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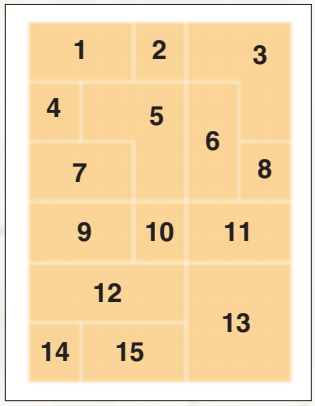
Illinois Department of **Natural Resources**

What's Inside

(Photo by Randy Nyhoer.)

This Special Edition of *Outdoor* Illinois is dedicated to Carl N. Becker

In the spring of 1978, the Illinois Endangered Species Protection Board hired a young biologist from Wisconsin to be the board's first executive director. Carl Becker was not a known entity at the time, but this was soon to change. One of his first tasks was to develop the first Illinois List of Endangered and Threatened Species. He did this by working with many diverse groups of biologists, academians and conservation groups. The list consisted of 436 species and was as diverse as the man who organized it. This was the first of many outstanding accomplishments Carl Becker's leadership would spearhead. His abrupt passing last spring only shortened a stellar career that gave a voice to protecting the rare resources that could not speak.



On the Covers

A profile of the Illinois-endangered barn owl (*Tyto alba*) hints of its nickname of the "heart-faced" owl. Back cover: **1.** great plains rat snake (*Elaphe guttata emoryi*); **2.** Karner blue butterfly (*Lycaeides melissa samuelis*); **3.** peregrine falcon (*Falco peregrinus*); **4.** pitcher plant (*Sarracenia purpurea*); **5.** Hine's emerald dragonfly (*Somatochlora hineana*); **6.** royal catchfly (*Silene regia*); **7.** cave amphipod (*Gammarus acherondytes*); **8.** fanshell (*Cyprogenia stegaria*); **9.** Indiana crayfish (*Orconectes indianensis*); **10.** eastern wood rat (*Neotoma floridana*); **11.** four-toed salamander (*Hemidactylium scutatum*); **12.** greater redhorse (*Moxostoma valenciennesi*); **13.** mushroom (*Volvariella bombycina*); **14.** eastern narrowmouth toad (*Gastrophryne carolinensis*); **15.** river cooter (*Pseudemys concinna*).

Photo credits: Cover and Nos. 1-6 by Carol Freeman; No. 7 by Frank Wilhelm; No. 8 by Kevin Cummings; No. 9, 11, 14, 15 by Michael Redmer; No. 10 by Joe McFarland; No. 12 by Konrad Schmidt; No. 13 by Andrew S. Methven.

How do threatened and endangered species get legal status as Illinois rarities?

Making the List

Story By Joe McFarland

Gray wolf (*Canis lupus*)

(Photo courtesy David Olson.)

Yellow-headed blackbird (*Xanthocephalus xanthocephalus*)

(Photo courtesy David Olson.)

Ever walk into a forest and been stumped by an unusual plant, or maybe a snake or bird you can't identify? Don't be embarrassed. Nobody—not even the best biologists—can instantly recognize every species of floral and faunal life known to exist in Illinois. Sometimes, even the pros scratch their head when encountering an obscure species beyond their field of study.

While everybody encounters plants or wildlife they don't recognize, deciding what's truly a rare species—therefore worthy of special, legal protection—or what's merely unfamiliar is a decision-making process requiring the collective input of many experts.

Let's start with the big picture: Most of us are at least vaguely familiar with the federal Endangered Species Act of 1973, and how it affords nationwide protection to native species which are critically endangered, therefore at risk of becoming totally extinct or extirpated from the United States. (Extinct means the species no longer exists anywhere on Earth; extirpated means that species no longer exists in a certain region: black bears, for example, have been extirpated from Illinois since the 1800s, but still thrive elsewhere.) When a species is "threatened," the population of that species isn't exactly endangered, but might be in serious decline, or chronically low in numbers and at risk of soon qualifying for the "Endangered" list.

The Illinois Endangered Species Protection Board, a nine-member group of scientists (including botanists, zoologists, ecologists and one citizen advocate) meets four times annually to review the status of Illinois threatened and endangered species. Automatically, any species already listed as a federally threatened or endangered species is granted the same legal protection in Illinois. But some species, while not critically rare nationwide, might be very rare in Illinois, and therefore require protection not offered at the federal level. The review and changes to the Illinois list occurs every five years.

The greater prairie-chicken (*Tympanuchus cupido*), for example, remains common enough to be a game species in certain Great Plains states. But Illinois' population is severely limited by chronic habitat loss. The eastern wood rat (*Neotoma floridana*) is a common

(Photo courtesy Mike Redmer.)

River cooter (*Pseudemys concinna*)

Indiana crayfish (*Orconectes indianensis*)

(Photo courtesy Mike Redmer.)

(Photo courtesy Michael Jeffords.)

Least bittern (*Ixobrychus exilis*)

resident from southern states to Nebraska, but is listed as endangered in Illinois.

A natural question: Why bother protecting relatively tiny populations of a species when they're merely a fragment of a larger population living at the edge of its range? Scientists realize healthy populations of any species are adapted to live among slight to moderate shifts in habitat and environment. Individual populations living on the edge of their overall range are better adapted to survive those slight differences. Evolutionary changes often occur at these margins. Illinois is located at the continental cross-roads where many species are on the edge of their range.

If one mission of natural resource management is to ensure genetic diversity among populations, protecting those "marginal" populations becomes critically important.

With legal habitat and harvest protection, and sometimes through reintroduction efforts, some species recover sufficiently to be "de-listed," or removed from what's commonly known as the "T and E" list. The recovery of the bald eagle—once a federally endangered species—is a national example of what can happen when rare species receive special protections. Once a rare sight in Illinois, bald eagles now nest in dozens of Illinois counties and even have been spotted soaring over Chicago.

According to law, the decision to add or remove a species from the state or federal list doesn't rest with one individual. Scientists must go afield to examine known habitats to document the presence or absence of the species. They review historical records of the species in Illinois, organizing research and monitoring efforts. There is a lengthy checklist of verifications which demand the documentation of recorded sightings or even a physical specimen of the species being considered.

Since the Endangered Species Protection Board is composed of scientists, all working to establish proven facts about the status of threatened or endangered species, the whims of subjective opinion do not influence the final recommendations of the board. Cute or ugly, all species of flora or fauna in Illinois receive equal consideration under the law.

(Photo courtesy Carol Freeman.)

Yellow-lipped ladies' tresses (*Spiranthes lucida*)

(Photo courtesy David Olson.)

Western hognose snake (*Heterodon nasicus*)

Habitat protection is key to rare species protection.

The Illinois Nature Preserves Commission

The Illinois Nature Preserves Commission (INPC) was created in 1963 by an act of the Illinois General Assembly. Its primary mission is to assist landowners in protecting natural areas and habitats of endangered or threatened species through voluntary, permanent dedication of Illinois Nature Preserves or registration of Land and Water Reserves in perpetuity or for a term of 10 years or more.

There are 328 Illinois Nature Preserves covering more than 44,000 acres in 79 counties and 131 Land and Water Reserves covering in excess of 35,000 acres in 58 counties. The Department of Natural Resources (DNR) owns and/or co-owns 111 nature preserves (22,000-plus acres) and 50 registered reserves (about 23,000 acres); the rest are owned by a variety of other entities including other public bodies, private individuals and businesses, and non-governmental organizations. The Illinois Natural Heritage Landmark is for landowners with a natural area who desire a voluntary, non-binding management agreement. There are currently 138 landmarks totaling more than 6,157 acres in 56 counties.

Because about 25 percent of all occurrences of threatened or endangered species in Illinois are located in nature preserves or registered reserves, the INPC staff work closely with DNR and the Illinois Endangered Species Protection Board. Active restoration management has a much greater role today than when the commission was first created.

—**Thomas V. Lerczak**, Illinois Nature Preserves Commission

Additional information on Illinois nature preserves is available at www.dnr.state.il.us/INPC/index.htm.

This group of scientists and citizens decides which species need special protection.

Illinois Endangered Species Protection Board

The Illinois Endangered Species Protection Board (IESPB) was created with the passage of the Illinois Endangered Species Act in 1972. Illinois was the first state to pass an endangered species act—even before the federal act was passed. This nine-person, voluntary board, made up of professional biologists and citizen advocates, determines what animals and plants are to be included on the list of Illinois endangered and threatened species.

Currently there are 144 animals and 339 plants listed in Illinois, and nearly 80 percent of these plants and animals are found on private property. The Illinois list is reviewed for changes every five years, with the last list revision occurring in 2004. IESPB also are required to publish a biennial report of the board actions. Staff and Technical Advisory Committees work with the Department of Natural Resources on the conservation, recovery and management of endangered and threatened species. IESPB staff also provide educational materials on endangered species to the citizens of Illinois.

—**Randy Nÿboer**, Illinois Endangered Species Protection Board

For more information on the board and Illinois endangered and threatened species, visit www.dnr.state.il.us/espb/index.htm.

ILLINOIS ENDANGERED SPECIES PROTECTION BOARD

It's a $4.8 million success story:
taxpayers giving something extra for wildlife.

Wildlife Preservation Fund

One quick mark with the pen yields timeless rewards for the wilds of Illinois.

A voluntary "check" on the Illinois income tax return—or a direct donation—means a hill prairie is restored, a mussel bed inventoried or a state-endangered turtle population studied. Or, it could mean allocation of funds to distribute educational materials to Illinois school children, construct a shorebird nesting island, conduct native-plant landscaping workshops or purchase prairie grass seeds for a schoolyard habitat area.

Illinois' first check-off fund was established by the Illinois General Assembly in 1983 and titled the Non-game Wildlife Conservation Fund. Renamed the Wildlife Preservation Fund in 1993, nearly $4.8 million has been collected from the generous citizens of Illinois. In the past 23 years, more than 950 projects have been funded, resulting in valuable information about Illinois' natural resources that have national, and even international, significance.

Projects selected for funding meet one of three primary objectives: education, research or management related to natural lands and non-game species.

Thanks to the interest of Illinois residents, Wildlife Preservation Fund donations have fostered a greater understanding of problems in our natural world and helped craft solutions. Illinois has developed critical conservation programs related to a wide range of species and habitats. And, with the release of another round of grants, the state will have a collection of 1,000 on-the-ground success stories.

Why should you consider putting a check on your income tax form this year? Because you care about Illinois.

> *"Non-game wildlife have need of special protection and that it is in the public interest to preserve, protect, perpetuate and enhance non-game wildlife and native plant resources of this State through preservation of a satisfactory environment and an ecological balance."*
>
> —Illinois Non-game Wildlife Protection Act, September 17, 1983

Want to learn more?

To learn more about the Wildlife Preservation Fund, including how to make a donation or submit an application, visit www.dnr.state.il.us/ORC/WPF/index.htm.

1983 Illinois Non-Game Wildlife Protection Act creates a voluntary check-off on Illinois tax returns.

1986 First projects funded using voluntary contributions.

1988 A legislative initiative passed to modify the Act to allow contributions whether or not a refund is to be received.

Amendment allows allocation of funding for projects involving plants.

1993 Name of the fund changed by legislative act to the Wildlife Preservation Fund.

1994 WPF ranks first in the seven available tax form funds.

2006 Donations approaching $5 million.

Some rare species never get noticed—until they form a mushroom.

Threatened and Endangered Fungi

(Photo courtesy Andrew Methven.)

Unlike flowering plants and animals, most fungi are noticed only when they produce their short-lived fruiting bodies—a phenomenon that makes it difficult to document the presence or absence, abundance and distribution of fungi, and even more complicated to determine whether a fungus is threatened or endangered.

Even so, threatened and endangered fungi have been reported throughout the world. For example, many European countries have developed Red Lists of threatened and endangered fungi, and biologists in the Pacific Northwest have prepared lists of threatened and endangered fungi associated with old-growth forests. In the Midwest, however, only Minnesota has fungi on a threatened and endangered species listed; none are listed for Illinois, Indiana, Michigan or Wisconsin. While some species of Midwestern fungi are certainly threatened or endangered due to habitat destruction and pollution, only long-term monitoring would provide enough data to support including fungi on threatened and endangered species lists in these states.

—**Andrew N. Miller**, Illinois Natural History Survey, Center for Biodiversity in Champaign, and **Andrew S. Methven**, Department of Biological Sciences at Eastern Illinois University, Charleston

These flowering treasures are prized by all—but stolen by criminals.

Orchids: Gems of the Plant World

(Photo courtesy Randy Nÿboer.)

Orchids have been long sought by botanists, plant collectors and growers because of their rarity and unique beauty. Illinois has 51 orchid species of which 19 are endangered or threatened. Many orchids are rare because they live in unusual habitats, like bogs and fens; have had habitat loss, like prairies and wetlands; or lack native insect pollinators because of environmental pollution.

Another reason for their decline are plant diggers who sell the roots. Lady slipper and fringed orchids are two of the more common species dug. Conservation organizations can protect orchid habitats from destruction and pollution, but orchid thieves are hard to stop. Because they take the whole plant, regrowth doesn't occur. Many orchids have unique soil needs and may live only a few years after taken from the wild. Illinoisans can protect wild orchids by not buying them and reporting sellers who do.

(Photo courtesy Carol Freeman.)

—**Randy Nÿboer**, Illinois Endangered Species Protection Board

Will deer and rabbits eat this tasty clover into oblivion?

Leafy Prairie Clover

(Photo By Lynne Scott.)

Dalea foliosa, or leafy prairie clover, is a state and federally endangered species. This species is a short-lived herbaceous perennial endemic to cedar glades of central Tennessee and northern Alabama and in Illinois has five disjunct populations in Will County where it grows in prairie remnants along the Des Plaines River in thin soils overlying dolomite. As with many threatened or endangered species, habitat loss, degradation and fragmentation are major causes of the decline of this species.

Several studies conducted in Illinois on seed germination, demographics, herbivory, population genetics and reproductive success (i.e., fruit or seed set) are providing invaluable information about which aspects of the biology/ecology of the species are limiting its recovery. These studies show that seedling survivorship and herbivory by mammals (e.g., rabbits and deer) are contributing to the decline of the species in Illinois.

—**Brenda Molano-Flores**, Plant Biologist, Illinois Natural History Survey

This prairie plant is rare everywhere—including the Prairie State.

Eared false-foxglove

(Photo By Mary Ann Feist.)

Tomanthera auriculata, or eared false-foxglove, is an Illinois threatened species and rare throughout its range. An annual hemiparasite that occurs sporadically throughout the eastern and central United States, this plant has been reported in 24 Illinois counties, but only 11 counties have existing populations.

In Illinois, this species occurs in mesic to wet prairies, disturbed prairies, shrubby prairies and old fields. Loss of habitat due to lack of management, agricultural land use and urban development has contributed to the decline of this species in Illinois; although aspects of its biology (e.g., seedling survivorship and availability of hosts) cannot be ignored as potential contributors to its decline.

Eared false-foxglove studies have provided much-needed information on the ecology and biology of the plant and show that seedling survivorship, host association and herbivory (i.e., large mammals and insects) are among several of the biological aspects contributing to the decline of the species.

—**Brenda Molano-Flores**, Plant Biologist, Illinois Natural History Survey

The web of survival.

Prairie Insects

All plants and animals have specific habitat requirements. Many endangered prairie insects take this a step further, requiring a single species of plant, or group of plants, to survive on the Illinois prairie—a habitat that is endangered in itself. Conversely, some prairie plants depend on one or a few insects to complete their life cycle.

A Hawk moth

(Photo courtesy Michael Jeffords.)

Larvae of the regal fritillary (*Speyeria idalia*), a threatened butterfly, need prairie violets for food in early spring. But when the adults emerge in June, their food source shifts to the nectar of prairie milkweeds and sunflowers.

An example of a plant that depends on just one insect is the endangered Eastern prairie fringed orchid (*Platanthera leucophaea*) and a species of hawk moth—now possibly extirpated in Illinois—needed to pollinate this orchid. The flower's nectar spurs and the tongue of this native hawk moth are nearly the same length. When the moth inserts its tongue for a sip of nectar, the orchid's pollen sacs stick to its face for transfer to and pollination of the next flower.

In addition to the loss of the native moth, researchers have discovered that non-native, long-tongued hawk moths are stealing the nectar and failing to pollinate the orchids.

Eastern prairie fringed orchid

(Photo courtesy Carol Freeman.)

For successful recovery of any rare or endangered species, the intricate web of life upon which that species is dependent needs to be fully understood. Solving the puzzle around some species is just now beginning.

—**Randy Nÿboer**, Illinois Endangered Species Protection Board

Is this orange-spotted wonder fluttering toward extinction?

Karner Blue Butterfly

Adult

(Photo courtesy Carol Freeman.)

The orange-spotted blue wings of the Karner blue butterfly (*Lycaeides melissa samuelis*) once fluttered among wild lupine plants from New England to Minnesota. Now listed as federally endangered by the U.S. Fish & Wildlife Service, Karner blue population numbers have dropped nearly 99 percent in the last 100 years—with 90 percent of that loss occurring in the last 15 years.

The loss and degradation of oak savanna habitats to agriculture and development, coupled with degradation of these savannas by fire suppression and invasion by non-native plant species, have led to the decline of this butterfly. These habitats support wild lupine, the only known host plant for the Karner blue caterpillar. This graceful butterfly species produces two generations each year, with adults emerging in the spring and again mid-summer. A diverse habitat with savanna, prairie and wetland plant species is required to provide nectar sources for the adults throughout the two flight periods. Although large, high-quality landscapes required by this species are rare in the Midwest, reintroduction of the Karner blue butterfly in suitable landscapes in Indiana has been successful, and is under consideration at Adeline Jay Geo-Karis Illinois Beach State Park.

—**Debra Nelson**, Natural Heritage Biologist, DNR Division of Natural Heritage, Spring Grove

Caterpillar

(Photo courtesy Mitch Magdich, The Toledo Zoo.)

Once "common as grass" in the Prairie State, this symbol of open lands desperately needs more habitat.

Prairie-chickens

Once abundant in Illinois, the greater prairie-chicken (*Tympanuchus cupido*) is now a state-endangered species. Throughout its range, this signature bird of the prairie is a high conservation priority because of its declining abundance due to habitat loss.

Several problems had thrown the last Illinois prairie-chickens into what conservation biologists call an "extinction vortex:" habitat goals had not been achieved, the birds were isolated from other prairie-chicken populations and nest were parasitized by pheasants. Because of inbreeding depression resulting from a low population, less than 40 percent of eggs could hatch.

In an attempt to restore genetic diversity and provide demographic relief, prairie-chickens were translocated from other states to Illinois from 1992 to 1998. Egg fertility rates soon returned to normal levels above 90 percent.

Since 1998, 1,600 acres of additional habitat have been secured. The birds responded to this new habitat by increasing 56 percent in 2005. Full recovery, including delisting this species, will require thousands of acres of additional habitat.

(Photo By Adele Hodde.)

—**Jeff Walk**, Research Scientist, Illinois Natural History Survey, and **Scott Simpson**, Manager Prairie Ridge State Natural Area

Illinois' farm landscape is changing, and so is life on the farm.

Barn Owl

The barn owl, *Tyto alba*, has been living near humans for a long time and is recognizable to many. Its distinct heart-shaped face and pale plumage set it apart from other owls in Illinois.

The symbiotic relationship between people and barn owls was established when humans began to build structures that provided roosting and nesting sites. The owl reciprocated with its ability to consume one and a half times its own weight in rodents daily.

This relationship has started to deteriorate, however. Modern structures no longer provide suitable roosts. Urban sprawl consumes valuable owl habitat. Pesticides to control rodents reduce food supplies.

Recovery of this endangered Illinois bird has potential, though. This species is quite prolific, reaching sexual maturity at one year of age, and capable of producing two large clutches a year—if food is abundant. The use of artificial nest boxes and the silvicultural practices of leaving dead trees for wildlife habitat can help this cavity nester. The conservation of open lands with management can ensure adequate forage lands.

(Photo By Dan Thompson.)

With any luck, the spine tingling "scr-r-i-i-ich" of the barn owl will resonate well into the future.

—**Dan Thompson**, Animal Ecologist, DuPage County Forest Preserve District

The Conservation Reserve Program has helped stabilize the population of one grassland species.

Henslow's Sparrow

(Photo courtesy Kanae Hirabayashi.)

Populations of most species of grassland birds are declining, and among grassland birds Henslow's sparrows (*Ammodramus henslowii*) are exhibiting the steepest declines. These population declines, along with a small overall population size, have led to high conservation concern. Habitat loss is the most likely cause of recent Henslow's sparrow population declines, although its preference for undisturbed grasslands also may limit its breeding distribution.

One encouraging habitat program for Henslow's sparrows has been the Conservation Reserve Program (CRP), where agricultural lands are removed from production and planted to undisturbed grass cover. Surveys of breeding birds within CRP fields have shown them to be particularly attractive to Henslow's sparrows. There is strong evidence that the long-term decline of this species has reversed and the population has stabilized in Illinois—resulting in the recent status upgrade from endangered to threatened status.

—**Jim Herkert**, Director of Science for The Nature Conservancy of Illinois

As these birds of prey rebound from near extinction, conservationists celebrate a glimmer of good news.

Raptor Recovery Trifecta

(Photo courtesy Carol Freeman.)

Birds of prey are majestic creatures, but bioaccumulation—the concentrating of poisons from the environment into their bodies—makes their position atop the food chain precarious. In the mid-20th century, we nearly lost the bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*) and peregrine falcon (*Falco peregrinus*) because of the pesticide DDT.

After DDT was banned, populations rebounded slowly at first. In many areas, people helped out by "hacking," releasing young birds into unoccupied areas where they learn to fly, and eventually return to nest. Peregrine falcons nest in Chicago and many cities, thanks to successful hacking efforts. Bald eagles have made an amazing comeback, with nearly 100 active nests being found along Illinois' rivers and impoundments, and thousands visiting in winter.

Of the three birds, the osprey remains the rarest in Illinois. But, biologists are optimistic for the future: populations are robust in surrounding states, platforms have drawn nesting ospreys to Carlyle Lake, and dozens more nesting platforms are going up statewide.

—**Jeff Walk**, Research Scientist, Illinois Natural History Survey

In Illinois, the river otter got a shove from endangered to common status.

Over-achievers?

Historically, river otters (*Lontra canadensis*) were common almost everywhere in North America except the desert southwest and arctic circle.

As explorers and settlers moved westward, otters disappeared from about 75 percent of their former range because of unregulated harvest, habitat loss and water pollution.

When I graduated from high school in 1978, otters had been protected in Illinois for nearly 50 years without much success. Fewer than 100 remained in the state and they were confined to a few counties.

However, prospects for a turn-around seemed promising. Water quality had improved greatly thanks to the Clean Water Act. Many streams and rivers were still flanked by trees. Beavers were abundant, providing wetlands and vacant den sites.

Perhaps all otters needed was a little push. As it turned out, they got a hard shove.

Illinois, Indiana, Iowa, Kentucky and Missouri released more than 2,000 otters during the 1980s and 1990s. Nearly all of them came from Louisiana, where otters were abundant and a network of trappers could supply healthy animals captured from the wild with small foothold traps.

Otters flourished in their new homes.

By 1997, they had been documented in all the major waterways in our state. Illinois' Endangered Species Protection Board down-listed their status from endangered to threatened in 1999.

(Photo © C.C. Lockwood.)

In 2004, otters were common and de-listed from their status as state threatened.

Coming up with a population estimate for central and southeastern Illinois is straightforward because we know we started with 346 otters that were released there. Scientists from the Cooperative Wildlife Research Lab at SIU estimated that their numbers had doubled every 4 to 5 years and reached 4,600 in 2005.

Coming up with an estimate for the entire state is a bit trickier, but 17,000 is a good ballpark figure.

Some people consider this bounty a mixed blessing. They are beautiful, adaptable animals that remind us that an endangered species' fate is not sealed, even nowadays.

But I've spoken to more than one grandfather who was excited about a fishing trip with the grandkids—until they found fish heads scattered around their favorite pond.

Facing similar problems, Missouri, Iowa and Kentucky recently approved regulated trapping seasons to balance the needs of otters and people. Some believe this has tarnished the otter's success. Others believe it shines as brightly.

—**Bob Bluett**, Wildlife Diversity Program Manager, DNR Division of Wildlife Resources

A partnership proves the value of teamwork in protecting the federally endangered Indiana bat.

Strength in Numbers

Photos courtesy Dr. Tim Carter and Joe Kath

Discovered in Indiana in 1928, the Indiana bat (*Myotis sodalis*) is a federally endangered species whose distribution is associated with cavernous limestone areas in the Midwestern and eastern United States.

Reported from 27 states, including Illinois, this bat was officially listed as an endangered species by the U.S. Fish and Wildlife Service in 1967. With a weight of 1/4 to 1/3 ounce and a wing-span of 9.5 to 11 inches, these animals hibernate from October to April in large, dense clusters numbering in the thousands. Caves and abandoned mines where temperatures range from 37 to 43 degrees Fahrenheit, and relative humidities are 65 to 99 percent, make optimal hibernacula.

Bats arrive at their hibernation sites between August and October where they mate. Female Indiana bats store sperm throughout hibernation, and leave for their summer grounds in early spring carrying a developing fetus. One pup is born in June or July and is raised within a maternity colony, usually under the loose bark of a hardwood tree within a stream corridor. Young are able to fly after several weeks and begin to forage for moths, beetles, flies and mosquitos. The life-span of an Indiana bat in the wild can reach 14 years.

In spite of recovery efforts by state and federal biologists, Indiana bat populations continue to decline because of habitat loss, environmental pollution and toxins, and disturbance at key roost sites. The current population estimate in North America is approximately 380,000 animals—nearly 60 percent lower than when surveys began in the 1960s. If scientists cannot determine appropriate methods to reverse this trend, the Indiana bat may become extinct by 2025.

Representing the most compromised of North America's terrestrial mammals, bats have been forced to use artificial or modified habitat to survive. Abandoned mine lands now offer a proverbial "refuge of last resort" for many bat species, most notably the Indiana bat. Recent efforts at the UNIMIN Corporation's "Magazine Mine" to protect resources critical to bat reproduction and hibernation have promoted a conservation ethic greatly benefitting the Indiana bat. The Magazine Mine currently supports at least 33,000 wintering Indiana bats and is the largest known hibernaculum of this federally endangered species ever documented in Illinois.

The success at Magazine Mine has been possible because of partnership between industry, nonprofit organizations and state and federal governmental agencies. A willingness by biologists, government administrators, industry representatives and private citizens to work together can—and does—have a direct impact on the survival of our nation's flora and fauna.

—**Joe Kath**, Terrestrial Endangered Species Project Manager, DNR Division of Natural Heritage

With better understanding of the species came discoveries of new populations of a northern glacial relict.

The Four-toed Salamander


Adult

Photos By Michael Redmer

The four-toed salamander (*Hemidactylium scutatum*) is an inhabitant of cool, moist habitats, such as deep ravines and forested seeps scattered throughout the northern two-thirds of Illinois. This diminutive salamander is thought to have been present throughout Illinois since retreat of the last ice sheet that covered the northern half of the state. During this period, from about 18,000 years before present to about 8,000 years before present, most of the state was considerably cooler and wetter, and covered with mixed coniferous-hardwood forest, more typical of present-day northern Wisconsin and Minnesota. Starting about 8,000 years ago, the climate in Illinois became progressively warmer and drier, oak-hickory forest and grasslands became the dominant vegetation types and four-toed salamander colonies were restricted to moist, cool microhabitats.

In 1961, when Phil Smith, a noted herpetologist at the Illinois Natural History Survey, wrote his book, "Amphibians and Reptiles of Illinois," it was believed that the four-toed salamander occurred in Illinois only in Lake and Cook counties. Since then, biologists have discovered the four-toed salamander in 11 additional counties, from the northwest corner of the state as far south as Lawrence County.

These additional populations do not represent recent colonization, but rather a better understanding of seasonal activity and microhabitat requirements of the salamander which has led to more efficient searching by biologists.

In April or May, females lay clutches of eggs in moist places above cool water. After an incubation period of several weeks, gilled larvae drop into the water to develop before transforming into the adult form.

It was formerly believed that this rather specialized salamander required the presence of sphagnum moss for nesting sites. Recent researchers have discovered the species in a wider variety of habitats than Smith and his predecessors probably searched. For example, the Lawrence County location consists of deep ravines with intermittent streams. And while sphagnum moss is present at the Vermilion County location, most nests have been found in grass tussocks.

Hopefully, future research will result in several more locations for this northern relict.

—**Christopher Phillips**, herpetologist, Illinois Natural History Survey, Champaign-Urbana, and **Michael Redmer**, biologist/herpetologist, U.S. Fish & Wildlife Service, Barrington


Adult at Nest


Embryos

Evicted through habitat loss—or killed outright—threatened and endangered reptiles also fall prey to greedy collectors.

Illinois' Disappearing Reptiles


Alligator snapping turtle (*Macrochelys temminckii*)

(Photo courtesy David Olson.)

Illinois is home to 63 species of native reptiles, and nearly one-third are in jeopardy. Five of the 17 turtle species and 11 of the 39 snake species are either state-endangered or state-threatened, and an additional three species have some federal protection (exportation from the United States of both species of box turtles is prohibited without a special permit and the copperbelly water snake is proactively protected in southeastern Illinois because of an agreement with the U.S. Fish and Wildlife Service).

Many state-listed reptiles are at the edge of their geographic range and exist only in a handful of Illinois counties. Others once were more widespread, but their numbers have drastically declined through development/alteration of their habitat or outright killing. Additional pressures put on these already rare reptiles include illegal collecting and commercialization in the pet trade.

Usually the best tool to protect these vanishing resources is protection of the animal and its critical habitat. Captive breeding programs have not yet been instrumental in saving any of Illinois' endangered or threatened reptiles. Any attempt to restore a species through reintroduction must be carefully evaluated to assure the best possible match between the animal and available habitat. Development of a formal recovery plan for a species is one way to make certain that all important factors have been considered before reintroduction is undertaken.

—**Scott Ballard** District Natural Heritage Biologist, DNR Division of Natural Heritage, Marion


Eastern massasauga rattlesnake (*Sistrurus catenatus*)

(Photo courtesy Scott Ballard.)


Great Plains rat snake (*Elaphe emoryi*)

(Photo courtesy Carol Freeman.)

Illinois' endangered and threatened reptile species:

- alligator snapping turtle (*Macrochelys temminckii*) - SE
- spotted turtle (*Clemmys guttata*) - SE
- Blanding's turtle (*Emydoidea blandingii*) - ST
- river cooter (*Pseudemys concinna*) - SE
- Illinois mud turtle (*Kinosternon flavescens*) - SE
- Kirtland's snake (*Clonophis kirtlandii*) - ST
- Great Plains rat snake (*Elaphe emoryi*) - SE
- western hognose snake (*Heterodon nasicus*) - ST
- coachwhip snake (*Masticophis flagellum*) - SE
- Mississippi green water snake (*Nerodia cyclopion*) - ST
- broad-banded water snake (*Nerodia fasciata*) - SE
- flathead snake (*Tantilla gracilis*) - ST
- eastern ribbon snake (*Thamnophis sauritus*) - ST
- lined snake (*Tropidoclonion lineatum*) - ST
- eastern massasauga rattlesnake (*Sistrurus catenatus*) - SE
- timber rattlesnake (*Crotalus horridus*) - ST

Management tools include wetland conservation and restoration, and education of the well-meaning public.

Blanding's Turtle

(Photo by Dan Thompson.)

The Blanding's turtle, *Emydoidea blandingii*, is a unique reptile that is relatively unknown to many people. Its bright yellow throat and chin, domed shell, and permanent smile help distinguish this species from others.

A long-lived species, with accounts of individuals living more than 70 years, this turtle's life expectancy continually declines as human populations increase. Habitat loss and degradation, automobiles, unscrupulous collectors and accidental fishing-related deaths are just some of the factors that jeopardize the survival of this threatened Illinois species.

Conservation and restoration of wetlands and surrounding uplands for nesting will provide essential habitat, but education also plays a critical role as many Blanding's turtles are lost directly to human activity. Taking a wild turtle home, even temporarily, not only is a bad idea but also illegal in the case of this or any listed species. The use of artificial fishing lures instead of live bait in areas where Blanding's turtles are prevalent can greatly reduce losses.

Conservation, along with an educated public, will help to ensure that Blanding's turtles will be around to "smile" for future generations.

—**Dan Thompson**, Animal Ecologist, DuPage County Forest Preserve District

This little turtle with a down-to-earth name is one of Illinois' reptilian rarities.

Illinois Mud Turtle

(Photo by Randy Nÿboer.)

The Illinois mud turtle (*Kinosternon flavescens*) is not exactly a glamorous-sounding name for an endangered species, but this rare prairie turtle does garner a lot of attention.

A small, fist-sized reptile, the mud turtle has several physical attributes that make it easy to identify: the ninth marginal scute of the shell has a triangular shaped tip; four fleshy barbels on its chin create a "beard;" and, males have a distinctive claw at the tip of the tail.

Illinois mud turtles are now found mainly in the Green River and Illinois River sand areas where shallow ponds exist. Two Henry County farmers discovered they had this turtle on their land and allowed researchers and Department of Natural Resources biologists to study the turtle's secretive lives. Using radio transmitters attached to the turtles, biologists discovered nesting areas and summer and winter hibernation sites critical for the survival of this endangered species.

—**Randy Nÿboer**, Illinois Endangered Species Protection Board

Unfortunately, being removed from the list usually isn't a good sign.

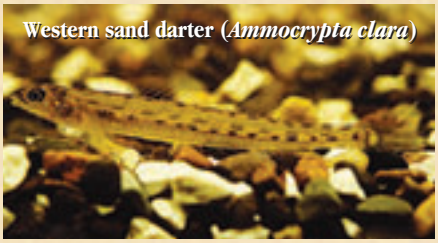
Endangered and Threatened Fishes of Illinois

Photos By Konrad Schmidt

The number of species included on the official list of endangered and threatened fishes of Illinois increased dramatically in 1989 but has changed little in subsequent lists. Fifteen species were added in 1989, three in 1994, two in 1999 and two in 2004. Three species were removed from the list due to presumed extirpation: alligator gar in 1994, flathead chub in 2004 and bluehead shiner in 2004. No species has been removed from the list because its status has improved.

Changes in the list for species of *Coregonus* were the result of taxonomic problems. The longjaw cisco, listed in 1981 and removed in 1989, is no longer considered a valid species. The lake whitefish was listed in 1981 but removed in 1994 because of uncertainty surrounding its taxonomic and demographic status. Both now are considered valid species found in the Illinois portion of Lake Michigan; however, their population status remains uncertain.


Iowa darter (*Etheostoma exile*)


Western sand darter (*Ammocrypta clara*)


Greater redhorse (*Moxostoma valenciennesi*)

—**Michael E. Retzer**, Illinois Natural History Survey, Champaign, and **Larry M. Page**, Florida Museum of Natural History, Gainesville

Fish species recognized as endangered (E) or threatened (T) in Illinois.

Common Name	Scientific Name	Year				
		1981	1989	1994	1999	2004
Least brook lamprey	*Lampetra aepyptera*		T	T	T	T
Northern brook lamprey	*Ichthyomyzon fossor*		E	E	E	E
Lake sturgeon	*Acipenser fulvescens*	T	T	E	E	E
Pallid sturgeon	*Scaphirhynchus albus*			E	E	E
Alligator gar	*Atractosteus spatula*	T	T			
Gravel chub	*Erimystax x-punctatus*					T
Cypress shiner	*Hybognathus hayi*		E	E	E	E
Bigeye chub	*Hybopsis amblops*	E	E	E	E	E
Pallid shiner	*Hybopsis amnis*		E	E	E	E
Sturgeon chub	*Macrhybopsis gelida*				E	E
River chub	*Nocomis micropogon*			E	E	E
Pugnose shiner	*Notropis anogenus*	T	E	E	E	E
Bigeye shiner	*Notropis boops*		T	E	E	E
Ironcolor shiner	*Notropis chalybaeus*		T	T	T	T
Blackchin shiner	*Notropis heterodon*		T	T	T	T
Blacknose shiner	*Notropis heterolepis*	T	T	E	E	E
Taillight shiner	*Notropis maculatus*			E	E	E
Weed shiner	*Notropis texanus*		E	E	E	E

Common Name	Scientific Name	Year				
		1981	1989	1994	1999	2004
Flathead chub	*Platygobio gracilis*				E	
Bluehead shiner	*Pteronotropis hubbsi*	E	E	E	E	
Longnose sucker	*Catostomus catostomus*	T	T	T	T	T
River redhorse	*Moxostoma carinatum*		T	T	T	T
Greater redhorse	*Moxostoma valenciennesi*		E	E	E	E
Northern madtom	*Noturus stigmosus*		E	E	E	E
Longjaw cisco	*Coregonus alpenae*	E				
Cisco	*Coregonus artedi*	T	T	T	T	T
Lake whitefish	*Coregonus clupeaformis*	T	T			
Banded killifish	*Fundulus diaphanus*		T	T	T	T
Starhead topminnow	*Fundulus dispar*					T
Redspotted sunfish	*Lepomis miniatus*		T	T	T	T
Bantam sunfish	*Lepomis symmetricus*	T	T	T	T	T
Western sand darter	*Ammocrypta clara*		E	E	E	E
Eastern sand darter	*Ammocrypta pellucida*		E	E	T	T
Bluebreast darter	*Etheostoma camurum*	E	E	E	E	E
Harlequin darter	*Etheostoma histrio*	E	E	E	E	E
Iowa darter	*Etheostoma exile*		T	E	E	T
Total number listed		13	28	28	30	31

Population studies reveal critically low numbers of this "new" species in Illinois.

The Redspotted Sunfish

Photos By Trent Thomas

Most people have never heard of the redspotted sunfish (*Lepomis miniatus*)—and for good reason. Until 1992 when researchers at Southern Illinois University determined this fish to be a separate species, it was known as the spotted sunfish (*Lepomis punctatus*). The redspotted sunfish is found as far south as Florida and Texas, and Illinois is at the northern edge of its distribution.

Although never abundant in Illinois, when the first collections of Illinois fish were made 100 years ago, the redspotted sunfish was more widespread than it is today. Historically, the redspotted sunfish was found along the Illinois and Ohio rivers, and in the Mississippi and the Iroquois rivers. Currently, this species appears to be much less abundant along the Illinois and Ohio rivers, and has disappeared from the other two rivers.

The habitat of this sunfish is larger river backwater lakes with aquatic plants—habitats that have been lost through draining, filling or construction of extensive levee systems. While many of the backwater lakes still exist, siltation and introduced species (grass carp) have diminished the aquatic vegetation, leading to the demise of the redspotted sunfish except in small, slow-moving, vegetated streams—habitats that are quite vulnerable to disturbance.

With the help of a federal grant, the Department of Natural Resources' Division of Fisheries has begun a statewide survey to determine the population status of the redspotted sunfish. Small fin-clips are being taken from fish collected in Illinois and neighboring states for use in genetic studies. Results from these surveys and studies will guide efforts to reintroduce this species into restored habitats throughout their historic Illinois range.

Redspotted sunfish habitat

Preliminary results of the population surveys show the redspotted sunfish is quite rare in Illinois. An adult population is yet to be found along the Illinois River (a few juvenile fish were found in a single, small stream in the lower Sangamon River basin), which was once the heart of its existence in the state.

The news is better along the Ohio River as the occasional redspotted sunfish is found in a few backwater lakes despite the lack of necessary aquatic vegetation and presence of exotic silver carp. Several adults have been collected from a remnant population in a small stream in the lower Saline River basin.

Plans for the Illinois population of this sunfish include continuation of population surveys and genetic analyses to determine if genetic variation exists among the isolated populations, allowing for identification of the most appropriate source of fish for stocking into restored habitats. Adult redspotted sunfish will be collected and spawned in rearing ponds, producing the number of fish needed for stocking efforts.

—**Trent Thomas**, Region 3 Streams Biologist, DNR Division of Fisheries

Multiple organizations work toward developing refuges as a tool in managing rare fish species.

Aquatic Refuges

Photos By Trent Thomas


Mansion pond aquatic refuge

Many of the 31 fish species in Illinois listed as endangered or threatened are species adapted and dependent on the slack-water habitats once provided by backwater lakes, wetlands, swamps and meandering streams. As these habitats were destroyed for development and agriculture, the fishes dependent on them declined—or disappeared completely.

The adaptations to life in water with little or no current may also save them from extirpation (extinction at the local level) as biologists are establishing populations in aquatic refuges in ponds and small lakes. The aquatic refuge practice has been used successfully across the nation for many years, with the desert pupfish aquatic refuge project drawing broad news coverage.

In Illinois, the first aquatic refuge for endangered and threatened fish species was established in Lake County in the 1990s by Integrated Lakes Management. Four fish species from natural glacial lakes of northeastern Illinois were stocked into an urban detention pond at a subdivision in Grayslake. The blackchin shiners (*Notropis heterodon*), blacknose shiners (*N. heterolepis*), Iowa darters (*Etheostoma exile*) and banded killifish (*Fundulus diaphanus*) have reportedly thrived in the detention pond, ensuring their continued existence in the state.


Starhead topminnow (*Fundulus dispar*)

In 2004, a cooperative effort between a University of Illinois Restoration Ecology class and the Department of Natural Resources Division of Fisheries was initiated to establish an aquatic refuge for rare fish species of the Sangamon River basin. The 1.3-acre Mansion Pond at Allerton Park (Piatt County) was drained in the spring of 2004 and all fish removed. After minor repairs, landscaping, and refilling of the pond, lake chubsucker (*Erimyzon sucetta*) from Crane Creek in the Lower Sangamon River basin were stocked. Two additional species, the starhead topminnow (*F. dispar*) and ironcolor shiner (*N. chalybaeus*), both state-threatened, were released in the spring of 2005. Successful spawning was observed in 2005. A U.S. Fish and Wildlife Service grant is supporting management of aquatic vegetation in the pond.

Future planned stockings of additional rare fish species from the Sangamon River basin include obscure species such as the redspotted sunfish (*Lepomis miniatus*) and mud darter (*E. asprigene*). As additional species are added, pond management becomes tricky as all species need to co-exist and prosper. One dominant and destructive species could eliminate the other species from the small pond.

Genetic diversity is another issue to contend with. A sizable population with a large number of adults needs to be established to help maintain a high level of genetic diversity—a population of closely related, inbreeding individuals is not desirable in the refuge or in the wild.

Aquatic refuges are not the ideal situation for maintaining biological diversity in our rivers and lakes, but simply an insurance plan to save species from being lost. As lost habitats are restored through conservation efforts by the state and federal governments and conservation organizations, fish reared in refuge populations can once again populate our backwater lakes, wetlands and streams.

—**Trent Thomas**, Region 3 Streams Biologist, DNR Division of Fisheries

Ongoing research providing information on an imperiled guild of aquatic insects.

Sand-Inhabiting Mayflies

Photos By Dawn Dockter

Mayflies are aquatic insects classified in the order Ephemeroptera—a name of Greek origin, with *ephemeros*, meaning living only a day, and *pteron*, for wing. Although mayflies have lived on the planet for more than 300 million years, they still display ancestral characteristics in the form of their upright and unfolding wings. Illinois streams and lakes historically have supported 107 mayfly species but the current status of mayflies in Illinois is unknown.

The sand-filtering mayfly (*Homoeoneuria ammophila*), once thought extirpated from Illinois but recently "rediscovered" in the Sugar River in Winnebago County, presents an opportunity to study the biology of a rare and usually difficult-to-collect mayfly.

This species thrives in fast-flowing, sandy rivers and can be found from late June to early September. Lying in fine sand, nymphs raise their thorax, creating a vortex that concentrates food particles in the water. Hatching starts in August with male nymphs rising to the surface of the stream before dawn—struggling from the nymphal skins while riding the waves and searching for females just an inch above the water. By 7 a.m., females leave the water, are grabbed by a male and they mate on the wing. Females then fly back to the stream, belly smacking the surface, and collectively expel millions of eggs. By 10 a.m., all is done and only the carcasses, floating down the river, remain.


Adult


Nymphs

These behaviors are largely unknown even to the scientific community. Few others, perhaps only fisherman, ever witness this brief event. Locating additional populations and genetic analyses are needed to form protection strategies so others can witness the amazing annual emergence.

—**Dr. R. Edward DeWalt** and **Ms. Dawn Dockter**, Illinois Natural History Survey, Champaign

Deep within the caves of southwestern Illinois, the existence of one invertebrate species hinges on water quality.

Cave Amphipods

(Photo by Frank Wilhelm, SIU-C, Zoology Department.)

The Illinois cave amphipod (*Gammarus acherondytes*) is a small crustacean (related to shrimp) that inhabits underground streams of several cave systems in southwestern Illinois—an area called the sinkhole plain because of the high density of sinkholes and caves in the bedrock limestone.

The cave amphipod's survival depends on the quality of the groundwater. In the sinkhole plain, surface activities strongly affect the groundwater because it is extremely shallow, allowing virtually no filtering to occur before water enters caves through sinkholes. The close connection of surface and ground water allows pollutants, such as road runoff, human and livestock waste, pesticides and other chemicals to be transported almost directly into the habitat of the amphipod.

Water quality is critical for this species. Protection measures include strategies to reduce development in sensitive areas, protect natural habitat buffering sinkholes, prevent dumping and spilling into sinkholes and cleaning old sinkhole dumps that may be leaching toxic chemicals.

—**Diane Tecic**, Regional Administrator, DNR Division of Natural Heritage

Freshwater mussel populations are shrinking in Illinois—some species are gone forever.

A Case of Mussel Atrophy

(Photo by Kevin Cummings)

Freshwater mussels are one of the most endangered groups of animals in North America. Surveys conducted over the past few decades have documented significant declines in mussel populations across the entire continent. Among the factors thought to be responsible for the decline are over-harvest; siltation of their habitat from poor land management, channelization and impoundments; competition from exotic species such as the zebra mussel; and pollution by herbicides, pesticides and other chemicals.

Illinois once supported 80 species of mussels and a large and vibrant mussel fishery. Today, 20 species are no longer found in the state; six of these are totally extinct. An additional 25 are either listed as threatened or endangered or are very rare. Only 35 of the original 80 species can still be found with some regularity in our streams.

The Department of Natural Resources, in cooperation with the U.S. Fish and Wildlife Service and state of Ohio, have begun a recovery project for two mussels, the clubshell (*Pleurobema clava*) and the northern riffleshell (*Epioblasma turulosa rangiana*). The clubshell, formerly known from many sites in the Wabash River drainage, is one of the rarest mussels in Illinois, known only from a single location. The northern riffleshell has not been seen alive in Illinois since the early 1900s but numerous relict shells suggest that it, too, was widespread in the Wabash River drainage. With improved water quality and awareness of the importance of streamside vegetation and erosion control, conditions are favorable for the recovery of these species in Illinois.

—**Kevin Cummings**, Center for Biodiversity, Illinois Natural History Survey, and **Bob Szafoni**, District Heritage Biologist, DNR Division of Natural Heritage

The science of restoring endangered species depends upon good data, suitable habitat—and a plan.

Recovery Plans

River otter (*Lontra canadensis*)

(Photo courtesy Michael Jeffords.)

Crucial to the survival of any endangered species is a comprehensive understanding of suitable habitat and a distinctive management plan which encourages permanent habitat protection and sustainable, healthy populations. These items are typically addressed by biologists in a formal document known as a Recovery Plan.

The Illinois Endangered Species Protection Act, passed in 1972, mandates that the Department of Natural Resources (DNR) actively plan and implement programs for the conservation of endangered/threatened species with the advice of the Illinois Endangered Species Protection Board. Programs may include research, management, habitat acquisition and education of the general public. Recovery plans provide the format by which biologists can officially describe the recovery goals, objectives and criteria for a listed species. These technical documents typically advocate an overall goal of re-establishing native, listed plants or animals in suitable habitats, monitoring populations and conserving key habitats to ensure the long-term viability of the species. The target area can be as general as across all of North America, or a specific county within Illinois. A number of state recovery plans have been prepared and published to date by DNR including: river otter (*Lontra canadensis*), Eastern wood rat (*Neotoma floridana*), greater prairie-chicken (*Tympanuchus cupido*) and alligator snapping turtle (*Macrochelys temminckii*).

The river otter recovery plan has been successfully implemented and this animal was officially removed from the state's endangered and threatened species list in September 2004.

Translocation/re-introduction efforts for the Eastern wood rat continue in extreme southern Illinois and post-release monitoring is yielding positive results.

Intensive grassland habitat acquisition and prairie management for the greater prairie-chicken continues in southeastern Illinois, and DNR is investigating the feasability of prairie-chicken survival on other large grassland complexes, such as the Midewin National Tallgrass Prairie near Joliet.

Initial translocation efforts for the alligator snapping turtle will begin in the lower Mississippi River drainage in 2007 and continue for the next 10 to 15 years.

With the availability of several new state and federal conservation initiatives such as SWG (State Wildlife Grants), LIP (Landowner Incentive Program) and WHIP (Wildlife Habitat Incentive Program), DNR has the unique opportunity to partner with various conservation organizations and citizens groups. These partnerships will greatly contribute toward and facilitate the continued recovery of Illinois' most imperiled plant and animal species. There are many conservation challenges ahead in the 21st century and the key to success remains cooperation.

—**Joe Kath**, Terrestrial Endangered Species Project Manager, DNR Division of Natural Heritage

Eastern wood rat (*Neotoma floridana*)

(Photo courtesy Joe McFarland.)

From a grand prairie to a coastal plain, Illinois' landscape is perfectly natural.

Naturally Illinois

From pre-Ice Age glacial relicts to bogs, swamps, sand prairies and hardwood forests, Illinois contains amazingly diverse habitat communities. Categorized into 14 Natural Divisions, plus Lake Michigan, these geographic regions are based on topography, soils, bedrock and plants and animals.

These unique habitats, and their associated flora and fauna, present glimpses into the presettlement conditions of Illinois.

The **Wisconsin Driftless Natural Division** (1) is characterized by rugged terrain that apparently escaped Pleistocene glaciation.

Prairies once occupied the level uplands of the **Rock River Hill Country Natural Division** (2), with forests covering the remainder of the rolling topography.

The most recently glaciated area in Illinois, the **Northeastern Morainal Natural Division** (3) has abundant marshes, natural lakes and bogs.

Once tallgrass prairie, and now primarily agricultural fields, bison once roamed the **Grand Prairie Natural Division** (4).

Forest and savannas predominated the **Western Forest-Prairie Natural Division** (5), with prairie present on level uplands.

Sand areas and dunes contain relict western amphibians and reptiles in the **Illinois River and Mississippi River Sand Areas Natural Division** (6).

River bottomlands and backwater lakes are distinctive features in the **Upper Mississippi River and Illinois River Bottomlands Natural Division** (7).

Hill prairies and forest make up the narrow band of river bluffs in the **Middle Mississippi Border Natural Division** (8).

The **Lower Mississippi River Bottomlands Natural Division** (9) once included prairies, marshes and rich forests with several southern lowland tree species.

High clay soils, streamside forests and prairies characterize the **Southern Till Plain Natural Division** (10).

The **Wabash Border Natural Division** (11) includes the bottomlands and the loess-covered uplands bordering the Wabash River.

The **Ozark Natural Division** (12) consists of a mature, dissected plateau with bluffs along the Mississippi River, a sinkhole plain and hill prairies.

The southern tip of Illinois contains the **Shawnee Hills Natural Division** (13), mostly forested, unglaciated hill country.

Swampy, forested bottomlands and low clay and gravel hills can be found in the **Coastal Plain Natural Division** (14).

(Illustration by Loren Kirkwood, Illinois Natural History Survey.)

Northwestern Illinois' unusual, natural ice houses support some of Illinois' rarest life.

Algific Slopes

Photos By Randy Nÿboer

It was a hot July day and walking was tiring and difficult on the steep Jo Daviess County hillside. A small clearing at the base of a limestone cliff was a jumble of shrubs and scattered wildflowers. Walking was treacherous across slippery, moss-covered rocks. Taking a break before crossing the clearing, we felt cold air coming out from around the rocks. Unknowingly, we had stumbled onto an algific slope.

Talus slopes are commonly formed at the base of a cliff from an accumulation of rocks that break off. Sometimes these talus slopes, particularly at the base of north-facing cliffs, retain subsurface ice throughout most or all of the summer. During the growing season the air chilled by the subterranean ice flows between the rocks creating a blanket of cold air a few inches thick over the talus slope—temperatures that hold even during the warmest days of summer. These natural "ice houses" are rare, and support an interesting and equally rare assemblage of plants and animals.

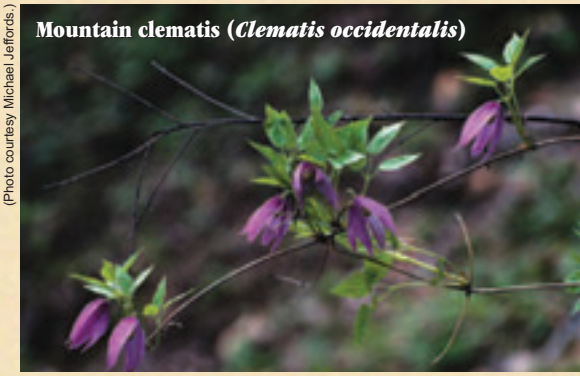
Beaked hazel (*Corylus cornuta*)

In Illinois, algific slopes are confined to the driftless, or unglaciated areas, in the extreme northwestern part of the state, and the region extends into adjacent southwestern Wisconsin and northeastern Iowa. Nine algific slopes have been located in Jo Daviess County, with the largest having a diameter of about 100 feet. Three sites have received protection as Natural Heritage Landmarks, a voluntary landowner designation.

The cool microclimate of the algific slopes supports species normally found in the upper Great Lakes Region, Canada and at higher elevations in the northeastern portion of the Appalachian Mountains. Perhaps the most interesting endangered species restricted to algific slopes is the Iowa Pleistocene snail (*Discus maclintockii*). First described from a fossil in 1928, this tiny, flatland snail was thought to be extinct until living specimens were found in 1955. Currently, this species of snail is known from 18 locations, all algific slopes in Iowa and Illinois.

Three cool-climate plant species are known from Illinois only from algific slopes: beaked hazel (*Corylus cornuta*), a small woody shrub restricted to a single algific slope; bristly rose (*Rosa acicularis*), a small thorny rose known from two algific slopes; and mountain clematis (*Clematis occidentalis*), a semi-woody climbing vine often abundant in this limited habitat.

—**John E. Ebinger**, Emeritus Professor of Botany, Department of Biological Sciences, Eastern Illinois University, and **William E. McClain**, Adjunct Research Associate in Botany, Illinois State Museum



Mountain clematis (*Clematis occidentalis*)

(Photo courtesy Michael Jeffords.)

Unique habitats at one northeastern Illinois park create an Illinois biological "hot spot" for plants and animals.

Coastal Property

Pitcher's thistle (*Cirsium pitcheri*)

(Photo courtesy Mike Redmer.)

Some of Illinois' newest real estate—sand deposited by wind and wave action only a few hundred years ago—lies along the shoreline of Lake Michigan.

Tucked within the dry beach ridges and wet swales at Adeline Jay Geo-Karis Illinois Beach State Park are 14 distinct plant communities supporting more than 40 state threatened and endangered plant and animal species: beach, foredune, sand prairie, coastal sand savanna, fen, sedge meadow, marsh—and a globally rare wet swale community called panne.

Subtle elevational, moisture and soil gradients (sometimes only a few feet apart) are largely responsible for the variety of plant communities. Desert-like conditions exist along dry ridges where sand prairie and black oak sand savanna communities support plants such as prickly pear cactus (*Opuntia* sp.) and downy yellow paintbrush (*Castilleja sessiliflora*).

Wet and peaty habitats between the ridges support rare sedges, bog arrow grass (*Triglochin* spp.), a variety of orchids and two carnivorous wetland plants—bladderwort (*Utricularia cornuta*) and sundew (*Drosera rotundifolia*). Red root (*Carex inops* subsp. *heliophila*) is found in the sand savanna. Horizontal juniper (*Juniperus horizontalis*) and bearberry (*Arctostaphylos uva-uris*) are adapted to the dry conditions of the open stable foredunes and beach ridges. Kalm's St. Johnswort (*Hypericum kalmianum*) is found in the moist calcareous sand of the zone between the dry ridges and wet swales. Dynamic sand movement provides open foredune habitat for the successful reintroduction of the federally threatened Pitcher's thistle (*Cirsium pitcheri*) in the southern part of the park.

A multitude of rare insects also are found at the site, many of which are dependent on a particular plant species as a food source during a part of their life cycle. When the plant's habitat is rare, the plant is rare. When the plant is rare, the dependent insect species also is rare. The primary food source for the caterpillar of the Hoary elfin butterfly (*Incisalia polios*) is bearberry, and since little undisturbed dune habitat remains to support bearberry, both species are rare in Illinois.

Some of these species are rare in Illinois because they are at the south edge of their range and are biological treasure troves of genetic diversity that could allow for species' adaptations to changing climate. But the biggest threat to most rare species is the loss of suitable habitat. Shoreline development and artificial methods of erosion control threaten these sand habitats and remnants of Illinois' biological heritage.

—**Debra Nelson**, Natural Heritage Biologist, DNR Division of Natural Heritage, Spring Grove

Hoary elfin butterfly (*Incisalia polios*)

(Photo courtesy Tom Peterson.)

(Photo courtesy Adele Hodde.)

Citizens, developers and biologists work together to minimize habitat damage.

The Consultation Process

Does an endangered species live in your community? Chances are good they do. What happens when a change to the environment is proposed?

Recently a subdivision was proposed in the Village of Lake Barrington, on high ground overlooking the Wagner Fen Forest Preserve, an Illinois Natural Areas Inventory Site (INAI) and dedicated nature preserve. Controversy flared as local residents and conservation groups rallied to protect the preserve, a rare calcareous fen supporting nine endangered or threatened species, including the sandhill crane (*Grus canadensis*), Blanding's turtle (*Emydoidea blandingii*) and snakemouth pogonia (*Pogonia ophioglossoides*). The fear was that the proposed development would damage or destroy the groundwater recharge area crucial to the preserve's survival.

State law requires state agencies and local governments, such as Lake Barrington, to consult DNR before authorizing, performing or funding any action that may adversely affect state-threatened or endangered species or their essential habitats, or modify an INAI site, such as Wagner Fen. DNR consults on thousands of proposals every year, providing advice to avoid or reduce threats to protected resources.

In this case, community leaders chose to implement consultation by convening a stakeholder's group which included the developer, DNR, the Lake County Forest Preserve District, the Nature Preserves Commission, local homeowners associations and conservation groups. The group designed a groundwater study, paid for by the developer, that provided data about the origins, flow paths, chemistry and quantity of groundwater associated with Wagner Fen. The findings demonstrated that threats from the proposed project were not as serious as originally believed. Stakeholders were able to negotiate a development plan which avoids or reduces the more serious impacts.

Most proposed actions are not as publicly controversial as those affecting Wagner Fen, and whether an agency or local government implements DNR recommendations generally depends on factors other than public outcry, including the extent of their power or their perception of how best to promote the general welfare. While actions detrimental to listed species often proceed unchanged, consultation at least assures informed choice.

You can help protect natural areas and endangered species by encouraging your local officials to consult with DNR, and by urging serious consideration of DNR recommendations before projects go forward. Consultation is most effective when local citizens get involved.

—**Keith Shank**, Impact Assessment Analyst, DNR Office of Realty and Environmental Planning

(Photo courtesy Jim Miner, Illinois State Geological Survey.)

With DNR as a consultant, a developer-funded groundwater study near the Wagner Fen Forest Preserve in Lake County helped alleviate concerns about environmental impacts of nearby development.

(Photo courtesy Carol Freeman.)

Sandhill crane (*Grus canadensis*)

In 1999, the Illinois General Assembly approved legislation giving the Department of Natural Resources the authority to allow taking of endangered or threatened species when that take is incidental to carrying out an otherwise lawful activity. This "incidental take" authority allows the Department to work with developers, highway departments and others, whose work may involve an unavoidable taking of rare species, to assure that the effect on the species is minimized and mitigated.

Yes, cacti do grow in the Prairie State.

The Deserts of Illinois

Photos By Michael Jeffords


Redroot (*Ceanothus herbaceus*)

(Photo courtesy Debra Nelson.)

When you think of deserts, you think of sand, cacti and the American West, not Illinois. However, there are large deposits of sand along Lake Michigan and the Mississippi, Illinois, Kankakee and Green rivers where these desert-like habitats are important to more than 70 listed plants and animals. The sand that forms the dunes, sand prairies and wetlands was deposited at the end of the last glacial period, 12,000 to 8,000 years ago. Between 8,000 to 6,000 years ago, many of the rare plants and animals migrated to Illinois from the west during a much warmer and drier climate.


Regal fritillary (*Speyeria idalia*)

(Photo courtesy Susan Dees.)

Each of the sand areas mentioned above has their own characteristic group of endangered species. The Lake Michigan area is home to the Karner blue butterfly (*Lycaeides melissa samuelis*), piping plover (*Charadrius melodus*), trailing (*Juniperus horizontalis*) and ground (*J. communis*) junipers, Pitcher's thistle (*Cirsium pitcheri*) and bearberry (*Arctostaphylos uva-ursi*), to name a few.

The Kankakee Sands near the Kankakee River provides habitat for the regal fritillary (*Speyeria idalia*), the yellow wild indigo (*Baptisia tinctoria*), sweet fern (*Comptonia peregrina*), orange-fringed orchid (*Platanthera ciliaris*) and narrow-leaved sundew (*Drosera intermedia*). Many of these species migrated from eastern populations in the U.S.

Sand habitats of the Green River host the Blanding's (*Emydoidea blandingii*) and Illinois mud (*Kinosternon flavescens*) turtles, Queen-of-the-Prairie (*Filipendual rubra*) and broomrape (*Orobanche ludoviciana*).

The Illinois River sands are the southernmost deposits in Illinois. They are characterized by the Illinois chorus frog (*Pseudacris streckeri*), Illinois mud turtle, Arogos skipper (*Atrytone arogos*), regal fritillary and silvery bladderpod (*Lesquerella ludoviciana*).

Finally, the sands of the Mississippi River stretch along the northern third of the state. The sand prairies here provide habitat for the upland sandpiper (*Bartramia longicauda*), loggerhead shrike (*Lanius ludovicianus*) and western hognose (*Heterodon nasicus*) and lined (*Tropidoclonion lineatum*) snakes. Rare plants found there include the large-flowered beard tongue (*Penstemon grandiflorus*), false heather (*Hudsonia tomentosa*), blue grama (*Bouteloua gracilis*), James' clammyweed (*Polanisia jamesii*) and fragile prickly pear cactus (*Opuntia fragilis*).

The "Deserts of Illinois" remain because of their dry nature, and the sand is "forgiving." The conservation of these areas is critical to the endangered species of Illinois.


(Photo courtesy Michael Jeffords.)

—**Randy Nyboer**, Illinois Endangered Species Protection Board

Southern Illinois' exposed rock cliffs are one of Illinois' rarest habitats.

The Shawnee Hills Cliff Communities

Cliff communities are among the most variable and harsh of the biotic communities in southern Illinois.

A cliff community is characterized as a natural exposure of bedrock along with the associated variety of soils, rock debris and plants and animals that inhabit it. Characteristics of the associated community are determined by composition of the exposed rock, rainfall, elevation and direction of exposure. In these communities, the soil is thin or absent, the parent material is at or near the surface, and they are maintained at an early stage of succession by the substrate or by natural disturbance.

The Shawnee National Forest is the primary caretaker for the high-quality examples of Shawnee Hills cliff communities remaining in Illinois. The Shawnee Hills region is an area of unglaciated uplands with rugged topography, with many escarpments, bluffs and ravines, and it is restricted to southern Illinois, southwestern Indiana and western Kentucky. In Illinois, the Shawnee Hills are located in the far southern portion of the state where they form a band from Fountain Bluff along the Mississippi River on the west to the mouth of the Wabash River on the east and south to the edge of the Ohio River lowlands.

(Photo courtesy Joe McFarland.)

There are seven biotic communities on, or in close association with, the cliffs in this region—dry limestone cliffs, moist limestone cliffs, dry sandstone cliffs, moist sandstone cliffs, sandstone overhangs, limestone talus and sandstone talus.

These rare communities, and the associated sensitive species, face several significant threats, including: physical damage by human use (mining, quarrying, logging, rock climbing); human use of sandstone overhangs and rock houses; increased rate of erosion; a decrease in moisture regime, or increased drying and shading of microhabitats; herbicide use in the vicinity; and changes upstream or upslope that could change water-flow patterns.

One of the most successful conservation and protection programs has been the designation of Special Use Areas within the National Forest system in which certain activities, such as logging, off-road vehicle recreation, or other potentially destructive activities are restricted. In Illinois this includes such well-known sites as Bell Smith Springs Ecological Area, La Rue-Pine Hills/Otter Pond Research Natural Area, Little Grand Canyon/Horseshoe Bluff Ecological Area and Lusk Creek Canyon Ecological Area.

—**Steven R. Hill**, Illinois Natural History Survey, Champaign

French's shootingstar (*Dodecatheon frenchii*)

(Photo courtesy Michael Jeffords.)

Nineteen plants designated as endangered or threatened in Illinois grow on, or in close association with, cliffs in the Shawnee Hills: Bradley's spleenwort, black-stem spleenwort, American barberry, Ofer hollow reedgrass, Bellow's-beak sedge, black-edged sedge, red honeysuckle, yellow honeysuckle, short-sepaled beardtongue, shortleaf pine, southern sanicula, early saxifrage, ovate catchfly, filmy fern, French's shootingstar, rock clubmoss, rock chestnut oak, American orpine and small flower-of-an-hour. At least two plant species formerly known on the cliffs have disappeared from the state in recent years: starry cleft phlox and barren strawberry.

Legislation alone can't save rare plants and animals. The fate of our natural world depends on you.

What Can You Do to Help?

■ **Volunteer Your Time:** From the Plants of Concern Program volunteers (who monitor more than 25 subpopulations of endangered and threatened species) to volunteers monitoring rare species of orchids to participants in the annual Christmas and spring bird counts, teams of Illinois citizens contribute countless hours assisting local, state and federal land managers and biologists manage and protect native flora, fauna and habitats.

■ **Make a Donation:** Not only do adults make contributions to the Wildlife Preservation Fund, so do youth. Rogers Elementary School in Marquette Heights raised nearly $11,000 from 1996 through 2005 and each year earmarked funds to assist in the recovery or management of one Illinois species. Species included the red-shouldered hawk, barn owl, Illinois mud turtle, massasauga rattlesnake, Indiana bat, river otter, listed freshwater mussels and Franklin's ground squirrel.

■ **Support Education Programs:** Encourage the use of Illinois-specific natural resource education materials in your local schools. Several divisions within DNR produce educational materials suitable for classroom use. Visit www.dnr.state.il.us/lands/education.index.htm for a list of available materials.

■ **Report Potential Violations:** The "Target Illinois Poachers" program provides a system for concerned citizens who witness a conservation offense to report the violation. Simply defined, "poaching" is the illegal taking or possession of game and non-game animals, fish or other resources. Call 1-877-2DNRLAW (1-877-236-7529).

■ **Conserve Habitats:** Offer your assistance in the purchase and management of critical habitats. Join a local organization on a work day to replant river banks with native plants, clean up a river, remove invasive species from a prairie and other habitat restoration projects.

■ **Plant Natives:** Ask your nursery operator to help you select plants native to your area. While there, stress the importance of and reasons for minimizing the use of non-native plants.

■ **Control Introduced Plants and Animals:** If you own an aquarium or water garden, do not release unwanted aquatic vegetation and animals into lakes, rivers and streams. For more information visit www.habitattitude.net.

■ **Join an Organization:** Many community groups are dedicated to conservation activities and would appreciate your help.

■ **Make Your Voice Heard:** Tell your family and friends, and write letters and articles for your local newspaper, about endangered and threatened species and rare habitats.

(Photo courtesy Adele Hodde.)

In addition to Illinois taxpayers making donations to the Wildlife Preservation Fund during tax season, donations are also made throughout the year by other wildlife supporters, including Illinois school children.

What's Happening

January Calendar of Events

January						2007
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

To learn more about this photo, visit www.dnr.state.il.us/OI/calendar/index.htm.

January 9

Eagle Watching Programs, Pere Marquette State Park, Grafton. Programs begin at the Visitors Center at 8:30 a.m. Call (618) 786-3323 to reserve your spot. Program repeats on Jan. 22-23, 27-31, Feb. 3-4.

January 10-14

Chicagoland Outdoors Show. See NewsFront.

January 11

Last day to apply for spring turkey, second lottery.

Archery deer and turkey seasons close statewide.

January 12

Wonders of Winter Walk, Giant City State Park, Makanda. Moderate 1-mile hike. 1-2:30 p.m. Call (618) 457-4836 for information.

January 12-14

Late winter antlerless deer season in select counties.

Special CWD season in CWD counties.

Chicago Muskie Show, Harper College, Palatine. Visit www.chicagomuskieshow.com or call (847) 328-6200 for information.

January 13

Mad about Mammoths and Mastodonts Super Saturday, Illinois State Museum, Springfield. 10 a.m.-4 p.m. For information, call (217) 782-6044.

Eagle Days, Old Chain of Rocks Bridge (Jan. 13-14). 9 a.m.-3 p.m. Call (314) 416-9930 for information.

January 14

Brant, Canada, snow and white-fronted goose season closes in North Zone.

Winterfest, Volo Bog SNA, Ingleside. Noon-4 p.m. For information, call (815) 344-1294.

January 15

Conservation order light goose season opens in North Zone (Jan. 15-March 31).

Pheasant, quail and partridge season closes in South Zone.

January 17-21

Chicago Boat, RV & Outdoors Show, McCormick Place, Chicago. For information, call (312) 946-6272.

January 20

Red fox, gray fox, badger, coyote, raccoon, opossum, skunk, weasel, mink and muskrat trapping season closes in North Zone.

Friends of Giant City Work Day, Giant City State Park, Makanda. Noon-3 p.m. For information, call (618) 457-4836.

Winter Wilderness Weekend, Starved Rock State Park, Utica (Jan. 20-21). 9 a.m. and 1 p.m. For information, call (815) 667-5356.

January 21

Duck season closes in South Zone.

January 22

Rabbit season closes in South Zone.

January 25

Red fox, gray fox, badger, coyote, raccoon, opossum, skunk, weasel, mink and muskrat trapping season closes in South Zone.

January 27-28

Eagle Watch Weekend, Starved Rock State Park, Utica. Eagle viewing and birds of prey shows. 9 a.m.-5 p.m. Call (815) 667-5356 for information.

January 31

Red and gray fox hunting season closes statewide.

Brant, Canada, snow and white-fronted goose season closes in South and Central Zones.

Biodiversity Field Trip grant applications due.

February 1

Conservation Order light goose season opens in South and Central Zones (Feb. 1-March 31).

Last day to submit paper applications for FY08 C2000 Ecosystem Project Grants.

February 3

Illinois Conservation Foundation Hall of Fame Banquet, Crowne Plaza, Springfield. 5 p.m. For tickets, call (217) 785-2003.

Cross-Country Ski Weekend, Matthiessen State Park. Utica (Feb. 3-4). 9 a.m. and 1 p.m. Call (815) 667-5356 for information.

6th Annual Eagle Days Festival, Havana. Visit www.scenichavana.com for information.

February 6

St. Louis Boat Show, Missouri (Feb. 6-11). Visit www.stlouisboatshow.com for details.

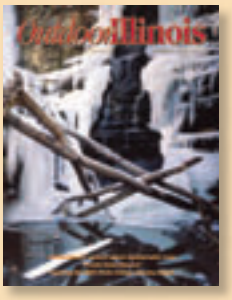
Nature Preserves Commission meeting, Emerson Building, Springfield. 10 a.m. For information, call (217) 785-8686.

2006 *Outdoor*Illinois Index

January 2006

Ogden Mounds. Central Illinois' Ogden-Fettie mounds mark the location of a pre-historic Native American community containing nearly 30 burial mounds.

Also: the sportsman's tax, the Illinois Wildlife Action Plan, historic postcards, beagle rabbit hunt, bird feeders, cement kiln dust.



February 2006

"Prairie State Seasons." *Outdoor*Illinois' second annual photographic issue featuring the 2005 Photo Contest winning entries.

March 2006

Horseshoe Lake State Park. At Horseshoe Lake, an ancient river bend provides thousands of acres of outdoor opportunity—with a view of a different arch.

Also: dogs and shed antlers, walleye circuit, ruffed grouse, paddlefish tagging, taxidermy, prairie gardens, aquarium invasives, Illinois big buck recognition program.

April 2006

Walnut Point State Park. Picturesque Walnut Point State Park offers visitors diverse recreational programs.

Also: shorebirds, nearshore fishing, the Illinois Forest Legacy program, modern history of wild turkeys, shad fishermen.

May 2006

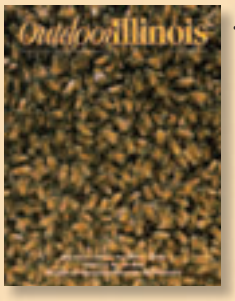
Chain O'Lakes State Park. Where Water Rules the Prairie. At Chain O'Lakes State Park, Illinois' largest concentration of lakes attracts everything from eagles to otters...and you.

Also: wood warblers, introduced plants, hogging for catfish, Better Fishing Association, plant a river, Chicagoland fishing rodeo.

June 2006

I & M Canal—Part 1. Wedding of the Waters. The Illinois and Michigan Canal is a historically rich artery of travel, connecting the East Coast to the Mississippi River.

Also: fish management, Chicago shipwrecks, lightning, fireworks safety, pumpkinseed, keeping our parks safe, mayapple.



July 2006

I & M Canal—Part 2. A Ribbon of Progress. With each step along the 96-mile Illinois and Michigan Canal, visitors retrace a significant path in Illinois' history.

Also: honeybees, moths, fishing on the Fox River, off-highway vehicle grant program, quail research.

August 2006

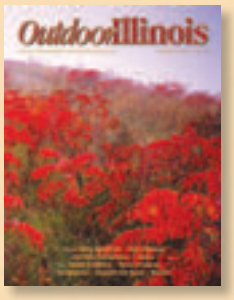
World Shooting and Recreational Complex. A New Lease on an Old Tradition. Thousands flock to Illinois' new WSRC to witness the transition of a 100-year-old competition.

Also: goldenrod galls, ancient bison discovery, building fish passages, puffballs, red fox.

September 2006

River-to-River Trail. Shawnee Ramble. The River-to-River Trail offers horseback riders and hikers hours—and even days—to explore the splendors of southern Illinois.

Also: Nachusa Grasslands, Perdew Museum, bowfishing, pawpaws, mine rescue squad, fall wildflowers, doe management, INHS Library.



October 2006

Ferne Clyffe State Park. Overlooking History. Visitors at Ferne Clyffe State Park can take in a priceless view at this celebrated southern Illinois destination.

Also: rock climbing, fall color destinations, sumac, family traditions, forest products, persimmons, emerald ash borer, shrews.

November 2006

Shelbyville State Fish and Wildlife Area. From summer angling to winter waterfowling, Shelbyville State Fish and Wildlife Area offers sportsmen thousands of acres of opportunity.

Also: urban coyotes, duck blind tradition, beaver lodge "Castorcam," avian bird flu, bull hog, deer hunting.

December 2006

Land Acquisition. The Natural Areas Acquisition Fund is protecting Illinois' crowning habitat gems—and creating recreational opportunities.

Also: nature art, wild game recipes, winter storms, cabin fever, walleye, Ashley Bishop.