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In This Issue

Chicago WILDERNESS

Join Rutherford Platt and John Rogner as they reflect upon the first 10 years of Chicago Wilderness.

On May 17, 2006, Chicago Wilderness members gathered in Stanley Field Hall at The Field Museum to commemorate the consortium's tenth anniversary. Rutherford H. Platt, professor of geography and planning law, and John Rogner, Chair of the Chicago Wilderness consortium each reflected upon the work and impact of Chicago Wilderness. The following are excerpts from both addresses.

Chicago Wilderness: Flagship of the Urban Biodiversity Movement
Rutherford H. Platt, University of Massachusetts Amherst

It is a great honor and delight for me to be invited back to Chicago to share in the Tenth Anniversary of the Chicago Wilderness, the world's flagship urban biodiversity collaboration and unique regional voice for greener, more ecological cities and suburbs.

I feel a bit like the Prodigal Son—having left here in 1972 to pursue an academic career at the University of Massachusetts. Although I grew up in New York City, my professional home base was and still is Chicago. I first came here in 1964 as a student in the University of Chicago Law School. After that, I crossed the Midway to pursue a Ph.D. in the Department of Geography under a federal Urban Studies Fellowship. A year or so later, Gunnar Peterson, then the Executive Director of Open Lands Project (OLP), hired me as staff attorney at OLP under a grant from Gaylord Donnelley.

My real world job thus stimulated my doctoral research, and vice versa, and I managed somehow to produce a book for Open Lands and a thesis for the Geography Department, both concerned with greenspace preservation in the Chicago area. Moreover, the chance to work with, and learn from, people like Gunnar and Betty Peterson, Lee Botts, George Overton, Bill Beecher, Charles Olmsted, Jim and Mary Lou Marzuki in Park Forest, the Nadelhoffers in Naperville, and so many others, was a life-changing experience which I have never outgrown.

In 1972, my wife and I, with our two young children, moved to Northampton, Massachusetts where I started my career at UMass, Amherst. But the withdrawal from the Chicago Open Lands scene was traumatic for a while; Western Massachusetts was too bucolic, too pretty, too boring—with no "airports in the lake" or Cross-town Expressways to fight, or Thorn Creek Woods to be saved. I even called George Overton to see if the law job he had once offered me was still available. (It wasn't).

Fast forward: In 1990, I collaborated with Paul Heltne and others to hold a conference at the Chicago Academy of Sciences in Lincoln Park on the topic of "Sustainable Cities: Restoring and Preserving Urban Biodiversity." That led to

an edited collection of essays under the title *The Ecological City* published by the University of Massachusetts Press in 1994.

A few years after that, I started the Ecological Cities Project as a program of "research, teaching, and outreach" based at my university. We were fortunate to attract a number of national leaders, including my old friend Jerry Adelmann, to lend their names to the steering committee. One outgrowth of the Ecological Cities Project is a new book: The *Humane Metropolis: People and Nature in the 21st Century City* to be published this fall by the University of Massachusetts Press and the Lincoln Institute of Land Policy. The book and its companion DVD film are based on a conference we held in New York in 2002 that celebrated the work of the late William H. Whyte, and sampled new ways of greening cities in progress today around the country.

Returning to Chicago Wilderness—with some 190 public and private sector member organizations, your magazine, your *Biodiversity Atlas* and restoration program, your environmental education programs, and your research, restoration, and outreach initiatives, this is an amazing and unique enterprise. The model you have created begs to be replicated in other large urban regions. However, the only one I am aware of at this time is Houston Wilderness. (At my suggestion, Carol Fialkowski was invited to New York to brief a group of urban environmentalists there on how your network operates. After lengthy discussion, they formed "The Nature Network" which is now under development.)

In fact, the *modus operandi* of Chicago Wilderness may not so easily be transplanted outside its home territory. It draws on and reflects some of the special cultural traditions of the upper Midwest and of Chicago in particular. Let me briefly identify three of these traditions from which Chicago Wilderness emerged:

1. Regionalism—The 1909 Burnham and Bennett "Plan of Chicago" famously reflected and reinforced a growing sense of the Chicago Area as embracing the City along with its suburbs and nearby farm lands as a planning and perceptual "region." The Cook County Forest Preserve District (FPD) was established in 1914 as a direct result of the Burnham Plan and a campaign of civic support for forest preserves spearheaded by Dwight H. Perkins. The Cook County FPD effectuated a regional approach to conservation of forests and greenspaces that has continued with counterpart districts in other Illinois counties of the Chicago region. Regionalism has also long been embodied in such institutions as the Metropolitan Sanitary District (now the Metropolitan Water Reclamation District), the Chicago Regional Planning Commission and its successor the Northeastern Illinois Planning Commission, Chicago Metropolis 2020, Openlands Project, and over the past decade, Chicago Wilderness.

Tony Hiss, in his recent book on the New York region *H2O: Highlands to Ocean*, characterizes a region as the "middle ground, a missing link that reflects both local actions and global consequences. Living and cooperating regionally makes it possible to think globally and act locally."[1] Similarly, the National Research Council Board on Sustainable Development in its 1999 report stated that: "The quest for sustainability at the regional scale is rich in the variety of institutions, values, and kinds of environmental and social systems it engages… Many of the greatest

[1] Tony Hiss and Christopher Meier, H2O: Highlands to Ocean. Morristown, NJ: Geraldine R. Dodge Foundation, 2004, p. 30

challenges facing a sustainability transition occur at the regional scale." [2]

The Chicago area has a powerful regional sense of place. One can stand at Buckingham Fountain (or the shining new "Bean" in Millennium Park) and imagine the region as a highly diverse but unified space radiating outward through the Loop, the gentrified near-downtown neighborhoods, the troubled West and South Sides, the Calumet and Southwest industrial corridor, the older railroad suburbs, the new "edge cities" such as Naperville, the raw subdivisions and residual farm villages of Will, Kane, and McHenry Counties, along with nearby parts of Indiana and Wisconsin—in short the territory of Chicago Wilderness. This geographic "diversity within unity" has been splendidly portrayed by Terry Evans in her book *Revealing Chicago: An Aerial Portrait*[3] and the exhibit of some of her photographs in Millennium Park last year.

2. "Urbs in Horto"—Leif Ericson allegedly chose the name "Greenland" to lure settlers to that icebound and forbidding land. Perhaps with similar motives, Chicago's founders adopted the motto "Urbs in Horto" ("city in a garden") which is inscribed on the city's seal of 1837. Chicago's site on a swampy, glacial plain bordering Lake Michigan actually had little to recommend it geographically except for its location straddling the divide between the Great Lakes and Mississippi River watersheds. But whether boosterism or wishful thinking, the motto came to represent Chicago's tradition of city and nature intertwined. Frederick Law Olmsted helped realize this vision in his landscape design for the 1893 Columbian Exposition, whose imprint is still enjoyable today at Wooded Isle in Jackson Park. Jens Jensen furthered the tradition in his many landscape projects for the Chicago Park District, particularly his celebrated plantings in the Garfield Park Conservatory.

Today, Chicago's "Urbs in Horto" tradition continues with Mayor Daley's City Hall Green Roof, the Chicago Green Technology Center, the Chicago Park District, and the many initiatives overseen by the city's Department of the Environment. Outside the city, key member institutions of Chicago Wilderness—including the Morton Arboretum, the Brookfield Zoo, the Illinois Nature Conservancy, Openlands Project, and this Museum—have long helped to propagate the "Urbs in Horto" tradition to the entire region. This role is now shared and strengthened by Chicago Wilderness itself—the whole being much more than the sum of the parts.

3. Land Advocacy—My first book "Open Land in Urban Illinois"[4] documented how open land preservation relies on the persistence and passion of key individuals who I referred to as "citizen advocates." Think of: Dorothy Buell, Paul Douglas, and Sylvia Troy—Indiana Dunes National Lakeshore; May Watts—the Illinois Prairie Path; Gunnar Peterson—Goose Lake Prairie and the I&M Canal; Mary Lou Marzuki and Nancy McCrohon—Thorn Creek Woods; Lee Botts—Lake Michigan Federation; Jerry Adelmann—Upper Illinois Valley Heritage Corridor and much else; and Marian Burns—the Southeast Environmental Task Force which is spearheading the revitalization of the Calumet region.

[2] NRC Board on Sustainabile Development, Our Common Journey: Transition Toward Sustainability. Washington, DC: National Academy Press, 1999, pp. 154-155

[3] Terry Evans, *Revealing Chicago: An Aerial Portrait*. New York: Harry N. Abrams, Inc. 2005.

[4] R. H. Platt, *Open Land in Urban Illinois: Roles of the Citizen Advocate*. DeKalb: Northern Illinois University Press, 1971.

You are welcome to add your own favorite examples to the list. And notice that not one of these projects is named after its chief advocate(s). The ability to subsume oneself into a collaborative effort where the credit is widely shared is fundamental to open space advocacy—Chicago-style!

Let me finally share some thoughts about the future role of Chicago Wilderness itself. Clearly, despite all the open lands and "smart growth" efforts of recent decades, this region continues to sprawl relentlessly. The rate of land consumption is far higher than regional population growth: according to the 1998 Openlands Project report *Under Pressure: Land Consumption in the Chicago Region*, by 2020 the Greater Chicago region will experience population growth of *25 percent* but a likely *55 percent* increase in developed land. (While recent census data indicates the rate of population growth is slowing, the rate of sprawl shows no sign of relenting.)

Moreover, Chicago and its region are going through dramatic structural and socioeconomic change. Like the central city, much of the region is increasingly multi-cultural and multi-generational with all the opportunities and challenges which that represents. Aging infrastructure of all kinds needs to be repaired and updated, as witness the current reconstruction of the Dan Ryan. Housing costs are astronomic, often requiring at least two pay checks to support a mortgage on a modest home at the urban fringe. And much new residential construction consists of oversized pseudo-mansions, often within gated communities that isolate their residents, literally and perceptually, from participation in the larger community. The population of the Chicago region, as in other large metro areas, is stressed out in many ways: shortage of time, money, nervous energy, lack of exercise, family issues—all compounded by daily immersion in a metropolitan environment of visual dreariness, blight, noise, crowding, pollution, and absence of nature.

Beginning in the 1920s, with the widespread availability of motor cars, the white middle class began to escape from urban pressures by driving to "the country." The 1962 Report of the Outdoor Recreation Resources Review Commission identified "driving for pleasure" as the most popular form of "outdoor recreation." Today, the option of escaping to "the country" for most people is increasingly infeasible. Metro areas like Chicago are too large, traffic too intense, costs too high, and once-rustic destinations are beginning to look like what you're trying to escape from.

Moral of the story: Olmsted was right. He and Calvert Vaux designed Central Park in the 1850s as an accessible "White Mountains" for the laboring class of New York, or, to use the Victorian phrase, as their "green lungs." Similarly Burnham and Jensen planned the Chicago parks for the carless masses. In the 21st Century the "carless masses" have become the "carbound masses." The outward-bound, macho name-plates of SUVs—Explorer, Navigator, Sierra, Denali—mock the reality that they spend much of their time stuck in traffic going nowhere at considerable personal and environmental cost.

But there is much more at stake here than simply how long it takes to get anywhere within or outside our metropolitan regions. A half century ago, the urban historian Lewis Mumford warned that: "[The modern city tends] to loosen the bonds that connect [its] inhabitants with nature and to transform, eliminate, or replace its earth-bound aspects, covering the natural site with an artificial environment that

enhances the dominance of man and encourages *an illusion of complete independence from nature*."[5]

This "illusion" of disconnection from nature has immense social and emotional implications for metropolitan inhabitants. To quote Tony Hiss once more: "The heaviest burden of sprawl is that, as it isolates us physically from one another, it wounds each of us inside, diminishing fellowship, and impoverishing our sense of kinship with the rest of the earth."[6]

Chicago Wilderness and its member organizations are concerned with healing those wounds, by reconnecting people with the remnants of the natural world immediately at hand. As the metropolitan area continues to sprawl and stress levels continue to rise, the region's "green infrastructure" (the trendy new term for "green lungs") provides the essential counter-weight to deadening, depressing, isolating effects of an otherwise totally artificial metropolitan environment.

But as we consider the prospects for adding to our inventory of natural and restored greenspaces, there clearly are few, if any, large scale opportunities like the Indiana Dunes left. Chicago does not even have a ridge of highlands still available for public protection as does New York. Chicago's Calumet Area Initiative is a visionary concept for reviving that degraded region both economically and ecologically. Other than that kind of opportunity, what remains are scraps of prairie, forest, dune, or wetland that have been skipped by earlier development. Gunnar Peterson taught me that even a five-acre tract of unplowed prairie, like Peacock Prairie in Glenview, is worth saving. As the wave of development sloshes unevenly outward, there must be dozens if not hundreds of such scraps of nature left to be salvaged, protected, studied, interpreted, and enjoyed by the people living nearby.

Meanwhile, there are many new benefits to be gained from older greenspaces and abandoned vacant lands. Parks can be adapted to new recreational uses and cultural preferences. Volunteers are removing invasives and planting native species. School-based urban gardens are thriving, such as those stimulated by Will Allen's Growing Power program based in Milwaukee. Stream restoration improves water quality and biodiversity, and connects people to their local watersheds. Environmental education programs, such as those run by Chicago Wilderness, are introducing kids to the wonders of nature, as found right at their doorsteps and under their noses.

One of the most important potential benefits of urban ecology restoration and education efforts is the opportunity for contact and shared experience among people from diverse neighborhoods, backgrounds, and walks of life. Such activities may thus help to relieve the sense of helplessness and loss of "community" that is a widely lamented attribute of metropolitan growth. Apart from numerical indicators such as trees planted or protected, wetland acres restored, invasive species removed, fish stocks revived, songbirds counted, and bugs discovered by children, there may be a penumbra of good feeling and sense of belonging that comes from direct personal contact with nature and each other. This may be a key element of social adaptation to life in the enveloping 21st century metropolis.

[5] Lewis Mumford, "The Natural History of Urbanization" in Man's Role in Changing the Face of the Earth (W. L. Thomas, et al, editors). Chicago: University of Chicago Press, 1956, pp. 386 and 397), emphasis added.

[6] Tony Hiss, Foreword to William H. Whyte, The Last Landscape (Republication). Philadelphia: University of Pennsylvania Press, 2002, p. x.

Chicago Wilderness—you have had a brilliant decade. Keep up the great work for many decades to come!

Dr. Platt is a professor of geography and planning law at the University of Massachusetts Amherst. He directs the Ecological Cities Project, a program of research, teaching, and outreach: www.ecologicalcities.org.

Reflections upon Chicago Wilderness
John Rogner, U.S. Fish and Wildlife Service

Holding an event in Stanley Field Hall is not something you do casually nor is it without risk; too few people and the echoes only underscore the emptiness. The planning committee for this event took a chance that Chicago Wilderness members would rise to the occasion, and they are not disappointed this evening. As I looked over the list of registrants I counted over 550 people here, representing over 100 member organizations, 15 corporate council members, and many friends and associates.

This is a reflection, not just of our swelling ranks, but of a growing sense of purpose and relevance of Chicago Wilderness.

I'm not one to look behind or to rest on anyone's laurels, but an event like this one seems to demand that we take stock of where we have been. To help us do that, the other night I actually dug into files that had not seen daylight in over ten years, files that chronicle the early days of Chicago Wilderness. What I found reminded me of something I have heard about certain cultures.

There are cultures that, when calculating someone's age, include the time spent in the womb, so that a person at birth is already nine months old. Using that calculus, we are actually celebrating the 11 year and four month anniversary of Chicago Wilderness. Conception happened right here at the Field Museum, where on September 28, 1994, Chicago Wilderness took on an existence. That was the meeting where executives of 25 Chicago area organizations first convened to explore the possibility of a grand partnership. By the end of the meeting, steps had been taken that would eventually lead to the launch of the Chicago Wilderness consortium.

These executives were not starting from scratch. Over a year earlier, a handful of staff of local conservation organizations had met to explore the notion of collaborative conservation. These were the people who work in the trenches of conservation, the people who actually get their hands dirty, the land managers and scientists.

I want to read to you from the invitation to that exploratory meeting of field staff. The memo first talks about all of our conservation assets, the rich natural resources in northeastern Illinois, the management expertise, the management resources, the legions of volunteers, the considerable base of public support for conservation, all the positives, and then it makes this stark assessment:

"Despite the demonstrated commitment by private and public conservation agencies, the challenges far outweigh our ability to cope."

These people were not fatalists. They believed something could be done to change this state of affairs:

"It is time that all agencies, both public and private, involved in this critical work come together to help solve mutual problems, provide interagency support, and develop a regional plan for the protection, management, and restoration of our natural communities."

That's an ambitious agenda but these were dedicated people. They did develop a vision and shell of a plan that they called the Chicago Wilderness Bioreserve Strategic Plan. This plan said the Chicago region had the best remaining examples of prairies, woods, and wetlands left in the Midwest, and through education, through grass-roots organizing, through planning, through restoration, through acquisition, we can make them part of the core culture of the region and ensure that people and land can coexist in harmony forever. But there was only one way to achieve this. The plan said we would have to work together in a single massive effort, and it would require organizational support from top to bottom. Staff took this vision to the executives, which led to the historic meeting here on September 28, 1994.

The organizations represented at that meeting are familiar: all of the forest preserve or conservation districts of northeast Illinois, Friends of the Chicago River, Brookfield and Lincoln Park Zoos, Sierra Club, City of Chicago, Field Museum, Chicago Botanic Garden, The Morton Arboretum, The Nature Conservancy, Shedd Aquarium, Openlands Project, Chicago Academy of Sciences, Illinois Department of Conservation, Northeastern Illinois Planning Commission, federal agencies including US FWS, USFS, USEPA; 25 of them in all. I read the notes from that historic meeting and it gave me goose bumps. You could sense the vision and plan sitting in the middle of the table. Everyone was going around kicking it, poking it, probing it, and then offering comments on the idea. There was a lot of skepticism. Here are some of the comments:

We need more conversation to be comfortable with this.

This is the right direction, but it will mean commitments. Most of us can't make those decisions quickly. We have boards, we have budgets

Is this going to help me or compete with me?

The process may be painful, but it's necessary

As I think of getting my commissioners to buy in, I worry about the title Chicago Wilderness. I think we need to get "regional" in there somewhere.

Who has the command and control when it comes to hard resources?

As the meeting wore on, people got more comfortable and even inspired:

Individually we have done a good job, but together we'll do even better

For this to work, everyone must feel like an equal partner

This draft plan is an exciting beginning, but the real work is ahead of us.

Who cannot believe in this?

This is an important idea

This effort will attract federal support

(Whoever said that was clairvoyant)

When I read the plan and talked with staff, I had fears. Now I find that you have the same fears. That reassures me.

This partnership already exists. The difference is the size and number of partners. A lot of this may be more comfortable when we sit down to discuss it.

Sit down to discuss it they did, at a two day meeting the next month. They left their bowling shirts at the door and hammered out a plan for doing conservation work across boundaries.

Over the next sixteen months we firmed up the partnership. We organized into the four teams we have today, developed some short-term and long-term goals, we developed a handful of pilot projects to show the public what we were about, and officially launched with 34 founding organizations 10 years ago.

What a long way we've come.

We quickly went beyond the boundaries of Illinois and invited Indiana and Wisconsin to the table. Now we're at 193 organizations and a Corporate Council. Our membership continues to diversify as it grows. It's no longer just the conservation choir. We've developed the *Biodiversity Recovery Plan* and our member organizations have completed several hundred projects that advance its goals. We have a strategic plan that creates a continuous pipeline of projects. We have an on-the-ground green infrastructure vision. We've developed and are actively promoting sustainable development principles and practical planning tools to go along with it. You see the Mighty Acorns here today, a school-based program that has flourished under this collaborative approach. Our science agenda continues to develop. Opportunities for citizen volunteerism continue to expand.

And through all this our profile continues to rise. We are viewed nationally, even globally, as leaders in regional urban conservation planning. We have been privileged to share our experiences and stories in many places—Portland and Eugene, Oregon; Houston; New York City; San Diego; Durban, South Africa; Thailand. We have a colleague from Australia here today, and I want to welcome Ian Morgans to Chicago. We were featured as a case study at the White House Conference on Cooperative Conservation last year. It is so gratifying to be able to give others some ideas and inspiration as they find their own path toward conserving wild nature in their parts of the world.

What accounts for our success? Organizational consultants would look at the model and offer some textbook reasons. We've kept our organizational mission clear and simple; we've kept participation open and voluntary; there is very little controlling influence; organizations are free to pursue their own niche within the overarching mission and vision. Any group can find a place if they choose to participate.

Though these are certainly important to success, they are secondary to two primary and essential elements: people, and a powerful vision of healthy native ecosystems interwoven through urban landscapes.

Going back to that historic meeting here in 1994, Sandy Boyd of The Field Museum said: "People, not structure, make organizations". We have been blessed with people who have a passion for the work and a generosity of spirit. These are people who, in Leopold's words, cannot live without wild things and who consider the right to find

a pasqueflower as inalienable as free speech. These are people who firmly believe that, on a high level, we have an obligation to preserve the diversity of life on this planet. These are people who, on a more practical level, believe healthy habitat—whether in national parks, county forest preserves, corporate campuses, backyards, or rooftops—has a lot to do with making this metropolitan region a good place to live.

These people are you, and I want to take this moment, right now, to thank and congratulate you for ten years of a job well done.

Huge challenges remain, of course. From our recent report card, you know there is a lot of progress yet to be made in restoring our lands and waters to a condition of peak health. We are a long way from integrating conservation thinking into all of our land use decisions and even personal decisions.

But I no longer have doubts about the staying power of the consortium. No longer do I believe, in the words of the original invitation memo to land managers, that the ***challenges outweigh our ability to cope***. Through your fine work as organizations there is no question that you will continue to grow as a force for conservation in this region, and that you will meet and overcome the challenges.

We've come a long way since that day in September 1994 when the embryonic Chicago Wilderness could fit around a conference table in The Field Museum, and I enjoyed revisiting some of the early conversations that I had forgotten. As I quickly ran through the pages of comments I paused when I came across the name Carl Becker. Carl was one of the conservation leaders in that meeting. At the time, he directed the Division of Natural Heritage in the Illinois Department of Conservation, as it was known in those days. As most of you surely know, Carl recently passed away and is dearly missed.

From the minutes of the meeting it was clear he was excited about the prospect of Chicago Wilderness and saw it as an opportunity to get the Department more involved in this part of the state. He was rock steady in his support, from these early days through the first several years as we worked to iron out the rough spots in the consortium. And he accomplished exactly what he set out to do: IDNR was able to engage more of the Chicago conservation community in their work and the relationship has continued to flourish ever since.

In addition to working with him on Chicago Wilderness matters, I considered him a personal friend and colleague and greatly appreciated his unwavering commitment to conservation. He inspired me personally while I was in college when he came and talked about endangered species conservation, and helped a somewhat unfocused graduate student make an eventual career choice. In his honor and memory, I want to dedicate this Chicago Wilderness tenth anniversary year and only hope that I, too, can inspire someone along the line to pick up the baton.

Critics may assert that mission-driven conservationists are occasionally too serious and devote too little time to celebrating successes. We hope to counter this charge tonight. This is a special evening and a special year, so please take some time to congratulate your old friends and colleagues, engage some of the many new faces here, and reflect on ten years of accomplishments. And I hope to see you out in the field.

John Rogner is the Chicago Office Field Supervisor for the US Fish and Wildlife Service, as well as chair of the Chicago Wilderness consortium and can be reached at john_rogner@fws.gov

Become an expert at the inner workings of Chicago Wilderness teams, with this in-depth team analysis provided by Christopher Mulvaney and Lori Heringa.

Past, Present, and Future Efforts of the Chicago Wilderness Teams

Christopher Mulvaney, Chicago Wilderness
Lori Heringa, Chicago Metropolitan Agency for Planning & Chicago Wilderness

The Chicago Wilderness (CW) teams have long been the think tanks for the CW consortium. It is at the team level where many project ideas are surfaced, shaped into proposals, and put into action. Over the years, each team has evolved its own working style that fits that of its members and team missions. In this article, we provide an overview of the teams, take a brief look back at some of the work that has resulted from these collaborations, and finally cast our eyes forward to what the teams are working on now and what they hope to accomplish in the years ahead. In doing so, we hope to inspire others to seek their own niche within a Chicago Wilderness team.

The Teams in a Nutshell

Chicago Wilderness has spawned numerous groups dedicated to achieving the vision, goals, and objectives of the consortium. A quick background on the four teams can provide context to understand how the various groups operate and can help new member organizations identify where they may best participate. Chicago Wilderness consists of four teams organized around major strategic themes of the consortium—Education, Natural Resources Management, Science, and Sustainability. The teams were established as forums for the development of projects. Each team consists of staff and volunteers from CW member organizations who devote a portion of their time to the work of their respective team. This may entail participation in team meetings, involvement on project working groups, or a combination of both.

Early on, each team developed specific mission statements to provide guidance to their work. The Education Team's basic mission is to increase knowledge and connections with local biodiversity among the region's residents. The Natural Resource Management Team's underlying objective is to facilitate the restoration and management of the region's natural areas. The Science Team seeks to foster collaboration among the region's researchers and increase our scientific understanding of Chicago Wilderness ecosystems so that we can ensure the efficacy of restoration and management practices. The Sustainability Team focuses on planning and

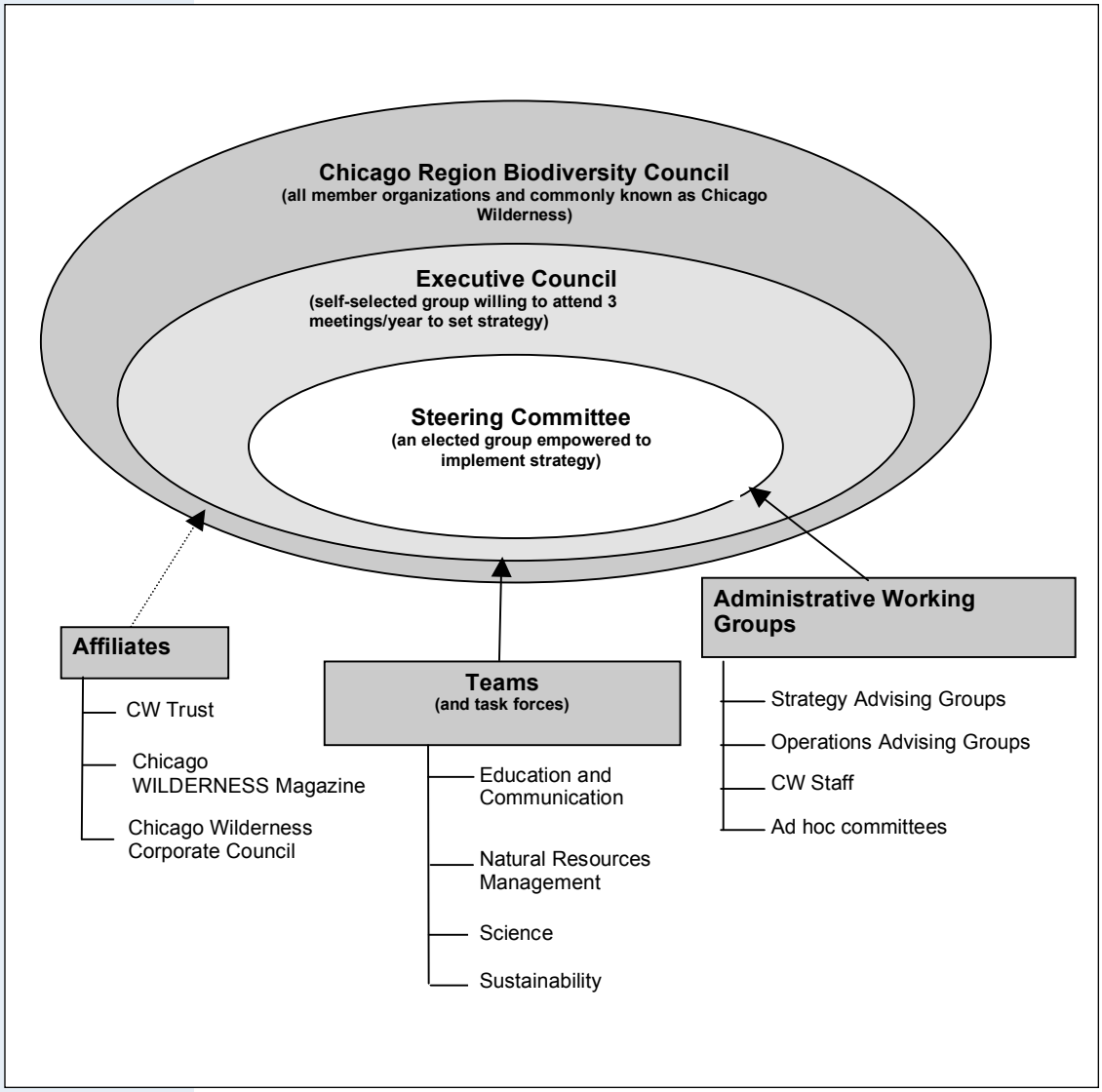

Figure 1. Chicago Wilderness organizational chart from The Chicago Wilderness Consortium: A Participants Handbook.

development by promoting and facilitating the use of sustainable development principals such as conservation design.

Team. Task Force. Working Group. Confused yet? Wondering how these groups relate to one another and fit in with the broader structure of CW? This is a good opportunity to explain the structure of CW with a specific focus at the Team level (Figure 1). Within each team, task forces emerge around high priority sub-themes or issues. For example, in 2003 several CW members recognized the need for a focus on aquatic systems, and hence the Aquatics Task Force was born. In contrast, working groups develop around specific projects and in many cases are more ephemeral, usually dissolving at the project's

conclusion. As with task forces, working groups may or may not fall under the realm of a single team. In some cases, the agenda of a task force or working group may overlap several teams such that the group operates across team "borders."

Each team is directed by two co-chairs—team members who have agreed to dedicate additional time to leading and guiding their team. Team co-chairs are assisted in their efforts by Chicago Wilderness staff coordinators. The current co-chairs for the teams are:

Education Team
- Peggy Stewart, Chicago Park District
- John Elliot, Forest Preserve District of Cook County

Natural Resources Management Team
- Steve Byers, Illinois Nature Preserves Commission
- Jeff Mengler, US Fish & Wildlife Service

Science Team
- Liam Heneghan, DePaul University
- Kay Havens, Chicago Botanic Garden

Sustainability Team
- Jim Van der Kloot, US EPA, Region 5
- Richard Mariner, Consultant

Ten Years of Initiatives

So what have the Teams accomplished during the 10 year history of CW? The simple answer to this question is, "a lot." A look at the projects database on the CW Members Web site will show that CW has funded close to 250 projects. The majority of these projects have stemmed from the team process. Rather than describe all of these excellent team initiatives, we will highlight a few key accomplishments to illustrate the nature of their past and future work.

Beginning in 2001, the Education Team's Community-Based Task Force carried out a project that utilized Northwestern University Institute for Policy Research's Asset Based Community Development model to conduct biodiversity conservation outreach in four communities (Stewart 2003). These efforts served as valuable learning experiences for CW members and now serve as models that can be adapted and used in other communities. In 2005, the Education Team's Interpreters Task Force brought in professional trainers from the National Association for Interpretation (NAI) to certify several CW representatives as NAI approved trainers (Elliot 2006). These individuals can now train other interpreters to become NAI Certified Interpretive Guides (CIG), thus increasing the quality and consistency of biodiversity interpretation throughout the CW region.

Until the last few years, the Science Team and the Natural Resources Management Team operationally functioned as one entity, previously known as the Science and Land Management Team. Because of the overlap, the origin for many past "Science and Land Management Team" projects does not lie solely within either team. Rather, many of these projects involved both groups. Still, Chicago Wilderness has supported a number of efforts over the years that can be justifiably linked to one

or the other team. The Natural Resources Management Team is well known for its work in creating the CW Midwest Ecological Prescription Burn Crew Member Training. Recognizing a need for a standard training program that focused on conditions in the CW region, several members of the Natural Resources Management Team established the Burn Task Force and created an introductory burn training program that was adopted by many of the land-owning agencies within CW. Designed for use either internally by CW members or as a consortium-wide workshop, Team members typically organize at least two workshops each year. To date, over 300 staff and volunteers have received the training. Another effort that arose from the Natural Resources Management Team is the Plants of Concern project. Utilizing volunteer monitors, this project continues to collect important long-term trend information on 144 rare, threatened, or endangered plant species throughout the region. Established in 2003 as part of the Natural Resources Management Team, the Aquatics Task Force has also undertaken several initiatives. In both 2004 and 2005, a working group within the Task Force organized the Linking Watersheds Conference, designed to promote information sharing among the region's watersheds groups. As part of the 2005 conference, the working group also generated an inventory of watershed plans and groups within the Chicago Wilderness region. Considered a success by many participants, the conference won recognition from the Illinois Association for Floodplain and Stormwater Management, who provided the Task Force with their annual public education award in 2006.

Chicago Wilderness has funded several research projects that can be either directly or indirectly connected back to the Science Team. As one example, Marlin Bowles from The Morton Arboretum has re-sampled the original 1976 Illinois Natural Areas Inventory (INAI) forest, prairie and wetland sites from the Chicago region and assessed twenty-year changes in plant species richness, composition, and structure (Bowles and Jones 2004; Bowles et al. 2005). The Science Team also houses the Invasive Species Task Force. In 2003, this task force convened a workshop of researchers, land managers, and volunteers to exchange information on issues pertaining to the management of woodland invasives. Part of this effort also included a survey of invasive species management practices by natural resource management agencies within CW.

The Sustainability Team has given much attention to the management of built-up and developing areas. The types of plantings and the methods of storm-water management that are used can have impacts on the region's biodiversity. Promotion of native landscaping in built and developing areas, promotion of natural stormwater techniques, outreach to local government decision makers, and removal of barriers to green redevelopment practices have been priorities. A few key projects of the team include: the Green Infrastructure Vision, which produced a map identifying protected natural areas in Chicago Wilderness and opportunities for expansion and interconnections; the development of Sustainable Development Principles, followed up with outreach to local governments and professionals in the development business; formation of the Sustainable Watershed Action Team (SWAT), a group of experts lending sustainable development expertise to municipalities and developers; and the Green Engineering and Brownfields Redevelopment Conference, which provided information to engineers on incorporating sustainable green design practices in brownfield projects.

In addition to conducting projects like those described above, the Teams often organize activities to encourage networking and information sharing among the CW membership. For example, each year the Natural Resources Management Team holds several Restoration Roundtables whereby natural resource professionals and volunteers have the opportunity to learn about restoration and management work by their colleagues throughout the region. These forums are one way that natural resource managers can stay connected to one another and provide an excellent mechanism for the exchange of ideas and techniques. Likewise, the Education Team typically hosts bi-monthly workshops on topics of interest to Chicago Wilderness educators. Workshops this year have ranged in focus from training in early childhood environmental education techniques to program evaluation.

A Look Ahead

The CW consortium's 10th anniversary has provided a number of opportunities for reflection on past accomplishments; yet many goals remain. In fact, as part of its recently completed Strategic Plan, CW has outlined several ambitious long-and short-term objectives for the teams, which will provide direction for their future work.

The Education Team is continuing to examine ways to engage high priority audiences identified during the strategic planning process. For example, there is currently a great deal of interest among educators in identifying the best strategies for instilling a love of nature in very young children. The CW Early Childhood Task Force is picking up momentum and is examining ways to build upon its successful spring 2006 workshop that brought in early childhood educators from Minnesota. This is especially important as the Team explores ways to utilize the current energy being generated by the recent book from Richard Louv, Last Child in the Woods: Saving Our Children From Nature Deficit Disorder. Another segment of the Education Team, the Interpreters Task Force, is currently planning for an early 2007 workshop that will provide interpreters with techniques for enhancing their creativity skills. The Interpreters Task Force has organized several professional development opportunities during the last several years. Because many of these have focused on the development of skills in more experienced interpreters, the task force intends to once again offer a skill building opportunity that will be applicable to the beginner, and the intermediate, interpreter.

The Natural Resources Management Team also has several initiatives that it will be pursuing in the coming months. One of these is the creation of a CW geographic information system (GIS) data layer identifying the distribution and extent of natural communities across the landscape. This will be integrated into the interactive, online green infrastructure Web mapper being developed by the Center for Neighborhood Technology and Openlands. Such a tool will be extremely useful in enabling CW to provide basic statistics such as the amount of each community type currently under some type of protection. Led by the Illinois Natural History Survey, Team members are also engaged in a project to develop a regional ecological monitoring plan for CW. This plan will provide a comprehensive set of recommendations to CW on the development of a collaborative ecological monitoring program that will address several high priority regional-level questions for the consortium.

By the end of 2006, the Science Team will be wrapping up an initial draft of the Chicago Wilderness Natural Science Research Agenda. Two years in the making, this

document will identify and prioritize the major biodiversity conservation research needs for the consortium. The team plans to implement a process that will convert the research gaps into funded projects that are part of a coordinated CW research program. Model projects will consist of long-term management-focused research involving academics, natural resource managers and citizen scientists. The results will provide CW with important insight regarding the effectiveness of various restoration and management techniques.

The Sustainability Team is continuing to conduct outreach to target audiences by engaging in projects such as: creating a local outreach program to further implement the Green Infrastructure Vision; conducting training and advising municipalities, homeowner associations, developers and land trusts on effective conservation area maintenance; facilitating implementation of watershed plans; and convening a workshop of the municipal commissions that address natural resource and environmental issues.

Getting Involved

As the teams address the short-term objectives identified in the strategic plan, member involvement will be critical. Individuals can participate on a variety of levels. One way is to simply sign up to receive team emails from CW staff. Team coordinators periodically send information to team members updating them on future meetings, initiatives, and other team related activities. Individuals can then choose when and where they may be able to best participate. One of the best methods of involvement is through work on a task force or project working group. Member-driven projects are the means by which CW carries out its work and these depend upon the availability of individuals with the time and expertise to carry them forward. Finally, individuals may also choose to participate by attending regular team meetings and serving as one of the voices that steers the direction of a team. Meeting structure and conduct varies by team; some teams have formally identified a sub-group of members to serve as a team "board," whereas other teams utilize a less structured approach and have regular meetings consisting of all team members able to participate. The team coordinators can help potential team members to determine the best way to become involved in team meetings.

Conclusion

This is an exciting time for Chicago Wilderness. The consortium recently established an executive director position, filled by Melinda Pruett-Jones. The number of members joining the consortium is growing at a rapid pace. And CW continues to gain praise, both nationally and internationally, as a model for collaborative conservation work. Nonetheless, many challenges lie ahead, and the teams will continue to play a vital role in the consortium's efforts to address these challenges. By tapping into the vast amounts of expertise existing within the consortium, the teams will serve as catalysts for many CW initiatives. Collectively, these groups and their projects will move the consortium closer to realizing its vision for the Chicago Wilderness region as articulated in the Strategic Plan.

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Literature Cited

Bowles, M., M. Jones, J. McBride, T. Bell, and C. Dunn. 2005 Temporal instability in Chicago's upland old growth forests. *CW Journal* 3(2): 5-16.

Bowles, M. and M. Jones. 2004. Long-term changes in Chicago region prairie vegetation in relation to fire management. *CW Journal* 2(2): 7-16.

Elliot, J. 2006. Interpretive training for Chicago Wilderness. CW Journal 4(1): 25-29.

Stewart, P. 2003. Natural partners: Chicago Wilderness and asset based community development. *CW Journal* 1(1): 6-11.

Combined Manual and Automated Conductivity Measurements to Assess the Dynamics of Road Salt Input to a Wetland

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Investigating the role of road salt's impact on wetland ecosystems, John Quinn, Bob Van Lonkhuyzen, and Mark Kamiya examine how timing aspects of salt-impacted water may be just as critical as the amount of salt entering a system.

Abstract
Road salt is a water quality issue because of its potential impact on aquatic plants and other wetland biota. Although measurements of dissolved chloride concentration provide important information, the timing aspects of the salt-impacted water may be just as critical. This study sought to examine the dynamics of the chloride concentration in wetlands, including the character of short-term spikes, the residence time, and the timing relationship with the onset of the growing season.

To assess the chloride concentration at an Illinois wetland, a combination of numerous manual water conductivity measurements, a much smaller set of water samples for chloride analysis, and continuous conductivity data from several key locations were collected. Analysis showed that chloride attributed to road salt was found in the wetland throughout the early part of the growing season and extending into July. The analysis also demonstrated that the conductivity probe provides a quick and inexpensive means of assessing the fluctuations of chloride in the wetland. Continuous measurements provided information on salt loading to the wetland that could not be obtained through traditional water sampling.

Introduction

Road salt in the form of sodium chloride is commonly used in northern regions as a deicer for roads and parking lots. Dissolved sodium and chloride, however, may be detrimental to wetland ecosystems (Wilcox 1986, Panno et al 1999, Richburg et al 2001). The effects of salt exposure on wetland plants and animals may be influenced by the temporal variation in chloride concentrations and the flushing of chloride from the wetland relative to the growing season.

Water conductivity measurements have been shown to tie closely to water quality parameters such as salt concentration or total dissolved solids (Wang and Yin 1997). Monitoring programs may focus on the quality of surface water exiting watersheds ranging in size from large river systems (e.g. Wang and Yin 1997) to small ditch systems (e.g. Granato and Smith 1999). Although studies may rely on collecting individual

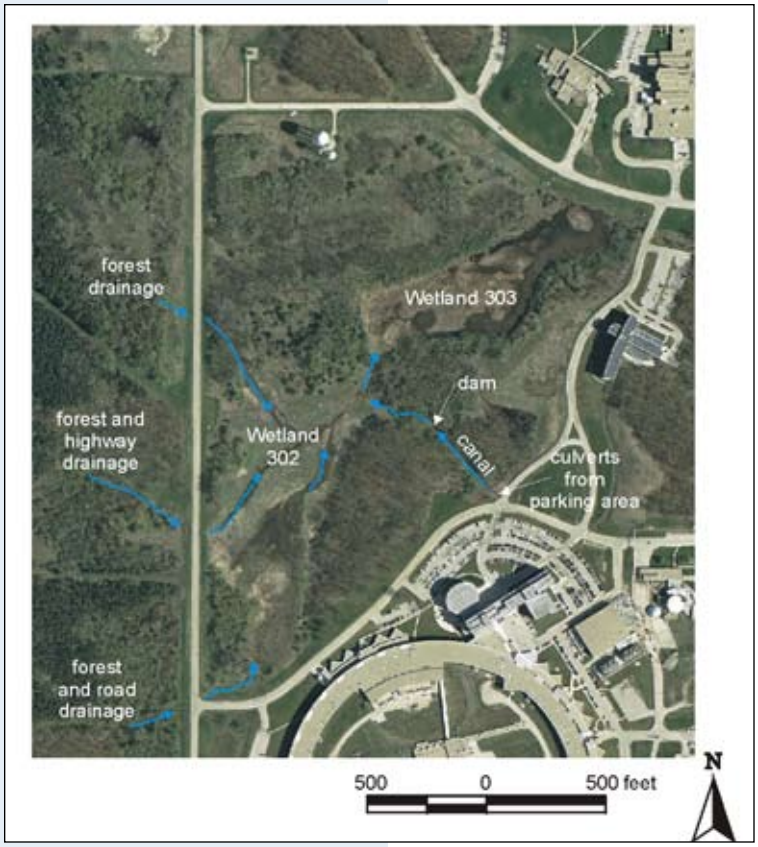

Photo 1: Wetland 302 and vicinity.

water samples, the importance of continuously changing conductivity and associated concentrations has been recognized (Granato and Smith 1999, Ostendorf et al. 2001).

While the dissolved concentration of road salt in a drainage system is expected to vary throughout the year, short-term pulses of high chloride concentrations in water are an important concern for wetland biota (Ramakrishna and Viraraghavan 2005, Transportation Association of Canada 2003), especially during the growing season. These pulses may arise when snowmelt or precipitation causes dissolution and transport of road salt from the shoulders of roadways, along curbs, or within storm sewers. Chloride loading to a wetland, if high in concentration or of long duration, may result in changes to the wetland plant community (Transportation Association of Canada 2003).

Study Area and Methodology

At Argonne National Laboratory, Argonne, Illinois, a wetland referred to as Wetland 302 is in a watershed that receives runoff from a parking lot, a highway cloverleaf, and large natural areas (Photo 1). The wetland intermittently includes areas of shallow surface water, depending on prevailing weather conditions. Since the recent removal of agricultural drain tiles that drained the wetland, more water is generally present. The wetland's watershed includes a broad area with various land uses, yet it is small enough to be assessed by collecting data at key locations. Any surface flow from Wetland 302 travels north to another wetland and through a series of drainageways that ultimately flow into the Des Plaines River.

With a goal of improving the biodiversity and sustainability of the wetland, facility managers needed a means of assessing the wetland's exposure to road salt. From late 2005 to mid 2006, numerous measurements were taken with a water conductivity probe in open water, wetland pools, inlet ditches and culverts, and a large drainage canal that feeds the northern end of Wetland 302. This canal has a dam constructed of gabions (wire baskets containing large pieces of crushed stone) at its northern end that restricts flow. Water, normally 1-2 feet deep, is held in the canal. In addition to the

Photo 2: Probe suspended in canal near gabion dam.

conductivity measurements, eleven water samples were collected corresponding to a wide range of conductivity measurements and analyzed for chloride content.

To supplement the manual measurements, the measurement probe, which can be programmed to take periodic measurements, was suspended in surface water in several locations and set up to take hourly readings (Photo 2). The continuously recorded conductivity measurements tallied thousands of data points, providing a nearly complete understanding of the dynamics of the chloride concentration at several key locations in the study area. Interruptions in continuous data collection occurred because of extreme temperatures (the sensor cannot be used in freezing water conditions), use of the equipment elsewhere, and, in one instance, dead batteries.

This study relied on an In-Situ, Inc., probe equipped with a calibrated conductivity sensor (accurate to ±2 microSiemens per centimeter, or µS/cm), a water temperature sensor, and a water pressure sensor for measuring water level changes. It is designed to be suspended in a 2-inch monitoring well, but can be hand-held for use in surface water studies. The data-logging equipment can be programmed to take measurements at any frequency. Conductivity is recorded as actual conductivity, which is temperature dependent; afterward, the readings were converted to specific conductivity.

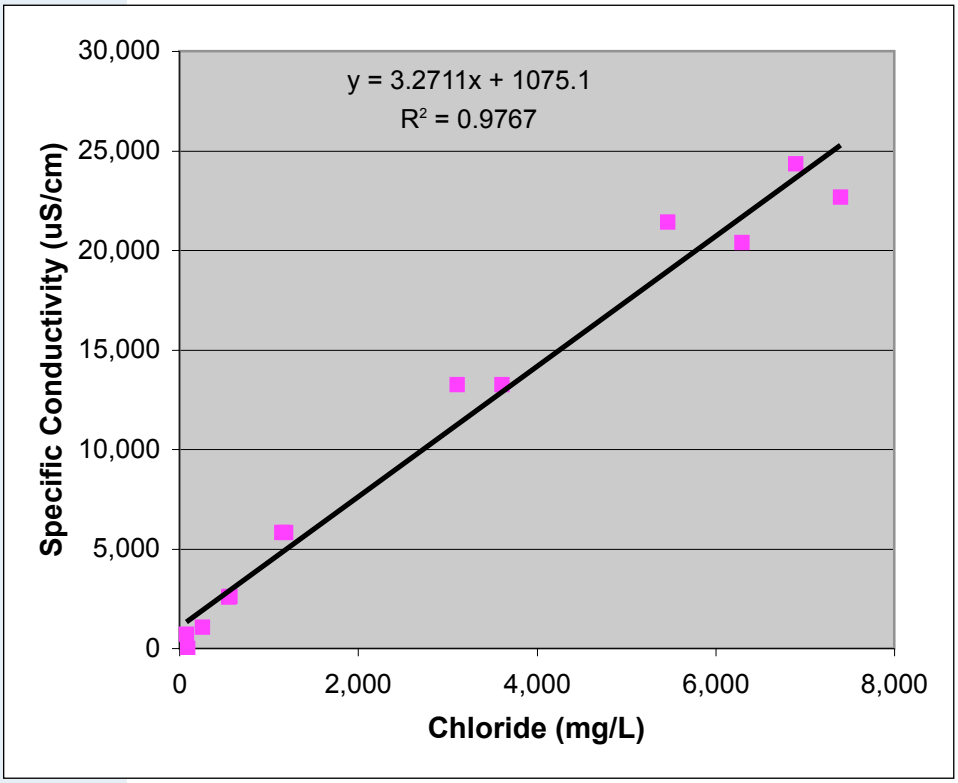

Figure 1: Linear relationship between chloride concentrations and conductivity.

Results

In Fall 2005, the wetland and its input drainages were dry due to drought conditions. In November 2005, rainfall produced surface water in most locations, and measurements were taken to provide background values for this study.

Water sampling demonstrated a strong linear relationship between chloride concentration and the corresponding conductivity measurement, allowing the manual or continuous conductivity measurements to substitute for more costly lab analyses for chloride (Figure 1).

With the onset of winter and salt use, conductivity and chloride values were high, with large, short-duration fluctuations. This is exhibited in continuous data from the dam at the drainage canal (Figure 2), with specific conductivity values ranging from 1,500 to nearly 9,000 µS/cm. This canal receives water and dissolved salt from a large nearby parking lot. Salting ended in late March, and overall conductivity values at the dam decreased through July, with occasional sudden decreases in response to rainfall events. From March to July, chloride concentrations decreased from 1,100 mg/L to 500 mg/L. These data, along with manual measurements taken throughout the wetland study area, suggest that

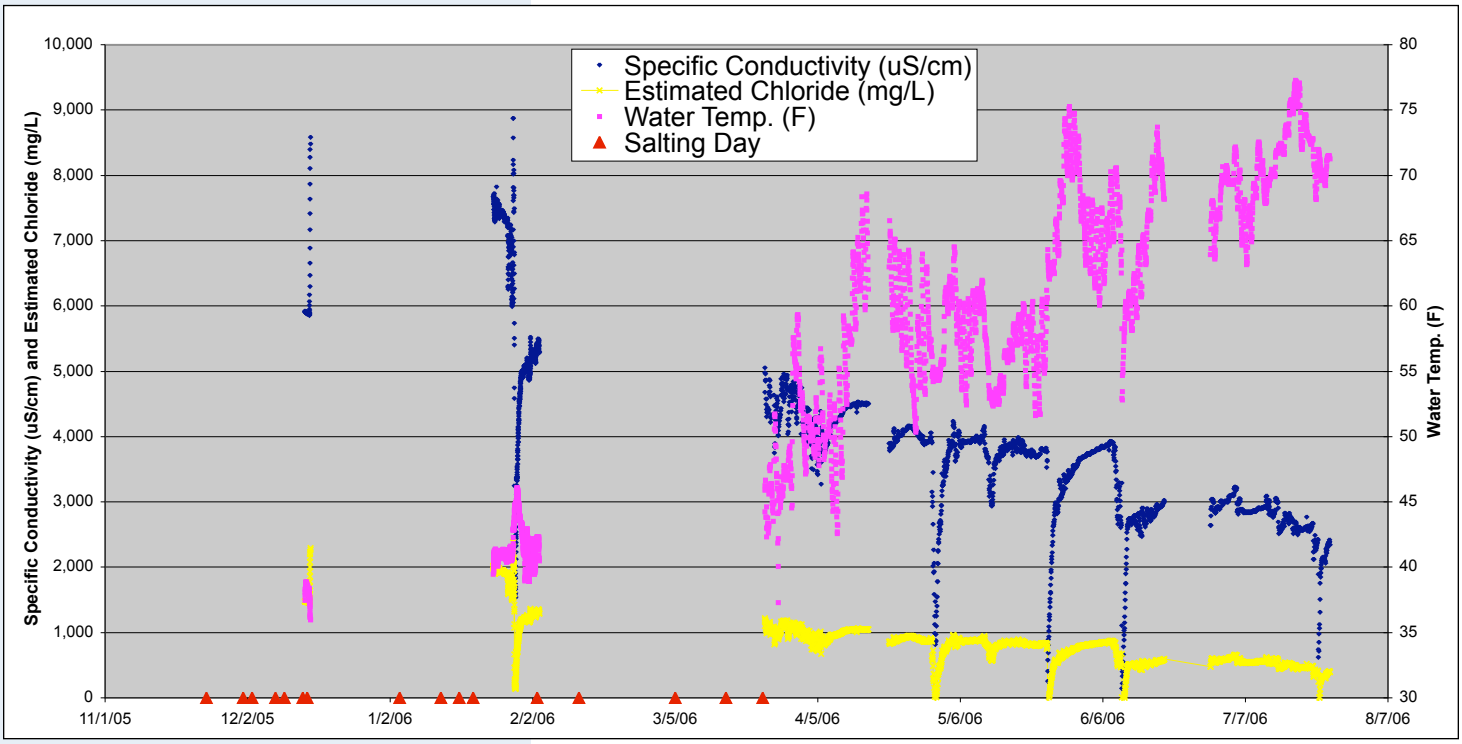

Figure 2: Data demonstrating that with the onset of winter and salt use, conductivity and chloride values were high, with large, short-duration fluctuations.

neither Wetland 302 nor the canal had flushed out the winter's road salt until late July; the residence time of the road salt is therefore approximately 9 months. In the central basin of the wetland, for example, specific conductivity was about 750 µS/cm in November, rising to as much as 2,800 µS/cm during the winter, and returning to background levels in July.

Continuous data were also collected over a short term at the twin culverts that convey runoff from the large parking lot to the canal. During a visit to take manual measurements in February, conductivity values at the culverts were as high as 35,000 µS/cm but were dropping rapidly (Figure 3). The manual and continuous measurements from a 2-day continuous recording at this location demonstrate the dynamics of the sudden decrease in conductivity. The chloride level was at least 10,000 mg/L, but was likely much higher prior to the field visit.

Lessons Learned and Implications

Field investigations at the wetland study area demonstrated the value of numerous, quick, and inexpensive water conductivity measurements for assessing the road salt load to the wetland. These measurements, when tied to chloride concentrations through a small number of lab-analyzed

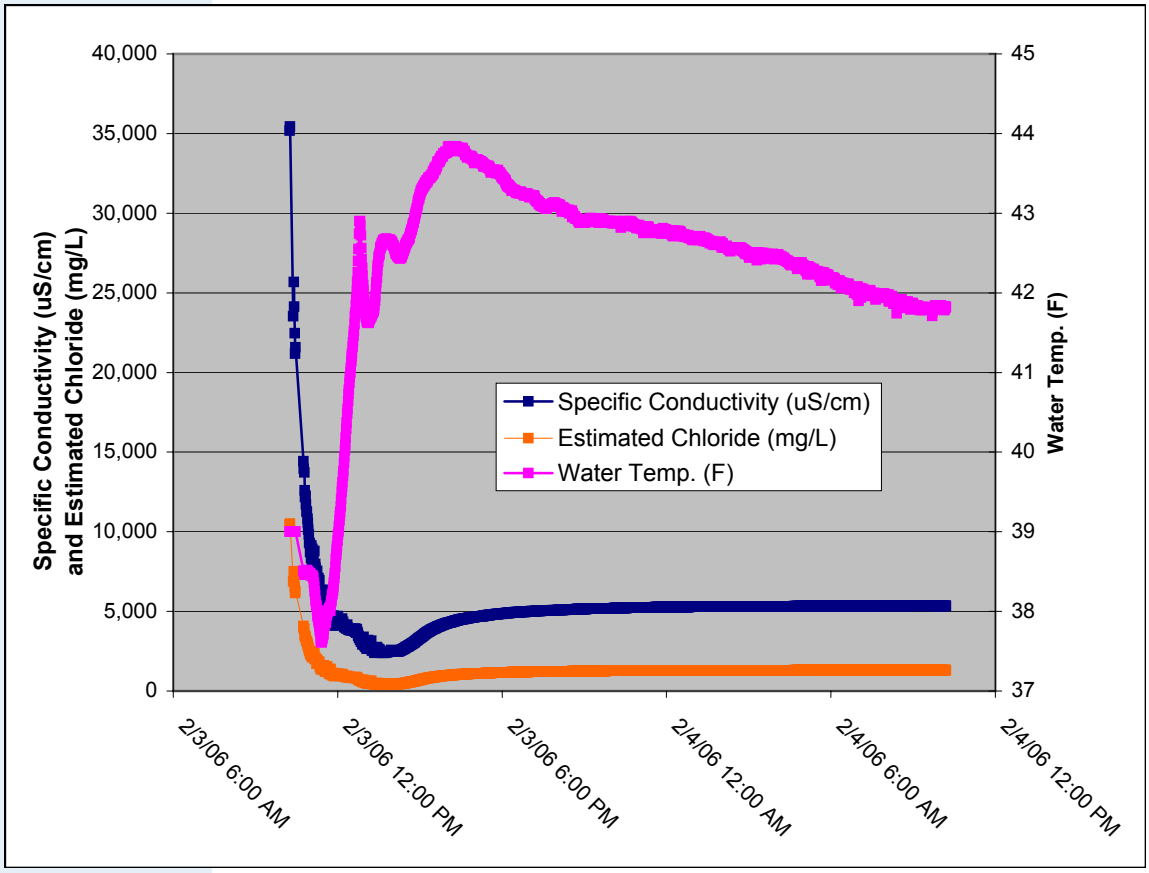

Figure 3. Rapidly declining conductivity measurements at the culvert from the parking lot.

samples, provide good estimates of chloride concentrations in the waters within and entering the wetland basin. However, the most significant finding of this study is that the chloride concentrations at individual measurement stations fluctuate wildly throughout the year, with large fluctuations during the salting season, and sudden, but brief, decreases resulting from winter, spring, or summer rain. These variations would not be observable with a traditional water sampling program, yet they may be significant in evaluating the environmental effects. The continuous data, along with numerous hand measurements taken throughout the study area, also indicate that winter salting has a prolonged effect on the chloride concentrations in the wetland, as chloride concentrations decreased during the spring and summer, yet remained above background levels until July.

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References
Granato, G.E., and K.P. Smith, 1999, *Estimating Concentrations of Road-Salt Constituents in Highway-Runoff from Measurements of Specific Conductance*, U.S. Geological Survey, Water Resources Investigation Report 99-4077.

Ostendorf, D.W., D.C. Peeling, T.J. Mitchell, and S.J. Pollock, 2001, "Chloride Persistence in a Deiced Access Road Drainage System", *Journal of Environmental Quality*, 30:1756-1770.

Panno, S.V., V.A. Nuzzo, K. Cartwright, B.R. Hensel, and I .G. Krapac, 1999, "Impact of Urban Development on the Chemical Composition of Ground Water in a Fen-Wetland Complex", *Wetlands*, 19(1):236-245.

Ramakrishna, D.M. and T. Viraraghavan, 2005, "Environmental Impact of Chemical Deicers – A Review", *Water, Air, and Soil Pollution*, 166:49-63.

Richburg, J.A., W.A. Patterson III, and F. Lowenstein, 2001, "Effects of Road Salt and Phragmites Australis Invasion on the Vegetation of a Western Massachusetts Calcareous Lake-Basin Fen", *Wetlands*, 21(2):247-255.

Transportation Association of Canada, 2003, "Drainage and Stormwater Management", in *Syntheses of Best Practices, Road Salt Management*, Chapter 4.

Wang, X., and Z.-Y. Yin, 1997, "Using GIS to Assess the Relationship Between Land Use and Water Quality at a Watershed Level", *Environment International*, 23(1)103-114.

Wilcox, D.A., 1986, "The Effects of Deicing Salts on Vegetation in Pinhook Bog, Indiana", *Canadian Journal of Botany*, 64:865-874.

Marlin Bowles and Michael Jones examine 26-year changes in Chicago region wetlands to assess the state of our wetlands.

Trends of Change in Composition and Structure of Chicago Region Wetland Vegetation

Marlin Bowles, The Morton Arboretum
Michael Jones, Christopher C. Burke Engineering

Summary
To understand long-term changes in Chicago region wetlands, in 2002 we investigated the status of 31 high quality grass- or sedge-dominated wetland plant communities that were originally sampled in 1976. Our objectives were to quantify vegetation changes over time by resampling transects and then correlating changes with site fire histories, as well as other factors linked with compositional and structural change. Three of the sites sampled in 1976 were destroyed. The 28 remaining sites included ten graminoid fens, ten sedge meadows, four calcareous floating mats, two marshes, a single calcareous seep and one graminoid bog. Analysis showed that 20 % or more fire frequency maintained species richness, but that most sites had less frequent burning, and the majority of these sites declined in species richness. Almost all communities underwent significant increases in alien and woody vegetation as well as invasion by narrow-leaved cattail, which also had a negative relationship with native species richness. Marshes and fens underwent the most significant declines. There was a 50% loss of species richness in marshes that was largely replaced by an increase in narrow-leaved cattail. In fens, woody vegetation increased in abundance while grasses and sedges declined, and compositional changes included replacement of characteristic species by more generalist wetland and alien species. Infrequent fire and altered environmental factors appear to be driving these changes. Applied research is needed to determine how combinations of fire management and control of other environmental factors can maintain high quality wetland vegetation.

Introduction

When natural processes that maintain plant communities are altered, their vegetation becomes vulnerable to loss of plant species, change in structure, or invasion of alien plants (Pickett & White 1985, Hobbs & Hunneke 1992). Chicago region wetlands may be particularly vulnerable, as they represent one extreme of a landscape moisture gradient in which vegetation is maintained by fire and is also dependent upon hydrology (Bowles & Jones 2004, Bowles & Jones 2006a). For example, midwestern fens and

Community	Grade (N)	xRn		Sn		NRI	
		Mean	Std. err.	Mean	Std. err.	Mean	Std. err.
Calcareous floating mat	A (4)	10.16	(+2.24)	30.75	(+6.35)	35.30	(+9.08)
Calcareous seep	A (1)	7.13	(+0)	41.00	(+0)	26.49	(+0)
Graminoid bog	A (1)	7.55	(+0)	26.00	(+0)	24.60	(+0)
Graminoid fen	A (8)	11.19	(+0.58)	40.88	(+2.19)	41.56	(+2.68)
	B (3)	10.52	(+1.91)	38.00	(+4.62)	38.57	(+8.18)
Marsh	A (2)	7.05	(+0.1)	29.00	(+9.00)	23.42	(+2.60)
	B (1)	6.13	(+0)	27.00	(+0)	20.21	(+0)
Sedge meadow	A (6)	6.67	(+0.51)	23.50	(+2.14)	21.13	(+2.07)
	B (5)	6.44	(+0.75)	26.80	(+2.37)	21.25	(+2.80)

Table 1: Mean (+ standard error) species richness indices for Grade A and B high quality wetland plant communities sampled by the Illinois Natural Areas Inventory in 1976. Sample sizes (N) are in parentheses. Grade B vegetation was not sampled for calcareous floating mat or calcareous seep.

sedge meadows appear to be fire-dependent, yet patterned by hydrology and chemical gradients, all of which can be modified by human impacts (Curtis 1959, Zimmerman 1983, Bowles et al. 1996, Bridgham et al. 1996, Bowles et al. 2005, Kost & De Steven 2000). As a result, understanding changes in wetland vegetation is critical for its conservation and management. In this paper we examine 26-year changes in Chicago region wetlands originally sampled by the Illinois Natural Areas Inventory (INAI) in 1976 (White 1978). The INAI data are valuable because they were collected from vegetation thought to be relatively undisturbed by human impacts. Our objectives were to resample original INAI transects in order to 1) determine the present condition of vegetation, 2) quantify vegetational changes by comparing the 1976 and current data sets, 3) correlate these changes with fire management histories and other factors, and 4) project vegetation trends and suggest management and research needs.

Methods

The INAI originally sampled 31 Chicago region wetland stands representing marsh, graminoid bog, graminoid fen, calcareous floating mat, sedge meadow and calcareous seep natural community types (Table 1). Community classification follows White & Madany (1978). Twenty-two of these sites were Grade A (essentially undisturbed) and the remainder Grade B (lightly disturbed). The INAI usually sampled Grade B vegetation when Grade A examples were not present within a natural area, resulting in fewer Grade B data sets. The data also represent samples of a larger number of INAI natural areas, not all of which were sampled. We relocated the study sites in 2002 using original INAI community and transect maps, and

re-sampled those that remained extant (Bowles & Jones 2003). Following INAI methods, all sites were sampled for species presence in 20 or 30 circular 1/4m2 plots placed randomly along transect lines (White 1978). Almost all of these sites were officially protected and managed, and fire-management histories were obtained from land managers.

We used species richness as a primary metric of vegetation change, as it is sensitive to effects of management and restoration (e.g., Korb et al. 2003, Bowles & Jones 2004, Bowles & Jones 2006b,). For each transect data set, we calculated the total number of native species sampled (Sn), the average number of native species sampled per plot (xRn), the Native Richness Index (NRI = Ln(Sn)*xRn), and an Alien Index (AI) of the proportion of alien species present. We used t-tests to determine whether xRn changed over time in each site. We used linear regression to determine the relationship between changes in species richness over time and how often sites had been burned, expressed as fire frequency. We calculated changes in relative abundance of invasive or alien species, primarily purple loosestrife (*Lythrum salicaria*) and buckthorns (*Rhamnus frangula* and *R. cathartica*), as well as the broadleaf cattail (*Typha latifolia*) and narrowleaf cattail (*T. angustifolia*), which may include their hybrid blue cattail (*T. x glauca*). Regression analysis was used to determine how species richness responded to change in Typha abundance. Nomenclature for scientific names follows Swink & Wilhelm (1994).

As a measure of vegetation structure we calculated a ratio of the relative abundance of woody to graminoid vegetation (Bowles & Jones 2004). Repeated analysis of variance was used to determine whether this variable changed over time. PC-ORD software (McCune and Mefford 1999) was used to conduct three multivariate tests. To assess compositional changes at the community level, we calculated the average proportional similarity across all sites within calcareous floating mat, graminoid fen and sedge meadow community types using the method of Bray and Curtis (1957) and compared the average values over time. Multi-response permutation procedures (MRPP) was used to test significance of this change (e.g. Zimmerman et al. 1985). Indicator species analysis (Dufrene & Legendre 1997) was used to determine whether different indicator species were associated with graminoid fen in 1976 and in 2002, as this community changed significantly in composition over time.

Results and Discussion

In 1976, species richness varied across communities, with greater values in graminoid fens and calcareous floating mats (Table 1). The most abundant species occurred across multiple vegetation types, tending to be dominant in single communities and less frequent elsewhere. Few characteristic or indicator species were encountered, possibly because they were too infrequent to be sampled with consistency (Bowles and Jones 2006a). The most frequent graminoid species in each wetland community were distributed as follows. Calcareous seep: hair beak rush (*Rhynchospora capillacea*) and wicket spike rush (*Eleocharis rostellata*); graminoid fen: marsh wild timothy (*Muhlenbergia glomerata*), big blue stem (*Andropogon gerardii*), dioeciuos sedge (*Carex sterilis*); sedge meadow: common tussock sedge (*Carex stricta*); calcareous floating mat: blue joint grass (*Calamagrostis canadensis*), narrow-leaved wooly sedge (*Carex lasiocarpa*); marsh: common lake sedge (*Carex lacustris*), broadleaf cattail; graminoid bog: narrow-leaved cottongrass (*Eriophorum angustifolium*).

Table 2: Indicator species (P < 0.10) in 1976 and 2002 for graminoid fen vegetation. Probabilities are based on 1000 permutations of the original data set in a Monte Carlo test (Dufrene & Legendre 1997). Asterisk (*) = alien species.

Species	Common name	Year	
Carex sterilis	dioecious sedge	1976	
Glyceria striata	fowl manna grass		2002
Dryopteris thelypteris	marsh fern		2002
Muhlenbergia glomerata	marsh wild timothy	1976	
Scirpus acutus	hard-stemed bulrush		2002
Panicum implicatum	old field panic grass		2002
**Rhamnus frangula*	glossy buckthorn		2002
Solidago ohioensis	Ohio goldenrod	1976	
Solidago riddellii	Riddell's goldenrod	1976	
Carex stricta	common tussock sedge		2002
Calamagrostis canadensis	blue joint grass		2002
Impatiens capensis	spotted touch-me-not		2002
**Rhamus catharitca*	common buckthorn		2002

"Chicago region wetlands are undergoing widespread undesirable changes in plant species composition and vegetation structure."

In 2002, we located and resampled 90% of the original INAI wetland sites. Only single graminoid fen, marsh, and sedge meadow stands were destroyed. Significant positive or negative changes in plot species richness between 1976 and 2001 occurred in 54% of all sites, with about 29% increasing in species richness and 25% decreasing in richness (Bowles & Jones 2003). Half of the sedge meadows increased in species richness, while only one decreased. Three graminoid fens increased in richness, while four decreased. One calcareous floating mat increased in richness while one declined. Both marshes and the graminoid bog declined in richness, while the calcareous seep remained stable.

Change in species richness appears to be regulated in part by the frequency at which wetland sites are burned (Figure 1). Our analysis suggests that a 20% fire frequency (four burns over a 20-year period) is needed to maintain species richness in Grade A wetlands. Regression also suggests that more frequent burning increases species richness in Grade B wetlands, which would indicate that management can improve their quality. However, the slope was not significant, possibly because too few sites were available for resampling. Fire management records indicated that only one-third of the Grade A sites had 20% or greater fire frequency. As a result, more Grade A sites decreased than increased in richness. Mesic and wet mesic prairies also appear to require 20% fire frequency for maintenance of species richness (Bowles & Jones 2004). Similar responses in wetlands and prairies suggest that fire has an equally important role in maintaining species richness in both habitats.

In 1976, alien species were rarely encountered in transects; however, by 2002, alien species were rarely absent from transects, and their proportional abundance increased significantly over time in calcareous floating mat, graminoid fen and sedge meadow (Repeated ANOVA: Year $F = 20.25$, $P < 0.001$). This primarily was due to increases of purple loosestrife and buckthorns. This increase appeared to have no relationship with change in native species richness. This may be due in part to introduction of leaf

eating beetles that can effectively reduce purple loosestrife flowering, leaf area and stem height, so that native species co-exist with it, a process we observed at several sites. The broadleaf and narrowleaf cattails also increased significantly (Figure 2). Moreover, there was also a significant negative relationship between increasing abundance of narrowleaf cattails and plot richness of native species across all communities (Figure 3). This process appears to be most advanced in marshes, which lost more that 50 % of their species richness between 1976 and 2002 (Bowles & Jones 2003).

The ratio of woody to graminoid vegetation increased significantly over time, with a comparatively large increase within graminoid fens and a lesser increase within sedge meadows (Figure 4). This difference occurred because graminoid fens underwent an increase in woody vegetation abundance as well as a decline in graminoid abundance, while sedge meadows only increased in woody abundance. The single graminoid bog also underwent an increase in woody vegetation. There was a significant temporal shift in composition of graminoid fen vegetation shown by a low mean proportional similarity between 1976 and 2002 (mean = 40 %, MRPP: $t = -4.0342$, $P < 0.0001$). In association with this shift, there were different indicator species in 1976 and 2002 (Table 2). These changes in indicator species indicate lower importance of formerly dominant or characteristic species, such as dioeciuos sedge (*Carex sterilis*) and Ohio goldenrod (Solidago ohioensis), and greater importance of aliens and generalist species that occupy a wide range of community types. The decline of dioeciuos sedge could be directly related to the lack of fire, as this small stature sedge is easily covered by unburned litter from the previous growing season. However, individual species responses may differ, as Ohio goldenrod also declined under high fire frequencies used to restore graminoid vegetation at Bluff Springs Fen (Bowles et al. 1996).

Conclusions

Chicago region wetlands are undergoing widespread undesirable changes in plant species composition and vegetation structure. Calcareous floating mats have increased in alien species and cattails, but have not changed significantly in species composition. While only two marshes were re-sampled, both have undergone large-scale invasion by cattail and almost a complete collapse of species composition. The authors observed a single graminoid bog habitat that underwent an increase in woody vegetation and is threatened by cattail invasion from adjacent wetlands. Graminoid fens and sedge meadows have increased in alien species, cattails, and woody vegetation, and fens have undergone shifts in composition and indicator species. If these trends continue, there will be increasingly less resemblance between the high quality examples of wetlands found in 1976 and those that survive in the future.

The causes of these changes may be complex and interrelated, involving both environmental factors as well as successional change. Few long-term studies have projected fire frequencies needed to maintain wetlands. However, these results are similar to changes occurring in prairie communities that receive low fire frequencies (Bowles and Jones 2004). Continued monitoring and experimental management will be needed to test our projection that a 20% fire frequency is needed to maintain plot-scale species richness across all wetland vegetation types. This relationship could differ among community types, and may be stronger in graminoid fen and sedge meadow because they have a greater component of species that also occur in prairie (Moran 1981, Bowles et al. 1996, Bowles et al. 2005). The increase in woody vegetation

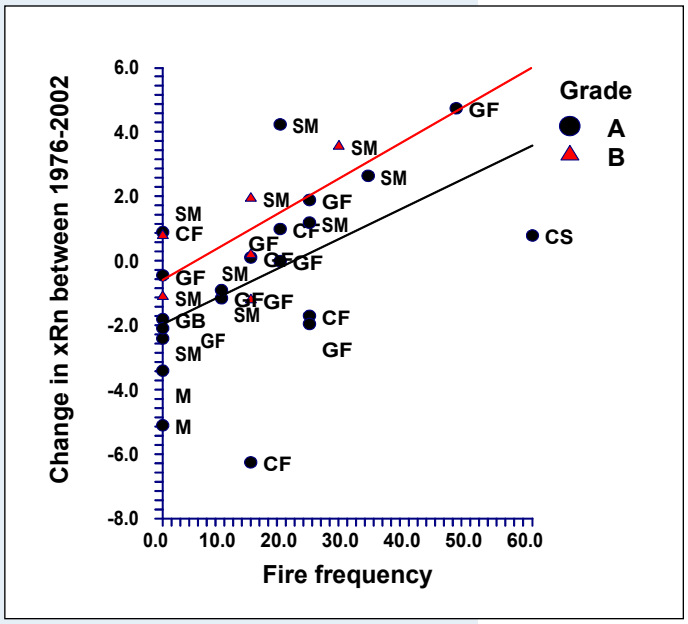

Figure 1: Positive relationships between percent fire frequency and temporal change in plot richness of native species for Grade A (r2 = 0.3076, P = 0.009) and Grade B (r2 = 0.4707, P = 0.089) wetland vegetation. CF = calcareous floating mat, CS = calcareous seep, GB = graminoid bog, GF = graminoid fen, M = marsh, SM = sedge meadow.

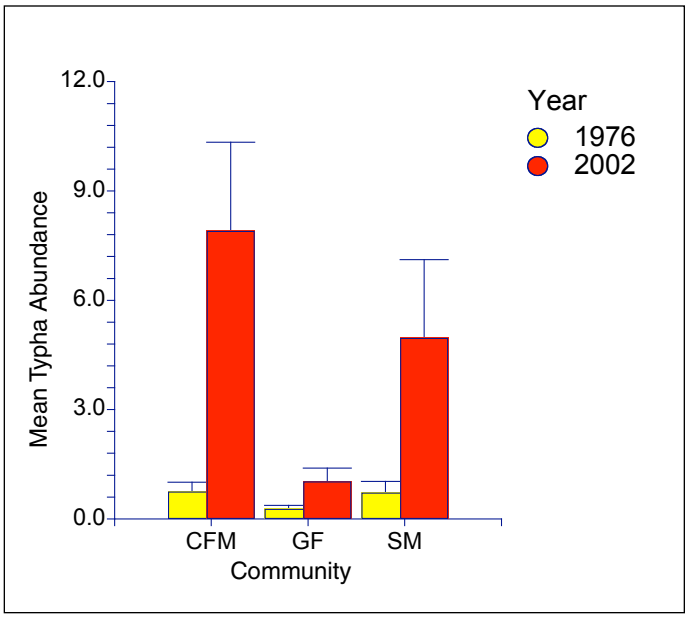

Figure 2: Temporal increase in abundance of Typha latifolia and T. angustifolia in calcareous floating mat (CFM), graminoid fen (GF) and sedge meadow (SM). Repeated ANOVA with pooled species: Year F = 15.57, P < 0.001).

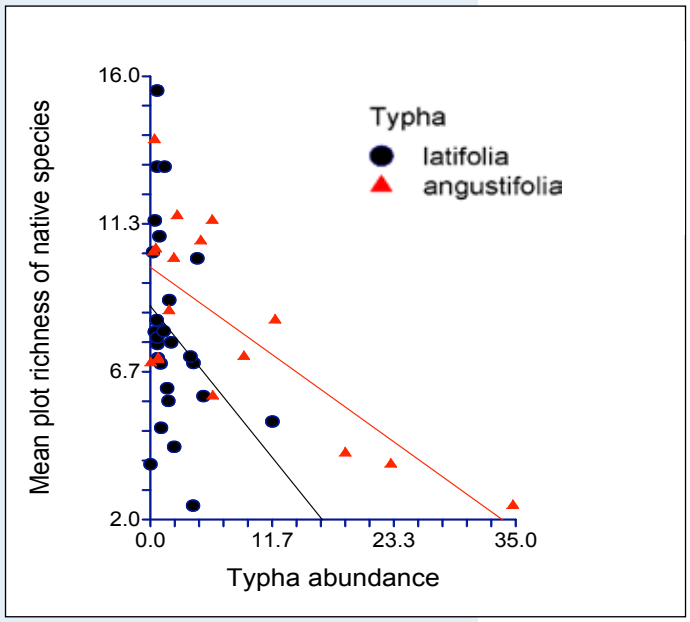

Figure 3: Negative effect of the relative abundance of T. latifolia (r2 = 0.106, P = 0.091) and T. angusitfolia (r2 = 0.540, P = < 0.001) on plot richness of native species (xRn).

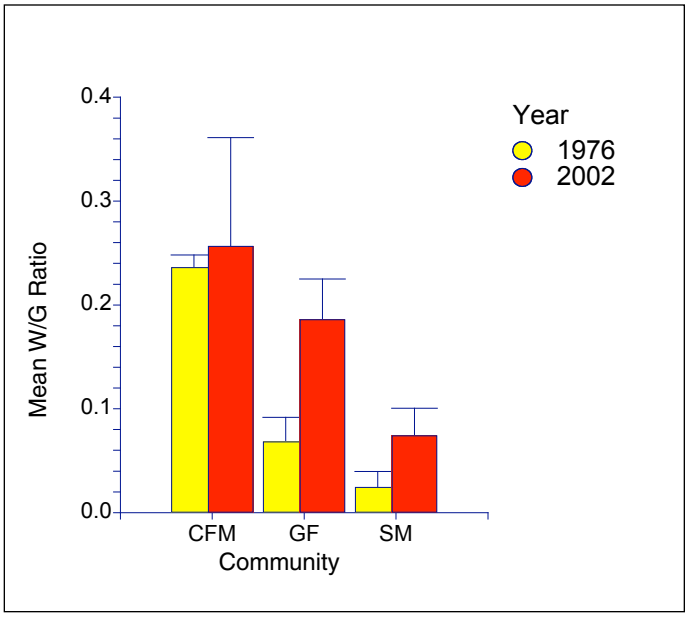

Figure 4: Temporal increase in the mean ratio (W/G) of woody to graminoid species in calcareous floating mat (CFM), graminoid fen (GF) and sedge meadow (SM). Repeated ANOVA: Year F = 9.64, P = 0.001.

relative to graminoid vegetation in these habitats indicates a reduction of the fine fuel matrix, which will reduce the effectiveness of fire in structuring vegetation a critical process in fire-dependent graminoid fens (Bowles et al. 1996). For example, Bowles et al. (1996) found that a 70% burn frequency recovered fen vegetation by increasing graminoid importance relative to woody and forb vegetation. In Wisconsin sedge meadows, Kost & De Steven (2000) found that fire increased living biomass and maximized diversity among species with different life-histories, but recommended fire rotations to allow replenishment of seed banks. Increasing invasive species can have a great degree of impact because they can alter vegetation structure by increasing vegetative biomass, thereby altering species composition and reducing species richness. Once established, many of these species also appear to be insensitive to fire, and may reduce the effectiveness of fire in structuring vegetation and maintaining species richness. They also may have the capacity to alter soil nutrient cycling processes, possibly in a feedback process (Ehrenfeld 2003, Heneghan et al. 2004).

Altered hydrology and increasing pollution and eutrophication are linked with wetland vegetation deterioration and increasing invasive species, including both, narrowleaf cattails and blue cattail (e.g. Wilcox et al. 1985, Galatowitsch et al. 1999, Panno et al. 1999, Keddy 2000, Woo & Zedler 2002, Werner & Zedler 2002, Rickey & Anderson 2004, Miklovic & Galatowitsch 2005). All of these factors appear to be so widespread in the Chicago region that few wetlands have escaped their impacts (J. Miner, Illinois State Geological Survey, pers. comm.). Particularly disruptive effects result from destabilized surface water and groundwater extraction, sodium and chlorine release from septic fields and road salt, excessive herbicide use, and fertilizer runoff. Increasing regional nitrogen (Hey 2002) and phosphorus levels also may be critical, as they limit native plant growth in wetlands (Verhoeven et al. 1996). For example, increased nitrogen and phosphorus levels stimulate growth of broadleaf cattail (Svengsouk and Mitsch 2001), and narrowleaf cattail becomes a superior competitor to broadleaf cattail under eutrophic conditions (Weisner 1993). Unless environmental factors contributing to the increase of alien and invasive plant species in wetlands can be understood and controlled, fire management may be ineffective in maintaining species composition and structure in graminoid wetland vegetation. One approach used to avoid eutrophication in European wetlands is the annual summer harvest of nitrogen- and phosphorus-rich hay (Verhoeven et al. 1996). This harvest technique was formerly used in Wisconsin fens (Curtis 1959) and might be applied experimentally to appropriate Chicago region wetlands.

Acknowledgments
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References

Bowles, M., L. McBride, N. Stoynoff and K. Johnson. 1996. Temporal change in vegetation structure in a fire-managed prairie fen. *Natural Areas Journal*., 16:275-288.

Bowles, M. and M. Jones. 2003. Twenty-five year trends of change in prairie and wetland natural areas in the Chicago region of northeastern Illinois. *Report to the Illinois Department of Natural Resources and Chicago Wilderness. The Morton Arboretum*, Lisle, Ill.

Bowles, M. and M. Jones. 2004. Long term changes in Chicago region prairie vegetation in relation to fire management. *Chicago Wilderness Journal* 2(2)7-16.

Bowles, M.L., P.D. Kelsey and J.L. McBride. 2005. Relationships among environmental factors, vegetation zones, and species richness in a North American calcareous prairie fen. *Wetlands* 25(3):685-697.

Bowles, M. and M. Jones. 2006a. The prairie-wetland continuum in the Chicago region of northeastern Illinois. *Proceedings of the 19th North American Prairie Conference*. D. Egan & J. Harrington, editors. Madison, Wisc. USA.

Bowles, M. and M. Jones. 2006b. Testing the efficacy of species richness and floristic quality assessment of quality, temporal change and fire effects in tallgrass prairie natural areas. *Natural Areas Journal* 26:17-30.

Bray, J.R. and J. Curtis. 1957. An ordination of the upland forest communities of southern Wisconsin. *Ecological Monographs* 27:325-334, 337-349.

Bridgham, S.D, J. Pastor, J.A. Janssens, C. Chapin and T.J. Malterer. 1996. Multiple limiting gradients in peatlands: a call for a new paradigm. *Wetlands* 16:45-65.

Curtis, J. 1959. *Vegetation of Wisconsin*. University of Wisconsin Press, Madison.

Dufrene, M and P. Legendre. 1997. Species assemblages and indicator species: the need for a flexible asymmetrical approach. *Ecological Monographs* 67:345-366

Ehrenfeld, J.G. 2003. Effects of exotic plant invasions on soil nutrient cycling processes. *Ecosystems* 6:503-523.

Galatowitsch, S.M., N.O. Anderson and P.D. Ascher. 1999. Invasiveness in wetland plants in temperate North America. *Wetlands* 19:733-755

Heneghan, L., C. Rauschenberg, F. Fatemi, and M. Workman. 2004. European buckthorn (Rhamnus cathartica) and its effects on some ecosystem properties in an urban woodland. *Ecological Restoration* 22:275-280

Hey; D.L. 2002. Nitrogen farming: harvesting a different crop. *Restoration Ecology* 10:1-01.

Hobbs, R.J. and L.F. Huenneke. 1992. Disturbance, diversity, and invasion: implications for conservation. *Conservation Biology* 6:324-337.

Keddy, P. A. 2000. *Wetland Ecology Principles and Conservation*. Cambridge University Press, Cambridge, U. K.

Korb. J.E., W.W. Covington and P.Z. Fule. 2003. Sampling techniques influence understory plant trajectories after restoration: an example from ponderosa pine restoration. *Restoration Ecology* 11:504-515.

Kost, M.A. and D. De Steven. 2000. Plant community responses to prescribed burning in Wisconsin sedge meadows. *Natural Areas Journal* 20:36-45.

McCune, B. and M.J. Mefford. 1999. PC-ORD. Multivariate Analysis of Ecological Data, Version 4. MjM software Design, Gleneden Beach, Oregon.

Miklovic, A. and S.M. Galatowitsch. 2005. Effect of NaCl and Typha angustifolia L. on marsh community establishment: a greenhouse study. *Wetlands* 25:420-429.

Moran, R. 1981. Prairie fens in northeastern Illinois: Floristic composition and disturbance. Pages 164-168 in (R.L. Stuckey & K.J. Reese, eds.) *Proceedings of the Sixth North American Prairie conference*, Ohio Biological Survey Biological Notes No. 15. College of Biological Sciences, The Ohio State University, Columbus.

Panno, S.V., V.A. Nuzzo, K. Cartwright, B. R. Hensel, and I. G. Krapac. 1999. Impact of urban development on the chemical composition of ground water in a fen-wetland complex. *Wetlands* 19:236-245.

Pickett, S.T.A. and P.S. White. 1985. *The Ecology of Natural Disturbance and Patch Dynamics*. Academic Press, Orlando Florida.

Rickey, M.A. and R.C. Anderson. Effects of nitrogen addition on the invasive grass Phragmites australisi and a native competitor Sparitna pectinaa *Journal of Applied Ecology* 41:888-896.

Svengsouk, L.J. and W.M. Mitsch. 2001. Dynamics of mixtures of Typha latifolia and Schoenoplectus tabernaemontani in nutient-enrichment wetland experiments. *American Midland Naturalist* 145:309-324.

Swink, F. and G. Wilhelm 1994. *Plants of the Chicago Region*. Indiana Academy of Science, Indianapolis. 921 p.

Weisner, S.E.B. 1993. Long-term competitive displacement of Typha latifolia by Typha angustifolia in a eutrophic lake. *Oecologia* 94:451-456.

Verhoeven, J. T. A., W. Koerselman and A. F. M. Muelman. 1996. Nitrogen-or phosphorous-limited growth in herbaceous, wet vegetation: relations with atmospheric inputs and management regimes. *Trends in Ecology & Evolution* 11:494-497.

White, J. 1978. Illinois natural areas inventory technical report. Volume I: Survey methods and results Department of Landscape Architecture, University of Illinois, Urbana-Champaign, and Natural Land Institute, Rockford, Illinois. 426 p.

White. J. and M.H. Madany. 1978 Classification of natural communities in Illinois Pages 309-405 in (J.White, ed.) Illinois Natural Areas Inventory Technical Report. Volume 1. Survey Methods and Results. Illinois Natural Areas Inventory, Urbana, Illinois.

Wilcox, D.A., S.I. Apfelfaum and R.D Hiebert. 1985. Cattail invasion of sedge meadows following hydrological disturbance in the Cowles Bog wetland complex, Indiana Dunes National Lakeshore. Wetlands 4:115-128.

Werner, K.J. and J.B. Zedler. 2002. How sedge meadow soils, microtophrography, and vegetation respond to sedimentation. *Wetlands* 22:451-466.

Woo, I. and J.B. Zedler. 2002. Can nutrients alone shift a sedge meadow towards dominance by the invasive Typha x glauca? *Wetlands* 22:509-521.

Zimmerman, G.D, H. Goetz and P.W. Mielke, Jr. 1985. Use of an improved statistical method for group comparisons to study effects of prairie fire. *Ecology* 66:606-611.

Zimmerman, J.H. 1983. The revegetation of a small Yahara Valley prairie fen. Wisconsin Academy of Science, Arts & Letters 71(2):87-102.

Illinois is known as the Prairie State, yet what is the quality of our remaining grasslands? Karen Glennemeier provides insight into the state of our grasslands.

The State of our Grasslands: Results from the Chicago Wilderness Grassland Audit

Karen Glennemeier
Audubon-Chicago Region

Abstract
In 2005, a team of 61 professional and volunteer plant monitors collected detailed vegetation data in 1,614 quadrats, at 84 randomly-selected locations within the protected grasslands of six Chicago Wilderness counties. The data tell us that the current state of our grasslands is poor, although there is potential for much improvement. Twenty-eight percent of the quadrats were rated as good or excellent, while 72% were rated as fair or poor, based on native mean Coefficient of Conservatism values. Evaluated on the basis of the Floristic Quality Index, only 10% of quadrats rated good or excellent, with 90% fair or poor. We can use these data to track our progress at grassland restoration, describe and prioritize threats for management, and estimate the costs of grassland restoration.

Introduction and Objectives

Prairies once covered much of the Chicago Wilderness region, as well as the Midwest landscape. But today, less than one one-hundredth of one percent (0.01%) of original Illinois prairie remains in "Grade B or A" quality according to the Illinois Natural Areas Inventory (White 1978). In addition to original high quality remnants, the CW region has many grasslands that have been preserved as natural land but that are in varying degrees of degradation. Many grasslands are former agricultural lands (which themselves are former prairies) that have gone fallow and, in some cases, provide habitat for declining grassland birds, reptiles, amphibians, and other wildlife. Some of this fallow acreage is being restored to natural prairie. Other grassland sites are degraded prairies that have become overgrown with woody and herbaceous invasives and have lost much of their original biodiversity. The main threats to these and other natural grasslands are fire absence, habitat fragmentation, loss of major predators (leading to overpopulation of white-tailed deer), and encroachment of invasive species.

The *Biodiversity Recovery Plan* (Chicago Region Biodiversity Council 1999) prioritized the natural communities of Chicago Wilderness (CW) in terms of their global and regional significance, and the degree to which they are losing native biodiversity. The *Recovery Plan* placed the highest conservation priority on the region's prairies. The CW region contains some of the best remaining examples of original prairie in the world, making

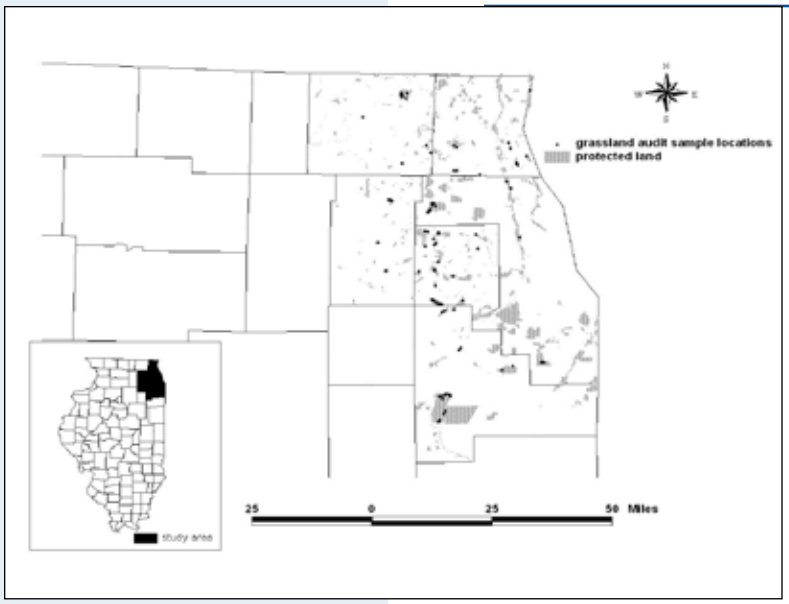

Figure 1: Grassland Audit sample locations.

prairie conservation in our region a globally significant endeavor.

The *Recovery Plan* outlined a vision for recovery of the prairies. This vision included viable populations of all prairie species and prairie types (fine-textured, sand, gravel, and dolomite) and the maintenance of ecological integrity through the return of landscape-scale processes such as fire, hydrology, and gene flow.

To begin tracking our progress toward this vision, we needed to first assess the current state of CW prairies and grasslands. The *State of Our Chicago Wilderness: A Report Card on the Health of the Region's Ecosystems*, released in 2006, found little data to document the current state of prairies. The 2003 CW Woods Audit provided the Report Card's only quantitative data on the region-wide status of upland wooded lands. The Grassland Audit was intended to provide similar, quantitative data on the state of CW prairies. It was the first region-wide assessment of these ecosystems in Chicago Wilderness. Its objective was to provide scientifically sound and statistically rigorous data to tell us (1) the state of CW grasslands, and (2) the nature and extent of threats to grassland biodiversity. We included fallow agricultural fields, degraded prairies, and any other protected grasslands in our study because much of the land that is restorable to prairie is currently in one or more of these degraded states.

One important limitation of the Grassland Audit is that we only sampled vegetation, so our quality assessment is based purely on floristic data. However, grasslands that are poor in plant biodiversity can be important to animal biodiversity, especially for birds and reptiles. The ideal quality assessment system would consider both animals and plants. Given the logistical challenges to such an approach, we began with the more practical task of assessing the vegetative quality of CW's protected grasslands. Separate studies have examined the region-wide status of grassland birds . Another ongoing study is examining the characteristics of native vegetation in areas of high grassland bird diversity in an attempt to improve our understanding of how to restore prairies for both plants and birds. Data from this study are currently being analyzed, and a report should be available next year.

Methods

We randomly established sample locations (Figure 1), based on the sample universe of prairie and 'unassociated grassy'

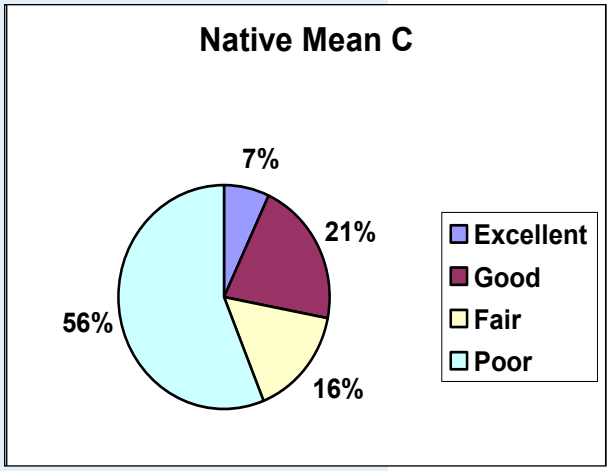

Figure 2: Quality of Grassland Audit quadrats, based on the Mean Coefficient of Conservatism (Mean C) for native species. Plots classified as 'excellent' were defined as having a quadrat Mean C > 4.5. 'Good' quadrat Mean C was 2.5 - 4.5, 'fair' quadrat Mean C was 1.5 – 2.5, and 'poor' quadrat Mean C was < 1.5. This scale was based on the parameters developed by Wayne Lampa and Gerould Wilhelm for DuPage County.

habitat identified in the 1997 CW/NASA land cover dataset (Wang and Moskovits 2001). We refer to the sample universe as the 'grasslands' of CW, to reflect the inclusion of degraded grasslands as well as remnant and restored prairies. The number of points in each county was proportionate to that county's acreage of grasslands.

In July and August 2005, 61 volunteer and professional plant monitors collected data at 84 randomly located transects in six CW counties. Monitors walked a 100-m transect and collected data at twenty $^1/_4$ m^2 quadrats along the transect. From the start point, monitors walked five meters in the direction of the transect and then drew a random number from a bag, indicating the number of meters (from 0 to 5) to walk to the right or left of the transect line, where they placed a quadrat frame. Moving off of the transect line provided better dispersion and greater independence among quadrat samples. Within each quadrat, monitors identified all plant species, estimated the percent cover of all herbaceous plants and all woody plants less than one meter tall, and estimated percent bare ground. The total number of quadrats was 1,614 (For some transects, not all 20 quadrats could be sampled due to physical barriers or to changing habitat—for example, from grassland into mowed lawn).

Using mean Coefficient of Conservatism value (Mean C) to define quality, quadrats with Mean C > 4.5 were classified as 'excellent.' 'Good' quadrat Mean C was 2.5 - 4.5, 'fair' quadrat Mean C was 1.5 – 2.5, and 'poor' quadrat Mean C was < 1.5. The C-value is a number from 0 to 10 that has been assigned to each plant species found in Illinois. The native species that most typically occur in badly degraded habitats, along with all non-native species, have been assigned C-values of 0. At the other end of the spectrum, species found only in remnant natural areas have been given C-values of 10 (Taft et al. 1997). It is generally held that an area with high Mean C, even if currently degraded, has high conservation potential due to the continued presence of conservative species.

Using the Floristic Quality Index (FQI) to define quality, quadrats with FQI > 11 were classified as 'excellent.' 'Good' quadrat FQI was 8-11, 'fair' quadrat FQI was 4-7, and 'poor' quadrat FQI was < 4. The FQI combines Mean C with a measure of species diversity (Taft et al. 1997).

Additional quality analyses were performed by weighting Mean C and FQI by species' percent cover within quadrats. Next, woody species were assigned a C-value of zero, with the exception of the woody prairie species *Ceanothus americanus, Amorpha canescens, and Salix humilis.*

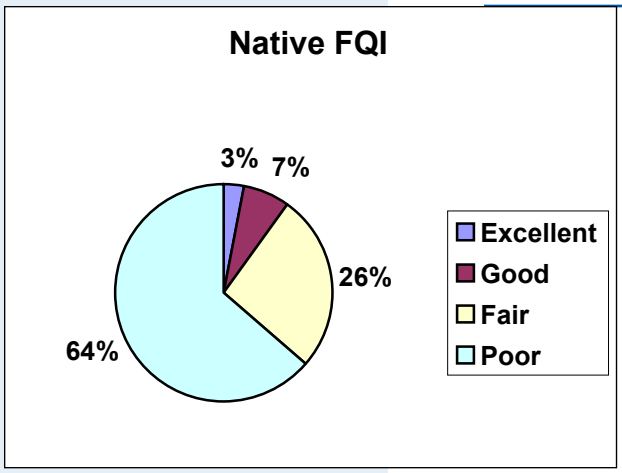

Figure 3: Quality of Grassland Audit quadrats, based on the Floristic Quality Index (FQI) for native species. Quadrats classified as 'excellent' were defined as having a quadrat FQI > 11. 'Good' quadrat FQI was 8-11, 'fair' quadrat FQI was 4-7, and 'poor' quadrat FQI was < 4. Scale was developed using data from the 1976 Illinois Natural Areas Inventory sampling of Grade A and Grade B prairies, provided by the Illinois DNR, Natural Heritage Database Program and Marlin Bowles of the Morton Arboretum.

Rank	Species	Sum of Cover	Percent of Total Cover
1.	*Solidago altissima*	13,167	9.7
2.	*Poa pratensis*	12,073	8.9
3.	*Bromus inermis*	11,273	8.3
4.	*Festuca elatior*	8,864	6.5
5.	*Phalaris arundinacea*	8,797	6.5
6.	*Poa compressa*	8,492	6.3
7.	*Daucus carota*	5,538	4.1
8.	*Solidago canadensis*	5,346	3.9
9.	*Cornus racemosa*	2,759	2.0
10.	*Andropogon gerardii*	2,724	2.0
11.	*Agrostis alba*	2,590	1.9
12.	*Rhamnus cathartica*	1,841	1.4
13.	*Solidago sp.*	1,832	1.4
14.	*Bromus japonicus*	1,745	1.3
15.	*Aster pilosus*	1,309	1.0
16.	*Cirsium arvense*	1,258	0.9
17.	*Melilotus alba*	1,242	0.9
18.	*Solidago nemoralis*	1,207	0.9
19.	*Dactylis glomerata*	1,191	0.9
20.	*Fragaria virginiana*	1,080	0.8

Table 1: Relative abundance of the twenty most abundant species. Sum of cover is the percent cover for that species within the _ m2 quadrat, summed for all 1,614 quadrats. Percent of total cover is the sum of cover for that species divided by the total cover for all species, all quadrats.

Results and Discussion

The condition of CW grasslands was generally fair or poor. When Mean C was considered, only 28% of quadrats ranked 'good' or 'excellent' (Figure 2). When species richness also was considered by looking at the Floristic Quality Index (FQI), this number decreased to 10% (Figure 3).

Twenty-eight percent of Grassland Audit quadrats ranked 'good' or 'excellent' according to Mean C, which suggests that, of approximately 58,000 total acres of grassland in Chicago Wilderness, we have 16,000 acres of prairie that have the potential to be high quality, because they have the species characteristic of high quality prairies. The remaining 42,000 acres can also be restored but will take more remedial efforts, including the seeding of native species.

The fact that grassland condition was poorer when looking at FQI compared to Mean C suggests that even where conservative species exist, overall species diversity is low. Thus, even the 16,000 acres of "high potential" grasslands will require sustained effort if we are to return them to high quality prairies.

When Mean C and FQI were weighted according to the abundance of each species within the quadrat, the overall assessment of CW grasslands did not change substantially compared to the unweighted Mean C and FQI assessments, respectively (Figure 4). When we assigned all invasive woody species a C-value of zero, on the basis that prairies are considered to have less than 10% tree cover and that these woody species are a threat to prairies (Chicago Region Biodiversity Council 1999), quality scores decreased somewhat although they remained in the same range as the original analysis. This result reflects that finding that woody species were present in 30% of Grassland Audit quadrats.

In addition to invasion by woody species, CW grasslands face other threats. For example, 13% of Grassland Audit quadrats contained reed canary grass (Phalaris arundinacea). Where reed canary grass was present, its average quadrat cover was 41%. Of the 20 most abundant species in CW grasslands, 13 were non-native, and six were species that require active control through restoration and management (Table 1). The most abundant species we found was tall goldenrod (Solidago altissima and S. canadensis).

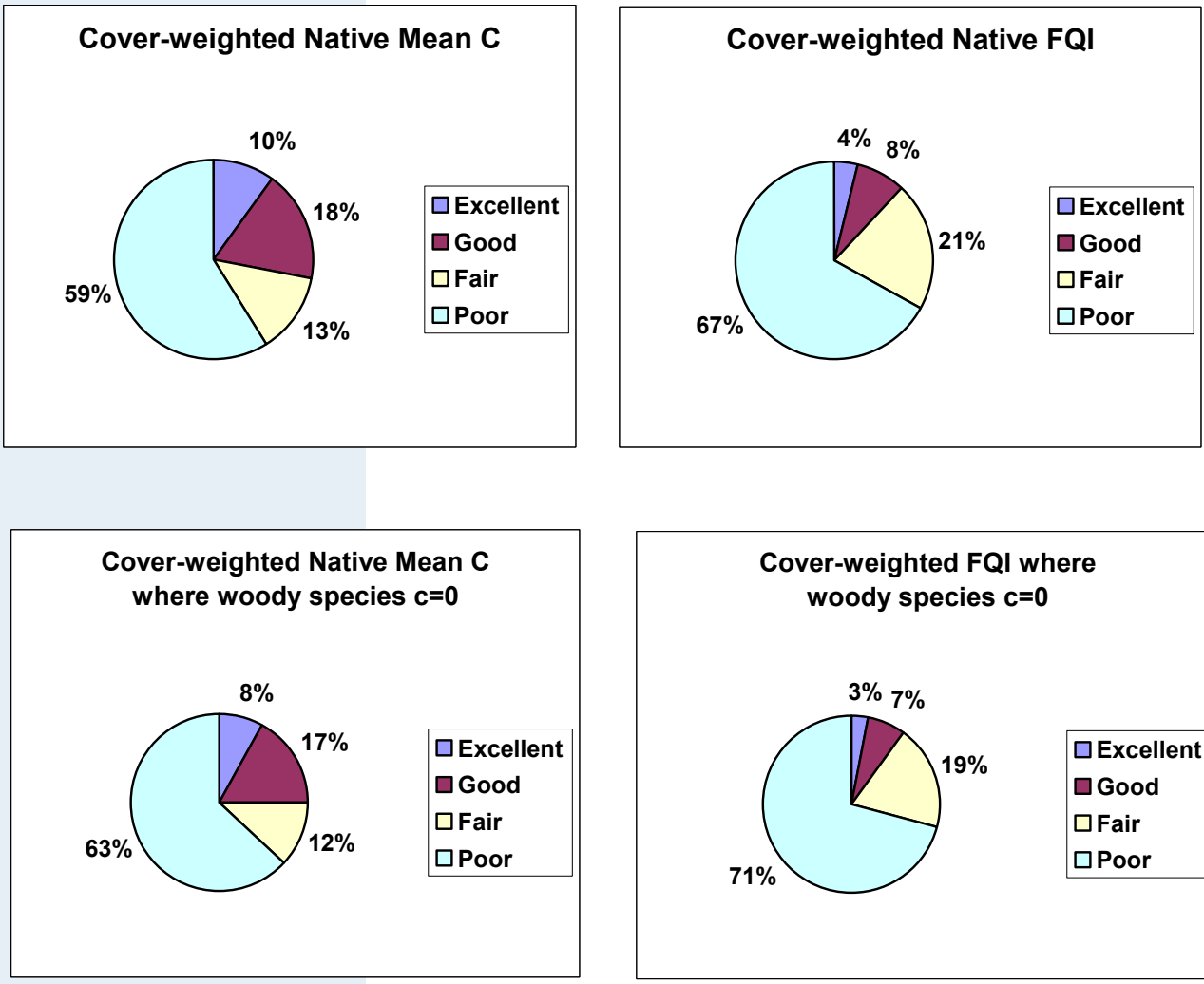

Figure 4: Quality of Grassland Audit quadrats when Mean C and FQI were weighted by species' percent cover within quadrats, and when woody species were assigned a C-value of zero (with the exception of the woody prairie species Ceanothus americanus, Amorpha canescens, and Salix humilis).

Conclusions

Quantification of the threats to CW grasslands allows us to allocate our restoration and management resources where they are most needed. It also allows us to track our progress over time as we address specific threats to these communities. The CW Grassland Audit, when repeated in future years, will allow us to track our overall progress at restoring our grasslands.

With these data, CW can pursue large scale funding to improve our ability to restore these lands. We also encourage Chicago Wilderness members to use the data to describe the problem to the citizenry and to public decision makers. We welcome suggestions for additional analyses, or requests for analyses that would speak especially strongly to a particular group of people. The data are readily available to all CW members.

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References

Chicago Region Biodiversity Council. 1999. Biodiversity Recovery Plan. Chicago Region Biodiversity Council, Chicago, IL.

Taft, J. B., G. S. Wilhelm, D. M. Ladd, and L. A. Masters. 1997. Floristic quality assessment for vegetation in Illinois, a method for assessing vegetation integrity. Erigenia 15:3-95.

Wang, Y. and D. K. Moskovits. 2001. Tracking Fragmentation of Natural Communities and Changes in Land Cover: Applications of Landsat Data for Conservation in an Urban Landscape (Chicago Wilderness). Conservation Biology 15:835-843.

White, J. 1978. Illinois Natural Areas Inventory Technical Report. Natural Areas Inventory, Urbana, Illinois.

Book Review

Cities in the Wilderness: A New Vision of Land Use in America

Bruce Babbit

Island Press, 2005

Reviewed by Catherine Bendowitz

As U.S. Secretary of the Interior from 1993 to 2001, Bruce Babbit participated in environmental battles that spanned the varied cultural and natural landscapes of our nation. In *Cities in the Wilderness*, published in 2005 as a response to his experiences, Babbit calls for a new constitution for public lands that "…subordinates (but does not eliminate) mining, grazing, and logging to an overriding public mandate for long-term biological diversity, abundant wildlife and fisheries, and the ecological integrity of our streams and watersheds." (p.10). Babbit argues that this new constitution, wherein the loss of landscape is prevented, hinges upon stronger federal leadership in land use planning (p.5), as well as new federal-state partnerships for managing and restoring our lands (p.45). This thesis is then supported throughout the book using several extensive examples whereby Babbit demonstrates how federal leadership and partnerships can successfully resolve natural resource management conflicts. At the core of Babbit's argument is the assertion that these environmental conflicts have arisen as a result of "…the absence of large-scale open space planning in the United States…" (p.70) and the conviction that "public lands should be administered primarily to maintain and restore their natural values" (p.178).

In reading and reflecting upon Babbit's analysis, I was struck by the prescience of the founders of Chicago Wilderness. In the early-1990s, our natural resource managers and volunteers already realized that the key to preserving and restoring our region's myriad resources was to bring all the region's stakeholders together, and integral to that effort was ensuring the cooperation of federal, state, county, and local municipalities. Citizens of this region realized then that land use planning is not a local matter, contrary to what Babbit claims is the pervasive mantra. Realizing that the key to conserving biodiversity lay in ecosystem management, the fledgling Chicago Wilderness shunned the idea of its work being constrained by jurisdictional boundaries and instead sought solutions at a broader, more inclusive level. The assertion that isolated remnants of original ecosystems cannot function alone

(p.17), now affirmed by Babbit more than a decade later, was a key concept of the visionaries that started Chicago Wilderness.

In his book, Babbit laments the lack of large-scale plans to maximize the value of open space (p.92) while hoping for a paradigm shift such that in the absence of consensus, land is protected rather than developed (p.89). Babbit idealizes cities, suggesting that they be thought of as "islands surrounded by a sea of open landscapes… [and that they] should be compact, self sustaining, with discernable outer boundaries..." (p.74). While striking me as a vision resonant of Thomas More's *Utopia*, the idea of establishing an urban growth boundary and showing such a boundary on a map has already been recognized, and acted upon, by Chicago Wilderness. Once again, Babbit's position is in harmony with CW's existing practices, as the consortium has already developed and adopted a green infrastructure vision for our region, with the intention that this vision guides future land use planning. Babbit recommends that cities use water allocation to shape and limit sprawl (p. 127), and that land use decisions would be better informed with increased scientific understanding of the needs of species (p.60). These recommendations have also already been acknowledged within the consortium, and several projects are underway to address these concerns.[1]

Reading Babbit's book provided me with an increased understanding of federal farm policy, increased knowledge of the legislation that influences the rhetoric used in public vs. private land use debates, and greater insight into the limitations of the Clean Water and Endangered Species Acts. However, I originally chose to read this book because of its title and because I wanted to learn what exactly Babbit saw as the new land use vision. What began as an interest in learning about new planning ideas became a journey of affirmation—that Chicago Wilderness truly is a model of cooperative conservation—for Babbit's self-proclaimed new vision is actually one that this consortium has already discovered, embraced, and implemented. In a call to the next generation, Babbit cites managing natural resource extraction and establishing a "stable configuration of lands that remain permanently in the public ownership" (p.159) as the most important tasks. In the Chicago Wilderness region, this work has already begun. Perhaps in a future writing, Babbit will include the lessons learned and achievements of this consortium as an example of a success story.

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[1]Additional project details are available on www.chicagowilderness.org, and in the article written by Mulvaney & Heringa in this issue of the CW Journal.

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 consortium-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 consortium 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). 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 Catherine Bendowitz at cbendowitz@chicagowilderness.org. Queries should include a thorough abstract of the intended topic. Articles and all accompanying graphic files should be submitted electronically to Catherine. Be sure to include the author's contact information. Submissions can also be saved on a disc and mailed to Catherine 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 Catherine Bendowitz at (312) 580-2137.

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) 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:

- Catherine Bendowitz, Chicago Wilderness
- Lori Heringa, Chicago Metropolitan Agency for Planning & Chicago Wilderness
- Lucy Hutcherson, Chicago Wilderness
- Kristopher Lah, U.S. Fish and Wildlife Service
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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 Catherine Bendowitz at cbendowitz@chicagowilderness.org.

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