios at other banding stations in the north central U.S. Breeding site fidelity was documented for 20 species, all common breeders. Variation in capture rates among net locations demonstrated the role of the shrub layer within the savanna habitat mosaic during migration stopover.

### Study Site

This study was conducted in the eastern portion of Miller Woods, a 350-hectare section of the Indiana Dunes National Lakeshore in northwest Indiana. Miller Woods is located on the east side of Gary, Indiana and is surrounded by residential, commercial, and industrial development (Figure 1). The area is part of the Grand Calumet River/Indiana Harbor Canal (GCR/IHC) Area of Concern, which was designated as having significantly impaired water quality by the 1987 Great Lakes Water Quality Agreement between the United States and Canada. Despite the proximity to development and impaired



areas, Miller Woods remains one of the few examples of high-quality black oak savannas/woodlands in the Midwest.

The Miller Woods overstory is dominated by black oak (*Quercus velutina*). Canopy cover in the area is about 65% (215 black oak stems > 10 cm diameter at breast height per hectare), but the relatively low density of subcanopy woody vegetation differentiates Miller Woods from forested habitats. Common shrubs and herbs include sassafras (*Sassafras albidum*), winged sumac (*Rhus copallinum*), New Jersey tea (*Ceanothus americanus*), early low blueberry (*Vaccinium angustifolium laevifolium*), wild sarsaparilla (*Aralia nudicaulis*), wild lupine (*Lupinus perennis occidentalis*), wild columbine (*Aquilegia canadensis*), various asters (*Aster linariifolius*; *A. nemoralis*; *A. azureus*), and rough blazing star (*Liatris aspera*). The low, wet areas typically support willows (*Salix* spp.). Several wetlands support exotic/invasive species such as common reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), and cattail (*Typha* spp.), but most are not dominated by these species. Wetlands composed roughly 15% (2 hectares) of the breeding study area and 9% (1.5 hectares) of the migration area.

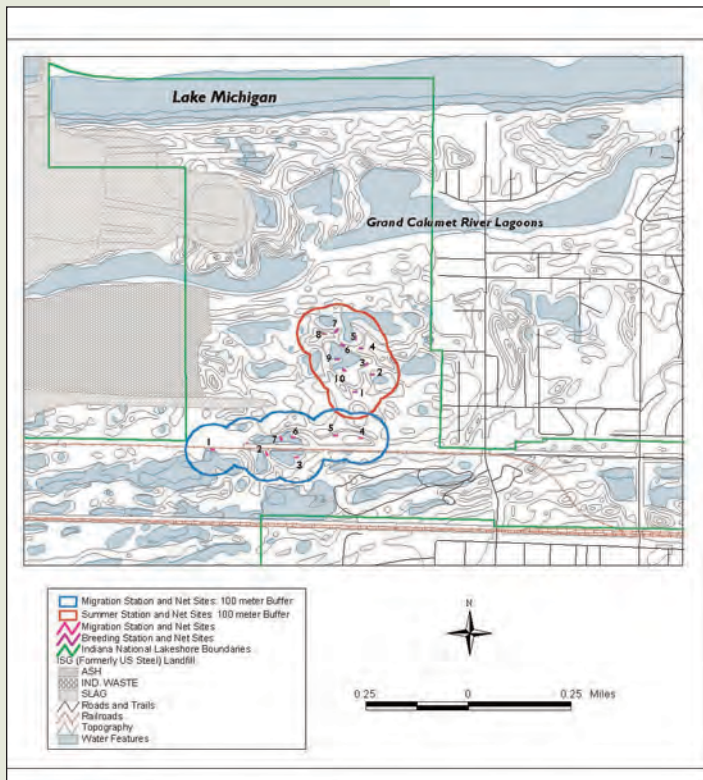


Figure 1: Net Sites

## Methods

To monitor long-term population trends in breeding and migratory birds, two separate banding areas were established at Miller Woods in 1999. Twelve-meter long mist nets (30 mm mesh size) were used in each area to capture birds. Seven net sites were established over approximately 12 hectares at the migration area and ten net sites over nearly 15 hectares at the breeding area (Figure 1). The net sites were a mixture of open savanna and woodland habitat with little understory, and low areas with substantial understory habitat. Nets were set up approximately one half hour before sunrise. During the spring and fall migrations, nets were open for approximately 5.5 hours per day, twice per week. During the breeding season, nets were open for approximately seven hours per day, once per ten-day period. The specific protocols used for processing birds are described in detail in the Monitoring Avian Productivity and Survivorship (MAPS) Manual (DeSante *et al.* 2001).

## Results and Discussion

Between 1999 and 2004, 6,696 birds were banded. Of those, 742 birds were recaptured for a total of 7,438 netted birds from 112 species (not including birds banded for demonstration purposes). Of the species banded, 27 are considered probable breeders at the Miller Woods site, and the remaining 85 species were considered migratory or transient. Common breeders included several known to breed frequently in Midwestern savannas, such as the eastern towhee (*Pipilo erythrophthalmus*), red-headed woodpecker (*Melanerpes erythrocephalus*), eastern wood-pewee (*Contopus virens*), and great-crested flycatcher (*Myiarchus crinitus*) (Davis et al. 2000), as well as the field sparrow (*Spizella pusilla*), American goldfinch (*Carduelis tristis*), song sparrow (*Melospiza melodia*), gray catbird (*Dumetella carolinensis*), and common yellowthroat (*Geothlypis trichas*). Of these, the red-headed woodpecker, and great-crested flycatcher have been identified as species that are concentrated in savannas or woodlands in the Chicago Wilderness region (Moskovits et al. 1997; Bendowitz 2004). Common migrants (>150 banded) included the white-throated sparrow

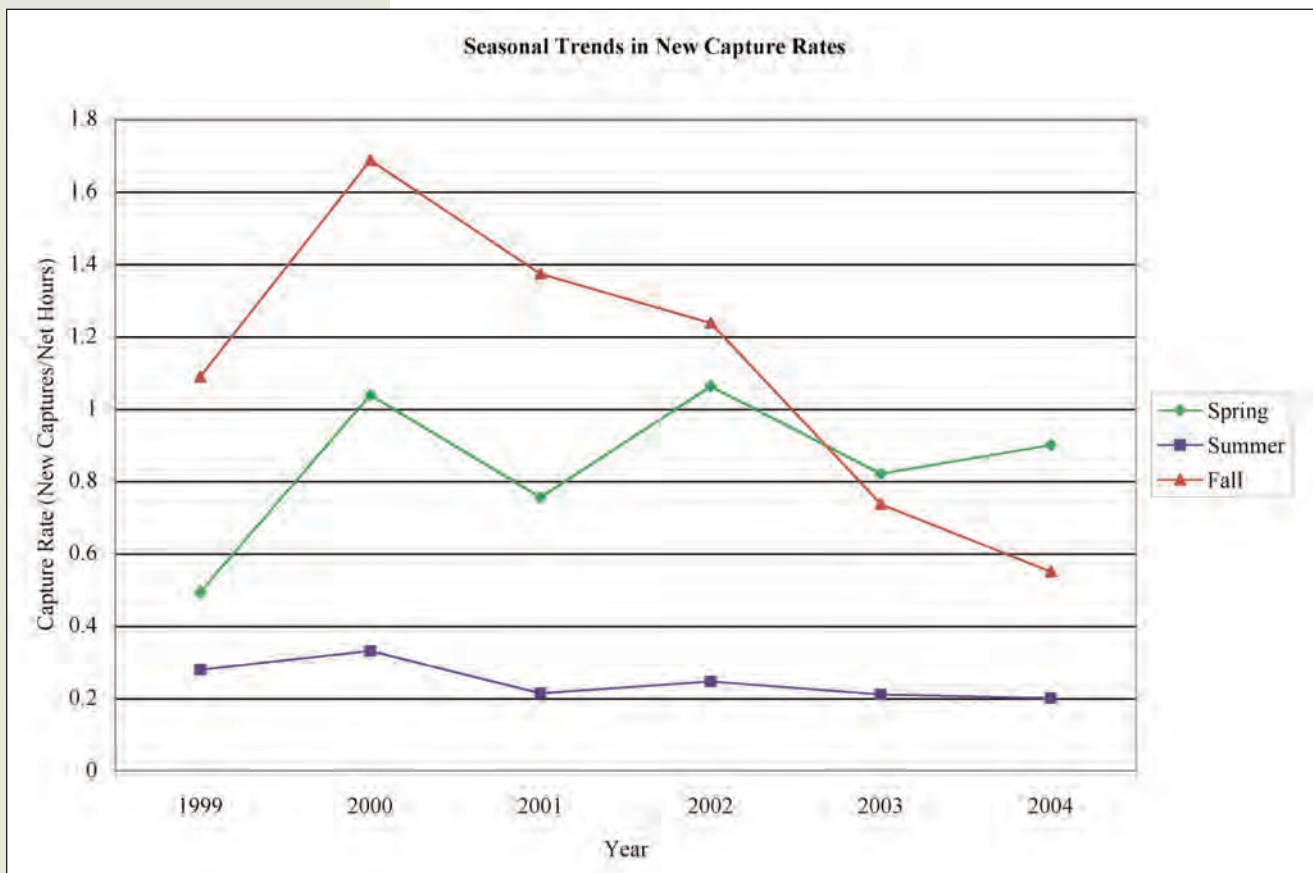


Figure 2. Capture rates (total new captures/net hours) for the Miller Woods bird banding station by season and year.

---

(*Zonotrichia albicollis*), ruby-crowned kinglet (*Regulus calendula*), swamp sparrow (*Melospiza georgiana*), hermit thrush (*Catharus guttatus*), magnolia warbler (*Dendroica magnolia*), myrtle warbler (*Dendroica coronata*), Swainson's thrush (*Catharus ustulatus*), and American redstart (*Setophaga ruticilla*).

Over the course of the study, capture rates (total new birds captured/net hour) varied between 0.49 and 1.06 during the spring, between 0.20 and 0.33 during the summer, and between 0.55 and 1.69 during the fall (Figure 2). Variation in capture rates among adult birds is thought to reflect variation in breeding densities for most passerines (DeSante *et al.* 1999; Silkey *et al.* 1999). Capture rates during the summer and fall seasons include juvenile and adult birds and reflect both changes in breeding density as well as the success of breeding efforts in producing juvenile birds.

Fluctuations in spring capture rates suggest a positive response to wildfires, with the high capture rates in 2000 and 2002 corresponding to fires affecting most net sites prior to the spring migration.

A trend for more birds to be netted in autumn than spring was anticipated due to the effect of Lake Michigan concentrating birds in the region during fall migrations. Many southbound fall migrants following the shores of Lake Michigan converge in northwest Indiana (Brock 1997). The presence of juveniles among captures in the fall was also expected to contribute to increased numbers. However, in 2003, and especially in 2004, capture rates for spring migrants were greater than for fall migrants (Figure 2). The significant decline in fall migration capture rates between 2000 and 2004 (Pearson correlation coefficient ( $r$ ) = -0.99,  $p < 0.001$ ) suggests that reduced productivity may have occurred in bird populations during this period. Other potential contributing factors include the limited migratory banding effort (only two days per week) that might have resulted in missing primary bird movements (which can occur over the course of just a few days) and weather conditions delaying fall migrations.

Fall captures of white-throated sparrows in particular declined sharply from a high of 192 in 2001 to only 14 in 2004. This species is declining throughout much of its breeding range (Falls and Kopachena 1994) but was the most common fall migrant in Miller Woods through 2002. When white-throated sparrow numbers are removed from the data shown in Figure 2 to determine any impact on the trend for the overall rate, there is still a significant negative correlation in capture rate of fall birds between 2000 and 2004 ( $r = -0.95$ ,  $p < 0.05$ ).

The ratio of juveniles:adults (reproductive index) can be used to indicate reproductive success (DeSante *et al.* 1999) within a population of birds. Comparing the reproductive index for five common species from the Miller Woods site to the reproductive index compiled for these same species across the north central or the entire U.S. may indicate whether the Miller Woods site is serving as a relatively good source (net producer) or relative sink (net loser) of juvenile birds (Pulliam 1988). This is important for savanna conservation because it has been suggested that savannas, in general, are poorer habitats for avian reproduction than prairies or forests (Temple 1998). Low reproductive index values may be related to many factors. Predation is the primary cause of songbird nest mortality, and levels of predation are affected by landscape characteristics (Howell *et al.* 2000; Rodewald and Yahner 2001; Knutson *et al.* 2004). Miller Woods is embedded within an urban matrix that often is associated with increased nest predation by raccoons and blue jays in the Chicago Wilderness region (Schmidt and Whelan 1999). Table 1 is a summary of the five most commonly



captured breeding species, and lists whether the reproductive index at Miller Woods was greater or less than the reproductive index for the north central or entire U.S. For three of the five species the reproductive index at Miller Woods was lower than for the region, and for two species the Miller Woods index was not different from the regional index. None of the Miller Woods species had a higher reproductive index than for the region. Over a longer time and with more species, the type of analysis illustrated by Table 1 can help us understand how well savanna/woodland habitats such as Miller Woods support avian reproduction.

Common Name	Code	"Miller Woods 1999-2004"		"Regional Totals 1999-2001"		Region	Chi-Square Value	P	Trend*
		Adults	Juveniles	Adults	Juveniles				
red-winged blackbird	RWBL	115	13	176	18	North Central US	0.7	0.469	ns
field sparrow	FISP	45	13	243	100	All US	1.1	0.186	ns
song sparrow	SOSP	96	45	345	276	North Central US	7.4	< 0.01	MW<Region
common yellowthroat	COYE	73	22	556	262	North Central US	3.1	< 0.05	MW<Region
American robin	AMRO	329	93	241	136	North Central US	40.2	< 0.01	MW<Region

*\*The reproductive index at Miller Woods (MW) was greater (>) than, less (<) than, or not significantly different from (ns) the reproductive index for the region*

*Table 1. Comparison of number of adults and juveniles banded between Miller Woods banding site (totals between 1999-2004) and the north central US (or entire US) (totals between 1999-2001). Significant chi-square test indicates that the relative ratio of juveniles to adults differs between Miller Woods and the US region.*

Breeding site fidelity was noted for twenty species, mainly common breeding species at Miller Woods, between 1999 and 2005. Table 2 lists these species in order of overall return rate and the number banded as hatch-year birds. For our study, individual birds were said to have exhibited breeding site fidelity if they are banded during one breeding season and recaptured in a subsequent breeding season. Of the twenty species, eight species exhibited natal philopatry—birds banded as juveniles that were recaptured in subsequent years in Miller Woods as migrants or breeders. Table 2 also shows the maximum number of years that returns were documented following an original capture.

Species	"Overall return rate"	Number banded as HY	"Summer return rate"	Max. # yrs return documented after original capture
gray catbird	1% (3/249)	1	3% (1/33)	2
blue jay	2% (1/52)	-	0% (0/4)	1
American goldfinch	3% (8/279)	-	2% (3/164)	4
eastern bluebird	3% (1/30)	-	5% (1/21)	1
red-headed woodpecker	5% (2/44)	-	6% (2/32)	2
American robin	5% (8/167)	-	3% (2/54)	2
eastern towhee	5% (2/41)	-	11% (1/9)	2
white-breasted nuthatch	4% (1/20)	1	5% (1/18)	3
eastern wood peewee	5% (3/58)	-	3% (1/36)	3
common yellowthroat	6% (23/392)	6	8% (5/61)	4
northern cardinal	6% (3/47)	1	0% (0/16)	1
black-capped chickadee	8% (5/65)	3	0% (0/15)	2
red-winged blackbird	7% (12/153)	-	6% (7/106)	3
song sparrow	9% (18/202)	2	9% (8/80)	3
brown-headed cowbird	10% (4/37)	-	8% (2/20)	2
tufted titmouse	11% (5/45)	1	5% (1/18)	1
field sparrow	12% (13/102)	5	13% (5/35)	4
Baltimore oriole	16% (7/42)	-	0% (0/25)	2
great-crested flycatcher	17% (2/11)	-	11% (1/8)	3
hairy woodpecker	40% (2/5)	-	50% (1/2)	5

Table 2. Return rates for species exhibiting site fidelity to Miller Woods. Overall rates include migration and summer season records; summer rates include only those species with new and recapture events during the breeding season. Also listed are the number of returns banded as juveniles and the maximum number of years returns were documented for each species.

The return rate of field sparrows (12% overall and 13% for breeding season, N=102 and 35, respectively) is significantly lower than the 28-75% reported in the literature (Carey *et al.* 1994). It did, however, include birds fledged from the study site, which has not been widely documented.

During the spring and fall migrations, the number of species captured per net was significantly greater ( $P < 0.05$ , one way ANOVA) at nets 6 and 7 than at the remaining five nets. The number of individuals captured was significantly greater at these two nets during the spring migration. Nets 6 and 7 (Figure 1) were distinguished by local habitat diversity that included dense shrubby vegetation around an adjacent wetland. Nets in areas with open understories captured more sparrows and thrushes. Warblers were most frequently captured in areas with higher shrub density. Thus, even within the small area surveyed in this study, habitat diversity both at the net scale and among nets contributed to overall avian diversity of Miller Woods.

---

## Conclusions and Recommendations

Save the Dunes Conservation Fund (SDCF)'s bird banding program successfully completed six years of consistent migratory and breeding bird population monitoring in Miller Woods. Locally these data provide important information on the health of bird populations using this savanna/woodland habitat, thereby contributing to improved land management decisions. In addition, these data establish valuable baselines for evaluating future trends. Between 1999 and 2004, the number of fall migrants banded declined, reproductive index during the breeding season was lower at Miller Woods than across the region for several species, and there was a positive response to spring burns during the spring migration. Variation in capture rates among net sites demonstrated the role of the shrub layer within the savanna habitat mosaic during migration stopover.

However, sustaining long-term monitoring efforts is difficult. SDCF discontinued the Miller Woods bird banding program after 2004, primarily due to lack of adequate funding. In addition, with only one banding station, the ability to analyze trends in the data for use in adaptive management will remain limited. Ideally, several stations within the region should be established to ensure robust analyses and to allow for comparison of results. Failure to fund one long-term station indicates that it would be difficult to maintain a network of stations. Recognition of such problems was an important consideration in the establishment of the Canadian National Monitoring Network, a series of migration banding stations supported by Bird Studies Canada to ensure a stable source of funding (<http://www.bsc-eoc.org/national/cmmn.html>).

Although resource intensive, monitoring avian productivity and survivorship (as in the breeding component of this program) provides information that is central to adaptive management, since environmental stressors and management actions affect vital productivity and survivorship without substantial time lags (Temple and Wiens 1989; DeSante and George 1994). Moreover, data on vital rates provide crucial information about the health of populations and the stage of the life cycle at which population change is affected (Peach *et al.* 1996) and can serve as an index of habitat quality.

The breeding component of the program is being maintained on a voluntary basis, with supplies kindly donated from SDCF. The data collected from this station are donated to national programs examining trends in breeding bird productivity. Volunteers will continue to work toward meaningful application of the data at the local/regional level, evaluate our efforts, and make improvements where possible. Ten to twenty years has been suggested as an appropriate range of duration for monitoring to contribute to improved management (Donovan *et al.* 1999).

*Sandra L. Wilmore was the program director for Save the Dunes Conservation Fund from 1997-2005, and principle investigator for the Miller Woods Bird Banding Program during this time. She can be reached at (219) 938-1573 or [swigoe@sbcglobal.net](mailto:swigoe@sbcglobal.net).*

*There is a presentation about the Miller Woods Bird Banding Program available at <http://www.savedunes.org/MIWO-BB.htm>.*

## Acknowledgements

Many thanks to those who contributed to the success of this program: Save the Dunes Conservation Fund; Lou Brenan (Indiana Dunes National Lakeshore), Jamie Claus, John Goeb, Randy Knutson (Indiana Dunes National Lakeshore), Theresa

---

Lavendusky, Audrey Lowry, Kevin Miller (Indiana Department of Environmental Management), Danielle O'Grady (Institute for Bird Populations), Chris Salberg (Dunes-Calumet Audubon), Elizabeth Schultz, Cora and Elma Thiele, Ron Weiss (Chipper Woods Bird Observatory), and many other volunteers; and the Dunes-Calumet, South Bend-Elkhart, and Amos W. Butler Audubon Societies, US EPA Great Lakes National Program Office, MortarNet, Inc., and Chicago Wilderness. This article is contribution 1340 of the USGS Great Lakes Science Center.

## References

- Bendowitz, C. 2004. Chicago Wilderness Report Card Data Workshop: Birds. Unpublished notes from the July 23 Chicago Wilderness Biodiversity Recovery Plan workshop on birds. Naperville, IL.
- Brock, K. J. 1997. *Birds of the Indiana Dunes*, 2nd edition. Shirley Heinze Environmental Fund, Michigan City, Indiana, USA.
- Carey, M., D. E. Burhans, and D. A. Nelson. 1994. Field Sparrow (*Spizella pusilla*). *The Birds of North America*, No. 103 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Davis M. A., D. W. Peterson, P. B. Reich, M. Crozier, T. Query, E. Mitchell, J. Huntington and P. DeSante, D.F. and George, T.L. 1994. Population trends in the landbirds of western North America. , A Century of Avifaunal Change in Western North America (J.R. Jehl, Jr. and N.K. Johnson Eds.). *Studies in Avian Biology* 15: 173-190.
- DeSante, D.F., O'Grady, D.R. and Pyle, P. 1999. Measures of productivity and survival derived from standardized mist-netting are consistent with observed population changes. *Bird Study* 46: S178-188.
- DeSante, D. F., Burton, K. M., Velez, P., and Froehlich, D. 2001. *MAPS Manual: 2001 Protocol*. The Institute for Bird Populations, Point Reyes Station, CA. 67 p.
- Donovan, Therese M., K. E. Freemark, B. A. Maurer, L. Petit, S. K. Robinson, and V. Saab. Setting local and regional objectives for the persistence of bird populations. In Bonney, Rick, David N. Pashley, Robert J. Cooper, and Larry Niles, eds. 1999. *Strategies for Bird Conservation: The Partners in Flight Planning Process*. Cornell Lab of Ornithology. <http://birds.cornell.edu/pifcapemay>
- Falls, J. B., and J. G. Kopachena. 1994. White-throated Sparrow (*Zonotrichia albicollis*). *The Birds of North America*, No. 128 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.
- Howell, Christine A., S. C. Latta, T.M. Donovan, P. A. Porneluzi, G. R. Parks, and J. Faaborg. 2000. Landscape effects mediate breeding bird abundance in Midwestern forests. *Landscape Ecology* 15: 547-562.
- Knutson, Melinda G., G. J. Niemi, W.E. Newton, and M. A. Friberg. 2004. Avian nest success in midwestern forests fragmented by agriculture. *The Condor* 106: 116-130.

- 
- Moskovits, D., S. Packard, T. Sullivan, and W. Urban. 1997. Chicago Wilderness Taxonomic Workshop: Birds. Unpublished notes from the July 17 Chicago Wilderness Biodiversity Recovery Plan workshop on birds. Chicago, IL.
- Peach, W.J., Buckland, S.T. and Baillie, S.R. 1996. The use of constant mist-netting to measure between-year changes in the abundance and productivity of common passerines. *Bird Study* **43**: 142-156.
- Pulliam, H. R. 1988. Sources, sinks, and population regulation. *Am. Nat.*, **132**: 652-661.
- Rodewald, Amanda D. and R. H. Yahner. 2001. Avian nesting success in forested landscapes: influence of landscape composition, stand and nest-patch microhabitat, and biotic interactions. *The Auk* **118**(4): 1018-1028.
- Schmidt, K. and C. J. Whelan. 1999. Nest predation on woodland songbirds: when is nest predation density dependent? *Oikos*, **87**: 65-74.
- Silkey, M., N. Nur & G.R. Geupel. 1999. The use of mist-net capture rates to monitor annual variation in abundance: a validation study. *The Condor* **101**: 288-298.
- Temple, S. A. 1998. *Surviving where ecosystems meet: ecotonal animal communities of mid-western oak savannas and woodlands*. Pages 207-222 in W. J. Urbrock, editor. Trans. Wisc. Acad. Sci. Arts Lett. Wisconsin Academy of Sciences, Arts and Letters, Madison, Wisconsin, USA.
- Temple, S.A., and Wiens, J.A. 1989. Bird populations and environmental changes: can birds be bio-indicators? *American Birds*, **43**, pp. 260-270.



*Can smoke promote the germination of tallgrass prairie seeds? Researchers at the Chicago Botanic Garden explore this question by focusing on a rare prairie perennial.*

---

## Smoke: Promoting Germination of a Tallgrass Prairie Species

Marcello Pennacchio, Lara V. Jefferson, and Kayri Havens  
Institute for Plant Conservation, Chicago Botanic Garden

### Introduction

The ability for smoke to promote seed germination was first reported by the South African team of de Lange and Boucher (1990), who showed that it helped break dormancy in the fynbos species, *Audouinia capitata* (L.) Brongn. Since then, various other researchers have employed smoke to promote germination in plants in South Africa, Australia and North America (Brown 1993; Brown and Van Staden 1997; Dixon *et al.* 1995; Tieu *et al.* 2001). As a result, smoke is now routinely used in those countries as an ecological and restoration tool in conservation practices. It has even found a useful role in assisting with the management of land (Brown and Van Staden 1997).

Interestingly, others may have already been using smoke to promote germination prior to those reported here. Centuries before de Lange and Boucher tested smoke on their fynbos species, Native Americans were, quite possibly, already using it to promote germination in pumpkin seeds. During his voyages to Canada in the early 1600s, the French missionary, Gabriel Theodat Sagard, reported that the people of the Lake Huron tribes constructed special germination boxes specifically for this purpose (Sagard 1632). These boxes, which were lined with multiple layers of soil and seeds and were suspended above fires, may have been designed to enable both the smoke and the heat of those fires to act on the seeds. Elsewhere, the Zulu People of Africa reportedly used smoke as a fertility charm to improve crop sizes in subsequent seasons (Hutchings *et al.* 1996). It is not clear, however, whether or not these people were aware of the effects of smoke on seed germination.

Most contemporary research into the use of smoke has focused primarily on its ability to promote germination in species of fire-prone ecosystems of Mediterranean environments. Few studies have looked at the effects of smoke on the seeds of plants from other fire-prone ecosystems, such as the tallgrass prairies in the Midwest of the United States. Given that these plants occur in naturally fire-prone environments, we decided to test the effects of smoke on their seeds. What we soon discovered was that germination was promoted in several species. Our study also revealed that the duration of smoke treatments was different for each species. Some responded following short periods that ranged from 2-4 minutes, while others required up to 32 minutes of exposure. In some cases, longer treatments actually inhibited germination.

---

One of the many plants that responded both positively and negatively to smoke was the imperiled species, hairy mountain mint (*Pycnanthemum pilosum* Nutt). Hairy mountain mint (Lamiaceae) is a highly aromatic and herbaceous perennial that was once abundant throughout central North America. Its leaves give it a distinctly peppermint-like aroma, making it ideal for the preparation of herbal teas and salads. In the past, Native Americans also used its leaves for medicinal purposes (Lawton 2002). It is now listed as very rare in the Chicago region (Swink and Wilhelm 1994), threatened in Michigan, endangered in Ohio and New York and extirpated in Pennsylvania (USDA 2005). Although the specific reason for its decline in the Chicago region is unknown, loss of habitat and over-harvest may likely have influenced its current status. The results of a detailed investigation into the effects of smoke on hairy mountain mint seeds are reported here as an example of the type of response to smoke by the seeds of tallgrass prairie species. Instructions and recommendations on how to treat this and other tallgrass prairie species with smoke are included.

### Methods

Two separate trials were performed in our study. In the first, hairy mountain mint seeds, purchased from Prairie Moon nursery (Winona, MN), were treated with eight different time periods of aerosol smoke and were then germinated in 55 mm Petri dishes lined with Whatman filter paper No. 1. Each Petri dish was sealed with Parafilm and was kept in an incubator (Low Temperature, Precision Scientific Inc.) at 20°C and with a 12-hour light/12-hour dark cycle. There were eight replicates of 25 seeds for each treatment. The smoke durations were 0, 1, 2, 4, 8, 16, 32 and 64 min. Smoke was produced by burning straw in a modified burner, which was then pumped into an 80-liter glass aquarium. The purpose of this trial was to determine the effects, if any, of the prolonged exposure to smoke.

In the second trial, the seeds were directly sown onto a germination soil mixture (Fafard Inc., Agawam, MA). Trays loaded with eight replicates of 25 seeds were treated in the smoke chamber, also receiving one of the eight smoke treatments. The trays were then transferred to a greenhouse where the seeds were watered for 3 sec every 20 min or earlier if the intensity of the sun exceeded a certain limit. This trial was designed to explore the effects of smoke on seeds that were watered and, therefore, rinsed frequently.

We monitored the seeds for 14 days to determine when they had sprouted. Three germination parameters were calculated: final germination percentage (FG%), rate of germination (RG) and mean period to final germination (MPFG). We used statistical analysis to determine if there was a significant difference between treatments.

### Results and Discussion

The results of both trials revealed that the germination of hairy mountain mint seeds were significantly promoted and inhibited when treated with smoke. Seeds exposed to long periods of smoke in Petri dishes exhibited decreased FG%, RG and increased MPFG when treated for 1-4 min (Table 1). In contrast, the FG% of those seeds tested in trays in the greenhouse increased following aerosol smoke treatments of 4-32 min (Table 1). However, the only significant increase occurred at 32 min of exposure, when it increased from  $64.50 \pm 3.96$  to  $85.50 \pm 3.11\%$  (32.6% increase). The rate at

which those seeds germinated (RG) was not affected, however. The MPFG significantly decreased following 64 min of smoke time, changing from  $7.63 \pm 0.14$  to  $8.75 \pm 0.18$  days (14.7%).

Smoke	P. pilosum (Petri dishes)			P. pilosum (Soil)		
Time	FG %	RG	MPFG	FG %	RG	MPFG
0	$57.50 \pm 5.85a$	$3.74 \pm 0.37a$	$4.02 \pm 0.14a$	$64.50 \pm 3.96b$	$1.12 \pm 0.11a$	$7.63 \pm 0.14a$
1	$38.00 \pm 9.65ab$	$1.526 \pm 0.49b$	$6.89 \pm 0.69b$	$69.00 \pm 3.91b$	$1.19 \pm 0.08a$	$7.47 \pm 0.07a$
2	$39.50 \pm 4.37ab$	$0.77 \pm 0.14b$	$8.16 \pm 0.29bc$	$62.50 \pm 4.47b$	$1.07 \pm 0.09a$	$7.56 \pm 0.22a$
4	$27.50 \pm 5.09b$	$0.72 \pm 0.14b$	$8.54 \pm 1.27c$	$75.50 \pm 4.69ab$	$1.24 \pm 0.11a$	$7.44 \pm 0.15a$
8	$0.00 \pm 0.00c$	$0.00 \pm 0.00c$	$0.00 \pm 0.00d$	$75.00 \pm 2.24ab$	$1.19 \pm 0.15a$	$7.31 \pm 0.08a$
16	$0.00 \pm 0.00c$	$0.00 \pm 0.00c$	$0.00 \pm 0.00d$	$80.50 \pm 3.81ab$	$1.48 \pm 0.15a$	$7.39 \pm 0.12a$
32	$0.00 \pm 0.00c$	$0.00 \pm 0.00c$	$0.00 \pm 0.00d$	$85.50 \pm 3.11a$	$1.48 \pm 0.22a$	$7.43 \pm 0.11a$
64	$0.00 \pm 0.00c$	$0.00 \pm 0.00c$	$0.00 \pm 0.00d$	$78.50 \pm 2.26ab$	$1.53 \pm 0.09a$	$8.75 \pm 0.18b$
P-Value	< 0.001	0.001	< 0.001	< 0.001	0.172	<0.001

Table 1: Mean  $\pm$  S.E. for FG%, RG and MPFG results for the two seed germination trials of *Pycnanthemum pilosum* (Petri dishes and soil) following the eight smoke treatments with aerosol smoke. Different letters indicate significant differences between extract concentrations, using Tukey's Compromise. FG% = final germination percentage; RG = rate of germination (days); MPFG = mean period to final germination (days). See Methods for calculation of RG and MPFG.

Based on the results of this study there appear to be at least two biological activities associated with smoke. These both promote and inhibit the germination of hairy mountain mint seeds. The promotive agent is significantly active at 32 min of aerosol smoke treatment, but only if the seeds are watered regularly. Rinsing the seeds appears to decrease or eliminate entirely the effects of the inhibitory agent. Without rinsing, prolonged or high exposures to smoke may inhibit germination. This type of dual regulation has previously been reported for the cape everlasting plant, *Syncarpha vestita* (L.) B. Nord (Brown *et al.* 1993) and for lettuce (*Lactuca sativa* L.) seeds (Light *et al.* 2002). Those researchers have also suggested that the inhibitor in smoke, which has yet to be identified, could be rinsed out with water.

In other related studies by our team, we noticed that most seeds are permanently inhibited or even destroyed if they are subjected to either high concentrations of smoke or prolonged exposures to it. It is therefore recommended that seeds treated with smoke, irrespective of the duration of the treatment, be rinsed within an hour to avoid any damage to them. This will not diminish the promotive effects of smoke (Baldwin *et al.* 1994; Light *et al.* 2002). The agent responsible for promoting germination has recently been identified as a butenolide (Flematti *et al.* 2004; Van Staden *et al.* 2004). A similar substance, strigol, has also been shown to stimulate seed germination (Wigchert and Zwanenburg 1999).

The competitive interactions of smoke, as well as the need for water or rainfall to lessen or eliminate the inhibitory effects, may be important considerations for those who routinely

---

manage land and co-ordinate conservation practices in post-fire environments (Light *et al.* 2002). Some thought should therefore be given to the duration for which seeds are treated with smoke, a species-specific characteristic. The time it takes to wash out the inhibitor will also vary with species. Preliminary studies with progressively greater durations of smoke and wash times will help to establish the most effective treatments. Conducting these types of studies is highly recommended before any large-scale applications of smoke are attempted.

Any plant or blank paper can be burned to generate smoke since the active constituent is a by-product of cellulose combustion (Flematti *et al.* 2004; Van Staden *et al.* 2004). It is, however, recommended that certain plants be avoided. Tobacco smoke, for example, has been shown to inhibit seed germination in some species (Noble 2001). We recommend the use of commercially available straw. Aqueous solutions, in which smoke is bubbled through water for an hour, can also be prepared, stored and used at a later date. Dilutions of 1:100, 1:500, 1:1000 and 1:2000 are typically used to determine the most effective concentration.

In conclusion, the germination of seeds of hairy mountain mint and other tallgrass prairie species can be significantly improved if they are treated with smoke and then subsequently rinsed. This may have implications for their conservation. Given that future demands for plants such as hairy mountain mint are likely to increase in the future, it becomes imperative that new cost-effective and more successful methods for cultivating the species become available to meet those demands (Van Staden 1999). We believe that smoke will play an important role in the conservation and cultivation of many species such as this one. Researchers at Chicago Botanic Garden's Institute for Plant Conservation are currently investigating the effects of smoke on other species. Several species have been determined to respond to smoke in early studies (Jefferson *et al.* 2005). More thorough studies by Leora Siegel (Chicago Botanic Garden) and our team are currently underway. To our knowledge, the use of smoke to promote germination in tallgrass prairie species is the first of its kind in the United States and certainly in the Midwest.

We have also looked at the effects of smoke on a well-studied plant species, mouse-ear cress *Arabidopsis thaliana* (L.) Heynh (Brassicaceae). This member of the mustard family (which includes cabbages and radish), has been used extensively throughout the world for a variety of plant-related studies. The results of our work with mouse-ear cress have shown that it is ideal for use in the laboratory when exploring the effects of smoke on seed germination. Those results have recently been submitted elsewhere for publication (Pennacchio *et al.* 2005). It is hoped that they will help to unlock some of the mysteries surrounding smoke and its effects on the germination process.

*Marcello Pennacchio is a Conservation Scientist in the Institute for Plant Conservation at the Chicago Botanic Garden. He can be reached at [mpennacchio@chicagobotanic.org](mailto:mpennacchio@chicagobotanic.org)*

*Lara Jefferson is a Conservation Scientist in the Institute for Plant Conservation at the Chicago Botanic Garden. She can be reached at [ljefferson@chicagobotanic.org](mailto:ljefferson@chicagobotanic.org)*

*Kay Havens is the Medard and Elizabeth Welch Director of the Institute for Plant Conservation at the Chicago Botanic Garden. She can be reached at [khavens@chicagobotanic.org](mailto:khavens@chicagobotanic.org)*

---

## Acknowledgements

Mr. Brian D. Clarke, Manager of plant production at the Chicago Botanic Garden, and all his staff, especially Cathy Thomas, are thanked for providing us with advice, materials and space for our greenhouse seed germination trials. Mr. Scott Basten and his staff in Maintenance, Chicago Botanic Garden, are thanked for building the burner and smoke device.

## References

- Baldwin, I.T., L. Staszak-Kozinski, and R. Davidson. 1994. Up in smoke. I. Smoke-derived germination cues for post-fire annual, *Nicotiana attenuata* Torr ex Watson. *Journal of Chemical Ecology* **20**: 2345-2371.
- Brown, N.A.C. 1993. Promotion of germination of fynbos seeds by plant-derived smoke. *New Phytologist* **123**: 575-583.
- Brown, N.A.C., G. Kotze and P.A. Botha. 1993. The promotion of seed germination of Cape Erica species by plant-derived smoke. *Seed Science and Technology* **21**:179-185.
- Brown, N.A.C. and J. Van Staden. 1997. Smoke as a germination cue: a review. *Plant Growth Regulation* **22**: 115-124.
- De Lange, J.H. and C. Boucher. 1990. Autoecological studies on *Audouinia capitata* (Bruniaceae). I. Plant-derived smoke as a seed germination cue. *South African Journal of Botany* **56**: 700-703.
- Dixon, K.W., S. Roche, and J.S. Pate. 1995. The promotive effect of smoke derived from burnt native vegetation on seed germination of Western Australian plants. *Oecologia* **101**: 185-192.
- Flematti, G.R., E.L. Ghisalberti, K.W. Dixon, and R.D. Trengove. 2004. A compound from smoke that promotes seed germination. *Science* **305**: 977.
- Hutchings, A., A.H. Scott, G. Lewis, and A.B. Cunningham. 1996. *Zulu Medicinal Plants*. University of Natal Press, Pietermaritzburg.
- Jefferson, L.V., M. Pennacchio, and K. Havens. 2005. The effects of smoke on tall-grass prairie species (in preparation).
- Lawton, B. P. 2002. *Mints: A Family of Herbs and Ornaments*. Timber Press, Oregon.
- Light M.E., M.J. Gardner, A.K. Jäger, and J. van Staden. 2002. Dual regulation of seed germination by smoke solutions. *Plant Growth Regulation* **37**: 135-141.
- Mander, M. 1998. Marketing of indigenous medicinal plants in South Africa: a case study in KwaZulu-Natal. United Nations Food and Agricultural Organization, Rome.
- Noble, R.E. 2001. Effect of cigarette smoke on seed germination. *The Science of the Total Environment* **267**: 177-179.
- Pennacchio, M., L.V. Jefferson, and K. Havens. 2005. The inhibitory effects of plant-derived aerosol smoke on seed germination of *Arabidopsis thaliana*. *American Journal of Botany* (in review).
- Sagard, G.T. 1632. *Le Grand Voyage du pays des Hurons*. Denys Moreau, Paris
- Swink, F. and G. Wilhelm. 1994. *Plants of the Chicago Region*. Indiana Academy of Science. Indianapolis, IN.
-



---

Tieu A., K.W. Dixon, K.A. Meney, and K. Sivasithamparam. 2001. The interaction of heat and smoke in the release of seed dormancy in seven species from Southwestern Western Australia. *Annals of Botany* **88**: 259-265.

USDA, NRCS. (2004). The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490, USA.

Van Staden, J. 1999. Medicinal plants in southern Africa: utilization, sustainability, conservation—can we change the mindsets? *Outlook Agriculture* **28**: 75-76.

Van Staden, J., A.K. Jäger, M.E. Light, and B.V. Burger. 2004. Isolation of the major determination cue from plant-derived smoke. *South African Journal of Botany* **70**: 654-657

Wigchert, S.C.M. and B. Zwanenburg. 1999. A critical account on the inception of *Striga* seed germination. *Journal of Agricultural and Food Chemistry* **47**: 1320-1325.

*Rain gardens are increasingly popular as practical and aesthetic ways to efficiently handle stormwater overflow, and promote healthier environments. But Chivia Horton explores what concerns might prevent homeowners from installing rain gardens in their own yards.*

---

## Accepting Flood Management Strategies: Public Perceptions of Rain Gardens in Chicago

Chivia Horton

U.S. Fish and Wildlife Service

Chicago, Illinois Field Office

### Abstract

Urban constructs like rooftops, streets and driveways are impervious surfaces making it impossible for stormwater to penetrate the soil. As a result, many municipalities are beginning to use bioretention facilities (rain gardens) as a method to reduce flooding caused by stormwater runoff. Though rain gardens may prove useful for stormwater management, there is still some question of their acceptance by Chicago area residents. The staying power of ecologically friendly landscape designs is subject to human interest based upon its social and cultural value. Humans are more likely to value a residential landscape area when it appears maintained and neat. Urban residents view their landscapes as representatives of themselves and may be skeptical of rain gardens that lack aesthetic appeal. A survey was conducted to evaluate resident perceptions of rain garden aesthetics in the Norwood Park area of Chicago. Survey results show that a variety of color in plantings and a neat appearance are important in aesthetic preferences. Results also show that there are misconceptions of human effects on water quality.

### What is a Rain Garden?

In 1987, bioretention facilities or “rain gardens” were created by Maryland’s Prince Georges County Department of Environmental Resources (PGDER). They were created as a cost-effective, alternative stormwater management technique or Best Management Practice (BMP). Typical stormwater BMPs include stormwater detention basins that hold rainwater and release it over a gradual period of time. Stormwater detention basins are very costly to construct and consume space that may be used for other purposes. Rain gardens are designed to imitate the hydrology of natural ecosystems. The term “rain garden” was dubbed by a consulting firm commissioned by PGDER for a residential development project (U.S. E.P.A., 1995).

Rain gardens are created in naturally low lying areas or by making shallow depressions in the ground that can collect stormwater runoff. Native plants that can endure standing water and fluctuating water levels are usually selected. Native

plantings are encouraged to avoid the introduction or spread of exotic and invasive species. In addition to the reduction of flooding, a rain garden can also serve as a bioretention facility that removes pollutants from stormwater (Davis et al., 2001, 2003). Once the stormwater filters through sediments, it passes on to contribute to groundwater and aquifer recharge.



*Figure 1 Caption. This rain garden was the most preferred by survey participants. The shape and outline of the garden are well defined, showing intent or a "cue to care." Color and height variation were also noted by survey participants. Photo courtesy of Urban Resources & Borderland Alliance Network*



*Figure 2: This rain garden photo received the lowest mean selected value. Lacking "cues-to-care", participants noted it as being unkempt. Photo provided by U.S.D.A.. Forest Service North Central Research Station.*

## Introduction

Many cities including Chicago are beginning to take the initiative for improving their environmental status. As a result, several Best Management Practices for stormwater management have been launched. Some of these BMP's include green roofs, rain barrels, permeable pavement, natural landscaping and

rain gardens. Though these techniques may prove useful for stormwater management, there is still some question of their acceptability by urban residents like those of Chicago.

In the book *Placing Nature* (1997), Joan Iverson Nassauer suggests that landscape areas that are designed with visual "cues to care" are more likely to gain social and cultural value. Furthermore, using the term "cultural sustainability," Nassauer implies that the staying power of ecologically friendly landscape designs is subject to human interest based upon its social and cultural value. In other literature, Nassauer (1995, 1988), explains the concept of "cues to care." The cues create a visual language (Eaton, 1990) which indicates that people maintain a given area. While the cues may differ among regions and cultures, neatness is the essential ingredient. Fences, ornaments, paint, trimmed shrubs, plants arranged in a linear fashion, crisp edges (See Figure 1), mowing, or even wildlife feeders communicate care to the "landscape reader." Designs that appear messy or disorganized (based upon cultural or region-related clues) are not favored and can be perceived as untamed (See Figure 2), or as reflecting poorly on the

---

individual or neighborhood. Thus, it may be difficult for the City of Chicago to convince residents to use rain gardens as stormwater management tools if the appearance is visually unappealing.

A survey was conducted to evaluate resident perceptions of rain garden aesthetics in the Norwood Park neighborhood. This paper will analyze results of that survey and give a general understanding of urban stormwater issues.

## Methods

Door-to-door surveys were conducted in August and September of 2004 in Norwood Park. A total of 24 residents were interviewed. Surveys were performed on residents residing on streets where rain gardens were to be installed by the City of Chicago. Residents located on streets adjacent to those with rain gardens were also surveyed. Questions were designed to gain understanding of aesthetic preferences for rain garden design in the Norwood Park neighborhood. The survey included an evaluation exercise that relied on eight color photographic images.

The photos were aimed at differentiating aesthetic preferences based on color and neatness. Each photograph represented a category: well maintained with color (WMWC), well maintained no color (WMNC), poorly maintained with color (PMWC), poorly maintained no color (PMNC). Each category was represented by two photos. Respondents were asked to rate their opinions of the photos based on a scale of 1 to 5, where 1 indicated "very unattractive" and five indicated "very attractive." The photo order was randomized and photos were not identified by category (e.g. WMNC, WMNC).

Considering that cost may be a determining factor with resident participation, questions were designed to give a general range of willingness-to-pay for rain garden installation. The categories supplied to residents included: *"Didn't cost anything at all," "Cost less than \$50", and "Costs over \$50."*

The survey also included questions aimed at understanding resident awareness of stormwater management techniques. Six techniques were listed including rain gardens, deep tunnel, constructed wetlands, storm/rain blockers, swales, and disconnecting downspouts.

A final aspect of the survey questioned respondents on their own personal usage of lawn care maintenance products and their knowledge of the subsequent impacts on water quality. Water quality was defined as ground water, surface water, drinking water, or water bodies in general. Respondents were asked if they use or don't use lawn maintenance products. Participants were also asked if various water quality treatments had no effect, good, bad, and don't know.

## Results

Color variance and evidence of high maintenance were important in aesthetic preferences of rain garden design. Photos of rain gardens under the category of Well Maintained with Color (See Figure 1 for example) received the highest mean rating (3.85). Photos of rain gardens under the category of Poorly Maintained No Color received the lowest mean rating (2.65, See Figure 2). Categories of Well Maintained No Color (mean 3.15) and Poorly Maintained With Color (mean 3.45) were rated on



---

the positive side of neutral. Obtrusive human made structures such as French drains were considered unattractive (See Figure 3).

Portions of the survey that were aimed at understanding resident willingness to install rain gardens and their awareness of storm water related issues (e.g., flood occurrences, management techniques, storm water pollution) revealed that many respondents were willing to install rain gardens if the cost was fifty dollars or less, and if maintenance was minimal. Many respondents noted that a large amount of flooding occurred at least twice a year in the street.



*Figure 3: A parking lot island converted to a rain garden. French drains and metal gratings made this rain garden undesirable, despite being colorful and neat. Photo courtesy of Karen Kabbes.*

Most respondents concluded that activities carried out in one part of the yard could affect the functionality of the entire lawn. Both inorganic and organic products were used by participants. A little more than half of the residents reported using mainly organic lawn care products, particularly fertilizer. However, roughly half of the participants said they used inorganic fertilizers and weed killers. Smaller numbers of individuals used organic and inorganic weed killers/pesticides. In addition half of those surveyed used deicing salts. Nearly one-third used lawn treatment companies, and as a result some of these respondents were not completely sure of the nature of the products used on their lawns. On the other hand, some clearly chose lawn treatment companies that only used organic products.

General trends show that most respondents thought inorganic products, lawn treatment companies and de-icing salts had a “bad” effect on water quality. In contrast, a high number



---

perceived organic products as having a good effect or no effect at all. But nearly half of the individuals didn't know what effect organic products would have on water quality.

### Discussion

When planning rain gardens, designers and landscape architects should consider the effects of color and a well-maintained "look." It should be noted here that in this study color was defined as anything other than green. Hence, plantings should include a variety of colors other than green. The survey was not designed to determine preferences for specific colors. Nor was it designed to determine preferences for the degree of height variation or massing colors versus a potpourri design. Designers should give some consideration to these issues when designing rain gardens. Too many colors and too much height variation could also be perceived as messy and be deemed undesirable. It may be better to use different colors but separate the colors into groups. The plant species should provide a variety of appearances as those provided by grasses, sedges, flowers, and perhaps rushes. Rocky swales or obtrusive French drains appear to be an eyesore in garden design. They should be out of sight and blend in with the garden, if they are needed to increase functionality.

Most respondents were willing to alter their lawns with the use of rain gardens to reduce flooding. Because many of them are at least moderately involved in maintaining their lawns, and lawn maintenance may involve the use of inorganic or organic and de-icing products, planners should give this serious consideration. Rain gardens are designed to act as both filters and retention areas for stormwater. Many of the plant species may be sensitive to products (organic/inorganic, deicers) that could be transferred through stormwater runoff from nearby resident lawns. Selection of plants tolerant of such products should be included in plan design.

Planners should consider subsidizing cost for residents when economically feasible. It is logical to say that rain gardens would likely decrease the costs of stormwater management in the long run because they could help reduce the strain on more expensive stormwater management technologies. However, residents may perceive initial costs as burdensome. Householders may also have difficulty seeing the long term economic benefits. Therefore, resident participation is likely to increase as the cost of installation decreases. The average cost for rain garden installation is \$3 to \$4 per square foot (City of Chicago, 2003). Depending on the resident's income and the size of the rain garden this may or may not be affordable. In addition, despite affordability some residents may base their investment amount on importance or personal value rather than affordability. Practically half of all participants (10 of 24 individuals) were not willing to install rain gardens if the cost was greater than \$50. Nine participants selected "maybe" as an option depending on how much greater the cost was over \$50. A range of \$100 to \$200 was often stated as being "too much for a garden." Net household income may be a determining factor in willingness to pay. The average net household income of those surveyed was approximately \$241,000. However, not all respondents were willing to share household income (9 individuals) which could have skewed the results. Five of the individuals that did share household income reported making \$50,000 or less per year. Several respon-

---

dents reported \$400,000 or better (\$400,000-\$775,000). The rest had a household income between \$100,000 to \$200,000. The Chicago Fact Finder reports median household income at about \$55,000 (2005).

Planning design should include some educational outreach to increase awareness of stormwater management related issues and techniques. Most respondents did notice flooding in their neighborhood. Many were aware of some current stormwater management techniques. However, the depth of awareness was not explored in this survey. Further studies should be aimed at teasing out the nature of understanding of management methods. Outreach and surveys should also explore lawn maintenance product use and its effect on water quality. Survey results showed that most respondents lacked knowledge on the effects of organic products on water quality. Interestingly, one participant mentioned using small amounts of arsenic to control weeds in the lawn.

These survey results provide some insight into aesthetic preferences for rain garden design. It is important to note that this study was conducted in one small neighborhood in the Chicagoland area. Residents of other areas may not express the same perceptions. Generalized assumptions could lead to unfair and inaccurate judgments of other neighborhood preferences. Though neighborhoods may be a small fragment of a larger urban complex, there is still the possibility of a unique local logic that pertains to that neighborhood. The logic is likely to influence landscape design preferences. There may be several factors, including cultural histories, affecting perceptions and preferences of landscape design.

Overall there is an interest in and some support for rain gardens in Chicago. Rain garden design is important. Giving careful attention to color, neatness, height variation, and minimization of human-made structures is likely to increase the success of public participation.

*Chivia Horton is a biologist with the U.S. Fish and Wildlife Service Chicago Illinois Field Office. She may be reached at [Chivia\\_Horton@fws.gov](mailto:Chivia_Horton@fws.gov).*

### **Acknowledgements**

I gratefully acknowledge the City of Chicago, Catherine Werner, Sarah Beazley, Joyce Coffee (all members of the City of Chicago Department of Environment) for providing assistance and information for the project design. I would also like to acknowledge John Rogner (U.S. Fish and Wildlife Service) for suggesting me to carry out the research for the project. I would like to extend a special thanks to Lynne Westphal (U.S. Forest Service) for guidance, ingenuity, extremely useful comments on all aspects of this project and her patience with my inexperience with social science research. Thanks are also extended to members of the review committee for the Chicago Wilderness Journal for their patience with my writing of this article. Finally, I would like to thank all those involved with this project, at all stages, for trusting a young biologist with a social science project. Neither this article nor this project could have been done without your hard work and support.

---

## References

- Chicago Fact Finder. (2005) <http://www.nd.edu/~chifacts/>
- Davis, A.P., Shoukoughian, M., Sharma, H., Minami, C., and Winogradoff, D. (2003) *Water Quality Improvement through Bioretention: Lead, Copper, and Zinc*. Water Environmental Resources. (73) Pp. 75-82.
- Davis, A.P., Shoukoughian, M., Sharma, H., Minami, C. (2001) *Laboratory Study of Biological Retention (Bioretention) for Urban Storm Water Management*. Water Environmental Resources (73). Pp 5-14.
- Eaton, M.M (1990). *Responding to the Call New Landscape Metaphors*. Landscape Journal 9(1). Pp. 22-27.
- City of Chicago. (2003). *Guide to Stormwater Best Management Practices*. Pp. 16-17.
- Nassauer, J.I. (1995). *Messy Ecosystems, Orderly Frames*. Landscape Journal.(4). Pp. 161-170.
- Nassauer, J.I. (1997). *Placing Nature*. Island Press. Pp. 65-83.
- Nassauer, J.I. (1998). *The Aesthetics of Horticulture: Neatness as a Form of Care*. Horticultural Science 23 (1988). Pp. 937-977.
- United States Environmental Protection Agency. (1995) *Maryland Developer Grows "Rain Gardens" to control Residential Runoff*. Urban Runoff Notes. Nonpoint Source News. (42) August/September. [www.epa.gov/OWOW/info/NewsNotes/issue42/urbrnf.html](http://www.epa.gov/OWOW/info/NewsNotes/issue42/urbrnf.html)

*The potentially devastating effect of the Emerald Ash Borer upon Illinois trees made several researchers come together to devise a plan to combat a beetle invasion. Learn about the preparedness plan in this article by Katie Armstrong, Thomas Dilley, and Edith Makra.*

## The Ash Tree Population in the United States is Under Attack; What Are We Doing About It?

Katie Armstrong and Thomas Dilley, USDA Forest Service  
Edith Makra, The Morton Arboretum



Figure 1. Dying ash trees in a Detroit parking lot  
(David Cappaert, Michigan State University)

The future of the ash tree population in the United States may be in doubt because of a small green beetle. It is difficult to overstate the devastating impacts of the emerald ash borer (*Agrilus planipennis*). To date, it is estimated that the emerald ash borer (EAB) has killed up to 15 million trees in Michigan alone. It is hard to comprehend just how many trees that figure represents, but try to imagine the loss this way: it is the equivalent of one dead tree for every Illinois resident- plus over two million more.

Approximately 275 million board feet of ash (*Fraxinus*) are harvested annually in the United States (Solomon et al. 2005). Some major uses for ash wood include tool handles, oars, baseball bats, furniture and numerous other commodities. Historically, the green, white, and black ashes have been found abundantly on moist fertile soils, but the green ash seems to be the most adaptable of the three types and grows naturally in many diverse ecosystems. Ash trees have been known for their hardiness in tough urban settings and have been the tree of choice among arborists for areas that seem daunting to other tree species. Ironically, ash was widely planted to replace trees

---

lost to Dutch elm disease. These three main species of ash are strong, resilient and very resistant to shock, but an unforeseen enemy—the EAB—has changed that picture and has raised concern at the national level.

### **Background**

With the discovery of the EAB in Michigan and Windsor, Ontario, Canada in 2002, it became apparent that the ash population may become threatened to the point of either drastic species reduction or elimination. This invasive species became a reality that local, state, and federal officials in Michigan, Indiana, and Ohio had to address in a timely and expeditious manner. From a land manager's perspective, the loss of nearly 15 million ash trees has placed a tremendous financial and ecological burden on municipalities in every county affected in each state. The significance of this threat to the ash population and the ecosystem at the local, regional, and national levels could mean significant economic, sociological, and ecological damage to the United States (U.S.).

Looking at ash distribution, the northeastern U.S. is more densely populated with ash species than the rest of the U.S. According to the United States Forest Service North Central Research Station (2005) it is estimated that more than a billion ash trees are growing in the U.S., and about 800 million of these can be found in Michigan alone.

The Executive Summary of the "Emerald Ash Borer Strategic Plan" for Michigan, Ohio, and Indiana suggests that the economic impact would be devastating if the EAB spread from currently infested areas into the forests of the northeastern U.S. The document cited an estimated value of 25.1 billion dollars could be lost due to the decline of the nursery, landscaping, timber, and recreational and tourism industries. Further, in the U.S. and Canada it is estimated that the ash population alone accounts for approximately 7% of all the hardwood species. Preliminary results from the U. S. Department of Agriculture Forest Service state that in ecological terms these ecosystem changes could impact urban canopy loss to the tune of about 0.5 to 2 percent loss of total leaf area, or 30 to 90 million trees. The value of these trees is estimated at 20 to 60 billion dollars.

Some of the efforts to date to ward off this pest will be discussed in the following pages, and include harvesting infested and host trees; imposing quarantines; conducting surveys around confirmed infested sites; developing information which will support management strategies; and researching chemical and biological control techniques.

### **Important Messages**

A critical EAB spread factor that is causing alarm but difficult to control is the transport of firewood. The possibility of spreading the EAB infestation through the private and commercial sectors by transporting firewood has become an area of increasing concern. This has prompted various agencies to inform and educate the public about the spread of EAB through the movement of cut hardwood. Various messages, such as the one below, are being distributed throughout the Michigan EAB area.



*The following are indicators that EAB may be present:*

1. *Basal sprouting.*  
*Ash infested with EAB often have 'water sprouts'.*
2. *Crown dieback.* *EAB damage often starts at the top of the canopy.*
3. *Bark splits.* *Look for bark splits throughout the canopy and stem.*
4. *Woodpecker damage.*  
*Woodpecker activity on ash is often a reliable early-warning sign.*
5. *S-shaped tunneling.*  
*These serpentine galleries are left by feeding EAB larvae.*
6. *D-shaped exit holes.*  
*As adult beetles emerge, they leave a small D-shaped hole.*

---

**“DON’T MOVE FIREWOOD!** Exotic insects like the emerald ash borer are a major threat to Michigan’s 19 million acres of forestland. Emerald ash borer can be established when infested firewood is transported to new areas.\*Use local sources of firewood \*Do not bring firewood home\*If you already have, do not take it back home and do not leave it—BURN IT!”

It is imperative for citizens throughout the Michigan, Ohio, and Indiana to understand the dangers associated with the movement of potentially infected wood, hence the importance of these messages. Traditionally, the Forest Service’s (USFS) role has been to provide financial, technical, and scientific support to local communities, and to state and federal plant pest regulatory agencies in order to detect, contain, and eradicate EAB and other invasive pests in urban and rural areas. The USFS has also promoted early detection programs on federal, tribal, and cooperative lands outside of the EAB program area. Restoration programs are also being instituted throughout the Michigan EAB area to enable communities impacted by the EAB to recover from the devastating loss of their ash trees. The multifaceted role of the USFS and cooperating agencies in Michigan, Indiana, and Ohio has produced a response strategy which has helped to hasten the development of a proactive response strategy in the Chicagoland area. Critical elements of the Chicago endeavor, as well as the biology of the beetle, and components of the current Michigan program will also be explored by experts from the USFS and the Morton Arboretum of Lisle Illinois.

#### **Abbreviated EAB biology (Adapted from the USFS pest alert # NA-PR-02-04)**

The EAB kills trees by feeding on the cambium (located just under the tree’s bark), creating S-shaped feeding galleries. Heavy feeding on the cambium interrupts the tree’s ability to move water and nutrients, and is fatal to the tree. The ash borer attacks all true ash species of the genus *Fraxinus*, but not trees of other species that are commonly referred to as “ash” trees, for example, the American mountain-ash (*Sorbus Americana*). EAB generally has a one-year life cycle in southern Michigan but could require two years to complete a generation in colder regions. In 2003, adult emergence began in early June, peaked in late June and early July, and continued into late July. Beetles usually live for about 3 weeks and are present into mid-August. Adult beetles (Figure 3) are active during the day, particularly when conditions are warm and sunny. Females can mate multiple times, with egg laying beginning a few days after the initial mating. Females can lay at least 60 to 90 eggs during their lifetime. Eggs are deposited individually in bark crevices on the trunk or branches. Eggs hatch in seven to 10

days. Feeding is completed in autumn and pre-pupal larvae overwinter in shallow chambers excavated in the outer sapwood or in the bark on thick-barked trees. Pupation begins in late April or May. Newly enclosed adults often remain in the pupal chamber for one to two weeks before emerging head-first through a D-shaped exit hole that is three to four millimeters in diameter.



Figure 2. Photo of Adult Emerald Ash Borer from 7.5 to 13.5 mm long

The following are indicators that EAB may be present:

1. *Basal sprouting*. Ash infested with EAB often has 'water sprouts'.
2. *Crown dieback*. EAB damage often starts at the top of the canopy.
3. *Bark splits*. Look for bark splits throughout the canopy and stem.
4. *Woodpecker damage*. Woodpecker activity on ash is often a reliable early-warning sign.
5. *S-shaped tunneling*. These serpentine galleries are left by feeding EAB larvae.
6. *D-shaped exit holes*. As adult beetles emerge, they leave a small D-shaped hole.

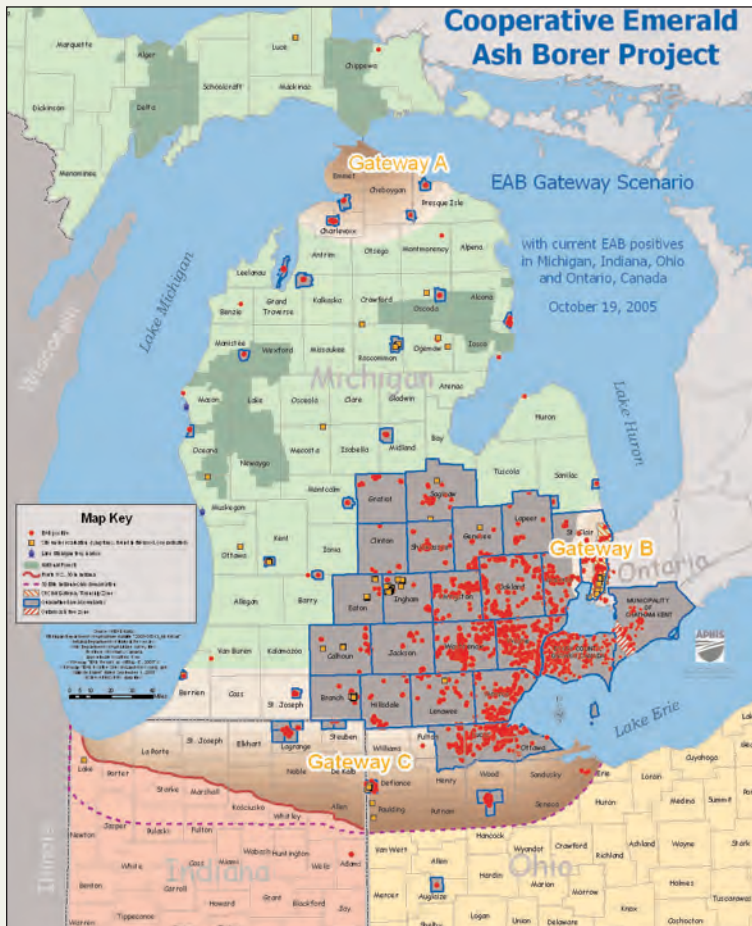


Figure 3. The Gateway Scenario Map

### The Michigan Story

When the EAB was first identified in Michigan in 2002, it was previously unknown on the North American continent. In fact, the only available information about the EAB was about a page and a half long and written in Chinese (the beetle is native to Asia).

Researchers looking for tools in the fight against EAB have made much progress in the short amount of time since the beetle's discovery in the United States. As of yet, though, the 'magic bullet' remains elusive, but some treatment options do exist in infested areas; however, currently available treatments can only be applied to individual trees (as opposed to aerial applications similar to gypsy moth (*Lymantria dispar*) treatments), and must be repeated yearly. There are at least 10 USFS research units studying EAB.

The Cooperative EAB Project is made up of cooperating agencies and partners that are involved in the fight

---

against the borer. Included in this effort are Animal and Plant Health Inspection Service (APHIS), the USFS, State Departments of Agriculture and Natural Resources, universities, and many others. The actions of this group are guided by recommendations provided by the Science Advisory Panel (SAP). The SAP is a group of experts appointed by APHIS. Strategies to eradicate the beetle have evolved considerably as a better understanding of the nature and extent of the problem has been reached. The strategy currently recommended by the SAP recognizes that the population of the beetle is primarily in the Lower Peninsula of Michigan. A “gateway” strategy (Figure 3) has been developed to contain the infestation to the Lower Peninsula. The strategy focuses resources on three gateways. The first is a northern gateway just south of the Mackinaw Bridge. The Michigan Department of Agriculture has staff stationed at the Mackinaw Bridge enforcing the quarantine and restricting the movement of all non-coniferous firewood out of the Lower Peninsula. The second gateway is located along the St. Clair River and is designed to stop the movement of EAB from the US into Canada. In 2004, Canada created an ash free zone about 25 kilometers long and 10 kilometers wide in Western Ontario in an effort to stop the natural spread of EAB. The St. Clair gateway complements the Canadian actions and reduces the likelihood that EAB will reach forests in the northeastern United States via Canada. The third gateway runs along the southern Michigan border between Ohio and Indiana.

It is the program goal to aggressively attack infestations that occur within 50 miles of a gateway. The recommended treatment is the removal of all ash trees within a half mile radius of any infested tree. Unfortunately, a lack of program resources has not allowed full eradication efforts to be implemented.

The currently quarantined area in Michigan, Ohio and Indiana is nearly 14,000 square miles. The quarantines are aligned to provide restrictions which will bar the movement of materials that could potentially spread the EAB. For complete quarantine rules see <http://na.fs.fed.us/fhp/eab/quarantine/quarantine.shtml>

### **The Illinois Plan**

Illinois is at very high risk for EAB introduction and establishment (Figure 4). The extent of the Michigan infestation, the proximity of all Midwestern infestations to Chicago, the importance of the region’s transportation industry, and the dominance of ash in the urban landscape are contributing risk factors. Add to these the heavy tourist traffic between Chicago and Michigan and the future of the metropolitan area’s ash trees could look very bleak.

However, all hope may not be lost because Chicago has collectively waged a seemingly successful battle against another invasive enemy, the Asian long-horned beetle (ALB). Through its incredible interagency and community involvement, Chicago is poised to win this battle. Acknowledging this feat the governor of the State of Illinois, Rod R. Blagojevich, recognized this accomplishment on April 15, 2005 by declaring April 21, 2005 as Asian Longhorned Beetle Awareness Day in Illinois. The APHIS has removed all of the original communities from their quarantine status except the Oz Park area, which was the last geographic sector added into the ALB quarantine. If Oz Park remains clean for a two-year inspection period, we may be able to declare victory over a very formidable enemy. Numerous Chicago public agencies and communities have shown the ability to cooperate and act quickly and decisively in the face of this threat. Realizing that the public already has a good



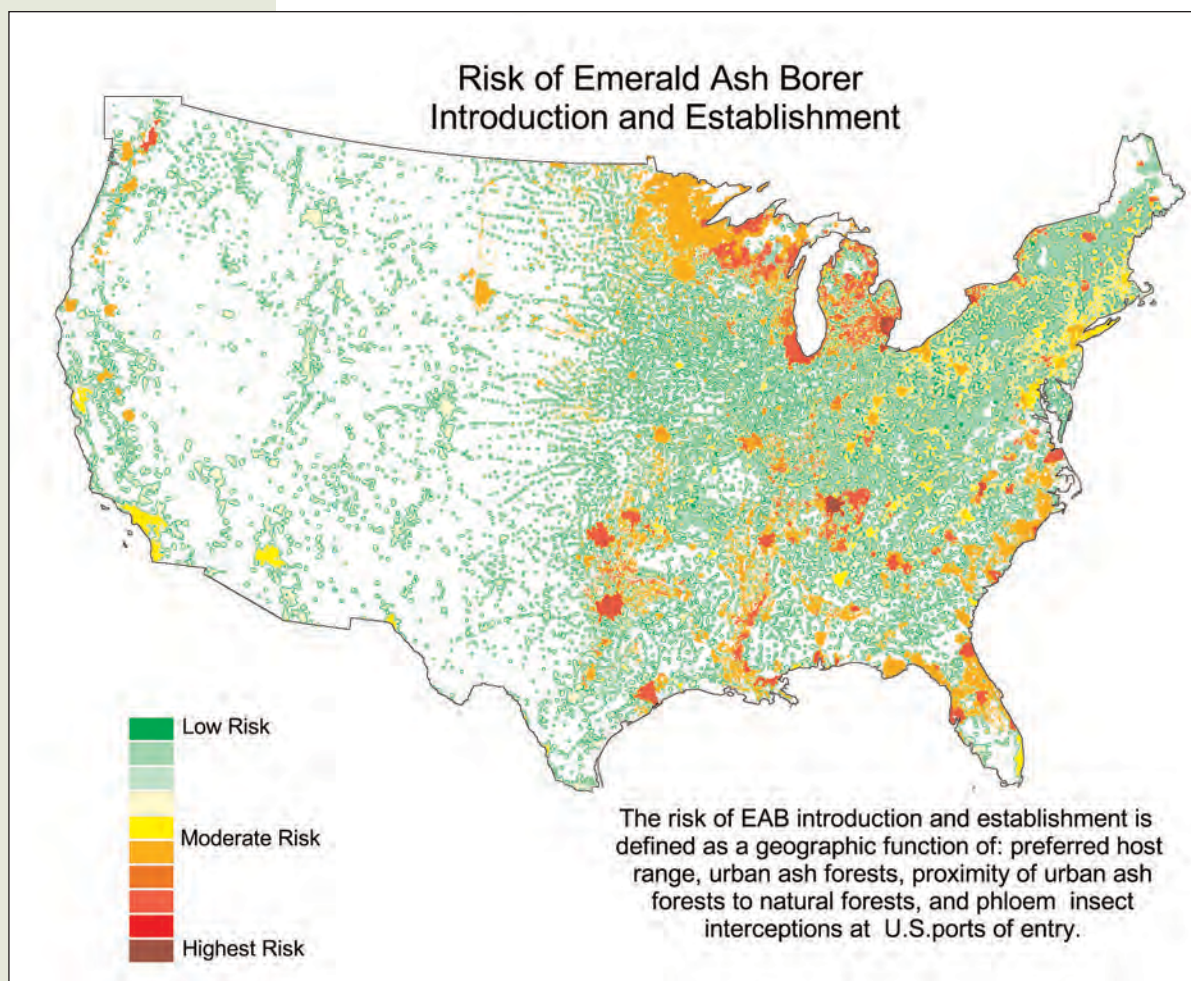


Figure 4. Emerald Ash Borer Risk Map

understanding of invasive species from the extensive media coverage given to the ALB eradication effort, we hope to capitalize on this and strengthen Illinois' ability to prepare for the arrival of EAB.

### Teamwork

In July of 2003, The Morton Arboretum took the lead in preparing for the impending arrival of the EAB by convening a Readiness Planning Team. Nearly 40 representatives from municipal, county, state, and federal governments; green industry professional associations; universities; and Chicago Wilderness agreed to collaborate and develop an EAB 'Readiness Plan.' The team worked together to identify existing resources available from participating organizations and to identify gaps. Existing EAB efforts and programs were compiled, including current regional efforts and work from other states that serve as useful models. All members of the planning team brought useful and important knowledge and

---

experience to the planning effort. The team created a critical network for information sharing and dissemination. Educational outreach to the members and constituents represented on the planning team has been very effective in raising awareness and fostering cooperation and collaboration. The team's work has strengthened the Illinois Department of Agriculture's regulatory agency, putting more staff expertise in the field inspecting nursery stock and responding to possible sightings of EAB. The collaboration has also spawned and funded three early detection surveys for EAB and promoted outreach to the legislative and executive branches of the State, which has fostered discussion and examination of Illinois' firewood policies (cited earlier as an important variable in the Michigan defense). The complete Illinois Emerald Ash Borer Readiness Plan can be found at:

<http://www.agr.state.il.us/Environment/Pest/emeraldashborer.pdf>

### **Early Detection Surveys**

It is critical to be aware of any EAB introduction as soon as possible to minimize damage. Early detection surveys monitor ash trees across a variety of landscapes, but concentrate on areas most at risk. The USFS Plant Health Program establishes protocols for surveys and assists states in survey planning and implementation. The USFS provides funds to support state surveys (including Illinois' survey), and compiles information from participating states.

In 2003, the first year of available funding for survey support, Illinois was not able to participate, but in 2004, mostly through the Readiness Planning Team network, team members agreed to undertake four surveys. The University of Illinois stepped forward to complete an EAB survey at 21 sites statewide, in cooperation with the USFS. The City of Chicago surveyed for EAB in conjunction with their survey for ALB. The USFS surveyed for EAB on national forest and grasslands. In addition, the Morton Arboretum surveyed the greater Chicago area with assistance from more than 40 partners including municipalities, forest preserve districts, and nurseries. The Illinois Department of Agriculture funded this survey.

In 2005, the Morton Arboretum is again surveying in northeastern Illinois in cooperation with the APHIS and the USFS. Federal survey protocols for 2005 recommend greater use of trap trees; the recommendation is the result of the research in Michigan which found that trap trees are currently the most effective means for detecting the presence of the EAB. Small and inconspicuous ash trees are stressed by cutting a band through bark and phloem five to eight inches wide. Sticky 'tanglefoot' is applied to trap insects visiting the tree. Trap trees are monitored regularly throughout the summer when adult borers are active. This girdling does eventually kill the tree but in turn can provide valuable information about EAB presence. In autumn, trees are felled and dissected to reveal any EAB galleries present under the bark.

Forest preserve districts are vital partners in the survey. Vast landholdings allow access to multiple communities that are all under one jurisdiction. There are plenty of ash trees available in remote areas of forest preserves where their use will not alarm visitors who might be concerned. Just over 120 trap trees have been established in seven counties in northeastern Illinois. Visual surveys that involve inspecting symptomatic trees for signs of EAB without harming them are also being done in municipalities and campgrounds. The good news is that as of August 9, 2005 all surveys have been negative for EAB, with the project continuing.



---

*Katie Armstrong is the Emerald Ash Borer Liaison for State and Private Forestry, Northeastern area, USDA Forest Service, in Brighton Michigan.*

*Thomas Dilley is the Chicago Metropolitan Initiative Coordinator for State and Private Forestry, Northeastern area, USDA Forest Service, in Evanston Illinois.*

*Edith Makra is the Community Tree Advocate for The Morton Arboretum, in Lisle Illinois.*

### **References**

J. D. Solomon, T. D. Leininger, A. D. Wilson, R. L. Anderson, L. C. Thompson, and F. I. McCracken. (n.d.). Retrieved July 23rd, 2005 from <http://www.forestpests.org>.

United States Forest Service Research Station Emerald Ash Borer:, (n.d.). Retrieved July 19, 2005, from <http://www.ncrs.fs.fed.us/4501/eab/>

*Bird watchers,  
building managers,  
and downtown Loop  
workers in Chicago  
have been well aware  
for decades of the  
deadliness of the  
city's buildings when  
it comes to birds,  
especially migrant  
birds. Learn what is  
being done to address  
this concern by  
Christine  
Williamson.*

---

## CW Partners Host First-Ever Birds & Buildings Conference

Christine Williamson

Chicago Ornithological Society

On March 11, 2005, Chicago Wilderness partners brought together an extraordinary group of architects, ornithologists, public planners and conservationists to discuss for the first time the problem of bird collisions with buildings and possible solutions.

The Birds & Building Conference was sponsored by CW affiliates, the City of Chicago Department of the Environment (Chicago DOE) and Chicago Ornithological Society (COS), together with conference host, Illinois Institute of Technology (IIT).

The conference featured the best-known North American experts in this nascent field of conservation, who described the magnitude and seriousness of bird collisions with buildings, and presented case studies and solutions to an audience of more than 100, half of whom were architects.

### Setting the stage for the conference

The problem of bird collisions with buildings throughout the U.S. is well documented. Dr. Daniel Klem, Jr., professor of ornithology and conservation biology at Muhlenberg College, Allentown, Pennsylvania, and conference presenter, has estimated that between 100 million and one billion birds are killed annually in the U.S. alone (Klem, 1990b).

The collision problem is two-fold. Most song birds, known as passerines, fly at night to avoid predators, migrating north in the spring to breeding grounds in the northern U.S. and Canada and south in the fall to over winter in the southern U.S. and Central and South America. Birds navigate their twice-annual routes using a combination of all senses, but most particularly sight, charting a path using the moon, stars and landmarks on the ground. On foggy or overcast nights when celestial navigation is impossible, birds seem to switch to a reading of the earth's electro-magnetic field and are more easily mesmerized by lights burning at night in taller urban buildings. When lights are left on in tall buildings at night and weather conditions for migration deteriorate, birds tend to get "stuck," unable to fly above or around the lights.

At dawn, birds caught up by lights usually come down to ground level rather than fly on to a safer stopover. There birds

are exhausted by their night's wasted labors, some die from starvation, and others fall victim to predators such as gulls, crows, falcons, rats and domestic dogs and cats.



The birds that survive and can fly away often fall prey to a second urban danger—glass.

Glass is both reflective and transparent, two qualities that make it lethal for birds. When startled by close proximity of humans in an urban setting, loud noises or predators, birds fly away. But birds can't distinguish between the reflection of the sky or trees in a glass window and the real thing and become frequent victims of fatal or very serious head, bill, wing, clavicle and leg injuries when they fly full-tilt into a reflective window.



*The transparent lobby of the Hines/Quaker Tower attracts birds, with deadly results.)*

Transparency becomes a problem for birds when the building design is “see-through”—a lobby that is glass on all sides, like that of the Hines/Quaker Tower at Clark and the Chicago River, for instance. Birds aim for the safety of the other side of the building and hit the first pane, often with deadly results. Another transparency issue arises when a building lobby features trees or other vegetation that are easily seen from the outside. When startled, birds will very often aim for the safety of a large fig tree they see within a building lobby and hit glass first.

Bird watchers, building managers and downtown Loop workers in Chicago have been well aware for decades of the deadliness of the city's buildings when it comes to birds, especially migrant birds. During just a single migration period—fall 2003—partial data regarding bird fatalities collected by the Chicago Bird Collision Monitors (CBCM) showed that buildings all over Chicago's Loop killed 655 birds (CBCM web site).

### **Conference presenters were the Who's Who of bird collision prevention**

In setting the stage for discussion at the March 11th conference, Dr. Douglas Stotz opened the conference by describing the biology of bird migration for the audience, many of whom had not previously been involved with bird watching, rescue or biology.

*The new State Street Village Dorm, designed by Helmet Jahn, features an especially translucent glass throughout that unfortunately resulted in the death of more than 250 birds during the fall 2004 migration. However by hanging taut netting on the outside of the building, as suggested by students, birds are now prevented from striking the glass.*

---

Dr. Stotz is a conservation ecologist in the environmental and conservation programs at the Field Museum and his main area of research is the ecology of Neotropical migrant birds, with much field work conducted in Peru, Bolivia and Cuba.

Dr. Daniel Klem picked up the conference thread and, based on 20 plus years of research, explained why birds strike windows. Michael Mesure, founder of the Fatal Light Awareness Program (FLAP) in Toronto then detailed how bird collisions have been reduced in Toronto through the darkening of that city's night lights. The efforts of bird conservationists in reducing building collisions in New York city was recounted by Bruce Fowle, a principal and the founder of Fox & Fowle Architects PC and E. J. McAdams, executive director, New York City Audubon Society.

Dr. Albert Manville, a wildlife biologist with the U.S. Fish & Wildlife Service, provided best practices for tall buildings, towers and bridges. Dr. Manville's research focuses on bird collisions with communication towers and wind turbines, as well as on building collisions. By way of gentle warning, Dr. Manville reminded architects, urban planners and building owners that federal migratory bird laws prohibit the "taking" of large numbers of any protected species without a permit. Large numbers of bird deaths due to building collisions may qualify as taking, Dr. Manville said, and he advised building owners to work to prevent bird kills rather than risk federal sanctions.

Randi Doeker highlighted those good, bad and downright ugly buildings throughout Chicago, providing a tutorial in how to build safer buildings and how to rehab existing structures to prevent or reduce collisions.

Case studies in making buildings safer for birds were presented by David Baker, IIT's vice president of external affairs; Steve Sullivan, manager of scientific collections at the Peggy Notebaert Nature Museum in Chicago; and by architect, Meghan Maves, who is developing education programs for Chicago DOE at the Chicago Center for Green Technology. Ms. Maves also is an associate designer at Marc L. Nielsen Interiors.

Architects who provided case studies from their work in designing bird safe buildings were Jeanne Gang, principal and founder, Studio Gang Architects; Carol Ross Barney, design principal, Ross Barney & Jankowski; and Margaret Helfand, principal, Helfand Architecture.

The concluding session of the conference was a brainstorming session to identify next actions needed to find solutions to bird-building collisions. The session was led by one of the conference organizers, Donna Robertson, Dean of IIT's college of architecture.

---



*The City of Chicago  
Lights Out program  
asks building managers  
to voluntarily turn off  
their building lights  
and non-essential  
antenna lights after  
11:00 p.m. during  
spring and fall migra-  
tion. Compliance is  
fairly high and the  
number of migrant  
birds that land in  
downtown Chicago is  
much lower as a result.*

---

### **Concluding Remarks**

Chicago and many other urban centers located along migratory bird flyways can do much more to prevent bird collisions, from rehabilitation of existing buildings to make glass less reflective to bird-safe designs for new buildings. More information is available at COS's web site—[www.chicagobirder.org](http://www.chicagobirder.org) and from the Chicago Bird Collision Monitors web site—<http://www.birdmonitors.net/>. Many ideas for changes and resources also are available within the conference proceedings that may be accessed at The Birds and Buildings Forum web site—[www.birdsandbuildings.org](http://www.birdsandbuildings.org).

*Christine Williamson is the conservation chair of the Chicago Ornithological Society and is active in bird conservation, collision prevention and bird rescue. Christine can be reached at [birdchris@aol.com](mailto:birdchris@aol.com).*

### **Editor's Note**

Christine Williamson has been working in downtown Chicago since 1988 and has picked up literally thousands of dead and injured birds in the ensuing 17 years. She is now a bird monitor with the Chicago Bird Collision Monitors (CBCM) and helps get injured birds safely to rehabbers and dead birds to the Field Museum of Natural History to be used in their collections. And she is tired of having the blood of birds on her hands.

Midway through 2004, she explained to then-Chicago Ornithological Society (COS) president, Randi Doeker, her impassioned vision of a world of buildings made safer for birds through design changes. She demanded the development of new glass that is not reflective or that contains a pattern invisible to the human eye, but immediately apparent to birds that acts as a collision deterrent.

Christine was pounding the proverbial table of vision for Randi, exclaiming that if only they could convince architects not to design buildings like IIT's State Street Village ever again, anywhere on the globe, the world could really be made safer for birds. If architects demanded that manufacturers create safer glass for birds and municipalities required, or at least strongly encouraged its use, demand would quickly lead to the research and development required for the break-through invention she saw so clearly in her head. She described for Randi a planet where the ethic of green architecture expanded well beyond energy efficiency and convenience to safety for birds and all wildlife, and where such an ethic was widespread. These discussions led to the creation of the first conference ever on the impacts of buildings on birds.



---

## References

Chicago Bird Collision Monitors, 1993. Web site reference.  
<http://www.birdmonitors.net/database.html>.

Klem, Daniel, Jr. 1990b. Collisions between birds and windows: mortality and prevention. *Journal of Field Ornithology*. **61**: 120 – 128.

---

## Book Review

### *Nature Friendly Communities*

Christopher Duerksen and Cara Snyder

Island Press, 2005

Reviewed by Jon Voelz

This summer Chicago Wilderness was highlighted in a new book entitled *Nature-Friendly Communities: Habitat Protection and Land Use Planning*. In the book, authors Christopher Duerksen and Cara Snyder list Chicago as one of the nation's 19 most nature-friendly communities due to the efforts of Chicago Wilderness and its Biodiversity Recovery Plan.

This book provides excellent resources for local land use planners and experienced, sophisticated activists. However, this book is not recommended for causal nature enthusiasts—it is loaded with details and valuable tools, reminding me of a college textbook.

The first two chapters provide background, statistics, and compelling arguments for protecting natural areas in our communities. Some of the statistics are frightening, such as the fact that according to a 1995 report issued by the National Biological Service, 27 ecosystems have declined by 98 percent since European settlement. Prairies, sagebrush steppe, and oak savannas are just a few that have been almost completely wiped out. The book also lists the invasion of non-native species as a growing threat to our ecosystems. The authors cite the fact that non-native species make up about 5 percent of the total U.S. continental biota, and in some states make up almost 50 percent of the flora.

While Chapter 1 provides facts and figures and documents the economic and other benefits of nature protection, Chapter 2 offers lessons from the case studies of the 19 local communities profiled in the book. Chapter 2 details best practices and tools to protect wildlife and advance biodiversity, including fundamental strategies utilizing regulations and acquisition.

The remainder of the book is divided into two sections. Chapters 3 through 11 are devoted to major case studies, while Chapters 12 through 22 are referred to as focused case studies. The major case studies are in-depth descriptions of conservation practices and tools used by the following communities: Baltimore County, Maryland; Dane County, Wisconsin; Eugene, Oregon; Fort Collins, Colorado; Pima County, Arizona; Placer County, California; Sanibel, Florida and the Twin Cities region

---

of Minnesota.

The focused case studies, which are brief descriptions of successful habitat protection programs, include Bath Township, Ohio; Charlotte Harbor, Florida; Chicago Wilderness; DeKalb County, Georgia; Farmington Valley, Connecticut; King County, Washington; Pittsford, New York; Powell County, Montana; Teton County, Wyoming; Traverse Bay area, Michigan; and Loudoun County, Virginia.

The Chicago Wilderness chapter is in the focused case studies, so it is brief—just three pages. Although the chapter includes a brief history of Chicago Wilderness natural areas and background on the Chicago Wilderness consortium, the main focus of the chapter is on the Biodiversity Recovery Plan.

For people already familiar with Chicago Wilderness there is nothing new in this three-page chapter. As a matter of fact, the information contained in this chapter can be easily read on the Chicago Wilderness web site. However, the information should be useful for communities considering the creation of a similar consortium.

Nature-Friendly Communities is certainly a valuable resource for people interested in attempting to halt rapid development and urban sprawl in their community. However, the information is presented in ways that will appeal to professional planners more than to casual conservationists. To order the book, go to the Island Press web site at <http://www.islandpress.org/>.

*Jon Voelz is the Public Relations Manager for Chicago Wilderness and may be contacted at [jvoelz@chicagowilderness.org](mailto:jvoelz@chicagowilderness.org).*

---

## Web Site Review

### Web Resources for North American Bird Identification

Review by Robert Sullivan and Kirk LaGory  
Argonne National Laboratory

*"Those little nimble musicians of the air, that warble forth their curious ditties, with which nature hath furnished them to the shame of art."*

—Izaak Walton (1593 - 1683)

In this issue we'll focus on Web resources for birds, specifically for bird identification (a future issue's review will address bird conservation sites). There are thousands of resources covering this topic on the Web; we'll review only a few here, and we'll concentrate on several sites that help users identify birds of North America, and some sites specific to birds of Illinois, home of many CW member organizations. As might be expected, some of the sites serve both purposes, and include other useful bird-related information as well. While our list represents only a tiny sample of the available resources, these sites should provide a good starting point for CW members interested in exploring the world of birds via the Web.

This review includes two types of bird identification Web sites:

1. Sites that help users identify unknown birds using a structured query process based on observed bird characteristics (i.e., a key). Sites reviewed here include *The BioDiversity Institute Internet Field Guide to Birds*, *Duncraft Birds of North America*, and *Discover Life IDnature Guide for Birds*.
2. Sites that provide information about bird characteristics by selecting the species name (i.e., a list). While generally less useful than a key for identifying an unknown bird, this type of site can be very useful for identifying a bird if a user has narrowed identification of the bird in question to several known possibilities. Reviewed sites include *Patuxent Bird Identification InfoCenter*, *Cornell Lab of Ornithology Online Bird Guide*, *The Birds of North America Online*, *Illinois Breeding Bird Atlas*, and *Illinois Birds*.

#### **The BioDiversity Institute (BDI) Internet Field Guide to Birds <http://www.bdi.org/>**

The BDI *Internet Field Guide to Birds* is a comprehensive guide to the birds of North America, and is specifically designed for bird identification. In addition to providing distinguishing

---

characteristics and photos/drawings of individual species, the site provides off-site links to other Web information on the species (most notably *NatureServe Explorer*). The *Guide* can also be used to generate checklists for birds in any area, and to obtain information on entire groups of birds.

The identification guide provides three ways for the user to input information to identify birds: geographic area (State or Province); taxonomic information (species, genus, family, order); and/or specific characteristics of the bird. These parameters are entered on one long, but well-organized form. Each selection criterion type is optional in that the user need not input information of a particular type to obtain a list of birds. By inputting geographic area alone, the user can generate a checklist for an area. By inputting taxonomic information, the user can restrict their search to a particular taxonomic group. This is a handy feature; if you know you've seen a striped warbler, there is no reason to include sparrows and sandpipers in your search.

Identifying birds by specifying observed physical characteristics is the most involved approach to bird identification using the *Guide*, as the user is walked through the physical characteristics of the bird in a long series of pull-down menus. Included are body characteristics (body size; body shape; and color and pattern of breast, belly, back, and rump), wing characteristics (wing shape; wing bars; and color and pattern of upper wing coverts, upper primaries, upper secondaries and tertiaries, underwing lining, etc.), head characteristics; tail characteristics; and leg/foot characteristics. The amount of detail that can be input with this system is truly incredible and could be daunting. One could argue that if the user knows the difference between tertiaries and secondaries, they probably won't need the system for identification; however, the user does not need to input this level of information to narrow down their search.

Output from a search is provided in the form of a series of thumbnail images that can then be used to either narrow your search or to link to other information on the species including distinguishing characteristics; (generally) high-quality images (colored illustrations as well as photos); status; life history; and distribution information. Much of the non-image information is provided through direct links to *NatureServe Explorer* (reviewed in *CW Journal* Vol. 2, No. 1). An innovative feature built into the results page for any query is a new form that allows searching of several Internet search engines for additional information on the species and relevant family using "pre-formed" queries, and another "pre-formed" query to search the Google image database for additional images.

The BDI *Internet Field Guide to Birds* is a very good Web site. The database engine is fast and reliable, the site is generally easy to use, and the images are generally high in quality and plentiful. The links to *NatureServe Explorer* provide quick access to detailed information. Of the three sites using a key approach to bird identification reviewed here, it is the best all-around choice.

### **Duncraft Birds of North America**

**[http://percevia.duncraft.com/db/birds\\_of\\_north\\_america\\_western/rl/\\_/0/attrs.aspx](http://percevia.duncraft.com/db/birds_of_north_america_western/rl/_/0/attrs.aspx)**

Duncraft is a company that specializes in selling equipment for attracting and feeding birds. Their site, *Duncraft Birds of North America*, accesses a database of 799 bird species found in North America.



---

The user searches the Duncraft database by selecting one or more bird attributes through pull-down menus, including location, body shape, size, color, bill shape, wing shape, and habitat. The information is accessed one attribute at a time to gradually narrow the list of possible bird species. Thus, if one wants to start with location, a location link is clicked which loads a checklist of choices (States and Provinces). The user then chooses a State, and the list is narrowed to only those birds found in the State. The user would then select another attribute, (such as bill shape) to further narrow the list, and so on, until the best choice is left. At each new level, color thumbnail graphics of all possible species are provided. The list of thumbnails will obviously be quite large until the user gets deeper into the selection process. This navigation is quite slow, especially with a slow internet connection, because the user must wait for all of the thumbnails to load after each selection.

After clicking on the thumbnail of the identified bird, the user is linked to detailed information for the species (and, unfortunately, much information on suggested equipment purchases). The information is quite good and includes a high quality illustration of different plumages, identification tips, life history information, a recording of the bird's call, range maps, and links to related Web sites (Patuxent's bird identification guide, *eNature.com*, *Wikipedia*). Providing the thumbnails at each step allows the user to quickly select the bird in question, but slows the page reloading to a frustrating crawl. Also, the attribute selection process requires some practice to master.

#### **Discover Life IDnature Guide for Birds**

**[http://pick4.pick.uga.edu/mp/20q?guide=Birds&flags=not\\_no](http://pick4.pick.uga.edu/mp/20q?guide=Birds&flags=not_no)**

This site can be used to identify and gain access to information on 1,752 species of birds of North America. It was developed by Discover Life and the Polistes Foundation. Discover Life also provides web-based guides for fish, amphibians, reptiles, mammals, insects, spiders, crabs, snails, slime molds, fungi, plants, and corals. The bird guide functions in a similar fashion to a dichotomous key by providing the user with a series of choices related to location and the physical characteristic of birds (a completely separate selection option is available through a list of species). A picture accompanies each choice to provide guidance. For example, the user is first asked to identify the "group" to which the bird belongs (ducks, geese, swans; game; perching; raptor; sea; shore, wading; woodpecker; other birds). These aren't necessarily typical groupings of birds, but the approach works in the context of the rest of the identification key. Next comes questions on head color, range, wing-bar number, head shape, bill shape, etc. There are 16 questions in all. At any point in the key, the user can choose to search the bird database for matches. We liked the fact that this key teaches users the key things to look for when seeing an unfamiliar bird, and therefore serves as a teaching tool to improve birding skills.

Once the user searches the database for matches, a list of possible species is provided and each species name is linked to a wealth of information on that species from a variety of Web sites (including some of the ones reviewed here). Included are (generally) high-quality photographs, life history information, population and distribution information, and "cool facts." It is interesting that the links provided are specific for each species, so there is an attempt to tailor the information fairly closely to the species of interest.

---

While the *IDNature Guide for Birds* provides an understandable and useful approach for bird identification, as well as good information on search returns, the site has some drawbacks. The interface is somewhat cluttered, and the search engine is slow. We tried using the intriguing “Report” feature to report a mock sighting, only to find out after numerous errors that the feature is “under development”. The site lacks elegance and needs interface and usability work, but it does have a good search feature for direct access to known species.

### **Patuxent Bird Identification InfoCenter**

**<http://www.mbr-pwrc.usgs.gov/>**

The *Patuxent Bird Identification InfoCenter* is affiliated with the Patuxent Wildlife Research Center, part of the United States Geological Survey (USGS). Like many USGS sites, the interface is bare bones; a user simply picks a name off a list of species grouped by family common name. The link leads to a frame-based presentation of information about the species, with a menu in a left-hand column, content in the middle of the page, and photo thumbnails in a right-hand column. The default content view is of a bulleted list of identification tips. Other menu choices lead to life history; Breeding Bird Survey (BBS) and Christmas Bird Count (CBC) maps (the BBS and CBC are major bird surveys); photos of eggs; call and song recordings; high-quality taxonomic info (linked from the *Integrated Taxonomic Information System* from the National Museum of Natural History); and links to a glossary and the main list page. The information is sparse but sound—a number of reputable bird sites link back to the *Patuxent Bird Identification InfoCenter* as a content provider. The site is also very fast, because there is no database querying, and the pages are very small. On the downside, while it is comforting to know that the USGS is not wasting tax dollars on such frivolities as search tools, introductory text, or online help, the site would benefit from these features, particularly a search capability. The site would also be enhanced by beefing up the content and photos (both quality and quantity).

### **Cornell Lab of Ornithology Online Bird Guide**

**<http://www.birds.cornell.edu/programs/AllAboutBirds/BirdGuide/>**

The *Cornell Lab of Ornithology Online Bird Guide*, part of the Lab’s *All About Birds* Web site, is as beautiful as the *Patuxent Bird Identification InfoCenter* is plain. The interface is visually attractive, and in general, the site is a pleasure to use. While our review will focus on the Online Bird Guide, it should be noted that *All About Birds* contains a wealth of bird-related resources; we were repeatedly distracted from our review by wandering off to learn about bird conservation, attracting birds to one’s yard, etc.

One of the few drawbacks of the *Online Bird Guide* site is immediately apparent when selecting a species to view; this is accomplished by selecting the common name of the bird from one of two lists, one organized by family, the other organized alphabetically by common name. These are possibly the longest pull-down menus we have ever encountered, and their usefulness is compromised further by the use of strict alphabetizing. All birds whose full name starts with an adjective (e.g. “Common Loon” or “American Crow”) are listed under the adjective, rather than the noun, and so there are 14 entries under “Common” and 18 entries under “American.” If the user doesn’t know beforehand that the “Pauraque” is, in fact, the “Common Pauraque,” the species is very difficult to find. While “Fish Crows” and

---

“American Crows” are grouped together on the Taxonomic Order pull-down menu, they are located at a seemingly random spot on the taxonomic list (though it isn’t random in reality). Without a search tool, this approach to selecting a bird species is a real hindrance.

Once past the species selection process, however, the user is presented with a beautifully laid out page featuring one or more high-quality photos of the bird, a range map, and the following descriptive information:

- Description
- Sound (with spectrograms and Real Audio® recordings)
- Conservation Status
- Other Names
- Cool Facts

Sometimes a link to a short video clip (in Quicktime® format) is available as well. The information is of good quality, but not detailed. Clicking a tab takes the user to a detailed description page with additional information, including similar species, range, habitat, food, behavior, and reproduction. Citations are also provided for each page, a useful feature for those wishing to do further research.

The *Cornell Online Bird Guide* performed well in terms of loading pages quickly, and with the exception of the bird selection process, is easy to use and informative, though not detailed. The sounds files, photos, and videos are of very high quality and quite useful. The site is definitely worth exploring.

### **Birds of North America Online**

**<http://bna.birds.cornell.edu/BNA/>**

*Birds of North America Online*, produced by the Cornell Laboratory of Ornithology and the American Ornithologists’ Union, is available only by subscription (\$40 annually for individuals, with higher fees for institutions). For anyone serious about birds, the investment would be well worth the money, if the Web site demo pages are representative of the site as a whole. The site is the online version of *Birds of North America*, an 18-volume compilation of life histories of more than 700 North American bird species. The *Birds of North America Online Web* site presents at least an order of magnitude more information than any of the other sites reviewed, and the quality is outstanding. For each species of birds, there are 19 sections of information that total about 30-40 printed pages, liberally sprinkled with outstanding photos, drawings, and linked references. Separate tabs lead to pages of video clips and sounds with spectrograms; photos, maps, and breeding cycle diagrams; and extensive references. The range of topics covered for each bird is extensive, including behavior, migration, populations, and even (under Food Habits) information on Drinking, Pellet-casting, and Defecation. No stone left unturned, obviously.

Without having a paid subscription we were unable to evaluate the full site, which reportedly includes a searchable database allowing comparison of traits across multiple species, likely a very useful feature, and we are unable to say if the *Birds of North America Online* uses the same unsatisfactory approach to selecting bird species that Cornell’s *Online Bird Guide* uses. One suspects that users of the *Birds of North America* site are much more likely to know the exact name of the birds they are researching, in any event.

---

*Birds of North America Online* is an excellent example of use of the Internet for presentation of scientific information, and it is especially pleasing to see that in transitioning printed material to the Web the creators made an easy-to-use site that takes good advantage of the multimedia and database interactivity capabilities of Web-based communication. Both the printed and multimedia content is of the highest quality, and the presentation beautiful. Even though we weren't able to fully evaluate the site, we're confident that anyone with a strong interest in birds would find it an extremely useful resource.

**Illinois Breeding Bird Atlas (<http://www.inhs.uiuc.edu/chf/pub/ifwis/maps/>) and Illinois Birds (<http://www.inhs.uiuc.edu/chf/pub/ifwis/birds/>)**

Lastly, we'll discuss briefly two sites closer to home, the *Illinois Breeding Bird Atlas*, and *Illinois Birds*. These two sites are actually subsections of the Illinois Natural History Survey, though they are not linked to each other. Both sites are relatively simple, and lacking in search or other navigation tools; the user simply picks a species of interest from a lengthy list.

The *Illinois Breeding Bird Atlas* is the simpler of the two sites; species are listed in alphabetical order by common name, and links next to the name lead to a map showing confirmed, probable, and possible sightings of the bird in Illinois; and another link leads to a single, uncaptioned photo. The maps are simple, but clear. The photos vary in quality, but in general are not as good as the other sites we reviewed.

*Illinois Birds* provides much more information than the *Illinois Breeding Bird Atlas*. A link from the common name of the species in question leads to a single, very long page loaded with useful information about the species, much of it in bulleted or table format. Information provided includes taxonomy, occurrence in Illinois, status, habitat associations, guilds, food habits, environmental associations, life history, management practices, and references. Some of the information is somewhat technical, and the slant is toward ecological information, which may be useful to many CW member organizations.

Though both sites are inelegant, both are relatively easy to use, and users should have no trouble locating and selecting a species of interest; reducing the total number bird species to those known to occur in Illinois makes for much shorter pull-down lists. Both sites are worth a look by CW members interested in birds, especially those interested in how birds fit into and interact with the environment in which they live.

*Both authors are in the in the Ecological & Geographical Sciences Section of the Environmental Science Division at Argonne National Laboratory. Bob Sullivan is a program manager and Kirk LaGory, Ph.D. is an ecologist. For more information, contact Bob Sullivan at [sullivan@anl.gov](mailto:sullivan@anl.gov)*

*Do you have important research or a great success story that you believe your Chicago Wilderness colleagues would find interesting and useful? These guidelines explain what we're looking for and how to submit an article.*

---

## **Chicago Wilderness Journal**

### **Guidelines to Authors**

#### **About the Chicago Wilderness Journal**

##### **Mission of the Chicago Wilderness Journal:**

1. Facilitate the sharing of results and lessons learned from member-initiated projects and activities, including coalition-funded projects, team activities or the work of individual member organizations that would be useful to the wider membership;
2. Through easily consumable articles discuss practical implications, interpret data, and/or make recommendations about issues within the areas of science, land management, sustainability, education, and communication in the Chicago region;
3. Foster a sense of community among Chicago Wilderness members and improve members' ability to communicate with diverse audiences.

##### **This journal is:**

- A forum for sharing important results and lessons learned through biodiversity conservation work,
- An interdisciplinary publication that features a mix of articles in each issue from the fields of science, land management, education, communication, and sustainability,
- An online journal, published three times a year, guided by an editorial board made up of Chicago Wilderness members and coalition staff.

##### **This journal is not:**

- A peer-reviewed journal,
- A forum of advocacy or political positions,
- A newsletter with event announcements,
- A means of presenting biodiversity issues to the general public.

#### **What we're looking for in an article**

Submissions will be considered from the volunteers and employees of Chicago Wilderness member organizations, and from participants in Chicago Wilderness Teams and projects. Articles should report on the results of a Chicago Wilderness project, workshop, roundtable, or the results of such work performed by an individual Chicago Wilderness member organization. While the emphasis of this publication is on Chicago Wilderness members and affiliates, submittals from outside the membership that are relevant to the Chicago Wilderness audience will also be considered. The topic should



---

pertain to biodiversity conservation in this region. Articles should emphasize the lessons learned and interpretation of data, rather than methodology or simply reporting of results.

Questions to answer in the article include:

- Why did you undertake the project and what did you do?
- What did you learn from the experience? What do your results tell you?
- What are the practical or applied implications of the work – both in your field and in other fields?
- Based on what you learned what do you recommend to Chicago Wilderness members?

Note that articles don't necessarily need to tell a success story; if valuable lessons were learned from an unsuccessful project, please consider submitting an article.

### Target audience

The target audience for this journal is the volunteers and employees of Chicago Wilderness member organizations, and participants in Chicago Wilderness Teams and projects. To meet the needs of this broad audience, articles should:

- Emphasize practical implications,
- Be easy to read and interesting, not overly technical and full of jargon,
- Be short but refer to additional sources of information for interested readers,
- Help readers feel connected to other Chicago Wilderness members,
- Offer readers information and resources that will help them carry out their jobs.

### Article format

Please submit your article as a Microsoft Word or WordPerfect file. Articles should be three to five pages in length (approximately 450 words per page if there are no pictures or graphics; 250 words per page if graphics are included). Pictures and graphics are welcome and encouraged, but the editorial staff will make final selections! Graphics files can be submitted at 72 dpi, actual size or larger. JPG files are the preferred format for graphics. The journal can accommodate sidebars, so please indicate if there are quotes or charts that you would like set out from your article.

#### **All articles must include the following components:**

- A short abstract of several sentences that will quickly capture the reader's attention,
- A description of the work you did and why you did it,
- Results and implications for Chicago Wilderness partners.

Beyond these requirements, articles may follow a variety of outlines as suggested by these examples:

Traditional scientific research format:

- Abstract
- Objectives
- Methods
- Results and Discussion
- Conclusion/Recommendations/Implications
- References

---

Report on outcome of a workshop:

- Abstract
- Rationale for workshop; reasons to learn more about topic
- Main points made at workshop
- Insights gained from talks and discussions
- Conclusions and final recommendations

Description of the development of educational tool or product:

- Abstract
- Rationale for project
- Brief description of final product (e.g. curriculum, model policy)
- Lessons learned from development process
- Recommendations to others attempting similar work
- Recommendations on use of product

## Submission procedures

Authors can submit either an article or a query to Elizabeth McCance at [emccance@chicagowilderness.org](mailto:emccance@chicagowilderness.org). Queries should include a thorough abstract of the intended topic. Articles and all accompanying graphic files should be submitted electronically to Elizabeth. Be sure to include the author's contact information. Submissions can also be saved on a disc and mailed to Elizabeth at 8 South Michigan Ave., Suite 900, Chicago, IL 60603.

Although articles will be accepted on an ongoing basis for consideration in all upcoming issues, a rough schedule of deadlines follows:

- For March issues: first drafts will be due the second Friday of the preceding December,
- For July issues: first drafts will be due the second Friday of the preceding April,
- For November issues: first drafts will be due the second Friday of the preceding August.

Authors are welcome to submit articles that have already been published, as long as the article contains specific implications for Chicago Wilderness, and the author observes copyright law and has obtained the appropriate permissions for reprinting. If your submission has been published elsewhere, please indicate where and when it was published so we can note this in the journal.

The journal's editorial board recommends that if possible, authors should work with their internal PR departments for assistance in translating specialized information into material that is accessible to a more general audience. In addition, members of the journal's editorial board will partner with authors to adapt the style and format of articles to be most useful to the broad Chicago Wilderness audience.

For more information, contact Elizabeth McCance at (312) 580-2138.

---

## About the *Chicago Wilderness Journal*

The *CW Journal* is published by the Chicago Region Biodiversity Council (Chicago Wilderness) on its web site ([www.chicagowilderness.org](http://www.chicagowilderness.org)) three times per year: in March, July, and November.

An editorial board composed of scientists, sustainability professionals, education, and communication specialists from Chicago Wilderness member organizations guide the production of each issue in accordance with the mission of the journal and the goals of Chicago Wilderness. The opinions expressed in this journal, however, are solely those of the authors.

Board members are:

- Kristopher Lah, U.S. Fish and Wildlife Service
- Cathy Maloney, Prairie Club
- William Peterman, Chicago State University
- Robert Sullivan, Argonne National Laboratory

Support is provided by the following Chicago Wilderness staff members:

- Catherine Bendowitz
- Irene Hogstrom
- Elizabeth McCance
- Chris Mulvaney

### Mission of the Chicago Wilderness Journal:

1. Facilitate the sharing of results and lessons learned from member-initiated projects and activities, including coalition-funded projects, team activities or the work of individual member organizations that would be useful to the wider membership;
2. Through easily consumable articles discuss practical implications, interpret data, and/or make recommendations about issues within the areas of science, land management, sustainability, education, and communication in the Chicago region;
3. Foster a sense of community among Chicago Wilderness members and improve members' ability to communicate with diverse audiences.

For information about how to submit articles please refer to the Guidelines to Authors posted on the journal's home page. For other inquiries about this publication, please contact Elizabeth McCance at [emccance@chicagowilderness.org](mailto:emccance@chicagowilderness.org).

*The CW Journal has been made possible by the generous support of the USDA Forest Service and the US Fish and Wildlife Service*

