Kentucky State Nature Preserves Commission

35 Years of Protecting Kentucky's Natural Heritage

Cumberland River

Biennial Report

January 2011

KENTUCKY STATE NATURE PRESERVES COMMISSION MEMBERS

Mr. Adrian K. Arnold
Mt. Sterling, KY
Representing The Kentucky Farm Bureau Federation

Mr. Carl Breeding
Lexington, KY
Representing Members at-large

Mr. Peter E. Brown
Lexington, KY
Representing Members at-large

Mr. John E. Chism
Winchester, KY
Representing Soil Conservation Districts of Kentucky

Mrs. Shirley Trunnell
Utica, KY
Representing National Farmers Organization

Donald S. Dott, Jr.
Executive Director
Kentucky State Nature Preserves Commission
801 Schenkel Lane, Frankfort KY 40601-1403
Telephone: 502-573-2886 - Fax: 502-573-2355

Cover photo by Thomas G. Barnes

The KSNPC provides, on request, reasonable accommodations including auxiliary aids and services necessary to afford an individual with a disability an equal opportunity to participate in all services, programs and activities. To request materials in an alternative format, contact: KSNPC – 801 Schenkel Lane, Frankfort, Kentucky 40601 – (502) 573-2886 – (http://naturepreserves.ky.gov). Hearing and speech-impaired persons can contact the agency by using the Kentucky Relay Service, a toll-free telecommunication device for the deaf (TDD). For voice to TDD, call 800-648-6057. For TDD to voice, call 800-648-6056.

Table of Contents

Introduction 1
Major Accomplishments for 2009-2010 1
I. Protecting Kentucky's Biological Diversity 2
Factors Reducing Biodiversity 4
II. State Nature Preserves and Stewardship 7
Major Stewardship Accomplishments 2009-2010 9
III. The Natural Heritage Program 13
Major Natural Heritage Accomplishments 2009-2010 14
Uses of Natural Heritage Data 17
Conservation Planning 18
IV. Additional Commission Projects 19
V. Conclusion 23
Appendices Index 26

Tables:
KSNPC Contracts 19

Appendices:
Appendix 1. Kentucky's Federally Listed Endangered and Threatened Species 27
Appendix 2. Plants and Animals Presumed Extinct or Extirpated from Kentucky 29
Appendix 3. Diversity and conservation status of the major groups of organisms and natural communities in Kentucky, 2010 31
Appendix 4. Kentucky State Nature Preserves & State Natural Areas Map 32
Appendix 5. List of Dedicated State Nature Preserves 33

Biennial Report
of the
Kentucky State Nature Preserves Commission
January 2011

INTRODUCTION:

This biennial report is submitted to the Governor and the General Assembly as directed by KRS 146.410 et seq., the Kentucky State Nature Preserves Act, which created the Commission in 1976. The Commission is directed by 5 members appointed by the Governor, and currently has 19 full-time staff positions following a 2008 CAP reduction of two.

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 natural 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.**
3. **Educating Kentuckians as to the value and purpose of nature preserves and biodiversity preservation.**

MAJOR ACCOMPLISHMENTS FOR 2009-2010

- ***Kentucky's Natural Heritage: An Illustrated Guide to Biodiversity.*** A new book, our most comprehensive publication to date has been released and depicts the best natural areas and most interesting plants and animals in the state. It describes changes to Kentucky's environment and biota that have occurred from historic times to present day. It is written for both the general public and for use as a teaching resource in classrooms.

- **Additions to the State Nature Preserves:**

Blood River Seeps SNP (new preserve)	Calloway County	193 acres
Brigadoon SNP	Barren County	3 acres
Crooked Creek SNP	Lewis County	294 acres
Jim Scudder SNP	Hardin County	64 acres
River Cliffs SNP	Franklin County	99 acres
Terrapin Creek SNP	Graves County	28 acres
TOTAL ADDITIONS		**681 ACRES**

- **Plant Discoveries:**
  - 2 plants were found that have never before been documented in the state: Western wallflower and Bear huckleberry, a shrub which is limited to the southern Appalachians.
  - Running buffalo clover, a federally listed plant known in the Bluegrass area was located in 4 new counties (Grant, Bath, Owen and Campbell), which aids in its recovery.

- **Rare Species List Published**:
  - Updated the list of Kentucky's rare plants and animals, adding natural communities for the first time. The list will be published in the Journal of the Kentucky Academy of Sciences and is available on our web site.

- **Species Discoveries:**
  - 2 species have been found that are *new to science* (never before described in scientific literature).
  - 2 invertebrate species have been found that had never before been documented in Kentucky.
  - 1 aquatic species was rediscovered that had not been seen since the mid 1800's.

- **Two New Registered Natural Areas:**
  - Cornett Woods in Muhlenberg County protects 245 acres with two high quality wetland communities.
  - Sulphur Creek Cave in Metcalfe County protects 16.5 acres and a summer roosting cave for federally listed gray bats.

I. PROTECTING KENTUCKY'S BIOLOGICAL DIVERSITY:

The Commission's statutory directive is to protect biological diversity ("biodiversity"), but that alone doesn't explain why it is of such great consequence. A good start is to explain what is meant by **"biodiversity**". It is the abundance of **plants, animals** and **other organisms,** including their relationships with each other and their environment. These living things form a **mosaic of biological communities** and ecosystems that represent the complex diversity that makes **Kentucky unique**. This **diversity** of life is a fundamental characteristic which enables living organisms to evolve and survive on our planet. The **sheer magnitude** of the diversity of living organisms is one of its greatest strengths.

Kentucky's abundance of plant and animal life, from lowland swamps along the Mississippi River to rich Appalachian forests in the east, is extraordinary as well as beautiful. Our great varieties of **natural lands teem with diverse species**, some of which are found nowhere else in the world. Kentucky is home to **102** species, subspecies and varieties that are **endemic** to the state, i.e. **found nowhere else in the world**. The southeastern U.S. is the ***global*** center of diversity for several freshwater aquatic species. There is a greater concentration found here than

anywhere else. These species include **salamanders, freshwater fishes and mussels, and crayfish**. On a national scale **Kentucky is ranked third and fourth** respectively after only Alabama and Tennessee for the number of freshwater fish and mussels species found in the state. We are 5th in the U.S. for the number of crayfish (crawdad) species. The Green River which flows through Mammoth Cave National Park is considered nationally significant for its diversity. Forests in the east which are classified as mixed mesophytic are considered one of the **most diverse temperate deciduous forests** in the world. **Blanton Forest State Nature Preserve**, which protects one of the larger old growth forests east of the Mississippi River, is a sanctuary for the mixed mesophytic forest.

But 12,000 years of human habitation have had an impact on the landscape, most intensely since the time of the pioneers. From 1780 to 1980, **wetlands in Kentucky declined** from about 1.6 million acres to about 380,000 acres. This is a loss of over **80%,** compared to national wetland losses of about 50% during that same time frame. The majority of wetland losses were from the conversion of bottomland forests to agricultural fields. Forest coverage has declined from an estimated 85-90% of the state to about 50%. The loss of forested habitat has contributed to declines in bird populations, increased erosion and excessive sedimentation of streams. While **freshwater mussels** reach their greatest diversity in the southeastern U.S., harmful impacts to streams and rivers have **reduced their populations so severely** that they have become one of the **most imperiled groups** of animals in the country. **Twenty percent** of Kentucky's **mussel species** (21 species total) are extinct or extirpated (no longer surviving in the state).

Yet, **should we be concerned** about the loss of species and habitats? Protecting the natural diversity of species and the habitats they live in is our best insurance for a stable, supportive, livable environment. It increases the options for recovery following an environmental calamity. Over reliance on one species caused a historic human tragedy when the potato blight struck Ireland, resulting in the Great Irish Famine in the 1840's and over a million deaths. Wild species of rice have provided genetic traits to increase the production level of the domesticated rice used for food world wide. The more plants and animal species we have to draw upon, the greater our resources for food, medicines and the myriad other products that contribute to the quality of our lives.

And there are other equally compelling reasons to protect Kentucky's biodiversity:

1. <u>Economic values</u> – Plants and animals are the basis for countless commercial products including **food** and **clothing**. **Wood** provides building materials and a host of other products.

The Kentucky Division of Forestry reported in 2004, that **22,500 individuals were employed** at wood processing facilities with an annual payroll of $788 million, and the value of **wood products** totaled more than **$6.3 billion**.

2. <u>Medicines</u> – Almost **one-fourth of all medical prescriptions** throughout the world are derived from plants and microorganisms, or are synthesized versions of their chemical compounds.

3. <u>Recreation</u> – Our diverse natural areas draw **millions of visitors** each year to Kentucky's state parks and other natural lands. **Wildlife recreation -** hunting, fishing, and wildlife watching generated a ***$1.9 billion boost*** to the economy in 2006, based on the most recent data from the National Survey, U.S. Fish and Wildlife Service. More than **$840 million** was contributed to the state's economy in 2008 by the **Kentucky State Parks**.

4. <u>Eco-Services</u> – Forests **provide oxygen** to the atmosphere, help **cool the climate** and **absorb air pollution**. Next summer when you drive from an inner city into a rural wooded area, roll the windows down and feel the drop in temperature. **Wetlands purify water** runoff from uplands and are sometimes referred to as "nature's kidneys" releasing clean water to streams and rivers that provide drinking water. Songbirds and bats reduce crop damage by feeding on harmful insects. Other insects **pollinate food crops and wildflowers.**

5. <u>Earth's Steward</u> – Many people share a belief that we have a **responsibility to preserve** and share our natural resources **held in trust for future generations –** the same natural wealth we have been privileged to enjoy – and which was left to us by earlier generations. The General Assembly set this belief in statute in KRS 146. 410.

<u>FACTORS REDUCING BIODIVERSITY:</u>

A. <u>LAND CONVERSION</u> – The number one threat to our natural areas and the biological diversity they sustain is land development – i.e. **habitat loss**. High quality **natural areas support a great diversity of species**, unlike our managed landscapes which we populate with only a few preferred species. Suburban lawns are planted in fescue and a relatively few ornamental plant and tree species that thrive in urban conditions. Farmlands are largely fescue pastures or monocultures of row crops. Certainly these types of managed landscapes are both desirable and necessary, but part of their overall cost is a **loss of biodiversity**. As the conversion of land increases, it becomes more **critical to protect the best remaining natural areas** that serve as reservoirs of Kentucky's biological diversity. If we do not protect these areas they will continue shrinking to such a small scale that they will not be able to **sustain themselves over time.** The NRCS Natural Resources Inventory for Kentucky, 1982-1997 (most recent data available) states, "In Kentucky, urbanization has caused a large land use change. In 1982, there were 1.15 million acres of urban areas and roads. In 1997, this increased to 1.74 million acres… This increase is a **52 percent**

growth in urban and road areas over the 15-year period."

A statistic compiled by the USDA Natural Resources Conservation Service reveals that Kentucky was **losing *130 acres per day*** of forest and farmlands to development, 1992-1997 (the 2007 Natural Resources Inventory is not yet complete). This is an irreversible loss of prime farmland, wildlife habitat and natural areas. It equates to ***1 square mile*** of land being developed ***every week***, one of the highest rates in the country. When compared to the seven surrounding states, **Kentucky has protected the smallest percentage of its land.** State owned lands are approximately .9% of the state. When federal lands are added, including military bases, this figure increases to 7.5%. To be competitive with other states from a **quality of life** perspective and attract better economic development, Kentucky needs an expanded land stewardship and conservation initiative. Recognizing the need to increase land conservation, the 2008 General Assembly created the **Land Conservation and Stewardship Task Force** to identify a larger, sustained funding mechanism to acquire and conserve natural lands.

B. <u>INVASIVE SPECIES</u> – The second most serious threat to our native species is the invasion by exotic (non-native) species. Invasive species like **kudzu, musk thistle, emerald ash borer, hemlock wooly adelgid and zebra mussels** multiply and spread rapidly because they are unchecked by the natural controls that limit them in their place of origin. They choke out and displace native species, often the rarest ones. The **U.S. Government Accounting Office** has long recognized the enormous costs in **billions of dollars in damage** to agriculture, natural areas, businesses and consumers caused by invasive species. Kentucky **farmers fight musk thistle and Johnson grass**, which are also a scourge for natural areas managers. Kudzu is the most widely recognized invasive exotic plant, but others like bush honeysuckle and winter creeper are rapidly changing the composition of forests in the Bluegrass area. Unfortunately, new invasive species continue to arrive in the United States, due to our global economy.

Historically, **American chestnut blight** and **Dutch elm disease** inflicted a devastating toll on these two very important trees, substantially changing our forests. More recent forest threats include the **emerald ash borer** which has devastated ash trees in northern states, including Ohio and Indiana. It arrived in Kentucky in 2009 and the outlook is grim for the species of ash trees that grow in Kentucky. The **hemlock wooly adelgid**, an insect pest that has decimated hemlock forests in eastern states and the Great Smoky Mountains was found in Harlan County in 2006. All nine of the state nature preserves in Bell, Harlan and Letcher counties, including **Blanton**

Forest, the state's largest old growth forest are infested. This insect slowly kills hemlock trees which make up a significant portion of the forest canopy in the southeastern region of the state. **Kill rates** in other Appalachian states have been **about 80%.** The Commission's land managers have treated over 25,000 hemlock trees in four nature preserves in areas of habitat critical to the protection of rare species dependent upon a hemlock canopy. The Secretary of the Energy and Environment Cabinet declared the hemlock wooly adelgid **a public nuisance** in January 2010 because of its threat to our forests.

C. <u>CLIMATE CHANGE</u> – "Climate change **is real**….Climate change is **not a distant threat**; it is **occurring here and now**… The unmistakable signs of a rapidly changing climate are everywhere – melting glaciers, heat waves, rising seas, flowers blooming earlier, lakes freezing later, migratory birds delaying their flights south. No geographic region is immune", declares the **U.S. Fish and Wildlife Service** (USFWS) website, dated December 2, 2010. The USFWS also states that climate change, "Is the **single greatest conservation challenge of the 21st century**; ….The Service is already witnessing and documenting the effects of climate change on fish and wildlife and their habitats, and accelerated climate change is magnifying impacts on water and land resources, agriculture, and biological diversity. Accordingly, the Service must…prepare a comprehensive … response to issues such as:

- Changes in the timing, location, and intensity of wildfires;
- Changes in rain and snowfall patterns;
- Increases in temperature in many locations;
- Changes in access to water resources;
- Altered hydrology in rivers and wetlands;
- Increased frequency of extreme weather events…

Climate change will amplify existing management challenges involving ….an emphasis on **large areas with interconnected and ecologically** functional habitats capable of sustaining many species — landscapes — rather than single species or isolated or remnant habitats."

- From: U.S. Fish and Wildlife Service, Questions & Answers, Climate Change Strategic Plan, September 2010.

Climate change will unquestionably be a tremendous challenge to protecting Kentucky's biodiversity. The only uncertainty is how severe it will become. Localized effects will be very difficult to predict, especially with the extreme weather events it will bring, but one thing is clear

– we will have to work on a **landscape level.** This means protecting larger areas and establishing **green corridors** to connect areas of high biodiversity to facilitate the **movement** of animals and plants as they are thrust into an unprecedented period of rapid change. Endemic and rare species are likely to be put at even greater risk of extinction.

II. STATE NATURE PRESERVES AND STEWARDSHIP:

One of the Commission's most effective tactics for protecting our biodiversity is to acquire the best natural areas, with the greatest concentration of rare species, for inclusion in the state nature preserve system. The Commission manages **60 preserves** and easements containing **25,180 acres**. While the primary purpose of nature preserves is to protect rare species and the best examples of Kentucky's varied natural habitats, they also provide great opportunities for the **public to experience unaltered natural lands**. They are an incomparable resource for **environmental education** from elementary school to graduate student research. Stewarding the nature preserve system requires **specialized expertise in ecosystem restoration** techniques such as prescribed burning and invasive plant control. Tasks range from researching the viability of a rare species population to creating interpretive materials for the public to building hiking trails.

Nature preserves are often thought of as areas in an undisturbed natural state, best left to the care of "Mother Nature." Unfortunately, there are too many human-caused threats to these scarce, high quality natural areas for a hands-off approach. Threats come in the form of unauthorized use of ATVs, timber theft, degraded adjoining land, arson, etc. Even more relentless is the second greatest threat to native biodiversity – the encroachment by non-native invasive species. These plants, animals and diseases of exotic origin plague preserves. Without constant removal they overwhelm the native species populations we are protecting.

The Commission also holds **conservation easements** on **private properties** with significant populations of rare species. We have protected 116 acres this way. One conservation easement protects a population of the federally listed endangered plant Braun's rockcress. Two sites protect maternity caves for the federally listed endangered gray bat. An easement in Bullitt County protects state endangered gladecress. Conservation easements are a **less costly** method of protecting a natural area, than a full purchase.

One of our major new acquisitions in 2010 was a 294 acre addition to **Crooked Creek State Nature Preserve in Lewis County.** This addition nearly doubles the size of the preserve. **River**

Cliffs State Nature Preserve in Franklin County gained 99 acres to protect habitat for Braun's rockcress. Progress can be slow, but even adding small tracts to existing preserves provides more buffer land to protect some of the most fragile areas and life forms in Kentucky. The 28 acres added to **Terrapin Creek State Nature Preserve in Graves County** enhances our ability to maintain high water quality and quantity for some of the rarest fish in Kentucky. We added a total of 681 acres to the state nature preserves system in the past two years.

Stewardship activities have steadily increased. All preserves require routine maintenance such as boundary posting and inspections. Projects involving habitat manipulation, invasive species control, trail construction or rare species monitoring vary with each preserve. A number of preserves require **intensive management to restore** the integrity of natural communities **and ensure the survival of rare species**.

A less obvious threat to the nature preserve system comes from our **growing inability to maintain a sufficient level of stewardship**. We were unable to fund two interim positions in both years of the biennium, that we have relied on in prior years to complete many time intensive tasks. Invasive species control requires years of commitment to contain the spread or eliminate species from a site. **Hard work from past years is slipping away** as invasive species rebound in the absence of ongoing control. Follow-up work at prescribed burn units has not been conducted due to lack of personnel, so these areas will need to be burned more frequently to control resprouting. Safety may be compromised on some trails as we struggle to maintain infrastructure such as bridges, steps and railings. The Commission needs a separate **infrastructure maintenance budget** to provide for interim salaries, equipment and supplies.

The 60 nature preserves are scattered across the Commonwealth from the banks of the Mississippi River to Pine Mountain on the Virginia border. Two regional preserve managers are stationed in satellite offices in Bowling Green and Whitesburg to reduce travel costs. **We lost a full time position this summer** when one of two stewardship assistants resigned and we lacked funding to rehire. The preserve system continues to expand, but due to CAP reductions and budget cuts, we have **not been able to add new stewardship staff in over 12 years,** yet during this period we have ***added 11,816 acres!***

The constantly growing work load is overwhelming. Crucial tasks go uncompleted. There are **25,180 acres** in the nature preserve system, but ***only 5 staff*** to manage them. Without sufficient stewardship these high quality natural areas and the rare species they shelter are put at risk and the quality of the visitor experience will decline. To address our immediate needs, **two**

additional preserve managers are sought to divide the oversized eastern and western regions. **Two additional full time stewardship assistants** and **4 seasonal/interim** workers are needed to rotate among the preserves, conducting prescribed burns, controlling exotics, building trails, maintaining infrastructure, marking boundaries and implementing other stewardship tasks.

The preserves in southeastern Kentucky will continue to require a significant amount of staff time and resources due to their size, remoteness and the lack of sufficient staff to patrol them effectively. We continue to have **encroachment problems and illegal trespass** on our seven Pine Mountain preserves and those on Stone, Cumberland and Brush Mountains as well. Damage from **illegal off-road vehicle use is increasing** as local communities promote tourism opportunities for ATV enthusiasts. Areas set aside specifically for all-terrain vehicles are being developed, but more are needed to keep pace with the interest to prevent the spill over to conservation lands. The assistance of **local law enforcement** will be necessary to restrict off road vehicle riders to areas authorized for such heavy usage.

To respond to the increasing demands of preserve management, the Commission has entered into **partnerships to provide assistance**. In 2010, the Commission received assistance from the Student Conservation Association through an arrangement with the Kentucky Department of Fish and Wildlife Resources (KDFWR) and Mammoth Cave National Park, gaining a student crew. Custodial care of two preserves has been assigned to other organizations. We use Memoranda of Agreement with other public agencies and private organizations to assume partial responsibility for the costs of preserve maintenance and operation, when we can find willing partners. Agreements are in effect with the **Louisville Nature Center,** the **Jefferson County Board of Education** and the **Blackacre Conservancy**. The Commission continues to **recruit volunteers** as management demands have increased. Volunteers include scout troops, school groups, preserve neighbors and members of organizations such as the Sierra Club, the Kentucky Native Plant Society and others.

MAJOR STEWARDSHIP ACCOMPLISHMENTS: 2009-2010:

- Acreage needing **prescribed burns** has increased each year. Grassland type communities at seven preserves are becoming more open as woody vegetation is decreased by fire.

- **Invasive plant control**. Repeated efforts to control Kudzu have virtually eliminated this pest plant from three preserves. Control of Asian bittersweet, another choking vine at two Pine Mountain preserves has been very successful.
- With the Kentucky Department of Parks, the American Cave Conservation Association and Bat Conservation International constructed a new gate to protect a hibernation cave for the **federally listed Indiana bat** at **Carter Caves State Park.**
- The preserves branch manager continues her leadership role in **educating the public and other agencies on the threat of invasive species** in natural areas by participating in state and regional invasive exotic species organizations. **Weed Awareness Month** was proclaimed in September 2009 by **Governor Steve Beshear**.
- The branch secured **$26,400 in Wildlife Habitat Improvement Program (WHIP) funds** to conduct restoration on declining grassland habitat. The funds were used to conduct prescribed burns and fund cedar removal at Crooked Creek SNP and Bouteloua Barrens SNP.
- The ice storm in January 2009 caused major problems for the trail systems of all preserves. **Trails were closed through spring on 14 preserves**. FEMA funds were secured to partially pay for tree services to remove tall hazard trees and large hanging limbs that were too dangerous and numerous for the stewardship staff.
- **Tree ring research** at Floracliff SNP in Fayette County identified **a tree that dates to 1611**, making it one of **the oldest known in the state**. Other research projects on preserves have discovered a number of plants that were previously unknown in Kentucky. **Black bears** are finding good habitat in the large preserves on Pine Mountain.

Fighting New Invasive Species - The **hemlock wooly adelgid**, first found in Harlan County in March 2006, **has infested all nine** of the Commission's state nature preserves on Pine Mountain as well as Natural Bridge State Park Nature Preserve on the Cumberland Plateau. The preserves are beginning to experience **hemlock die-off** that will alter the landscape and damage habitat for numerous plants and animals dependent upon the cool, moist habitat provided by hemlocks.

The Commission and other state and federal agencies have joined with individuals and non-profit organizations to pool resources and prioritize areas to treat hemlocks. **Save Kentucky's Hemlocks** is an organization the Commission helped form in 2008 to coordinate efforts and

inform the public of this new insect pest. **Multi-agency efforts** have begun to assess the hemlock groves on public lands and treat trees in priority areas. The Commission has led the way with over **24,000 trees** treated in **areas critical to visitor safety and rare species protection**.

An even **newer insect pest** threatening the forest is the **emerald ash borer**. This beetle was found in Kentucky in 2009. All species of **ash trees are threatened** by this insect pest. Its larvae girdle the trees as they bore galleries under the bark. **Blue ash trees**, the signature species in bluegrass savanna woodlands, have been **treated** at the Julian Savanna State Nature Preserve in an effort to prevent mortality of the surviving old growth trees. A threat expected in Kentucky within the next year is **Thousand Cankers disease**, which attacks walnut trees. Trees are infected by a fungus carried by a small beetle causing large cankers on the trees which splits their bark and leads to death. The disease has been found as close as Knoxville, Tennessee. Quarantines and other efforts to minimize movement of infested walnut wood are being discussed, yet similar efforts were unable to stop the emerald ash borer from arriving in Kentucky.

White Nose Syndrome, a fungal infection that has **proven fatal** to a number of species of **bats** is another exotic disease that is expected in Kentucky at any time. First observed in New York in 2006 it has already spread to several states adjoining Kentucky. The disease has caused **mortality rates of 90%** and higher at some caves, and is expected to be devastating. **Bats are crucial** in their role of **consuming insects**; especially night flying species including mosquitoes and others that also damage crops. Not enough is yet known about the fungus and its role in bat deaths. It is thought that the fungus disturbs the bats while they hibernate, causing them to waken and use up precious reserves of fat. There is **no known protection** against this fatal syndrome. The Commission has **3 critical bat hibernation caves** on preserves at Carter Caves and Kingdom Come state parks. We are working with the Kentucky Department of Fish and Wildlife Resources (KDFWR) and the U.S. Fish and Wildlife Service (USFWS) to monitor for the disease and implement protective measures when it is found.

Funding to Purchase State Nature Preserves:

The Commission's main source of funds to purchase land for state nature preserves is the **Kentucky Heritage Land Conservation Fund** (KHLCF). From January 2009 to December 2010, the Commission purchased properties totaling $665,283. One of the revenue sources for KHLCF is the ***Nature's Finest*** **auto license plates** which depict dragonflies, Cumberland Falls or

a hummingbird. The Commission received an average of about $430,000 in 2009/2010 from KHLCF for land purchases. However, our list of approved land acquisitions is "in the red" in the amount of $1,051,960. If all the landowners for our targeted properties agreed to sell, this is the amount by which we would fall short.

The Commission has been very successful in seeking **additional funding** to enhance land acquisition. For example, we received a Recovery Land Acquisition grant in the amount of **$1,097,000** from the **USFWS** in 2009. Unfortunately, the owner of the targeted land declined our purchase offer, but we are looking for replacement land. This grant is to **protect Short's goldenrod**, a federally listed rare plant along with a federally listed mussel in the Licking River.

The **Nature and Wildlife Fund** allows **taxpayers** to **donate** a portion of their state income tax refund to the Commission by using the income tax form check-off. Contributions are divided equally between the Commission and KDFWR. Donations reached their all time high in 1996 in the amount of $109,792. They have declined steadily in part due to competition from additional tax check off options. For the last six years donations have averaged about **$34,000 per year**. Funds donated through the tax check off are restricted by statute to being used only for the **purchase or maintenance of state nature preserves.** The small amount of funds from this source makes them ineffective for land acquisition, so they are used to defray stewardship costs.

The Commission was also selected for a mitigation grant of **$461,000** from **American Electric Power** (a.k.a. Kentucky Power) under a settlement with the U.S. EPA. The grant has been used to purchase and restore 328 acres at Crooked Creek State Nature Preserve in Lewis County. This preserve protects a unique oak barrens community with prairie grasses such as big bluestem, five rare wildflower species, including scarlet Indian paintbrush and rare animal species.

The remaining balance of $179,000 in AEP mitigation funds will help acquire land in Whitley County along the Laurel Fork which is within one of the largest forest blocks in the state. The Commission is working with the Kentucky Natural Lands Trust, the Division of Forestry , and KDFWR to purchase approximately 1,591 acres on **Pine Mountain along the Laurel Fork**. This is a **first partnership for these three agencies**, and the property will be managed as a State Nature Preserve/Wildlife Management Area/State Forest. About half of the purchase price, $400,000, will be provided by a **State Wildlife Grant** from KDFWR.

The Commission is working with several partners to purchase approximately 2,500 acres in Meade County, a site known as **Lapland Barrens**. This natural community harbors the largest

known **post oak woodland and limestone glade complex** in the state, and is home to several rare plant and animal species. The Nature Conservancy, the Division of Forestry, and USFWS are also working to find sufficient funding to acquire this large forested tract.

Note: a list of your state nature preserves, by county, is included as Appendix 5. **A directory** listing each preserve with descriptions of what can be found there, location and directions is available on the KSNPC website at http://naturepreserves.ky.gov. A printed directory is available on request.

III. THE NATURAL HERITAGE PROGRAM:

To find the least disturbed lands for inclusion in the state nature preserve system the Commission uses a system known as the natural heritage methodology. This is a systematic process to find and rank rare plant and animal species locations and natural communities found throughout the state. This information enables us to make science-based decisions to ensure we protect the most threatened natural areas and rare species. The highest ranking areas are targeted for acquisition to become state nature preserves. The natural heritage program is used in all 50 states, 12 Canadian provinces and 10 Latin American countries, making the Commission a partner in the largest international biological data network in the world.

The Natural Heritage Program has enabled us to create the most complete and accurate database of information on rare species, natural communities and conservation lands in Kentucky. The database is the result of over 34 years of field research by Commission biologists, and the compilation of herbarium and natural history museum records and field records from other biologists. To collect this information the Commission has a staff of expert biologists including:

- **Two botanists** specializing in listed rare plants.
- **An aquatic zoologist** who specializes in locating native fish and mussels.
- **An invertebrate zoologist** for multiple groups including cave adapted species, many of which are found only in Kentucky.
- **An ecologist** to find and document Kentucky's varied **plant communities**; i.e. various types of forests, wetlands, prairies, barrens, etc.

The Commission had previously employed a **terrestrial zoologist** to survey **birds, mammals, reptiles and amphibians**, but lost this position through a retirement, budget cuts and **agency cap**

reduction in 2008. This is a serious **loss of a critical expertise**. Animal groups are some of the most widely appreciated wildlife and many are vital to the ecosystems in which they live. Without the zoologist position we lack the ability to work for the recovery of Kentucky's rarest animal species. This position is key to securing biological inventory contracts on other agency lands, which helps fund the Commission.

The primary focus of **the ecologist** is conducting **Natural Areas Inventory** (NAI), a systematic analysis of the state's landscape to find the best remaining natural areas in Kentucky. The NAI process **has not yet completed a full assessment** of Kentucky's 120 counties, due to limited staff and resources. We estimate that only ***one-half of one percent* (0.5%) of Kentucky remains in a natural condition comparable to what existed when the pioneers arrived**. Locating such sites is akin to finding "a needle in the haystack". With land development progressing at a rate of ***130 acres per day***, this increases the need to complete a Natural Areas Inventory of the state.

MAJOR NATURAL HERITAGE ACCOMPLISHMENTS: 2009-2010:

Kentucky's Natural Heritage, An Illustrated Guide to Biodiversity **-** A seminal new book about Kentucky's biodiversity is available, thanks to a major effort by Commission staff and publication by the **University Press of Kentucky**. As noted in the many positive reviews of this new publication, there has **never been such a comprehensive look at Kentucky's natural treasures.** It focuses on the rarest species of plants and animals, some of which are found no where else in the world, as well as the natural communities in which they survive. The Courier Journal review stated **"This is simultaneously a scientific and historic work", "beautifully photographed"** and "a valuable guide to places where rarities can be viewed". Renowned Kentucky author **Wendell Berry** contributed the **forward** for the book and declared it "**a publication of inestimable significance**". The book was written to educate Kentuckians about the Commonwealth's natural qualities, and inspire citizens to support conservation. We are encouraging educators to use it as a resource book in classrooms for biodiversity studies focusing on Kentucky.

Botany Program –

KSNPC has the **only botanical conservation program in state government**. In 2009-2010 it focused intensively on several federally listed plants for which the Commission receives

federal funding from the U.S. Fish and Wildlife Service. A sample of the work on federally listed plants includes:

- Comprehensive surveys and analyses of the status of:
  1) **White-haired goldenrod**, a plant that is found only in the Red River Gorge and **no where else in the world**;
  2) **Cumberland rosemary**, federally listed threatened and found in the Big South Fork, updated records of populations that had not been seen for almost 20 years;
  3) Surveyed for **Eggert's sunflower**, a species that was delisted in 2005, i.e. it is no longer on the Endangered Species Act list. It was delisted, partly based on our surveys documenting more populations than were previously known.
- Continued monitoring two candidates for federal listing, **Kentucky gladecress** (known worldwide from **only Jefferson and Bullitt counties**), and **White fringeless orchid**, a beautiful white orchid, known only from 4 counties and state endangered. Kentucky gladecress gained federal status as a candidate for ESA listing, despite our efforts working on its protection.
- Monitored **Price's potato bean**, a federally listed threatened plant, finding an unexpected benefit from the ice storms of 2009. Increased light reaching the forest floor as a result of heavy tree damage caused abundant growth and seed production in this rare vine after years of decline. In Kentucky it is found only in the western Kentucky lakes region.
- New county locations were found for **Running buffalo clover**, a federally listed endangered plant associated with the Bluegrass area. Interestingly it was found in **Grant, Owen and Campbell** counties and a **Bath County population** was found outside its expected range.

<u>Ecology</u> –

The ecologists engaged in several new activities including:

- Surveyed rare **grasslands and dry woodlands of west-central Kentucky** that provide habitat for declining grassland birds and reptiles.
- Began a Natural Areas Inventory of **Ohio County**.
- Surveyed **rare bogs and seeps** in southeastern and western Kentucky. This information will help classify and determine the **global rarity** of these unusual communities.
- Updated the state **natural community classification** and developed a first draft of a semi-

natural and anthropogenic (human impacted) community classification.

Aquatic Zoology –

- **Completed a 2 year study** on the **freshwater mollusks** of the South Fork Kentucky River system. Found several locations of the **snuffbox mussel** (*Epioblasma triquetra*), which is being proposed for federal protection as an endangered species. Confirmed the only extant site in the Kentucky River system for the **rabbitsfoot mussel** (*Quadrula cylindrica cylindrica*).
- Updated surveys for the **federally-threatened blackside dace** (*Phoxinus cumberlandensis*) in the upper Cumberland River system. **Two new streams were added** as a result of this work. Also monitored sites for the **Cumberland arrow darter** (*Etheostoma sagitta sagitta*) and the **Cumberland Papershell mussel** (*Anodontoides denigratus*), two very rare species in the Upper Cumberland River system.
- With funding and cooperation from the U.S. Fish and Wildlife Service, Kentucky field office, visited all historical sites for the federally-endangered **relict darter** (*Etheostoma chienense*) in Graves and Hickman Counties.
- An aquatic species was rediscovered that had not been seen since the mid 1800's.

Invertebrate Zoology –

- **Senior author of a paper** documenting the presence of four species previously unreported from Kentucky.
- **2 species** have been found that had **never before been documented in Kentucky**.
- Completed status evaluations of **rare invertebrates** for an update to the *Rare and Extirpated Biota of Kentucky*. **Approximately 62 invertebrate species** have been added to the list since 2000.
- **2 species** have been found that are ***new to science*** (never before described in scientific literature).

Publication of the List of Rare Species –

Another accomplishment is the **update of the rare species list** which is published on a ten year schedule in the ***Journal of the Kentucky Academy of Sciences.*** Species are removed or added continuously as new information becomes available. This list is kept current and **available**

on our web site and is widely used to assess land use impacts, prioritize conservation actions and identify areas for research. **A new feature** of the list is **the inclusion of the rare natural communities**. These are biological communities in the Kentucky landscape that have declined and without conservation attention, **could disappear from the state**.

A. USES OF NATURAL HERITAGE DATA –

The Commission provides natural heritage data to other state and federal agencies and conservation organizations through data agreements. It is invaluable for providing government and private requesters with **current**, **reliable data for environmental impact statements, biological analyses, research and long-term conservation planning**. We responded to **269 data requests** during fiscal years 2009 and 2010. Funding provided by data access agreements helps offset the cost of keeping the data current, accurate and complete as well as meeting the expense of keeping computer hardware and software operating.

The natural heritage data is maintained in the Biodiversity Tracking and Conservation System (**BIOTICS**); which was developed by NatureServe solely for use by natural heritage programs. **NatureServe** is the umbrella non-profit data center which compiles and manages the natural heritage data from the U.S., Canada and Latin America. An annual subscription fee is paid to NatureServe to keep BIOTICS current. Kentucky's natural heritage database currently contains an impressive **12,770 species** and **ecological community** records, **765 high value site** records and **588 conservation lands** records.

The use of BIOTICS allows our **data to be compared** with data from other members of the Natural Heritage Network throughout North and South America. This enables the ranking of species and natural communities on **a *global* level** and the assignment of conservation status ranks. This natural heritage **data is shared with state and federal agencies** for many purposes, including environmental reviews for development projects (Energy and Environment Cabinet and Transportation Cabinet); Outstanding State Resource Water designations (Division of Water); Species of Greatest Conservation Need assessments (Kentucky Department of Fish and Wildlife Resources); and species status reviews for possible federal listing(U.S. Fish and Wildlife Service), and forest species conservation (Division of Forestry and U.S. Forest Service).

Some of the **changes experienced by Kentucky's rare species** can be revealed by examining the natural heritage data for the two-year period from November 2008 to November 2010. One

category used to monitor the status of a species is the "**state protection status**" – a ranking that characterizes the relative **rarity or endangerment** of a native species within the state.

Based on the state protection status (endangered-E, threatened-T, special concern-S, historic-H, or extirpated –X):

- **33 species declined.** For example, these are species that changed from threatened to endangered, including16 species that could no longer be located, ranking them either historic or extirpated).
- **12 species improved**, moving from endangered to threatened, including 3 species that were rediscovered or reintroduced to the state.

B. CONSERVATION PLANNING –

The Commission has been involved in conservation planning with a variety of organizations including the **Kentucky Natural Lands Trust** on the **Pine Mountain Wildlife Corridor** and the **Fort Knox-Bernheim Wildlife Corridor**. We provided natural heritage data to **Kentucky Chapter of The Nature Conservancy** to assist projects in its focus areas. Commission data was used to support a diverse array of projects such as biological assessments for numerous infrastructure and development projects statewide, land preservation efforts in **Jefferson County**, identifying significant areas for wildlife **Species of Greatest Conservation Need** for the **State Wildlife Grants** (KDFWR), best management practices on **private forestland**, and conservation work in the **Green River** and **Obion Creek Watersheds.**

The use of Geographic Information Systems (GIS) enables us to provide meaningful data and comments in a timely manner and provide accurate information in **many user-friendly formats**. The development of new services such as delivering real-time data to other agencies, providing **searchable data to the public via the Web**, and creating GIS display products has made the natural heritage data more accessible and useful in conservation planning.

The Commission continues to support and enhance custom GIS applications created for the **Department for Natural Resources**, for **surface coal mine permit reviews** and for the **Division of Abandoned Mine Lands** for **reclamation project reviews**. The applications we created provide a suite of tools to streamline the review process saving limited staff time and providing customized reports. The application used by DNR was converted to ArcGIS in 2010, providing permit reviewers with new tools and enabling them to access the latest imagery and spatial data available.

The Commission assisted the **Kentucky Heritage Lands Conservation Fund** by developing a GIS program to track all the lands they have funded since 1995. This provides an ability to display and evaluate these protected conservation lands. Tools like this can increase the effectiveness of future acquisitions by identifying areas lacking in protected natural lands and connecting key areas.

The Commission was the Kentucky partner for the **National Conservation Easement Database.** We provided Kentucky data for the first national database of conservation easements. This project is compiling records from land trusts and public agencies throughout the United States to facilitate national level conservation planning by identifying all lands already protected by easements.

The Commission also used GIS to generate public educational posters and cartographic products, such as:

- ***Conservation Lands Map*** – A map of federal, state and privately managed lands that retain natural qualities at various levels. This will be a key tool to document the status of land conservation in Kentucky, and help prevent conflicts with land development projects by identifying important areas before resources are expended.
- ***State Nature Preserve Trail Maps*** – Numerous hiking trail maps and information panels have been created and are used in preserve brochures, kiosks and on the web.

IV. ADDITIONAL COMMISSION PROJECTS:

A. GRANTS AND CONTRACT WORK –

During 2009 and 2010, KSNPC undertook grant and contract work in addition to the regular demands of agency operations, which also **provides agency receipts** to supplement the Commission's budget. The contract work we obtain benefits the budget, but diverts our biologists from their most pressing work with rare species conservation. The following table lists projects undertaken by the Commission for 2009, contracts in 2010 are similar:

Contracts by Agency and Project - FY2009	**Amount**
U.S. Fish and Wildlife Service, Endangered Species Act	$ 36,713
Cooperative Agreement, U.S. Fish and Wildlife Service	$ 33,471
U.S. Dept of Agriculture – WHIP Grants	$ 6,092
Ky. Dept. for Natural Resources (data for surface mine permit review)	$ 33,000
Division of Abandoned Mine Lands (data for project review)	$ 5,000

NiSource (natural gas company consultation project)	$ 6,000
Ky. Dept. of Fish and Wildlife Resources – SWG Data Agreement	$ 75,000
Ky. Dept. of Fish and Wildlife Resources, Mussel Survey Grant	$ 13,205
Ky. Dept. of Fish and Wildlife Resources – Remnant Grassland Survey Grant	$ 10,800
National Park Service – Cumberland Gap Nat'l Park, rare plant survey	$ 7,500
Heritage Land Conservation Fund – GIS/Spatial Data Development	$ 3,000
Clarks River National Wildlife Refuge (USFWS) – natural community mapping	$ 2,180
NatureServe - Survey of Bogs and Seeps on Cumberland Plateau	$ 5,990
Grants/Contracts total for 2009	**$ 237,951**

B. KENTUCKY PRESCRIBED FIRE COUNCIL –

The Commission joined other state and private organizations to **raise awareness** about the need for the use of **prescribed fire** to restore natural community types which evolved with fire as a natural element, i.e. **prairie remnants and savannahs**. The Fire Council is developing **training standards** for participants, working on air quality concerns, coordinating research efforts and creating educational materials on **the safe use of prescribed fire**. The Nature Preserves Branch Manager will lead the organization as chair during the next biennium. The Fire Council will work with the Kentucky Division of Forestry to propose legislation setting standards for the professional use of prescribed fire.

C. STEWARDSHIP TRAINING REQUESTS –

The **expertise of the Commission's Nature Preserves Branch** has been recognized by several state agencies who requested assistance for staff training during the biennium. The Heritage Land Conservation Fund (KHLCF) contracted for training sessions for recipients of its grants for land purchases. **Training focused on invasive species identification** and control and on how to build and maintain trails on new public lands. Invasive species training was conducted for all Kentucky Division of Forestry, Service Foresters and Rangers.

D. $20,000 RECREATIONAL TRAILS GRANT –

The Southeastern Regional Preserve Manager received a grant to construct an interpretive trail at Cranks Creek WMA/Stone Mountain SNA in Harlan County. The grant funds will refurbish a parking lot so school busses can gain access, repair an existing sandstone amphitheatre that will be used for classroom activities, and purchase interpretive panels for trail signs to

educate students and other visitors.

E. NATURESERVE SOUTHEAST REGION REPRESENTATIVE –

The Commission's director was re-elected in 2008 to a second term as a southeast representative on the U.S. Section Council of NatureServe. NatureServe is the parent organization for our natural heritage program. This gives Kentucky a stronger voice in this non-profit, international conservation organization, and provides opportunities to benefit from heritage program innovations in other states.

F. LAND STEWARDSHIP AND CONSERVATION TASK FORCE –

The director was appointed to the General Assembly's task force, co-chaired by **Senator Brandon Smith** and **Representative Charlie Hoffman** in 2009. The task force was charged with developing a plan to fund **expanded land conservation across Kentucky**. The task force adopted findings including:

- Responsible land stewardship is necessary to protect water resources and agricultural and forest lands, to curb fragmentation and destruction of wildlife habitats, to prevent the loss of outdoor recreation space; promote tourism, and to preserve the state's essential ecological functions and biodiversity.
- Legislation should be enacted to, among other things, **expand protection of wildlife habitat, agricultural lands, forests, and woodlands** through the acquisition of public lands either in fee simple, by the use of easements or leases, or by donations or other legal arrangements between government agencies and willing private landowners.

Several participants from the task force, including the Commission, are continuing to work on this initiative and have gained funding and assistance from the national **Trust for Public Land**, **The Nature Conservancy** and the **Doris Duke Foundation**.

G. EDUCATING KENTUCKIANS –

The third prong of our mission is to educate Kentuckians about the value of biodiversity conservation and the importance of state nature preserves. The Commission has never had sufficient staff to dedicate a position solely to education, but has addressed this mission by spreading it among all staff. **Kentucky Educational Television (KET)** continues to **partner** with KSNPC by presenting biodiversity and conservation issues on its program ***Kentucky Life***.

Several episodes for 2011 were filmed based on the new *Kentucky's Natural Heritage* book.

The Commission also pursues its education mission through the Web site: **http://naturepreserves.ky.gov**, which includes the **Rare Plant Database**. The **State Nature Preserve/Natural Areas Directory** allows visitors to print brochures on preserves that have hiking trails. Fact sheets on trees, plants, insects and invasive exotic species are accessible, as well as our **scientific series of books** which are available for purchase. Lists of rare species are available including a county-by-county list.

Each quarter the ***Naturally Kentucky* newsletter** was distributed via e-mail to nearly 2,000 recipients who read about rare species and communities, informative articles from the staff and new preserves. However, the Commission reluctantly reduced the frequency of its publication beginning in 2009 to twice a year, as an efficiency measure in response to budget cuts and CAP reductions.

The Nature Preserves branch contributed to a new project called "**Questing"**, which is being promoted by the Kentucky Environmental Education Council. This program is designed to **get Kentuckians outdoors** to learn about the natural world and Kentucky's history. Each quest involves **a short scavenger hunt** in which participants solve clues as they hike a natural area.

H. REGISTERED NATURAL AREAS –

The **Kentucky Natural Areas Registry** enrolls high quality natural areas owned by individuals, agencies or organizations to assist them in wisely stewarding their lands. The registry is a non-regulatory program that **recognizes landowners** who agree to **exercise good stewardship** of **ecologically significant property**. The registry encourages the preservation of important habitat on private and public lands that are not available for acquisition, or may not qualify for dedication as a state nature preserve. Those who have enrolled in the Natural Areas Registry have **earned the appreciation of all citizens** of the Commonwealth for their preservation of high quality natural lands. With 93% of the state in private ownership it is **critical to partner** with private landowners to be successful.

As of December 2010, a total of 55 landowners with interests in 64 different sites are enrolled in the Natural Areas Registry program. These agreements encompass 5,162 acres and are found in 45 counties. Since January 2009 **two privately owned sites were added** to the program.

V. CONCLUSION:

KRS 146.485(13) directs the Commission to report to the Governor and General Assembly on matters which may significantly affect the natural ecology or the human environment, and to recommend actions to prevent significant adverse effects which would harm **our quality of life**. To this end, the Commission ***Recommends***:

1. Increase significantly the rate of land conservation in Kentucky.

Kentucky has fewer state owned conservation lands than any of the seven surrounding states. **Conservation lands are key** to protecting **biodiversity** and the **eco-services** provided by natural areas which are necessary to a high quality of life for our citizenry. Land is being developed at a rapid rate, and conservation opportunities are being lost, never to be regained in our lifetimes.

2. Develop a climate change action plan.

A plan must be developed to **prepare for changes in the climate** and its impacts on the biota and habitats of Kentucky. Because these changes will affect all of us, the plan must be developed **inclusively** with the participation of KDFWR, USFWS, the Dept. of Natural Resources., The Nature Conservancy, and other resource and conservation agencies and groups. **A state wide plan** is needed to identify and conserve key areas of the landscape and green corridors to interconnect them and facilitate wildlife travel. A climate action plan can be provided to educate and inform agencies involved with, or regulating land development. This will enable such agencies to make better informed land use decisions to protect conservation lands and ensure continued eco-system services.

3. Increased stewardship capacity to protect and manage conservation lands and increase public access to them.

Particularly following the reduced budgets of the last several years, the capacity of the Commission and other state agencies which own conservation lands **has not kept pace with the pressing needs** to manage these special areas. Habitat restoration and controlling invasive species are time intensive operations. The Commission **last added a stewardship position in 1998** and has since gained ***11,816 acres***. Worsening that situation, **we *lost* one**

stewardship position in 2010 which cannot be replaced due to the budget shortfall.

4. Restore critical biologist positions.

We need to restore and maintain our capacity for biological assessments. In December 2008 we lost our only terrestrial zoologist to survey **birds, mammals, reptiles and amphibians.** This loss impacts our ability to conduct basic biological surveys and will also **adversely impact other agencies, which rely on the Commission for this data.** We need to maintain core biologist positions.

The Kentucky State Nature Preserves Commission, despite being a small agency, has created an impressive system of state nature preserves, safeguarding some of the most unique habitats in Kentucky. The Commission is the **best resource** for information on the **rare species** and **natural areas** of the state. This biological data is used by various federal and state agencies, private consultants and Kentucky's scientific community. Our biologists, ecologists and preserve stewardship staff are **experts in their fields** and well respected among their peers.

A great deal has been accomplished by the Commission in 35 years, but much work remains to be done. **25,180 acres have been forever protected as preserves**, but considering that **Kentucky has over 25 million acres**, it is apparent we need a greatly expanded preserve system to protect at least **one viable example** of each of Kentucky's many unique natural communities. Other natural areas are held under public ownership, but the Commission's nature preserves the best-protected **repository for Kentucky's biological diversity, as this is their first purpose.**

To forge ahead with our task of surveying the **nearly *half* of Kentucky** that has yet to be inventoried for the best surviving natural areas, we need a **second ecologist.** *Kentucky is losing 130 acres per day of land to developed uses*. With a single ecologist it will take an estimated **15 *years* to complete a first natural areas inventory** of the state.

The great variety of plant and animal species and unique natural areas that make Kentucky unique and so ecologically diverse are perhaps the **most precious endowment** we can leave to our children and their children. In 1976 the **General Assembly declared** that,

> "As a part of the continuing growth of the population and the economic development of the Commonwealth, **it is necessary and desirable** that the overall impact on the **natural ecology be considered** when major alterations are proposed affecting same and that certain areas of unusual natural significance **be set aside**

and preserved for the benefit of present and future generations. Such unique areas are valuable to the **vital human dependence upon fresh air, clean water and unspoiled natural areas**."

The pending threat of **climate change** is adding a **new urgency** to this mission. As noted by the U.S. Fish and Wildlife Service, "Climate change is real and its here." It will potentially have **more far-reaching impacts on wildlife and wildlife habitat than any challenge that has come before us.** We need to lay the ground work now for the best responsive measures we can devise to ensure the greatest survival of our critical biological resources. The maxim that an **ounce of prevention** is worth a pound of cure is particularly applicable - conservation is far more effective and less costly than restoration. It is the task of the Kentucky State Nature Preserves Commission to **protect our natural heritage –** but in order to be successful **we are in critical need of greater resources**.

Appendices Index

Appendix 1. Kentucky's Federally Listed Endangered and Threatened Species 27
Appendix 2. Plants and Animals Presumed Extinct or Extirpated from Kentucky 29
Appendix 3. Diversity and conservation status of the major groups of organisms and natural communities in Kentucky, 2010 31
Appendix 4. Kentucky State Nature Preserves & State Natural Areas Map 32
Appendix 5. List of Dedicated State Nature Preserves 33

Appendix 1. Kentucky Federal Listed Proposed and Candidate Species.

A list of species with KSNPC designations (Endangered, Threatened and Special Concern) is available at www.naturepreserves.ky.gov.

This list includes only species that are not extinct or extirpated from the state.

SCIENTIFIC NAME	COMMON NAME	US STATUS
Vascular Plants		
Apios priceana	Price's Potato-bean	LT
Arabis perstellata	Braun's Rockcress	LE
Conradina verticillata	Cumberland Rosemary	LT
Leavenworthia exigua var. *laciniata*	Kentucky Gladecress	C
Lesquerella globosa	Globe Bladderpod	C
Minuartia cumberlandensis	Cumberland Sandwort	LE
Platanthera integrilabia	White Fringeless Orchid	C
Schwalbea americana	Chaffseed	LE
Solidago albopilosa	White-haired Goldenrod	LT
Solidago shortii	Short's Goldenrod	LE
Spiraea virginiana	Virginia Spiraea	LT
Trifolium stoloniferum	Running Buffalo Clover	LE
Freshwater Mussels		
Alasmidonta atropurpurea	Cumberland Elktoe	LE
Cumberlandia monodonta	Spectaclecase	PE
Cyprogenia stegaria	Fanshell	LE
Dromus dromas	Dromedary Pearlymussel	LE
Epioblasma brevidens	Cumberlandian Combshell	LE
Epioblasma capsaeformis	Oyster Mussel	LE
Epioblasma florentina walkeri	Tan Riffleshell	LE
Epioblasma obliquata obliquata	Catspaw	LE
Epioblasma torulosa rangiana	Northern Riffleshell	LE
Epioblasma triquetra	Snuffbox	PE
Lampsilis abrupta	Pink Mucket	LE
Obovaria retusa	Ring Pink	LE
Pegias fabula	Littlewing Pearlymussel	LE
Plethobasus cooperianus	Orangefoot Pimpleback	LE
Plethobasus cyphyus	Sheepnose	PE
Pleurobema clava	Clubshell	LE
Pleurobema plenum	Rough Pigtoe	LE
Potamilus capax	Fat Pocketbook	LE
Ptychobranchus subtentum	Fluted Kidneyshell	C
Quadrula cylindrica cylindrica	Rabbitsfoot	C
Villosa trabalis	Cumberland Bean	LE

Crustaceans

Palaemonias ganteri	Mammoth Cave Shrimp	LE

Insects

Pseudanophthalmus caecus	Clifton Cave Beetle	C
Pseudanophthalmus frigidus	Icebox Cave Beetle	C
Pseudanophthalmus parvus	Tatum Cave Beetle	C
Pseudanophthalmus troglodytes	Louisville Cave Beetle	C

Fishes

Chrosomus cumberlandensis	Blackside Dace	LT
Etheostoma chienense	Relict Darter	LE
Etheostoma lemniscatum	Tuxedo Darter	LE
Etheostoma sagitta spilotum	Kentucky Arrow Darter	C
Etheostoma susanae	Cumberland Darter	PE
Notropis albizonatus	Palezone Shiner	LE
Scaphirhynchus albus	Pallid Sturgeon	LE

Breeding Birds

Sternula antillarum athalassos	Interior Least Tern	LE

Mammals

Corynorhinus townsendii virginianus	Virginia Big-eared Bat	LE
Myotis grisescens	Gray Myotis	LE
Myotis sodalis	Indiana Bat	LE

(US) Endangered Species Act of 1973

LE = Endangered. A species "in danger of extinction throughout all or a significant portion of its range."

LT = Threatened. A species "likely to become endangered within the foreseeable future throughout all or a significant portion of its range."

C = Candidate. A species under consideration for official listing for which there is sufficient information to support listing.

PE = Proposed Endangered. Species proposed for official listing as endangered.

PT = Proposed Threatened. Species proposed for official listing as threatened.

For status category definitions see:

- United States Fish and Wildlife Service. 1992. Endangered Species Act of 1973 as amended through the 100th Congress. United States Government Printing Office, Washington, District of Columbia;
- United States Fish and Wildlife Service. 1999. Endangered and threatened wildlife and plants; review of plant and animal taxa that are candidates or proposed for listing as endangered or threatened; annual notice of findings on recycled petitions; annual description of progress on listing actions; proposed rule. Federal Register 64:57533-57547.

Appendix 2. Plants and Animals Presumed Extinct or Extirpated from Kentucky.

	US Status [1]
Plants	
Vascular Plants	
Anemone canadensis Canada Anemone	--
Argyrochosma dealbata Powdery Cloakfern	--
Callirhoe alcaeoides Clustered Poppy-mallow	--
Caltha palustris var. *palustris* Marsh Marigold	--
Coeloglossum viride Long-bract Green Orchis	--
Cypripedium reginae Showy Lady's-slipper	--
Dryopteris ludoviciana Southern Shield Wood Fern	--
Lysimachia fraseri Fraser's Loosestrife	--
Lysimachia radicans Trailing Loosestrife	--
Monarda punctata Spotted Bee-balm	--
Orbexilum stipulatum Stipuled Scurf-pea	--
Pedicularis lanceolata Swamp Lousewort	--
Physostegia intermedia Slender Dragon-head	--
Plantago cordata Heart-leaved Plantain	--
Polytaenia nuttallii Prairie Parsley	--
Pyrola americana American Wintergreen	--
Saxifraga pensylvanica Swamp Saxifrage	--
Scirpus microcarpus Small-fruit Bulrush	--
Xerophyllum asphodeloides Eastern Turkeybeard	--
Animals	
Freshwater Mussels	
Epioblasma arcaeformis Sugarspoon	--
Epioblasma biemarginata Angled Riffleshell	--
Epioblasma cincinnatiensis Cincinnati Riffleshell	--
Epioblasma flexuosa Leafshell	--
Epioblasma florentina florentina Yellow Blossom	LE
Epioblasma haysiana Acornshell	--
Epioblasma lewisii Forkshell	--
Epioblasma obliquata perobliqua White Catspaw	LE
Epioblasma personata Round Combshell	--
Epioblasma propinqua Tennessee Riffleshell	--
Epioblasma sampsonii Wabash Riffleshell	--
Epioblasma stewardsonii Cumberland Leafshell	--
Epioblasma torulosa torulosa Tubercled Blossom	LE
Hemistena lata Cracking Pearlymussel	LE
Leptodea leptodon Scaleshell	LE
Lexingtonia dolabelloides Slabside Pearlymussel	C
Plethobasus cicatricosus White Wartyback	LE
Quadrula fragosa Winged Mapleleaf	LE
Quadrula tuberosa Rough Rockshell	--
Villosa fabalis Rayed Bean	PE
Insects	
Nicrophorus americanus American Burying Beetle	LE
Pentagenia robusta Robust Pentagenian Burrowing Mayfly	--
Fishes	
Ammocrypta vivax Scaly Sand Darter	--
Crystallaria cincotta Diamond Darter	C
Erimystax x-punctatus Gravel Chub	--
Etheostoma microperca Least Darter	--
Hemitremia flammea Flame Chub	--
Ichthyomyzon gagei Southern Brook Lamprey	--
Moxostoma lacerum Harelip Sucker	--

Appendix 2. Plants and animals presumed extinct or extirpated from Kentucky.

	US Status [1]	US Status [1]
Moxostoma valenciennesi Greater Redhorse	--	
Percina burtoni Blotchside Logperch	--	
Reptiles		
Masticophis flagellum flagellum Coachwhip	--	
Breeding Birds		
Anhinga anhinga Anhinga	--	
Campephilus principalis Ivory-billed Woodpecker	LE	
Chlidonias niger Black Tern	--	
Conuropsis carolinensis Carolina Parakeet	--	
Ectopistes migratorius Passenger Pigeon	--	
Elanoides forficatus Swallow-tailed Kite	--	
Picoides borealis Red-cockaded Woodpecker	LE	
Tympanuchus cupido Greater Prairie-chicken	--	
Vermivora bachmanii Bachman's Warbler	LE	
Non-Breeding Birds		
Cygnus buccinator Trumpeter Swan	--	
Grus americana Whooping Crane	LE	
Mammals		
Bos bison American Bison	--	
Canis lupus Gray Wolf	--	
Canis rufus Red Wolf	LE	
Puma concolor couguar Eastern Cougar	LE	

[1] The US Status provided here refers to the current status of the taxon under the U.S. Endangered Species Act (USESA) as interpreted for its range within the state of Kentucky.

Extinct/Extirpated. A taxon for which habitat loss has been pervasive and/or concerted efforts by knowledgeable biologists to collect or observe specimens within appropriate habitat have failed.

Extinct: A taxon that no longer exists.

Extirpated: A taxon that no longer exists in the wild in Kentucky, but exists elsewhere in the wild.

See Appendix 1 for explanations of status categories

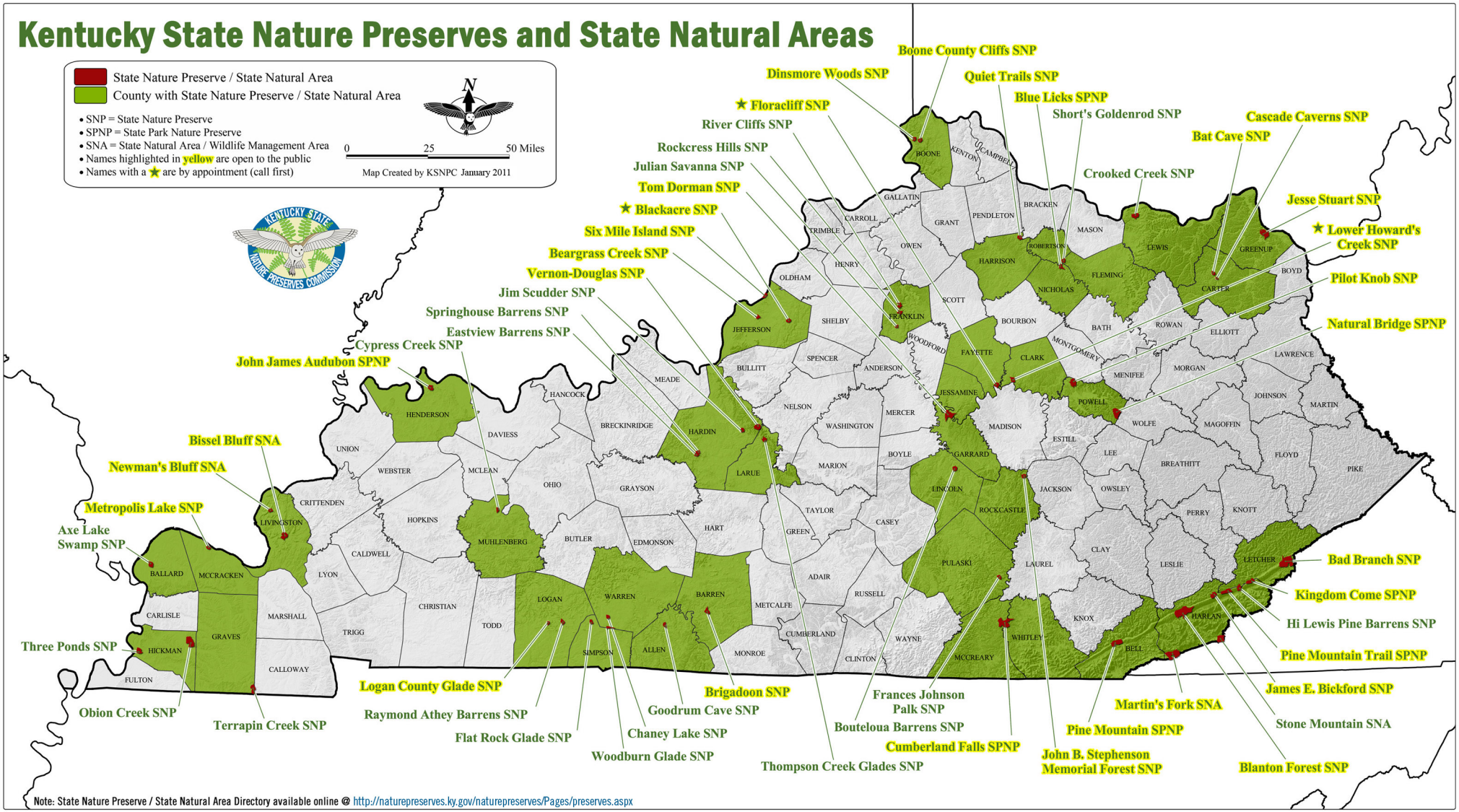
Appendix 3. Diversity and conservation status of the major groups of organisms and natural communities in Kentucky, 2010.

Number of Kentucky Species or Taxa[1]	Lichens	Mosses	Vascular Plants	Natural Communities	Snails[2,3]	Freshwater mussels	Crustaceans	Insects	Other Invertebrates	Fishes	Amphibians	Reptiles	Breeding Birds	Mammals
Native	unknown	317	2030	63	251	103	unknown	15,202[4]	unknown	245	53	54	168	67
Exotic	0	0	570	unknown	15	2	unknown	unknown	unknown	23	0	1	4	5
KSNPC Endangered	1	12	157	20	4	28	12	20	0	32	3	2	15	4
KSNPC Threatened	0	5	108	11	8	5	13	35	14	12	1	8	15	3
KSNPC Special Concern	0	0	55	5	15	1	8	13	5	18	6	7	16	7
KSNPC Historical	0	0	50	0	0	0	0	14	0	0	0	0	2	0
Presumed Extinct or Extirpated	0	0	19	0	0	20	0	2	0	9	0	1	9[5]	4
Extant Federally Threatened or Endangered	0	0	8	0	0	16	1	0	0	5	0	0	1	4
Extant Federal Candidate	0	0	3	0	0	4	0	4	0	1	0	0	0	0
Extant Proposed for Federal Listing	0	0	0	0	0	1	0	0	0	1	0	0	0	0

See Appendix 1 for explanations of status categories

1 - Totals include some distinctive subspecies and varieties for gastropods, freshwater mussels, and fishes but only species for lichens, mosses, vascular plants, amphibians, reptiles, breeding birds, and mammals.
2 - total excludes fossils, includes slugs, and is estimated for freshwater snails. Full list of sources available at http://naturepreserves.ky.gov
3 - totals for slugs and land snails courtesy of D. Dourson (Copperhead Consulting, pers comm., 23 July 2010).
4 - estimated
5 - two non-breeding birds are considered Extinct or Extirpated

Appendix 4. Kentucky State Nature Preserves and State Natural Areas Map



Appendix 5. List of Dedicated State Nature Preserves.

COUNTY	STATE NATURE PRESERVE	ACRES
Allen	Carpenter Cave CE*	14
	Goodrum Cave SNP	51
Ballard	Axe Lake Swamp SNP	458
Barren	Brigadoon SNP	184
	Mutters Cave SNP	108
Bell	Pine Mountain SPNP	868
Boone	Boone County Cliffs SNP	75
	Dinsmore Woods SNP	107
Bullitt	Apple Valley Glades CE	23
Calloway	Blood River Seeps SNP (dedication pending)	193
Carter	Bat Cave SNP	128
	Cascade Caverns SNP	18
Christian	Bob Overton Cave CE	55
Clark	Lower Howard's Creek SNP	228
Fayette	Floracliff SNP	287
Fleming	Short's Goldenrod SNP	210
Franklin	Feindel CE	15
	Julian Savanna SNP	42
	River Cliffs SNP	210
	Rockcress Hills SNP	65
Garrard	Tom Dorman SNP	674
Graves	Terrapin Creek SNP	259
Greenup	Jesse Stuart SNP	714
Hardin	Eastview Barrens SNP	119
	Jim Scudder SNP	231
	Springhouse Barrens SNP	54
	Vernon-Douglas SNP	730
Harlan	Blanton Forest SNP	3124
	Hi Lewis SNP	303
	James E. Bickford SNP	348
	Martin's Fork SNA	1601
	Pine Mountain Trail SPNP	609
	Stone Mountain SNA	1025
Harrison	Quiet Trails SNP	165
Henderson	John James Audubon SPNP	339
Hickman	Obion Creek SNP	1601
	Three Ponds SNP	528
Jefferson	Beargrass Creek SNP	41
	Blackacre SNP	175
	Six Mile Island SNP	81
Jessamine	Tom Dorman SNP	143
Larue	Thompson Creek Glades SNP	169
Letcher	Bad Branch SNP	2639
	Kingdom Come SPNP	225
Lewis	Crooked Creek SNP	694

Lincoln	Bouteloua Barrens SNP	261
Livingston	Bissell Bluff SNA	563
	Newman's Bluff SNA	169
Logan	Logan County Glade SNP	42
	Raymond Athey Barrens SNP	156
McCracken	Metropolis Lake SNP	123
McCreary	Cumberland Falls SNP	1294
Muhlenberg	Cypress Creek SNP	98
Powell	Natural Bridge SPNP	1188
	Pilot Knob SNP	742
Pulaski	Francis Johnson Palk SNP	150
Robertson	Blue Licks SPNP	53
Rockcastle	John B. Stephenson SNP	123
Simpson	Flat Rock Glade SNP	99
Warren	Chaney Lake SNP	169
	Woodburn Glade SNP	20

TOTAL NUMBER OF COUNTIES	**37**
TOTAL NUMBER OF PRESERVES	**60**
TOTAL NUMBER OF ACRES	**25,180**

*CE indicates land protected by a conservation easement. A directory of the state nature preserves is available upon request, or at http://naturepreserves.ky.gov.