

FIGHT THE BITE

OFFICIAL NEWSLETTER OF VECTOR MANAGEMENT

PROGRAM GOALS

The purpose of Vector Management is the surveillance and control of biting arthropods within the Commonwealth that can cause human illness and pestilence. This is accomplished through Integrated Vector Management. Integrated Vector Management incorporates educating the public, arthropod surveillance, and preventative practices coupled with physical, biological, and chemical control applications.

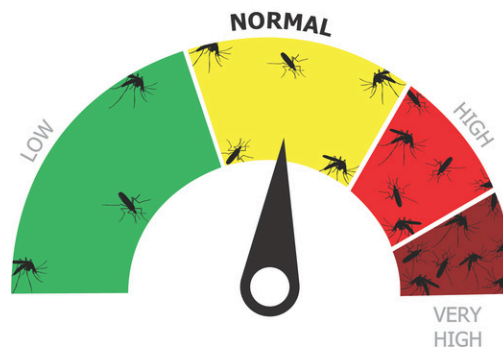
MOSQUITO SPOTLIGHT

Vector Management's West Nile Virus Program uses a "Skeeter Meter" at www.dep.pa.gov/westnile to keep the public informed of risk during the summer months.

The meter is derived from a calculation of risk called the Vector Index (VI). The VI takes multiple things into consideration such as the number of mosquitoes per trap and the number of positive West Nile virus (WNV) mosquitoes over time. As the VI rises, so does the risk to the public to contract WNV.

SKEETER METER

THIS WEEK'S LEVEL IS:



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40th
Anniversary

PENNSYLVANIA BLACK FLY SPRAY OPERATIONS

BY: STEVE MEANS, AQUATIC BIOLOGIST SUPERVISOR

The Pennsylvania Black Fly Suppression Program began its 40th year of spray operations in the Commonwealth this spring. Unlike other Vector Management Programs, the Black Fly Suppression Program had its start from a grassroots organization that led an effort to rid the Harrisburg area of gnats (black flies). Neighbors Against Gnats (NAG) spearheaded a campaign to raise funds for the then-DER to conduct larvicide sprays on the Susquehanna River (Figure 1). Improving water quality in the Susquehanna River and ideal habitats of rock ledges and rapids created perfect conditions for black flies to complete their life cycle. Nuisance black flies were rampant, making outside life unbearable in the summer for both residents and tourists in the Susquehanna Valley. It did not take long for legislators and the Governor at the time, Richard Thornburg, to get behind funding for a Black Fly Suppression Program.

Experimental sprays were initially conducted in 1983 to evaluate the use and effectiveness of *Bacillus thuringiensis israelensis* (Bti) on black fly larvae in the Susquehanna River. Once the proof of concept and reduction in adult populations were realized, the state increased funding in the 1984-85 budget to \$1.5 million, and full spray operations were initiated in the spring of 1985.



NAG

We guarantee you that zillions of GNATS will be here the first of May—just to bug you!

There is also a promise of even more to come!

- Gnats are also known as Black Flies.
- The Black Fly larvae thrive in clean, fast moving waters.
- The DER recommended method of control is directed at the larvae. A special bacteria has been developed which kills only the Black Fly species. This bacteria is applied by helicopter or boat. The larvae feed on the bacteria. The bacteria disrupts the digestive process which leads to the death of the Black Fly. This bacteria is harmless to humans, animals and non-target aquatic life. The Department of Agriculture has approved the product for use in Pennsylvania.
- The following areas will be treated: 20 mile sections of the Susquehanna River, Conodoguinet Creek, Swatara Creek, Shermans Creek, a five mile section of the Juniata River at Duncannon and several sites in the Yellow Breeches near New Cumberland.
- Adult Black Flies (GNATS) can travel at least 10-20 miles from the streams and rivers where they emerge. For example, residents of Lingletown, Palmyra, Mechanicsburg, Carlisle, etc., are all bothered by Black Flies emerging from the Susquehanna River.
- Adult GNATS live 3-4 weeks. The females' sole purpose in nature is to get a blood meal so they can lay more eggs. Controlling the adult is not economically feasible.
- There are no state funds available for the Summer of 1983. Therefore we need to raise \$300,000 from private sources in order to apply the bacteria. The goal of this project is to reduce the GNAT population to a tolerable level this summer.
- Time is important to us, the bacteria program **must** begin the last week of April so that we can eliminate the larvae now in the water. These larvae will become adults early in May without our intervention. Approximately 5 more applications of the bacteria will be required from April to September.

Is this the year we give, or, is this the year we give up?

For relief send your contribution to:
Neighbors Against GNATS
75 S. Houcks Road, Suite 309
Harrisburg, PA 17109
717/652-6952
NAG is working in cooperation with the Lower Dauphin Council of Governments, (L.D.C.O.G.)
Your contribution is tax deductible.

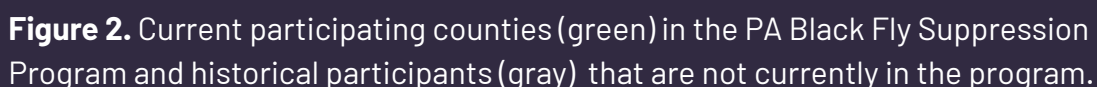
MAP INDICATES APPROXIMATE AREA OF FLIGHT RANGE AND RELIEF

Figure 1. Early campaign flyer for Neighbors Against Gnats to raise funds to conduct larvicide sprays on the Susquehanna River.

The Black Fly Suppression Program currently monitors and treats over 1,800 river miles in 35 counties with 6.1 million residents and countless numbers of tourists and visitors.

BY: STEVE MEANS, AQUATIC BIOLOGIST SUPERVISOR

Improving water quality in rivers has allowed for the expansion of the targeted black fly species, *Simulium jenningsi*, to spread into new areas over the course of the program's history. Not all counties in Pennsylvania contain suitable habitat or water quality conditions to support the targeted species that is a pest during the summer recreational season. However, there have been counties that have elected not to participate or have withdrawn from the program due to budgetary constraints or other reasons over its history (Figure 2). The Black Fly Suppression Program currently monitors and treats over 1,800 river miles in 35 counties with 6.1 million residents and countless numbers of tourists and visitors. The goal of the program is to reduce adult populations to tolerable levels during the summer recreational season. The current state budget for the Black Fly Suppression Program in the 2024-25 fiscal year is \$8.435 million.



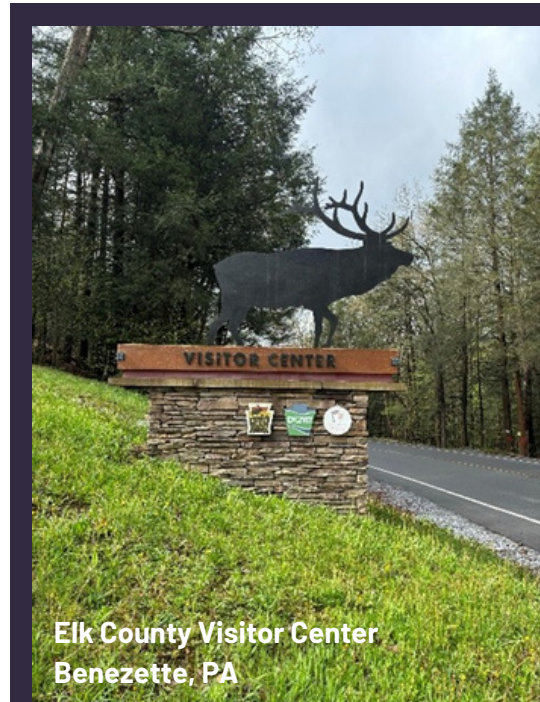
IMPROVING WATER QUALITY ADDS ANOTHER STREAM TO THE BLACK FLY PROGRAM LIST

BY: MORGAN THOMPSON, AQUATIC BIOLOGIST II

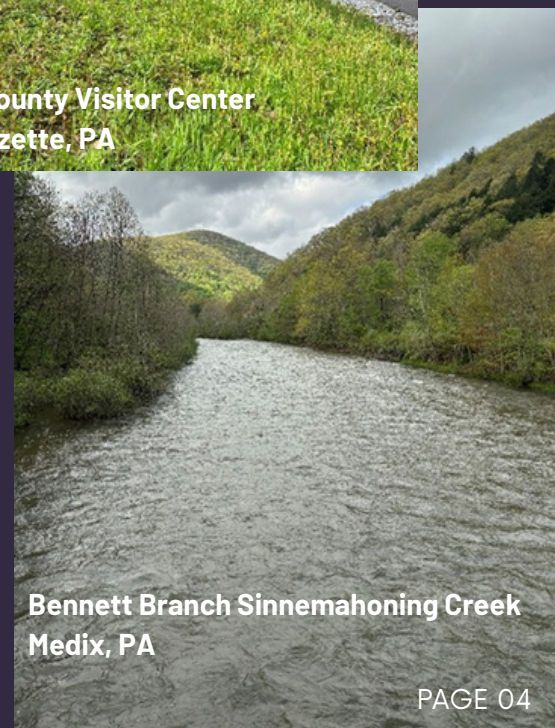
The Department of Environmental Protection has been working diligently with numerous partners to improve the water quality of streams affected by acid mine drainage (AMD) across Pennsylvania. Many streams have suffered from pollution associated with AMD, including the Bennett Branch Sinnemahoning Creek and its tributaries located in Clearfield, Elk, and Cameron Counties. The Bennett Branch was added to the impaired waters list in 1996 for heavy metals from AMD. Mine reclamation efforts in the watershed have been ongoing for over 25 years. However, it was not until 2012 when the Hollywood AMD Treatment Plant (located in the village of Hollywood in Clearfield County) came online that water quality significantly improved to support and sustain aquatic life in the Bennett Branch. In 2022, DEP removed 32 miles of Bennett Branch from the impaired waters list based on the improvement in water chemistry, macroinvertebrates, and habitat.

Black flies require clean water to complete their life cycle, so it was easy to surmise that improvements in water quality in the Bennett Branch would likely correspond to an increase in black flies. However, not all streams can support the black fly species, *Simulium jenningsi*, which is a nuisance to people. Based on the size and characteristics of the stream and a known population of *S. jenningsi* downstream in Sinnemahoning Creek, we suspected that the stream could support a viable population with improved water quality.

In 2024, the Black Fly Suppression Program began black fly larval and adult monitoring in portions of the Bennett Branch Sinnemahoning Creek in Clearfield and Elk County. Information from this survey indicated that a viable population of *S. jenningsi* was present and that some larval numbers reached treatable levels in 13 river miles of Elk County during the summer. The village of Benezette, located along the Bennett Branch, is a major tourist hub in Pennsylvania for visitors to view the Pennsylvania elk herd. Each year nearly half a million people visit the Benezette area in the summer and early fall to recreate and observe elk. Therefore, it is critical to monitor and suppress black fly populations in this area to ensure an enjoyable experience for all visitors and residents of the region. The Black Fly Suppression Program will continue to monitor the Bennett Branch Sinnemahoning for *S. jenningsi* in 2025 and will conduct sprays if larval populations build to a treatable population.



Elk County Visitor Center
Benezette, PA



Bennett Branch Sinnemahoning Creek
Medix, PA

LUZERNE COUNTY FLOODING PRESENTS CHALLENGES

BY: OLIVIA WOLFE, AQUATIC BIOLOGIST II

In 2024, the remnants of Hurricane Debby put Luzerne County's Mosquito Control Program to the test due to flooding and the resulting mosquito population. In May of 2025, multiple rain events led to a river height and flooding that exceeded what was experienced with Debby. Thankfully, with the help of the National Water Prediction Service, there were a few days' notice to prepare for the impending inundation.

By May 13th, Keith George, the Luzerne County Mosquito-borne Disease Control Program Coordinator, estimated that over 500 acres of floodplains were holding water. Only a portion of those acres were accessible and stagnant. Keith along with his team at the Luzerne County Conservation District and a few DEP biologists applied over 700 pounds of *Bacillus thuringiensis israelensis* (Bti) to roughly 70 acres over the following days to eliminate mosquito larvae (Figure 3).

With the welcomed assistance of a new tool purchased this season, a Polaris UTV was able to ferry bags of product through the floodplains closer to the applicators, making treatments more efficient (Figure 4). In the following weeks, the UTV was also used to assist in adult control applications targeted specifically at these floodplains. This proactive treatment prevented mosquitoes from maturing to adulthood and protected citizens and visitors to the Commonwealth from swarms of mosquitoes.



Figure 4. DEP biologists, Olivia Wolfe and Dave Hurley, with Luzerne County Conservation District staff Keith George utilizing the new UTV for larval treatments.



Figure 3. Top: Flooding in wooded areas makes treating these areas difficult. Staff safety is always top priority. The red circle highlights two staff members using the buddy system to treat the water with larvicide. **Bottom:** Staff continue to work in pairs to treat the deep water for mosquitoes following multiple rain events that led to flooding in Luzerne County.



DETERMINING LYME DISEASE RISK

BY: HOLLY CHAPMAN, AQUATIC BIOLOGIST II

DEP's Tick Surveillance and Testing Program's main focus is to conduct statewide active tick surveillance to determine the distribution, density, and expansion of tick populations throughout the Commonwealth. We also monitor the most common tick in Pennsylvania, the blacklegged tick (*Ixodes scapularis*) and its Lyme disease infection rate. Our 2024 testing results demonstrate an average nymphal blacklegged tick infection rate of 21.2% statewide. The nymphal life stage of the blacklegged tick poses the greatest risk to human health because of the nymph's small size which increases the chance of a longer attachment time. To determine the relative risk of encountering an infected nymph, we need to calculate the Density of Infected Nymphs (DIN).

To calculate DIN, we first looked at our collection data from our summer surveillance. Using 4 years of data, we were able to take the density of host-seeking blacklegged tick nymphs collected and their infection rates to determine the DIN by region. We then created a numerical range based on these values to break down the risk to the public from low, moderate, high, and very high. These ranges are displayed on a Pennsylvania county map by month between April and August on our DEP website (www.dep.pa.gov/ticks) and will be updated with our most recent data as surveillance continues (Figure 5).

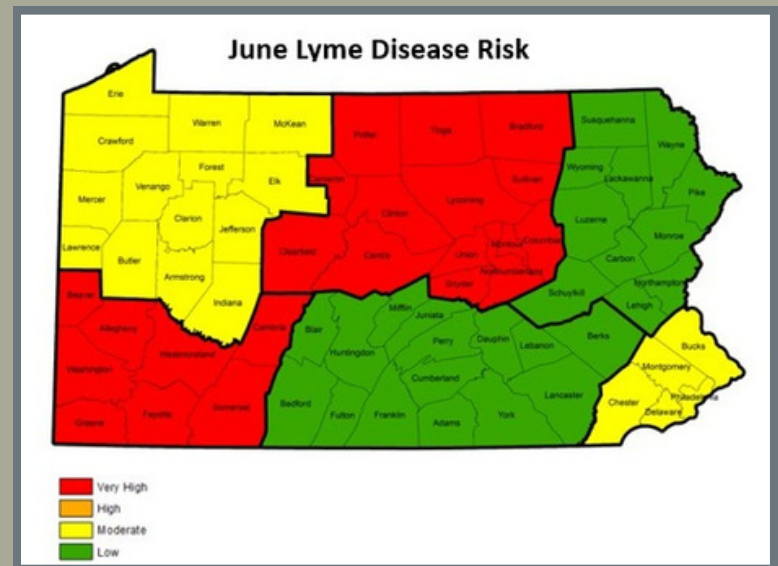


Figure 5. Lyme disease risk map by DEP region. Risk is determined by calculating the density of infected nymphs (DIN).

WHAT'S THE FUZZ ABOUT TICK COLLECTIONS?

BY: CHRISTIAN BOYER, AQUATIC BIOLOGIST SUPERVISOR

The Tick Surveillance and Testing Program is in the process of switching drag fabric. The felt has proven to be problematic in the field and in the lab at times. The lab began noticing damaged ticks and theorized that the damage could have been happening in the field when pulling them out of the felt fibers (Figure 6). This damage, such as a missing leg or palp, could potentially lead to leakage of pathogens into the solution causing contamination of the sample. Additionally, many fuzzy felt fibers were making their way into the sample, significantly increasing the time it takes to taxonomically identify and count each sample. Going forward, the Tick Program will be using flannel for drag material. In trials, the flannel has picked up less "sticky" seeds and burs making it easier to find ticks on the drags, improving efficiency.



Figure 6. DEP tick biologist, Holly Chapman, collecting ticks at Hibernia Park in Chester County as part of the statewide collection effort.

FIRST DETECTION OF BLACKLEGGED TICK (*IXODES SCAPULARIS*) GYNANDROMORPH IN PENNSYLVANIA

BY: LYDIA ZIMMERMAN, AQUATIC BIOLOGIST I

Last year, the Vector Management Taxonomy Laboratory encountered an *Ixodes scapularis* (blacklegged tick) with unique features. After diving into the scientific literature and reviewing images, we postulated that the tick was a gynandromorph, a single organism demonstrating both male and female characteristics. High-resolution images of the *I. scapularis* gynandromorph specimen (Figure 7), collected in Susquehanna County in November 2024, were taken using the new Nikon SMZ-25 and sent to Dr. James W. Mertins at the National Veterinary Services Laboratories (NVSL) who confirmed our identification. This tick is the first record of an *I. scapularis* gynandromorph in Pennsylvania and only the third documented in the United States. To better describe the specimen, the Taxonomy Laboratory has quantified a series of structures on the tick, known as morphometrics, to support our assessment of the specimen's male and female characteristics. This discovery is important to vector-borne disease testing because knowledge of any deviations from typical species anatomy, such as in the case of gynandromorphism, is essential to making informed taxonomic decisions and in turn, ensuring correct pathogen screening.



Figure 7. Image comparing *I. scapularis* gynandromorph (center) with an adult male *I. scapularis* (left) and an adult female *I. scapularis* (right) using the Nikon SMZ-25. **Photo:** Lydia Zimmerman and Ben Paul.

VECTOR LAB NOW SCREENING FOR WEST NILE VIRUS LINEAGE 2

BY: MIKE CHROSCINSKI, MICROBIOLOGIST II

Initially isolated from a woman in the West Nile district of Uganda in 1937, West Nile virus (WNV) has become the most globally widespread mosquito-borne disease and can result in lethal neuroinvasive disease in avian reservoir species or in incidental human and equine hosts. WNV is a mosquito-borne RNA virus and is a member of the family Flaviviridae which includes other significant human pathogens like dengue, Zika, and yellow fever viruses.

Presently, up to nine WNV lineages are recognized, with human infections resulting from viruses belonging to lineages 1 (WNV1) and 2 (WNV2). WNV1, the most widespread lineage, has caused significant outbreaks in Europe, the Middle East, and North America. WNV1 was first identified outside of Africa in France in 1962, but not in the US until 1999 when a significant outbreak erupted in New York City. WNV2 was first found beyond Africa in 2004 when an outbreak occurred in Hungary; WNV2 has subsequently spread throughout most of Europe but has yet to be identified in the Americas.

To monitor the introduction and spread of WNV2 in Pennsylvania and to ensure we are not omitting a significant pathogen, we are adding WNV2 testing to our comprehensive vector surveillance and testing program (Figure 8). We are initially testing samples from Philadelphia and Allegheny counties. These counties typically have high levels of WNV1 and are major travel hubs. If found, we will expand testing to all future *Culex* sp. mosquito pools for WNV2.

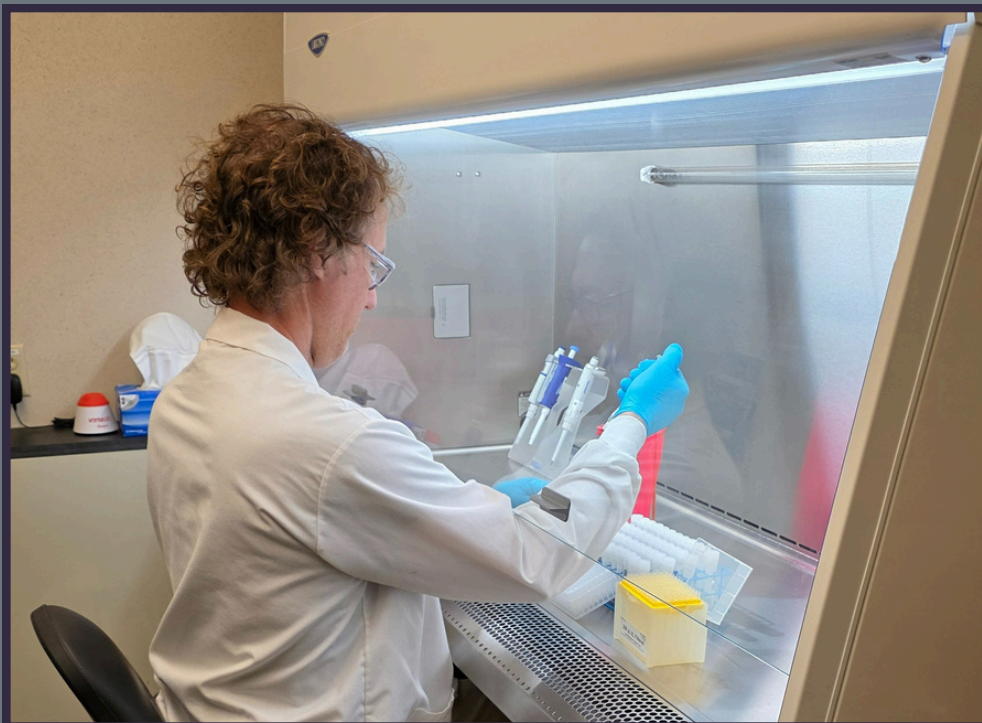


Figure 8. Mike Chroscinski performing manual extraction of arthropod samples in preparation for BioRobot DNA purification.

To monitor the introduction and spread of WNV2 in Pennsylvania and to ensure we are not omitting a significant pathogen, we are adding WNV2 testing to our comprehensive vector surveillance and testing program.

PICKIN' FOR TICKS

BY: PHOEBE PRINCE, BEAVER COUNTY CONSERVATION DISTRICT

We attended the Maple Syrup Festival on April 12-13, 2025, held in Brady's Run Park. We set up the MEC (Mobile Education Center) trailer with information about all the programs at the district including West Nile virus. The Vector Program provided visitors information and flyers describing mosquitoes, West Nile virus, ticks and the diseases they can carry, personal protection, and habitat reduction. We had activity books for the kids about ticks and mosquitoes, tick kits, mosquito dunks, and bookmarks. We had a kids' activity area where they could make a butterfly out of native seeds and a pelt with poppy seeds to mimic how small nymphal ticks are and how hard they are to detect (Figure 9). We had tweezers and magnifying glasses so the kids could find the "ticks". At the table, we also had information that "Ticks can be Tiny" that we distributed to participants. The poppy seed pelt was a huge success! The kids were grossed out, fascinated, and loved digging for ticks!



Figure 9. Kids enjoyed picking "ticks" from pelts. Nymphal blacklegged ticks are about the size of a poppy seed, making the poppy seeds a great educational tool.

MOSQUITO BREEDING GROUNDS FINALLY FLUSHED OUT

BY: RAY BUCKLEY, BUCKS COUNTY DEPARTMENT OF HEALTH

For over a decade, residents near this property endured recurring mosquito problems. Complaints noted dozens of containers collecting water including buckets, pots, and every mosquito's dream: toilets. The only wildlife observed within? Larvae... mosquito larvae.

Thanks to our persistent environmental protection specialist, Melissa Encinias, control kicked off a series of inspections in July 2023 and kept a lid on the situation with regular follow-ups. While progress was slow to trickle in, the homeowner eventually got on board, working with local services to remove debris. By April 2025, the situation was under control: containers were covered, dumped, or removed entirely. The breeding stopped. The bugs backed off. And the complaint was officially... flushed (Figure 10).



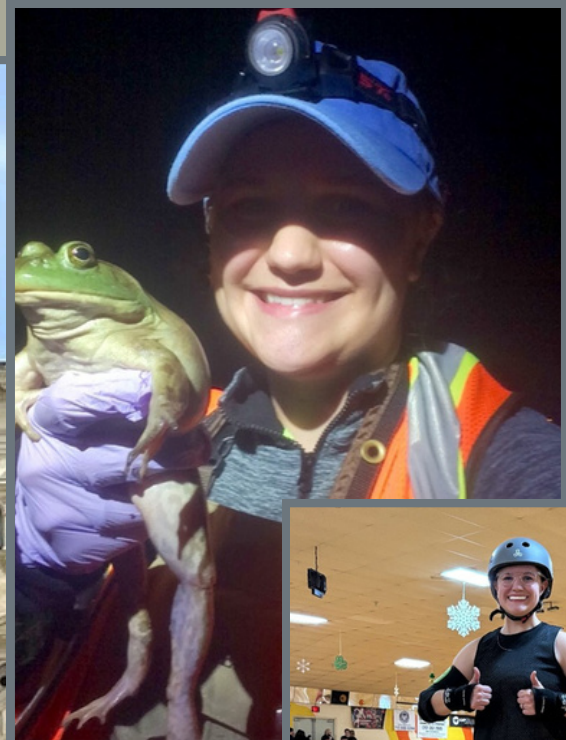
Figure 10. Top left: The property before the cleanup occurred in July 2023. **Bottom:** After the cleanup in April 2025.

LYDIA ZIMMERMAN, AQUATIC BIOLOGIST I

I received a Bachelor of Science in Biology from the University of Pittsburgh and completed a Master of Wildlife and Fisheries Resources from Clemson University. During my undergrad, I worked for several years in a lab that researched host-pathogen interactions in an amphibian system. This was my first introduction to disease ecology and working in a lab setting.

I started working for Vector Management in 2023 where I worked as a limited term for two seasons. Then, I was hired into a permanent position to fill the role of tick taxonomist in November 2024 at the Bureau of Labs.

Outside of work, I spend my time gardening, running a local book club, playing Dungeons & Dragons with friends, and skating on a roller derby team. I also love to travel and am a big foodie. I love that I get to “do science” every day! In the Taxonomy lab, we are constantly learning and making new discoveries, and it is exciting to be a part of that process. I also really enjoy collaborating with all the other talented biologists in the department and knowing that our work helps keep people healthy. As an early career scientist, I have really enjoyed the professional development opportunities that I’ve had since joining the Vector Management team. Attending conferences such as PVCA each fall and the 2025 Eastern branch ESA meeting have been great experiences where I was able to make connections in the field and gain a wealth of knowledge.



VECTOR ACADEMY TRAINING COMPLETE

BY: BROOKE CODER, WATER PROGRAM SPECIALIST

Vector Management holds an annual training each spring to train new staff in the county and state vector programs. This year, the training was held at the Union County Government Center in Lewisburg, PA. This training was held over 2 days and was a mix of classroom and fieldwork. Many Vector Management staff from the West Nile Virus, Tick, Black Fly, and Laboratory programs presented on important topics like adult and larval mosquito surveillance and control, tick surveillance, black fly surveillance and control, and taxonomy and molecular lab work. Additionally, Leanne Lake and Samantha Ramirez-Lachmann from Valent Biosciences were invited to perform an industry-standard cage trial and then discuss the importance of calibrating equipment for the efficacy of control treatments. This annual training is regarded as a vital component to train new staff in DEP field standards and protocols.



Top Left: Holly Chapman, Tick Biologist, teaching new staff field techniques to collect nymphal blacklegged ticks.

Bottom Left: Chick Clark, WNV Biologist, instructs new staff in the classroom on the program. **Right:** County staff collecting mosquito larvae while surveying stagnant pooling water.



DID YOU KNOW?

Some mosquito species lay their eggs on the water's surface, known as an egg raft. These egg rafts can contain hundreds of eggs each that can then hatch in 24-48 hours. Once the mosquito larvae hatch, they can move through their entire life cycle and emerge as adults in as little as 7-10 days.



Above: Many tiny mosquito egg rafts deposited on the surface of a stagnant pool. **Below:** Red arrow indicates a single egg raft on the water's surface. **Photos:** Maddie Metzger. **Inset:** Mosquito larvae emerging from an egg raft under magnification. **Photo:** Ben Paul.



UPCOMING EVENTS:

Pennsylvania Vector Control Association Annual Meeting
October 20 - 22, 2025
State College, PA

Entomological Society of America Meeting
November 09 - 12, 2025
Portland, OR

Northeastern Mosquito Control Association Annual Meeting
December 07 - 10, 2025
Hyannis, MA