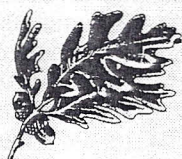
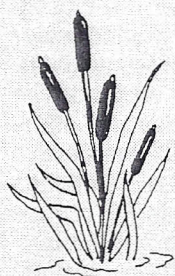


A new series for our *Illinois Audubon* readers.....

The Illinois Natural Areas Inventory has documented that our state is rich in natural diversity. (See the Winter 1999-2000 issue) It has often been said that Illinois is a meeting place of four of the United States' major ecological regions: the southern mixed pine and hardwood forests and swamps, the eastern deciduous forest, the tallgrass prairie, and the northern or boreal forest. Indeed, we have many natural communities specific to only one of these regions. But with 77% of the state in agriculture and another 12% covered with human development, many of these interesting natural areas are unknown to most Illinois residents. *Illinois Audubon* is doing a four year series to take a closer look at Illinois' natural communities as classified by the INAI. And when you finish reading the article, why not go and check out the communities in person? We are including a section on where to visit an example of the community(s) we've written about. (See the first in the series, dolomite prairies, in the Winter 99-2000 issue.)



Illinois' Natural Communities



FENS: More than "Peat with Calcareous Seepage..."

By Steven Byers

Photos by Steven Byers

Imagine bouncing across a bowl of jello, wading through a babbling brook that cools - even on the hottest summer days, finding a wetland perched on the side of the hill, or traversing a landscape festooned with orchids. These vignettes describe, in part, some of the surviving fen wetlands of northeastern Illinois.

WHAT IS A FEN ANYWAY?

A scientific description of fens, taken from the Illinois Natural Areas Inventory, describes them simply as "peat with calcareous seepage..." This definition, however, fails to describe the unique geological circumstances associated with the presence of fens, and does not address their ecological significance, or capture the interest or appreciation of citizens for these unique natural communities. Fens are wetlands whose unique assemblage of plants and animals are dependent upon an uninterrupted and unaltered flow of cold, highly mineralized water from the ground.

So where does this mineralized ground water come from? First, I may need to remind you that the landscape of Northeastern Illinois was shaped by a glacier that retreated from the region as recently as 13,000 years ago. As that glacier retreated, sand and gravel was deposited by torrential melt waters. Nearly all the surviving fens in Illinois are located on

terraces and slopes overlooking the present-day Fox River and its major tributaries—a watershed carved and terraced by torrential glacial rivers.

As strange as it may seem, fens are likely to be present without nearby deposits of sand and gravel. Let me explain. When it rains, some of the rain runs off the surface and enters streams, lakes, or ponds; while a lesser amount enters the ground. Porous deposits of sand and gravel allow rain to enter the ground rather easily. As the water moves through the ground, it begins to absorb the chemical properties of the sand and gravel. As it does so, the water becomes mineralized or alkaline! In those few places where this cold, highly mineralized water emerges from the ground, it creates harsh living conditions for plants. In fact, only a select few species of plants, that were either trapped in these places by the retreat of the glaciers or are best adapted for survival in these harsh conditions, thrive in fen wetlands. That's at least one reason why a disproportionately high number of State-listed Endangered and Threatened plant species are found within the few surviving fens in northeastern Illinois.

HOW RARE ARE FENS?

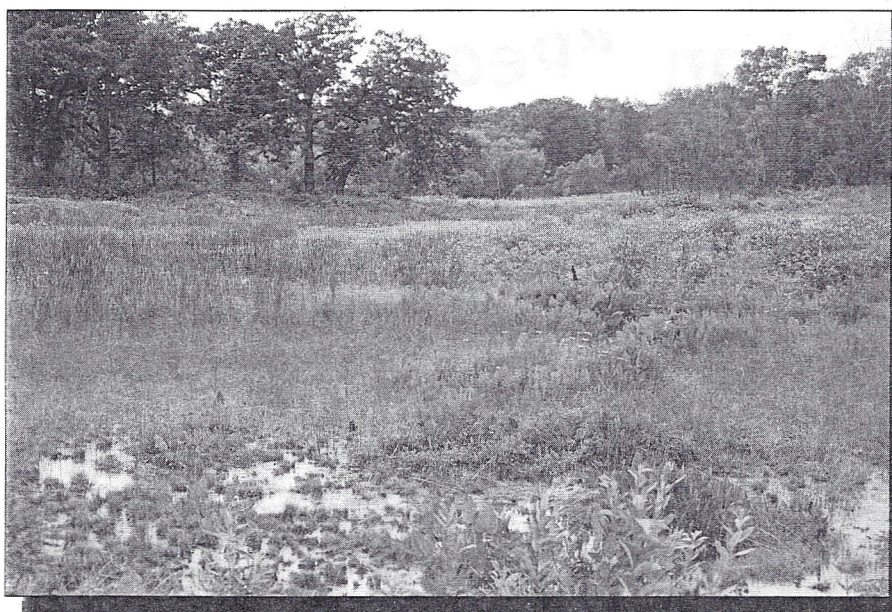
The Illinois Natural Areas Inventory (INAI) reported that only 353.84 acres of high-quality fens (an area equivalent to

approximately half of a square mile) survive in the entire State of Illinois! (see Table 1) Nearly all of these occur in those areas of northeastern Illinois shaped by the advance and retreat of the most recent glaciers. The U.S. Army Corps of Engineers, which has responsibility for permitting activities in wetlands, reports that fens are "...perhaps the *most unique type of wetland in the entire continental United States.*"

ARE THERE DIFFERENT KINDS OF FENS?

The INAI recognizes five different types of fen wetlands. Sound confusing? Yes, especially when several different types of fens occur at one location. For example, the calcareous floating mat occurs on a floating layer of peat, while the rest of the fens do not. Fens are differentiated mainly on the amount of peat that has accumulated and whether the fens have had a history of being subjected to repeated fires.

Calcareous floating mat: This type of fen is characterized by a floating layer or mat of peat that extends from a shoreline into a wetland or lake basin. Walking across this type of fen is an adventure; and if the layer of peat is relatively thin, (6 - 8 inches), it is much like walking on a bowl full of jello. The mat is dominated by sedges (*Carex* spp) and grasses such as bluejoint grass (*Calamagrostis canadensis*).



Other characteristic plants include bog bean (*Menyanthes trifoliata*) and marsh cinquefoil (*Potentilla palustris*).

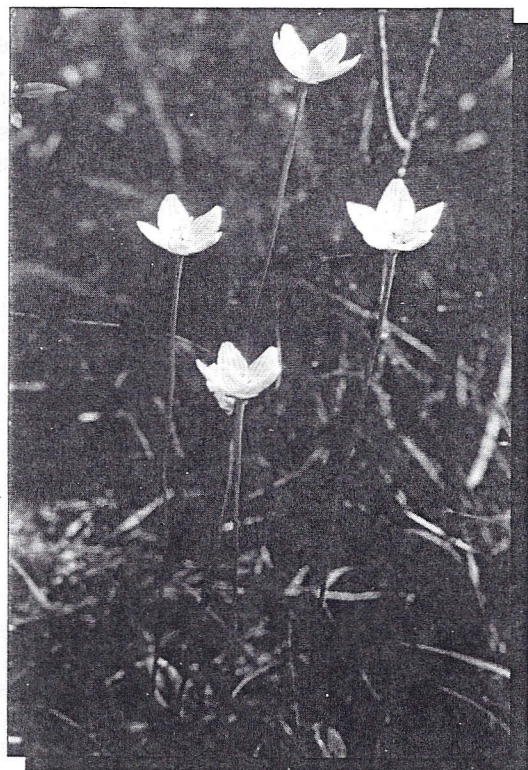
Graminoid fen: Accumulations of peat (as much as 20 feet thick!) that remain saturated with ground water support graminoid fens. Although these fens most frequently occur along the toe or bottom of a slope, they are sometimes observed "perched" along the side of a hill. They are "perched" because the ground water is emerging on the side, rather than the bottom of the slope. Graminoid (which literally means grassy or grass-like) fens are dominated by prairie grasses and sedges that lend these fen wetlands a prairie-like appearance. A careful plant survey, however, reveals the presence of certain "indicator" species such as bog lobelia (*Lobelia kalmii*), grass of parnasus (*Parnassia glauca*), and Ohio goldenrod (*Solidago ohioensis*). These plants are closely associated with the presence of mineralized ground water and, by their presence, help define this type of fen wetland.

Low shrub fen & Tall shrub fen: These fen wetlands are very similar to graminoid fens, except that they are dominated by shrubs, as their name implies. Biologists believe these "shrubby" fens have not been subjected to prairie fires as frequently as the graminoid fens. Consequently, shrubs (rather than grasses that flourish under repeated fires) dominate these fen wetlands. Such shrubs commonly include red-osier dogwood (*Cornus stolonifera*) and pussy willow (*Salix discolor*). Other species of note include swamp goldenrod (*Solidago patula*) and showy lady's slipper (*Cypripedium reginae*).

Forested fen: Forested fens are restricted to only two locations in Illinois, both on steep, west-facing slopes positioned just east of the Fox River. Biologists believe that natural fire breaks (such as the river) are necessary for sustaining this community. As opposed to the low shrub and tall shrub fen communities, the forest fen community is characterized by greater than 20% tree cover. Dominant plant species include black ash

Above: Calcareous seep in the foreground, and graminoid fen in the background, Bluff Spring Fen.

Right: Grass of parnasus, an indicator species of graminoid fens.



(*Fraxinus nigra*), white cedar (*Thuja occidentalis*), marsh marigold (*Caltha palustris*), and skunk cabbage (*Symplocarpus foetidus*).

Calcareous seep: Although the authors of the Illinois Natural Areas Inventory chose not to include calcareous seep with the other fen wetland communities, it makes sense to do so in this article because calcareous seeps and graminoid fens both require ground water and they frequently merge together along shallow moisture and peat gradients. A noticeable ground water flow, coupled with a conspicuous absence of peat, defines this community. In many cases, the ground water is so mineralized that tufa deposits (conglomerates of sand & gravel) form at the surface. In other cases, the ground-water discharge is so great, forming babbling brooks with extremely cold water, that peat fails to accumulate and plants sometimes fail to become established. Calcareous seeps usually occur in close association with graminoid fen communities, sometimes blending together along subtle moisture, or soil chemistry gradients. Characteristic plant species include beaked spike rush (*Eleocharis rosteellata*), tufted hair grass (*Deschampsia caespitosa*), false asphodel (*Tofieldia glutinosa*), and slender bog arrow grass (*Triglochin palustris*).



Above: A variety of plants are found in calcareous seeps.



Left: Small white lady's slippers are found in low shrub fens and tall shrub fens.

FEN PROTECTION - A HUGE AND DIFFICULT UNDERTAKING:

Given the rarity and ecological significance of fen wetlands, (See table 1) there has been a concerted effort to protect them and to learn more about them. For example, staff of the Illinois Nature Preserves Commission and other natural resource professionals have worked diligently to protect the few surviving fens through formal protection as Illinois Nature Preserves.

While this designation offers the greatest amount of protection available under Illinois law, changing land use patterns outside the preserve boundaries pose serious threats to the ecological integrity of these fens. These changes can affect infiltration rates of rainfall into the ground and surface drainage patterns. Ultimately, any changes that alter either the amount or the chemical properties of surface water entering the ground or of the water emerging from the ground can have profound, adverse impacts on fens. For example, increased levels of nutrients from nearby septic fields can lead to changes in groundwater chemistry and changes in species composition in the fen wetlands. Now, resource professionals are exploring ways to protect the locations where the water percolates into the ground. The difficulty, of course, is that this "recharge zone" may occur some distance from the fen itself and very likely occurs outside the boundary of the nature preserve. Threats to the integrity of ground water resources, upon which these fens depend, represent one of the least understood and most difficult aspects of fen protection.

Table 1. Illinois Natural Area Inventory sites containing high quality fen communities

Type	Site Names	County
Calcareous floating mat 175.5 acres*	Elizabeth Lake Nature Preserve Exner Marsh Fourth Lake - Rollins Road Savanna Grass Lake Wetlands Kettle Moraine Nature Preserve Lac Louette Lange Road Bog Pistakee - Brandenburg Bog Nature Preserve Schreiber Lake Bog Turner Lake Nature Preserve	McHenry McHenry Lake Lake McHenry McHenry McHenry Lake/McHenry Lake Lake
Calcareous seep 16.1 acres*	Bluff Spring Fen Nature Preserve Chicago Junior School Area Gladstone Fen Intern Seep Lake in the Hills Fen Nature Preserve Sterne's Fen Windfall Prairie Nature Preserve	Cook Kane McHenry Lake McHenry McHenry Vermilion
Forested 14.5 acres	Chicago Junior School Area Trout Park Nature Preserve	Kane Kane
Graminoid 142 acres*	Alden Sedge Meadow Barber Fen Nature Preserve Bates Fen Nature Preserve Bluff Spring Fen Nature Preserve Boone Creek Fen and Seep Nature Preserve Elizabeth Lake Nature Preserve Fox River Fen Nature Preserve Gladstone Fen Nature Preserve Grass Lake Wetlands Hebron Peatland Hemmer - Kloempken Wetland Illinois Dunes North Kettle Moraine Nature Preserve Lake in the Hills Fen Nature Preserve Larsen Prairie and Fen Nelson Lake Marsh Nature Preserve Palos Fen Nature Preserve South Elgin Sedge Meadow Spring Grove Fen Nature Preserve Sterne's Fen Nature Preserve Tower Lake Fen Nature Preserve Turner Lake Nature Preserve	McHenry McHenry McHenry Cook McHenry McHenry Kane McHenry Lake McHenry Kane Lake McHenry McHenry McHenry Kane Cook Kane McHenry McHenry Lake Lake
Low Shrub .4 acres	Lake in the Hills Fen Nature Preserve Sterne's Fen Nature Preserve	McHenry McHenry
Tall Shrub 5 acres	Spring Bay Fen Nature Preserve	Woodford

* exact acreage unknown

FEN MANAGEMENT - IT WORKS!!

Quite a bit of information, much gathered from hard-earned experience in northeastern Illinois, has been published about management of fen wetlands. One of the most insidious threats to fen wetlands is encroachment by woody, invasive species. For example, early observations of twelve different fens revealed that those fens that had "burned" exhibited the richest and most diverse plant communities. Consequently, Steve Packard (then with The Nature Conservancy) and myself began conducting prescribed burns at Bluff Spring Fen Nature Preserve over 20 years ago. The results were spectacular! Numbers of white lady's slipper orchids (*Cypripedium candidum*) that were formerly being shaded out of existence by invading brush increased by the hundreds! Now, natural resource managers aggressively use prescribed burns to curtail woody plant encroachment in fen communities. The lessons learned by resource professionals regarding the use of prescribed burns to manage fens in Illinois have been well documented and, just as importantly, shared with resource professionals in other Midwestern states.

In addition to resuming prescribed burning in fen wetlands, resource professionals (together with interested and committed volunteers) have further reversed years of fire suppression by removing invasive woody species. Over the years, a variety of brush removal strategies, from hand tools to chainsaws, have been used and evaluated. A typical "fen work day" now includes either a resource professional or trained volunteer using a chain saw, coupled with a number of volunteers who haul, stack, & burn brush. Note: the brush is burned either on upland sites well away from the peat or during the winter when the ground is frozen. Even then, large amounts of brush are burned on slightly elevated metal platforms to keep the heat away from the peat. Because of massive invasion of woody species in some fen wetlands, resource professionals have successfully used large, wheel-mounted mechanical devices to shred in one day an area of invading brush that would otherwise take six to eight people working all week to accomplish. All cut woody stems are herbicided as a standard management protocol. A 20% mixture of Garlon 4 and dyed mineral oil diluent applied to cut stems or as a basal bark treatment seems to be most successful.

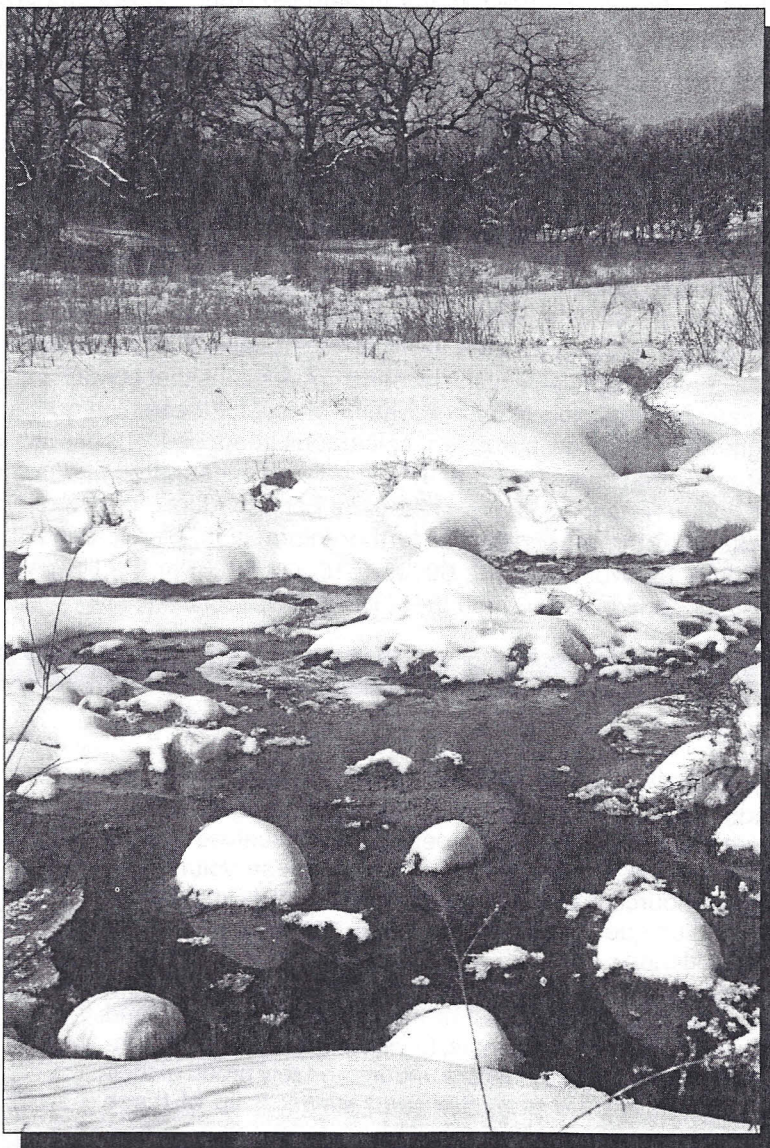
In addition to restoring plant communities, natural resource managers in northeastern Illinois are exploring efforts to restore fen hydrology. Techniques include removing extensive networks of subsurface field drain tiles or filling surface ditches. At Bluff Spring Fen Nature Preserve, a shallow gravel pit located next to the fen was filled, and overburden pushed into a fen wetland over a period of 30 years was removed. The groundwater that formerly emerged as a spring in the gravel pit lake now moves laterally into the fen. This type of fen management has underscored the importance of maintaining the unique geology and hydrology upon which fens are dependent.

COMMITMENT TO THE FUTURE:

In Illinois, volunteers work with natural resource professionals under the auspices of The Nature Conservancy and the Illinois Nature Preserves Commission's Volunteer Stewardship Network. With landowner approval, volunteers conduct surveillance, cut brush, ap-

ply herbicides, organize work days, conduct tours to educate the public, and monitor selected plant and animal species. Let me give you just a few facts about the Volunteer Stewardship Network. In 1998, approximately 8000 volunteers contributed over 61,000 hours toward management of 210 high-quality natural areas in northeastern Illinois. That effort is equivalent to a 30 year career in natural resource management. Volunteers at Bluff Spring Fen Nature Preserve, Sterne's Fen Nature Preserve, Lake In The Hills Fen Nature Preserve, and other fen wetlands, have worked hard to reverse traditions of misuse and abuse and establish new traditions of appreciation and awareness. Volunteers have also assumed leadership roles in development and implementation of management strategies, and were also largely responsible for preservation of Bluff Spring Fen as an Illinois Nature Preserve.

This article is dedicated to the many volunteers who have helped restore fen wetlands in northeastern Illinois. With their help, invading brush and exotic species have been



Water emerges from calcareous seeps in winter, creating a scenic vista, such as this one at Bluff Spring Fen.

Go Visit a Fen!

A "Fen" is a special wetland community created by groundwater laden with dissolved limestone (calcium carbonate) that continually seeps out through the soil. Fens are of particular interest because they support many unique and rare plant species. In Illinois, fens are limited to the northern third of the state and can be viewed at a couple of different Illinois Nature Preserves open to the public: **Bluff Spring Fen Nature Preserve** and **Lake in the Hills Fen Nature Preserve**.

Bluff Spring Fen Nature Preserve:

This fen is located in the City of Elgin (Cook County). From the intersection of Rt 25 (Liberty Street) and Bluff City Boulevard, proceed east 0.6 miles to Bluff City Cemetery, turn south into the cemetery at the eastern entrance. A small parking lot is located in the southwest corner of the cemetery. A designated nature trail, along with a self-interpretive guide, is available to enhance your visit. At this 91-acre preserve, you will experience one of the richest mosaics of fen, native prairie, and oak savanna communities in the Fox River valley. The site harbors 12 State-listed endangered and/or threatened plant species and one State-threatened insect. Bluff Spring Fen was recognized on the Illinois Natural Areas Inventory for its high quality wetlands consisting of: graminoid fen, sedge meadow, and calcareous seeps. An extensive volunteer organization "Friends of the Fen" conducts fen walks and welcomes additional help in restoration efforts at the preserve. For further information, please contact: The Nature Conservancy, 8 South Michigan Avenue, Suite 900, Chicago, IL 60603 (312/346-8166) or the Illinois Nature Preserves Commission, 914 South River Road, McHenry, IL 60050 (815/385-9074).

Lake in the Hills Fen Nature Preserve:

Located in the Village of Lake in the Hills (McHenry County), take Pyott Road north to the entrance of Barbara Key Park. Vehicle parking is available at the park and a designated nature trail provides direct access to the preserve. Lake in the Hills Fen Nature Preserve is a picturesque complex of morainal ridges, composed primarily of limestone gravel, which surround depressions that contain very high quality wetlands. The preserve was recognized by the Illinois Natural Areas Inventory for these high quality wetlands consisting of: calcareous floating mat, graminoid fen, low shrub fen, calcareous seep, sedge meadow, and dry gravel prairie communities. Collectively, these communities support 19 State-listed endangered and/or threatened species. An extensive volunteer organization "Friends of Lake in the Hills Fen" conducts fen walks and would welcome additional help in restoration efforts at the preserve. For further information, please contact: McHenry County Conservation District, 18410 Route 14, Woodstock, IL 60098 (815/338-6223) or the Illinois Nature Preserves Commission, 914 South River Road, McHenry, IL 60050 (815/385-9074).

pushed back to reveal landscapes festooned with orchids. In addition, fen wetlands have been dedicated as Illinois Nature Preserves, and more people have received guided tours of fen wetlands. And because of these volunteers, natural resource managers and citizen scientists know more about the unique assemblage of plants and animals that live in fen wetlands.

Finally, I would like to extend an invitation for *Illinois Audubon* readers, on behalf of the volunteer stewards and natural resource professionals, to visit a fen wetland in northeastern Illinois. These folks are understandably proud of their contributions toward protection and stewardship of these extremely rare landscapes.



Steve Byers is Field Representative for the Illinois Nature Preserves Commission. His responsibilities include protection and stewardship of nearly 100 Nature Preserves in northeastern Illinois. Steve has worked for the Commission for 10 years and, prior to that, was a wildlife biologist with the Max McGraw Wildlife Foundation. Steve has a B.S. and M.S. in Wildlife Ecology from Iowa State University. He has served as President of the Illinois Chapter of The Wildlife Society, President of the Elgin Chapter of the Izaak Walton League, and currently serves as President of the Fox Valley Land Foundation. Steve is also a Colonel in the U.S. Army Reserve and serves as Chief of Professional Services on the staff of a Medical Brigade. His interests include restoration management, fen wetlands, landscape ecology, and canoeing across Canada.