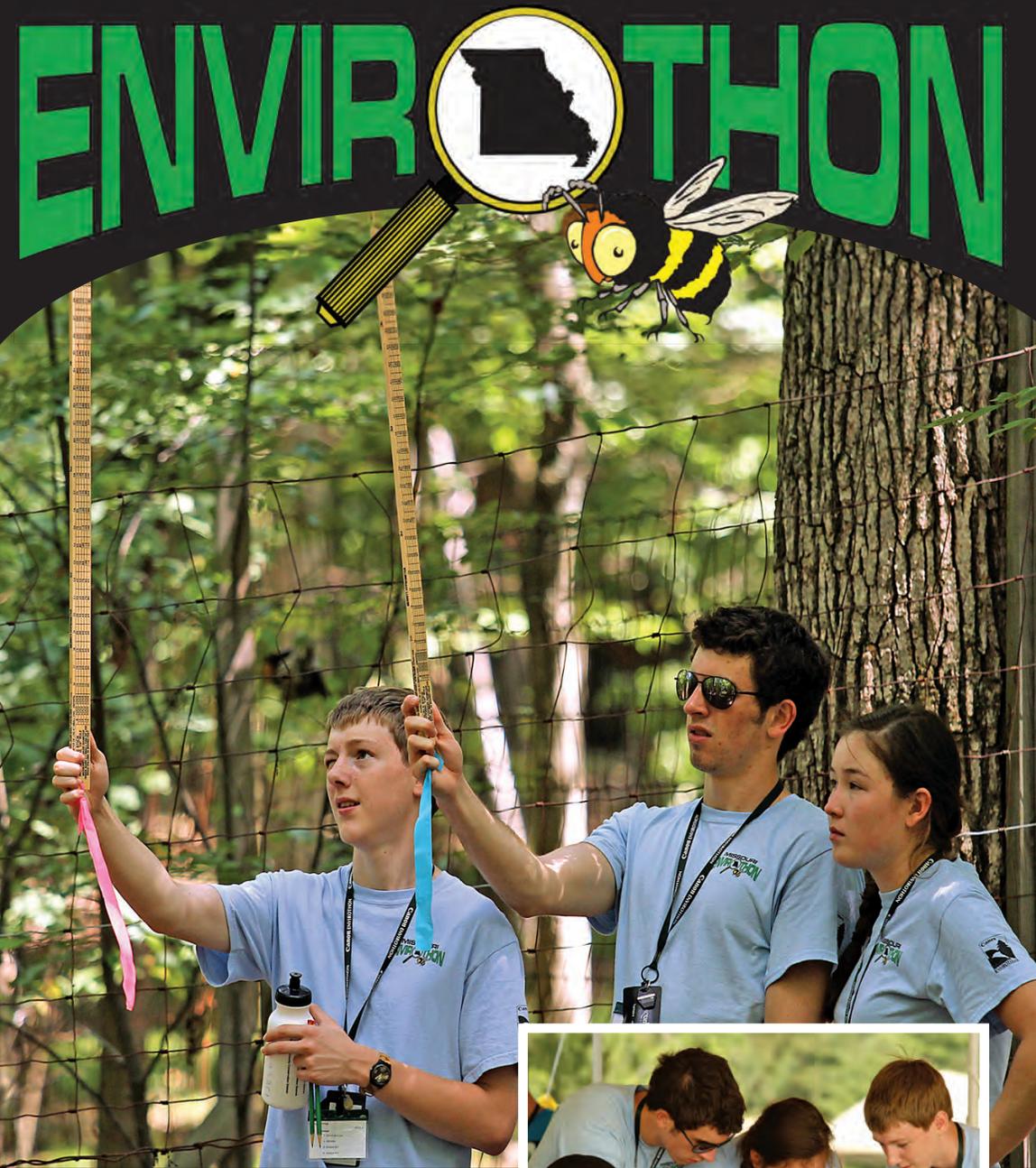


MISSOURI ENVIROTHON



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What is the Missouri Envirothon? *And How it all Began...*

Tomorrow's environmental problems will be more challenging, but the solutions will be more apparent if students are encouraged to become environmentally aware, action-orientated adults.

The Missouri Envirothon is a problem-solving, natural resource education program for high school students. In the field, teams of students are challenged to hone critical thinking skills as they answer questions and conduct hands-on investigation of environmental issues in five categories—Soils/Land Use, Aquatic Ecology, Forestry, Wildlife, and Current Environmental Issues. In addition to a written test the teams also prepare an oral presentation solving a specific natural resource issue.

The Envirothon stimulates, reinforces, and enhances students' interest in the environment and our state's natural resources. The concept began in Pennsylvania in 1979 as an outgrowth of a vocational agricultural land judging contest. Conservation districts felt there was a need for a statewide environmental program highlighting different disciplines within the natural resource field. By the mid-eighties, New York, Ohio, Massachusetts, and Maine had their own state Envirothon programs and interest was spreading to other states. In 1988, the first National Envirothon was held in Pennsylvania with five states participating. In 1993, 26 states participated in the National Envirothon in New York.

Currently there are teams from more than 45 states and nine Canadian provinces competing in the North American Envirothon.

In 1998, Missouri held its first state Envirothon. Ten teams participated in the pilot event. Since then, the participation has grown significantly. There are now seven regional competitions held throughout the state with the top three teams of each of those regions advancing to the state competition. The Missouri state champion team has represented Missouri at the North American Envirothon each year since 1998 and has placed in the top five in five of those years.

The Missouri Envirothon is a 501(c) 3 non-

Year	Missouri's Placement	Scholarship Award per student
2007	fourth	\$2,000 scholarship
2008	second	\$4,000 scholarship
2009	fifth	\$1,000 scholarship
2012	first	\$5,000 scholarship
2013	third	\$3,000 scholarship

profit organization established to coordinate the delivery of an environmental education program for high school students in the state.

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Each year the Missouri Envirothon touches and positively influences the lives of more than 500 students across the state. That number continues to grow as additional schools and organizations become involved. Thanks to the dedicated volunteers, staff of cooperating agencies, teachers and advisors, enthusiastic students, and valuable support and sponsorship from many conservation partners the Envirothon has proven to be an exciting and useful tool for incorporating environmental education into high school classrooms.

The competitive nature of the program motivates students to expand their knowledge of natural resource issues. Through this program, students realize their responsibility as stewards of our natural resources.



Thank You Donors

- *Naturalist (A minimum gift of \$1,000)*
- Jackson County SWCD
- *Steward of the Land (A minimum gift of \$250)*
- S & H Farm Supply
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- Bates County SWCD
- Cass County SWCD
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Friend of the Envirothon (A minimum gift of \$25)

- Rose Marie Hopkins
- Liz Brown
- Hamilton Seeds
- Charlie Perkins
- Judy Stinson
- Rachel Griffin
- Theresa Dunlap
- Deneen Jenkins
- Andrea McKeown
- Michael Thorton
- Melissa Welch

Campaign for the Continuing Support of Envirothon in Missouri

The Envirothon program across the state requires approximately \$15,000 to \$20,000 annually. These dollars fund trainings, competition t-shirts, lunches, site fees, materials, water, and other site necessities for over 500 students, 150 teachers and numerous volunteers across the state.

Missouri Envirothon recently embarked on a campaign for financial support to ensure the continued success of this important program. Donors are invited to give any amount, and will be listed annually in this magazine.

How to Donate to the Missouri Envirothon

For more information on how to donate to the Missouri Envirothon, a non-profit educational high school competition, contact Rachel Griffin at Ripley County SWCD at 573-996-3619 or Rachel.griffin@swcd.mo.gov. Your donation will help the Missouri Envirothon committee fund seven regional competitions and the state event every year. These funds will also provide a cash financial award for the winning Missouri team to attend the North American Envirothon held annually in one of the participating states or Canadian provinces.

The categories of giving for the campaign to support Envirothon in Missouri are:

Conservationist (A minimum gift of \$10,000)

Ecologist (A minimum gift of \$5,000)

Naturalist (A minimum gift of \$1,000)

Steward of the Land (A minimum gift of \$250)

Friend of the Envirothon (A minimum gift of \$25)

**You can make a difference with any pledged amount.
Help us keep this program in Missouri!**

Please choose the sponsorship level of your choice and mail a check made payable to Missouri Envirothon to:

**Missouri Envirothon
Rachel Griffin, Ripley County SWCD
#3 Confederate Ridge Road
Doniphan, MO 63935**



The Adventures of an Envirothon Advisor

By Daniel Hatch Ph.D., Instructor of Biology, Licking High School

Early in my Envirothon experience I would come to regionals with two or three teams. This resulted in some regional success, but in poor preparation of state competition. Many successful schools make good use of A and B teams. However, I now work better with only one team - - but a diverse team. This way, each member gets more of my input.

Selection of team members usually begins in my freshman biology class. There I watch for students with a high interest level in everything biological, with good testing skills, and with family recreation that involves outdoor sports. I also try to select students with limited involvement in team sports. Usually, if complimented on my coaching, I simply admit “all I do is select five good people, let them do all the work, and I stand around and try to look important”.

Each member is to have a specialty (thus a RESPONSIBILITY). However, each is also to be somewhat knowledgeable about all the specialties, especially in taking measurements. Thus, they can double-check each other’s data.

Tapping into the knowledge and experiences

of the professionals is a “gold mine.” I could fill a page of “thank yous” to the many specialists from SWCD, MDC, DNR, and other organizations that have brought knowledge and inspiration to my teams. The Mini-Envirothon is of great value in helping us to FOCUS on the most vital basics as we prepare for state.

We are also extremely grateful for the stipend for meals and lodging that helps support our trip to state competition. This helps make the “ENVIROTHON EXPERIENCE” a memorable event.

Recently I communicated with several past team members, asking about long-term values that have resulted from their Envirothon experience. ENVIRONMENTAL AWARENESS was their most important value, followed by the concept of WORKING AS A TEAM (bouncing ideas off each other). SPEAKING IN PUBLIC was also high on their list (we rehearse our Oral Presentation in front of my high school and college classes). DEVELOPMENT OF TESTING SKILLS was important to several that are now in college, and MANAGEMENT PRACTICES to those that farm or have chosen other biology-related careers.

Pembroke Hill High School takes the Gold at 2012 Canon Envirothon

A five-member team of high school students from Pembroke Hill High School beat out more than 50 other teams to win the 2012 Canon Envirothon. This was Pembroke Hill’s fourth trip to the national Envirothon and the first time a Missouri team has won first place in the North American competition.

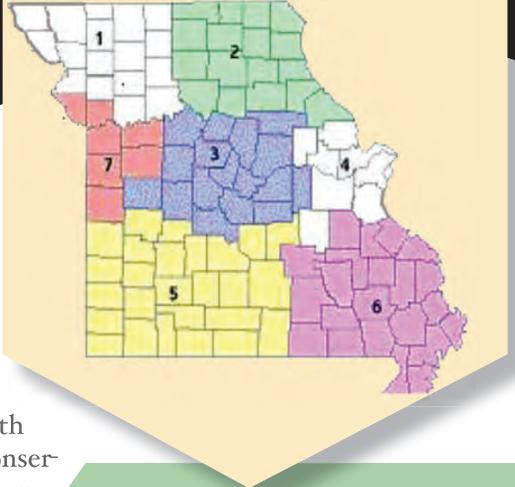
The 55 teams in the North American competition represented 45 U. S. states, nine Canadian provinces and one Canadian territory. The winning team was announced during closing ceremonies at Susquehanna University in Selinsgrove, PA. This was the 25th Anniversary of the national competition.

Test stations required the team to answer a variety of both hands-on and written natural resource questions. Additionally, the students gave an oral presentation to a panel of



judges. The team won a first place award for the oral presentation event.

The Pembroke Hill team members are (from left) Hossain Ghassemi, Ryan Hrinya, Riley Sloan, Wanda Czerwinski and Jeffrey Rubel. Each student on the winning team received a \$5,000 scholarship, for a team total of \$25,000 in Canon scholarships.



Missouri Regional Competitions

There are seven Regional Envirothon competitions held each year in Missouri, with each region hosted by local Soil and Water Conservation Districts (SWCD) with assistance from partnering agencies.

Each region's Envirothon committee plans the logistics and recruits the trainers and test writers for their event. Locations are designated based on the year's current environmental topic and on proximity to a majority of the competing teams. Many of these locations are Missouri Department of Conservation sites or state and national parks.

The number of competing teams varies among the regions based on many factors, with most regions having a maximum yearly capacity of 20 teams of five students each. Most regions allow up to three teams from any particular high school.

Regional competitions are all-day events, with the teams completing written and hands-on testing at five outdoor stations (aquatics, soils, forestry, wildlife and current issue), and then demonstrating their ability to apply knowledge as they orally present solutions to a real-world problem related to the current environmental issue. Teams, chaperones, and volunteers are provided with lunch, and in most regions the teachers who accompany the teams to the site are either sent on an entertaining field trip or are provided with on-site Envirothon training.

Partnering Agencies

- Missouri Association of Soil & Water Districts
- Soil & Water District Employees Association
- Missouri Department of Conservation
- Missouri Department of Natural Resources
- Natural Resources Conservation Service
- University of Missouri Extension
- Missouri Naturalists
- Show-Me Soil & Water Conservation Society

Northwest Regional Coordinator:

*Heather Keith, SWCD Manager, Grundy County,
660-359-2006, ext. 101*

This region includes 17 counties in the northwest part of the state. A fall competition is held, with the most recent at Crowder State Park. Five high schools, with a total of nine teams, competed, and six of those teams consisted of first-time Envirothon competitors.

The Northwest Region includes 155 cities, villages and unincorporated towns. These rural-based communities host numerous livestock producers, and cropland producers of corn, beans, wheat, hay, pasture and CRP lands.

The goal of the Northwest Region is to increase awareness and promote the Envirothon



to the 65 high schools that reside in the region. Envirothon students have the opportunity to visit state parks and conservation areas within the region through this program.

A variety of landscapes and habitats can be studied at Missouri Department of Conservation's Designated Natural Areas, including – Star School Hill NA (Atchison County), McCormick Loess Hill Prairie (Holt), Little Tarkio Prairie (Holt), Pawnee Prairie (Harrison), Chloe Lowry Marsh (Mercer), and Yellow Creek Bottomland Forest (Chariton).

Students also learn about the federally endangered and threatened species in their region. These are pallid sturgeon, Indiana bat, Eastern and Western Prairie Fringed Orchids and Meads Milkweed. State protected species are the Greater Prairie Chicken and Eastern Massasauga.

The Northwest Region has major support from the Missouri Department of Conservation, University of Missouri-Master Nat-

uralists, NRCS, Soil & Water District Staff and Soil & Water Program Office Staff.

"I tell everyone that Envirothon is a great program. Not only do my students enjoy Envirothon, but they are also learning important skills that will benefit them in their future jobs: teamwork, critical thinking skills and problem solving. Envirothon also exposes young people to some of the environmental issues in their communities and invites them to be informed and active citizens. Another plus is the opportunity to break into public speaking in a gradual sort of way that is not super intimidating. Being in a rural school, many of our students live and breathe nature on their farms and it's wonderful to see them combine what they know with the things we are teaching them. I too have learned so much in the years that we have been participating!" **Susie Franklin (Science), Norborne High School**

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Northeast Regional Coordinators:

Lena Sharp, SWCD Manager, Monroe County, 660-327-4117, ext. 3 and Andrea McKeown, SWCD Manager, Randolph County 660-263-5702, ext. 3

A fall competition is held in this 17-county region in the northeast section of the state. Participation has fluctuated over the years, beginning with only two teams in the event's debut year, 2000, and seeing the highest participation of 16 teams in 2009. In 2003, a team of five young ladies took third place at the State Envirothon. A goal of this region is to reach more schools and increase involvement among interested youth.

The Northeast Region has had generous support from the Missouri Department of Conservation, the Natural Resources Conservation Service, Pheasants Forever Ten Rivers Chapter, the Wild Turkey Federation, the Department of Natural Resources and local Soil and Water Conservation Districts.

Two student participants recently shared



their thoughts about the regional competition: *"I improved my thinking skills and learned how to work effectively as a member of a team. I would recommend the Envirothon to anyone who enjoys the outdoors."* Another comment: *"The Envirothon helped improve my speaking skills by requiring the oral presentation part of the competition."*

3

Central Regional Coordinator:

Bruce Longan, SWCD Technician, Moniteau County, 573-796-2010, ext. 3

Being located in the center of Missouri, the Central Region Envirothon contest works extremely close with the state contest. Competition sites must be coordinated and rotated between these two contests. Most recently,

the Central Region held their event at the MDC Runge Nature Center in Jefferson City. This facility is a fabulous location as it has adequate rooms, trails and natural settings that are needed for the contest. Past Central Region Envirothons have been held

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Missouri Regional Competitions *(continued)*

at state parks, university farms, and other areas within central Missouri.

Historically the Central Region has had tremendous support from several schools within the 17 county region. Twenty-one teams from 14 different schools participated in 2013. Central Region teams earned 3rd and 5th places in the State Envirothon that year.

“Out of all the competitions I have competed in through the FFA, I have to admit that the Envirothon was the one contest I always looked forward to the most. Not only did I develop an appreciation for the environment around me and the importance

of preserving it, but I had so much fun in the process! After four years of participating in the Envirothon (2006 – 2009), I can honestly say it has helped shape my career decision and I can't wait

to enter my students in the Envirothon this year!”

Rachel Longan, Knob Noster Ag Teacher and FFA Adviser



4

St. Louis Regional Coordinator:

*Theresa Dunlap, SWCD Information/Education Specialist,
St. Charles County, 636-922-2833, ext. 3*

The St. Louis Region covers an eight-county area in the east central portion of the state. This is the most populated Envirothon region in Missouri and includes the densely populated urban areas of St. Louis and St. Charles. The competition is designed to accommodate up to 21 teams with a multitude of volunteers and resource professionals needed to have a successful event. These professionals offer two to three training sessions each year, with one being an overnight total environmental immersion. This is important because many of the competitors are urban youth who haven't spent a lot of time outdoors.

By using the Dana Brown overnight conference facilities at the Shaw Nature Preserve in Grey Summit, trainers have been able to expose the students to a variety of activities including Dutch oven cooking, net fishing, macro-invertebrate investigation, tree id walks, plant id lessons, after-dark explorations with no light sources, animal calling, and more. Not only are Envirothon topics presented, but also students are invited to observe and enjoy nature in a way that is memorable and will help them connect the dots of the different resource facts they've learned in the classroom. Another training is offered at Busch Conservation Area and includes an intense investigation of soils led by top NRCS soil scientists.

The St. Louis Region offers these training opportunities to teams across the state, and has had attendees from the Kansas City, Central and Southeast Regions.

The St. Louis Region encompasses several different land types, and while urban sprawl has covered great areas, there are still plenty of wild and natural places. These include the



confluence of two of the greatest rivers in the world which is home and/or resting place for millions of migratory birds; rich bottomland farms; forested hill ground with some of the best wine producers in the country; productive farm land, forestland, prairies and rolling hills.

Particular environmental challenges in the area include the competition for land use between urban sprawl and the desire to protect natural places. Water quality is a huge concern – both urban land and farmland drain to the Missouri and Mississippi rivers and have the potential to harm coastal waters miles away.

This region has a growing invasive plant problem, including such species as bush honeysuckle, Sericia Lespedeza, Callery Pear, Johnson Grass and Multi-flora Rose, to name just a few. There has also been an increase in the number of Asian Carp in this region's rivers.

Most of the competitions in this region are held at county parks, Missouri Department of Conservation lands, and state parks.

An area teacher was asked if Envirothon had provided any skills that he would use in his teaching. *“I plan to teach more about connecting soils to ecosystems,”* he said. *“I hope to show my students the connections of wildlife and plants to abiotic factors.”*

Southwest Regional Coordinator: *Paula Champion, SWCD Manager, Lawrence County,* 417-466-7682, ext. 3

This is the largest Envirothon region in the state with 26 mostly rural counties, but including the 2nd largest urban school district in the state (Springfield). A fall competition is held, with the most recent at the Missouri Department of Conservation Nature Center in Springfield.

The diversity of this region makes it quite unique. It offers rich farmland and prairie and grassland to the west, rugged and timbered land to the southeast and beautiful rolling hills and innumerable caves with karst topography in the middle. While the region has cropland that produces predominantly small grain, it also supports a thriving black walnut industry and is the leading area in Missouri for beef production.

Environmental challenges in the area include monitoring and controlling soil erosion on cropland/grassland, and attention to water quality is vital due to the karst topography. Among the 54 threatened or endangered species in the Ozark country are the Ozark Cavefish and the Greater Prairie Chicken. Envirothon students also learn about invasive plant and animal species in the region, of which there are 10 invasive animals and/or insects, and 25 invasive plants.



There are many wild and natural spaces in this region, which is also a tourist destination for people living both in and outside of the state. Rivers, caves, trout fishing, camping, hiking, and outdoor festivals are all part of the long list of activities for outdoors enthusiasts. It is also home to two National Parks: Wilson's Creek National Battlefield (a resource site of the 2005 Canon Envirothon Competition) and George Washington Carver National Monument.

Daniel Hatch, Ph.D., Instructor of Biology and the Licking, Mo., High School Envirothon team advisor links the work of this program to the future of the state, *"The Envirothon program is an important part of the environmental future of Missouri. We are grateful for the energy, time, and funding that goes into this program."*

Southeast Regional Coordinators: *Rachel Griffin, SWCD Manager, Ripley County, 573-996-3619, ext. 3* *and Wilma Carlyon, SWCD Manager, St. Francois County,* 573-756-6488 ext.3

The Southeast Region includes 22 counties and is a mostly rural area with the largest metropolitan area being Cape Girardeau. The Envirothon program has seen increased interest in this region, and the committee is working to expand participation.

The southeast encompasses an extremely varied landscape, with both the tallest point (Taum Sauk Mountain) and lowest point (Hornersville) in Missouri. There are scenic rivers, Mark Twain National Forest, cropland, pastureland and urban areas.

There are many environmental issues including urban sprawl, wetland depletion, sand prairie losses and the protection of glade and open woodland. This region has the hardwood bottomlands of the Mississippi River basin and the only true mountains in



the state, the St. Francois Mountains. The region is home to the only inland cape in the US, Cape Girardeau, and the southern town of New Madrid is the epicenter of the New Madrid Earthquake of 1810/1811. The New Madrid Fault is larger than the San Andreas Fault, just not as active!

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Missouri Regional Competitions *(continued)*

Agriculture is important in this area with rice, cotton, peaches, soy beans, cattle, hogs and sawlogs being among the products. Missouri is world renowned for high quality white oak logs, and black walnut logs and nuts. At one time, Missouri was the largest producer of lead, and these mines were located throughout St. Francois and Iron counties.

Envirothon students learn that water quality is an issue requiring attention due to the karst topography, intense row cropping, livestock in waterways, and expanding population. The region is home to Crowley's Ridge, the ancient bank of the Mississippi River where there are more listed protected species than any other place in the state. The Ozark Hellbender, a protected salamander, makes its home in the clear streams within the Ozarks.

Students also find that the southeast has many invasive species problems including the presence of Emerald Ash Borer, Armadillos, Big-head Carp, Zebra Mussels, Gypsy Moths, Spotted Knapweed, Kudzu and *Sericea Lespedeza*.

An area resource professional responded on a survey as to why she participates in the Envirothon: *"Educating our youth is one of the most important jobs that we, as resource professionals, have. In our normal day to day business, we work with landowners to provide good resource management advice, but our students are the new landowners, educators, managers, politicians and parents to pass on the conservation legacy."*

Four members of one successful team are now employed in teaching and conservation. Three are science/environmental teachers and one is a technician for a Soil and Water Conservation District.

7 Kansas City Regional Coordinator: *Dave Fry, SWCD Information/Education Specialist, Jackson County, 816-228-1836, ext. 111*

The Kansas City Region includes seven counties in the west-central part of the state, and includes the second-largest metropolitan area in Missouri.

The "Red Carpet" has been extended to the Kansas City Regional Envirothon students and sponsors for the past 15 years by the Missouri Department of Conservation Burr Oak Woods Conservation Area. Burr Oak Woods is located about 20 miles east of downtown Kansas City, Missouri and consists of 1,071 acres of woodlands, glades, native grass and forb plantings, fields and ponds and includes a portion of Burr Oak Creek.

Manager Lisa LaCombe and her MDC staff and volunteers play a major role in the successes of the KC Regional training and testing events. Staff members assist in choosing site locations, act as training coordinators, test writers and graders as well as set up each of the eco-stations. The Burr Oak Woods Nature Center Volunteer Staff



help as team guides, photographers, time keepers and assist wherever they are needed sometimes with very little advance notice.

The top achieving team in North America in 2012 was from Pembroke Hill High School in this region. This impressive team competed again in 2013 and placed third at the national level.

“North American Envirothon” is Program’s New Name at the National Level

In July 2012 during a review of the contribution agreement between Canon USA and Canon Envirothon, the legal department of Canon USA advised that it would be in the best interest of both Canon USA and Canon Envirothon to not have the name “Canon” included in the organization’s name or logo. Therefore, a name change process was started to change the name of the program from Canon Envirothon to North American Envirothon. Contribution agreements between Canon USA and North American Envirothon will continue for funding of the scholarships and host grant funds. The name change was effective August 10, 2012 with the official name change in the state of Texas where the program is incorporated.



Missouri to host



★ North American Envirothon ★

in
2015

The Missouri Envirothon executive committee is proud to announce that Missouri will be the site of the 28th annual North American Envirothon in summer 2015. This will be the second time that Missouri will host this event; the first time was in 2005. The week-long event will be located at Springfield on the Missouri State University campus.

The North American Envirothon is the largest and fastest growing environmental competition. Approximately 54 teams of high school students from across the United States and Canada will come to Missouri to test their knowledge of wildlife, forestry, aquatics, soils and a current conservation issue that changes each year. The current issue topic for 2015 is Urban Forestry. Teams compete by applying their knowledge and problem-solving

skills in these areas. The best teams advance through regional, state and provincial competitions to the North American Envirothon championship, which is held in a different state or province each year.

The learning experience and competition take place in a variety of outdoor and indoor settings. Students are engaged in hands-on activities that range from studying and analyzing soil and forestry samples, to measuring tree heights. The program focuses on developing teamwork, cooperation and problem-solving skills.

Approximately 300 volunteers will be needed to make the event happen so if you are interested in participating please contact Peggy Lemons at peggy.lemons@swcd.mo.gov or Judy Stinson at judy.stinson@dnr.mo.gov.

Nancy Snider

*Missouri Department of Conservation
Education Consultant—St. Louis Region*



Missouri Department of Conservation Education Consultant Nancy Snider has an inexhaustible enthusiasm for learning that is both admirable and infectious. This trait makes her a natural teacher, and combined with her deep attachment to nature, Nancy has developed an outstanding Envirothon training program.

The St. Louis Regional Envirothon is managed by the St. Charles County Soil and Water Conservation District with a team of conservation-minded individuals. Besides Nancy, there are five SWCD employees and a Wentzville City Stormwater employee who sit on the committee. Together they handle all the logistics of the regional events, plan the trainings, recruit the trainers, choose the test writers and graders, and review and edit line-by-line each test question. Each person has valuable skills and knowledge to contribute—all spokes in a wheel that has been turning smoothly for many years; but at the hub of that wheel is Nancy! Her high level of dedication, her endless energy, her honest love of the natural world, and her superb teaching ability make her a natural leader of the group.

“It never really feels like work when Nancy is around. She has a fascination with the natural world and the rest of us just can’t help but get caught up in her excitement.” said Theresa Dunlap, regional committee member and SWCD employee.

Nancy’s style of teaching Envirothon topics doesn’t involve many lectures or PowerPoint presentations because she believes students learn through discovery. She gently guides them through a lesson: asking questions, and allowing them to discover facts and answers in “aha” moments.

Nancy initiated a total environmental immersion training weekend for Envirothon students at the Dana Brown Conference Center in the Shaw Nature Preserve in Grey Summit, Missouri. The students stay in restored historical cabins and participate in a variety of Envirothon-related activities, including a tree id hike, a fish id session on the banks of the Meramec River, investigation of glade habitat, a wetland discovery, and wildlife id using live animals.

Students have chopped their own veggies for Dutch oven cook-outs, and after dinner they always enjoy S’mores by the bonfire. Before heading to the cabins for the night, students are taken on a night hike with no man-made light sources. At first the kids are worried... “how will we be able to see anything?”, but as their eyes adjust to the natural light of the moon and stars—a whole nocturnal world appears. They call to owls and coyotes, find glow worms and listen to the night noises.

Nancy has promoted Envirothon, not just in the St. Louis region, but across the entire state of Missouri. She is involved with the Missouri Environmental Education Association (MEEA), and Science Teachers of Missouri (STOM) and has showcased the Envirothon program at the conferences. She also teaches Environmental Science Education to future teachers at Lindenwood University in St. Charles, Mo., and is deeply committed to the impressive outreach program she has developed as a full-time employee of the Missouri Department of Conservation. She is a true champion for Envirothon and a cheerleader for all learners—young and old.

Missouri Association of Soil & Water Conservation Districts Supports Envirothon

Envirothon in Missouri has developed into a successful program thanks to numerous supporters, volunteers and partners. One of those important partner agencies is the Missouri Association of Soil and Water Conservation Districts (MASWCD), the agency that, in 1998, embraced this relatively new idea for an environmental competition for high school students and brought it to Missouri as a conservation education program.

MASWCD is the state association offering guidance and support to the 114 county Soil and Water Conservation Districts (SWCDs) across Missouri. Each of the seven Envirothon regions in the state has a local SWCD sponsor, in conjunction with organizational and financial support from the MASWCD Board and the Missouri Envirothon Board.

“The MASWCD Board fully supports this program and was very excited when the decision was made to host the national competition in 2005 (then titled Canon Envirothon)”, said Peggy Lemons, co-chair of the Missouri Envirothon Board and a member of MASWCD. “As a result of the contacts for sponsors and volunteers, and the amount of funding generated to host the competition in 2005, the Missouri Envirothon was able to gain its own status as a 501c3 non-profit organization with its own board of directors. Even though the Missouri Envirothon is no longer a program under MASWCD, the MASWCD Board of Directors continues to strongly support the Envirothon program both financially and through volunteering at regional and state competitions.”

The conservation partnership in Missouri works very closely together on conservation education and the Missouri Envirothon is one of the main education programs in the state. The partners include MASWCD, the local SWCDs, Soil and

Water Conservation District Employees Association, Missouri Department of Natural Resources, Missouri Department of Conservation, Natural Resources Conservation Service, University of Missouri Extension, Show-Me Chapter of the Soil and Water Conservation Society and Canon U.S.A. These partners assist with locations for competitions, finances for things like lunch and t-shirts at the events, and resource professionals who provide student training, write and grade tests, and volunteer at the events.

The Missouri Envirothon will be hosting the North American Envirothon competition again in 2015 in Springfield, MO at the Missouri State University. The conservation partnership strongly supports the Envirothon program and will all be involved in the 2015 competition as financial supporters and volunteers. As a part of hosting the 2015 North American Envirothon, the Missouri Envirothon board will also be seeking financial sponsors for the competition in the form of training and testing station sponsors, bus sponsors and activity sponsors as well as additional volunteers.

If anyone is interested in more information about the 2015 North American Envirothon, please contact Peggy Lemons at peggy.lemons@swcd.mo.gov or call her at 573-353-1417.



Envirothon Influenced Decision to Teach

Rachel Longan, an Agricultural Science teacher at Knob Noster High School in Central Missouri and a former Envirothon student, is enthusiastic about the Envirothon team she is coaching.

“I truly loved the time I spent on my Envirothon team in high school, and I hope I can spark that enthusiasm in my students,” she said. “The hands-on component of the competition is a great way to learn about natural resources, and it offers students an opportunity to interact with nature in ways they may not otherwise have had.”

Many of Rachel’s students come from rural and agricultural areas which have provided them with an understanding of the importance of resources like soil and water. Envirothon builds on that knowledge, adding instruction in all natural resources with an emphasis on managing and sustaining healthy ecosystems.

“Through Envirothon, I’m getting my students outside and face-to-face with nature in ways they’ve not experienced before,” she explained. “Students join our team because they say they love nature, and I enjoy watching that fascination grow into

a deeper understanding and respect for natural resources and the role they have in our lives.”

Rachel was an Envirothon competitor from 2006 through 2009 at California High School in California, Mo. She originally joined the program because she loved being outdoors and had an interest in wildlife management.

“Those years with Envirothon definitely shaped my decision to become an ag teacher,” she said. “Envirothon was such a positive learning experience, and I wanted to pass that along through my career choice.”

Rachel, the daughter of Lee and Sharon Longan, grew up on a farm and brings plenty of personal experience to the classroom as well. She is a graduate of the University of Missouri-Columbia, and she currently teaches a wildlife management class and Agricultural Science I and II.





A HEALTHY PLANET PROMOTES HEALTHY PEOPLE

(Why Envirothon is Important)

Measuring the health of our planet is a difficult and controversial task. Many scientists, world health groups, and environmentalists have conflicting views on the state of the planet and the global issues facing the health of all ecosystems, but there is a consensus that conscientious and intentional stewardship by all human beings is required if we are to maintain a global ecology capable of the long-term support of all living things...including humans.

Data collectors often have self-serving interests that motivate any particular study and this can result in selective and misleading information. A study may show that a country is reclaiming forest acres at a certain impressive rate, but a deeper look into that country's imports of wood products reveals that their consumption is adding to the depletion of forests in another locale. The truth is the consumption has not been curbed, only moved to another location on the planet. So basing environmental health on any one study is risky business.

Not all environmentalists agree, not all politicians agree, and not all scientists and biologists agree on the prognosis of planet health in years to come. Many fear that the Earth's health is in decline due to the depletion of healthy natural resources and continued population growth.

One camp optimistically plans for a future where consumption rates will continue to

increase, but ingenuity and technical advances will compensate for that rate of consumption. New and better energy efficient products, electric cars, wind energy, solar heat, better plant hybrids and a long list of other recent advances hold the promise for this group.

The other camp focuses on conservation. They believe that the best and most proper solution is to restore as near as possible the ecological and natural balance within ecosystems around the globe. For this group, conservation, preservation and restoration through various types of efforts (recycling, invasive species removal, prairie restoration, waste reduction) are the key to future planet health.

Young people today are inundated with doomsday messages and they are listening. Ask middle school and high school students what they think are the biggest challenges facing their generation, and ranked near the top are environmental issues. They live in a time when news headlines and textbooks include discussions on declining biodiversity, increased carbon dioxide in the atmosphere, stressed energy reserves, declining ocean fisheries, ozone depletion, warming waters... the list goes on and on.



These young people are also seeing a new shift in science education. In just the last few decades, schools in the developed parts



A HEALTHY PLANET PROMOTES HEALTHY PEOPLE (CONTINUED)

We are encouraging a generation of leaders and citizens who will need to think ecologically, understand the interconnectedness of human and natural systems, and have the will, ability and courage to act.

of the world have included curriculum focused on environmental science. While many of us grew up in a world where the dominating attitude was that nature needed to be controlled, confined and manipulated, our children are learning that survival means being a healthy part of the ecosystem with limited disturbance to an environment's natural balance. We have seen the advent of such movements as Low Impact Development, or LID, which promotes progress with preservation. This movement has led to "green" roofs, pervious street pavers, native plant landscaping and natural sources of energy in new urban developments. Additionally, on the rural scene we have observed an increase in participation in agricultural conservation practices that reduce cropland soil erosion in an effort to reduce the impact on important water resources, and aid in addressing the issue of Gulf hypoxia. Hypoxia is the depletion of oxygen in the water caused in large part by an increase in the concentration of nitrogen and phosphorous in the Lower Mississippi River, and resulting in a "dead zone" in the Gulf that can no longer support aquatic life.

Our young people, not bogged down by old anti-ecological ways of thinking, will lead the way in combining the two camps: new and more earth-friendly ways of economic growth, coupled with greater conservation, preservation and restoration efforts. Youth have access to the knowledge and are growing up in a time when environmental awareness is trendy.

One drawback is that they must wade through a web of distractions, especially in a developed country such as our own. Our fast-paced, modern society glamorizes a materialistic lifestyle where everything, including people, comes in glitzy

packaging; and "green" has become a selling point for everything from a new car to diapers. In addition, we now have a generation that is far removed from life on the land – less than 2% of our nation's population is involved in raising our food. This unfamiliarity with the fundamental resources that are key to our own continued health and well-being, and ignorance about how they interact to impact us and our environment, is a huge hurdle to overcome.

This is where Envirothon is successful. Education through this program focuses on the local ecosystem, the one in which the students themselves are an important part; and teaches them a combination of natural history and conservation biology. Classroom-based instruction is combined with hands-on, location-oriented immersion where students can see for themselves the positive and negative impacts of actions within the ecosystem. For example, we can speak to them in the classroom about bush honeysuckle invasion in our Missouri woodlands. We can show them PowerPoint presentations and bring in a specimen of the plant. But Envirothon takes a few steps further by actually taking students into the woods and letting them see for themselves the extent of an infestation and the resulting reduction of understory vegetation and the monoculture that is developing. And then students are presented with the scenario of a real-life problem and are asked to come up with a solution. Teaching and learning are important, but action is the goal. Envirothon informs students and invites them to act.

Envirothon focuses on the interconnectedness of nature with a holistic approach to managing the environment and restoring the planet's natural balance. Air, wa-

A HEALTHY PLANET PROMOTES HEALTHY PEOPLE (CONTINUED)



ter, land, animals...all are connected, and any action within any of these areas will have consequences—some seen, some unseen, some intended, some unintentional.

The Envirothon trainers and test-writers are experts in their fields (foresters, soil scientists, aquatic biologists, etc.), but these men and women work across disciplines in their day to day jobs. They may be experts in one area, but due to the intricate and undeniable link between all natural systems, they must also understand a great deal about the other disciplines. A soil scientist must know how soil affects the water. The aquatic biologist knows how the presence of trees influences water temperature. The wildlife biologist knows that an animal will leave its home territory if its



JOHN MUIR

native forage is depleted. These experts, who work across disciplines, also teach across disciplines. An Envirothon aquatic training will include information about soils, forestry, and wildlife and how those areas influence aquatic health. It's all connected! As John Muir, environmentalist, adventurer, writer and scientist, said, "When we try to pick out anything by itself, we find it hitched to everything else in the Universe." ("My First Summer in the Sierra")

Mankind was once closer to the earth, closer to nature. They had to be in order to survive in a time where everything they owned or consumed came from the land, air and water in the immediate area. Understanding the moon's role in tidal movement, discovering that a root alleviated bowel troubles, planting more trees because some were felled for a shelter, burning the prairie because it stimulated forage—these things weren't taught...they were discovered. This is what we strive to do through the Envirothon program. Teach kids to discover by guiding them to look, analyze and solve.

We are encouraging a generation of leaders and citizens who will need to think ecologically, understand the interconnectedness of human and natural systems, and have the will, ability and courage to act. Envirothon is empowering youth to lead the way in ecosystem-based management of natural resources with a goal of maintaining and restoring the health of our planet...and consequently—ourselves.

Even if these high school students do not pursue ecological careers, we hope that they will live their lives with a deeper understanding of how they are a part of the natural world. When they walk through the hills and woods, and cross the streams, not only will they say how beautiful it is, but also how wonderfully and intricately they are connected to it all. When a butterfly alights on their little child's shoulder, not only will they comment, "Isn't that pretty", but they will also be able to tell their child that she is alive because that butterfly lives, because that waterfall flows, those trees transpire, microbes attach to plant roots, birds spread seeds, coyotes hunt...! It's all connected!



Mary S. Burt Envirothon Scholarship

Mary Burt served as the District Manager for the St. Charles County Soil and Water Conservation District for more than 26 years, until her retirement in April of 2009. She was a founding member of the Missouri State Envirothon and the chair of the St. Louis Regional Envirothon.

Mary became involved at all levels of the competition, and worked closely with organizers, test writers, trainers, advisors and students. She especially enjoyed working with the students and operated on the premise that the Envirothon “kids” are the natural resource professionals of the future. She expected her “kids” to study hard and perform well, and she encouraged them to pursue careers in environmental fields.

Near the end of her service to the SWCD, Mary became seriously ill due to recurring breast cancer which eventually spread to other areas of her body. She became tired and weak and reduced her work hours and commitments, but still attended a State Envirothon, despite the pain it took to ride in the

car for a considerable distance.

Mary succumbed to the cancer in November of 2009, just over 6 months after her retirement. During her final days at home, her family made the decision to establish this scholarship fund, and while she was not able to respond, her sisters said that they are sure Mary heard and understood that the fund would help Envirothon students who wanted to go to college.

The current amount of the scholarship award is \$250, but the committee would like to increase the award as fundraising efforts continue. As of December 2013, three scholarships have been awarded to the deserving Envirothon students listed below.

If you would like to donate to the scholarship fund, please contact Theresa Dunlap at 636-922-2833, ext. 3, or send a check made out to the Mary S. Burt Envirothon Scholarship Fund, in care of Theresa Dunlap at 160 St. Peters Centre Blvd., St. Peters Mo., 63376.



2011 - Chelsea Smith

Chelsea is the daughter of Ryan Smith and Angela Harris of Licking, Mo., and she is a graduate of Licking High School. Currently a student at Lindenwood University in St. Charles, Mo., Chelsea is enrolled in the Biology Department and has an interest in Wildlife Management.

2012 - Kristen Steiner

Kristen is the daughter of Gary and Connie Steiner of Amity, Mo., and a graduate of Union Star R-II High School. She is enrolled at the University of Missouri – Columbia in the Agriculture, Food and Natural Resources Department where she is pursuing a major in Plant Sciences with an emphasis on Horticulture.



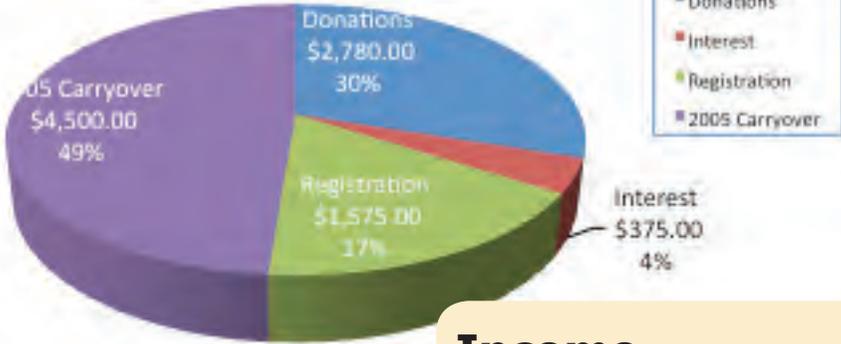
2013 - Alicia McCabe

Alicia is a graduate of Incarnate Word Academy in St. Louis, Mo., and is the daughter of Tim and Mary McCabe. She is attending the Missouri University of Science and Technology at Rolla, and is planning to major in both Bio-chemical and Environmental Engineering.



2012 Missouri Envirothon

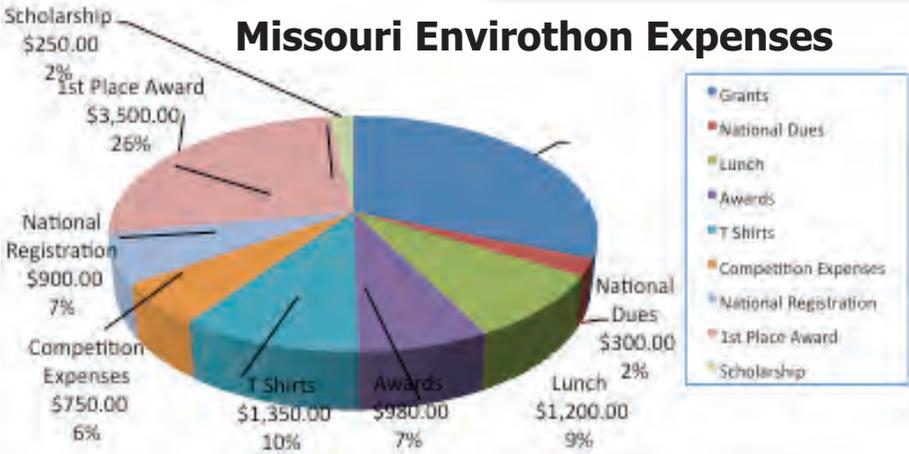
Missouri Envirothon Income



Income

Donations	\$ 2,780.00
Interest	\$ 375.00
Registration	\$ 1,575.00
2005 Carryover	\$ 4,500.00
	<u>\$ 9,230.00</u>

Missouri Envirothon Expenses



Expenses

Grants	\$ 4,200.00
National Dues	\$ 300.00
Lunch	\$ 1,200.00
Awards	\$ 980.00
T Shirts	\$ 1,350.00
Competition Expenses	\$ 750.00
National Registration	\$ 900.00
1st Place Financial Travel Stipend	\$ 3,500.00
Scholarship	\$ 250.00
	<u>\$ 9,230.00</u>



Take the Test

Could you identify an animal by its track, fur or scat? Do you know the horizon layers in a soil profile? How much do you know about natural systems in your state?

Envirothon students gather knowledge on a variety of living systems and answer a multitude of questions in a limited amount of time. Take the abbreviated sample test below to see how you would do. Most of the questions below were taken from the North American Envirothon website's "sample tests" section. A Current Issue section was not included in this sample. Answers are on page 26.

Forestry

1. Explain how trees in bottomlands are adapted in their seed dispersal or method of reproduction to ensure their survival.
2. Explain the difference between hard mast and soft mast.
3. When planting trees around a house or building, what key factors should be considered?
4. What is a "snag" tree and what is the best use for one?
5. Stands of trees that originated over a relatively short period of time, give or take 20 years, are called:
 - a. All-aged stands
 - b. Pole stands
 - c. Even-aged stands
 - d. Intermediate-aged stands
6. New growth occurs in what part of the tree?
 - a. Annual ring
 - b. Stoma
 - c. Cambium
 - d. Vein
7. The products of photosynthesis are:
 - a. Carbon dioxide and water
 - b. Water and sugar
 - c. Carbon dioxide and oxygen
 - d. Sugar and oxygen
 - e. Carbon dioxide and sugar
8. In forest measurement, a cord of wood is:
 - a. A short-bed pick-up truck load
 - b. A long-bed pick-up truck load
 - c. A stack of wood measuring 2' x 8' x 16'
 - d. A stack of wood measuring 128 cubic feet
9. The state tree of Missouri is:
 - a. Pawpaw
 - b. Flowering Dogwood
 - c. Maple
 - d. Ash
10. A deciduous tree:
 - a. Is undecided about where to grow
 - b. Loses its leaves in winter
 - c. Keeps its foliage all year
 - d. Grows in a wetland

Wildlife

1. Name the poisonous snakes of Missouri.
2. Identify this mammal from the drawing of its track.



Wildlife

3. What term is used to describe when the lack of food, water or shelter or hunting, pollution, disease or predation prevents a particular wildlife population in an area from growing?
 - a. Carrying capacity
 - b. Competition
 - c. Limiting factor
 - d. Zero population growth
 - e. Compensatory loss
4. Duck populations have declined in recent years. Which of the following factors contributed the most to this decline?
 - a. Nest predators
 - b. Thinning of egg shells
 - c. Drought
 - d. Wetland destruction
5. Name three species in Missouri that are pollinators and explain why pollinators are important.
6. Which of the following played an important role in shaping Missouri prairies?
 - a. Birds
 - b. Fire
 - c. Herbivores
 - d. Tornados
7. Approximately _____ of a prairie's biomass is underground.
 - a. 90%
 - b. 75%
 - c. 50%
 - d. 20%
8. List 2 values that a woody plum thicket would have along the edge of woodland for Northern Bobwhite.
9. Name two species of wildlife that may be considered a nuisance in developed areas.
10. List two examples of forestry management practices that are used to improve wildlife diversity within a timber stand and list for each practice a wildlife species that would benefit.

Aquatics

1. What is the most common cause of a fish kill in a pond or lake?
 - a. Safe Drinking Water Act
 - b. Clean Water Act
 - c. Federal Water Quality Initiative
 - d. Both A and B
 - e. Both B and C
2. Which species of fish is LEAST likely to contain unacceptable levels of PCBs or dioxin chemicals which sink to the river bottom? Explain why.
 - a. Northern hog sucker
 - b. Bluegill
 - c. Carp
 - d. Channel catfish
3. Define an ephemeral stream.
4. List four components of all streams.
5. Name an organism that uses an intermittent stream during its life cycle.
6. Identify this federally endangered species.
 - a. Safe Drinking Water Act
 - b. Clean Water Act
 - c. Federal Water Quality Initiative
 - d. Both A and B
 - e. Both B and C
9. Which of the following is the leading cause of water-borne illnesses in the United States?
 - a. Coliform bacteria
 - b. Giardia
 - c. Iron Bacteria
 - d. Cryptosporidium
10. The main impact of water temperature on stream water quality is:
 - a. Heat will decrease the capability of water to hold dissolved oxygen
 - b. Spawning rates increase as water temperatures decrease
 - c. Water has a low heat capacity, which makes it susceptible to changes in temperature
 - d. Most aquatic organisms cannot tolerate slow, gradual changes in temperature
7. What are some reasons that the above species has declined?
8. Which of the following federal laws affect water quality in the United States?

Take the Test

(continued)



Soil

1. What are the three components that make up soil texture?
2. Name the five soil-forming factors.
3. What do grey colors indicate in a soil?
4. Describe how the following parent materials are deposited:
 - a. Loess
 - b. Alluvium
 - c. Glacial Till
 - d. Residuum
 - e. Colluvium
5. As annual rainfall increases, soil pH:
 - a. Increases
 - b. Decreases
 - c. Is Unaffected
6. A community is expanding. As development occurs, housing, jobs, community attractions and shopping centers are needed. A plot of pasture land outside of town is for sale. A soil survey reveals a colluvial soil with a fragipan at 12 inches. What is the best use of this land?
 - a. Community park
 - b. Housing development
 - c. Shopping mall
 - d. Factory
7. During saturation, the rusty brown iron coating on mineral particles is reduced to a grey color. The combination of grey and brown colors is called:
 - a. Tilth
 - b. Mottling
 - c. Running
 - d. Stripping
8. Which of the following essential nutrients is most easily leached from soils?
 - a. Potassium
 - b. Magnesium
 - c. Phosphorous
 - d. Calcium
 - e. Nitrogen
9. What is the most common water pollutant from farmland?
 - a. Nutrients
 - b. Sediment
 - c. Pesticides
10. A soil layer that is nearly parallel to the land surface and is different from other layers above and below it is called a soil _____.
 - a. Profile
 - b. Ped
 - c. Horizon
 - d. Taxa

Each Envirothon station test typically has 20 to 25 questions, many of which are dependent on the site. For example, at the soil station several questions would be dependent on evaluation of a soil pit, while at the forestry station, teams will provide site-specific forest management responses. For the sample tests on these pages, only multiple choice and short essay questions are used.

Go to
Page 26 to
check your
answers!

Envirothon Investigates Current Environmental Issues

Georgia Chooses “Sustainable Local Agriculture /Locally Grown” as 2014 Current Issue Topic



Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs.

The 2014 Current Issue topic reflects a growing movement in the United States and around the world to find more sustainable ways to provide food and fiber: ensuring the long-term survival of local farms and agricultural enterprises. Key goals in this movement include:

- Fulfilling the food and fiber needs of the world
- Ensuring long-term profitability for farmers and ranchers
- Preserving and restoring natural resources on and around the farms
- Using wisely the nonrenewable resources needed to operate farms
- Sustaining the economic viability of farm operations

- Enhancing the quality of life of farmers, ranchers and society as a whole

Envirothon students will learn that agricultural operations are continually faced with decisions that will affect the natural community, the local economy and their own profits. New technological advances that aid the farmer in increasing profits may clash with desires to protect the future productivity of the farm. Maximizing production and increasing farm income is desirable for all, but at what cost? Many agricultural practices, such as chemical applications to control diseases and pests, may increase production for a few years, but will definitely have long-lasting effects on the environment and local natural resources.

Some environmental and social costs are topsoil depletion, groundwater contamination, decline of family-owned farms, increasing production costs, intensified use of fossil fuels, and degrading economic

continued on next page



Past Current Issue Topics

Each year the host state or province chooses a current issue topic that is pertinent throughout North America and the students research that topic for their oral presentation component of the national competition. The regional and state events in Missouri offer the students the opportunity to research the same topic for their oral presentation to help prepare them for the next level. Below is a list of the topics that have been presented since Missouri began attending the national event in 1998.

- 1998 - Watersheds
- 1999 - Wildfire Management
- 2000 - Wetland Management
- 2001 - Urban Nonpoint Source Pollution
- 2002 - Introduced Species
- 2003 - Farmland Preservation & Conservation
- 2004 - Natural Resource Management in an Urban Environment
- 2005 - Managing Cultural Landscapes
- 2006 - Water Stewardship in a Changing Climate
- 2007 - Alternative / Renewable Energy
- 2008 - Recreational Impacts on the Natural Environment
- 2009 - Biodiversity in a Changing World
- 2010 - Protection of Groundwater
- 2011 - Salt and Fresh Water Estuaries
- 2012 - Low Impact Development
- 2013 - Rangeland Management

conditions in rural areas. The sustainable agriculture movement highlights several practices that can help offset the negative impacts of modern farming. These include:

- Selecting species and varieties that are well suited to the site and conditions of the farm
- Diversifying crops, livestock and cultural practices to enhance the biological and economic stability of the farm
- Managing soil to enhance and protect soil quality
- Using inputs efficiently and humanely
- Considering the farmers' goals and life style choices

Examples of specific practices that fit within this framework include but are not limited to: recycling/composting yard and kitchen waste, polycultural farming, square foot gardening, seed saving/

use of heirloom varieties, rainwater management practices (rain barrels, cisterns, rain gardens), vertical gardening, animal husbandry practices (small paddock rotational grazing, backyard chickens), integrated pest management and no-till and cover crops.

The way that crops are sold must also be accounted for in relation to sustainability. Food sold locally saves transportation energy, while food that is sold at a remote location involves a different and higher set of energy costs for material, labor and transport.

The Georgia Envirothon will focus this topic on smaller scale, family farm level operations, while recognizing that sustainability practices are advantageous to all farm operations, large and small.

Robert Wright (on far right) is pictured with the Pembroke Hill team.



Engineer says Envirothon Aided School/Career Development

Robert Wright was a senior at Pembroke Hill High School in Kansas City, Missouri in 2007 when his mom, SueAnn Wright, became the Envirothon coach. Robert joined the team which included his younger brother and three other young men.

After graduating from high school, Robert attended the Colorado School of Mines to study Physics and Mechanical Engineering. “During my first year at Mines, I used much of my soils knowledge in my basic engineering classes,” he said.

After four years of undergrad, he completed an additional year to get a Masters in Engineering Management. “At Mines, there was an emphasis on environmental responsibility similar to what the Envirothon program instills in students,” Robert explained. “I took ethics classes that addressed our responsibilities as engineers to ensure that the future work we do would not be done at anybody’s expense. I used the critical thinking skills required by Envirothon’s Oral Presentation in these classes.”

Robert spent recreational hours in Colorado hiking, hunting and going on ski trips.

“Wildlife information I had learned through Envirothon came in handy when trying to pick preferred habitats of ani-

mals. It also became very apparent that hunting is not as much about killing an animal as it is making sure their habitats and numbers stay healthy for generations to come.”

Robert is now an engineer in the energy division with Burns & McDonnell, an engineering consulting firm.

“Environmental considerations drive everything I do at work. I have only worked on designing natural gas power plants, because nobody is building the dirtier coal-fired plants any longer. The switch from coal to natural gas for power in the US is the single largest reduction in greenhouse gas emissions. For where the US is now, designing new efficient combined cycle natural gas plants is doing more to clean up our atmosphere than all the renewable energies combined. This is something I take pride in as I work on power plant designs every day.”

Although it has now been six years since Robert participated in Envirothon, he said the principles and lessons have stayed with him. “Environmental consciousness is an integral part of my life. What I learned in Envirothon has not only given me a greater appreciation and understanding of these critical issues, but it has also helped me in my schooling and career. “



Answers to “Take the Test”

Forestry

1. Bottomland trees must cope with frequent disturbances, such as flooding, in order to survive and reproduce. Adaptations that aid survival include: being a prolific seeder and/or sprouter; utilizing water in dispersal of seed; being a fast grower.
2. Mast is the edible vegetative or reproductive part produced by woody species of plants. Hard mast includes things like acorns and hickory nuts. Soft mast includes things such as leaf buds, catkins and berries.
3. Things to consider when planting trees around a house: 1) Size of the plant (width and height) vs. size of space (buildings, power lines, underground utilities, sidewalks, etc.) 2) Purpose of the planting (screen, shade, food, aesthetics, etc.) 3) Soil/site characteristics (soil type, drainage, fertility, pH, etc.) and 4) Climate, including micro-climates (hot/cold, reflective heat, exposure, etc.)
4. A snag tree is a standing dead/dying tree. It is critical to many species of wildlife that utilize them for food and shelter.
5. C. Even-aged stands
6. C. Cambium
7. D. Sugar and O₂
8. D. A stack of wood measuring 128 cubic feet
9. B. Flowering Dogwood – *Cornus florida*
10. B. Loses its leaves in winter

Wildlife

1. Osage Copperhead, Western Cottonmouth, Timber Rattlesnake, Eastern Massasauga Rattlesnake, Western Pygmy Rattlesnake
2. Beaver
3. C. Limiting Factor
4. D. Wetland Destruction
5. Pollinators include: birds, bats, bees, butterflies, beetles and other small mammals. One third of the food we eat is dependent on pollinators. Without them, agricultural economies, our food supply and surrounding landscapes would collapse.
6. B. Fire
7. B. 75%
8. Two values of the woody plum thicket are escape and thermal cover.
9. Two species considered a nuisance in developed areas are deer and Canada geese.
10. Two forestry practices used to improve wildlife are: Even-Aged Management (ex: clearcut – creates a diverse habitat for a wide variety of wildlife species, and Uneven-aged Management (ex: group selection – provides habitat for birds and animals preferring continuous cover.

Aquatics

1. The most common cause of a fish kill in a pond or lake is oxygen deprivation due to low dissolved oxygen in the water. This typically occurs in the summer on cloudy days when oxygen production falls behind. Ponds with low dissolved oxygen typically have algal blooms. Winter kills are also possible, especially when snow covers the ice on a pond, blocking out the sun and limiting photosynthesis.
2. B. Bluegill
3. An ephemeral stream is one that only flows after a rainfall event.
4. Four components of all streams: watershed, floodplain, riparian corridor and channel
5. Organisms that use intermittent streams: stonefly, caddisfly, some salamanders, some minnows
6. Pallid Sturgeon
7. Reasons for decline of Pallid Sturgeon: overharvest, channelization, artificial hydrograph
8. Both A (Safe Drinking Water Act) and B (Clean Water Act) are federal laws affecting water quality
9. B. Giardia is one of the leading causes of waterborne illness in the U.S., and is found in every part of the U.S. and the world.
10. A. The main impact of water temperature on stream quality is heat which decreases the capability of water to hold dissolved oxygen.

Soils

1. Sand, silt, and clay are components of soil texture.
2. The five soil forming factors are: Climate, Topography, Parent Material, Time, Organisms/vegetation
3. Grey colors indicate saturation for prolonged periods.
4. Deposition of Parent Materials: Loess – moved by wind; Alluvium – moved by water; Glacial Till – moved by glacier; Residuum – deposited by weathering of bedrock; Colluvium – moved by gravity.
5. B. Decreases
6. A. A park is the best choice due to the high water table.
7. B. Mottling (redoxamorphic)
8. E. Nitrogen
9. B. Sediment
10. C. Horizon

Envirothon Alumna, Jen Hunt, Restores Habitats in Mining Areas

As a high school student at Parkway North in St. Louis County, Jennifer Hunt joined the Envirothon program because she was interested in the environment and loved being outdoors. Envirothon was in its first year at her school, but the teacher who volunteered to coach the team was a young eager, nature enthusiast himself, and a man with a natural inclination to explore, investigate, and discover. Russ Barton brought science to the classroom in a way that intrigued and challenged his young students. Jen was on that first team in 2005 as they progressed through the regional competition and then came in third in the state—quite an accomplishment for a school competing for the first time.



Jen not only worked well as a member of a team, but also exhibited leadership qualities that made her a perfect candidate for training new team members.

“The next year I was with a new team of younger students to help show them the ropes. I was busy with other commitments, so I stepped back and took a captain’s role. Our team came in second in the state behind the team I had been on the previous year.”

After high school, she attended the Missouri University of Science and Technology and earned her BS in Environmental Engineering. She is currently employed as an Operations Associate at Peabody Energy in Evansville, Indiana. According to Jen, the Ops Associate program is geared toward getting entry level engineers experience in many areas within their field to see what the best fit within the company might be. Peabody Energy is the world’s largest private-sector coal company, serving customers in nearly 30 countries on six continents, and a leader in sustainable mining. A part of Peabody’s mission is “When mining is complete, we will leave the land in a condition equal to or better

than we found it.” This has brought the company into the environmental restoration business—reclaiming landscapes and sustaining farms, ranches, wildlife, wetlands, forests and communities all over the world.

Jen has had many duties including working on permitting, compliance and reclamation activities. On a typical workday, she might prepare a request for the release of a mined area, and submit the request to the state. She identifies specific areas for inspection to ensure proper reclamation.

“A specific thing that I learned from Envirothon and that I use in my job is tree identification,” she said. “When we reclaim the land, part of the reporting requirement is to state which trees are present. Because of Envirothon, I can point to a swamp white oak and know that it’s not a burr oak.”

Jen said her favorite part of her job, besides being able to mix field and office time, is knowing that she is making a difference in the environment.

“I make sure that we’re putting the land back right. I can go to a stream I worked on, and it looks so natural. It’s healthier and more stable than before mining took place.”

Envirothon was able to feed Jen’s interests and develop certain skills such as public speaking.

“My favorite part of Envirothon was the learning process. I enjoyed learning about all the different aspects of the environment and how they are all related to each other. I’m a big outdoors person, so having the opportunity to be a part of Envirothon was a huge plus. I developed an even greater appreciation for the natural world, and it helped me to decide that I wanted to make sure these things would be here for future generations.”



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