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## Kentucky's shrewd mammals — the Soricids

By Brainard Palmer-Ball

The Bluegrass state is rich in wildlife. More than 450 species of terrestrial vertebrates are known to occur as residents or regular transients within the state including about 100 amphibians and reptiles, more than 300 birds, and nearly 70 mammals. Among the mammalian species, eight occur in a family known as the Soricidae, or shrews. This little-known group is remarkable in several respects, making them among our most intriguing animals.

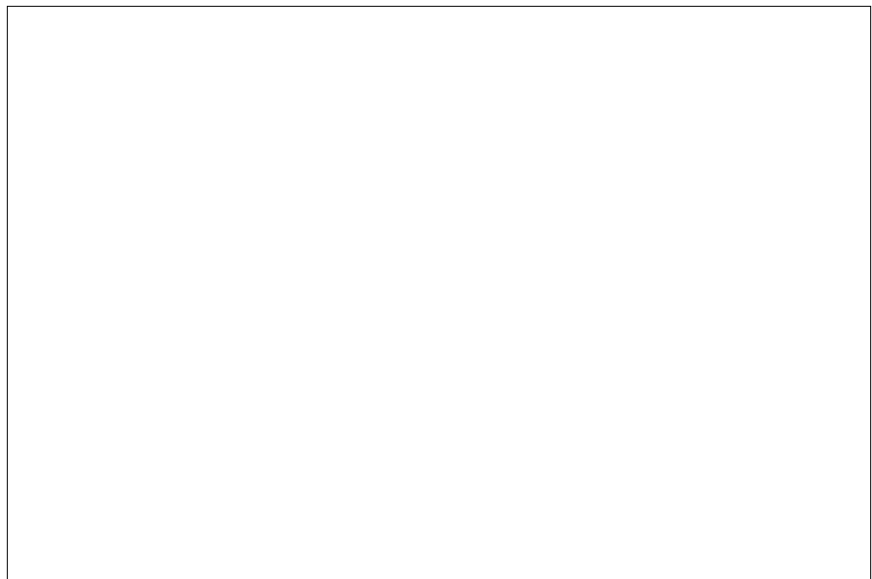
Shrews are sort of like bumblebees, which — according to the laws of physics — apparently should not be able to fly. With shrews, it's the fact that they survive at all that is a miracle. The respiratory rate of shrews has been recorded to be 140 or more breaths per minute at rest and as high as 850 per minute when active! With a metabolism like the engine of a race car, shrews require so much fuel that they must continually forage while awake to survive. Indeed, shrews left in captivity without food often perish within a few hours. With such an active life, these tiny mammals don't last long in the world; most probably live only about a year.

Shrews are somewhat similar to moles but they are smaller and do not have enlarged feet specialized for digging. Together the two groups make up the taxonomic order Insectivora. As the name implies shrews eat many insects, but they

actually prey on a great variety of invertebrates including centipedes, earthworms, spiders and snails. Most species also will feed to some extent on seeds, berries and other vegetable material, especially in winter. The northern short-tailed shrew (*Blarina brevicauda*), our largest species at about five inches in length, is a voracious predator for its size. It will attack and eat other small mammals, including some considerably larger than itself. Such large prey is secured in part utilizing a type of poison that is administered with each bite. The poison is secreted from salivary glands in the jaws and apparently slows the heart and breathing rate of prey and partially immobilizes them.

labyrinth of narrow tunnels beneath the leaf litter of the forest floor or the thick grass and weeds of edges and fencerows. For this reason their eyes are tiny and of little use. Their sense of smell is thought to be poor, as well. But their sense of touch is well developed using the tactile hairs on their long, flexible snouts. The ears are typically hidden within the fur, but their hearing seems to be acute and is likely used in locating prey.

Shrews have scent glands that release a musky secretion that serves in communicating territorial boundaries and reproductive status, and may deter some predators. Most have grayish or brownish, silky fur that is very soft to the touch. Somewhere within their



Northern short-tailed shrew

Photo by John MacGregor

Shrews are busy around the clock, but they seem to be most active at night. Unlike many mammals they don't seem to hibernate, remaining active and continuing to feed beneath the ground throughout the winter. At most any time during the day or year shrews can be found somewhere in a

system of tunnels they construct a cozy nest that lies at or just beneath ground level in which they live year-round. Like other mammals, they give birth to live young and nurse them as they grow. Up to three litters of 3-10 young are raised each year.

# Highlights of the 96<sup>th</sup> Meeting of the Kentucky State Nature Preserves Commission

by Barry Howard

Commissioners and many staff members traveled to Murray State University on June 16 for the quarterly meeting of the Kentucky State Nature Preserves Commission (KSNPC). All of us at the Commission are thankful for the opportunity to hold one of our meetings at such a fine University. We also appreciate the Murray faculty members and students who were able to attend this meeting and participate in our field trip to Terrapin Creek State Nature Preserve the next day.

Among its many attributes, Murray State University is home to the Mid-America Remote Sensing Center, and it owns and manages Murphy's Pond, one of Kentucky's most significant natural areas.

## Personnel

As most of you know, the Commission is currently in the process of searching for and selecting a new executive director. The job announcement for this position was widely distributed and the closing date for applications was June 10. The Commissioners announced at the meeting that they would now begin the process of reviewing applications and selecting the director. This should proceed swiftly, and we anticipate a new director coming on board by the next Commission meeting. We should be able to report to you the name of this individual in our next newsletter!

The Commissioners were notified that, as a result of legislation passed during the recently concluded session of the Kentucky General Assembly, KSNPC will soon have several additional full-time employees. This legislation converted seasonal positions that were staffed for 11

months of the year into full-time positions. Consequently, we will be able to keep year-round four of our dedicated employees whom we have previously had to "lay off" for one month out of every year.

Another important development relating to our staffing level is the creation of a new full-time position for a Pine Mountain Nature Preserves Manager. This position was created by the General Assembly, and we are very grateful to our friends in the legislature who have given us additional resources to protect some very important places along Pine Mountain in southeastern Kentucky. The Pine Mountain preserves are some of the most biologically and aesthetically significant places in Kentucky.

One sad note relating to our employees is the pending departure of Teresa Prather and Sandy Vasenda. Teresa has served the Commission for almost three years as executive assistant to the director and as special projects coordinator. One of the many things she does for us is organize, edit, and publish this newsletter! Teresa is leaving for a new challenge with the state Department of Agriculture. Sandy Vasenda has been our data manager for over a year and has decided to follow her heart to the Center for Institutions, Population, and Environmental Change at Indiana University in Bloomington. Teresa and Sandy have been very devoted to the work of KSNPC and we already miss them.

## Department for Natural Resources Commissioner

Dr. Bill Martin is leaving state government to return to Eastern Kentucky University. Dr. Martin served as Commissioner of the Department for Natural Resources (DNR) for six years. Although KSNPC is an independent agency of state government, we are "administratively attached" to the Department for Natural Resources within the Natural Resources and Environmental Protection Cabinet. We are grateful to Dr. Martin for all of

his help over the years, and look forward to his continuing advice and counsel in his capacity as one of our officially appointed "advisors". Commissioner Martin was instrumental in helping KSNPC acquire the large tract of old-growth forest we own at Blanton Forest, and he was a guiding force behind the creation of the Kentucky Heritage Land Conservation Fund. Both of these achievements continue to be of enormous value to the preservation of the biodiversity of Kentucky.

Hugh Archer is the incoming DNR Commissioner and is also a long-time friend of KSNPC. Hugh's commitment to preserving Kentucky's significant natural areas dates back many years. Hugh was the first director of the Kentucky Chapter of the Nature Conservancy, back in the days when KSNPC and TNC actually worked out of the same building! He helped preserve places such as Bad Branch and in subsequent years served as chairman of our Commission. During Hugh's tenure as director of the Kentucky River Authority, the River Authority purchased and KSNPC dedicated the Kentucky River Authority Palisades State Nature Preserve. We very much look forward to working with Hugh in his new capacity as Commissioner of DNR.

## Preserve Designs

Staff presented preserve designs to our Commissioners for three sites, all of which represent updates or expansions to existing state nature preserves. In simplest terms, a "preserve design" is a package of information consisting of maps, data, and descriptive material which identifies and describes the biological significance of a natural area. This is the first step in identifying land that may one day become part of our state nature preserves system. Preserve designs approved at this meeting were those for Axe Lake Swamp (Ballard County), White Oak Creek (adjacent to KRA Palisades State

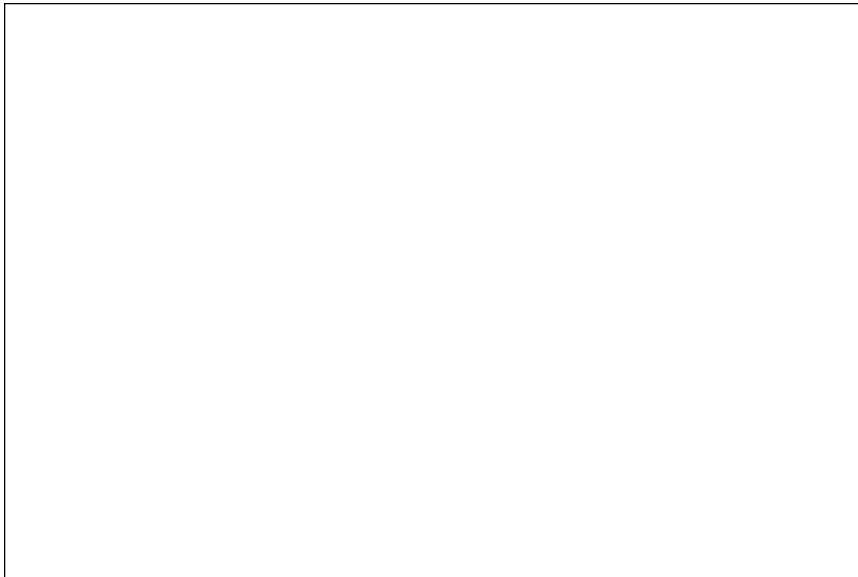
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**Kentucky's shrewd mammals - the Soricids**  
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Several Kentucky shrews are quite common and widely distributed; especially widespread are two closely related species in the genus *Blarina*. Apparently the Tennessee River has served as a barrier to genetic flow between the shrews on either side of it for long enough that they are now considered distinct species — the northern (*B. brevicauda*) and southern

the smoky shrew (*Sorex fumeus*) and the pygmy shrew (*Sorex hoyi*). The latter species occurs primarily in eastern Kentucky, but a few inhabit the knobs and ravines west towards Land Between the Lakes. The pygmy shrew is the continent's smallest mammal, typically measuring less than 70 mm in total length (of which about 25 mm is tail); the average body size is the length of the typed words 'Land Between the Lakes'!

Two other shrews are restricted enough in range in Kentucky that the



**Masked shrew**

(*B. carolinensis*) short-tailed shrew. Short-tailed shrews are the ones most commonly encountered by humans, resembling a tiny, dark gray mole to most people. They have adapted well to the changes that we have made to the landscape and are often brought in by roaming house cats.

The least shrew (*Cryptotis parva*) isn't really our smallest shrew, but it does occur statewide in grassy fields and woodland edges. It has a shorter tail and lighter belly fur than members of the genus *Sorex*. The southeastern shrew (*Sorex longirostris*) is not as widespread as the least shrew but it also favors woodland edges and abandoned fields, especially if they are moist.

Two shrews are relatively common in woodlands of the state,

Commission monitors their status. The masked shrew (*Sorex cinereus*) is considered of Special Concern. There are two distinct areas where this animal occurs in Kentucky. One is in the cool, deciduous forests of the Cumberland Mountains, the other is in the bottomland forests of the Ohio River floodplain in the Shawnee Hills. These two populations represent distinct subspecies. The long-tailed, or rock, shrew, (*Sorex dispar*, KSNPC Threatened) is known in Kentucky only from Pine Mountain, where it has been documented at several sites in Harlan and Letcher counties. Why it is restricted to Pine Mountain is currently a mystery, but a concerted effort to find the rock shrew in other parts of southeastern Kentucky has to this point failed.

Shrews are eaten by a variety of predators, especially owls, but the only real threat to their existence is habitat

loss. The key to protecting our rare shrews is preserving large tracts of their preferred mature forest habitats. The Commission's extensive efforts at protecting natural communities in the Cumberland Mountains have been successful in preserving habitat for these unique creatures — and many others.

## KSNPC 1998 Field Trip Information



### Natural Bridge SPNP

Powell County - August 22

Limit 20; moderate hike.

Reservation deadline: August 1.

### Eastview Barrens SNP

Hardin County - October 10

Limit 20; moderate hike

Reservation deadline: September 25.

### Pilot Knob SNP

Powell County - November 7

Limit 20; difficult hike.

Reservation deadline: October 19.

Tours are limited and reservations will be taken on a first come, first-served basis. Contact Karen Gossett at (502)573-2886 for reservations.

### Field Trip Ratings

moderate... Generally easy with a comfortable pace. Must be able to negotiate occasional steep slope or rough trail.

difficult... More endurance required to negotiate longer distances and longer stretches of steep slopes and rough trail.

# Bug Revelations at Natural Bridge SPNP

by *Ellis L. Lauder milk and Ronald R. Cicerello*  
artwork by *Mary Walter*

Bugs are not usually ranked among the most desirable of friends by the average person. In fact, many people prefer to avoid interactions with bugs at all costs. However, during our recent investigation of the aquatic insect ("bug") community of Upper and Lower Hood branches in Natural Bridge State Park Nature Preserve, we discovered secrets about the preserve that only the bugs could reveal. So, what could the bug community of these two small streams tell us?

Actually, investigations of aquatic insect communities can yield very useful information about the water quality and overall health of a watershed. They may be more useful than periodic monitoring of water quality through chemical analysis because the bugs live in the stream year-round. In some cases, short-term pollution events (e.g., chemical spills) are not detected by chemical analysis, but the bugs are affected. They may also be affected by acute pollution events, or chronic pollutants in low amounts.

Summarizing aquatic insect data in the form of various metrics or indices (i.e., number of species, number of pollution-sensitive species, etc.) allows one to compare streams which are similar in size and to assess the overall quality of the stream ecosystem, providing standard sampling methods and schedules are followed. A commonly used index is the number of species classified as caddisflies, mayflies, or stoneflies (EPT Index). Since these groups are consid-

ered the most intolerant to water pollution, the greater the number of EPT species the better the water quality. Many aquatic insect species have been assigned tolerance values based on their susceptibility to water pollution, and these values may be used to calculate a biotic index which considers all or a significant number of species from a site. Low biotic index values reflect high water quality, while high values reflect poor water quality. We used the North Carolina Biotic Index (NCBI), so named because it was developed in North Carolina.

The two streams yielded 63 kinds of bugs. Of these, 43 (68%) were caddisflies, mayflies, or stoneflies. The NCBI values were low ranging from 1.3 to 2.9, well below the 4.2 value indicative of excellent water quality. These data, and information from previous studies, strongly suggest that both streams are among the best in the Kentucky River drainage.

But what else can be learned by examining the species composition of the community? Many species of aquatic insects that live in small, forested streams are primarily dependent upon the fall leaf-drop for food. This group of organisms is collectively referred to as "shredders" because they specialize in feeding on (shredding) leaves or other organic matter. During this process, smaller pieces not utilized by the shredders drift downstream. Therefore, one of their roles in the community is to break down leaves into smaller components, so insects living downstream can take advantage of a food source not utilized by their upstream associates. Because of the stable nature of the forest in the preserve, a dependable and renewable source of leaves is available. Consequently, some shredder species have a competitive advantage over other species, and were found in both streams.

However, removal of the trees would bring about major changes in

the insect community because of physical and chemical changes in the stream, and the loss of a renewable food source. For example, with the canopy cover gone, sunlight could penetrate to the stream causing an increase in water temperature. Sedimentation would increase initially with the removal of the trees and leaves on the ground. The food source for the shredders would be greatly reduced. With these changes, other insects that are more tolerant of temperature increases, higher sediment loads, and that do not require intact leaves would begin to colonize the stream, displacing the usual inhabitants. These invaders are classified as generalist species, meaning they can live just about anywhere because they have an ability to use a wide range of resources. The physical and chemical changes, in association with a change in the insect community, may lead to changes in the species composition of organisms up the food web (i.e., fishes). Ultimately, the community would change from a composition of predominately specialized members that are dependent on other specialized members to one containing mostly generalists, with fewer species overall.

Consequently, by periodically examining aquatic insect communities one can determine, to some degree, the history of a watershed.

From all indications, the aquatic insect community in Upper and Lower Hood branches is very healthy and stable. However, we have only collected the baseline data, which may now be used for comparative purposes in future investigations. Will the community characteristics change? Only time and the bugs will tell.

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Nature Preserve in Garrard County), and Thompson Creek Glade (Larue County).

**Land Acquisiton and Dedication**

We have closed on three tracts of land in Graves County that will be added to our Terrapin Creek State Nature Preserve. In addition, another landowner has agreed to sell property here, and the state will soon initiate an appraisal on yet another parcel. Although these tracts are relatively small, they contain critical habitat for preserving some of the important wetland features of this site.

At Blanton Forest we have purchased a small parcel that borders the privately-owned old-growth forest tract at this site. This parcel is near a residential area, and development of this parcel would impair the view from one of the prominent vantage points within this forest.

The owners of significant acreage adjacent to our Pilot Knob State Nature Preserve have agreed to sell up to 340 acres to KSNPC. This project will now enter the survey stage. This land is important because it is within the viewshed from the top of the knob, and contains historically significant millstone quarries.

At Hymes Knob in Lewis County, surveys of two parcels should be completed sometime this summer. These tracts will be purchased shortly after the completion of these surveys. It is likely that this site will become our next new state nature preserve.

Also, at this commission meeting, our Commissioners approved Articles of Dedication for a 14-acre addition to the Blue Licks State Park State Nature Preserve. This preserve protects habitat for the federally endangered and globally rare plant, Short's goldenrod (*Solidago shortii*).

**Gap**

After the Commission meeting, participants were treated to a tour of the Mid-America Remote Sensing Center, and as a part of this tour, we were given an overview of Kentucky's GAP project. GAP (which is not an acronym) projects have already taken place in many other states. GAP methodology uses satellite photography and computer technology to identify the "gaps" in preserving a state's biodiversity. The first stage will be to use this technology to map the vegetation of Kentucky. Later stages include using the vegetation data to project the distribution of certain terrestrial vertebrate species, and mapping the existing lands in Kentucky that are managed and protected to some degree. The final stage will be to analyze these data layers and try to extract from them information that will identify those parts of our Kentucky landscape that are missing from our existing network of protected areas.

KSNPC is most grateful to Dr. Tom Kind and his staff for sharing their knowledge of remote sensing and Kentucky's GAP project with us.

**Terrapin Creek**

The field trip to Terrapin Creek State Nature Preserve was well-attended and most enjoyable. This was a different type of field trip for most of us, and included a visit to one of the unique, clear springs on this preserve. We were also fortunate that some of our aquatic biologists were along to demonstrate their skills at sampling these types of habitats. As a result we were privileged to see many of the fishes that live in Terrapin Creek and its associated drainages. Terrapin Creek is the only place in Kentucky that some of these fish live. Thanks to Ellis Laudermilk, Dan Jones, and Thann Grundy for all of their hard work in making this trip so much fun for the rest of us!

Number of different types of aquatic insects by major group at Natural Bridge SPNP.	
Alderflies and fishflies . . . . .	2
Beetles . . . . .	7
Caddisflies . . . . .	14
Dragonflies and damselflies . . . .	7
Mayflies . . . . .	18
Springtails . . . . .	1
Stoneflies . . . . .	10
True Bugs . . . . .	1
True Flies . . . . .	3
<b>Total . . . . .</b>	<b>63</b>

**KSNPC Commission Meeting  
September 22, 1998  
Country Fixins Restaurant  
Munfordville, KY**

# Native Plants - In Their Place

by Deborah White

When talking with people about endangered plants and their plight, many believe we should move them out of harm's way--move them to a safe place. When a rare plant is in the way of development, it's natural to try to consider moving the plant to a protected site. If plants become rare it is logical to think we can grow more of these plants somewhere and spread them to new places. Of course this situation will become more common as undeveloped land becomes scarcer and our native flora disappears. Why won't relocating plants work? Why is this approach to plant conservation flawed?

**Ecosystems are complex.** We don't fully understand all the relationships that contribute to success of an individual population - much less the system as a whole. We know little about the life histories of plants or habitat conditions needed for their successful growth. For example, there is recent evidence that trees have connections with one another and that one tree may supplement the productivity of a neighboring tree. There is new information about complementary plant-fungal relations that contribute to a population's success. Another example is Price's potato bean, a rare Federally protected vine in western Kentucky. All indications were that it would love a year with a lot of rain but we found these populations may decline in wet years. These are examples of relationships and conditions that indicate the complexity of the ecology of plant populations. Not knowing what will happen when we move plants and create new habitats may be acceptable under experimental conditions but too risky when it is used as a permanent solution to plant conservation.

We are concerned about the recipient habitat too. The flora is already functioning at these sites and

other species may be displaced by the introduction of new plants. Consider the outcome of introducing one species as a biocontrol for another species. No one dreamed that the nutria, an animal introduced in Louisiana to control exotic aquatic weeds, would itself become a nuisance. We don't always know what will happen when the natural ecology is manipulated.

**Mortality rates are high for relocated plants and success at creating natural communities is low.**

There is little assurance that a plant will establish at a new place - it may or may not. They could do well for a year or more, then decline. To claim that a plant has become integrated into a new site takes years and if it doesn't work, there is little recourse since the original habitat is gone.

We have learned a valuable lesson from wetland regulations and policies in the 1980's that allowed the destruction of wetlands on the promise that new ones would be created (by scraping out an area and planting wetland vegetation). In Florida, one of the few states to have checked whether these projects have been successful, 97% of the freshwater wetland projects failed. Wetland protection policies now emphasize restoration of existing wetlands and rarely allow creation. Restoration is an essential part of our work to maintain healthy ecosystems, but it cannot substitute for preservation of existing good quality natural communities.

**Mixing populations can be dangerous.** Natural populations of the same plant have a different genetic make up, even species that are very localized in distribution. Mixing in new genes from another population can undermine the plant's ability to react to the vagaries of its environment or could enhance it. Certainly gene exchange occurs between populations, but this is a natural process that occurs very slowly at low exchange levels.

The plant is not always the focus of rare plant conservation--the ecosystem is the focus. The concern is

the loss of that species' contribution to a healthy ecosystem, not the preservation of species in gardens, roadsides, or even anywhere outside its natural distribution. A plant species removed from its native habitat is devalued and disconnected from the natural processes that have contributed to a long adaptive process between the plant and its ecosystem.

Sometimes relocating a plant is the only way to save a species. There have been a few successful re-introductions, where plants from a failing population are grown off-site (from seed or other material from that population) and planted back into the same site after the habitat is restored. In this way the original plants from the site are maintained. A protection plan that results in introducing plants outside of the natural distribution is probably a last ditch effort to save a few of these plants rather than a plan integrated with protection of the ecosystem and habitat for the plant. Not even endangered species biologists agree on where or when species should be moved but we agree that one intact ecosystem is worth more than lots of small pieces of ecosystems. In plant conservation, the whole is worth more than the sum of its parts.

## Did you know?

**KSNPC has 9,576 records of monitored plants, animals, and natural communities in the state of Kentucky? Of these records, 2,758 are species considered endangered by KSNPC; 1,358 are federally endangered.**

# Cleanup at Quiet Trails

**SNP** *by Andrea Hughes*

On May 15th staff members from every corner of our office at 801 Schenkel Lane were working side by side to clean up an old home site on a recently purchased addition to Quiet Trails State Nature Preserve in Harrison County. Some of us who are more accustomed to fluorescent lights and the flickering of our computer monitors than the midmorning sun jumped at the opportunity to spend some time outside of the office and in touch with nature. What we ended up touching were moldy mattresses, a moth- and mildew-nibbled wardrobe, dented dishware and the remains of furniture. Our crew of 11 made short work of the cleanup and three hours later we had one empty house and one full dumpster.

Wildlife encountered included a rat snake, a box turtle, several mice, many wasps and a chimney swift pair nesting in a shed. They give the indication that the site's return to its natural condition has already begun.

After the cleanup, we enjoyed a relaxing potluck lunch hosted by Mr. Bill Wiglesworth, the donor of the original Quiet Trails tract, at his house on the Licking River. Thanks to everyone who helped.

**KSNPC wrecking crew - L to R: Barry Howard, Sandy Vasenda, Amy Covert, Dave Skinner, Andrea Hughes, Brainard Palmer-Ball, Tim Clarke, Joyce Bender, and Bryce Fields**

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## SUBSCRIPTION RENEWAL NOTICE

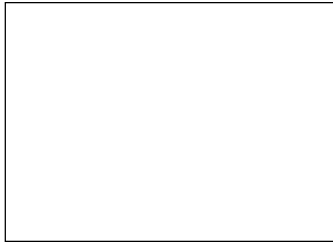
In order for us to be as efficient as possible, we ask that you let us know if you are still interested in receiving our quarterly newsletter. You have several ways of contacting us: 1) tear off this strip and return by mail; 2) call (502) 573-2886; 3) fax (502) 573-2355; or 4) e-mail: [gossett@nrepc.nr.state.ky](mailto:gossett@nrepc.nr.state.ky). We are expecting to have our mailing address database updated no later than November 1. If we do not hear from you by that time, your name will be removed from the mailing list. The Kentucky State Nature Preserves Commission appreciates your continued support.

## Volunteer Profile

by Mary Walter, volunteer artist

I first heard about KSNPC when someone at Shandwick (the PR firm I work for) put a newsletter in my mailbox . . . I suppose, because I am so interested in birds, nature, yadda, yadda, yadda. This is how I found out that they were looking for a volunteer to do some artwork for several brochures that KSNPC was to produce. I wanted to offer my services because I love to draw and don't get to do as much of it as I would like on a regular basis. Plus, anything connected with nature fascinates me.

While my B.S. degree is in photography, it has been my drawing that has allowed me to work on an archeological excavation in Torre da Palma, Portugal, for nine summers (six weeks each), drawing artifacts and site



Mary Walter

elevations and plans. For variety, I have also helped illustrate two cookbooks and have drawn "hunter/gatherer" artifacts for an anthropologist at the University of Louisville.

Other areas of interest include working with raptors, presently as a docent at the Louisville Zoo in the Raptor program and before that at Raptor Rehabilitation of Kentucky, Inc. (RROKI). I am also involved with the Citizen Advocacy Program at the Council for Retarded Citizens and

serve on the C.A. Advisory committee. I have acted as an advocate for a mentally retarded woman since 1988 when I became involved in the program. Presently, I am also serving on the Board of Directors of Community Living (an organization committed to finding homes for mentally retarded citizens in our community).

Being born and raised in Louisville, I feel a deep connection to the city and the state of Kentucky. I not only admire but also respect the work everyone at KSNPC is doing to preserve Kentucky's beauty for the future. It makes me happy to contribute in some way towards that work. Thanks for this opportunity.

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*It is the mission of the Kentucky State Nature Preserves Commission to protect Kentucky's natural heritage by: (1) identifying, acquiring, and managing natural areas that represent the best known occurrences of rare native species, natural communities, and significant natural features in a statewide nature preserves system; (2) working with others to protect biological diversity; and (3) educating Kentuckians as to the value and purpose of nature preserves and biodiversity*

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