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KSNPC Latest News:

- Pine Mountain Trail State Park Nature Preserve opens a new trail. Southeastern Regional Preserves Manager Kyle Napier gives the details on **Page 1**.
- Kentucky gladecress (*Leavenworthia exigua* var. *laciniata*) has been proposed as federally threatened under the U.S. Endangered Species Act. Lead Botanist Deborah White has the story on **Page 3**.
- **New clover discovered!** *Trifolium kentuckiense* was found independently by our own Tara Littlefield in Franklin County and Joe Lacefield from the Kentucky Department of Fish and Wildlife Resources in Woodford County. Take a look at the new clover and link to the technical report on **Page 5**.

In This Edition:

Rough Green Snake
~ KSNPC photo by Dan Cox

Another Pine Mountain Treasure to Open Soon

By Kyle Napier
Southeastern Regional Preserves Manager

Pine Mountain is and always will be a special place to me. Growing up on the steep north face and spending most of a half century there has built a special bond between the mountain and me. So nothing pleases me more than when an area of this old mountain becomes protected for future generations to enjoy. One such place is the Pine Mountain Trail State Park Nature Preserve located near the Little Shepherd Trail in Harlan County. Dedicated into the state nature preserve system on June 13, 2007, this 609-acre preserve was purchased with funding from the Appalachian Regional Commission (ARC) by the Kentucky Department of Parks as an addition to the Pine Mountain State Scenic Trail.

The preserve contains a great variety of habitats which results in an impressive level of biological diversity. A total of nine natural community types are found on the preserve. The most common communities are Appalachian sub-xeric forest and Appalachian mesophytic forest. The Cumberland Mountains xeric pine woodland/outcrop a rare community type recovering from the southern pine beetle outbreak in the late 1990s, can be found along several of the large sandstone outcrops found throughout the preserve. An Appalachian seep/bog, one of the rarest natural communities in the state, is also found on the property. Several rare plants occur on the preserve such as showy gentian (*Gentiana decora*), rock harlequin (*Corydalis simpervirens*), Steele's joe-pye weed (*Eupatorium steelei*), whorled aster (*Oclemena acuminata*) and the globally rare southern bog clubmoss (*Lycopodiella adpressa*).

Currently, access to the preserve is open by commission-sponsored hikes only. However, a parking lot has been constructed off the Little Shepherd Trail and a hiking trail will be opened this fall. Visitors will be able to hike in the preserve on their own from sunrise to sunset throughout the year. The trail system is a 1.5 mile loop with a couple of short side trails that lead to several unique features. Hiking is moderate to strenuous in difficulty and showcases a variety of natural features such as large sandstone outcrops, a unique waterfall (near an abandoned sand quarry), Appalachian mesophytic forest, Appalachian pine-oak forest, and Appalachian sub xeric forest. A portion of the Pine Mountain Trail (PMT) will cross through the preserve in the near future. The PMT, when completed, will extend approximately 120 miles from Breaks Interstate Park in Pike County to Cumberland Gap National Historical Park in Bell County. A camping shelter is planned near the preserve in order to allow back packers an opportunity to spend the night in a dry place. The PMT will eventually connect to the preserve trail system, but will be a separate trail. However, the preserve trail will allow PMT hikers the opportunity to enjoy the preserve if they so choose. KSNPC is planning an open house on Saturday, October 26 to celebrate the nature preserve being opened to the public. Please join us for a hike starting at 10 a.m. Contact the commission for more information.

Pine Mountain
~ KSNPC photo by Kyle Napier

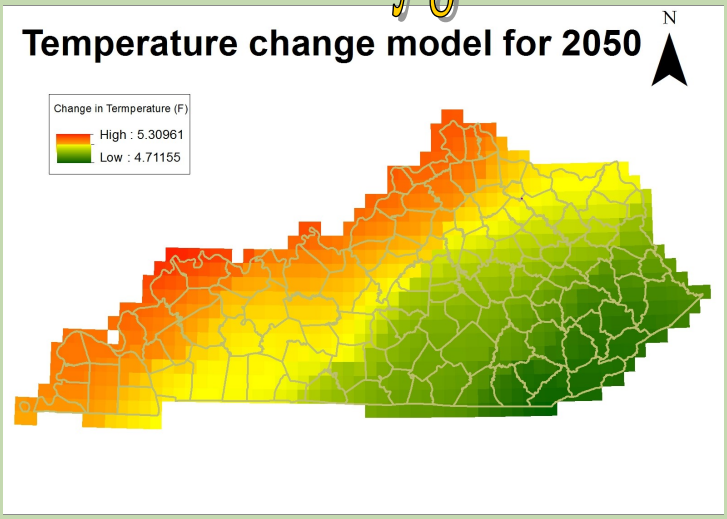
Kentucky Gladecress Proposed for Federal Listing
By Deborah White, Lead Botanist

Kentucky gladecress (*Leavenworthia exigua* var. *laciniata*), a tiny plant of rocky (glade) habitats, is not only a Kentucky native - it grows nowhere else in the world. It is one of only three plants endemic to this state. It also has a very limited distribution within Kentucky (found only in Bullitt and Jefferson counties on a particular kind of limestone that is also uncommon) making its situation even more precarious. The dolomitic limestone where Kentucky gladecress occurs is near greater Louisville, the most populous area of the state, and well within the area with the highest development rate in the state.

As commission botanists monitored this plant species over the last twenty years, a continuous decline in population sizes and habitats became obvious. This information recently led to the proposed listing of Kentucky gladecress as federally threatened under the U. S. Endangered Species Act. This listing by the U.S. Fish and Wildlife Service will bring more attention to the protection of glade habitat, and focus recovery efforts on populations of this rare species.

In early spring, flowering gladecress appears like white stars sprinkled across the open flat rock of the glades. While most plants would not be able to grow in this extreme habitat, this little plant, about 3-4 inches tall, gets established over the moist winter in the thin soil at the edge of the rock. It flowers in early spring and by mid-June has distributed its seeds and disappeared until the next year, avoiding the hot summer conditions. Kentucky gladecress is a tiny survivor in these open rocky grasslands and without conservation of habitat and other recovery efforts, it may even disappear from the Kentucky landscape.

How will Kentucky gladecress fare under a changing climate?



Kentucky botanists recently assessed this question using a model (developed by NatureServe) that displays a plant's life history, characteristics of its habitat and its associations with other species. For instance, as an annual, gladecress grows from seed every year. If seed production is disrupted one year, by an extended drought for instance, the number of plants may be fewer the next year. Also, while many plants may grow in habitats that are more broadly distributed and able to migrate as climate changes, the habitat where gladecress occurs is isolated and narrowly distributed, so this species has no where to move as the landscape changes. And some models predict the habitat around the Louisville area to become a little hotter and drier over the coming years (see map). Because of these and other factors, the climate model determined that Kentucky gladecress is extremely vulnerable to climate change. No doubt we will begin to use this information in developing recovery strategies for Kentucky gladecress and other rare plant species in the near future.

Receives Regional Emmy Award
By Leslie Isaman, Administrative Specialist

The Ohio Valley Chapter of the National Academy of Television Arts and Sciences presented Kentucky Educational Television (KET) productions with a Regional Emmy Award at a ceremony on Saturday, July 20. The *Kentucky Life* program feature on "Migratory Songbirds at Red River Gorge" received the 2012 Emmy Award in the "Magazine Feature/Segment" category. Brandon Wickey was the segment's producer.


Dave Shuffett, host of KET's *Kentucky Life* studies a hooded warbler

"It's an honor for public television to receive a Regional Emmy Award," said KET Executive Director Shae Hopkins. "KET's staff is so dedicated and talented, and we're honored that everyone's hard work for all Kentuckians is seen as exemplary."

The focus of the project is to monitor long-term population trends in migratory woodland songbirds that are suffering population decline due to habitat loss. Bird banding data is used to discover migration patterns and survival rates. (Biologists track individual birds by placing ID bands around their legs.) Target species include wood thrushes, Swainson's warblers, Acadian flycatchers, and Louisiana waterthrushes.

The banding station located at Natural Bridge State Park Nature Preserve from 2003-2011 was a partnership between the Kentucky State Nature Preserves Commission (KSNPC), Kentucky Department of Parks (KDP), Kentucky Department of Fish and Wildlife Resources (KDFWR) and the Kentucky Heritage Land Conservation Fund (KHLCF). In 2013, the station moved to Rockcress Hills State Nature Preserve in Franklin County and is currently operated by KHLCF and KSNPC. This effort is part of a national project called "Monitoring Avian Productivity and Survivorship" coordinated by the Institute for Bird Populations. Rockcress Hills, owned and managed by KSNPC, is a 65-acre preserve that protects the federally endangered plant, Braun's rockcress.


Zeb Weese banding and recording a wood thrush

Zeb Weese, former KSNPC preserve manager and now environmental biologist consultant with the KHLCF, has been a long-time participant in the bird-banding project at both locations. He noted that "biologists begin inventorying plant and animal species on all natural areas funded by the KHLCF as soon as they are purchased. This information helps to determine what kind of habitat management is appropriate for each site. Bird banding is just one of the techniques we use to figure out how native critters are using these protected areas."

You can view the Emmy Award winning segment through this link:
Migratory Songbirds at Red River Gorge

The Ohio Valley Regional Emmy Awards recognize excellence in the areas of local news, programming and individual achievement and are considered to be one of the industry's highest honors. The Ohio Valley Chapter includes 13 television markets from a four-state region, including parts of Ohio, West Virginia, Indiana and Kentucky.

There were 751 total Ohio Valley Regional Emmy Award entries this year, a record number, and only 291 received nominations. Nineteen KET productions and programs were nominated for an Emmy Award.

New Clover Discovered!

Welcome *Trifolium kentuckiense!* Remarkably, the two populations of this clover, which is similar to buffalo clover (*Trifolium reflexum*), were found independently by KSNPC's Tara R. Littlefield (Franklin County) and Joe Lacefield (Woodford County) from the Kentucky Department of Fish and Wildlife Resources. Joe found the first population in 2010 with Tara finding another population in 2012. After Tara's discovery, there was enough evidence to prove that the species was actually new to science.

You can read the technical report published in September through this link:
http://www.phytoneuron.net/2013Phytoneuron/63PhytoN-Trifoliumkentuckiense.pdf

Congratulations Tara and Joe! Most field biologists dream of finding a new, undiscovered species but will spend their entire careers without making such a find. Hopefully, both are just getting started!

New clover, *Trifolium kentuckiense* in Woodford County ~ Photo courtesy of Joe Lacefield

KET EncycloMedia expands with debut of PBS LearningMedia

A long-valued resource for Kentucky's educators and students has become even more valuable. Combining the educational power of PBS programming with its extensive offerings of high-quality teacher resources, PBS LearningMedia is now available for free to all Kentucky public and private school teachers and students, homeschoolers and families. This exciting new service provides access to more than 30,000 digital resources ranging from short videos to educational games to images and audio files. "Teachers at every level will find that these rich multimedia resources touch learners in ways that text alone cannot," said Nancy Carpenter, KET's senior director of education.

The service allows educators to search, save, organize and download content for use in lessons; share content and collaborate with colleagues; and create online folders that tailor content to fit classroom needs. All resources are searchable by keyword, subject and grade level and all are aligned to national and state education standards.

PBS LearningMedia includes many classroom and teacher professional development resources produced by KET, including Think Garden: a collection of elementary-level videos about the science and art of gardening; Kentucky's Natural Heritage: interactives and videos related to the state's biodiversity; and Everyday Learning: a program featuring science, math, and health resources for preschoolers.

The service also features content from iconic PBS series, video clips and other materials based on *Nova*, *American Experience*, and *Sid the Science Kid*, as well as resources developed by agencies like NASA and The National Archives.

Visit **KET.org/EncycloMedia** today to see the new PBS LearningMedia in action.

Julian Savanna State Nature Preserve Featured During Farm-City Field Day

By Joyce Bender, Nature Preserves and Natural Areas Branch Manager

Franklin County's 55th annual Farm-City Field Day was held on July 11 at the Julian Farm near Bridgeport. The popular cooperative extension farm tour attracted nearly 800 visitors between 9 a.m. and 1 p.m. Farm owners Jane Julian and her brother Bill Julian are celebrating the bicentennial of their family's ownership of the farm this year. The commission was on hand for the celebration, providing guided tours of the Bluegrass woodland growing on 42 acres of the 300-acre farm. Preserve manager Dan Cox and I hopped on the farm tour hay wagons with the visitors and called out the names of plants and birds seen along the route. We also described the features of the rare Bluegrass woodland natural community and the management activities that have been undertaken since the site was dedicated as a state nature preserve in 2002.

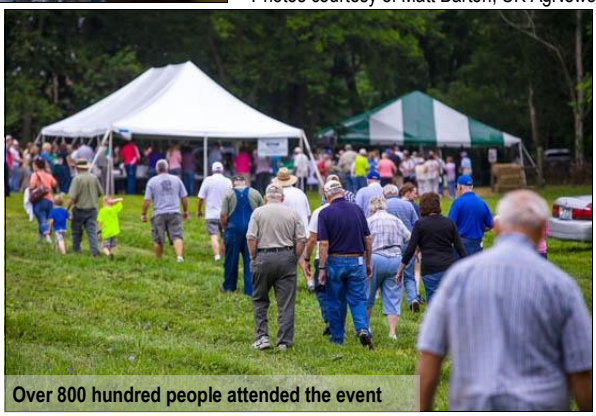
The commission has long been interested in the "big trees" found on the front end of the Julian farm. Chinquapin oaks and blue ash with ages estimated to be over 200 years intrigued staff ecologists who were tracking remnants of what is thought to have once been a more widespread plant community in the Inner Bluegrass Region. The presence of the large trees and absence of more conservative native grasses and wildflowers has generated many questions about this globally rare plant community. Only three examples of Bluegrass woodland have been documented by the commission. In addition to Julian Savanna, one is a private site located in Mercer County and the other is Griffith Woods in Harrison County, owned by the Kentucky Department of Fish and Wildlife Resources.

Jane and her mother, the late Jennie Julian, have worked closely with the commission for many years as we experimented with ways to enhance and protect the area. The cessation of cattle grazing in 1993 has allowed 20 years of succession to occur. Without regular mowing or grazing to nip off sprouting seeds and acorns, native trees including blue ash, white and chinquapin oak are growing again. The vegetation has been monitored over the years and a number of native grasses and wildflowers have made a comeback. Unfortunately, invasive plants such as bush honeysuckle and nodding thistle have also become established. The commission has conducted three prescribed burns since 2005 and continues to battle invasive plants with assistance from the farm's manager.

The Julian's longevity on the site is as remarkable as the old trees. The woodland has been part of the Julian family's history since 1813 and a notable part of local Kentucky history as well. One such event was a communitywide picnic held in the "Julian Woods" to celebrate the return of the veterans from the Mexican War in 1847. A rally and picnic were held there in 1861 when Kentucky debated staying in the Union during the Civil War. It seems only fitting that the community came together again to celebrate its longstanding connection with this unique Franklin County treasure.

~ Photos courtesy of Matt Barton, UK AgNews

Joyce Bender (in hat) of KSNPC conducting an educational tour



Over 800 hundred people attended the event

Kentucky's Invasive Plants

By Joyce Bender, Nature Preserves and Natural Areas Branch Manager

Japanese knotweed (*Polygonum cuspidatum*) or (*Fallopia japonica*)

Description: Japanese knotweed is in the Buckwheat family (Polygonaceae). It is an upright shrub-like perennial that grows to heights of 1-3 meters (3-10 feet). The stems are stout, smooth, and erect, with swelling at the leaf axils. The plant reproduces primarily vegetatively through its long, stout rhizomes. The ovate leaves vary in size but are normally 5-15 cm (2-6 in) long, 5-12 cm (2-5 in) wide, and pointed at the tip. The minute flowers are greenish-white and occur in branched sprays in August or September. The fruit is winged with small, shiny, triangular seeds 8-9 mm (3/8 in) long.

Habitat: Japanese knotweed was introduced to the U.S. from Japan in the late 1800s as an ornamental used for erosion control and landscape screening. It is capable of adapting to a variety of environments including full shade, high temperatures, high salinity, and drought. It is typically found near water sources, in low-lying areas, on utility rights-of-way, and on old home sites.

Distribution: Japanese knotweed is found in the eastern and western U.S. and in some central Midwestern states. It is found scattered throughout Kentucky including but not exclusively in Barren, Bath, Bell, Boone, Bracken, Caldwell, Calloway, Campbell, Carroll, Estill, Fayette, Franklin, Gallatin, Garrard, Greenup, Hardin, Harlan, Jefferson, Knox, Laurel, Lewis, Lincoln, Madison, Martin, McCracken, Perry, Pike, Powell, Rowan, Whitley and Wolfe counties. If you have seen it in other counties, please report it to KSNPC.

Threat: Japanese knotweed can easily escape cultivated gardens where it is used as a landscaping plant. It spreads quickly and forms dense thickets that out-compete native vegetation. It is particularly invasive in riparian zones where it can survive severe flood events and rapidly colonize scoured shores and islands.

Control: For small populations or in areas where herbicides cannot be used, pull out the plant by hand or with a grubbing hoe. Be careful to remove the entire plant including all roots and runners. All plant parts should be bagged and removed from the site.

For areas where the plant has become established among desirable native vegetation, cut the stem 5 cm above ground level and immediately apply a solution of 25 percent glyphosate (Roundup) or triclopyr (Garlon) and 75 percent water to the cut stump. Repetition of this treatment may be necessary if sprouting occurs from the stump. This method is not effective at low temperatures or if the ground is frozen. Large populations can best be controlled using a foliar spray. Apply a 2 percent solution of Roundup or Garlon 3A and water until leaves are wet but not dripping. An ideal time of year to spray is late spring, on a sunny day when the plant is actively growing. Be sure to follow all information provided on the herbicide label when applying any herbicide.

In the Spotlight:

Sinkhole/depression marsh

By Brian Yahn, Vegetation Ecologist

KSNPC's "Community Spotlight" is on a rare type of wetland that occurs across Kentucky, known as Sinkhole/depression marsh. This community has an extended hydroperiod meaning it holds water and often has standing water during the wettest of seasons. Due to these periods of prolonged saturation, the community (usually treeless) is dominated by herbaceous wetland plants and may also support wetland shrubs. Soils are hydric with dark, fertile layers referred to as "muck." The abundance of this community prior to Euro-American settlement is not easy to determine as occurrences are naturally small scale and scattered irregularly across the landscape. This community usually forms over small, poorly-drained depressions above impermeable bedrock (sandstone of ridgetops) or plugged sinkholes within rolling to flat karst areas.

Sinkhole/depression marsh—Larue County
~ KSNPC photo by Brian Yahn

Since settlement, the conversion of land to agriculture and other development (including wetland drainage or altering marshes to create open-water ponds) and suppression of natural fire has reduced this community's "footprint" on the landscape. Higher frequency of landscape-level fire prior to the time of settlement likely played a role in shaping the community, especially the (less saturated) margins; this enabled fire to carve out a more open herbaceous community. In a fire-laden past, one can imagine an expanse of prairie and open woodland transitioning into marsh (especially in areas across the Pennyroyal Plain). Today, only the wettest parts of this marsh community remain open, with closed forests on the margins. With such a shift from prairie and woodland to closed forests, many unique prairie and wetland plants that were once a vibrant part of Kentucky's native flora, are today quite rare. Thus, due to so many changes in the natural landscape, Kentucky's Sinkhole/depression marshes and adjacent barrens are extremely rare.

Outside of Kentucky, depression marsh communities extend across the U.S. but vary in species composition, representing many different types. Some types of depression marshes are globally rare while others are more common. One type that occurs in Kentucky also occurs in Missouri and Indiana (and possibly Tennessee). This type is the most unique of its kind within the Commonwealth and found predominately in the Interior Low Plateau Region (an area that spans from the Bluegrass to Land Between the Lakes). It is considered globally vulnerable (=G3G4) by NatureServe (the national authority on the status of rare species and natural communities). KSNPC lists this Sinkhole/depression marsh as state endangered (S1S2). Very few intact examples are known in the entire State.

A description of the natural condition of this community is defined by the remaining examples left in Kentucky. The margins of these communities have been continually disturbed by unnatural conditions (logging, plow lines, berms, non-native spp. invasion, etc.). The best Sinkhole/depression marsh communities that occur in Kentucky are dominated by wetland grasses, sedges and forbs. They often have healthy populations of conservative (sensitive to unnatural soil disturbances) native species scattered throughout. Common native grasses include rice cutgrass, Virginia cutgrass and redtop panic grass. Common native sedges include hop sedge, cat-tail sedge, three-way sedge, blunt spike-rush, square-stem spikerush, soft rush, soft-stem bulrush and many others. Native shrubs and small trees include red maple, common buttonbush, silky dogwood, and swamp rose. High quality remnants are also diverse with aquatic herbs (i.e. forbs) and can include an array of species. Characteristic herbs include upright burhead, halberd-leaf rosemallow, marsh seedbox, taperleaf bugleweed, mild water-pepper, broadleaf arrowhead and many others (KSNPC 2013).

In Kentucky, Sinkhole/depression marsh communities provide habitat for rare plant and animal species, a few found nowhere else outside of this community. At least 13 KSNPC-listed plants have been documented on, or in close association with, Sinkhole/depression marshes (KSNPC 2013). These associated rare species (not previously highlighted in the article) include blue mud-plantain, grassleaf arrowhead, pickerel-weed, sessile-fruited arrowhead, shaggy hedgehyssop, spotted pondweed, tall beaked-rush, zigzag iris and several others (KSNPC 2013). Unique herps found in association include eastern mud turtles, eastern narrowmouth toads, eastern spadefoot toads, marbled salamanders, and wood frogs (J. MacGregor, KDFWR pers. com.). A couple of rare and interesting invertebrate species that have been documented in such wetlands in Kentucky include the world's second smallest dragonfly, the elfin skimmer, and the double-ringed pennant, a species more common in states south of Kentucky. In addition, most species of bats in Kentucky, including rare ones, will use the open water to drink and also to forage on many insects that utilize depression wetlands (KSNPC 2013).

Sinkhole/depression marsh continued

Since the time of Euro-American settlement, wetlands have been disappearing from Kentucky at an alarming rate. Estimated at 1.5 million acres at the time of settlement, today wetlands have been reduced to less than 300,000 acres in Kentucky (Abernathy et al. 2010). Draining, logging, plowing, grazing, construction of ponds and reservoirs, development of roads and buildings, suppression of fire, succession to forest, all these activities continue to degrade and often eradicate natural wetlands. Better understanding and protection is needed to keep these wetlands healthy and on the landscape. For more information on wetland communities in Kentucky contact commission ecologists Brian Yahn (brian.yahn@ky.gov) or Martina Hines (martina.hines@ky.gov)

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Sinkhole/depression marsh—Cooley's Meadow—Wayne County
~ KSNPC photo by Brian Yahn

Species associated with Sinkhole/depression marsh:

Four-toed Salamander — *Hemidactylium scutatum*


Photo by John R. MacGregor

KSNPC Status: None

USFWS Status: None

General Description: A secretive, slender salamander up to 4 inches in length. The species is identified by having four toes on each hind foot, a constriction at the base of the tail, and a white belly with bold black spots. The back is mottled brown and the sides of the body are grayish with light flecking. The tail can be voluntarily disconnected at the point of constriction; leaving it to wiggle as a distraction to predators.

Habitat: Adults are terrestrial and live in forests surrounding wetland depressions or small streams. They find shelter under woody debris, rocks, moss, or leaf litter. Females lay and attend egg clusters near the edges of ponds, woodland pools, seeps, or sluggish boggy headwater streams. Nests are typically hidden in sphagnum moss, but may also be found in clumps of grasses and sedges, in and under woody debris, or in leaf litter. Larvae make their way to water after hatching from eggs. After about a month in an aquatic larval stage, they transform into the terrestrial body form and move into the forest.

Range: The four-toed salamander has a highly disjunct range; occurring from Nova Scotia west to Minnesota, and south to eastern Louisiana and the Florida panhandle. In Kentucky, the species is most common in the Appalachian Highlands with isolated colonies found in the western half of the state.

Blue Dasher — *Pachydiplax longipennis*


KSNPC photo by Ellis Laudermilk

KSNPC Status: None

USFWS Status: None

General Description: Mature males have brilliant green eyes with a white face, bluish abdomen coated with chalky white and a black tip, and a dash of amber color sprinkled throughout wings. Females and immature males have reddish brown eyes with white face, abdomen mostly black with thin interrupted stripes, and amber color restricted to wing bases. All individuals have brown or black multi-striped thorax.

Habitat: Ponds, lakes, marshes, and streams with slow current.

Flight Season: In Kentucky, April-September.

Range: Widely distributed across parts of Canada and Mexico, most of the United States, and even Bermuda and the Bahamas.

Cypress Knee Sedge — *Carex decomposita*

KSNPC Status: Threatened

USFWS Status: None

Habitat: Swamps, sinkhole ponds, often on floating logs or growing on elevated stems of buttonbush.

Management: Avoid changes in hydrologic conditions at the site. Changes could result from overstory removal, stream alteration or impacts due to erosion. Exotic pest plants are a threat to this species.

Diagnostic characteristics: Cypress knee sedge can be distinguished by the combination of dark-colored (dark green to brown) perigynia, and leaf sheath that is dotted with purple or red. The perigynia also contract abruptly into a short beak.

Range: A southern species once ranging from New York to Michigan, and southward to northern Florida and eastern Texas. The range has retreated within the last century, particularly in the north and east. Most northerly extant site is in southern Ohio. Possibly extirpated in New York, Michigan, Virginia, Maryland and North Carolina. In Kentucky, it is found in cypress swamps in the coastal plain in far western Kentucky, and in sinkhole depression ponds in the Shawnee Hills.

Sundew Meadow

(In the Winter/Spring edition (#69) of *Naturally Kentucky*, the following was inadvertently omitted from the Sundew Meadow article. KSNPC greatly appreciates the management assistance KDFWR is providing at this important site.)

Even though Sundew Meadow is a registered natural area, it lacks legal protection. We have been able to work at this site thanks to the generous support of the owners.

Staff from the Kentucky Department of Fish and Wildlife Resources have also volunteered resources and time to eradicate an early infestation of Japanese stiltgrass (*Microstegium vimineum*). Much more work remains to be done, including thinning the surrounding forest in order to expand the site and restore the xero-hydric flatwoods, monitoring populations of rare species, controlling exotic species and studying the community's ecology.

Let's hope that with continuous help from the Kentucky Department of Fish and Wildlife and cooperation from the landowners, we can develop an effective protection strategy before Sundew Meadow's luck runs out.

Staff from KDFWR spray Japanese stiltgrass at Sundew Meadow

Volunteer Appreciation - Clint Barber

KSNPC would like to recognize Clint Barber, a telecommunications technician in the IT Division at Western Kentucky University and Green River Grotto member for his recent assistance in repairing a cave alarm system at one of the gray bat maternity caves protected by the commission. His actions will ensure increased security for the federally endangered gray bats and their young. Human disturbance to a maternity colony can lead to the death of young bats and is punishable by law. Even with signage clearly posted, people continue to enter caves during the critical summer months and cause needless bat deaths. Cave alarms may seem a drastic step, but the bats need our help more than ever. White nose syndrome continues to take its toll on these very beneficial animals. We appreciate Clint's quick response and his willingness to lend a hand. We know we can call on the Green River Grotto for future assistance.

Land Protection Report

By Brent Frazier, Land Acquisition Specialist

The commission currently has nine acquisition projects underway and is working hard to add more to the list. The Perkins tract at Apple Valley Glade in Bullitt County was dedicated during the September 12 commission meeting. This helps us further the protection of Kentucky gladecress, one of our three state endemic plants (see associated article on Page 3), which is found in a globally rare glade on this preserve.

One of the most important ongoing projects involves two tracts at Frances J. Palk SNP in Pulaski County. We need to purchase both tracts to resolve an access issue. These tracts will add approximately 106 acres to the preserve. Currently encompassing 150 acres, this preserve contains a series of acid seep communities that are very rare in Kentucky. These small wetlands are formed by seepage found at the heads of several small streams. Although much of the preserve is dominated by upland forest, over 70 species of plants occur within the seeps, several of which are considered rare.

We have submitted two new projects to the Kentucky Heritage Land Conservation Fund Board. If successful, the Wagner Tract will become an addition to Bad Branch SNP. This 2,639-acre preserve protects the scenic beauty of the gorge and one of the largest concentrations of rare (including listed and non-listed) species known in the state. The preserve also protects Kentucky's only known nesting pair of common ravens (*Corvus corax*). The other new project is to acquire the Reynolds Tract and establish a new preserve, Lone Oak Glade SNP. This tract, located in Grayson County, contains a unique Limestone slope glade which is surrounded by a remnant Limestone barrens community. High quality remnants of these communities are very rare in the state and KSNPC ecologists consider any of these a high priority for protection. The Reynolds Tract also has the best known population in Kentucky of a globally rare and sensitive invertebrate species; as well as the only known location in Grayson County of hispid falsemallow (*Malvastrum hispidum*), a state threatened glade plant. Protection and enhancement of these species' habitats are crucial to their continued survival at this site.

Hispid falsemallow ~ Photo courtesy of Beverly James

We are also pursuing a conservation easement to add protection for a rare plant. This easement acquisition would establish the Swallowfield Arabis site. This tract, located north of Frankfort in Franklin County, consists of wooded slopes along the Kentucky River. It contains high quality occurrences of one of the Commonwealth's rarest plants – Braun's rockcress *(Arabis perstellata)*.

Bouteloua Barrens will be expanded if a planned purchase comes to fruition. This tract protects habitat for the preserve's namesake, *Bouteloua curtipendula*, side-oats grama grass, a species of special concern. The tract also contains a stand of big bluestem (*Andropogon gerardii*) and other native barrens species. The remainder of the tract will provide additional buffer land surrounding the grassland community to protect it from external threats such as off-road vehicle use.

Lastly, we continue working a long pending project to acquire the Carmical Tract at Hi Lewis State Nature Preserve. This project has moved outside the normal acquisition procedures due to substantial title issues that make it difficult to identify all the owners. Acquisition of remote lands is seldom straightforward, but well worth the effort. Named for the stream that drains the area, this preserve on Pine Mountain supports an extremely rare Pine Barrens community that provides habitat for a number of rare plants.

The Director's Notes

By Don Dott, Executive Director

Setting the Stage for Climate Change.

Whether it's precipitation in the form of rain or snow, or great or small variations in seasonal temperatures, climate is a controlling factor in the expression of the vegetation which covers a landscape. And the vegetation (or lack thereof) is a determinative influence on the animal species that inhabit that same landscape. These relationships between climate, land cover (vegetation) and wildlife have evolved over the millennia. Periodic events like floods, droughts, tornadoes and ice storms are viewed from a human perspective as destructive and life threatening, but these disturbances are a natural part of the environment and have shaped the earth from its beginning. Until recently, the natural environment has operated under a certain degree of equilibrium. But, as many besides me have observed, extreme weather seems to be the "new normal."

Prolonged and severe droughts feeding massive wild fires in the west, floods during normally dry August in the southeast and midwest, hugely destructive hurricanes like Katrina and Sandy, some of the fiercest tornado outbreaks in modern U.S. history, like Joplin, Mo., in 2011 and Moore, Okla., in 2013– these events are no longer unheard of. It's the future (and present) we face with climate change.

The generalized predictions for the southeastern U.S. (and Kentucky) largely agree that changes here will be more extreme weather as a result of increased energy in a warmer atmosphere. Experts foresee an increase in average temperature with periods of frequent heavy rains punctuated by longer drought spells.

While many species and ecosystems are expected to perish due to the disappearance of their specialized habitats, others, with our help, have a higher chance of long-term survival. Theoretically, species that are able to disperse over longer distances, or which can utilize a greater variety of habitats, are more capable of finding new suitable habitat if their current home becomes uninhabitable. But shifting ranges and relocating to new suitable habitat has become increasingly difficult for most species, due to a high rate of landscape fragmentation. Most natural areas remaining in Kentucky are small islands in a sea of development and agriculture that are impossible for most species to cross. Disjunct natural areas supporting small and isolated populations of animal and plant species are highly susceptible to local extinction.

The leading approach to this dilemma translates into a simple concept - protect the stage, while the actors change. Predicting specific local weather over the long term is impossible, making it impossible to prevent or mitigate the adverse effects of climate change for individual species. The best we can aspire to is to provide a viable stage to let these events play out, allowing plants and animals, the actors, to move, perish or prosper as the stage changes.

Until humans began altering the landscape in ways other species are incapable of, the stage upon which species survived was an entire continent. Wide ranging species like bison, elk, whooping cranes, wolves and bears moved far across the landscape. Migration is a major strategy to cope with inhospitable climate, whether normal seasonal changes or long-term changes like the last ice age. But our developments have disrupted migration routes with urban areas, interstate roads, croplands and other infrastructure. We need to conserve larger areas of the landscape and provide corridors that connect isolated core tracts of natural landscapes. We will lose more actors with climate change if we do not protect and, in some cases restore, key parts of "the stage."

Cores and corridors – a simple concept, but a very challenging reality. Kentucky's population is predicted to grow from 4.3 million in 2010 to over 5 million by 2035 (data provided by the Kentucky State Data Center at the University of Louisville). There will be more human infrastructure. We won't stop building and we can't. But we can do it smarter, in a manner less destructive of the natural world that provides our food, our water and our clean air.

Some suitable corridors already exist, but they need to be further protected. Two notable areas include Pine Mountain in southeastern Kentucky, as well as the Kentucky River Palisades in central Kentucky. Other corridors need to be restored. The Kentucky Natural Lands Trust, for example, is working with private landowners in an attempt to connect Bernheim Forest in Bullitt County with Fort Knox, two extensive forested tracts divided by I-65, a six-lane interstate highway. Because we have so extensively altered the landscape, corridors can't be only lands of intact natural qualities. They will have to include working landscapes, farms and sustainably logged forests that are managed in a way to facilitate natural vegetation (where possible) and enable plant and animal movement.

Creating an effective network of corridors requires planning and cooperation of multiple players including federal and state agencies, private organizations and private landowners. This approach will change how conservation agencies and organizations now plan their work. It will also require the broader support of the public and the infrastructure development agencies to prevent development that harms important habitat and corridors.

The commission has undertaken an effort to develop such a plan with the leading conservation agencies and organizations in Kentucky. The first step is underway to convene the major players. The second is to develop a map of the largest existing conservation lands and corridors which connect them, drawing upon work that others have begun. Third, and most important, is to disseminate the plan and seek broad support to make its implementation possible. It will demand creativity and willingness to change old ways of doing business. The plan will surely change as the unpredictable effects of climate change manifest themselves. It seems the old adage - the only constant is change itself - is one we are reminded of daily. But willingness to recognize that fact and to work with it rather than against it, will bear great rewards for lessening one of the most harmful, yet least appreciated consequences of climate change – a loss of irreplaceable biological diversity.

Our unintentional, but destructive habits of developing the landscape for exclusive human needs must adjust to the new climate realities. Humans are the most resourceful species on the planet, we can adjust, and we will. But the sooner we begin, the better for us all, and especially our younger people who will live to experience the changes we can now only speculate upon. As stated in the "*National Fish, Wildlife, and Plants Climate Adaptation Strategy"* released by the USFWS and NOAA (2013), "Admittedly the task ahead is a daunting one…..But we can make a difference. To do that, we must begin now to prepare for a future unlike the recent past". It concludes, "Unless the nation begins a serious effort to undertake this task now, we risk losing priceless living systems – and the countless benefits and services they provide – as the climate inexorably changes." We need to ready the stage.

Pine Mountain corridor ~ KSNPC staff photo

U.S. Fish & Wildlife Service

ESA Basics

40 Years of Conserving Endangered Species

When Congress passed the Endangered Species Act (ESA) in 1973, it recognized that our rich natural heritage is of "esthetic, ecological, educational, recreational, and scientific value to our Nation and its people." It further expressed concern that many of our nation's native plants and animals were in danger of becoming extinct.

The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. The Interior Department's U.S. Fish and Wildlife Service (FWS) and the Commerce Department's National Marine Fisheries Service (NMFS) administer the ESA. The FWS has primary responsibility for terrestrial and freshwater organisms, while the responsibilities of NMFS are mainly marine wildlife such as whales and anadromous fish such as salmon.

Under the ESA, species may be listed as either endangered or threatened. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future. All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened. For the purposes of the ESA, Congress defined species to include subspecies, varieties, and, for vertebrates, distinct population segments.

As of January 2013, the FWS has listed 2,054 species worldwide as endangered or threatened, of which 1,436 occur in the United States.

How are Species Listed?
Section 4 of the ESA requires species to be listed as endangered or threatened solely on the basis of their biological status and threats to their existence. When evaluating a species for listing, the FWS considers five factors: 1) damage to, or destruction of, a species' habitat; 2) overutilization of the species for commercial, recreational, scientific, or educational purposes; 3) disease or predation; 4) inadequacy of existing protection; and 5) other natural or manmade factors that affect the continued existence of the species. When one or more of these factors imperils the survival of a species, the FWS takes action to protect it. The Fish and Wildlife Service is required to base its listing decisions on the best scientific information available.

Candidates for Listing
The FWS also maintains a list of "candidate" species. These are species for which the FWS has enough information to warrant proposing them for listing but is precluded from doing so by higher listing priorities. While listing actions of higher priority go forward, the FWS works with States, Tribes, private landowners, private partners, and other Federal agencies to carry out conservation actions for these species to prevent further decline and possibly eliminate the need for listing.

Protection
The ESA protects endangered and threatened species and their habitats by prohibiting the "take" of listed animals and the interstate or international trade in listed plants and animals, including their parts and products, except under Federal permit. Such permits generally are available for conservation and scientific purposes.

What is "Take"?
The ESA makes it unlawful for a person to take a listed animal without a permit. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." Through regulations, the term "harm" is defined as "an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering." Listed plants are not protected from take, although it is illegal to collect or maliciously harm them on Federal land. Protection from commercial trade and the effects of Federal actions do apply for plants. In addition, States may have their own laws restricting activity involving listed species.

Recovery
The law's ultimate goal is to "recover" species so they no longer need protection under the ESA. Recovery plans describe the steps needed to restore a species to ecological health. FWS biologists write and implement these plans with the assistance of species experts; other Federal, State, and local agencies; Tribes; nongovernmental organizations; academia; and other stakeholders.

Federal Agency Cooperation
Section 7 of the ESA requires Federal agencies to use their legal authorities to promote the conservation purposes of the ESA and to consult with the FWS and NMFS, as appropriate, to ensure that effects of actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of listed species. During consultation the "action" agency receives a "biological opinion" or concurrence letter addressing the proposed action. In the relatively few cases in which the FWS or NMFS makes a jeopardy determination, the agency offers "reasonable and prudent alternatives" about how the proposed action could be modified to avoid jeopardy. It is extremely rare that a project ends up being withdrawn or terminated because of jeopardy to a listed species.

The ESA also requires the designation of "critical habitat" for listed species when "prudent and determinable." Critical habitat includes geographic areas that contain the physical or biological features that are essential to the conservation of the species and that may need special management or protection. Critical habitat designations affect only Federal agency actions or federally funded or permitted activities. Federal agencies are required to avoid "destruction" or "adverse modification" of designated critical habitat.

Critical habitat may include areas that are not occupied by the species at the time of listing but are essential to its conservation. An area can be excluded from critical habitat designation if an economic analysis determines that the benefits of excluding it outweigh the benefits of including it, unless failure to designate the area as critical habitat may lead to extinction of the listed species.

The ESA provides a process for exempting development projects from the restrictions if a Cabinet-level "Endangered Species Committee" decides the benefits of the project clearly outweigh the benefits of conserving a species. Since its creation in 1978, the Committee has only been convened three times to make this decision.

Working with States
Partnerships with States are critical to our efforts to conserve listed species. Section 6 of the ESA encourages States to develop and maintain conservation programs for threatened and endangered species. Federal funding is available to promote State participation. Some State laws and regulations are more restrictive than the ESA in granting exceptions or permits.

Working with Landowners
Two-thirds of federally listed species have at least some habitat on private land, and some species have most of their remaining habitat on private land. The FWS has developed an array of tools and incentives to protect the interests of private landowners while encouraging management activities that benefit listed and other at-risk species.

Habitat Conservation Plans
Section 10 of the ESA may be used by landowners including private citizens, corporations, Tribes, States, and counties who want to develop property inhabited by listed species. Landowners may receive a permit to take such species incidental to otherwise legal activities, provided they have developed an approved habitat conservation plan (HCP). HCPs include an assessment of the likely impacts on the species from the proposed action, the steps that the permit holder will take to avoid, minimize, and mitigate the impacts, and the funding available to carry out the steps.

HCPs may benefit not only landowners but also species by securing and managing important habitat and by addressing economic development with a focus on species conservation.

Safe Harbor Agreements
Safe Harbor Agreements (SHAs) provide regulatory assurance for non-Federal landowners who voluntarily aid in the recovery of listed species by improving or maintaining wildlife habitat. Under SHAs, landowners manage the enrolled property and may return it to originally agreed-upon "baseline" conditions for the species and its habitat at the end of the agreement, even if this means incidentally taking the species.

Candidate Conservation Agreements
It is easier to conserve species before they need to be listed as endangered or threatened than to try to recover them when they are in danger of extinction or likely to become so. Candidate Conservation agreements (CCAs) are voluntary agreements between landowners—including Federal land management Agencies— and one or more other parties to reduce or remove threats to candidate or other at-risk species. Parties to the CCA work with the FWS to design conservation measures and monitor the effectiveness of plan implementation.

Candidate Conservation Agreements with Assurances
Under Candidate Conservation Agreements with Assurances (CCAA), non-Federal landowners volunteer to work with the FWS on plans to conserve candidate and other at-risk species so that protection of the ESA is not needed. In return, landowners receive regulatory assurances that, if a species covered by the CCAA is listed, they will not be required to do anything beyond what is specified in the agreement, and they will receive an enhancement of survival permit, allowing incidental take in reference to the management activities identified in the agreement.

Conservation Banks
Conservation banks are lands that are permanently protected and managed as mitigation for the loss elsewhere of listed and other at-risk species and their habitat. Conservation banking is a free-market enterprise based on supply and demand of mitigation credits. Credits are supplied by landowners who enter into a Conservation Bank Agreement with the FWS agreeing to protect and manage their lands for one or more species. Others who need to mitigate for adverse impacts to those same species may purchase conservation bank credits to meet their mitigation requirements. Conservation banking benefits species by reducing the piecemeal approach to mitigation that often results in many small, isolated and unsustainable preserves that lose their habitat functions and values over time.

International Species
The ESA also implements U.S. participation in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), a 175-nation agreement designed to prevent species from becoming endangered or extinct due to international trade. Except as allowed by permit, CITES prohibits importing or exporting species listed on its three appendices. A species may require a permit under the ESA, CITES, or both.

For More Information
For more information, contact the U.S. Fish and Wildlife Service at the address below, or visit *http://www.fws.gov/endangered/*.

U. S. Fish and Wildlife Service
Endangered Species Program
4401 N. Fairfax Drive, Room 420
Arlington, VA 22203
703-358-2171
http://www.fws.gov/endangered/

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U.S. Fish and Wildlife Service - Southeast Region

Upcoming Hikes and Events

Please note that most events require preregistration. View our complete events calendar at naturepreserves.ky.gov/news/.

Oct. 26—Hike and Open House—Pine Mountain Trail State Park Nature Preserve, 10 a.m. until 1:30 p.m., EDT. Join us for a 3-mile moderate to strenuous hike of our new loop trail through the upper south face of Pine Mountain. The walk will pass through pine-oak and mixed mesophytic forest communities. The fall colors should be spectacular at this time. Call the commission office at (502) 573-2886 for registration and directions. Please bring water, lunch and hiking boots. This event is offered at no cost.

**More events are planned periodically, so please check our online calendar for an up-to-date list.

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ON YOUR STATE INCOME TAX RETURN AND USE THE CHECKOFF BOX TO DONATE TO THE NATURE AND WILDLIFE FUND!

Kentucky State Nature Preserves Commission
Quarterly Public Meeting

Dec. 12, 2013, 10 a.m.
Paul Sawyier Public Library
319 Wapping St., Frankfort, KY

Kentucky State Nature Preserves Commission
801 Schenkel Lane, Frankfort, KY 40601-1403
502-573-2886
http://naturepreserves.ky.gov
naturepreserves@ky.gov

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 preserve system; (2) working with others to protect biological diversity; and (3) educating Kentuckians as to the value and purpose of nature preserves and biodiversity.