

EECO

Environmental Education Council of Ohio



Fall 2019

Focus on Invasive Species

If you can't beat them, eat them!

Munching on invasive species

By Lydia Hunter, Science Education Program Specialist,
Ohio Department of Education



Asian Carp in the Ohio River. Photo by Asian Carp Regional Coordinating Committee

Many regions of the world struggle with the effects invasive species have on the local environment. A lack of natural predators is often the cause for out of control population growth and a keen ability to outcompete native species. A simple solution may just be for humans to become the missing predator.

Take, for example, the Asian Carp which has been causing problems to native species in waterways since their introduction in the 1960s and 1970s. Today they can be found in as many as 45 states and pose a significant problem in the Mississippi River and its tributaries. In some parts of the Mississippi basin Asian carp comprise up to 97% of fish biomass. Currently, private and public entities are working hard to prevent their entry into the Great Lakes. Many remediation techniques have been suggested or tried, none with total success. Drawbacks include killing native fish, creating barriers to natural

migration, safety hazards, lack of 100% effectiveness and being cost prohibitive. This PBS broadcast <https://www.youtube.com/watch?v=IIRXDDG6yB8> will give you background on the history of Asian carp in the United States and current mitigation efforts.

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Save the Date

OEEF Grant Deadlines

Letter of Intent due early Jan, Grant due Mid-Jan

OEEF Grant Workshops

Sept 5, Ottawa SWCD, Oak Harbor, Oh
Oct 3, Belmont College, St Clairsville, Oh

Greater Cincinnati Environmental Educators

Teacher Expo

Sept 24, 2:30 - 6 pm, Cincinnati Zoo

Science Alliance

Oct 1-3, Piketon, Oh

Teachers, Industry and the Environment Conference

October 9-11, Columbus (see inside)

"101" Conference

Oct 12, Camp Kern, Oregonia

Details will be posted at eeco-online.org soon

48th NAAEE Annual Conference

October 16-19, Lexington, Ky

Green Teacher Conference

October 29-30, Glouster, Oh

Winter Snow

Jan 31- Feb 1, at Camp Nuhop, Perrysville, Oh

Annual Conference

April 3-5, 2020 at Hueston Woods State Park

Continued If you can't beat them, eat them. Munching on invasive species

Although Asian carp is an excellent food source, Americans haven't developed much taste for the fish, probably because of an incorrect image of carp as a bottom feeder (the Asian carp is actually a filter feeder) and the fact that the fish is quite bony. Meanwhile in China the demand for Asian carp is immense. There the carp have been nearly eradicated from the natural environment by overfishing and other environmental stressors. Most of the demand is currently filled by farm raised carp, which are not as healthy or tasty as the wild fish. Enter entrepreneurs such as Angie Wu. Since 2013 Angie and her company Two Rivers Fisheries has been processing Asian carp for human consumption and shipping them throughout the world. They now also produce fish fertilizer and currently process over 4 million pounds of carp a year. Check out Angie's story here. <https://www.youtube.com/watch?v=FbyZ09woBSA>



*Baja Fish Taco recipe from ODNR
made with Asian Carp*

As part of its efforts to protect the Great Lakes the state of Illinois has launched an active campaign to encourage the eating of Asian carp. You can find information on-line about marketing campaigns, companies that process the fish and food programs that utilize them. In one initiative to overcome the carp stigma, Chef Philippe Parola has rebranded the fish with his trademark Silverfin name. Watch <https://www.youtube.com/watch?v=faZqIdGi87k> him prepare the fish baked and fried. If you are more of a do-it-yourselfer this video <https://www.youtube.com/watch?v=v8yibKfhyT8> shows you how to catch, clean and cook delicious Asian carp and includes directions for preparing Flying Fish Puppies.

Asian carp are far from the only invasive species that might best be dealt with by ingestion. There is a wide array of plants and animals that are historic or newly arrived invasive species which are quite edible to humans. Visit the site EatTheInvaders.org to see a collection of news, books and recipes for incorporating invasive species into your menu planning. There is also a wealth of other resources online for using various invasive species in productive ways. Happy feasting!

Other Asian Carp Resources

Kentucky producer of Asian Carp products <http://fingourmetfoods.com/about/>

Commercial Chinese fish company out of Illinois <https://www.youtube.com/watch?v=S6hr6wjR9tA>

Two River Fish Company processes Asian carp for both food and fertilizer <https://www.youtube.com/watch?v=lblL-9LeNUwk>

US Species Invading Other Countries https://blog.nature.org/science/2019/06/03/seven-us-species-invading-other-countries/?utm_source=cgs&utm_medium=alsoin&utm_campaign=birds

Bee the Power for our Food

September 10, 4:30 - 6:30 pm

OSU Mansfield Ecolab

Location: The 'Monarch Right-of-Way' Pollinator Demonstration Plots in front of Ovalwood Hall.

This is a FREE event - no need to register! Free refreshments!

**BONUS – Bee Walk with Denise Ellsworth from 3-4 pm!

Pollinators will be center stage at this Ecolab event! Come learn how the campus is working to create pollinator habitat along Ohio's utility right of ways. Visit with specialists at displays on beekeeping, pollinator habitat, invasive species, and land management. Take a self-guided tour of pollinator plots and the campus microfarm, where pollinators work on all levels. Stop to talk with experts along the way!

Questions? Marne Titchenell, titchenell.4@osu.edu



Call for Proposals

EECO Annual Conference

“EE 2020 The Vision of the Future”

April 3-5, 2020

Hueston Woods State Park



We are seeking proposals for presentations and workshops for the Annual Conference.

Proposal Form can be found at www.eeco-online.org

Applications Deadline: September 30, 2019. Electronic submissions are preferred and greatly appreciated. Please return submissions to Lynn White: whitelr@butlercountyohio.org, Butler Soil and Water Conservation District, 1802 Princeton Rd, Hamilton, Ohio, 45011. You will be notified of the status of your proposal in December. We look forward to working with you!

Questions should be directed to Lynn White at the preceding email address, or at (513) 785-6666.

Strands are flexible and all new or exciting proposals are encouraged.

Strands

- **Natural History: Ohio's Natural History:** Presentations can span different disciplines that cover Ohio rivers and waterways, animals, fungi and plants interacting with their natural environment and each other, Native Americans and Nature, and native flora and fauna.
- **Technology in Careers & Nature:** Presentations focus on programs and projects that implement the use of technology and other STEAM disciplines in nature and encourage students to pursue environmental career paths and the resources available to make connections to existing and future careers.
- **Strategic Growth for Organizations:** Presentations should focus on strengthening, improving and sustaining organizations including: funding, staff, volunteers, and program development. What works for your organization and how can that be translated to others?
- **Populations, Climate and Outdoor Education:** Presentations exemplify opportunities that use the outdoor classroom as a teaching tool to learn more about the connections between climate change and human/nonhuman population trends.
- **Inclusive World of EE in the Outdoors:** Presentations should focus on EE opportunities that encourage equity, diversity and inclusion of race, age, ability, LGBTQ, gender identity/expression, religion, military status/veteran individuals and more.

More information including registration will be made available later in the year at <https://eeco.wildapricot.org/>

Help EECO Grow

Would you like to help further environmental education in Ohio? Consider contributing to EECO. All donations are tax-deductible and will help increase awareness of environmental issues in Ohio. Find out more at <https://eeco.wildapricot.org/support>



Other ways to support EECO:

- **Amazon Smile.** Select the “Environmental Education Council of Ohio” as your charity. Log into Amazon Smile every time you shop at Amazon.
- **Goodshop.** You can also shop hundreds of popular retailers at Goodshop, purchases will benefit EECO.
- **Direct Donation.** You can make a direct donation through your Google account. Your full donation goes directly to EECO.
- **Legacy Donation.** Consider a legacy donation to EECO’s endowment fund at The Columbus Foundation.

Eating Invasives

Garlic Mustard Lentil Soup

Adapted from the "Pest to Pesto" cookbook from the Kalamazoo Nature Center in Michigan.

Yield: 6-8 Servings

Ingredients:

- 3 cups shredded garlic mustard leaves
- 2 cups lentils
- 2 chopped carrots
- 3 potatoes
- 3 Tbsp dried oregano
- 4 Tbsp dried basil
- 3 Tbsp minced garlic
- 1/2 cup low sodium soy sauce

Directions:

1. Soak lentils overnight.
2. Boil 7 cups of water,
3. Add potatoes, carrots, and lentils and let cook 25-30 mins.
4. Add the remaining ingredients and cook for an additional 25-30 minutes.

Uncle Frank's Pasta Salad (with Garlic Mustard)

Ingredients:

- 2 cups garlic mustard leaves, shredded
- 2 cups pasta (rotini, penne, etc)
- 1 large red pepper
- 1 large green bell pepper
- 1/2 cup onion (red preferable)
- 2 zucchini squash
- 2 tomatoes
- Italian seasoning
- olive oil
- Italian salad dressing (Wishbone)
- Optional: 1/2 cup chopped pepperoni

Directions:

1. Cook the pasta until "al dente." Drain and rinse in cold water.
2. Dress lightly with olive oil.
3. Cut peppers in julienne slices. Cut zucchini in disc-shaped, thin slices. Cut onion in slices, tomatoes in large chunks and garlic mustard in thin slices.
4. Add in garlic mustard leaves.
5. Add vegetables to pasta and mix
6. Add Italian seasoning and Italian oil dressing. Mix thoroughly.
7. Add in pepperoni if you like.



Tips for Cooking with Garlic Mustard

- Use garlic mustard in any recipe calling for mustard greens.
- Young plants have a mild mustard flavor with hints of garlic and can be used raw.
- Older, larger leaves and plants have a more bitter, stronger flavor.
- The round leaves are less bitter than the triangular ones on the flower stalk.
- If the plant is in full flower or has produced seeds, it will be much more bitter.
- DO NOT USE plants that may have been treated with weed killer.
- Pull up the entire plant gently. The roots will keep it fresh until you are ready to use it. Then cut off the leaves, discard the flower stalk, wash and use.
- DO NOT PLANT IT!!! That is like planting dandelions-absolutely not necessary!
- Have fun being creative; experiment with this weed while helping to control it!

Eating Invasives

Garlic Mustard Pesto

This pesto recipe is from the Central Ohio Technical College Culinary Science Program under the direction of Chef Matt Russo. It was served with the entree of Italian Baked Tilapia with Sun-dried tomatoes and Garlic-Mustard Pesto served with a House-made Lasagna Roll during the Locally Grown & Gathered Dinner. This annual fundraiser is hosted in partnership with Licking County Soil & Water Conservation District and supports the Hartford Fair Natural Resources Area.

Yield: 10 Servings

Ingredients:

- 2 cups lightly packed garlic mustard leaves and tips, loosely chopped
- ½ cup pine nuts
- 2 cloves garlic
- ¾ cup parmesan cheese, grated
- ½ cup extra virgin olive oil
- 1 tsp. salt
- 1 tsp. sugar
- Tbsp. lemon juice

Directions:

1. In a blender, grind the garlic, pine nuts and parmesan. Add the garlic mustard.
2. While blending, pour in a steady stream of the olive oil for one minutes, or until smooth.
3. Add salt, sugar, lemon juice and pulse until mixed.

Grandma Coppola's Dandelion Soup

This recipe comes from EECO Board Member Denise Natoli Brooks. Her Grandma made this soup often when she was growing up but she never questioned from where the dandelion greens came. This recipe won Best Use of Local Ingredients in the 2014 Sweets & Greens Cook-Off at the Hartford Fair. Denise shared that if you like dark leafy greens, this simple soup will hit the spot. Collect young dandelion leaves for a sweeter taste, and bigger/older dandelion leaves for a bitter taste.

Ingredients:

- 2 cans cannellini beans
- 6 cups dandelion greens (loosely packed)
- 3 cloves of garlic
- ½ tsp. crushed red pepper (for more spice-add more red peppers)
- 3 Tbsp. olive oil
- 3 qts. fresh water or broth

Directions:

1. Rinse greens in cold water.
2. In 6 qt. pot, cover greens with water and boil. Then strain out water.
3. In a skillet, heat oil, diced greens, garlic, and sauté for 1 minute in the oil, or until very wilted, and then add the red pepper.
4. Put 3 qts. of water or broth in pot, add the greens mixture and boil.
5. Add beans, then simmer until heated thoroughly.

Black Swamp Educators Workshop

Water Quality: It's Everyone's Business

Oct 25, 9 am - 3:30 pm

University of Toledo Lake Erie Center

6200 Bay Shore Road, Oregon, Oh

Open to all grade levels

Are you in need of some innovative ideas to teach your students about pollution, wetlands, and water quality? Join the Black Swamp Educators to uncover unique ways you can bring water quality education alive in your classroom.

Cost: \$25 (includes lunch and refreshments)

Registration deadline: October 11th.

Registration and Questions: Contact Amanda Podach at Fulton SWCD. apodach@fultoncountyoh.com or 419-337-9665.

Japanese Beetles

By J.T. Benitez, OSU Extension, Butler County

Have you ever heard of a Japanese Beetle? Well, if you are a gardener of vegetables, fruits, flowers, trees, shrubs or just like to have a beautiful lawn, then you may have seen or seen the results of the damage of these rather annoying pest. Japanese Beetles are one of the most destructive Invasive Species of Ohio and the Mid-West Region. They originally came to this country in 1916 through New Jersey from Japan unintentionally. Japanese Beetles are a major pest in the U.S. but not a problem at all in Japan. It seems we must have the perfect environment for them to thrive! Aren't we lucky!

Japanese Beetles populations are found in most of the Eastern United States (Except Florida) and continue to head west. Some isolated populations in the west have



Photo: Joe Boggs, OSU

been reported in Nebraska, Missouri, Kansas, Arkansas and as far west as Colorado. In Ohio, the most damaging populations are located from a line extending from Cleveland to Cincinnati. If

you have turfgrass, you most likely have some sort of Japanese Beetle populations. Some areas may have high concentrations of the pest and others may only have minor populations.

So why are Japanese Beetles so invasive? Well they are not picky eaters. If they find something they like, they will consume it and will eat quite a bit of the plant. They are known to feed on over 400 species of broadleaf plants with 50 species as being their most preferred. Roses, Zinnias, Grape plants, Raspberry plants, Basil, Corn Silks, Soybeans, Holly Hock, Virginia Creeper, Apple Tree, Cherry Tree, Crab Apple Tree, Plum Trees, Birch Tree, Elm Tree are just a few of many species popular for Japanese Beetles to consume & at times infest the whole plant. Take a look at the pictures included in this article. The trees that I have showcased are my Apple and Cherry Trees. It is amazing the consumption of the leaves and damage they have caused!

Japanese Beetles can cause major damage to the plants they consume. The adult beetles will skeletonize the leaves they consume only leaving the leaf veins behind. Take a look at the leaf in this article. Nothing left of the green in between the veins! The leaf, once at this point,

will wither and die. The beetles in the adult stage is usually the worst part about these bugs but for those with a nice lawn that turns into patchy brown spots, then the bugs can become just as big of an equal problem. The turfgrass browning occurs when the beetles young are feeding. Japanese Beetles young are the white grubs under the turf. They can become a real problem for turf as they feed on the roots of the grass.

So what are the stages of these pest? The last week of June into July is the adult mating season. This is when the adults emerge from the soil to begin the month long or more eating and mating cycle. We see these annoying pests flying around and eating everything in sight while also mating to create more of these eating machines. Eggs are laid 1-3 inches in the ground by the female beetle. They are laid in the soil not far from the plants that they are consuming. Eggs will then hatch after about 2 weeks of incubation and are then in the larvae (White Grub) stage. They will spend the late summer and fall consuming the roots of plants, especially turfgrass & organic matter. When the weather turns colder, the White Grubs will go deeper into the soil about 4-8 inches. They will hangout that deep for the winter until the weather warms up in the spring. They will begin coming closer to the surface once the ground warms up and begin consuming plant roots and organic matter again at the surface. May into June they transform into the pupa stage and are only 1-3 inches in the soil at this point and begin to change into the Japanese Beetle. Once the process of transformation is complete, the cycle starts again with this eating machine of a bug!

Is there a way to stop this pest? Somewhat. If you treat your yard for white



grubs in the late summer, it will help stop some but may not stop all! It will help in keeping your grass from being a patchy brown mess to some extent but there is no guarantee. If you plan to catch the beetles in June and July with traps, this may give you a sense that you are making an impact but unfortunately, you are only catching a small amount of a large infestation. The beetles can just be so prevalent that making a dent in them is not easy. If you are dedicated in getting treatment for the white grubs out of your yard but the rest of the street does not, the beetles will still be there unfortunately.

What is the best solution? I would say a combination of things may help at least reduce populations from a large infestation to a medium or maybe, if you are lucky, a small infestation. First, treat for the white grubs in late summer and fall. Second, Habitat Modification (Plant cultivars that Japanese Beetles do not eat). Third, physically removing as many as you can from your favorite cultivar to reduce the population some. Fourth, set traps to help reduce populations (sometimes this can bring in more from around the area reducing effectiveness.). Fifth, hope that the ground stays dry with no rainfall. The dryer the ground the harder it is for eggs and young larvae to hatch or survive. Sixth, chemical applications (be sure to read all label instructions) and Seventh, Bug Netting.

In conclusion, Japanese Beetles can be a huge problem.



Japanese Beetle Life Cycle

Their infestation of our favorite plants seem to be the ones that take the most damage from their feeding. The best thing to do is keep the populations as low on your property as possible by a combination of methods but know that it will not stop all of them. Be vigilant when they do come out of the ground and take steps to get protection (Bug Netting) on those plants you can protect. Unfortunately, they are not going away anytime soon, so it is a bug we have to learn to live with.

Sources

Shetlar, David J. & Andon, Jennifer E. (January 2015) Japanese Beetles ENT-46. Columbus, Ohio: The Ohio State University Extension, Retrieved on August 5, 2019 from <https://ohioline.osu.edu/factsheet/ENT-46>

Hahn, Jeff & Weisenhorn, Julie. (2019) Japanese Beetles in Yard and Garden, Minneapolis, Minnesota: University of Minnesota Extension, Retrieved on August 5, 2019 from <https://extension.umn.edu/yard-and-garden-insects/japanese-beetles>



Environmental Career Ambassadors

Environmental Career Ambassadors are environmental professionals willing to make classroom or school career fair presentations for middle and high school grades about their careers and/or provide shadowing, internship, field trip and scholarship opportunities.

This career initiative was created to address various needs in Ohio. For instance, there is an emerging need to prepare students in fields emphasizing Science, Technology, Engineering and Mathematics (STEM) for careers in today's high-tech economy. This initiative will also aid employers looking to hire professionals in environmental science and engineering as there is a reported shortage of qualified applicants.

Teachers• If you are interested in finding out about the Career Ambassadors available in your area, please contact us at director@eco-online.org.

New Career Ambassadors Needed• If you would like to be more involved by volunteering to be a Career Ambassador you can fill out this form and email back to us at director@eco-online.org.

The Environmental Career Ambassador (ECA) Initiative was created by the Environmental Education Council of Ohio (EECO) and the Ohio Environmental Protection Agency with the assistance of the Ohio State University School of Environmental and Natural Resources. Find out more at <https://eco.wildapricot.org/eca>

Addressing Natural Resource Concerns with Drones

By Madeline Maurer, Butler Soil & Water Conservation District

Early this year in March, Butler Soil & Water Conservation District (SWCD) was awarded a grant to purchase a drone, also known as small unmanned aerial vehicles (UAVs), and imagery software to kick start their Aerial Imagery Conservation Education Program. This will provide hands-on educational opportunities for children at events and in the classroom to experience 21st century technology used for conservation purposes. Not only will this technology be used as an education tool, but it will expose them to different career possibilities in environmental science, agriculture, and conservation.

This program will also utilize drones to educate landowners and farmers on the natural resource concerns found on their property. Demonstration farms have been recognized by the USDA as a smart investment that can accelerate the adoption of innovations. Videos and workshops can accomplish this same goal by using drone technology to demonstrate Best Management Practices (BMPs). By creating high quality videos of BMPs elsewhere in the county to help landowners and farmers see the benefits, increase their comfort level, and de-stigmatize BMPs leading to an increase adoption of them across the county. Secondly, farmers will benefit from the rapid surveys, helping pinpoint areas where they can focus BMPs, habitat restoration, honeysuckle removal efforts, locating historical agriculture tiles, and determining current drainage paths.

This unique program will bring a different perspective to land management that we have not seen before. For example, we have the capabilities to capture near infrared (NIR) imagery, which is a range of wavelengths strongly reflected by vegetation. We can use this to detect presence/absence of vegetation or assess vegetation health since healthy and abundant green vegetation has stronger reflectance of NIR. Drones can also provide higher resolution imagery compared to satellite images, seeing that they are flown close to the ground (with a maximum regulated height of 400ft). The adjacent images of the ground can then be 'stitched' together to create a high quality map of a property.

Many people do not realize that any drone activity for research or business purposes has to be conducted with a FAA Part 107 certified drone pilot present. Fortunately, Butler SWCD Urban Specialist is certified.

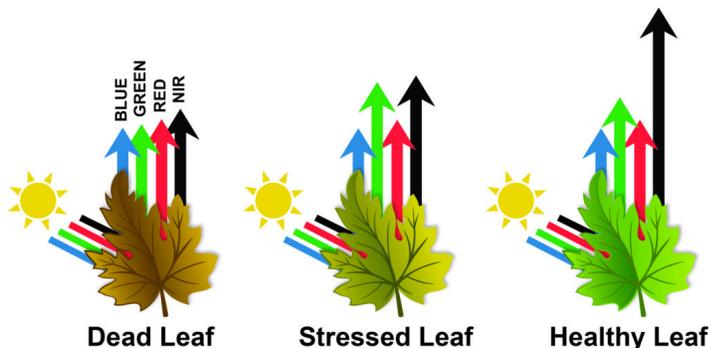
On November 20th, Butler SWCD will host a UAV Natural Resource Management workshop at the Cincinnati Nature Center. This workshop will help organizations or landowners understand how they can use drone tech-

nology to manage their property. See www.ButlerSWCD.org for details.

Drones and Invasive Plants & Animals

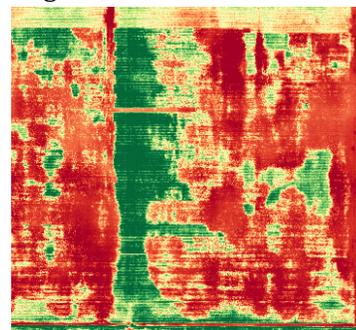
Drone technology has its advantages when it comes to surveying invasive species. Amur Honeysuckle (*Lonicera maackii*) is an invasive shrub, originating from Asia, which has taken over forest understory in the southwest region of Ohio. During the spring or fall, when invasive honeysuckle is one of the first plants to leaf out and last to drop its leaves, it is visible from aerial imagery while the upper canopy is absent. Drones can capture high resolution imagery to survey honeysuckle coverage with either RGB (color) imagery, by digitizing the visible coverage, or by using NIR imagery, to analyze remote sensing measurements for the detection of green vegetation.

Plants stressed by pests such as the invasive emerald ash borer can look different within Near Infrared Imagery (NIR). All plants reflect infrared light as they are actually absorbing the red, green, and blue light to convert into food. Mostly its only infrared that's reflected. On stressed plants, the amount of NIR and visible light reflected changes.



Surveying via drones offers a time saving advantage compared to on the ground field surveys, specifically when the subject of interest is visible from above and the survey area is quite large, and can also offer higher quality imagery compared to satellite or aircraft images.

For more information about this program, please contact Madeline Maurer at 513-785-6664 or maurermr@butler-countyohio.org.



Field with stressed crops

Beware the Invaders and Spread the Word! Effective Ways to Educate About Invasive Species

By Ryan Bourgart, Environmental Public Information Officer, Ohio EPA

Invasive species cost the US over \$120 billion per year in damages, affecting property values, crop production, fisheries, tourism, outdoor recreation, and ecosystem health (Pimentel et al., 2005). Ecosystems provide \$28.7 trillion in value to the global economy (Dodds et al., 2008). The most effective way to protect ecosystems (and our wallets) and fend off invaders may not be chemical but educational.

Ohio EPA's Environmental Education Fund recently awarded grants to three invasive species education projects that illustrate effective ways to reach local government, land managers, and K-12 students in formal and nonformal settings.

Cuyahoga River Community Planning received \$38,205 for Win the War on Weeds: Invasives Detection and Control for Communities to provide training about ecologically sound control of invasive species to land managers, grounds keepers, and contractors in northeast Ohio. The organization first conducted a survey to better understand



local communities' current practices for invasive species control. A workshop program was developed to:

- present an overview of invasive species, including the problems they cause and why alternative controls are better for watershed and human health;
- explore different alternatives such as bio-control or manual control;
- determine barriers to implementing alternatives and identifying potential solutions; and
- talk about ways to schedule and budget alternatives.

A webinar was also offered to reach the audience that was unavailable for the workshops. Finally, a handbook was designed for use in the field to assist with identification of invasive species and of alternative, less toxic methods of control.

Girl Scouts of North East Ohio was awarded \$5,000 for their West Virginia White (WVW) Butterfly Preservation Project to educate 30,000 girls about invasive species. This butterfly species is found on land owned by the Scouts and has received a G3 Global Conservation Status designation as vulnerable. The girls observed nature

and created field notebooks like scientists. They learned about microhabitats, habitat restoration, and how garlic mustard interrupts the WVW life cycle. The program was offered in single-day and resident camps as well as family day events. Based on their acquired knowledge, the girls removed garlic mustard to help restore habitat for the butterfly.



The Dempsey Ecological Project at Delaware City Schools - Dempsey Middle School was awarded \$5,000 to implement learning activities focused on understanding terrestrial and aquatic ecosystems, assessing ecosystem health, and controlling invasive species. Activities included both classroom and fieldwork components. Classroom activities included guest presentations about invasive species and lab demonstrations of surveying, observation, and data gathering techniques in forest and wetland habitats. Field activities included ecosystem surveys to monitor the presence of indicator species and practicing invasive species removal techniques. A pre- and post-assessment were conducted to determine student knowledge of invasive species before and after the learning activities. Paul Olen, Project Director and Science Teacher at Delaware City Schools, reflected on educating about invasive species: "When teaching about the effects of non-native invasive species and the techniques for managing them, it is essential to have a project-based, hands-on approach with as much field time as possible. Having frequent visits from local and regional forest ecology scientists and natural resource management professionals helps to keep the information



and activities relevant and interesting. We had tremendous collaboration with many community partners in this regard."

Having these kind of organized and collaborative educational projects may be one of the greatest tools for controlling invaders and protecting ecosystem health.

Ohio Environmental Education Fund

The Ohio Environmental Education Fund (OEEF) invites applications for mini grants (\$500 - \$5,000) and general grants (\$5,000 - \$50,000) for education projects targeting pre-school through university students and teachers, the general public, and the regulated community. Prospective applicants can start the application process by opening an account in Ohio EPA's eBusiness Center at <https://ebiz.epa.ohio.gov/>.

Ohio EPA encourages OEEF applicants to discuss their proposal ideas with OEEF staff members before completing their applications. OEEF staff members will be happy to provide a pre-review of draft applications as they are under development in the online grant service.

Electronic Letter of Intent Deadline is early January, 2020
Application Deadline is mid January, 2020.

Grant Writing Workshops

The Ohio EPA Office of Environmental Education offers grant writing workshops around the state throughout the year.

- **Grant Writing 101: Finding the Right Funder.** Prospecting tips to help you identify foundations, corporations, and government grant programs, and how to approach different kinds of grantmakers.
- **Grant Writing 102: Writing a Winning Proposal.** How to avoid common mistakes applicants make, and develop realistic objectives, activities and budgets. OEEF will be referred to during this session.

Upcoming 101/102 workshops

September 5, 9 am - 3:30 pm at the Ottawa SWCD in Oak Harbor

October 3, 9 am - 3:30 pm at Belmont College in St. Clairsville

Contact Dennis.Clement@epa.ohio.gov to register.



Teachers, Industry and the Environment Conference

October 9-11, Columbus

Free 2 ½ day professional development conference for 3rd-8th grade science educators sponsored by the Ohio Chemistry Technology Council and Ohio EPA's Office of Environmental Education.

Attendance, lodging, meals and a travel stipend are provided.

Registration for this year's conference available at <http://ohiochemistry.org/tieconference>

- The TIE Conference is aligned with state science teaching standards for STEM curriculums.
- Participating educators have the opportunity to visit a working facility that produces sophisticated chemicals for the health care and personal products industries.
- Hands-on demonstrations and experiments provide educators with interesting and exciting tools that are easily adaptable to the classroom. Materials provide educators with an abundance of information on the resources available to them, most at no cost.
- Educators have direct interaction with the Ohio Environmental Protection Agency and representatives from the chemical manufacturing industry.
- Graduate credits from Ashland University available (optional for all participants).

Green Ribbon School Award

U.S. DEPARTMENT OF EDUCATION



The Green Ribbon School award recognizes schools and school districts around the nation for their efforts to “maximize environmental and health impacts” while implementing environmental education. Applicants are reviewed and scored out of 100 points based on “demonstrated progress” toward the three Green Ribbon “Pillars”:

- Net zero environmental impact
- Net positive impact on the health and performance of students and staff
- 100 percent of the applicant’s graduates are environmentally and sustainability literate

Net zero environmental impact scores 30 points. The zero greenhouse gas emissions category scores 15 points and the following categories are worth 5 points each: improved water quality, efficiency and conservation; reduced waste production; and use of alternative transportation.

Net positive impact on the health and performance of students and staff scores 20 points. Two categories score 10 points: 1) having an integrated school/district environmental health program and having high standards of nutrition and 2) fitness and having high quantity and quality outdoor time.

The final pillar, having all graduates being environmentally and sustainability literate, scores 30 points. Scoring 15 points is “interdisciplinary learning about the key relationships between dynamic environmental, energy and human systems”. 10 points is “use of the environment and sustainability to develop STEM content, knowledge and thinking skills”. And scoring 5 points is “development and application of civic engagement knowledge and skills”.

EECO, Ohio EPA, ODNR, the Ohio Department of Health and the Ohio Facility Construction Commission all assist the Ohio Department of Education (ODE) in administering the program. The 2020 application should be available from ODE in early September at <http://education.ohio.gov/Topics/District-and-School-Continuous-Improvement/Awards-and-Recognition/Ohio-Green-Ribbon-Schools>

Interested schools can contact Jenny Adkins, jenny2@madscientistassociates.net or Brenda Metcalf, director@eco-online.org with questions.

Which Place is the Green Ribbon?

Graham Local Schools Takes the Prize

Graham Local Schools (GLS) is an Ohio designated STEM school district with a mission that embodies sustainability: “Success today, prepared for tomorrow”. Over the past 15 years GLS has participated in energy efficiency projects such as lamp and skylight replacements and heating, ventilation, and air-conditioning upgrades. These projects have cumulatively saved \$550,000 in energy costs. Other GLS sustainable features include an all-female Energy Team, a bee keeping club, a greenhouse, and a farm.



GLS is comprised of three schools: Graham Elementary, Graham MS and Graham HS. Graham Elementary is one of nine elementary buildings in the state to earn the STEM designation from the Ohio Dept of Education. As part of their outdoor education curriculum, Graham MS has access to 43 total acres of sustainable land lab space, 25 acres of which includes a greenhouse, chicken coop, food plot, commodities, specialty crop, and honeybees.

As a result of their dedication to the education and implementation of sustainability, GLS is one of 11 Ohio winners of the National Green Ribbon School Award. Several grants from the Ohio Environmental Education Fund have supported the school district’s efforts. Beginning in 2013 with their Trout in the Classroom project, GLS involved



students with daily testing and observations of conditions in a classroom aquarium where trout were being raised to ensure the fish had a suitable environment. GLS expanded the project in 2015, and in 2018 an aquaponics tank was added to enriched student understanding of trout habitat and water quality environmental issues.

Congratulations and thank you to the school district for their dedication to sustainability and for their efforts to help build a secure future!

Teaching About Invasives



Project Learning Tree

To receive a free copy of the following two PLT activities, please contact Sue Wintering, OH PLT State Coordinator, at sue.wintering@dnr.state.oh.us.

To learn more about PLT or

Wild Things

Investigating Invasive Species

Grades 5-12

This 48 page activity guide from US Fish and Wildlife Service covers multiple learning objectives: what invasives are, why they are harmful, what US Fish and Wildlife are doing, and most importantly what you can do. www.fws.gov/invasives/pdfs/wildThingsManual-1v4.pdf

Invent your own Device to Battle Invasive species

Grades 9-12

In this PBS NewsHour lesson plan, students will learn about the invention process, including researching an invasive species and designing their own invention to help deal with the problem. www.pbs.org/newshour/extra/lessons-plans/lesson-plan-killer-robots-battle-invasive-species

Hungry Pests: Attack of the Invasive Species!

Grades 6-8

This lesson from Ag in the Classroom teaches about invasive species: what they are, the threats they pose, and damages they can cause. www.agclassroom.org/teacher/matrix/lessonplan.cfm?lpid=151

obtain a copy of the complete PLT EE Activity Guide, go to www.plt.org for an always-available online workshop, or check out upcoming Ohio workshops at <http://forestry.ohiodnr.gov/plt>. Contact Sue to set up a training in your area.

PLT is part of the Sustainable Forestry Initiative. In Ohio it is sponsored by ODNR Div. of Forestry and the educational non-profit Project Learning Tree – Ohio.

Invasive Species

From PLT's PreK-8 Environmental Education Activity Guide which contains 96 activities.

Grades 5-8

Throughout history, people have intentionally and unintentionally moved plant and animal species to new environments. Some of these species have proved beneficial, but others invade natural habitats causing environmental, and sometimes economic harm. Students will research invasive species to determine how these species got to their new locations and what characteristics make them so challenging.

Forest Invaders

From PLT's Exploring Environmental Issues- Focus on Forests which contains 9 activities

Secondary Education

Students will consider what makes invasive species a problem for forest ecosystems, will work in teams to present different methods of controlling an invasive species, and will conduct research to find out how invasive species may affect their local forest.

Web Resources

Nab the Invader!

From NOAA, Sea Grant, and Great Lakes www.iiseagrant.org/NabInvader

Invasive Species Matching Game

www.pbs.org/wgbh/nova/nature/invasive-species-game.html

iNaturalist

A citizen science project and online social network built on the concept of mapping and sharing observations of biodiversity across the globe. www.inaturalist.org

iMapInvasives

iMapInvasives is an on-line system used by citizen scientists and natural resource professionals to protect our natural resources from invasive species. www.imapinvasives.org

101 Alternatives to the Chalkboard Educators Conference

Saturday October 12th

at YMCA Camp Kern, Oregonia

Optional events on Fri Oct 11 and Sun Oct 13.



\$30 for all 3 days Includes all sessions, programs, meals, and overnight accommodations. Scholarships and discounts available

Email Dave Moran to register dmoran@daytonymca.org

More details will be posted at www.eeco-online.org soon.

This event made possible by YMCA Camp Kern, the Environmental Education Council of Ohio, and the Ohio Environmental Education Fund .

The "101" Conference is THE weekend outdoor education experience designed to inspire teachers and outdoor educators with creative ways to provide exciting learning experiences. Enjoy meaningful large and small group sessions, excellent company, and fine eating.

The Vine that Ate the South is Taking A Bite Out of Ohio

By Samara Ord, Butler Soil and Water Conservation District

Kudzu is native to China, Japan, and the Indian subcontinent. It has become invasive within the United States, and in particular the southern states. Thus, giving it the nickname, "the vine that ate the south". Kudzu vines can grow up to 30 to 100 feet per year! Kudzu has been reported in at least 15 of Ohio's 88 counties, mostly in the southeast part of the state but also in Summit and Cuyahoga counties in the north.

Kudzu was first introduced to North America in 1876 in the Japanese pavilion at the Philadelphia Centennial Exposition. A second major promotion of kudzu came in 1884 at the New Orleans Exposition. During the early 1900s, Kudzu was heavily promoted when the government paid farmers to use the vine for erosion control and as a drought-tolerant, nitrogen-fixing legume for



livestock feed. During the Great Depression, thousands of acres were planted by the Civilian Conservation Corps for hillside stabilization projects. In some areas, kudzu blossoms have been prized for their use in making kudzu blossom jelly and jam.

Kudzu is a herbaceous to semi-woody, climbing, deciduous, perennial vine. It produces a fruit known as a legume. Dark-green, hairy, alternate, compound leaves have three oval to heart-shaped leaflets. Flowers are typically red, purple, or magenta with a strong, grape-like aroma. Vertical vines in full sun produce flowers in late-summer; horizontal vines seldom produce flowers.

Kudzu populations spread both asexually and by seed germination. A kudzu invasion can cause several different types of major impacts on native plant communities: it can crowd them out; it can outcompete them; and it can physically crush them. Since kudzu can fix nitrogen in its roots, it can thrive in soils too low in nitrogen to support robust growth of native vegetation, thereby outcompeting native plants for both nutrition and growing space. This significantly alters natural plant communities and the animals that rely on those natural communities for food and habitat. Kudzu's rapid growth rate and its manner of growing over whatever it encounters in its path can also overwhelm native plant communities. Heavy infestations of kudzu can completely cover trees of almost any size. The added weight of the kudzu liana along with the elimination of light availability within the forest canopy weakens or kills shade-intolerant species, particularly pines. Once kudzu gains access to the forest canopy, the liana formed can spread faster and more aggressively through a forest.



2018 Forest Health

Forest Resource Summary Ohio encompasses 26,209,700 acres, 30 percent of which are forested, not including the urban forest. Forests have increased dramatically since 1940, including an increase from 7.1 to 8.0 million acres since the late 1970s. Ohio's forests are 85 percent privately owned. The predominant forest type group is oak-hickory, which occupies 64 percent of Ohio's forest land. Ohio's forest industries contribute more than \$22 billion to the State's economy. The Ohio Department of Natural Resources Division of Forestry manages 21 State Forests totaling more than 200,000 acres.

Forest Health Surveys

Each year, the Ohio Division of Forestry conducts an aerial survey over the majority of the State to survey Ohio's forest health using Ohio Division of Wildlife aircraft. This year's survey began on June 4 and concluded on June 22. Flight lines were flown in an east-to-west direction with a spacing of about 4 miles. Each flight day, two observers were equipped with digital mobile sketchmap tablet computers containing a GIS/GPS mapping system. The observers identified 160 different sites on a total of 13,792 acres that had discoloration, defoliation, or mortality. Ohio Division of Forestry staff inspected 124 of these sites on the ground. The top five damage-causing agents and their associated acreages are in the accompanying table.

<i>Damage Causing Agent</i>	<i>Acres</i>
Unknown hardwood discoloration	4,289
Yellow poplar weevil	2,192
Emerald ash borer	2,038
Unknown conifer discoloration	1,101
Flooding/water damage	711

Non-native Invasive Plants

Non-native invasive plants are a threat to the biodiversity of forests throughout Ohio. Some forests are already declining due to severe infestations of invasive plants such as Ailanthus, bush honeysuckles, autumn olive, multiflora rose, and Japanese stiltgrass, while other areas remain largely uninvaded. Aerial mapping of Ailanthus in southern Ohio has allowed for targeted treatments to reduce infestations on State Forest, national forest, and neighboring lands. The Ohio Division of Forestry has partnered with researchers from the U.S. Forest Service Northern Research Station to examine the efficacy of *Verticillium nonalfalae*, a soil-borne fungus, as a potential biocontrol for Ailanthus. The Ohio Division of Forestry promotes invasive plant control by working with Ohio's Cooperative Weed Management Areas, Cooperative Invasive Species Management Areas, Partnerships for Regional Invasive Species Management, and on private land through its Service Forestry Program and other outreach events.

Gypsy Moth

In Ohio, gypsy moth occurs in the majority of the eastern half of the State, with the edge of the infested area extending generally from NW Ohio to SE Ohio. Fifty-one of Ohio's 88 counties are quarantined by the Ohio Dept of Agriculture to prevent the movement of gypsy moth out of those counties. In 2018, the moth was more abundant, though no additional counties were added to the quarantine. The Ohio Dept of Agriculture (ODA) continued its treatment efforts within the Slow the Spread transition zone with two types of treatments occurring in 2018: larvicide and mating disruption pheromone. A total of 1,896 acres were treated with larvicide, and mating disruption pheromone was applied to 29,658 acres. The 2018 aerial forest health survey documented 50 acres of gypsy moth defoliation in Lorain County. ODA will continue to monitor gypsy moth populations and assess treatment effectiveness.



Gypsy Moth

Walnut Twig Beetle



Walnut Twig Beetle/ Thousand Cankers Disease

In late 2012, walnut twig beetle (WTB), the insect vector of thousand cankers disease (TCD), was caught in Ohio Division of Forestry traps in Butler County (SW Ohio). The fungal pathogen that causes TCD, *Geosmithia morbida*, was subsequently confirmed from infested trees in Butler County in 2013. In 2014, several infested black walnut trees were removed and examined as part of a U.S. Forest Service research project. Since 2013, only three WTB have been caught in Lindgren funnel traps monitored by the Ohio Dept of Agriculture (ODA) (one each in 2016, 2017, and 2018). ODA has quarantined Butler County to prevent the movement of potentially infested walnut material out of the county. Further research on this pest will help guide future management activities.

Ohio Invasive Plants Council



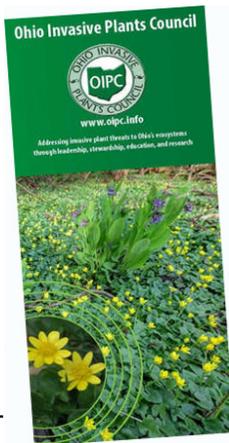
Combating invasive plants can be a daunting task. The Ohio Invasive Plants Council was formed as a 501(c)(3) not-for-profit organization in 2005 as a result of efforts in the late 1990's to improve aware-

ness of the threats of invasive plants. OIPC is a coalition of agencies, organizations, and individuals throughout Ohio concerned about the introduction, spread, and control of invasive, non-native plants in Ohio's natural habitats. OIPC promotes public awareness of invasive species issues and encourages land management and research to detect invasive species and prevent new invasions into natural ecosystems.

They participate in statewide efforts to address the threats of invasive species to Ohio's ecosystems and economy by providing leadership and promoting stewardship, education, research, and information exchange.

OIPC partners with other organizations around the state to present workshops, seminars, and even a research conference! Most recently, a workshop was presented in conjunction with Franklin County SWCD. This workshop was great for landowners, garden club members, Master Gardeners, nurseries, landscape architects and any member of the public who wants to learn more about invasive plants and their effects on the environment. Info can be found under the Program tab on the OIPC website below.

A visit to the website provides a wealth of info in addition to programs. <https://www.oipc.info> An invasive plants tab shows different lists, such as banned plants in Ohio Banned plants. An updated list of invasive species assessment results can also be found invasive plant assessment result list Fliers, posters, and brochures are available for download under the Research tab. Check them out and help spread the word about these floral invaders around our state!



Save The Date For The OIPC Research Conference

*Wednesday, February 13th, 2019
Columbus, Oh*

The OIPC Research Conference has been scheduled for this winter at the Nationwide & Ohio Farm Bureau 4-H Center on the OSU campus in Columbus. Registration, a call for posters, and a detailed agenda will be available soon on the OIPC website. It is not too early to get this date on your calendar to be sure not to miss it!

Web Resources

Ohio Dept of Agriculture: List of Invasive Plants

https://www.oipc.info/uploads/5/8/6/5/58652481/invasive_plants_of_ohio.pdf

Alternatives to Invasives

https://www.oipc.info/uploads/5/8/6/5/58652481/alternatives_for_invasive_plants.pdf

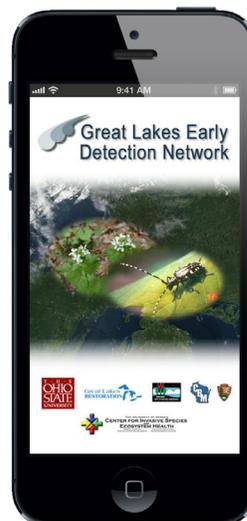
Invasive Plant Fact Sheets

<https://www.oipc.info/invasive-plants-of-ohio.html>

OIPC Speakers List

<https://www.oipc.info/contact-us.html>

Great Lakes Early Detection Network App



GLEDN is an invasive species early detection and warning system for the Great Lakes region developed through funding provided by the National Park Service as part of the Great Lakes Restoration Initiative

GLEDN is an online system that collects invasive species reports from casual observers, verifies these reports and integrates them with others networks. The system then uses this integrated information to send customized early detection email alerts.

Contact EECO

Partnerships strengthen EE in Ohio, leading to a more environmentally literate population and a healthier environment. You are welcome to become a partner and friend to EECO. Please contact any of our regional directors, officers, advisors, and board members to find out more about becoming a part of EECO.



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