



Environmental Education Council of Ohio

Issue Focus:

Exploring the Night

Fall 2014

Protecting the Darkness of Night

By Betsy Banks, Case Western Reserve University

While we are familiar with the concept of endangered animals and endangered plants, many of us are less familiar with the idea of endangered night skies. But for most of us in the US, dark nights are becoming increasingly rare. According to the National Park Service, two-thirds of Americans cannot see the Milky Way from their backyards and researchers predict that, by 2025, dark skies will no longer exist in the continental US.

The loss of dark nights is largely a result of light pollution, the illumination of the night by artificial lighting sources. Lights from businesses, billboards, streets, and parking lots are often overly bright and directed sideways or upwards. Air pollution intensifies the issue by obscuring the sky and scattering light through the atmosphere.



Light pollution impacts nocturnal animals that rely on darkness for hunting, protection, and reproduction. Some species evolved to navigate in the dark and lighter nights can disrupt migration patterns and cause disorientation in species such as sea turtles hatchlings that head toward the sky glow of cities rather than toward the ocean, which was historically the brightest spot on the horizon. Excessive nighttime light can also impact plants - and even humans.

We can help reverse light pollution by eliminating unnecessary, ornamental outdoor lighting, closing drapes, and working with our communities to utilize shields that direct lights from parking lots and streets downward. In raising awareness of the need to protect dark nights, the International Dark Sky Places Program certifies locations as International Dark Sky communities, parks, or reserves. For a location to make the list, it must not only have a dark sky but also have fully shielded light fixtures, go through a lighting audit, provide public access, and create an education program promoting dark sky stewardship.

Here in Ohio, Geauga Park District's Observatory Park is one of the few parks in the country to achieve the International Dark Sky Park status. The park includes 1,100 acres in Geauga County's Montville Township and offers telescope pads where amateur astronomers can set-up their equipment. During public programs, visitors have the opportunity to attend a planetarium presentation or use the Newtonian reflector telescope, featuring a 25" mirror, to explore the wonder of the night.

Read more about efforts to protect our night skies and how you can participate:

- International Dark-Sky Association www.darksky.org
- Geauga Park District's Observatory Park www.geaugaparkdistrict.org/observatorypark.shtml
- Globe at Night (citizen science project) www.globeatnight.org
- National Park Service Night Sky Team www.nature.nps.gov/night/

Save the Date

More information about each opportunity at
www.eeco-online.org

OEEF Grant

Letter of Intent due January 2015
Grant Due January 2015
www.epa.state.oh.us/oef/

Winter Snow Conference

Feb 6-8 at Camp Nuhop, Perryville, Ohio
See page 2 for details

EECO Annual Conference

April 9 - 12, at Maumee Bay State Park in NW Ohio
See page 9 for details

Science Education Council of Ohio Conference

Jan 26-27, in Columbus. Find out more at www.secoonline.org

Ohio River Valley Woodland & Wildlife

March 28, Sharonville, Ohio. Learn about landowner tools and techniques <http://tinyurl.com/qewo58d>

Geminid Meteor Shower

Dec 13 is the peak for this shower, though it runs annually from Dec 7-17.

Ursids Meteor Shower

Dec 22, 23, not usually as spectacular as the Geminids, however, there will be no moonlight to compete.

Experience the Night

By Lynette Dean, Program Manager, MetroParks of Butler County

When my grandson describes our dark basement as being scary, I suggest that it's not scary, just dark. When it comes to being comfortable in the dark, as humans we have a long way to go. Here are some suggestions to use, to have fun on night hikes.

It's your rods, not your cones

There are two types of photoreceptors in the eye: rods and cones. The cones work during the day, giving us color vision (cones = color). As daylight slips away, the rods begin to take over. As you begin your night hike, remind everyone that you will be able to see great, it just won't be in color. It takes about 7-10 minutes for the rods to take over from the cones. Since the rods do not provide any color information, vision is in shades of grey.



***Photo courtesy of ODNR,
Division of Wildlife***

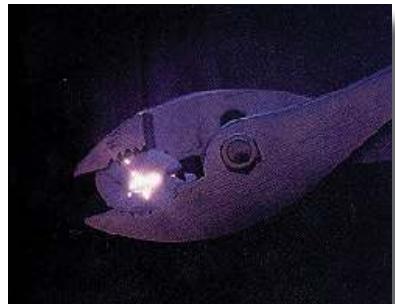
Play a guessing game. What color of clothing are folks wearing? (Is the sweater grey or pink?) Another way to show the work of the rods and cones is to have something with multiple colors in your bag. A good object to use is a colorful baby teething key ring. Can you guess what colors are on the key ring?

Let the other senses work

Our other senses are heightened after dark. Make sure that you incorporate the other senses into your hike. Pause periodically to let your group experience their sense of smell, hearing and touch. Ask them if they can feel what type of surface they are walking on. Be aware of changes from gravel to grass or mulch.

Be willing to be quiet

Remember that the experience of being in a forest in the dark can be more profound than any words that we might say. Allow folks to walk on the forest path by themselves. You will need a helper – choose someone you know and trust. Well into the hike, gather the group and explain that you are going to walk ahead of the group for a little way. They have the opportunity, a challenge by choice, to walk alone along the path. Explain that you will be waiting for them and the last person to walk along the path will be your helper. No words, no running. Remind them to experience the night.



Bring some mint life savers

Triboluminescence is science that disguises itself as a magic trick. Light can be generated by the breaking/crushing of chemical bonds in candy, particularly Wintergreen lifesavers (not the sugar free type). Ask your group to pair up. Give everyone a lifesaver. One of the partners chews the mint while the other stares into their mouth. Light sparks off of folk's teeth as they crush the candy. Make sure the other partner gets a turn. This is a great way to end your hike.

Winter Snow – Creative Ways to Teach STEM!

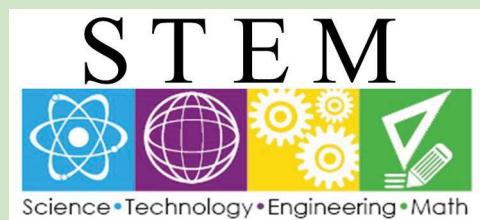
February 6-8, 2015

Camp Nuhop, Perrysville, Ohio

The conference will be held again at the fabulous Camp Nuhop, 1077 Hanover Twp. Rd. 2916, Perrysville, OH 44864.

Call for Presenters

Presentation topics can be diverse and may or may not relate to winter, but should relate to one of the following: STEM, Arts, Environmental Literacy, 21st Century Skills, or Careers and the Environment. We encourage possible session topics that include ways of getting students reconnected to nature, interested in Environmental Careers as well as using the outdoors as a teaching tool. Please fill out the presenter form(found at <https://eeco.wildapricot.org/news/3126535>) completely and return by November 24, 2015 to: Brenda Metcalf at brendasmetcalf@aol.com preferred, or if need be, by snail mail at: PO Box 1004, Lancaster, OH 43130.



Ohio Environmental Education Fund

OEEF grant guidelines and funding priorities have undergone substantial revision. Please read the guidelines carefully before beginning an application. The requests for OEEF general grant and mini grant proposals are now open in the eBusiness Center. The Letter of Intent to Apply must be submitted prior to submitting a grant.



The Ohio Environmental Education Fund grant program is administered by Ohio EPA and awards general grants of up to \$50,000 and mini-grants between \$500 and \$5,000. The grants are funded by half of the civil penalties OEPA collects for air and water pollution control violations. Eligible recipients include environmental groups, public and private schools, colleges, local governments, among others.



For more information, please contact the Ohio EPA Office of Environmental Education

Phone: 614-644-2873

Email: oeef@epa.state.oh.us

Web: www.epa.ohio.gov/oee

Grant Writing Workshops

Please visit the website to view a current list of upcoming workshops www.epa.ohio.gov/oee

For the Fall 2014 grant cycle, Ohio EPA awarded the following ten projects for a total of \$269,334.

Civic Garden Center of Greater Cincinnati, “Green Learning Station Stormwater Education,” F15G-015, \$31,758

Butler, Clermont, Hamilton, and Warren Counties, Audience: PreK – University (Grades 7-12). Contact: kjohnson@civicgardencenter.org, (513) 221-0981

A mobile, interactive urban water cycle display will be developed to upgrade the Civic Garden Center of Greater Cincinnati’s Green Learning Station, a site dedicated to educating students and adults about combined sewer overflows. The display will be used on site and transported to regional outreach events to educate audiences about how sewer systems work. The project will also create a data portal and a display that will allow visitors to interact with the data and engineering behind the stormwater infrastructure at the Green Learning Station. Students will be engaged in data analysis and real-world engineering through the portal. More than 5,000 people will be reached directly by the project during the year. The University of Cincinnati, Xavier University, Cincinnati State Technical and Community College and the Greater Cincinnati STEM Collaborative are among the collaborators on the project.

Five Rivers MetroParks, “Discover Huffman Prairie,” F15G-003, \$11,717

Greene County, Audience PreK-University (Grades 4-12). Contact: David Nolin, dave.nolin@metroparks.org, (937) 275-7275

Interpretive signs, plant identification markers, brochures and a weather resistant kiosk will be established on the Huffman Prairie State Natural Landmark, the largest black soil prairie remnant in Ohio. Since the site was rediscovered in 1986, the prairie has been the focus of successful habitat restoration work. The signs and brochures will provide information about the natural history, ecology, and human history of the site, as well as the native plant and wildlife populations. The project will also include prairie walks, bird watching events, and botanical programs that will reach 5,000 people. Collaborators include Wright-Patterson Air Force Base and the Dayton Aviation Heritage National Historical Park.

Friends of Stark Parks, “Introduction to Watershed Studies,” F15G-020, \$41,832

Stark County, Audience: PreK-University (High School and Undergraduates). Contact: nmorris@starkparks.com, (330) 409-8995

A watershed studies course will provide high school students with a service learning project focusing on evaluating stream habitat, monitoring for aquatic macroinvertebrates and water chemistry sampling. Part of the project will require students to prepare a Level 1 Credible Data Study Plan and assist in a public outreach program focused on storm water impacts in the Sippo Lake Watershed. Students will explore career opportunities as they interact with environmental professionals to learn about sample collection, laboratory analysis, compilation and analysis of data, and how to effectively present the results to the local community. Solar-powered, in-stream water quality monitoring sensors will provide real-time stream conductivity, temperature, pH, algae and stream flow data to an exhibit at the Exploration Gateway at Sippo Lake Park that hosts 134,000 visitors annually.

**Kenston Local School District, “Kenston Alternative Energy Outdoor Learning Center,” F15G-009,
\$46,627**

Geauga County, Audience: PreK-University. Contact: lynn.fagerholm@kenstonapps.org, (440) 543-1949

An outdoor learning center will be installed on the Kenston Local Schools campus to teach students and other visitors about the alternative energy initiatives currently in place at the school. Three interpretive signs will provide information about the wind turbine, solar arrays, hybrid school bus and other sustainability features on the campus, linked to the Kilowatts for Kenston energy efficiency curriculum. Students from all grade levels will participate in STEM activities including the use of tablets to monitor the energy generated and used on the campus, the National Engineers Week Future City Competition and K'NEX Forces, Energy, and Motion kits. Geauga Park District is collaborating with a binocular program for fifth grade students.

Medina County Beekeepers Association, “Beekeepers Collaborating to Create Pollinator Habitats,” F15G-028, \$24,070

Holmes, Medina, Montgomery and Summit Counties, Audience: General Public. Contact: progdirector@pollinatorstewardship.org, (832) 727-9492

Education materials, signs, native bee houses and seeds will be purchased to educate landowners and convert grassy land into pollinator habitat. Corporate, institutional and other landowners will prepare their land to be transitioned to pollinator habitat and agree to maintain the land as pollinator habitat for five years. Local beekeepers and 4-H youth would work with the land partner to locate managed pollinators on the forage area or place native pollinator houses on the site. Collaborators include the Ohio State Beekeepers Association and the Pollinator Stewardship Council.

The Ohio State University Extension, “Expanding the Livestock Manure Application Window in Ohio,” F15G-022, \$42,000

Darke, Fulton, Hancock, Mercer, Paulding, Putnam and Seneca Counties, Audience: Regulated Community. Contact: Glen Arnold, Arnold.2@osu.edu, (419) 235-4724.

The project will conduct on-farm demonstration plots with livestock producers to demonstrate the application of liquid livestock manure to growing crops, for better uptake of nutrients and reduced runoff to local streams compared to manure applications to bare ground after the growing season. Three new technologies will be used to apply manure to growing wheat and corn in side-by-side comparison to commercial fertilizer. The plots will demonstrate the economic and environmental value of applying manure to growing crops as a method of better capturing the nitrogen, phosphorous and potash in liquid swine and dairy manure. Applying manure to growing crops in late spring and early summer will extend the manure application window in Ohio and reduce the runoff of nutrients that contribute to the formation of harmful algal blooms in Lake Erie and inland lakes.

Toledo Botanical Garden, “Ottawa River Watershed Neighbors,” F15G-010, \$15,526

Lucas County, Audience: PreK-University (4th Grade). Contact: education@toledogarden.org, (419) 536-5589

A watershed education program will help fourth grade students from 11 area schools understand habitat restoration, storm water and nutrient management benefits of an ongoing Ohio EPA-funded project to create a wetland and reestablish the natural flow of an Ottawa River tributary running through the property. Educators from the Toledo Botanical Garden will visit classrooms to introduce watershed concepts using the Enviroscape Watershed Model. Students will then visit the Toledo Botanical Garden to map their watershed, collect macroinvertebrates, test water samples, and play games illustrating the aquatic food chain. BP-Husky Refinery is collaborating.

Ursuline College – Biology Department, “Stream Restoration Monitoring and Assessment to Improve Campus and Community Environmental Education,” F15G-012, \$26,135

Cuyahoga County, Audience: PreK - University (Undergraduate). Contact: jsnyder@ursuline.edu, (440) 646-8161

An Ohio EPA Surface Water Improvement Fund grant is supporting the ongoing restoration of a tributary to the Chagrin River that flows through the Ursuline Campus. The OEEF grant will provide equipment and supplies for sixty undergraduate students to collect water samples and assess turbidity, dissolved oxygen, conductivity, pH and temperature data compared to pre-restoration data to understand the effectiveness of the restoration. Student data will be presented at the College Undergraduate Scholarly Symposium. Student will also create posters and permanent interpretive signs to explain the habitat, storm water and nutrient reduction benefits of the stream restoration to local residents, the College community and visitors to the campus.

Village of Cuyahoga Heights, “Mill Creek Watershed Awareness and Education,” F15G-024, \$5,269
Cuyahoga County, Audience: General Public. Contact: goodmanj@crcpo.org, (216) 241-2414.

The project will raise watershed literacy among residents and visitors to the Mill Creek watershed. More than 100 signs marking the boundaries of the Mill Creek Watershed and identifying stream crossings will be installed in 10 Mill Creek communities, including the city of Cleveland. Brochures explaining what property owners can do to improve habitat, manage stormwater and reduce runoff will be distributed to help residents make the connection between where they live or work and the relationship with Mill Creek. The project is part of a larger public awareness campaign that will include outreach through community newsletters, web and social media, presentations, and exhibits at local events.

Warren County Soil and Water Conservation District, “Thomas C. Spellmire Water Trailer,” F15G-017, \$24,400

Warren County, Audience: PreK-University (Grades 2-12). Contact: amy.pond@co.warren.oh.us, (513) 695-1337

New interactive exhibits will enhance a travelling water quality education trailer and accommodate more visitors at one time. Using computer projection technology, two interactive stream tables will incorporate lessons on erosion, nonpoint source pollution, pollution prevention and other environmental issues. External graphics will be wrapped on the outside of the trailer to educate visitors about wetlands and stream ecology. A third graphic of a streambed will also be used as flooring on the trailer's ramp. The exhibit reaches 15,000 students and adults annually at school programs and community events.

OEEF Mini Grants

For the fall, 2014 grant cycle, Ohio EPA is awarding a total of \$36,589 to support the following nine projects.

Carroll-Columbiana-Harrison (CCH) Environmental Group/Solid Waste District, “Environmental Teachers Academy,” #F-15M-009, \$5,000

Carroll, Columbiana and Harrison Counties, Audience: Pre-School – University (Elementary School), Contact: Eric Matthews, mathesonman@gmail.com, 330-627-7311.

Provides three educator workshops and supplies to expand a previously funded Environmental Teachers Academy for middle school to include 20 teachers of grades K-3. Workshops will feature two national curricula (Project Wild-Aquatic, Wonders of Wetlands) to teach watersheds and water quality, and weather and climate change education resources being developed by NASA. Participating teachers will receive Earth Grow Boxes for their students to investigate soil types, decomposition rates, nutrient content, percolation and filtration, leaching of fertilizers and pollutants, and plant productivity. Topics include the use of rain barrels and rain gardens to conserve water and reduce runoff, and the use of remote sensing technology to monitor algal blooms.

City of Canton Parks Department, “Conservation Area Signage,” #F-15M-010, \$5,000

Stark County, Audience: General Public, Contact: Theresa Gang, Theresa.gang@cantonohio.gov, 330-438-4691.

The City of Canton Parks Department plans to cease mowing to improve water quality and restore habitat in areas of seven parks and the Nimishillen Creek Watershed. The mini grant will support interpretive signs to help park visitors understand the water quality, cost saving, and ecological benefits of the no-mow areas. Benefits include: natural infiltration; slowing down and cleaning storm water runoff before it enters a creek; reducing stream bank erosion and sediment; less use of fertilizer, water and weed killer; increasing biodiversity by providing food and habitat for native animals and plants; and providing shade and cooler temperatures for fish and aquatic insects.

Cuyahoga River Community Planning, “Woods for Waters: A Guide to Planting Riparian Buffers for Stream Health,” #F-15M-019, \$4,960

Cuyahoga and Summit Counties, Audience: General Public, Contact: Jane Goodman, goodmanj@crcpo.org, 216-241-2414.

Provides funding for the printing and distribution of 4,000 copies of the “Woods for Waters” guide to planting riparian buffers, a step-by-step manual for homeowners and other property owners. The guide was created to help people with streams on their properties to a.) understand how vegetated buffers create habitat, prevent polluted runoff and soil erosion, and increase biological diversity, and b.) design, lay out, choose appropriate trees and plants, and plant and maintain their riparian buffer. Collaborators include Cleveland Metroparks, Cuyahoga County Board of Health and Ohio Department of Natural Resources Division of Forestry.

Graham Local Schools, “Graham Local Schools Trout in the Classroom (TIC),” #F-15M-006, \$2,500

Logan County, Audience: Pre-School – University (Elementary and Middle School), Contact: Emily Kay Shreve, shrevee@grahamlocalschools.org, 937-663-4449.

Expands the successful Trout in the Classroom program previously funded by the OEEF to more grades, to include more than 400 students in grades 2-12. Students will focus on the relationship between water quality of the Mad River and the conditions required by trout. Students will be responsible for daily chemical testing and observations of the trout to ensure they are in a suitable environment until they are large enough to release to the Onion Creek tributary of the Mad River. Students will present their monitoring data through a community event and presentations to the school board and local organizations. Elementary students will use Nexus Tablets and iPads to photograph the stages of the project and create YouTube videos. The Madmen Chapter of Trout Unlimited is collaborating.

JB Green Team/Jefferson Belmont Regional Solid Waste Authority, “Enviroscape Waste Water Treatment Model for Land Labs and Education,” #F-15M-014, \$3,280

Belmont and Jefferson Counties, Audience: Pre-School – University (Middle and High School), Contact: Tammy Ann Shepherd, tshepherd@jbgreenteam.org 740-296-5376.

Provides two EnviroScape® Drinking Water and Wastewater Treatment Models with carrying cases and curriculum to be used for classroom presentations, library programs, after-school, 4-H and scouting club presentations and outdoor events in Belmont and Jefferson Counties. These models will be used in conjunction with EnviroScape® Landfill and Recycling Models to emphasize the importance of recycling, litter prevention and proper disposal of waste to protect drinking water supplies. Collaborators include the Epworth Center, High Meadows 4-H Club, Jefferson Soil and Water Conservation District, Ohio River Valley Council Boy Scouts of America, and St. Clairsville Public Library.

Medina County Park District, “Demonstration and Interpretation of a Vegetated Stormwater Buffer Strip,” #F-15M-005, \$2,500

Medina County, Audience: General Public, James C. Spetz, jspetz@medinaco.org, 330-722-9375.

The project site is a newly-developed park located directly on the divide that separates the headwaters of the Rocky River watershed (Lake Erie Basin) and Wolf Creek watershed (Ohio River Basin). A strip of native vegetation will be planted in a high-visibility area to intercept stormwater running off a slope before it enters a recreational fishing area. The project will involve a series of interpretive signs along approximately 425 feet of trail that will cover topics of watershed function and stormwater management, native vs. nonnative species, the importance of pollinators and host plants, and the role of vegetation in stabilizing soils and absorbing nutrients.

Village of Lowellville, “The Mahoning River on Display,” #F-15M-011, \$5,000

Mahoning County, Audience: General Public, Contact: Joann Esenwein, Lowellville.dam@yahoo.com, 330-717-5441.

Funding will provide an interpretive sign and informational flyers about the environmental benefits of the Mahoning River Water Resource Restoration Sponsor Program (WRRSP) dam removal project in the Village of Lowellville. Benefits include removal of sediment, restoration of natural stream flow and improvement of water quality and warm water aquatic habitat. The sign will include the dam site history, and flyers will be distributed by the Village, local businesses and schools. The Eastgate Regional Council of Governments and Lowellville Board of Education are collaborating.

The Wilderness Center, “Sugar Creek Watershed Environmental Education Project,” #F-15M-015, \$4,982

Holmes, Stark and Wayne Counties, Audience: Pre-School – University (Middle and High School), Contact: Lynda Marie Price, lynda@wildernesscenter.org, 330-359-5235.

The purpose of this project is to implement site-specific watershed science lessons targeted to 7th-12th grade groups. The project involves reestablishment of an educational outdoor space with accessible headwater streams in an area recently subjected to storm damage. This space offers a prime demonstration of the impact of natural and human disturbance on watershed ecosystems. Multiple lesson plans will be tailored to give students effective environmental problem solving experiences including hands-on learning activities, evidence-based decision making, and multidisciplinary approaches. Provides macroinvertebrate sampling supplies and supports the cost of transportation and substitute teachers. The mini grant will also replace storm-damaged trail markers utilized with a Wilderness Walk podcast used by thousands of hikers. Collaborators include the Ohio State University School of Environment and Natural Resources and the Dalton Local, East Holmes Local, Green Local and Orrville City School Districts.

Williams Soil and Water Conservation District, "Rivers Around Us," #F-15M-007, \$3,367

Williams County, Audience: General Public, Contact: Loretta Hayek, lhayek@williamsswcd.org, 419-636-2349.

Provides equipment and supplies to train a network of up to 15 citizen volunteers and local school classes to regularly monitor water quality in the Tiffin River. Workshops will introduce teachers to the Project WET and Healthy Water, Healthy People curricula and testing methodologies, and how to post their students' data to an online database for comparison over time. Teachers and citizen volunteer monitors will have the opportunity to receive certification as Level One Credible Data Collectors. The Ohio State University Extension Office in Williams County is collaborating.

Changes at Project WET

On January 1, 2015, Project WET in Ohio will move from the Ohio Department of Natural Resources to Ohio EPA. For information on correlation of the curriculum to Ohio's learning standards and upcoming workshops, contact the Ohio EPA, Office of Environmental Education at (614) 644-2873 or email OEEF@epa.ohio.gov



The Truth About Bats

By Donna Lewis, Program Coordinator, Clark County Park District

Bats are one of the most fascinating groups of night time animals. Usually, any conversation on bats centers on how someone was frantic because a bat got into their home. The bat was flying around the room, swooping down and trying to get into their hair. Then I cringe, as they say they grabbed a broom to knock it out of the air. Ouch!



The fact is that bats are non-aggressive and one of the most beneficial species in Ohio. The little brown bat, one of the most common bats in Ohio, can eat up to 1,200 mosquito-sized insects in one hour! The big brown bat eats tons of beetles and moths in one night, saving farmers billions each year from cornworm damage. Ohio has 11 species of bats that help us every day during the spring and summer, eating tons of pesky insects. They desperately need our help to ensure their survival in the wild.

One of the best things you can do for bats is to help educate others on their importance and to help them know what to do if one gets in their home. Bats live around us every day, in barns, under the eaves of houses, in trees, caves, mines and our chimneys and attics. They can fit through the tiniest of spaces to get into your home, so seal up any small entry points to exclude them from entering.



Little Brown Bat
Courtesy of ODNR Division of Wildlife

If one does get inside, turn the lights low, close off all doors and windows but one, and allow the bat to fly out. If you find an injured bat, use a glove to get it into a shoebox-sized container and call a licensed rehabilitator.

Today, White Nose Syndrome is probably the biggest enemy of bats in North America. Since its detection in New York in 2007, it's been confirmed in 25 states. Winter bat colonies in some states have declined by more than 90 percent. Habitat loss, pesticide use and persecution from humans are also huge factors. You can assist in bat conservation through education, donating to conservation efforts and even putting up a bat house at your home. Check out Bat Conservation International at www.batcon.org for more information. All of us are responsible for bat conservation so do your part to help these guys survive in Ohio and around the world.

Navigate Like a Nocturnal Animal

Nocturnal Adventure Overnight Program, Cincinnati Zoo & Botanical Garden

By Fia Cifuentes, Cincinnati Zoo & Botanical Garden

Nocturnal animals such as owls, foxes, bats, and cats can move around with ease during the darkest hours of the night. Try out some of these activities after the sun has gone down to see if you can navigate like a nocturnal animal, or if your diurnal senses got the better of you.

Fox Ears – Like many nocturnal animals, foxes have large, rounded ears that help them collect, direct, and amplify sound. They can even rotate their ears independently in order to collect sounds coming from different directions. “Fox ears” show how having larger ears can increase one’s ability to hear, as well as demonstrate how our ears collect sound coming from the direction in which they are facing. To do the activity, pick a space outside that has a fair amount of noise, such as nearby a road, next to a fountain, or along a babbling creek. Have your group face you, with the noise behind them, and place their cupped hands behind their ears. Say a few words to see what happens. Have them place their cupped hands backwards around their ears, and then say a few words. Has their hearing changed? What could they hear louder with their cupped hands, or fox ears, facing forward versus facing backwards?



Colors of the Night – Our eyes have two types of receptors in them – cones and rods. Cones allow us to see color, while rods only see shades of gray. Nocturnal animals have more rods than cones in their eyes, thus sacrificing their ability to see color in order to better detect shapes at night. After a few minutes in the dark, human eyes are also able to adjust and absorb more light, however there is not enough light for our cones to pick up colors. “Colors of the Night” demonstrates our poor ability to see colors at night.

Red Fox, Courtesy of ODNR, Division of Wildlife and Jim McCormac

After a few minutes in the dark, human eyes are also able to adjust and absorb more light, however there is not enough light for our cones to pick up colors. “Colors of the Night” demonstrates our poor ability to see colors at night. You will need different colored bandanas or different color paint samples to do this activity. Have your group line up or gather around in a dark area. Show them the bandana or paint sample and have them guess what color it is. They might be able to guess if it is light or dark, but most likely won’t be able to guess the exact color. After everyone has guessed, shine your flashlight briefly on the object to stimulate the cones in your eyes and reveal the object’s true color.



Southern Flying Squirrel, Courtesy of ODNR Division of Wildlife

cover their left eye and cover their right. What do they notice? The eye that was not exposed to light adjusted to darkness, and should be able to see much better. During this activity, the rods in our eyes change from white to red to better absorb dim light, increasing their ability to see shapes in the dark. The pupil of the left eye also opened wider (dilated) to let more light in. A fun, but disputed, fact is that this is the reason why pirates wore an eye patch, so one eye was already easily adjusted to the dark. When they went below the deck, the pirate could move the eye patch to the other side and see in the dark. Animals that move around at night time often have larger eyes, with bigger pupils to let more light in.



Northern Spring Peeper, Courtesy of ODNR Division of Wildlife

Eye Shine – Have you ever seen that eerie green, white, or orange glow of animal eyes caught in headlights on a dark night? It is caused by the tapetum lucidem, Latin for “bright carpet”, in the animal’s eyes. It is an extra layer of mirror-like, reflective tissue behind the retina where light-sensitive cells are found and images are processed. It makes the best use of even the dimmest situation by reflecting unabsorbed light back into the retina, enhancing the animal’s ability to see in the dark. This reflective layer of the eye is much more common in nocturnal animals adapted for night hunting, or who depend on keen night vision for survival. By shining your flashlight through the dark along your hike, you may see different animals’ eyes shine back at you. Spiders and frogs make excellent subjects for eye shine. The color that you see depends on the different types of pigment found in the animal eyes. Animals that display the brightest eyeshine, such as the bobcat, have more rods and fewer cones in their retinas than animals with no eyeshine. As a result, they have excellent night vision and most are colorblind.



**Least Weasel, Courtesy of ODNR,
Division of Wildlife and Keven Law**

Whisker Walk – Many nocturnal animals use their whiskers to help identify their surroundings, and to detect drafts and movement. Sensory hairs can be located all over the animal's body, but whiskers are located on the face and snout area, projecting from side to side and tend to be as wide as the widest part of the animal's body. They are often used in a wave-like motion to detect the immediate environment in front and to the side of the animal. To do the “Whisker Walk”, you will want to find an area that has some kind of narrow pathway with a fence on either side, or a row of trees that can easily be touched. Have a person at the start and the finish of the “Whisker Walk”, sending one or two members of your group down the path at a time. Their eyes should be closed, and arms outstretched to serve as their whiskers, feeling the fence or treeline along the way to know which way to go. You can add obstacles along the way (such as another group member) so that one's whiskers must really be utilized. After each member has done the walk, find out what they needed to do to successfully make it to the end. Move their whiskers (arms) a lot? Move slowly? Use other senses as well? Stay to the edge of the path, rather than the middle, much like a mouse in a house would?

Centipede Walk – An animal that has poor night vision must rely on its other senses to move around through the darkness. Often they will use several senses in conjunction in order to navigate. The Centipede Walk demonstrates how much information can be gathered by using senses other than sight. To complete the walk, have your group form a single file line. Each person should place their hands on the shoulders of the person in front of them, and then close their eyes. The person in front, or the head of the centipede, can keep their eyes open and gently guide the centipede down the trail. Remind the group that quiet nocturnal animals survive because they are not heard by their predators. After you have walked for a few feet, stop the group and ask them what they experienced. What did they feel, smell, or hear?

Experience these night hike activities on your own, or come spend a night at the Cincinnati Zoo for a wild nocturnal adventure. Visit www.cincinnatizoo.org for more information. Cleveland, Columbus, Akron, and Toledo zoos also offer overnight adventures.

EECO Annual Conference *Riding the Wave of Environmental Education*

**April 9 - 12, 2015
Maumee Bay State Park**

Strands:

- Population & Climate Change: Population crisis causing climate change & water issues
- STEM & Careers: Importance of STEM (Science, Technology, Engineering, Math) in schools and in the future of Ohio careers
- Youth Education: Connecting children to their natural world
- Funding & Philanthropy: What and who are fundable and why do individual donors give to non-profits

College Credit and Sanitarian Hours will be provided for this conference.

Registration will be on the EECO website soon.

Display or Sponsor: If you would like to display, be a vendor or a sponsor at the conference please contact Brenda Metcalf at brendasmetcalf@aol.com for more information.

Awards: If you can think of an educator (formal, non-formal, volunteer) or an organization that has performed outstanding contributions to environmental education in Ohio, please contact Brenda Metcalf. There are also awards for publications, EE through art, along with an award for business or industry that fosters a climate of cooperation for resolving environmental problems. Please visit <https://eeco.wildapricot.org/awards> to find out more about the various awards and how to submit a nomination. Brenda can be reached at brendasmetcalf@aol.com



Moths of Ohio—Jewels of the Night

By Brittany Friedel, Natural Resources Management Student, Ohio State

Moths are the unappreciated jewels of the night sky. They float in and out of our awareness, never gathering much attention to themselves, but are incredibly important components of many Ohio ecosystems. Moths and caterpillars, in particular, are significant food sources for birds, bats, and spiders. They are such an important dietary staple that 99% of caterpillars do not become moths; they are eaten before they have a chance to metamorphose. 75% of Ohio's songbirds rely on caterpillars, especially for feeding young during the breeding season.

Moths also function as plant pollinators; there are many plants that are structured just for specific moth species. One of Ohio's rarest plants, the prairie fringed orchid, releases an aroma at night, attracting species of Sphinx and hawk moths to the pale white flowers. This federally endangered plant relies exclusively on Ohio's night pollinators.

One common way of surveying and photographing moths is light trapping. A white sheet is hung where moths might naturally occur, and a light source is provided as the attractant. This is sure to bring an array of interesting and beautiful moths for observation. Planting a garden full of moth-friendly plants is another way to attract and promote moth populations. Favorite nectar plants include evening primrose, angel trumpets, lilacs, lavender, four o'clocks, moonflower, and butterfly bushes.

Common Ohio moths:



Luna Moth – Large and unmistakable, the Luna Moth is one of Ohio's most beautiful species. Populations have been documented in half of Ohio's counties, but are recently declining. Adults only live for a week or so, subsisting on energy obtained as a caterpillar.

Isabella Tiger Moth (Woolly Bear)

There is perhaps no caterpillar more recognizable than the woolly bear, but few know what the adult moth looks like. Isabella Tiger Moths are generalists and can occur nearly anywhere in Ohio.



Carolina Sphinx – A very common moth throughout farms, gardens, and weedy plots, the Carolina sphinx is very closely related to the five-lined hawkmoth. The caterpillar of both of these moths is particularly destructive to cultivated plants.

You can learn more about Ohio's moths by ordering the new Moths of Ohio field guide from the Ohio Division of Wildlife. Call 1-800-WILDLIFE to order your copy, or you can find it online at <http://wildlife.ohiodnr.gov/portals/wildlife/pdfs/publications/id%20guides/pub5467.pdf>

Those Nocturnal Beasts with Luminous Tails

By Joe Brehm, Rural Action

Those of us who have grown up in Ohio (or anywhere in the eastern U.S.) may tend to take fireflies for granted because they are simply a part of our summer nights. We take them for granted, that is, until we remember that THEIR BUTTS LIGHT UP.

Fireflies are among over 300,000 species of beetles (Order: Coleoptera) on earth; there are about 2,000 firefly species worldwide and 150 in North America, with about 25 species found in Ohio. According to *The Fireflies Book* by Brett Ortler, there are three main groups of fireflies, each with etymologies related to fire and light: Photinus (shining), Photuris (luminous tail), Pyractomeno (fire), and the Family name is Lampyridae (you can find “lamp” in there).



Perhaps because we humans rely on light to see the world around us and each other, we are fascinated with things that produce it. We worship the sun, we gaze, silent and content, into campfires long after the sun has set. And we pay special attention to organisms that can produce a light in the darkness. Foxfire, glow worms, fish in the deep sea, algae on its surface, and fireflies lure us on nocturnal explorations.

I undertook a quest this summer to get fully submerged in a wild body of water at least once a day. Like all environmental educators in the summer, I was quite busy and my submersions were often pushed to after-hours. I found myself crawling over rocks and sliding into leafy pools under sycamore roots with only the summer stars and methodic blinking of fireflies to light the fulfillment of my quest. As summer matured, I began to notice tiny glowing butts on the ground along the creek banks. These, I discovered, were the lightening larvae, roaming slowly in search of slugs and snails to devour. The larvae thrive along forest edges, stream banks, and even mowed lawns that remain untreated by chemicals. Their limiting

factor is the availability of slugs and snails, according to this Mansfield News Journal article <http://tinyurl.com/q4anmjz>. As I've mustered the courage to enter the cold creek into late October, the larvae are still glowing, like an ephemeral mirror of the stars above.



Luciferin is the chemical compound largely responsible for fireflies' luminescence. The Fireflies Book points out that “the name of luciferan derives from Lucifer, which means ‘light-bearer.’ Lucifer originally referred to the planet Venus, which shines so brightly that it’s often mistaken as a star—or even a low-flying airplane.” Fireflies employ luciferin and the bright butts it creates to find mates; each species has developed a distinct blinking pattern that males and females use to find each other. Amazingly, fireflies give off almost no heat as they convert energy into light. Again according to The Fireflies Book,

firefly light is, on average, about 1/400th as bright as a candle. In certain parts of the world, including the Great Smoky Mountains, fireflies will even synchronize their blinking (see video at <https://www.youtube.com/watch?v=a-Vy7NZTgos>). Interestingly, not all lightning bugs generate light to attract mates. Species in the Western US, for example, use pheromones to do the job.

Because we are so easily amazed by fireflies, they offer a great opportunity to get involved in citizen science projects focused on wildlife monitoring. Boston's Museum of Science created Project Firefly Watch, which relies on students, adults, and/or families to spend a few minutes each week during the summer to observe local firefly populations and submit the data online. This helps scientists monitor firefly populations over a wide area, ensuring that we adopt the right management practices to conserve these magical species for future generations of children to chase, observe, and enjoy.



Upcoming Newsletters

Do you have a theme that you are interested in? Want to share information about a particular EE topic? If so, contact our newsletter committee about submitting articles, or even becoming part of the committee.

Articles are typically 300-500 words. As you can see, we like to include lots of pictures. If you submit photographs, please make sure they are high quality/resolution.

To find out more about how to submit, or to join our committee, please contact Betsy Banks at ewb@case.edu

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