

Notes *from the* FOREST



Lacawac Sanctuary

Field Station and
Environmental Education
Center

Fall 2020
Newsletter

A Year in Review 2020

While Lacawac's visitor center and offices were closed due to the pandemic, the trails outside have never been busier. Upon further reflection, what more could we nature enthusiasts ask for than more people enjoying the outdoor scenery of this special place?

Despite the pandemic, Lacawac had a busy summer and fall. We were fortunate to host students and faculty from various universities and colleges conducting research at Lacawac. This was all done with safety precautions in place. During July and August Lacawac hosted four weeks of summer camps socially-distanced-style. Finally, Lacawac was able to host its 5th Annual Farm to Plate Dinner in August and its 7th Annual Lake to Lake 8K Trail Run and Walk/Dog Walk in October. Both events were a great success and Covid safety

precautions were followed by all attendees.

We were not able to greet large yellow school buses full of eager students ready to embrace the unique habitat of Lacawac this spring and fall. Squeals of delight and laughter would visit one through the woods as learners enter walk the trails and learn about Lacawac's various ecosystems. Obviously, this cannot happen this season, yet our creative staff has found new ways to share these experiences online with inquisitive learners in their own backyards – more information will follow...

This past year brought some exciting improvements to Lacawac. We were able to renovate our Gate House Residence (found just before our main gates – hence the clever name). The residence can house up to 7 guests and will be used by visiting researchers and Lacawac interns.

During the spring Lacawac was able to resurface the road leading from the main gates to the Great Camp (lodge area). We certainly do not miss avoiding the multitude of potholes!

Currently we are working on renovations to our Coulter Visitor Center with new

education displays and murals for the public to learn about what makes Lacawac special and what one can see and experience during a visit.

As 2021 approaches we are looking forward to the construction of a new wing and multipurpose room at our Environmental Education Center. During this year Lacawac was able to renovate the exiting garage and convert the space into a new education classroom. To date we have raised \$445,000 towards our goal of \$598,000 for the renovations and construction of the education center!

As you can see exciting things are happening at Lacawac! We are blessed this past year by the generosity of our friends, members, corporate sponsors and foundations. This certainly was a challenging year and without your support we could not continue our work of shaping the next generation of Earth stewards and scientists.

During this holiday season, the Lacawac Staff and Board of Trustees wish you the very best! We hope you have a wonderful, joyous yet safe season of celebrations. Here is to healthy and safe 2021!

Looking forward to seeing you on the trails soon!



Environmental Education at Lacawac in 2020

It is difficult to summarize 2020 and prepare for the coming year without mentioning Covid 19. In a typical spring season, we see over 2,500 school students during classroom visits and field trips. This year we lost all of our in-person school programs. The trails typically full of excited students were quiet. The pond lay still without students catching macroinvertebrates to observe. BUT we implemented several innovative virtual programs in the spring for students to learn about the environment at home. Our education team has been busy working on new and innovative virtual programs for school students. *(See our website to view those recordings and see other educational opportunities.)* Despite these challenges we continue to offer educational programs on site for groups (homeschool groups, scouts, private schools).

Day Camps changed as well in 2020. After a lot of brainstorming and modifications, we were able to offer safe opportunities for children to attend our day camp program. We reduced the number of camps from 8 to 4, reduced the number of campers per week from 16 to 12, erected a tent so that all campers could have an outdoor covered space, and many other program

modifications. We followed all CDC guidelines and successfully provided a safe and fun camp experience for over 40 children this past summer. Next summer we plan to offer 8 weeks of day camp with the same modifications in place. We believe that camp is an important experience for children to grow confidence, build friendships, and connect with nature in a safe environment. *Look for information for day camp 2021 coming soon.*

Unfortunately, our Conservation Leadership Academy (CLA) was cancelled this year. This is a life-changing weeklong resident program for students ages 13 – 17. Campers spend the week meeting conservation professionals, conducting field research, learning communication and leadership skills, and going on field trips to experience the natural world at Lacawac and surrounding areas. We are working on modifying this camp so that we can offer it safely next summer. Stay tuned for more information.

Although we cancelled all our originally planned public programs for the year, we were able to offer several new Covid safe programs that were well attended. All programs were conducted outdoors and socially distanced. One of the most successful programs was our Halloween Un-haunting Celebration. We had almost 30 people attend in costumes as we walked

through the dark historic buildings while the kids picked up scattered bags of candy. The eerie sound of the barn owl called and we learned about owls and other natural sounds that aren't so spooky when we know what they are. On the forest trails we used our night vision, learning about pirate patches and the function of rods and cones in our eyes. The loss of color vision at dusk made it fun have a lollipop hunt. We ended on the lake dock, howling as the full moon rose above the trees over the lake.

The increased use of outdoor spaces and many more people enjoying hiking trails and local parks only shows the greater need for environmental education. It is more necessary than ever!

Lacawac is leading the way in innovative onsite and virtual programs for life-long learners of all ages. We are shaping the next generation of Earth stewards!

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The Benefits of Clear Water and the Sun: Solar Disinfection of Mosquito Larvae

By: Nicole Berry

When thinking of mosquitoes, many people think of the pesky buzzing sound, waking up with itchy bumps on their arms and legs after night outside, and a lot of bug spray. Miami University (OH) researcher Nicole Berry (Fig. 1) thinks about mosquitoes a little differently than most people. In fact, her thesis research which was recently published in PLOS ONE journal, and coauthored by Thomas Fisher, Erin Overholt, and Craig Williamson, investigated the effects of dissolved organic matter (DOM) and solar UV radiation on the survival of the early life stages of mosquitoes (Berry et al. 2020).

Mosquitoes are very abundant carriers of diseases such as West Nile virus and Eastern Equine Encephalitis (Fig. 2). Both of these diseases are increasing in prevalence across northeastern North America in both humans and wild populations of economically and environmentally important birds, such as the ruffed grouse of Pennsylvania. The recent increases in mosquito abundance correlates with an increase in DOM in inland water bodies (a phenomenon referred to as "browning") across northeastern North America. Lacawac Sanctuary is no stranger to browning, as the Williamson lab has dedicated years of research documenting the increases of DOM in Lake Lacawac since the early 90's. From this research, DOM is known

to significantly decrease underwater exposure to damaging solar UV radiation and can reduce the ability for solar disinfection of water borne pathogens and diseases (Williamson et al. 2017). However, it is less understood what role browning plays in regulating the prevalence of vectors of disease with aquatic life stages (i.e. the mosquito larvae; Fig. 2).

Nicole Berry, at the time, was a master's student in Craig Williamson's Global Change Limnology Lab and noticed an abundance of mosquito larvae in browner, high DOM waters, but very few larvae in more clear, low DOM waters. Together, Berry and Williamson, with the help of their undergraduate assistant, Trevor Holm (Fig. 1), began investigating the role DOM played in promoting larval mosquito survivorship during the summer of 2017. Fast forward to the summer of 2018, and Berry, along with her undergraduate assistants, William Swales and Alyssa Cassidy (Fig. 1), found themselves funded by the Northeastern Mosquito Control Association, Jobbin's Scholarship, covered in mosquito repellent, and trampling through the woods of Lacawac Sanctuary placing storage containers full of "stinky", high DOM water in the woods in hopes of attracting adult female mosquitoes to lay their eggs for their experiments (Fig. 3). Berry's team would go to the woods daily, collect egg rafts laid the previous night, and raise the eggs in the lab until they hatched as larvae.

The larvae were placed in water with and without DOM and subjected to exposure to damaging UV radiation using both natural UV radiation from the sun (Fig. 3), and

artificial UV radiation from UV-B lamps. This design allowed Berry's team to test whether: 1) mosquito larvae were killed by solar UV radiation, 2) the presence of DOM increased larval survivorship, and 3) if the other wavelengths of light found in natural sunlight increased larval survivorship (some wavelengths can activate DNA repair enzymes if present in the organism). Berry's team found that mosquito larvae were intolerant of exposure to UV radiation even when exposed to natural sunlight and that DOM protected the larvae from damaging UV radiation. This novel work suggests that DOM not only acts as a food source as was previously known, but that young mosquito larvae need high DOM water bodies to protect themselves from the sun.

Understanding the mechanisms that naturally control mosquito survivorship is critical for mosquito management. Mosquitoes are present anywhere there is water and mosquito managers are often challenged with resources and person-time, and therefore have to prioritize which habitats are at highest risk of breeding mosquitoes. Berry and her team hope that their findings will help mosquito managers by encouraging them to focus their control efforts on habitats with higher DOM concentrations where mosquito larvae are protected from underwater solar UV radiation.



Figure 1. Miami University graduate student Nicole Berry (left) investigated the impacts of dissolved organic matter on mosquito survival assisted by undergraduate students Trevor Holm (center), William Swales, and Alyssa Cassidy (right).



Figure 2. Three of the four mosquito life stages: egg rafts (left), larvae (center), and adult (right). The egg, larvae, and pupae (not shown) are aquatic.

We are so very grateful for all the support that Lacawac Sanctuary receives from individuals, businesses, organizations and foundations. This strong philanthropic culture dates back to our origins as the Watres Family originally gifted the property to Lacawac Sanctuary Foundation in 1966. Our donors help us expand our reach, engage students from underserved areas and incorporate real world experiences into the educational curriculum. Together we deliver programs and experiences that instill the values of education, stewardship, and sustainability to the community.

REVENUES AND SUPPORT

Public Support:

Contributions and Membership <i>(This includes capital contributions)</i>	\$303,034
Grants	\$55,331
Fundraising Events	\$29,941

\$388,306

Revenues:

Facility Usage	\$40,368
Program Income	\$112,864
Investment Income <i>(Gifts to the endowments. These are for restricted use only).</i>	\$108,015

\$261,247

TOTAL REVENUE **\$649,553**

TOTAL REVENUE minus
Capital and Investment Income **\$441,538**

EXPENSES

Program Services	\$332,784
Supporting Services:	
Management	\$66,775
Fundraising	\$63,939

TOTAL EXPENSES **\$463,498**

Financial Report 2019

This annual financial report is published by Lacawac for its members, supporters and collaborating partners. If you have questions regarding the information provided in the report contact Lacawac's President at craig.lukatch@lacawac.org

For more information on our audited financial documents visit <https://www.lacawac.org/governance.html>

Letter from our President

Dear Friends:

Everything we have in life comes from the natural world around us. Learning to protect this gift is the core focus of Lacawac Sanctuary- shaping the next generation of earth stewards and scientists.

As a community based nonprofit, Lacawac relies on donations from friends to support our work and mission. Whether it is a membership donation, an annual appeal gift, support at one of our signature fundraising events, or a gift through a bequest, all funds support research, education and preservation. All funds stay local.

The services we provide come at a cost and over the next few years, Lacawac will look to increase its financial base of support to keep pace with our growing work. Wayne County is a great place in which to live, work and vacation and if we work together we can preserve and educate all ages about the beauty of the natural world around us.

Thank you for your support!

Craig Lukatch, President

{special}

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