



**WILD RESOURCE CONSERVATION PROGRAM**

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# Keystone **WILD!** Notes

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## Pools of the season

Who's that swimming in the vernal pool? Turn to page 7 to find out!

Photo by Bob Steiner

# PENNSYLVANIA WILD RESOURCE CONSERVATION PROGRAM

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is the official online publication of the Pennsylvania Wild Resource Conservation Program. Its goal is to inform people about the activities of the program, which is the principal agency that supports research and protection efforts for the state's natural heritage -- its unique collection of native nongame animals and wild plants. The program, which is administered by the Pennsylvania Department of

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Profile --

# WRCPeople

Photo by Greg Czarniecki

**JESSICA SPRAJCAR**

**Conservation Programs Manager  
DCNR Office of Conservation Science**

I have lived in Harrisburg for the past five years, although I was born and raised just outside of Pittsburgh.

I graduated from Ohio Wesleyan University with a B.A. in zoology, then went on to Tufts University and earned a M.A. in urban and environmental policy and planning. My original intent was to be a veterinarian, but after working in the environmental education field in Ohio for a year, and then interning with the Massachusetts Executive Office of Environmental Affairs, I got a taste for government outreach and policy work ... and it stuck.

I returned to Pennsylvania after graduate school, living in Pittsburgh until I stumbled upon the Pa. Management Associate Program. This is a one-year management training program in Harrisburg, where early to mid-career-level people rotate through six state agencies and then are placed in a permanent position.

My permanent position landed me in DCNR's Office of Conservation Science. For the past four years I have worked for DCNR on a variety of topics. A lot of my time is split between invasive species issues and sustainable landscape projects. I help provide technical assistance to state employees, local government staff and others about how to control invasive plants, use native plants in their landscaping, and maintain their lands in a more environmentally-friendly manner. I do this through conference presentations, newsletter and magazine articles (including this publication), festivals and other outreach events. Because WRCP has so few staff, I help them with the grant review process and coming up with activities for the Wild Resource Festivals. I was even one of the actors in the Cosmo's World videos!

In my spare time, I love to be outdoors, hiking, biking and kayaking. Some of my favorite outdoor memories related to my job are participating in the Schuylkill Sojourn and the Great River Adventure on the Susquehanna, Pennsylvania



*Jessica visited the Waymart Wind Farm in Wayne County, Pennsylvania, with the Wind & Wildlife Collaborative, to get a sense of the magnitude of a working wind farm.*

is certainly blessed with a multitude of scenic rivers!

I'm also a novice birder and artist. I love to paint, draw and take photos, mostly of birds. Singing is another passion of mine. I'm in a singing group through work, called "The Earthtones," and I've been known to karaoke a song or two now and then.

My interest in conservation formed at a very early age. I can remember being in the woods behind my house, pretending I was an archaeologist and biologist, searching for arrowheads and toads. As I grew older, what really left an impression on me was seeing the way land has changed and been developed. What was once a farm field or stand of trees became a big-box store or housing development.

I went into the conservation field because I wanted to make sure that didn't happen to every special natural place in Pennsylvania and elsewhere. I care about WRCP and work with them because they do great things. Their focus on research of statewide importance and their devotion toward education strike a chord with me. It has been a great experience to be part of WRCP's mission.

I do what I do in order to inspire future generations to care about the state's natural resources. Everything, from the tiniest stream insects to the raptors in the sky, has a value, even if you can't quantify it with a monetary value. I want people to realize that and appreciate life in all its forms, for the simple fact that it exists.



*Jessica's interests include art, such as this blue jay. She uses her talents to create our "Weed It & Reap" feature and, this issue, a kids' coloring page of "Critters of the Vernal Pond."*



# A Word From the



by Greg Czarnecki

herself with excitement when she dumped the first net full of muck and leaves into the white collection pan and discovered a newt. More netfulls revealed other “cool” things, including fairy shrimp, dragonfly larvae, and some really big predaceous diving beetles that she wouldn’t go near.

Even though we were in unfamiliar surroundings, we had no problem finding the next pond -- we

just followed our ears. We turned off our headlamps as we approached and just listened. The cacophony of mating wood frogs was so loud, it was difficult to hear the person next to you. After a couple of minutes, we turned on our lights and were greeted with total silence and hundreds of glowing eyes. The frogs were so intent on their spring courtship that Tara had no problem catching them with her hands.

Aura then led us to our last stop, a pond that was a bit smaller, but a little deeper. It was here that we found the animals that we had come to see -- one of Pennsylvania’s mole salamanders, the Jefferson salamander. Aura ventured into the deeper part of the pond and brought back an egg mass for everyone to see and hold if they wanted to, which Tara did, of course (see photo). It made the evening complete. We had seen, heard and held nature, and that’s worth more than a hundred lectures.

Tara’s been exposed to a lot of outdoor experiences. She’s hiked through wetlands and forests, held bog turtles and black snakes, pulled invasive plants and caught catfish nearly as big as she was. Without those opportunities, and with only classroom exposure to the natural world, she probably wouldn’t be very interested in or appreciate the natural world.

So if you know a young person who hasn’t had a chance to experience nature hands-on, do something about it. Take them on a hike, go fishing or, perhaps best of all, grab a net and take them to the pond. It just might be a life-transforming experience for them.

\* \* \*

To experience the sights and sounds of a vernal pond, visit <http://www.youtube.com/watch?v=vJsty0Blstrk>, to see a short video produced by the *Forgotten Friend* reptile sanctuary.



Columnist GREG CZARNECKI  
is the Executive Director of WRCP



*Tara holds a mass of salamander eggs, one of the rewards of her night-visit to a vernal pond*

In early March I had the opportunity to give a presentation about climate change to the Governor’s Youth Advisory Council for Hunting, Fishing and Conservation, at King’s Gap State Park. The council is a group of very bright, motivated and engaged high school students who were appointed by Gov. Rendell to advise the Governor’s Advisory Council and sportsmen on conservation, outdoor and recreation issues concerning youth.

Since it was on a Saturday, I invited my 10-year-old daughter to come along. As much as Tara loves science and is interested in the kind of work I do, she was less than thrilled with spending her Saturday listening to Dad give a lecture.

That was until I told her we’d be having a field trip afterward.

Tara’s reaction was like that of a lot of kids. Learning about nature in a classroom setting only goes so far toward holding their interest. It’s only when they experience the real thing that they truly connect with nature.

As night fell, Aura Stauffer, a wildlife biologist with the Department of Conservation and Natural Resources, led us on a walk to several vernal pools, to see the annual amphibious spectacle that is the subject of this issue of *Keystone Wild!Notes*.

It was a moonlit night and uncharacteristically warm for the time of year. We didn’t have far to walk to the first pond and, before I knew it, Tara was out in the water to the top of her boots, gathering a bottom sample with her dip net. She was beside



## “FRIENDS OF WRCP” get together at FACEBOOK.COM

FACEBOOK is a social networking website that connects people, organizations and causes. In order to boost awareness of the WRCP, a group page was created for the “FRIENDS OF THE WILD RESOURCE CONSERVATION PROGRAM.” This page will help distribute news, events and other bits of information about the program to a group of caring and concerned citizens. To join the group, go to [www.facebook.com](http://www.facebook.com) and search the Groups for the “Friends of the Wild Resource Conservation Program.”



by Heidi Mullendore

## WILD! Watch



Fighting to make my way along the shoreline, I squinted into the glare off the lake, as fierce winds whipped the brown-gray waves into frothy lines of white. Typical of spring, feisty drafts were testing the landscape, slashing the dried skeletons of grasses and teasels that hissed and crackled in the onslaught.

As the sun broke through,

the lake writhed in grayish-green waves braided with ribbons of purest turquoise, as it threw back tinted images of the sky. The gusts hurled an amalgam of seasonal scents: a sharp tang of cow manure and soft spice of new greenery, suffused with faint undercurrents of lake mud.

Sigurd Olson penned his reflections of a spring morning: “Early morning in the wilderness is the time for smells ... Winnow the morning air before it is adulterated with the winds and the full blaze of sunlight, and no matter where you happen to be, you will find something worth remembering.”

The land was breathing, scents rising like so many fiddleheads, uncurling from the depth of the warming earth. The winds carried the secrets of soil and life, flinging them joyfully into the air, to be carried over the fields. The lake tossed in a mad melee of springtime, churning its quiet winter waters into life.

A male red-winged blackbird called joyfully from the reeds; the males had arrived weeks ago, setting up territories to welcome home the females. Grackles flew over, cackling lustily as they landed in the alders. Through my binoculars, I could see a big-eyed killdeer sprinting in the quickening grass across the cove.

As the sun rose higher and the winds began to die down, painted turtles eased out of the murk to arch their necks in the hot sun. Pond striders etched patterns among the shoots of lily

pads, and a lone osprey high over the lake keened for fresh fish.

The transformation from late winter into spring switches from swift to sluggish and back again, driven by wind and sun. The breakup and decay of ice in the face of lengthening days signals the start of lake turnover, an annual complement of nature and science that determines the fate of food webs far from the lakeshore.

As the lake ice shrinks from the vernal sun, decaying and liquefying, the meltwater sinks until it reaches 39.2 degrees Fahrenheit (4 degrees Celsius). At that temperature, it ceases to shrink and begins to expand, becoming less dense. The lighter water rises and is stirred by thermal currents and wind, “turning over” the stratified layers of the lake and mixing them until the lake’s waters are the same temperature.

Donning hip boots, I slogged out among the cattails, making squelching sounds and sending frogs diving for cover. The shallows are a rich stew of decaying leaves; the alluvium that was once flora and fauna, rock and soil, all reduced to fine silt. Emerging from the muck were tender shoots. In evidence among them were eggs, thousands of tiny larvae of various species and the exoskeletons of the newly hatched.

The currents of spring turnover delve into the riches of the lake bottom, sending nutrients circulating through the lake water. The springtime bounty of nutrients provides phosphorus to algae and burgeoning shoots of submerged pond lilies. Increased oxygen levels fuel fish, eggs, tadpoles and countless aquatic insects. The springtime serves to bolster curlicue strings of toad eggs and tiny feather-gilled salamander larvae tiptoeing among cattail shoots and succors millions of mayfly larvae as they hatch and take flight, in turn strengthening populations of dragonflies, swallows and bats.

Vast armies of amphibians will sally forth from warm lake edges to move to field and forest where their flesh will become the bone and muscle of bigger predators that will, in turn, spread the bounty farther afield.

Left, top, Lake Pleasant, Erie Co., Pa. / Below, northern leopard frog. Photos by Linda Steiner

Spring turnover provides the jump-start to a season of life, something not seen in the stratified layers of summer and winter. Turnover time is just one part of the annual cycle of life; a small but essential part in the complex system of lake ecology.

As I muck along, releasing malodorous bubbles of decay, several turtles



wriggle into the water, vacating their perch on a slimed log. Something, maybe a mink, has used this half-exposed log as a feeding spot, leaving behind crayfish remains. The nameless muck of the lake bottom is replenished with such delights as exoskeletons and willow frills chiseled by sapsuckers. The normal cycle of life and death relinquishes its dead, dung, meal remains, egg casings and other detritus to tiny decomposers waiting to add to the aggregation of the nutrients on the lake bottom.

Humans and their grocery stores seem far removed from this annual pattern we see transpiring outside our windows, but in truth we evince changes, seen and unseen, in the happenings of nature.

Beneath my feet lay silt that washed downstream from the next valley. Into the stream that fed the cove came sediments and nutrients from storm-water retention ponds and the leavings from a popular golf course, which sported smooth, green lawns kept beautiful with the constant attention of fertilizers and a fleet of mowers.

Cigarette butts, soda cans and bleach bottles make a regular appearance each spring thaw, as they are scooped up by meltwater and delivered to this lake. And how many of the products in pretty bottles and containers on my dresser at home end up in the nearby town's graywater or blackwater systems or the landfill, to eventually overflow or leak out into nature? As we sigh in appreciation of a spring day on the lake, do we live in awareness that our car, golf game, hair gel and laundry detergent may impact the water where we dip our toes?

I stood to stretch complaining back muscles and looked over at the dam. Beyond that smooth green hump, the lake outflow wound its way through the watershed of the Juniata, carving its



Several turtles wriggled into the water, vacating their perch on a slimed log.

way to the broad Susquehanna and out into the Chesapeake. How much of my life ended up impacting the bay and its wildlife? The cumulative flurry of thousands of lives in smaller watersheds to millions of lives in water basins certainly alters the ancient systems of this land in ways we may or may not be able to see.

As I lumbered through the brownish stew of lake water toward my backpack on the shore, I wondered what my water testing kits would reveal. Would the phosphorus levels be higher compared to last spring's turnover? Each year summer's advance of pondweed reveals clues about temperature and nutrient levels, even as it leaves anglers cursing as they reel in yet another clump of tangled weed and line. Last year was the first in three that this

lake wasn't choked with weed, thanks to heavy treatments with the weed harvester and chemicals.

How much of that advance may have been due to humans we'll never know? Indirect impacts are evidenced as increasing numbers of Canada geese waddle through the grass near the lakeshore.

Humans have protected geese, while at the same time unintentionally providing extra habitat in the form of golf courses and parks. Large goose populations are the result, but their nitrogen-rich droppings can start a spiral of pond weed growth, algae blooms and decreased oxygen levels, impacting aquatic animal life. The complexities of humans acting upon natural systems are far-reaching -- for both good and bad.

Spring turnover is an annual celebration marked in hatches and tadpoles, much as freeze-up and breakup are marked in river systems. Turnover marks the beginning of the life-season that is spring, with its churning away of the cold and warm layers of the lake, bringing hungry trout looking for mayflies in the shallows and providing nutrients for a

multitude of critters. People flock to lakes in spring to revel in the newly warm days and smile at the trill of toads and raucous joy of red-winged blackbirds.

Maybe we will see our reflection in the water, understanding we are a part of this pulsing system, affecting the ebb and flow of the life of the lake.

Osprey / turtle photos by Linda Steiner



A long osprey high over the lake keened for fresh fish.

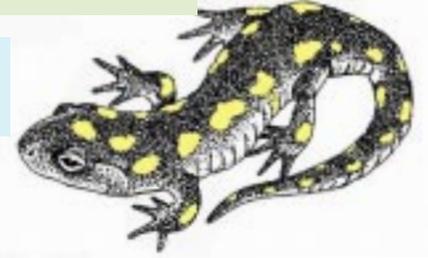


WILD!WATCH columnist Heidi Mullendore is the Environmental Education Specialist at Canoe Creek State Park

# POOLS OF THE SEASON

*Pennsylvania's short-lived vernal pools are vital to wildlife ... and through a PNHP project, now you can register one near you!*

*by Greg Podniesinski, Betsy Leppo, Sally Ray and Ephraim Zimmerman -- Pennsylvania Natural Heritage Program*



**It was a dark and stormy night, and hundreds of slimy creatures began crawling and hopping toward the icy-cold pool ...**

Sounds like the beginning of a scary tale, but it's actually the beginning of the annual breeding migration of salamanders and frogs to seasonal pools all across Pennsylvania.

Seasonal, a.k.a. "vernal," pools typically are shallow pools or ponds that hold water for only a portion of the year and often are completely dry by mid to late summer. Some deeper pools

may hold water all year round. Seasonal pools come in all sorts of shapes and sizes and may be full of grasses, shrubs and wildflowers. They may also have no vegetation at all, just a layer of blackened leaves (referred to as a black-leaf pool).

An important characteristic of most seasonal pools is the absence of fish. Since most seasonal pools go dry every year, fish cannot survive. In the absence of fish, the pools are used by a variety of amphibians and invertebrates that would otherwise be snack food for fish.

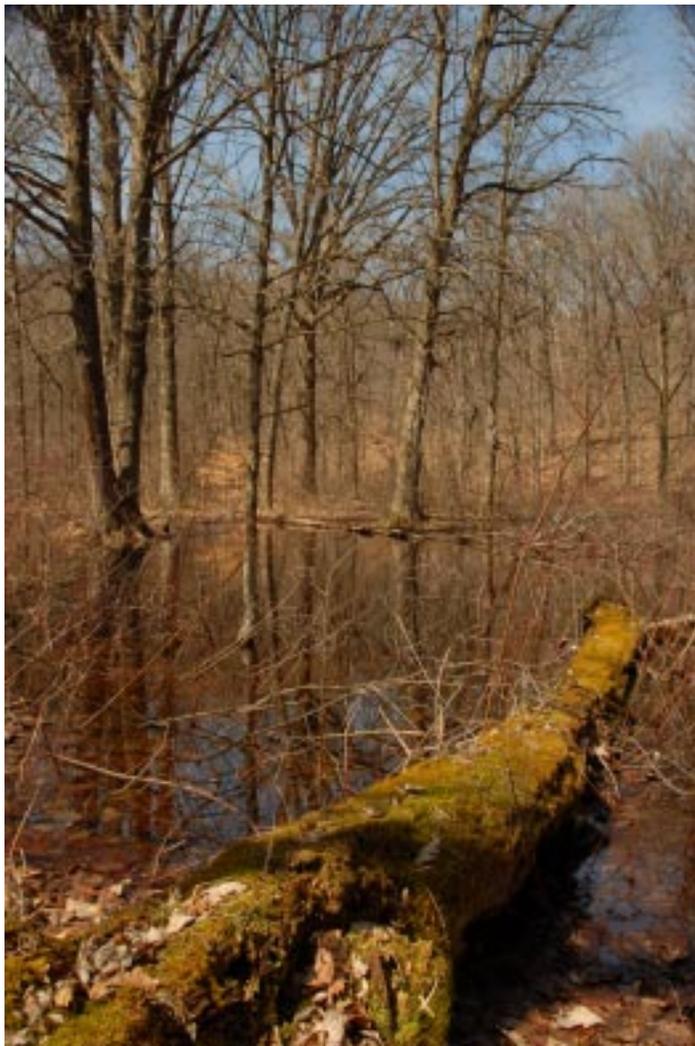
## Who's swimming in my seasonal pool?

Several types of salamanders and frogs are dependent on seasonal pools as breeding grounds and nurseries for their young. Characteristic vernal pool amphibians include marbled salamanders, spotted salamanders, Jefferson salamanders, wood frogs and spadefoot toads. Other amphibians that breed in both permanent and temporary aquatic habitats include green frogs, spring peepers, chorus frogs and American toads.

Breeding for most Pennsylvania amphibians begins in late winter to early spring, during the first few mild, rainy nights, when the air temperature is above 40 degrees F.

One of the earliest migrators is the Jefferson salamander, which may move across snow to pools still covered with ice. You may ask why any animal would purposely go out on such a cold, miserable night, but seasonal pool amphibians have several good reasons. Amphibians must keep their skin moist, and the rain wets the ground and animals as they move to the pools, preventing stress and injury that might result from drying out on a rainless night.

Photos by Bob Steiner / Spotted salamander artwork by Linda Steiner



*A wood frog (right) is swimming in the vernal pond on page 1. Wood frogs are among the most vocal visitors to seasonal pools each spring, going there to mate and lay eggs. At left, a woodland vernal pool that dries up each summer.*



By moving so early in the season, some of the amphibians' predators, especially snakes, are still hibernating, allowing the adults to migrate in safety. Other predators, such as small mammals and birds, are unlikely to be on the hunt on a cold, rainy night. As a result, the salamanders, frogs and toads can move to the ponds unmolested, except for the occasional hardy and curious human with a flashlight and raincoat. The greatest danger they may face during their migration is a close encounter with the wheels of a car.

Once they have laid and fertilized their eggs, the adults leave the ponds and return to the nearby forests, fields and meadows. The eggs and resulting larvae then begin a race against

Photo by Bob Steiner



Right, the gray treefrog sings loudly at mating time. Below, a spotted salamander. Below right, a seasonal pond on a wooded hilltop.



Photo courtesy Charlie Eichelberger, PNHP

time. Since most seasonal pools dry up by mid to late summer, amphibian larvae may have only weeks to months to grow and develop into juveniles that are capable of leaving the water.

One species, the spadefoot toad, has evolved to take advantage of even the most temporary of pools. The eggs may hatch in as little as two days and the larvae may metamorphose into juvenile toads in several weeks, albeit with tails still attached. If they don't leave the pool at this point, the weight of the spadefoot toad's tail may actually drown them.

The marbled salamander has quite the opposite strategy from the spadefoot toad. Rather than waiting for springtime, the marbled salamander will move into pools in early fall, often when the pools are still quite dry. The marbled salamanders will mate and nest on dry ground, with the females staying to guard the eggs until autumn rains come and fill the pool, after which the eggs will hatch. The larvae slowly grow over the fall and winter and come springtime are ready to prey upon the newly hatched larvae of other amphibians

## Shrimp, fleas, flies and tigers

Seasonal pools are also home to a host of interesting insects and other invertebrates, some of which are food for amphibian larvae and some of which prey upon amphibian larvae themselves.

One of the most interesting invertebrates is the fairy shrimp, a small crustacean that is 1/2 to 1-1/2 inches long, depending on the species. These graceful shrimp live only in seasonal pools, swimming "upside-down," with their many legs beating in a rhythmic pattern.

Fairy shrimp and other crustaceans typical of seasonal pools, such as seed shrimp and water fleas, produce eggs protected in tough cysts. The cysts can withstand drought and severe cold. Seasonal pool crustaceans are carried to new pool habitats on the wind or by hitching a ride with an animal. They may cling to the animal's exterior or pass unharmed through the digestive track. When water returns to the pools in autumn or spring, the cysts hatch and the cycle begins again.

Another interesting pool inhabitant is the caddisfly, which builds the case that houses it as a larva out of pieces of leaves and other detritus in the water. Different caddisfly species build different-shaped "houses." Some make a neatly rolled cigar-shaped tube, while others construct a four-sided "cabin."

When the caddisfly moves or feeds, it extends the front half of its body out of its abode and crawls about, but can retreat completely inside when it feels threatened. The caddisfly plays an important role in seasonal pools, by shredding the leaf litter as it feeds. The shredded pieces then become available for other smaller organisms to feed upon.

Some seasonal pool invertebrates are voracious predators, feeding on invertebrates and amphibian larvae alike. These include adult diving beetles and their larvae (also known as "water tigers" or "toe-biters"); dragonfly and damselfly larvae; giant water bugs (up to 2-1/2 inches long); and backswimmers (they do indeed swim on their backs). The water strider, which actually walks on water, is an important predator of mosquito larvae.

Photo by Bob Steiner



Photo by Bob Steiner



### Isolated, but a part of it all

The plants of seasonal pools are quite variable and the same pool can look very different from year to year, depending on how quickly the water in the pool evaporates or infiltrates into the ground. In many pools, annual plants germinate as the water recedes and exposes the soil, allowing plants that don't like being flooded to grow. In ponds where water persists for most of the growing season, the plants may include wetland grasses, sedges and shrubs that tolerate wet soils and flooding. Many vernal ponds, especially those surrounded by mature forest, are deeply shaded and have no vegetation in them. These pools are commonly called "black-leaf pools," referring to the layer of blackened, waterlogged leaves that line the pool bottom.

Seasonal pools are considered "isolated" wetlands, because they are not permanently connected to other water bodies. They can be found as shallow depressions in an upland area, associated with a wetland complex in a low-lying area, or in the floodplain of a stream or river. Seasonal pools can be found in a variety of land-use situations. Historically, seasonal pools were found in forested landscapes in the northeast and are most natural in this condition. Today, many are found in open areas, such as agricultural fields and residential areas.

### Classification is new to vernal pools

At present, there is no classification of seasonal pools in Pennsylvania, but one is in development. Pennsylvania Natural Heritage Program ecologists (Ephraim Zimmerman and Mary Ann Furedi) and zoologists (Betsy Leppo, Sally Ray and Ryan

Miller) are completing a statewide survey of seasonal pool types.

Their work focused on 89 pools selected from over 400 pools documented in their study, spread across 28 different counties in the Commonwealth. Their project documented the plants, reptiles, amphibians and invertebrates using each pool. They also sampled the water to measure important variables, such as pH and dissolved oxygen. This study represents the most comprehensive survey of seasonal pools in Pennsylvania and will help identify which types of pools are the rarest and unique and, consequently, most in need of protection.

Seasonal pools and the animals that depend on them are vulnerable to human activities. Increasing development and housing sprawl can result in the filling of pools and the loss of surrounding adult amphibian habitat. Increased use of well water for irrigation and drinking water can lower the water table and leave pools dry for most of the year.

Vernal ponds reliant on surface runoff can be contaminated by excessive use of fertilizers and pesticides. The spraying and draining of pools for mosquito control can also eliminate other pool invertebrates and affect amphibian larvae. Road construction that crosses amphibian migration routes can result in high mortality, especially when nearly the entire local breeding population must cross the road in one or two nights. Most amphibians, especially salamanders, simply cannot get out of the way of even a slow-moving vehicle.

### Understand, plan and protect

Several important pieces of information are needed when developing conservation and management plans for seasonal pools and the wildlife they support:

-- *What are the habitat requirements for each life stage of a seasonal pool species?*

Understanding the life history of seasonal pool wildlife is an area of ongoing research. From egg to larva to adult, each stage of an animal's life has certain requirements, and these requirements differ by species.

For example, some species ride out the dry phase in a seasonal pool as an egg. The egg must dry out and freeze before it will respond to environmental cues to hatch. In other species, the larva or adult waits out the dry phase of a seasonal pool in the moist soil under the leaf litter in the pool basin. Other species have terrestrial adults that leave the seasonal pool and

*Below, left to right, a blue dasher dragonfly; a singing spring peeper frog; and a marbled salamander. Above, left, a farmland vernal pool.*



Photo by Bob Steiner



Photos courtesy Charlie Eichelberger, PNHP

may travel several thousand feet away from the breeding habitat. These adults have another set of habitat requirements for their life away from the pool. Some species need wooded upland habitats, while other species require nearby streams or permanent ponds.

Terrestrial adults that leave the pool also need to find their way back for the breeding season. Eighty-five percent of seasonal pool amphibians return each year to breed in the same pond where they were born. They will bypass other pools that provide suitable habitat and cross obstacles, such as roads and other forms of human disturbance, in order to return to the pool of their birth. This fidelity by individual amphibians to a particular pool is an important consideration for the conservation of the species as a whole.

*-- Avoid use of certain pesticides and herbicides in and around seasonal pools to maintain the balance that is necessary between predators and their prey.*

Larval and adult seasonal pool animals feed on the smaller animals that share their environment, such as mosquitoes, midges, gnats and other flies. Predators, such as amphibian larvae, and insects, such as dragonflies and diving beetle larvae and adults, help control the insect species that are considered pests. However, when homes encroach upon wetland habitats, municipalities and homeowners often take measures to control mosquitoes and other nuisance insects. The pesticides used to control these pests have many negative effects on nontarget species. Direct mortality of all insect species occurs when broad-based killing agents are used. More specific killing agents are available that only harm blackflies or mosquitoes, but they indirectly affect the predators by decreasing the availability of their food.

*-- Protect the seasonal pool species and habitats within a healthy, functioning ecosystem.*

The most effective way to protect seasonal pool species is to protect the places where they live, including both the pools and the surrounding upland habitat. This means avoiding all disturbances to pools and carefully planning activities in the areas around them. Since many adult amphibian species live in the surrounding landscape all year, except during the brief breeding season, the health of the surrounding landscape and ecosystems is critical for the health of seasonal pool species. This means leaving surrounding forest intact, along with any downed trees, limbs and leaf litter. Rotting logs and leaf litter provide cover for many salamanders, frogs and toads, as well as prime habitat for their prey, worms, insects and other small invertebrates.

Photo courtesy Betty Leppo



Photo courtesy Jack Ray

Left, small residents of seasonal pools include the backswimmer (top), an insect, and the fairy shrimp (bottom), a crustacean. At right, a Jefferson salamander.

Photo courtesy Charlie Eichelberger, PNHP



## If you visit a vernal pond

When visiting a seasonal pool, you can explore with very little equipment. You can use a small net, a hand lens or magnifying glass and a shallow container. The net can be used for catching invertebrates and amphibian larvae, and the container used for looking at them (with a little water added). You should always return the animals back to the pool after viewing them.

Since most seasonal pool residents breathe using some form of gills, muddy, silty water kicked up by people wading there can clog the gills and make breathing difficult. Instead, sample the pool from the edges, if you want to catch and take a brief, closer look at its inhabitants. Or try just sitting or standing still and waiting for frogs and other vernal pond residents to show themselves again, after the intrusion of your approach. Polarized sunglasses can help minimize glare if you want to watch what's below the water surface. Always be mindful of the long-term protection of the pool.

## How to register a seasonal pool

The Pennsylvania Seasonal Pools Registry is an effort by the Pennsylvania Natural Heritage Program to document locations of and collect preliminary biological data on seasonal pool habitats throughout the Pennsylvania. The Natural Heritage Program hopes to facilitate this project with the help of volunteers and landowners to find and document these unique habitats.

Information collected for this project will be used to create a database of seasonal pools in Pennsylvania. The Seasonal Pools website (<http://www.waterlandlife.org/54>) provides information on how to register and study seasonal pools, general information about seasonal pool ecology, pictures and field guides for species that use seasonal pools, outreach ideas and information for educators, and a list of additional resources for seasonal pools.

Funding was provided by the U.S. Fish and Wildlife Service through State Wildlife Grants Program Grant T-24, administered through the Pennsylvania Game Commission and Pennsylvania Fish and Boat Commission. For more information, visit the State Wildlife Grants program on the website [www.pgc.state.pa.us](http://www.pgc.state.pa.us).



## Pennsylvania Natural Heritage Program

"Information for the Conservation of Biodiversity"

information on the location and status of important ecological resources (plants, vertebrates, invertebrates, natural communities and geologic features). Its purpose is to provide current, reliable, objective information to help inform environmental decisions. PNHP information can be used to guide conservation work and land-use planning, ensuring the maximum conservation benefit with the minimum cost.





## ANNOUNCING THE 2008 WILD RESOURCE CONSERVATION PROGRAM GRANTS



The 26 projects that received funding this year, as the culmination of the Pennsylvania Wild Resource Conservation Program's 2008 invitation for project applications, will share nearly \$1.2 million. The priorities targeted for this round of grants were: Effects of Climate Change on Biodiversity; Elementary Education Materials; Wildlife Action Plan Priorities; Wild Plant Management; and General Biodiversity Projects.

The Pennsylvania Department of Conservation and Natural Resources administers the Wild Resource Conservation Program, which is providing the 26 grants totaling \$1,179,768 through the Commonwealth's Growing Greener program. WRCP works with the Pennsylvania Game Commission and the Pennsylvania Fish and Boat Commission to operate the program.

Here's a peek at what was funded this year, from the 2008 application period. Applications for 2009 are available from WRCP, through a link on the website [www.dcnr.state.pa.us/wrcf](http://www.dcnr.state.pa.us/wrcf).

**Physiological Status of Salamanders Living in Acidified Stream Habitats.** The project assesses the status of a streamside salamander, the mountain dusky salamander, in relationship to acidification of the habitat. The physiological stress response is critical in helping an animal cope with stressors. The project will determine whether stream habitat acidification leads to a blunted stress response in streamside salamanders. Awarded to Duquesne University, \$14,516.

**Diatoms of Northcentral Pennsylvania.** The project will inventory diatoms of northcentral Pennsylvania, identify habitats containing rare, endemic or invasive diatom species and generate benchmark data for environmental assessments and climate change studies. The work will inventory the diatom flora of northcentral Pennsylvania, characterize diatom assemblages of the high quality aquatic habitats of the region, and produce benchmark data for evaluation of human impact and climate change on aquatic systems and organisms. Awarded to the Academy of Natural Sciences of Philadelphia, \$25,889.

**Identifying Species and Natural Communities in Pennsylvania Potentially Impacted by Global Climate Change and Developing Approaches to Monitor Key Populations.** The Pennsylvania Natural Heritage Program will collaborate with NatureServe to develop the Climate Change Susceptibility Index and apply the tool to plant and animal special and natural plant communities in Pennsylvania that are thought to be most likely

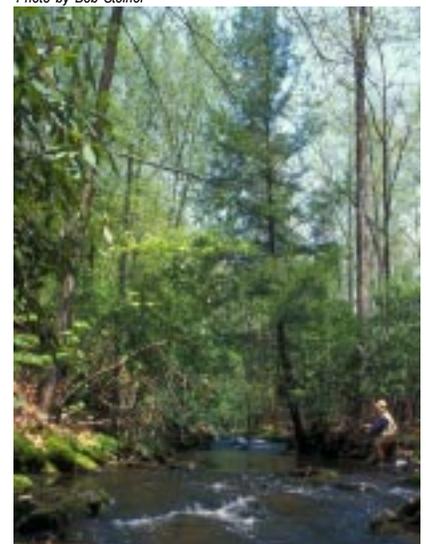
impacted by climate change. The project will develop and apply the first iteration of a Climate Change Susceptibility Index, develop a peer-reviewed list of plant and animal species and natural plant communities, and develop publications available to researchers, state agencies and others. Awarded to the Western Pennsylvania Conservancy, \$76,533.

**Fish Biodiversity of Selected Youghiogheny River Tributaries.** Conservation of biodiversity requires systematic temporal and comprehensive surveys of biological communities. From such data, local conservation and preservation strategies can be formulated, updated and implemented in regional plans. The project will provide taxonomic lists of fish inhabiting Youghiogheny River tributaries and compare them with existing records; document the presence of "Species of Special Concern" using GPS technology; and create a database for tributaries, which can be integrated into fish data. Awarded to the California University of Pennsylvania, \$18,585.

**High School Forest Conservation Education Modules: Preparing Students to Understand Conservation and Management of Penn's Woods.** Pennsylvania's forests are an important natural resource that contributes critically to the Commonwealth's forest-

based economy and to maintenance of invaluable ecosystem services. Current studies indicate a declining interest among high school students. This project will enhance hands-on, inquiry-based forest education exercises for high school students, increase exposure and experience of high school students and teachers to modern means of forest study and inquiry, and train high school teachers to use an inquiry-based approach. Awarded to Allegheny College, \$40,375.

Photo by Bob Steiner



*Pennsylvania's forests provide many services for recreation, the economy and ecosystems. Students will learn more through a WRCP grant.*

**Fish Database Review and Demonstration of Application Distribution and Status of Pennsylvania's Lampreys.** In excess of 30,000 fish survey events are represented in various databases for Pennsylvania. Many of these databases have not been critically reviewed and corrected for errors. Thus, fishery managers have been reluctant to make use of this information. The project will conduct a quality assurance review of existing fish survey and pool databases and convert them to a useable format (GIS, Access, Excel). They will also conduct lamprey surveys to fill gaps in distributional knowledge and assess historical locations. Awarded to the Pennsylvania State University, \$20,345.

**Use of a Calcium Supplement by Breeding Forest Songbirds.**

*Photo by Bob Steiner*



*Forest songbirds, like this hermit thrush, depend on a variety of food sources. A WRCP-funded study will look into the relationship between forest songbirds and the calcium supplement that snails provide.*

This project will improve understanding of the importance and use of calcium supplements for reproducing forest songbirds. Past research found many relationships between forest songbirds and snail abundance. The work will determine if forest songbirds in central Pennsylvania use snail shells as a calcium supplement for reproduction, by observing birds at snail-shell feeding stations. The work will also collect information on which forest bird species use snails. Awarded to the Pennsylvania State University, \$11,374.

**Habitat Selection and Territory Occupancy in Ovenbirds.**

Since 1988, over 500 male ovenbirds (*Seiurus aurocapilla*) have been banded and monitored on two contiguous study sites at Hawk Mountain Sanctuary. Results from this study will provide information on factors influencing long-term reproductive success and annual return rates. The project will determine whether specific territory features, such as vegetative structure, predict territory quality as estimated by occupancy, pairing success and reproductive success and determine the relative importance of male quality estimated by mass and age. Awarded to the Pennsylvania State University, \$14,517.

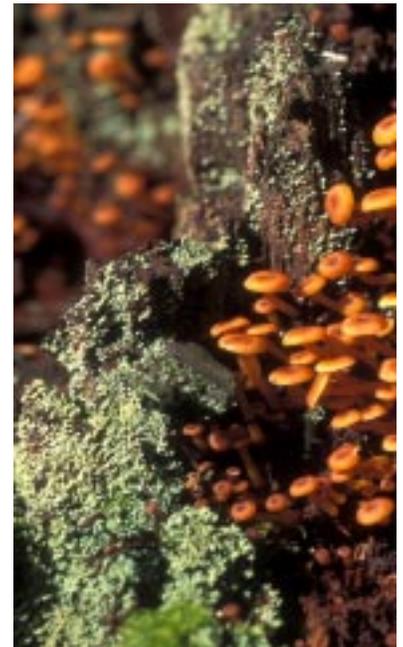
**Herbarium Studies and Field Studies of Pennsylvania Plants of Special Concern.** The project will provide essential data from

herbarium specimens deposited at the Carnegie Museum and Pennsylvania Natural Diversity Inventory for use in management and conserving Pennsylvania's natural resources, and to provide important services to staff and other organizations involved in conservation efforts in the Commonwealth. The work will include documenting new taxa for target counties in Pennsylvania, field surveys for rare species, data recording and herbarium services to the heritage program. Awarded to the Carnegie Institute, \$17,250.

**Morphological and Genetic Investigations of Pennsylvania Populations of the Channel Shiner, *Notropis wickliffi*.** The project will correlate genetic differences between channel, mimic and ghost shiners, with morphological variation seen in populations from the Allegheny and Monongahela rivers. The work will sequence the cytochrome b gene of mitochondrial DNA from 300 specimens of mimic and channel shiners previously collected throughout the Allegheny and Monongahela rivers in Pennsylvania. Awarded to Duquesne University, \$32,119.

**Lichen Community Structure across an Urban to Rural Landscape Gradient.** Intensive urbanization and industrialization deteriorate species habitats, biodiversity and local air quality. Environmental changes across a landscape gradient from urban to rural can be characterized by lichen communities. The project will examine the general condition and morphological characteristics of representative lichen species and characterize the composition of the epiphytic lichen community across two environmental gradients. Awarded to Point Park University, \$5,287.

*Photo by Linda Steiner*



*Lichens are seen here with mushrooms on a decaying tree stump. What effect does urbanization have on lichens? A WRCP-funded project will look into the topic.*

**Assessing Genetic Diversity of Pennsylvania's Eastern Golden Eagles: How Unique Are They?**

Eastern golden eagles are a significant presence during fall and winter in Pennsylvania, nevertheless, almost nothing is known of this small population. In particular, it has been suggested that Pennsylvania's eastern golden eagles are genetically distinct from others. The project will work to identify the degree of genetic uniqueness of the golden eagles that migrate through and winter in Pennsylvania and investigate if there are sex-specific wintering habits of eastern golden eagles. Awarded to the National Aviary, \$33,958.

**Field Survey and Status Clarification of Pennsylvania Natural Heritage Program Tentatively Undetermined Plant Species.** The project proposes to collect data on 12 - 15 additional species currently carrying a suggested status of tentatively undetermined, as advised by the Vascular Plant Technical Committee of the Pennsylvania Biological Survey. The work will collect data on the occurrence of suggested tentatively undetermined plant species from known and historic locations, on the occurrence of suggested tentatively undetermined plants from previously unexamined sites as determined from GIS analysis, and clarify their conservation status. Awarded to the Morris Arboretum of University of Pennsylvania, \$31,156.

**Critter Quest PA: Educational Materials.** The project will develop educational materials (targeting elementary level students, but translatable to all ages) to support Critter Quest PA, an online educational resource developed by the Pennsylvania Center for Environmental Education. The results will make Critter Quest PA easier to use and more interactive. The work will develop educational materials (e.g., classroom activities and webquests) and online tools (e.g., classroom wikis and blogs) that will increase the usefulness of this program for K-12 teachers. Awarded to Slippery Rock University, \$27,540.

**Assessing the Extent and Species Composition of Wet Scrub-Shrub-Dominated Habitat Types in Pennsylvania.** Wet scrub-shrub thickets provide important habitat for many species, however there is currently little information on the extent of naturally occurring wet scrub-shrub thickets and only a coarse classification for these habitat types exists. The project will examine the different community types found in representative wet scrub-shrub habitat across Pennsylvania and develop a preliminary community classification system, using quantitative data collected during this project and previous Pennsylvania Natural Heritage Program projects. Awarded to the Western Pennsylvania Conservancy, \$45,638.

**County Inventories in Pennsylvania.** County Inventories collect and provide important ecological information concerning rare species, exemplary natural communities and intact landscapes. This information helps to update and expand the Penn-

sylvania Natural Diversity Inventory database as inventories revisit historical locations. The project will continue the inventory of the final county not yet inventoried, Cameron; continue and complete inventories of those counties with ongoing projects; begin a new phase of inventory and assessment efforts; and identify county and municipal needs for products and services. Awarded to the Western Pennsylvania Conservancy, \$410,000.

**Golden-winged Warbler Response to Habitat Manipulation in Northcentral Pennsylvania.**

The golden-winged warbler is one of the most critically threatened, non-federally listed species in eastern North America. Management and/or restoration of early successional habitats that support golden-winged warblers and their associates is critical. The project will develop land management prescriptions intended to promote increased density and nesting success of golden-winged warblers, monitor the response to habitat manipulation, monitor the response of small mammals to habitat manipulation and correlate nesting success. Awarded to the Indiana University of Pennsylvania Research Institute, \$41,491.

**Complex Interactions Between Two Species of Flying Squirrels in Pennsylvania: Direct Implications for the Conservation of Northern Flying Squirrels.**

The project will pursue three new and exciting lines of investigation concerning the ecology, distribution and status of the state-endangered northern flying squirrel in Pennsylvania. The work will use portable, automated telemetry systems to conduct real-time monitoring of co-occurring southern and northern flying squirrels to evaluate detailed temporal and spatial overlap in nest-site use and foraging areas. Awarded to Wilkes University, \$50,953.

**An Invasive Species Educational Supplement for Upper Elementary**

**and Middle School Educators, Environmental Education Specialists, and the Public.** The project will develop an educational comic book featuring invasive species concepts. The work will include developing a set of five stories of invasion, each representing major taxa of invasive species commonly found in Pennsylvania, and developing two accompanying lessons with each story, one designed for in-class use and another for field study in an outdoor classroom setting. Awarded to the Southern Alleghenies Conservancy, \$32,363.

Photo by Greg Turner, courtesy PGC



*A northern flying squirrel peeks out at researchers, from its home in a manmade nesting box. A WRCP grant will enable automated telemetry to be used to monitor this species and its near relative, the southern flying squirrel.*

**Identifying Conservation Opportunity Areas and Assessing Future Land Use Patterns for Species of Greatest Conservation Need and Their Habitats.** The Pennsylvania Wildlife Action Plan provides critical guidance for resource agencies and organizations regarding the protection and management of Species of Greatest Conservation Need and their habitats. This project will identify concentration areas; assemble necessary species and habitat data, including locations and population information of species of highest conservation concern; and develop the framework for analysis of the data. Awarded to the Western Pennsylvania Conservancy, \$36,150.

Photo by Bob Steiner



Above, a northern harrier hunts the grasslands at the Piney Tract, in Clarion County. The tract is the subject of a newly-awarded WRCF grant.

**Yellow Lampmussel Status and Distribution in the Middle Susquehanna**

**River Sub-basin of the Susquehanna River.** The project will assess the status of the yellow lampmussel and its associated aquatic community through targeted sampling within major tributaries of the Susquehanna River system. The work will include conducting approximately 20 standardized, timed mussel surveys to examine the freshwater mussel communities in major tributaries in the Middle Susquehanna sub-basin, focusing on locations within this sub-basin where the yellow lampmussel was previously found. Awarded to the Western Pennsylvania Conservancy, \$42,143.

**American Ginseng, Goldenseal and American Bugbane in Pennsylvania: Habitat, Geography, Chemistry and Commerce.** This study will generate information that benefits conservation, management and stewardship of three native forest plant species that are commercially exploited in Pennsylvania: American ginseng (*Panax quinquefolius L.*), goldenseal (*Hydrastis canadensis L.*) and American bugbane (*Actaea podocarpa*). The project will document American ginseng habitat and geographic occurrence in Pennsylvania (15 sites, in at least 10 new counties) and document American bugbane geographic distribution in the state (10 sites), with targeted sampling in each known county. Awarded to the Pennsylvania State University, \$32,886.

**Habitat Associations of Pennsylvania's Breeding Bird Species of Greatest Conservation Concern: An Analysis of Spatially Explicit Breeding Bird Data Collected for the 2nd Pennsylvania Breeding Bird Atlas.** This project will benefit some 30 species of Wildlife Action Plan-Priority species (up to four "Immediate Concern" species; five "High Level Concern" species; seven "Responsibility" and "Vulnerable" species; and 18 "Maintenance Concern" species). The work will relate spatially explicit breeding bird observations for these species to the most current land-cover data for Pennsylvania, using various habitat association modeling procedures. Awarded to the Carnegie Institute, \$30,787.

**Grassland Management at Piney Tract Important Bird Area, Clarion County.** Grassland bird populations have declined precipitously in Pennsylvania and elsewhere, largely due to habitat loss and intensification of agriculture practices. Reclaimed surface mines compose a significant proportion of their remaining habitat. The purpose of the project is to convene stakeholders to discuss management options for the Piney Tract and to incorporate the results of the discussion into a short-term management plan that will allow comparisons of different management actions. Awarded to the National Audubon Society Inc., \$22,500.

Photo courtesy Jack Ray



The spadefoot toad is a rare vernal pool resident in the state. A WRCF grant will target its habitat.

**Endangered Eastern Spadefoot Toad Habitat Restoration at a Critical Southeastern Pennsylvania Breeding Site.** The project will benefit the state-endangered eastern spadefoot toad (*Scaphiopus holbrookii*) by managing critical breeding vernal pool and burrowing habitat at one of only two known spadefoot breeding sites in Pennsylvania, through conversion of abandoned field to native species grasses, etc. The project will create necessary island-edge habitat for eastern spadefoot toads, create forest-edge habitat vital to the species, promote the project as a model for other eastern spadefoot toad habitat restoration projects in the northeast U.S., and quantitatively determine the effectiveness of site management. Awarded to the Berks County Conservancy, \$38,734.

**Protecting Pennsylvania's Wildlife: A Radio Series.** The project will focus on six different species and the research efforts that are designed to protect them. From native grasses to the Allegheny woodrat, through the radio series the public will be educated about the threats to these species. The purpose is to educate listeners on the importance of wildlife conservation, by providing six examples in stories and interviews. Awarded to the Pittsburgh Community Broadcasting Corp., \$26,679.



Wind turbine photo by Bob Steiner / Photo below by Keith Hodan

# ON GOLDEN WINGS

***A State Wildlife Grants-assisted project maps eastern golden eagle movement to help guide the wise siting of wind-power generation***

Conflict between wildlife and humans occurs when both use similar resources. These types of problems are increasing in frequency as human populations and resource use grow together.

Each year, hundreds of eastern golden eagles pass through Pennsylvania, following wind currents along the ridges that traverse north to south. At the same time, wind turbines, which sometimes kill birds, are being erected on these same ridges to generate energy.

Because the eastern golden eagle population is small and because they migrate through a narrow corridor in Pennsylvania, it is important to develop wind energy in an eagle-friendly way. With high-technology tracking devices, a project based at the National Aviary ([www.aviary.org](http://www.aviary.org)), in Pittsburgh, is following golden eagle movements in order to gather the information required to reduce wind power threats to these magnificent birds. The work is being done on the eastern population of golden eagles, in the Appalachian Mountains of western and central Pennsylvania and surrounding states, including West Virginia, Kentucky, New York, Virginia, Maryland and other states.

The project began in 2005 and involves Todd Katzner of the National Aviary; Mike Lanzone of the Powdermill Avian Research Center of the Carnegie Museum of Natural History; Trish Miller, of the Powdermill Center and Penn State University; Brady Porter and Maria Wheeler, of Duquesne University; Dave Brandes, of Lafayette College; Dan Ombalski, of the State College Bird Club; and Charles Maisonneuve, Ministère des Ressources Naturelles et de la Faune, Quebec, Canada.

People in the Appalachian region of western and central Pennsylvania and surrounding states have a unique and special responsibility for the conservation of the eastern North American population of golden eagles. This biologically distinct population is of conservation concern, and preliminary data suggest that most individuals in the population migrate through one or more narrow, 30 to 60-mile bottlenecks along the mid-Appalachian Mountains. The ridges in these bottlenecks are, according to the U.S. Fish and Wildlife Service, also the sites within the region with the highest potential for development of wind power.

Wind power development is important to U.S. and local economies and also is the world's fastest growing energy technology. Development of wind power in the Appalachians should be conducted in a manner that will best meet the dual goals of promoting renewable energy generation and, at the same time, protecting this special population of raptors.

The goal of the eastern golden eagle research is to collect data and provide information that is believed to be essential for developers and land managers, so they can take steps to reduce the threats to eagles that are posed by turbines.



***Trish Miller, of the Powdermill Avian Research Center, holds eagle #41 for release. Left, a wind turbine at work.***

At present there is little science to guide the development of wind power on Appalachian ridges. The aim in developing this research is to produce the scientific data necessary to provide managers and elected officials at every level a

rational basis for turbine siting and operation criteria to reduce risk to migrating raptors.

The project's goal is to collect information on where and how the unique eastern population of golden eagles migrates through the Appalachian Mountains and to use these data to create regional maps showing the relative risk to eagles of development of wind power in different areas. The maps are expected to provide a crucial tool for managers and elected officials to guide safer development of wind power throughout the region.

The researchers are working with existing hawk migration counts, to collect additional data on flight dynamics and eagle behavior during migration. They have also trapped and telemetered eastern golden eagles for several years (the exact number changes as more birds are trapped and released and other tracking units become inoperative) and have that data for analysis. Katzner says that eight more eagles were captured and outfitted with telemetry equipment this past winter and at least another four will be done this coming summer.

First-stage modeling has begun by focusing on broad-scale migration patterns that will indicate the routes and rationales for eagle movement. Second-stage models that provide greater detail on the specifics of how eagles use topography and weather will follow as more data and funding are developed.

Providing information on potential impacts of wind power development on eagles in the mid-Appalachians requires a multistep strategy. The project approach focuses on three components:

- Discover the routes along which eastern golden eagles travel when they pass through the Appalachian Mountains. To do this, researchers compile data from new and existing hawk migration counts across Appalachian ridges and track individual eagles with satellite telemetry.

- Establish how individual birds behave as they move along these migration routes. Specifically, the project is using GPS-

quality telemetry data to evaluate the altitude and flight speed of birds under a suite of climatic and topographical conditions.

-- The third and final step to this process is to incorporate these data into spatially explicit computer models to predict population-level migration patterns and individual flight behavior on migration.

With these models, region-wide maps can be developed that describe the relative risk to golden eagles of wind power development in different areas along their migration routes. These maps will allow specific recommendations to be made to mitigate the impact of development of wind power on eagles and other raptors. This project will have numerous benefits to wildlife and to people, primarily because it will provide a framework for

*Photos this page by Todd Katzner*



**Above, Miller and Mike Lanzone, of the Powdermill Avian Research Center, show the telemetry unit affixed to the eagle's back. After release, its movements can be tracked.**

safer development of wind power.

Right now, there is little empirical evidence documenting the impacts of wind power development on birds in the eastern United States. Because golden eagles are an important potential "umbrella" for other migratory bird species, especially raptors, this project will benefit a suite of species that may be exposed to risk from development of wind turbines in the mid-Appalachians.

The ongoing research is showing that eastern golden eagles appear to be using the hypothesized migration corridor in western Pennsylvania, says Katzner, and they are definitely using some sites where turbines are planned.

Because there are ongoing educational programs at the institutions collaborating on this project, the results of this project will be disseminated beyond government offices, to a broad section of society. The participants of the eastern golden eagle project believe that this work will contribute to a recognized conservation priority for Pennsylvania and many adjoining states, and so enhance prospects for multi-state comprehensive wildlife conservation strategies.

The products resulting from the research's regionwide maps of relative risk to eagles of development of wind power in the mid-Appalachians will be a very important tool that regional land managers can use to protect the distinct eastern golden eagle population. The participants' hope is that this approach to solving conservation problems (i.e., using empirical data to develop spatially explicit models describing relative threats to

wildlife) will serve as a guide for other projects aimed at advancing conservation of other species of wildlife.

Although the wind power industry was not consulted in developing this research, those involved expect that the project will generate products that are exactly those required so the industry can make its efforts even more environmentally friendly.

Currently, the project is supported by the National Aviary and the Carnegie Museum of Natural History. It is also supported by Pennsylvania State Wildlife Grants and the Pennsylvania Department of Conservation and Natural Resources, and the government of the province of Quebec, with the support of Hydro-Quebec.

The 2008 WRCP grants include funding to continue eastern golden eagle research. Wild Resource Conservation Program funds have been primarily for genetic analysis, but, says Katzner, "The WRCP funding provides a solid basis for us to do all the components of the project. Take away any one of our grants and the overall whole is reduced."

How long will the project continue? "Another year or three," says Katzner. "We are right about at the middle stage. We anticipate a bit more data collection and tons more data analysis." That analysis will include genetic lab work and statistical GIS.

"We are already providing information to the Pennsylvania Game Commission and the U.S. Fish and Wildlife Service on where golden eagles fly and how they are impacted by turbines in those specific places," says Katzner. "We're getting to the point where we have sufficient information to make those evaluations and we were not really there until this year."



**WRCP board member Marcia Bonta (right) has special ties to the eastern golden eagle project. A golden eagle was captured on her property near Tyrone and was outfitted with a telemetry device, as part of the tracking study. Bonta wrote about the experience in her Pennsylvania Game News column, "Naturalist's Eye" (see her website: [www.marciabonta.wordpress.com/category/birds/golden-eagles](http://www.marciabonta.wordpress.com/category/birds/golden-eagles)).**



# WEED IT & REAP

## Have You Seen This Weed?



Aliases: *Trapa natans*, Water Nut

Last Seen: While this plant is relatively rare in its native habitat in Europe, it is forming dense floating mats on some parts of the Lower Susquehanna River, in areas around Philadelphia, parts of the upper Delaware River, and in a few isolated lakes in Pennsylvania (as well as other northeastern states).

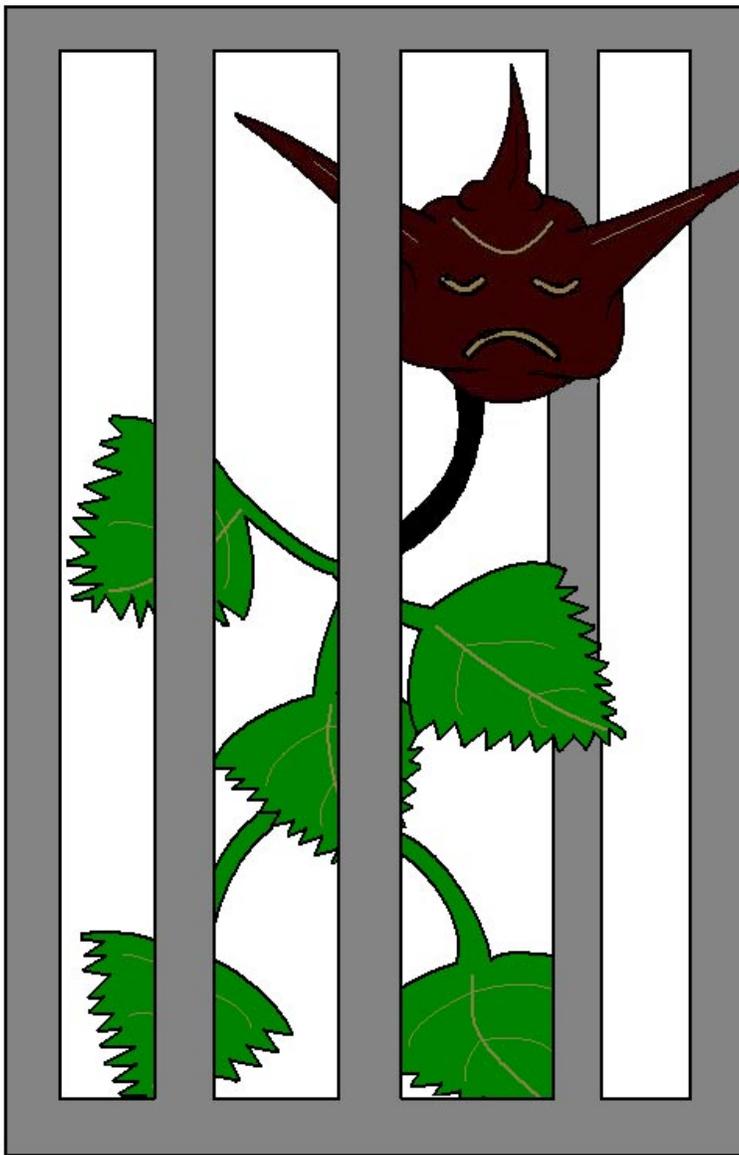
Description: This aquatic plant can reach up to 15 feet in length. Floating leaves grow in a dense rosette pattern and have a saw-tooth edge. Small, four-petaled, white flowers form in the middle of the leaf rosettes in June. Four spines stick out of the nut, making this a treacherous plant to come across as a barefoot swimmer. And because these nuts can remain viable for up to 12 years, this is a long-lasting problem plant.

Caution: The European water chestnut is NOT related to the edible water chestnut, used in Chinese cuisine. Not only is the plant not edible, it's TOXIC!

### Don't let this plant drive you nut-ty!

With nuts that can puncture shoe leather, this plant is a real "pain." But thankfully there are ways to get rid of it before it grows out of control.

To learn more about water chestnut management and its impact on the Chesapeake Bay, visit the website [www.anstaskforce.gov/Species%20plans/Water%20Chestnut%20Mgt%20Plan.pdf](http://www.anstaskforce.gov/Species%20plans/Water%20Chestnut%20Mgt%20Plan.pdf).

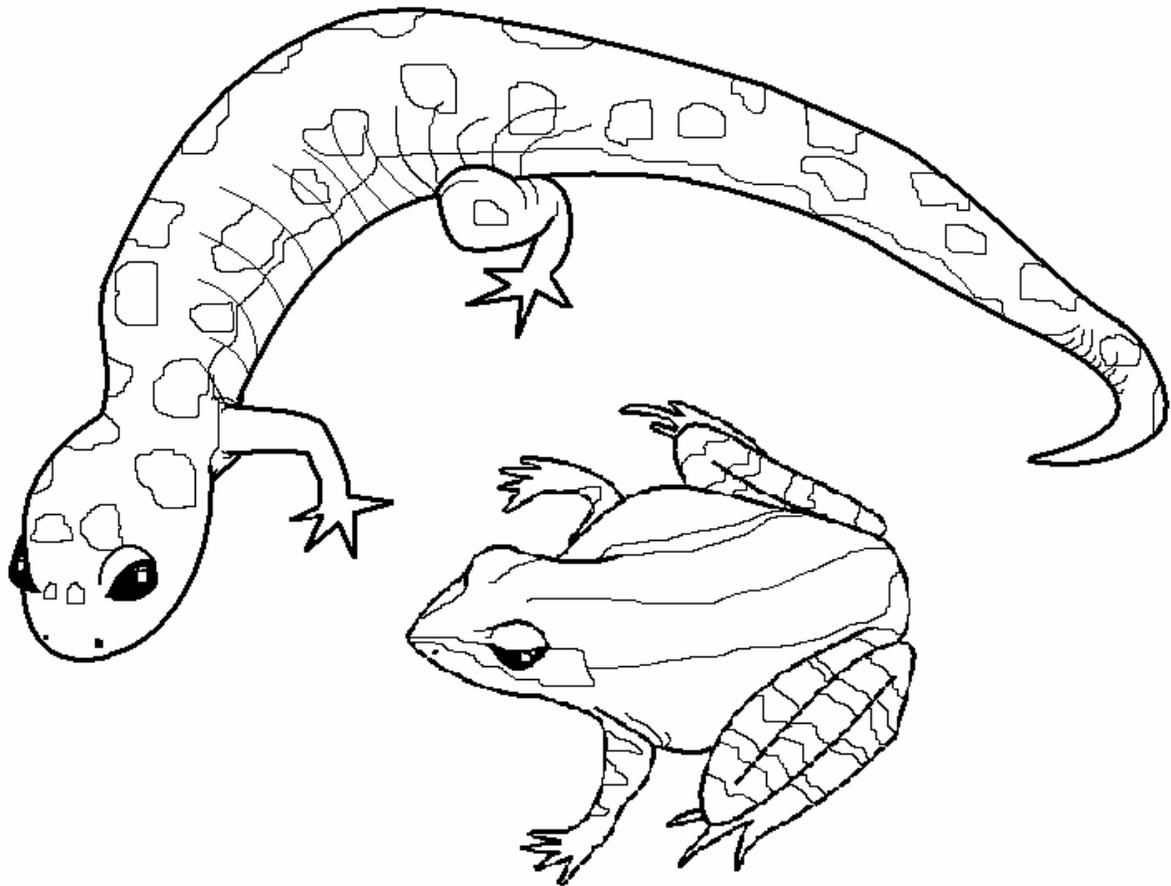


-- Text & illustration by Jessica Sprajcar,  
Conservation Programs Manager,  
DCNR Office of Conservation Science



Artwork by Jessica Sprajcar

# CRITTERS OF THE VERNAL POND



Spotted salamanders and wood frogs, like the ones shown here, spend part of their time living in vernal ponds. Color these two critters and draw in some vernal pond habitat (plants, water, other animals) for them.

Spotted salamanders are 6 to 7-1/2 inches long. Their main color is black, but can sometimes be blue-black, dark gray or dark brown. There are two rows of yellowish-orange spots on their back. Their belly is slate gray.

Wood frogs are under 3 inches long. Females are larger than males. Adult wood frogs are brown, tan or rust-colored, and they usually have a dark eye-mask. Wood frog bellies are pale yellow or green.



## VERNAL POOLS WORD SEARCH

by Jessica Sprajcar

W	J	E	F	F	E	R	S	O	N	P	O	S
E	E	A	S	F	O	R	E	S	T	E	D	P
T	R	S	L	N	I	S	T	T	D	R	A	O
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N	N	M	S	O	O	T	B	R	E	M	G	E
D	A	T	C	F	D	T	E	I	P	O	E	D
E	M	L	I	A	T	F	T	O	H	G	G	O
F	A	I	R	Y	S	H	R	I	M	P	G	E
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E	A	M	Y	T	R	L	V	A	G	F	A	A
R	S	D	H	Y	S	G	N	I	R	P	S	S
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amphibians  
forested  
jefferson  
spotted  
temporary

eggmass  
hydric soil  
larvae  
spring  
wetland

fairy shrimp  
invertebrates  
salamander  
tadpole  
wood frog



See Cosmo's videos online at [www.dcnr.state.pa.us/wrcf](http://www.dcnr.state.pa.us/wrcf) and on YouTube. DVDs also available to teachers from the Wild Resource Conservation Program.

**WHO AM I?** To find out, read each line that has the same color circle.

I am an animal

I have 4 legs

I have no legs

I have dry skin

I have moist skin

I have a tail, as an adult

I have no tail, as an adult

I may live part of my life in a seasonal pool

I don't live in a seasonal pool

I am a salamander

I am a frog

I am a toad

I am a snake

I am a lizard



USE ORDER FORM ON PAGE 24

# WILD! Buys -- Show Your Wild Side!

## OUR TOPS ARE TOPS!



**WRCP Logo Long-sleeved T-shirt (Adults)**

The WRCP logo is embroidered on a 100% cotton T-shirt (Chocolate brown)

Men's sizes: M, L, XL, XXL -- \$18

Ladies' sizes: S, M, L, XL, XXL -- \$18



**WRCP Logo Long-sleeved Faded Blue Denim Shirt**

Men's sizes: S, M, L, XL -- \$25; 2XL, 3XL -- \$27

Ladies' sizes: S, M, L, XL -- \$25; 2XL, 3XL -- \$27

This 100% cotton shirt features double-needle stitching and a button-down collar. WRCP logo is embroidered above the patch pocket (no pockets on ladies' shirt).



**WRCP Logo Long-sleeved Forest Green Pique Polo Shirt (Men's sizes only)**

Sizes: S, M, L, XL -- \$25; 2XL, 3XL -- \$27

This extra-heavy 100% ring-spun Egyptian cotton pique polo shirt features WRCP logo embroidered on the left chest.



**Salamander T-shirt**

The image of the red eft is embroidered in full color on this 100% cotton T-shirt (Periwinkle).

Youth sizes: S, M, L -- \$12

Adult sizes: S, M, L, XL, XXL -- \$14



**NEW!**

**COSMO'S WORLD T-SHIRTS**

The WRCP logo is on the front (see above) and Cosmo and Terra are on the back (at right). The T-shirt is 100% cotton, pre-shrunk and available in both Tangerine and Natural.

Children's sizes: S, M, L -- \$15

Adult sizes: S, M, L -- \$17





# WILD! Buys -- Show Your Wild Side!

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**WRCP Logo T-shirt (Youth)**  
The WRCP logo is embroidered on a 100% cotton T-shirt (Sand).  
Youth sizes: S, M, L -- \$12

**WRCP Logo Hooded Sweatshirt**

The WRCP logo is embroidered on an 80/20 cotton/poly hooded sweatshirt. (Blue; Gray)  
Adult sizes: S, M, L, XL, XXL -- \$27  
Youth sizes: S, M, L -- \$22



**Flying Squirrel T-shirt**

The image of a flying squirrel is embroidered in full color on this 100% cotton T-shirt (Sand).  
Youth sizes: S, M, L -- \$12  
Adult sizes: S, M, L, XL, XXL -- \$14

**Colorful Embroidered Patches to Wear or Collect**



- 2008 Presque Isle Festival -- \$10 (+ .60 tax)
  - 2008 Serpentine Barrens -- \$6 (+ .36 tax)
  - 2007 Northern Flying Squirrel Festival -- \$10 (+ .60 tax)
  - 2007 Rachel Carson Centennial -- \$6 (+ .36 tax)
  - 2006 Wine-capped Stropharia Festival -- \$10 (+ .60 tax)
  - 2006 Yellow Morel -- \$6 (+ .36 tax)
  - 2005 American Kestrel Festival -- \$10 (+ .60 tax)
  - 2005 American Kestrel -- \$6 (+ .36 tax)
  - 2004 Allegheny Crayfish -- \$6 (+ .36 tax)
  - 2003 Spreading Globeflower -- \$4 (.24 tax)\*
  - 2002 Red Eft -- \$5 (+ .30 tax)
  - 2001 Luna Moth -- \$5 (+ .30 tax)
  - 1999 Wood Thrush -- \$5 (+ .30 tax)
  - 1998 Dogwood -- \$4 (+ .24 tax)\*
  - 1997 Bog Turtle -- \$4 (+ .24 tax)\*
- \* Limited quantities



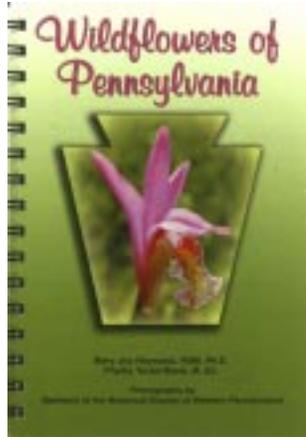
**Fuzzy River Otter** looks just like the real animal reintroduced into PA through efforts funded by the WRCP. 20 inches from nose to tail -- \$12 (+.72 tax)



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# WILD! Buys -- Show Your Wild Side!

## READ ALL ABOUT IT -- IN WILD! BOOKS

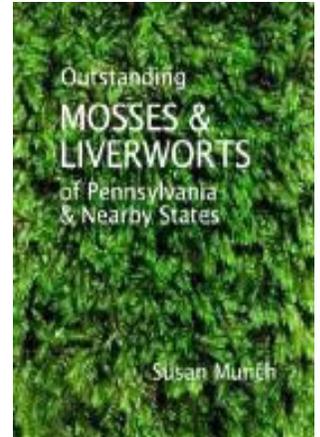


### WILDFLOWERS OF PENNSYLVANIA

This book is for all who enjoy nature and would like to become more acquainted with wildflowers. It will help the observer to identify the plants seen on a spring, summer or fall hike in a natural area. The book uses photographs of the plants, as photos reveal much more detail than can be found in drawings. Price: \$20 (+ \$1.20 tax)

### OUTSTANDING MOSSES AND LIVERWORTS OF PENNSYLVANIA

Botanist Susan Munch brings us the first full-color field guide for mosses in the Mid-Atlantic region. The guide's 89 pages contain detailed color photographs allowing for easy ID of many of the most common, yet striking, mosses and liverworts. No microscope is necessary. The guide is suitable for both professionals and non-botanists. Price: \$20 (+ \$1.20 tax)

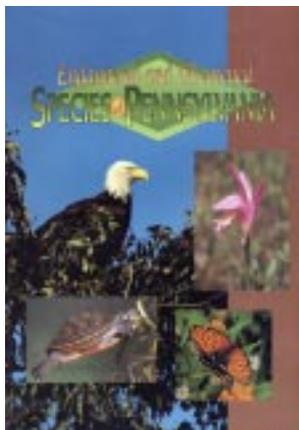


### THE RETURN OF MAGIC

A delightful children's book for ages 4 and up, the Return of Magic tells the story of a young kestrel through poetry and beautiful watercolor illustrations. The book is packed with information on the life cycles of these colorful raptors and even includes a design for building a kestrel nesting box. "The Return of Magic" was written and illustrated by Wendy Plowman, for the Hawk Mountain Sanctuary. Price: \$5 (+ \$.30 tax)

## WE HAVE BOOKS ON RARE SPECIES ... AND THEY'RE FREE!

### "ENDANGERED AND THREATENED SPECIES OF PENNSYLVANIA"



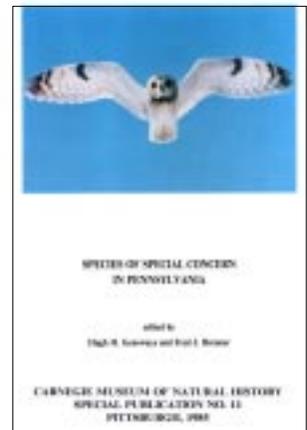
We have to make room for new publications, so we are offering individual copies of these two books, free of charge (\$2 shipping fee per book).

Teachers: Contact us for the publications in bulk (717-787-3212).

"Endangered and Threatened Species of Pennsylvania" is 80 pages, softcover, published 1995.

"Species of Special Concern in Pennsylvania" is 430 pages, hardcover, published 1985.

### "SPECIES OF SPECIAL CONCERN IN PENNSYLVANIA"





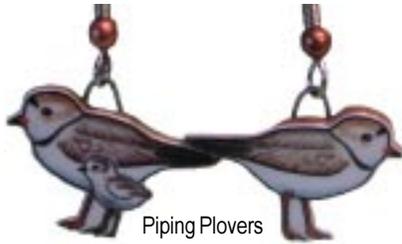
USE ORDER FORM ON PAGE 24

# WILD! Buys -- Show Your Wild Side!

Full of style and color, these wildlife earrings by Jabebo "Inspire Curiosity" and are made in Pennsylvania with post-consumer materials and surgical steel hangers. Price: \$10 (+ .60 tax) for each pair. Please note earring name on order form.



Global Biome



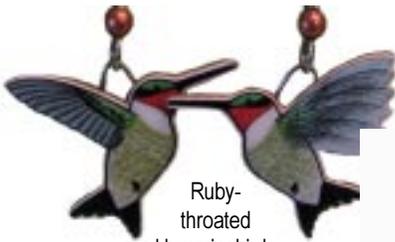
Piping Plovers



Little Brown Bats



Great Blue Herons



Ruby-throated Hummingbirds



White-breasted Nuthatches



Saw-whet owl



Barn Owls



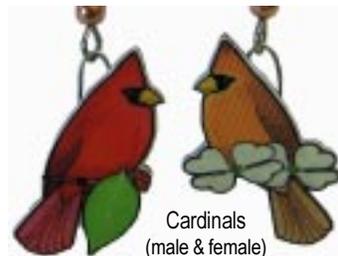
Dragonflies (colors not identical)



Painted Turtles



River Otters



Cardinals (male & female)



Fritillary Butterflies



Flying Squirrels

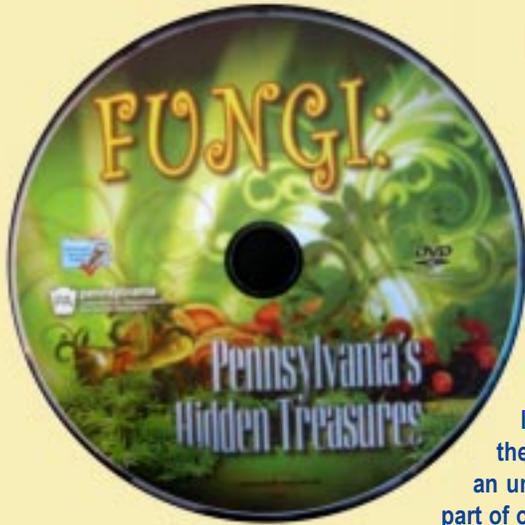
**WRCP Salamander Ball Cap**  
Our cap features the red eft salamander, the land-dwelling sub-adult of the aquatic red-spotted newt. The cap is constructed of garment-washed 100% cotton twill. One size fits all (adjustable). Colors: Blue (at right); Sand (light tan); and Green. Price: \$15 (No tax)





USE FORM BELOW FOR ALL ORDERS

# WILD! Buys -- Show Your Wild Side!



## MUSHROOMS AND MORE, OH MY!

The Wild Resource Conservation Program has released its 14th documentary video, "FUNGI: Pennsylvania's Hidden Treasures."

This award-winning video looks at both the ecological and the economic importance of fungi, an under-appreciated but essential part of our ecosystem. A DVD of the

video is available as an appreciation gift for donations of \$15 or more to WRCP. Order using the form below from WRCP, P.O. Box 8764, Harrisburg, PA 17105-8764; 717-787-3212; or e-mail [debmillar@state.pa.us](mailto:debmillar@state.pa.us).

### TO ORDER MERCHANDISE:

Print out and fill in the form below. Mail with check payable to "Wild Resource Conservation Program" and add Pa. sales tax and appropriate shipping fees. For more information, call (717) 787-3212 or e-mail [debmillar@state.pa.us](mailto:debmillar@state.pa.us).

### PA. STATE SALES TAX

WRCP is responsible for collecting 6% Pennsylvania sales tax on most items we sell, excluding apparel. The amount owed on each item is noted next to the item price.

### SHIPPING FEES

Total amount of order	Postage Fee
\$0 - \$10.00	\$2
\$10.01 - \$20.00	\$4
\$20.01 - \$40.00	\$5
\$40.01 - \$70.00	\$6
\$70.01 - \$100.00	\$7
\$100.01 or more	\$8



Spring-09

ITEM DESCRIPTION	Quantity	Price Each	Sales Tax	Item Total

**CONSERVE WILD RESOURCES LICENSE PLATE:** Please send me a form \_\_\_\_\_  
**KEYSTONE WILD! NOTES:** Please enter my web subscription (e-mail address below).

Total Order

Postage

**DONATION to WRCP:** If you wish to receive thank-you gifts, for \$15 choose either Invasive Plants DVD  or Fungi DVD  Donate \$25 and up, receive both! Add donation amount: \_\_\_\_\_

\*Please make check payable to "Wild Resource Conservation Program"

TOTAL ENCLOSED\*

**SHIP TO:** Name \_\_\_\_\_  
 Street Address (No P.O. Boxes) \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
 Phone \_\_\_\_\_ E-mail \_\_\_\_\_

**Mail form to: WRCP, POB 8764, Harrisburg, PA 17105 / Info: (717) 787-3212 or [debmillar@state.pa.us](mailto:debmillar@state.pa.us)**