



Notes from the FOREST

Lacawac Sanctuary

Field Station and
Environmental Education
Center

Fall 2019 Newsletter

Chestnut Tree Restoration Project

*By: Sinclair Oglof, Senior Western
Wayne High School*

This spring and summer I had the opportunity to participate in a nationwide movement led by the American Chestnut Foundation (TACF) that is taking place right here at Lacawac Sanctuary. The goal of TACF is to restore the American chestnut (*Castanea dentata*) tree that once dominated and ranged greatly over the Northeastern forests. The tree species was stricken by a fungal blight, *Cryphonectria parasitica*, and almost vanished completely from the forests. The fungal pathogen was imported accidentally from Asia to the U.S. Once introduced, with no predators in the U.S., the pathogen was able to spread rapidly throughout the eastern forests.

Since it is a wound pathogen it enters the tree through bark damage. As it spreads through the fungus deprives the tree of nutrients resulting in tree death. The species has managed to survive because the blight does not kill the root system, allowing sprouts to grow from

the stumps. Eventually the new trees surrender to the blight again and will die.

TACF is working on a couple different approaches to make blight resistant trees. The first is to cross-breed the American chestnut with the Chinese chestnut (*Castanea mollissima*), a species that is resistant to the blight. The hope is to develop a blight-resistant hybrid after several generations. This method was developed by Dr. Charles Burnham, a plant geneticist from the University of Minnesota and cofounder of TACF.



Field Trips to Lacawac for School Age Children

Lacawac provides hands-on, minds-on experiential environmental education field trips for public and private schools and groups! All environmental education field trip programs are aligned to Pennsylvania Academic Environment & Ecology Standards with a focus on STEAM content.

Sense of Wonder - Grade: PreK –K

Earth Cycles - Grade: K-1

Amazing Adaptations - Grade: 1-2

Nature Detectives - Grade: 2-3

Watershed Connections - Grades: 3 – 5

Forest Ecology - Grades: 5 – 7

Hands-on History and Geology at Lacawac

Grades: 6 – 9

Advanced Water Ecology - Grades: 9 – 12

For more information or to schedule a field trip contact Jamie Reeger, Director of Environmental Education at Jamie.reeger@lacawac.org or call 570.689.9494

At the second method is to genetically modify the American chestnut. With the help of genetic engineering, TACF wants to insert a gene that makes the trees blight resistant. The gene that has been found to work codes for a detoxifying enzyme, oxalate oxidase (OxO), that breaks down the oxalic acid that is a primary component in killing the trees. Inserting this gene into the chestnut tree's genetic material provides trees with blight resistance which can be passed down through generations. This gene is found in many food crops, especially wheat. The modified chestnut trees will still carry 100% of its original genes with the addition of the OxO-coding gene. The research is being conducted by TACF in conjunction with the State University of New York's College of Environmental Science & Forestry. The genetic engineering is in the process of obtaining government approval.

I am partnering with Tom Huff of the New York chapter of the TACF and Lacawac Sanctuary to assist with the effort to repopulate Northeastern forests with chestnut trees as my senior project at Western Wayne High School. In the early summer of 2019, I helped plant eight pure *Castanea dentata* seedlings in the meadow next to the Lacawac Visitor's Center. These tree seedlings were grown from seeds of surviving chestnuts and they were planted so they can mature to a reproductive stage. The trees are planted in a square pattern with space in the middle for several more trees. When approved, genetically modified trees will be planted in the middle to be pollinated by the "mother" trees I planted this year. This will increase the genetic diversity of the nuts produced by the modified trees as well as subsequent generations of

blight resistant trees. Planting seedlings this year kick-started this process that will take years to complete. Until then, my job for my Senior Project is to mow the area for access, water the trees when needed, and make sure the enclosures that protect the trees from deer and other herbivores remain intact.

There were wild chestnut trees on Lacawac's property as late as 1975. There may still be chestnut trees at Lacawac today because the chestnut's root system can survive the parasite's attack. New trees may have grown back from the surviving root sprouts. Tom Huff is offering \$125 award prize for the person who finds the largest wild chestnut tree at Lacawac. There is more



information located in the Visitor's Center lobby. The trees planted have been doing well throughout the summer and the crazy weather it brought. Come out and show your local chestnut trees some support while enjoying what Lacawac has to offer. Now all we can do now is wait and watch them grow.

Background sources and information obtained from [The American Chestnut Tree Foundation](#) website.



Watershed Educators Institute Held

By Jamie Reeger, Director of Environmental Education

The Environmental Education programs at Lacawac continue to grow and flourish. This past spring we visited more classrooms and had more schools participate in field experiences from various schools in Wayne and surrounding counties. An exciting new addition to our program offerings was the Watershed Educators Institute, a weeklong course for teachers in grades 6-12. Educators from across the state spent a week at Lacawac participating in an array of authentic outdoor inquiry activities aimed at teaching new ways to incorporate watershed education into their curriculum.

The Watershed Educators Institute combined state recognized curriculum from Stroud Water Research Center and DCNR PA State Parks plus Lacawac Research and Education resources. Lacawac partnered with Carissa Longo, the Environmental Education Program Coordinator for the DCNR State Parks and Steve Kerlin, Ph.D., Director of Education at Stroud Water Research Center to provide an engaging place-based educational experience. This is the first time all multi-state renowned programs were offered together.

One participant stated that "this course far exceeded my expectation in several different ways, the pacing was rigorous and I learned far more than I expected academically." The strengths of the course as stated by another participant was the "speakers, location, enthusiasm of all involved, amazing content and lesson examples, many hands-on opportunities, great food too."

Harmful Algal Blooms: A Primer

By: Beth Norman PhD, Director of Science and Research

Harmful algal blooms, or HABs, featured prominently in the news this summer. What are HABs and how concerned should you be? Here is a quick primer on algae and HABs.

Algae are microscopic organisms that are natural components of lake ecosystems. Algae use light to convert carbon dioxide into sugar through photosynthesis. They support many lake food webs and are an important source of oxygen, a product of photosynthesis. Algal populations are controlled by predation and the availability of nutrients such as nitrogen and phosphorus in the environment.

Algal blooms occur when algal populations grow rapidly and accumulate large amounts of biomass. Many factors can contribute to algal blooms including relatively warm temperatures and high nutrient availability. Algal blooms are often (but not always) visible. Blooms can look like green (or brown, gold, blue-green, or red) particles in the water, scums that accumulate on the water surface, have a pea soup-like appearance, or look like someone spilled green paint on the water.

The term "harmful algal bloom" often refers to a bloom of algae that can produce toxins. In fresh waters, most toxin-producing algae are cyanobacteria. Cyanobacteria have a suite of adaptations which give them a competitive advantage, including the ability to change their position in the water to maximize nutrient and light exposure,

relatively fast growth rates, and high tolerance to temperature.

Toxins produced by cyanobacteria can be harmful to humans, pets, and livestock. Cyanotoxins can affect the liver, kidneys, skin, and nervous system. Symptoms of acute exposure (through contact, ingestion, and/or inhalation of aerosolized water droplets) can include skin irritation, gastrointestinal issues, neurological symptoms such as numbness or tingling of lips and fingers, headache, ataxia, difficulty breathing, salivation, and weakness. Acute exposure can be particularly dangerous for pets and children. Toxins can reach harmful concentrations under bloom conditions. Cyanotoxins will eventually break down but this process can take days, weeks, or months depending on the type of toxin and environmental conditions. Consequences of chronic exposure are still being studied.

It is important to note that not all algal blooms are composed of cyanobacteria, not all cyanobacteria blooms are composed of species that can produce toxins, and species that can produce toxins do not produce them all of the time. Unfortunately, it is impossible to tell if a bloom is toxic just by looking at it. The only way to know what type of algae is blooming is to identify the species using a microscope or genetic testing. The only way to determine if the bloom is producing toxins is to test for the toxins themselves. Because it is impossible to tell if a bloom is toxic, the United States Centers for Disease Control and Prevention (CDC) advises avoiding contact with algal blooms. The CDC also recommends that people and pets who do come in contact with blooms wash with tap water immediately. Prevent pets from licking and grooming themselves until after being rinsed with tap water. For more information on HABs, HABs-related illness, and HABs testing, see the following online resources:

CDC Harmful Algal Bloom Associated Illness website:
<https://www.cdc.gov/habs/index.html>

United States EPA Harmful Algal Blooms in Water Bodies website:
<https://www.epa.gov/cyanohabs>

Pennsylvania Sea Grant Harmful Algae Bloom website:
<https://seagrant.psu.edu/topics/water-quality/harmful-algal-blooms>

PLEON Harmful Algal Bloom workshop website:
<https://www.lacawac.org/harmful-algal-blooms.html>



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6th Annual Lake to Lake

8K Trail Run – Woods Walk –
Dog Wag

*Sunday October 20th, 2019
8am Registration
9:30am Start*

More information or register at www.lacawac.org