The Eastern Massasauga Rattlesnake at Allerton Park

The eastern massasauga rattlesnake (Sistrurus catenatus) is one of the smallest rattlesnakes in North America, and by most accounts, it’s also the rarest. In Illinois, only three or four populations remain; one of these is at Allerton Park in Piatt County.

At the time of European settlement, the massasauga could be found in New York, Pennsylvania, Ohio, Indiana, Ontario, Michigan, Wisconsin, Iowa, Missouri, and the northern two-thirds of Illinois. An 1893 account of the abundance of the massasauga in Illinois states: “On the prairies of Illinois, before the country became thickly populated, these reptiles were extremely abundant, and the killing of two or three dozen of them in a season was not an unusual thing for a farmer’s boy. Now, in that same region, not one is seen in years.” Thus, by 1893 the massasauga was already in decline and its status has only gone downhill since. Because of habitat destruction and outright persecution, it is found only in scattered colonies across its former range, where it is afforded legal protection at the state and province levels.

There have been records of sporadic encounters with massasaugas in the vicinity of Allerton Park and surrounding towns since 1937, but historically, S. catenatus probably existed all along the Sangamon River in Piatt and Champaign counties. In the early years of the operation of the Allerton Estate as a park by the University of Illinois, rattlesnakes were routinely moved from areas of high human traffic on the north side of the Sangamon River (such as the lawns and formal gardens) to the restored prairie on the south side. This practice continued into the early 1980s when the number of encounters on the north side dropped to less than one per year and then stopped altogether.

In spring of 2000, Eric Smith, a regional Heritage Biologist with the Illinois Department of Natural Resources, asked if it would be worthwhile to start searching for massasaugas at the restored prairie at Allerton. Because so many individuals had been moved to this area from across the river, it seemed reasonable to expect that some had survived. Organized searches utilizing volunteers were started in spring 2000, but no massasaugas were encountered. In June of 2000 a University of Illinois graduate student saw a massasauga sunning on one of his mammal traps near the Allerton prairie. This observation led to renewed efforts to find an adult...
Wetlands of the Upper Sangamon River Watershed: Comparisons to the National Wetlands Inventory

Beginning in 2002, a comprehensive study of wetland habitat within the Upper Sangamon River watershed of central Illinois was initiated. Encompassing more than 1,400 square miles, the Upper Sangamon watershed is representative of many other watersheds within Illinois, dominated by rowcrop agriculture. Because of the large size of the watershed and uneven distribution of wetlands, sections (generally one square mile in size) were stratified and then randomly selected from across the watershed; 80 sections were investigated.

One aspect of this study was to compare existing wetlands to those identified in the National Wetlands Inventory (NWI). Conducted in the 1980s, the NWI was a comprehensive, remote sensing-based wetland mapping and classification scheme conducted across Illinois and the nation. Wetland data from the NWI are often referenced when discussing the status of Illinois wetlands. Wetlands in this study refer to “jurisdictional” wetlands only, those meeting the federal definition of a wetland. For example, many man-made ponds do not meet this definition.

Overall, the NWI mapped 371 wetland sites across the sampled area. Our study indicated that only 46% of these were actual wetlands. Only about 4% had been destroyed, but 50% had been misclassified as wetlands, when, in fact, they were not. A large part of this inaccuracy was attributable to wetlands identified as “farmed.” Sixty-nine of these farmed wetlands were identified in the NWI; however, only three of these were actual, functional wetlands. The NWI also failed to identify 33 other wetlands.

Inaccuracy in the NWI was not evenly spread throughout the watershed (Fig. 1) or across wetland types (Fig. 2). Of the wetland sites identified by the NWI and associated with the Sangamon River and its floodplain, most were found to be jurisdictional wetlands. However, fewer of the NWI-identified wetlands associated with the major tributaries of the Sangamon River were determined to be actual wetlands. In the upper reaches of the watershed, a mere 6% of wetlands classified by NWI were found to be jurisdictional wetlands. Of the misclassifications in the upper reaches of the watershed, 70% were attributable to NWI-identified emergent wetlands that were farmed.

From a wetland habitat standpoint, little has changed since the NWI. However, there is substantially less wetland habitat than suggested by the NWI. Although many of these sites still exist, particularly forests and ponds, they are not considered jurisdictional wetlands and, thus, are not afforded the protection status given wetlands. Also, recent regulatory changes have limited the protection for wetlands not associated with streams and rivers (such as many ponds), thereby making many of these wetlands even more vulnerable to destruction. The large number of farmed wetlands identified in the NWI is also very misleading. Although most of these sites, typically just shallow depressions in the landscape, still exist, it is inaccurate to consider them functional wetlands. They are farmed in all but the wettest years, are mostly unvegetated except for planted corn or soybeans, and provide virtually no wildlife habitat. In general, very little functional wetland habitat occurs in this watershed outside of the Sangamon River, its major tributaries, and their associated floodplains.

Brian Wilm, Jeff Matthews, Liane Cordle, and Jesse Kurylo, INHS Center for Wildlife and Plant Ecology
Arthropod Diversity in the Calumet Region

The Calumet region in southeast Chicago was once approximately 20 square miles of sand dunes, swales, and wet prairie forming one of the most significant wetland complexes in the Midwest. In 1848 the Illinois & Michigan Canal opened, connecting Lake Michigan to the Illinois River. This water passage connected the Great Lakes to the Gulf of Mexico and was the start of an industrial boom in the Calumet region. Over the next 100 years this flat grassy wetland felt the impact of the steel industry, railroads, and other industries such as brick, glass, paint, and petroleum products. When the steel industry collapsed in the 1970s, it and other area industries had left their impact on the entire Calumet region. Most undeveloped properties had suffered some level of environmental degradation. Most of this degradation came from the dumping of slag, industrial wastes, and dredge spoils from the Calumet River.

From 1980 to 2000 there was increasing interest in the Calumet, especially in the conservation of the remaining undeveloped sites. In 2002 the Calumet Ecological Management Strategy was adopted. This plan has two components, one industrial the other open space. It recommends approximately 3,000 acres for industrial development and 4,800 acres to become part of an open space reserve. Preserve, Improve, and Create (PIC) are three words that are at the heart of this plan for the Calumet Open Space Preserve. PIC presents a framework for land managers in the area. Preservation of the remaining higher-quality sites is a key component. Many of the highly degraded sites have been or are slated for transfer to the City of Chicago. Plans for these sites are to improve and create habitats on them. The goal is rehabilitation not restoration, the latter an impossible task.

Sites in the area that will undergo significant rehabilitation are Hegewisch Marsh, Indian Ridge Marsh, Marion Byrnes Natural Area, Van Vlissingen Prairie, Big Marsh, and Indian Creek. For most of these there is a list of plants, reptiles and amphibians, birds, and mammals but very limited data on invertebrates, with the exception of some groups such as butterflies and dragonflies.

During the spring, summer, and fall of 2001, Indian Ridge Marsh, Hegewisch Marsh, and Indian Creek were extensively sampled for invertebrates. The goal was to develop a baseline list of the species present prior to the planned rehabilitation efforts. A variety of sampling techniques was used varying from pitfall traps, malaise traps, vacuuming and sweeping vegetation, aquatic disc samplers, dredge bottom samplers, and black lighting. Insect material from these collections has been sorted to order and, when expertise was available, to family, genus, and species. For most orders it was not possible to identify the taxa to species; however, with the exception of the flies, all were sorted into morphospecies. Over 1,600 morphospecies were present. Flies were the most abundant group collected. No expertise could be found to work through these collections of flies; however, we did sort one of the largest collections taken in a malaise trap over a two-day period. In it were at least 120 different morphospecies. Based on the composition of this one sample, we estimate that 500 or possibly as many as 800 fly species may be in these collections. Two graduate students at the University of Illinois sorted through the parasitic wasps. Their final tally for this diverse group was over 900 morphospecies. These are insects that live parasitically on other insects. Although there is no data set available for comparison, this seems like a pretty diverse system.

How many taxa might there be in a higher-quality site in the area? Powder Horn Forest Preserve in the Calumet is the closest to presettlement conditions. A similar base level survey of this and two other sites began in 2003 and will continue for another year. As the collected material of these sites is sorted to morphospecies level, we will have the ability to compare species diversity and composition across sites with very different histories.

David Voegtlin, INHS Center for Ecological Entomology
World-renowned waterfowl researcher Dr. Frank C. Bellrose passed away from complications following surgery on February 19, 2005. He was 88 years old. Dr. Bellrose had a remarkable 67-year professional career that began at the Illinois Natural History Survey in 1938—an association that continued until his death.

Bellrose was born in 1916 in Ottawa, Illinois, on the Illinois River where he developed his lifelong interest in waterfowl and wetlands. He received his B.S. in zoology from the University of Illinois and began working for the Illinois Natural History Survey (INHS) in 1938. His extensive research studies conducted from the INHS field station located on Chautauqua National Wildlife Refuge near Havana, Illinois, included the migration and orientation of waterfowl; dynamics of waterfowl populations; life history, ecology, and management of the Wood Duck; ecology of aquatic and marsh plants; and the ecology of the Illinois River.

Bellrose began a study of Wood Duck nesting in the late 1930s. Eventually, he would develop predator-proof nest boxes. Wood Duck breeding biology, population dynamics, and evaluations of various types of nesting houses became career-long projects for Bellrose. He began a study of the ecology of aquatic, marsh, and moist-soil plants in the bottomland lakes of the Illinois River valley in the summer of 1938 and continued it periodically for more than 40 years. Through this long-term study, the detrimental effects of sedimentation upon the lakes of the Illinois Valley became apparent.

Bellrose initiated waterfowl surveys in the Illinois River valley from the ground in 1938. He began using a light aircraft in 1946, and the time required for a comprehensive inventory was greatly reduced, while the area covered was noticeably expanded. Waterfowl data, derived from these ground and aerial estimates, were incorporated into numerous studies. The aerial inventory of waterfowl continues to be an important part of the INHS waterfowl research program.

Pioneering work on lead poisoning as a mortality factor among waterfowl was one of Bellrose’s most important contributions. His research was a major factor in the gradual replacement of lead with nontoxic shot for waterfowl hunting in the United States and other countries as well.

Bellrose’s world-renowned book, *Ducks, Geese and Swans of North America*, was published in 1976 and has sold more than 350,000 copies. His latest book, co-authored with Daniel Holm, *Ecology and Management of Wood Duck*, was published in 1994. Both of these classic compendiums received The Wildlife Society’s Book Publication of the Year Award. Bellrose published more than 110 scientific and popular articles. His name is virtually synonymous with “ducks” throughout the world.

In recognition of his long and productive career, Western Illinois University, Macomb, Illinois, awarded Bellrose an honorary Doctor of Science degree in 1974, and McMurray College, Jacksonville, Illinois, recognized him with a similar degree in 1995. He received the Aldo Leopold Award, the most prestigious professional award of The Wildlife Society, in 1985. February 1, 1988 was declared “Frank Bellrose Day” in Illinois by Governor James Thompson. In 1992, the Illinois Department of Conservation dedicated its Cache River Wetlands Project, which includes the Frank Bellrose Waterfowl Reserve. He retired from the INHS in 1982 but retained an Emeritus status and was active in waterfowl research until his passing.

The Waterfowl Research Laboratory of the Illinois Natural History Survey’s Forbes Biological Station near Havana, Illinois, was officially named the Frank C. Bellrose Waterfowl Research Center in 1997. The naming of the Waterfowl Research Laboratory in his honor recognized the important contribution of Bellrose’s work to waterfowl ecology and management throughout the world and the Illinois River where he spent his entire life and professional career. Other places named in his behalf include The Bellrose Preserve in southern Illinois, and Bellrose Island and Bellrose Trail near Havana. Alexander Griswald Marsh in Manitoba, Canada, was dedicated to Bellrose by the Illinois Chapter of Ducks Unlimited.

In 2001, Bellrose was selected as a charter inductee into the newly established Illinois Outdoor Hall of Fame, a program of the Illinois Department of Natural Resources’ Illinois Conservation Foundation, in recognition of his lifelong commitment to natural resource protection and outdoor recreation in Illinois.

Bellrose’s lifelong dedication to waterfowl research was a shining example to peers throughout the profession. His commitment to furthering our understanding of the waterfowl resource continues in the present with his recent revision of the classic *Ducks, Geese and Swans of North America*.

Frank was a common and compassionate person who was blessed with a love

Continued on next page
Bellrose

Continued from previous page

for nature and an unlimited curiosity to unravel its mysteries. His passions were waterfowl and the Illinois River, both of which received his undivided attention for more than 70 years. Wherever ducks or the Illinois River are discussed, one name is always mentioned—Frank Bellrose.

Frank’s timing was remarkable. He was the right person at the right time at the right place. Frank began his career at the birth of wildlife management and research, and he shepherded them through infancy to maturity. Few have had that good fortune. The Illinois Natural History Survey provided Frank the unrestrained opportunity to exercise his relentless pursuit of nature’s mysteries in an era when little was known and recorded.

Dr. Stephen P. Havera, a long-time colleague of Bellrose recollected, “I noticed that wherever I went, whether it was professional meetings, banquets, duck clubs, or just a gathering of waterfowl people, that if Frank was present everyone would gravitate toward him. If Frank wasn’t there, it wasn’t long before I heard the inevitable question—‘How’s Frank?’ To me, that example of personal magnetism and a simple question captures the essence of respect and friendship Frank had among all walks of life.

“Although waterfowl was Frank’s passion, his family was his love. He told me numerous times that another award doesn’t mean anything, that his family and what people thought of him as a person were much more important.”

Frank and his wife, Esther, traveled extensively throughout North America. They were blessed with two sons, Ron (Sandra) and Frank Jr. (Becky), and four grandchildren.

In 2002, in keeping with Frank’s lifelong commitment to habitat and wildlife, the Bellrose family protected a segment of their farm along Sugar Creek in Logan County by dedicating it in perpetuity as the Sandra Miller Bellrose Nature Preserve.

Memorials can be made in Frank Bellrose’s honor to: The University of Illinois—Frank C. Bellrose Waterfowl Research Center, and sent to: Illinois Natural History Survey, Frank C. Bellrose Waterfowl Research Center, P.O. Box 590, Havana, Illinois 62644.

Stephen P. Havera and April Burgett, INHS Center for Wildlife and Plant Ecology

Bellrose examines a nesting box on the Mississippi River at Nauvoo, Illinois.

Bellrose installs a Wood Duck nesting box that he developed in the 1940s.

Bellrose poses with the Anax, once a floating laboratory for studies of the Illinois River.

Frank Bellrose in his office at the INHS Forbes Biological Station near Havana, Illinois.
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Subgenus *Onagrandrena*
Wallace E. LaBerge and Robbin W. Thorp

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The serial publications of the Survey have a remarkable history. *The Bulletin* has been published continuously since 1876, and *Biological Notes*, since 1933. Each issue of these research-oriented publications is mailed to various scientific and educational institutions throughout the world; additional copies are requested by ecologists, conservationists, and others throughout the nation. *Circulars*, by contrast, are usually “how to” publications written for a general audience. Manuals, published at irregular intervals since 1936, provide detailed descriptions and illustrations of a particular group of species, such as wildflowers or freshwater mussels. The content of *Special Publications* varies widely; recent sample subjects include a landowner’s guide to amphibian conservation and the history of the Forbes Biological Station.

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Gifts to this fund support introductory or otherwise hard-to-fund projects concerning the form, distribution, and function of Illinois’ aquatic ecosystem heritage. For more information, contact John Epifanio, Director of Center for Aquatic Ecology and Conservation (217-244-5059).

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This fund supports introductory or otherwise hard-to-fund projects concerning biodiversity in all its forms. For more information, contact Geoff Levin, Director of Center for Biodiversity (217-244-7481).

**Entomology for the Ages Fund**
This fund honors Dr. William H. Luckmann, who was a researcher and administrator for applied entomological programs at the Illinois Natural History Survey from 1949–1984. The Luckmann Award, first granted in 1994, is given annually to a student in applied entomology to support travel to a professional meeting. For more information, contact the INHS Center for Ecological Entomology at 217-333-6656.

**Philip W Smith Memorial Fund**
This fund, established by the family and friends of Dr. Philip W. Smith, honors his long and distinguished career at the Illinois Natural History Survey (1942–1979) and the University of Illinois (1965–1979). It supports research in all areas of natural history. For more information, contact Geoff Levin, Director of the Center for Biodiversity (217-244-7481), or visit www.inhs.uiuc.edu/~glevin/RossSmith.html.

**R. Weldon Larimore/Jordan Creek Award Endowment Fund**
Established by the family and friends of Dr. R. Weldon Larimore, this fund honors Dr. Larimore’s long and distinguished career at the Illinois Natural History Survey (1946–current) and the University of Illinois (1969–1988). It supports research in stream ecology. For more information, contact John Epifanio, Chair of the Fund’s selection committee (217-244-5059).

**Warren Brigham Memorial Fund**
This fund honors the memory of Dr. Warren Brigham, a leader in the application of GIS to natural history research and a specialist in aquatic beetles. It supports projects that involve computers and/or beetles with preference being given to proposals that make spatial information about water beetles available via the Internet. For more information, contact Mark Wetzel (217-244-2108).

**INHS Library Endowment Fund**
The goal of this fund is to help the library continue to build its excellent collection, which dates to the Survey’s founding in 1858. The INHS Library serves a wide range of users, including Survey scientists, University of Illinois faculty and students, and the public. For more information, contact Beth Wohlgemuth, Librarian (217-244-4907).
“This woodland pond is temporary, created by snowmelt. By midsummer, evaporation will have claimed its contents and only a low spot in the forest will recall the pond of April.”

Larry Weber

Backyard Almanac 1996

Temporary pools, variously called vernal, ephemeral, or seasonal, are a type of wetland once common in the landscape. These pools developed from the scouring process of the ebb and flow of flooding rivers, streams, and lakes; through wind action; or from depressions created by trees that tip over. These pools are shallow, temporary, and separated from streams and rivers. Their defining characteristics are that they periodically dry up and do not contain fish. While the drying may occur annually or only in drought years, by late summer they are usually dry. It is this temporary aspect of these wetlands that make them valuable. The wet-dry cycle prevents fish from becoming established, allowing for critical breeding and rearing habitat for amphibians, insects, and crustaceans, including the fairy shrimp.

Fairy shrimp are crustaceans with gills, head and thorax fused into a cephalothorax, and two pairs of antennae. In temporary pools fairy shrimp are easily identified. They are 0.5 to 1.5 inches long, with stalked compound eyes, two sets of antennae, and 11 pairs of leaflike swimming legs. Fairy shrimp can range in color from translucent whitish to blue, green, or red-orange. Their coloration is determined by the food supply in the pool. Microscopic organisms such as algae, bacteria, and protozoa, along with bits of detritus are the main food supply. The movements of the shrimp’s legs serve not only as a means of obtaining food, but also aid the shrimp in taking up oxygen from the water.

Fairy shrimp move along the bottom or glide about gracefully (usually upside down) by beating their legs, resulting in a wavelike front-to-back motion. Sometimes they rest on the bottom or drift slowly; other times they dart rapidly.

Reproduction begins when the male clasps the female with his antennae. The pair may swim clasped together for several days, but once mating occurs the male dies. A female can produce two types of eggs—summer and winter. Summer eggs are thick-shelled and once released, fall to the bottom of the pool. These eggs can withstand unusual amounts of heat, cold, and desiccation. When the pool refills in the spring, these eggs usually hatch in 1–2 days after being exposed to water. Winter eggs can be carried from pool to pool by traveling animals or by the wind if the pool dries out completely.

The egg hatches as a nauplius (a type of crustacean larva) and develops in a series of instars. The fairy shrimp continues to molt until it reaches 20 segments. The speed of development tends to reflect the amount of time water remains in the pool, but is usually around 16 days. Due to their ephemeral nature, fairy shrimp have few predators. The limiting factor in fairy shrimp populations is the need for 1 part per million dissolved oxygen in the water they inhabit and, of course, the temporary pools.
Many species of crustaceans live in Illinois, most of them in or near the water. See if you can match the drawings on the left with the names and descriptions of the groups of common crustaceans that can be found in Illinois. Write the letter of each animal in the blank on the left of its matching description below.

1. **Fairy shrimp** (anostracans) appear to swim upside-down, with their many swimming legs reaching upward from the body. They only appear after spring rains and must complete their life cycle before the pools dry up. The eggs withstand drying and freezing to hatch when the area floods again, sometimes years later.

2. **Crayfish** (decapods) have 10 pairs of legs. The first pair has large, pincherlike claws or chelae. They resemble lobsters.

3. **Freshwater shrimp** (decapods) have 10 pairs of legs like their crayfish cousins, but the pincherlike claws are much smaller. They are slightly flattened laterally (from side-to-side).

4. **Water fleas** (cladocerans, such as *Daphnia*) are round, tiny crustaceans that swim with their long antennae. They give birth to live young, which can be seen inside the transparent shell of the mother.

5. **Water fleas** (copepods, such as *Cyclops*) are tiny crustaceans that are difficult to see without a microscope, and are considered plankton. They have large heads that taper to an elongate body. There is often a single eye on the head.

6. **Seed shrimp** (ostracods) are tiny crustaceans that have their entire body enclosed within a clamlike shell. The shell has two halves that are hinged along the back. They often crawl along sediment or vegetation in water. They sometimes swim in the water column by beating their antennae.

7. **Pill bugs and sowbugs** (isopods) are either aquatic or terrestrial. The terrestrial species are usually found in moist areas, such as under logs and leaf litter. The pill bugs can roll into a ball when disturbed.

8. **Scuds or side swimmers** (amphipods) are small, shrimplike crustaceans that burrow in loose sediment and plant debris in still water. They are very flat from side to side and scuttle along through the sediment on their sides.

Answers and drawing credits on preceding page
Massasaugas
continued from front page

snake. In 2001, Eric Smith organized another spring search after prescribed burns, but without a single massasauga encounter. Finally in April 2002, volunteers Don Shepard and Fran Harty observed an adult male massasauga basking near a crayfish burrow, the snake’s probable hibernation site. This was the break we had been waiting for because we could now implant this snake with a radio transmitter and follow his movements using a receiver. Massasauga males actively search for females during the breeding season, usually July through September, and we hoped that our male snake would lead us to females that might be avoiding our detection with their superb camouflage abilities. Our telemetered snake, nicknamed Al, turned out to be an excellent tracker, leading us to two females by the end of the first summer. Since then, Al has led us to the same two females each year. Both females have given birth over this period, one giving birth twice in three years. We took photographs of the unique dorsal patterns of most of these young snakes and are hoping to recapture them in the coming years.

Even though we have only been able to track one snake at Allerton, the data we have collected on Al’s daily movements and the habitats he is found in have provided input into management decisions made at the prairie. For example, half of the prairie is burned every spring. We have been able to help the managers choose a burn date based on Al’s position in his burrow. If he is close to the surface, we postpone the burn until it is cooler and he goes deeper. We also have gathered information on Al’s use of the burned and unburned halves of the prairie. He uses the unburned half exclusively until the vegetation grows up and then he may move into the burned half. But most importantly Al has allowed us to find the two females and to document successful reproduction. This is a very important piece of information for addressing the future viability of the Allerton population. With more than 20 neonate snakes documented over the past three years, the future of the eastern massasauga at Allerton looks much brighter than it did just a few years ago.

Chris Phillips, INHS Center for Biodiversity