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On the Spotted Lanternfly

Erin Mallea & Travis Mitzel

The Spotted Lanternfly (SLF), *Lycorma delicatula*, is a planthopper native to regions of China, Taiwan and Vietnam. First reported in Berks County, Pennsylvania in 2014, SLFs are believed to have arrived in 2012 via a stone shipment through the Port of Philadelphia.¹ By June 2024, SLF had been reported in 18 states² and detected at the Nevada-California border³ 9 years earlier than experts estimated.⁴ Planthoppers, as the name suggests, move primarily by hopping and short-distance flight. They typically do not travel far without assistance, and human activity is the primary means for their spread throughout the eastern United States.⁵

By 2021 the SLF population had boomed and spread throughout the Mid-Atlantic and surrounding states. Lanternflies enjoyed rides via commodity chains and transit systems: trains, cars, shipping containers, semi-trucks and more to new destinations. The public took notice. Large numbers of SLF were seen on trees, vines, and buildings in urban, suburban and rural communities alike. Similar to the SLF themselves, the media buzz and public discussion were hard to miss: news articles, Reddit and Next Door threads, TikTok feeds, Saturday Night Live sketches, and a topic of regular conversation.

Beginning in 2018 and 2019, state departments of agriculture, USDA and Penn State Extension launched what became prominent, viral PR campaigns to “[STOP THIS INVADER!](#)”⁶, “[STOMP IT OUT!](#)”⁷ and “[JOIN THE BATTLE. BEAT THE BUG.](#)”⁸ Much of the public responded with enthusiasm. There was gleeful stomping, discussion of best practices, and patriotic appeals to civic-mindedness and concern for the environment. There were [SLF stomping pub crawls](#)⁹, [costumed instructional dances](#)¹⁰, and [an app to compete for the highest SLF body count](#).¹¹ While some installed traps on their trees, others embraced more aggressive weapons such as [propane torches](#)¹²



Spotted Lanternfly Posters, Maryland Department of Agriculture **LEFT** and USDA **RIGHT**

and [indiscriminate, DIY pesticides](#).¹³ “Mount their tiny heads on your front porch as a message to the rest,” stated a Reddit user in Connecticut on a thread titled “[These bugs are kill on sight. Spread the word.](#)”¹⁴

Amid the mania, there was also defiance against the campaign. Some saw futility in the endeavor, while others recalled the recent public fear about the impending invasion of brown marmorated stink [bugs which largely subsided](#).¹⁵ Many were uncomfortable with the demand to kill and concerned that others took it to heart without question.

One doesn’t have to spend much time reading online message boards and comment sections before starting to associate the SLF campaigns with wartime calls for civilian action. Community members are called to join the fight to “[Save American Forests and Agriculture](#)”¹⁶. A Maryland Department of Agriculture campaign deputizes citizens by riffing on the quintessential wanted poster. “[WANTED: DEAD OR ALIVE](#)”¹⁷: a foreign insect villain with a malicious agenda to destroy American industry.

There have long been critiques about the dominant language and orientation toward invasive species in western science. Scholars have argued that militarized rhetoric is counterproductive and creates an unsustainable relationship to ecosystems,¹⁸ while others emphasized parallels with nationalism and xenophobia amid globalization and increased migration.¹⁹ The language of pests, hoards, swarms, and pestilence do not exist in a vacuum. Such dehumanizing language has long been ,and continues to be, a tool to otherize, victimize and justify violence against human communities,²⁰ and pest control exists in relationship with actual warfare through the co-development of herbicides, insecticides and chemical weapons.²¹ Scientists have questioned the established ‘native good, non-native bad’ dichotomy for more specific, practical and flexible approaches.²² Others are studying the contribution and benefits of introduced species²³ while some ponder how to approach invasive populations when that species is endangered or faces extinction in their native range.²⁴

Species are labeled invasive when they threaten biodiversity. Their impact

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3 Aila Slisco, “Invasive Insect Eggs New to California Pose ‘Serious Threat,’” *Newsweek*, June 15, 2024, <https://www.newsweek.com/invasive-insect-eggs-new-california-pose-serious-threat-1913254>.
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9 “Destroy spotted lanternflies at this NJ. pub crawl,” NJ.com, Sep 1, 2021, 1:39, https://www.youtube.com/watch?v=sxQ_QzF5GFg.
10 Mary Hardbarger, “Do the Spotted Lanternfly Stomp!,” *Virginia Tech News*, October 5, 2023, <https://news.vt.edu/articles/2023/10/cals-stompthespot.html>.
11 Bradley Line. “Squishr.” Apple App Store, 3.1, 2019, <https://apps.apple.com/us/app/squishr/id1480114137>, accessed August 1, 2024.
12 “Spotted Lantern Fly verses [sic] propane torch,” vLog Cabin Life, Aug 11, 2018, 4:41, https://www.youtube.com/watch?v=_cE6nflL_Ic.

13 Benji Jones, “Blowtorching Spotted Lanternflies Is, in Fact, a Bad Idea,” *Vox*, September 16, 2022, <https://www.vox.com/science-and-health/2022/9/16/23353428/spotted-lanternfly-invasive-species>.
14 “R/Connecticut: These Bugs Are Kill on Sight. Spread the Word,” Reddit, August 8, 2023, https://www.reddit.com/r/Connecticut/comments/15yzzhw/these_bugs_are_kill_on_sight_spread_the_word/.
15 “Where Did The Stink Bugs Go?” Witt Pest Management, accessed August 2, 2024, <https://www.wittpm.com/blog/post/where-did-the-stink-bugs-go>.
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can be especially harmful in vulnerable ecosystems transformed by human activity: particularly the activity of the Global North.²⁵ During the lanternfly panic, a lot of concern around invasive species was focused on their economic impact to agriculture and commodities. Invasive species become a convenient target for the public’s attention rather than the transformation and stresses to ecosystems caused by deforestation, extraction, carbon emissions, large-scale monoculture agriculture and development that reduce ecosystem resilience to the inevitable arrival of new species.

SLF is invasive in South Korea and Japan, and has hurt South Korea’s grape industry.²⁶ In North America, the current concern around SLF is based on their damage to cultivated grapes and projected harm to the American wine industry. Researchers at Penn State concluded that SLF was not significantly harmful to mature, native hardwood trees. In the 2023 [study published in Environmental Entomology](#), Kelli Hoover, Professor of Entomology and primary author of the paper, concluded that SLF feeds on more than 100 species of trees and other plants, but they rarely kill them.²⁷ Saplings may experience markedly reduced growth with heavy SLF feeding, but most at risk are cultivated grape and *Ailanthus altissima*, or tree of heaven, an invasive tree and SLF’s preferred host. Spotted lanternflies can reduce the quality and yield of grapes and can kill grapevines with heavy feeding.²⁸ SLF researchers have attempted to clear the record that forests are not in mortal danger. However, the lore is difficult to dispel.

Tree of heaven, like the SLF, is native to regions of China and Taiwan.²⁹ Its name references its ability to grow quickly: “tree reaching for the sky”.³⁰ William Hamilton is credited for first introducing the tree of heaven to North America in 1784 as an ornamental. Hamilton was an amateur botanist, horticulturist, and acolyte of the English Garden tradition. Part of an elite Philadelphia family, Hamilton transformed his inherited estate into The Woodlands’, a landscape inspired by picturesque English estates of the late 18th and early 19th centuries.³¹ Tree of heaven had been introduced to Europe by a French Jesuit priest roughly 30 years earlier. It was a popular “stately” exotic tree for English and French gardens and thus fitting for Hamilton’s project.³² The Woodlands boasted greenhouses with some 10,000 species collected from around the world.³³ In 1888 a visitor to the Woodlands, described the grounds:

... and at different distances numerous copses of native trees, interspersed with artificial groves, which are set with trees collected from all parts of the world ... The green-houses, which occupy a prodigious space of ground, I can not pretend to describe. Every part was crowded with trees and plants from the hot climates, and such as I had never seen, all the spices, the tea-plant in full perfection; in short, he assured us there was not a rare plant in Europe, Asia, or Africa, many from China and the islands in the South Seas, none, of which he had obtained any account, which he had not procured.³⁴

Hamilton’s imitation English garden was a highly global one, a microcosm of the larger empire. Architectural and landscape historian Aaron Wunsch places the Woodlands within Romanticism which “...fostered an image of unmediated communion with nature that necessarily obscured the human systems on which ‘country life’ depended”.³⁵ The Woodlands’ design purposefully hid the estate’s workforce (paid, indentured, and enslaved individuals) from the view of Hamilton’s genteel guests³⁶, and ‘communion with nature’ was supported by the financial institutions and colonial reach of American and European powers. These systems supplied the capital and networks to gather plants from across the world while reinforcing a horticultural tradition that prized amassing, mapping, and categorizing global specimens.

Tree of heaven’s ability to grow quickly and provide shade amidst depleted soil, air pollution, and concrete made it a common choice for city street tree plantings.³⁷ Betty

Smith’s 1943 book, *A Tree Grows in Brooklyn*, famously solidified the tree’s reputation as a resilient plant able to endure despite adversity and impoverished conditions. Tree of heaven became synonymous with cities as it spread beyond garden and sidewalk plots and grew in vacant lots, parks, along roadsides, and from cracks in cement.

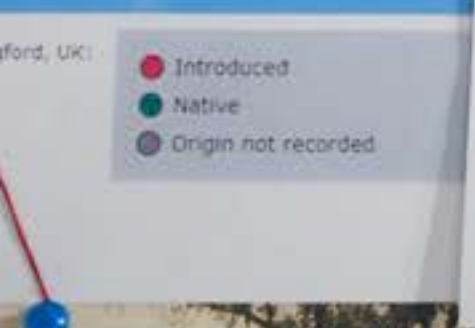
Tree of heaven’s reputation transformed radically since its introduction in 1784. Once among the “[Aristocrats of the Garden](#)”³⁸ looked at with “[wonder and admiration](#)”,³⁹ today it is often called the “Tree of Hell”.⁴⁰ In the mid 19th and early 20th century, attitudes began to shift. Echoing recent SLF rhetoric, citizens were asked to destroy the tree as patriotic duty. Historian Catherine McNeur recounts how New York City residents in the 1850s, began to complain about the tree’s smell and “weedy” characteristics. Horticulturalists and journalists penned explicitly xenophobic articles in the context of rising nativism and entangled concerns of odors and epidemics.⁴¹ A July 1855 article in *The New York Times* called the tree a “filthy and worthless foreigner” and embraced the Know-Nothing Party in regard to the tree stating, “We are Know-Nothings, decidedly, in our opposition to the *ailanthus* ... it has now taken such a root in our soil that it can only be eradicated by a public ordinance. Every man who has an *ailanthus* tree in his neighborhood, should make it his duty to destroy it”.⁴² Others came to the tree of heaven’s defense in letters to the editor. They lauded the tree as a necessary provider of shade and cooler temperatures and celebrated its ability to withstand inchworm infestations that devastated many street trees throughout the city.⁴³

In the United States today, tree of heaven is largely considered a weed because of its aggressive growth, large seed production, and emission of chemical compounds that deter predators and inhibit growth of neighboring plants.⁴⁴ The tree of heaven is incredibly difficult to remove. Seedlings quickly emerge and new growth shoots up along its lateral roots and remaining stumps. The tree’s prolific roots destabilize foundations and damage sewer lines.⁴⁵ Tree of heaven’s “indestructibility”, once an asset, is now the “Hell” that inspired its nickname: a sisyphian toil against the tree’s spread. At this point, tree of heaven is here to stay. *Ailanthus* has naturalized in most of the United States, grows in a large range of habitats including forest edges, woodlands, roadsides, backyards, vacant lots, and former industrial sites,⁴⁶ and currently lives on all continents except Antarctica.⁴⁷

Plants are labeled weeds for a number of reasons including biological characteristics that allow them to outcompete other plants, typically in human-disturbed or manufactured landscapes.⁴⁸ A plant becomes a weed when it is considered “undesirable in a particular situation, growing where it conflicts with human preferences, needs, or goals”.⁴⁹ Outside of its native ecosystems, tree of heaven has a prolific ability to thrive in human-disturbed landscapes while continually evading human control.

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25 Based on Jason Hicke’s 2020 study in *The Lancet Planetary Health*, as of 2015, the Global North was responsible for 92% of carbon emissions in excess of a safe emissions budget. [http://dx.doi.org/10.1016/s2542-5196\(20\)30196-0](http://dx.doi.org/10.1016/s2542-5196(20)30196-0).
26 Hyojoong Kim et al., “Tracing the Origin of Korean Invasive Populations of the Spotted Lanternfly, *Lycorma Delicatula* (Hemiptera: Fulgoridae),” *Insects* 12, no. 6 (June 10, 2021): 539, <https://doi.org/10.3390/insects12060539>.
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28 Hoover et al., “Effects of Long-Term Feeding by Spotted Lanternfly (Hemiptera: Fulgoridae) on Ecophysiology of Common Hardwood Host Trees.”
29 In its native range, tree of heaven is known for its medicinal uses which are increasingly being studied. See Xiang Li et al., “Traditional Uses, Phytochemistry, and Pharmacology of *Ailanthus Altissima* (Mill.) Swingle Bark: A Comprehensive Review,” *Journal of Ethnopharmacology* 275 (July 2021): 114121, <https://doi.org/10.1016/j.jep.2021.114121>.
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35 Aaron V. Wunsch, Woodlands Cemetery, *Historic American Landscapes Survey* PA-5 (Washington, DC: U.S. Department of the Interior, National Park Service, 2004), 35–36.
36 Wunsch, Woodlands Cemetery, 35–36.
37 Penny Lewis, “Tree of Heaven: An Exotic Invasive Plant Fact Sheet,” Ecological Landscape Alliance, July 25, 2018, <https://www.ecolandscaping.org/05/landscape-challenges/invasive-plants/tree-of-heaven-an-exotic-invasive-plant-fact-sheet/>.

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38 Lewis, “Tree of Heaven: An Exotic Invasive Plant Fact Sheet.”
39 The Gardener’s Monthly and Horticultural Advertiser, United States: Charles H. Marot, 1861, 80.
40 Troy Farah, “Tree of Heaven Is a Hellish Invasive Species,” *National Geographic*, March 3, 2021, <https://www.nationalgeographic.com/animals/environment/article/tree-of-heaven-invasive-species-could-fungus-save-the-day>.
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43 McNeur, “The Tree That Still Grows in Brooklyn, and Almost Everywhere Else.”
44 Lewis, “Tree of Heaven: An Exotic Invasive Plant Fact Sheet.”
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According to the Pennsylvania Department of Conservation, by the year 2000, 37% of the state’s wild plant flora were non-native species.⁵⁰ Not all introduced species are invasive. The EPA explains a general rule regarding invasive species, stating “... of non-native species that are released into new ecosystems, about 10% survive at all, and of these survivors, about 10%, or 1% of the original number of species released, become invasive.”⁵¹ Introductions occur accidentally and purposefully by individuals, via global trade, through nurseries and by animal trade. Well intentioned at the time, US government agencies are responsible for many species introductions. The USDA, for example, introduced more than 50,000 non-native plants into the United States by 1923.⁵²

Many governments, especially island nations such as Australia and New Zealand, have strict biosecurity and quarantine policies in place. The US seems to suffer from disjointed state regulation and its tendency to offload regulatory responsibility onto the individual. In 1999, the United States had an average of 8 invasive species introductions a year.⁵³ In the aftermath of the September 11th attacks, the US experienced a dramatic increase of invasive species introductions due to a shift in border priorities. During the creation of the Department of Homeland Security, hundreds of agricultural inspectors and scientists from Animal and Plant Health Inspection Service (APHIS, part of USDA) were reassigned to focus on terrorism at America’s borders. Inspectors were replaced with a skeleton crew of administrative and bureaucratic staff who had little to no training in species identification, invasive or otherwise.⁵⁴ The ramifications were dire. From 2001 through 2010 (the time period covered in a FOIA request by the Associated Press) there were 30 species introductions a year, a 275% increase from 1999. A 2004 Cornell study estimated that invasive species were destroying \$120 billion dollars of the American economy annually.⁵⁵

In August 2024, the *Pittsburgh Post Gazette* reported that SLF sightings are down 75% in Pennsylvania.⁵⁶ And anecdotal accounts suggest that Pittsburgh residents are seeing fewer of the insects this year. Is this a short or long term trend? A common, invasive boom-bust dynamic or did they travel elsewhere? It begs the question: was the lanternfly-mania, as some anticipated, largely a crisis of selective memory and short-term thinking?

Kelli Hoover, the Penn State Entomologist leading SLF research, explained that reporting fatigue could be a factor in reduced reports. Pennsylvanians are now used to SLF so reporting may not seem necessary unless populations are very high. As for what fewer reports means for larger population movement or changes, she continued, “I think we’d need to see a few years in a row of reduced numbers before we could be sure populations have declined. Unfortunately, we don’t have accurate methods for determining population sizes or even how to define a population with SLF because it moves so often. A pest population in a well defined area, like a corn field, can be counted definitively. However, with the spotted lanternfly, it’s difficult to know if numbers are down because they moved to a new area or because they are dying.”⁵⁷

It took roughly 250 years for SLF and tree of heaven to reunite in North America. After traveling roughly 7,000 miles, SLF found an old friend. When spotted lanternflies were first reported in the US, they were found on the tree of heaven⁵⁸ – flocking to the familiarity of a deeply ingrained evolutionary relationship. Tree of heaven is one of the few species SLF negatively impacts. Now reconnected, perhaps SLF could help reduce the *Ailanthus* population, and a quicker shift toward balance is possible. Climate change and human activity are creating countless opportunities for novel coexistence. The globalized world is changing every minute of every day, mixing plants and animals endlessly along trade routes, in and out of different ecosystems and economies. Today an old friend reappears, tomorrow someone new moves in next door.

Will the long-established relationship between SLF and the tree of heaven blossom in North America? Or will SLF not be long for Pennsylvania or the continent? How will cultivated grapes fare with SLF’s recent arrival in the Pennsylvania wine-region? Only time will tell.



Issue 5 was organized, designed, and produced through a collaboration between Erin Mallea and Travis Mitzel. The issue explores conversations around the spotted lanternfly in an attempt to consider the larger context of the insects’ arrival and ways forward.

The issue features an excerpt from an interdisciplinary roundtable on SLF organized by Noah Theriault, Nicole Heller, and Emily Wanderer at the American Ethnological Society’s Spring 2024 Conference and concludes with an essay by Maria Ryabova, PhD candidate in Cultural Anthropology at the University of Pittsburgh, focused on the development of a spotted lanternfly-killing robot within the larger Pittsburgh robotics ecosystem.



ABOVE: Travis Mitzel, adult spotted lanternfly and nymphs, 2024. **BELOW:** Travis Mitzel, Tree of Heaven and Spotted Lanternfly Relationship Sprawl across time, Pennsylvania and abroad, detail, 2024.

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53 Tracie Cone, “Bugs, Diseases Slipped into the U.S. after 9/11,” *The Philadelphia Inquirer*, October 11, 2011, https://www.inquirer.com/philly/news/nation_world/20110111_Bugs_diseases_slipped_into_the_U_S_after_9_11.html.
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56 Mary Ann Thomas, “Spotted Lanternfly Reports Drop about 75% across Pa., but Allegheny County Still Leads the State,” *Pittsburgh Post-Gazette*, August 8, 2024, <https://www.post-gazette.com/life/outdoors/2024/08/08/spotted-lanternfly-reports-allegheny-county-pa/stories/202408070120>.
57 Kelli Hoover, e-mail message to author, August 14, 2024.
58 Cornell University, “Spotted Lanternfly Reported Distribution Map.”







Long Live the Lanternfly

Invasive Lifeforms, Extermination Campaigns, and Possibilities for Coexistence

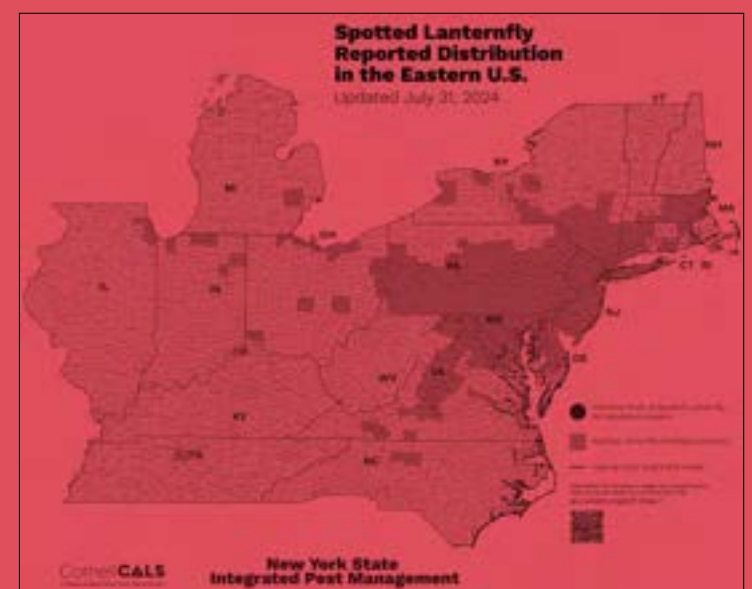
APRIL 5, 2024

The following is an excerpt of an interdisciplinary roundtable focused on the Spotted Lanternfly (SLF) that occurred during the American Ethnological Society's 2024 Spring Conference, Repair, at the University of Pittsburgh.

The panel included presentations by Nicole Heller, Ecologist and Associate Curator of Anthropocene Studies at the Carnegie Museum of Natural History, Kelli Hoover, Professor of Entomology at Pennsylvania State University, Erin Mallea Assistant Professor of Art at Pennsylvania State University, Travis Mitzel, Artist and Instructor at Seton Hill University, Noah Theriault, Associate Professor of History at Carnegie Mellon University, and Emily Wanderer, Associate Professor of Anthropology, at the University of Pittsburgh. The panel was organized by Noah Theriault, Nicole Heller and Emily Wanderer.

DR. KELLI HOOVER is a Professor in the Department of Entomology at Pennsylvania State University. She received her B.S. in Biology of Natural Resources from the University of California, Berkeley, her M.S. in Biology at San Jose State University, and her Ph.D. in entomology from U.C. Davis in 1997. Kelli is internationally recognized for her research on invasive species biology and ecology, especially for the discovery of mechanisms underlying multitrophic interactions between host plants, insects, and insect pathogens or their symbionts. She is currently investigating indigenous insect predators of spotted lanternfly for their potential as biocontrol agents.

I have been working on the Spotted Lanternfly (SLF) since about 2018, but I've been working on invasive species my whole career. This was a new one for me, and it's the hardest insect I have ever worked on. Spotted lanternfly was first discovered in 2014 in Berks County in Southeast Pennsylvania, and it quickly started spreading. It can be found in very large numbers on over 100 different plants. The reason it didn't get wiped out right away was because it was already in several townships by the time it was found and identified. When it was first discovered, the Pennsylvania Department of Agriculture didn't have funding to do much about it. They had to obtain funding to address the problem, and by the time they went after SLF, it had spread quite a bit further.



TOP: Map created by the New York State Integrated Pest Management Program. **BOTTOM:** Spotted Lanternfly aggregation. Photo by Travis Mitzel.

The northernmost part of Pennsylvania is not in quarantine yet, but environmental DNA has been detected in Erie County where all our grapes are grown. This is a very serious pest on grapes. The thing this insect does kill is grapes. When SLF feeds it removes large amounts of phloem sap, which contains mostly sugars, which reduces starch storage in the roots required to get the plant through the winter. That starch storage is the bank of energy the plant needs to get through the cold weather and produce new growth in the spring.

The good news is there are biological control agents already feeding on SLF in nature. Invasives are called “invasive” because when they arrive in a new ecosystem, they come without their natural enemies, so there is nothing to control the population size. What we’re starting to see through a citizen science project called “Birds Biting Bad Bugs”, is many different species of birds and arthropods eating them: spiders, praying mantises, and predatory stink bugs for example. Predatory stink bugs are almost always smaller than their prey. They mass attack, stick their beak into the insect, and put in a paralytic toxin. Like a spider they dissolve the inside and suck the juices out. We’re starting to work on predatory stink bugs as a potential biocontrol. The idea is to release them, and use their aggregation pheromone that attracts them to a certain area to keep them from leaving a field and/or call in more predatory stink bugs.



A Barred Owl eating a SLF, image collected through Penn State's community science project, Birds Biting Bad Bugs. Photo credit: Joanne Kline.

One reason SLF is such a serious problem is that it reproduces in large numbers, and the vast majority of the eggs are high up in the tree where you can’t reach them. Another problem is that SLF has a huge host range. It feeds on over 100 different plants, and we didn’t know anything about this pest when it first arrived except for some research from South Korea because SLF arrived there as an invasive insect in the early 2000s. Within three years it had spread across South Korea affecting their grape industry.

SLF will kill the tree of heaven, its favorite plant. I have some hypotheses, but we are not sure why tree of heaven is so strongly preferred. I have published some papers showing that SLF can reduce photosynthesis and growth of young trees when it feeds on them for several weeks in high numbers, especially if the same trees are attacked multiple years. SLF produces a lot of honeydew, which is a nuisance. SLF takes in sugar under high pressure in the phloem. They cannot digest it all so they excrete a lot of this sugar largely unchanged. It comes out in huge volumes, and serves as a food source for sooty mold to grow that covers trees, your deck, yard furniture etc. Because of the sugar content, honeydew attracts stinging insects and ants that want to collect it. For a homeowner that’s a pain.

We have discovered that SLF are attracted to tall silhouettes. They are not good fliers, so they tend to climb up a tree or a building to take off to get some lift. Unless it’s a warm day with thermals, they don’t travel very far, but they will fly toward something tall and continue to fly in bouts. They fly towards people, telephone poles, trees, and buildings. I start getting a lot of phone calls about the end of August from reporters because that’s when everyone starts to notice them.

Spotted lanternflies are excellent hitchhikers. That’s how they got to Pittsburgh skipping parts of central Pennsylvania originally. They hitched a ride on railroad cars. Railroad lines are where we were getting many new infestations. SLFs land on railroad cars, take a ride, and fly off when the train slows down again. Their preferred plant, tree of heaven, grows along our railroad lines because it grows in disturbed landscapes. What is more disturbed than where they put a railroad line? For years the railroads would not let the Pennsylvania Department of Agriculture or USDA treat trees along the railroad. Beginning last year regulatory authorities were given access, but look how many years it has been since SLF arrived. Washington, Oregon, and California and the Finger Lakes Region of New York are all gearing up to deal with this insect, because they all have very valuable wine industries.

Question: By 2030 they think SLF could make it all the way west – is that right?

Kelli: That’s an estimate. We keep thinking that SLF will not go very far north, but I don’t think that’s true – look where it is in New York. The Canadians are very worried as well. They have been in touch with us because they have a wine region near Niagara. We have been finding surprising information about the temperatures SLF can tolerate.

They can tolerate really cold temperatures if it’s not cold the whole day.

Question: What does quarantine mean in this case? Because I can drive across county lines and not even notice.

Kelli: A quarantine implemented by the government means that it is your responsibility to not transport the insect at any life stage out of the quarantine. For example, those of us who study this insect even though we never leave quarantine, we still have to keep a log of where we went and check our car. We have to look under our car, in the wheel wells, and up around the windshield wipers because they will hitch rides on vehicles.

Question: I was in Berks County last summer and what struck me was the number of SLF was much lower there than it was in Pittsburgh at that time. Are you seeing a pattern over time where species respond that causes the population of lantern flies to decline?

Kelli: Yes, it does decline, but I can only speculate why this occurs. We think what happens is that SLFs run out of food. They tap every tree of heaven they can find and then leave the area when they are no longer receiving sufficient resources.. SLF will do these mass flights where they leave in huge numbers and go somewhere else. After a couple of years when the trees recover, SLF may come back. It’s hard to predict when or if this will happen. This is one of the unknowns. How long does it take trees to recover, how much do they have to have lost in order to come back? Those are some of the questions we still have to answer.



EMILY WANDERER is an anthropologist of science whose research focuses on the intersection of medical and environmental anthropology. Her current work is on the contemporary convergence of technology and wildlife, particularly the development of biologging, AI, and machine learning tools. Her previous research was on the politics of nature in Mexico, and she is the author of *The Life of a Pest: An Ethnography of Biological Invasion in Mexico*, published by the University of California Press.

Wanderer is Associate Professor of Anthropology at the University of Pittsburgh, and earned her Ph.D. from MIT's program in History, Anthropology, and Science, Technology and Society. Her research and teaching interests include the anthropology of science and technology, medical anthropology, environmental anthropology, multispecies ethnography, Latin America, and Pittsburgh.

Moving away from biology, I am a cultural anthropologist. In my work about the politics of nature, I have long been interested in how people define, think about, and respond to invasive species. It started with fieldwork in Mexico where I was really interested in biopolitics and biosecurity. I found myself doing a lot of fieldwork with scientists who were running invasive species eradication projects. Because of this interest, I’ve been watching for a long time as the alarms have been raised about the impending arrival of the spotted lanternfly. I began talking about SLF in my classes starting in my multispecies ethnography course. In 2020 none of my students had ever seen a lanternfly, but they were all aware, or maybe I made them aware, that we were receiving these injunctions to learn about them and to kill. We talked about these invasive species and the way the rhetoric around invasive species often echoes or is connected with xenophobic talk about human migration.

Generally invasive species are interesting for me because of the way they confound the divide between nature and culture – divisions which are foundational to the discipline of cultural anthropology. Thinking about the emergence of anthropology as a discipline and talking about nature in general, nature is often represented as distinct and separate from the human.

Invasive species and their activities are intertwined with human agency, and they are often defined as “unnatural”. For example, in the USDA’s definition of invasive and non-native species, they identify them as, “plants and animals living in areas where they do not *naturally* exist”. They go on to say, “invasive species are spread primarily by human activities, often unintended”¹ as is the case with these SLFs hitching rides on railroads. In this definition, scientists call upon nature and culture to ground their descriptions and definitions even as these terms are being destabilized. What counts as “natural” in global ecosystems are increasingly recognized as intertwined with human activities. It’s in this context of definitions of native and invasive species that the SLF, as an invasive species, has been subject to the extremes of bio-political governance in which people have been killing them so that other species such as the grape, maple, the black walnut, and perhaps more importantly, the Pennsylvania economy may live. Economists at Penn State projected that the SLF could cost Pennsylvania \$324 million dollars.² The GDP of Pennsylvania is huge, so \$324 million represents only .03% of the state’s GDP – but still it’s a big number.

This biopolitical governance has involved outsourcing labor to multiple actors and institutions to enable governance at a distance.

People, particularly children,
have been enrolled as
biopolitical subjects and
laborers in invasive species
responses in which they
are asked to identify, to
monitor, to collect, but
primarily to kill.

Through calls to protect the plant life and economy of the state, citizens are dutified. They are expected to take their part. This killing is sometimes gamified, envisioned as what some people have referred to as a side-quest people are on as they’re going on their main objective. The state has taken lots of efforts to produce a particular kind of response to the SLF. For example, a heading from a Penn State website says, “Why You Should Care”.³ They’re doing this work to produce the proper emotional and practical response to these insects – why you should care. The goal has been to induce a specific kind of response and relation.

I’ve observed people do care very much about these insects. When you look at people’s actual responses, they don’t necessarily take the form of caring and killing. Instead, the relations with the SLF exceed those imagined or called upon by the state. While the state discourse is rife with calls to eliminate – the most negative and extreme reactions possible with SLF positioned as an unquestioned enemy of life itself – this discourse does not capture and the state and scientists cannot fully direct the range of responses people have to the lanternfly.

Instead, people have responded in unpredictable ways to this insect’s arrival in Pittsburgh. I’ve heard many people comment on the beauty of the lanternfly, notably its wings that are a soft brown with a flash of red. My daughter finds them friendly. She is charmed by the way they are attracted to sweat and crawl on her arm. She regards them as temporary pets that are very soft and affectionate and



The spotted lanternfly sculpture in attendance at the AES conference.

then fly away. Another friend of mine, very taken by the SLF, has built this sculpture here as a Halloween decoration. Look at the attention to detail here – the mouth part. He built this as a Halloween decoration, which I think really traffics in the idea of the lanternfly as a frightening scourge putting ecosystems and livelihoods at risk. Unlike the imaginary ghosts or villains that we have – this is something quite destructive. I think if we look carefully at this sculpture, it tells us that there is more going on than fear. This is lovingly constructed with incredible attention to detail.

He was actually hesitant to allow me to bring it in today because it is not anatomically correct. He didn’t want the lanternfly to be misrepresented. His careful consideration reflects a real engagement with the insect way beyond the careless identification in order to exterminate. If you’re only thinking “these are bad, I need to kill them”, then you don’t need to know how the legs attach to the body or what the mouth-part looks like. I will also note that Halloween was in October, and he has kept this in his home in a prominent place since. All the visitors to my house since I borrowed it and brought it here, have responded with, “Wow! That is beautiful. It’s so cool.” We can see that this is a charismatic bug, people are interested, they care and they’re engaged. As an anthropologist as we look in detail at these responses to the SLF, I’m interested in how they represent alternative relationships with insects and non-human lifeforms. How SLF have become figures in our lives that aren’t just pests or problems but become symbols of how new arrivals can bring surprising, unintended, and not necessarily bad multi-species relationships.

✱

NICOLE HELLER is Associate Curator of Anthropocene Studies for Carnegie Museum of Natural History. She is a transdisciplinary professional focused on improving cultural and ecological sustainability. Heller’s primary research is concerned with understanding and promoting biological diversity in the face of global changes associated with the Anthropocene. Heller’s dissertation research focused on the ecology of a globally dispersed ant: the Argentine ant. Her work shed light on their social organization and interactions with climate and human systems, and how these factors combine to determine the ants’ rate of spread and impact.

Heller received her Ph.D. from Stanford University in Biological Sciences in 2005, and a B.A. from Princeton University in Ecology and Evolutionary Biology in 1995. She conducted postdoctoral research in the Environmental Studies Department at University of California, Santa Cruz.

I am an ecologist and conservation scientist. My fundamental research question is how to care for ecosystems in order to protect and steward the diversity of life. As we face the climate and biodiversity crises, we have protected areas and we use certain strategies to manage those lands, but they are not really working in face of the larger trends. The conference’s thematic focus on repair and considering what tools work to produce repair are central to my interests. Yesterday at the plenary talk, I was really interested in comments speaking to a temporal aspect of repair: to what are we trying to repair? We are not trying to go back. We cannot repair to the past. That’s an important concept in ecosystem management. Instead, it is about repairing for transformation: to build ecosystems that can accommodate novelty and continue to sustain diverse, thriving, healthy spaces on this planet for human and non-human communities.

I’m interested in the issue of how transformation happens, how we can participate, and how we know when the trajectory of an ecosystem is headed in a good direction, or whether we need to intervene to stop it and stomp things. How can we manage systems to protect the so-called rare, endemic, and what we often call the native ecosystems, while also allowing flexibility for systems to change and transform and respond to novelty? How can systems absorb global anthropogenic driven changes, but continue to be healthy? (I am using “healthy” knowing how loaded a term that is - “healthy” for who and for what?)

1 “What Are Invasive Species?” USDA National Invasive Species Information Center, accessed August 21, 2024, <https://www.invasivespeciesinfo.gov/what-are-invasive-species>.
2 “Spotted Lanternfly.” Penn State Extension. Accessed August 21, 2024. <https://extension.psu.edu/spotted-lanternfly>.
3 Penn State Extension “Spotted Lanternfly.”

I saw SLF for the first time around 2015 in Berks County, we were walking in the woods, and I was like, “Whoa, what is that? This is a huge planthopper!” I was thinking, “How have I missed this my whole life? Who is this bug?” I immediately encountered the early concerns about it, and then watched what has happened here in Pittsburgh. I was really amazed at how much attention the public was paying to it, how interested they were, and how complex those responses were. I was paying attention to how the science community responds to the novelty in our ecosystem. What is the immediate response, rhetoric, and tactics that are employed and based on what kind of scientific evidence? They had to move fast. In an ideal world, we could immediately stop these nascent, small populations. Instead there was delay, and SLF reproduces so quickly that we now have a bigger problem. As a scientist, I’m always interested in the contradiction between the idea that in order to save certain parts of nature, we have to kill other parts. This puts conservationists in the inevitable position of what has been described as “playing god” with nature. There are a lot of problems with that approach. We often don’t have the information we need, and we are thinking on very small time scales that are not relevant to the geological time scales upon which these systems and communities evolve and emerge.

I have been fascinated with the SLF stomp campaign. In the face of this newcomer in our community, the biological community freaked out. It seemed like a quick decision to mobilize a campaign that asked all of us to smash these novel planthoppers. We weren’t asked to admire them, be curious about them, or even learn what kind of insect they were, but to smash them.

I became interested in how much children obliged. They were psyched to participate. While there were different feelings, overall there was a sense that “we must kill this bug, this bug is killing our trees.” One day my daughter and I paused for a moment to admire one, and I wavered. “Should we kill it, should we not?” She yelled at me, “I thought you love the environment. What is wrong with you?” We got into it. At that point, I decided to talk to kids, because they have really taken on this agenda to kill. If we are at a moment of crisis - unsustainability in our relationship with non-humans, nature, the earth - what does it mean to spread a campaign that says “Kill this bug. Don’t think about what it is, don’t think about where it comes from, just kill it. You need to do that to protect the trees.” How do these campaigns affect our deeper psychology and social, relational understandings? What are the long-term consequences? Are we helping transform our relationships with ecosystems toward sustainability, and cultivating flexibility, when we’re promoting this kind of campaign?

I began observing kids in my neighborhood. How they were killing SLFs and the tactics they came up with. Each kid will tell you they know how to do it best. Some said, “You have to do it this way, it’s the most cruel and therefore the most delightful.” Others said, “We have to do it in a way that is less painful.” Eventually, I did a focus group with kids on my street exploring their relationship with this insect. Why were they so intent on killing and how do they feel about it? How does the stomp campaign affect peoples’ attitudes, understandings, and sense of relationship? And, importantly, is it effective? And we have our entomologist on the panel shaking her head no.

Kelli: Every time I get interviewed, I say that it is not worth your time. It’s not going to make a dent.

Nicole: Exactly, that’s what is so powerful.

Kelli: I worry this tells kids that bugs are bad. So I’m highly against this campaign, and many of us at Penn State are. The Pennsylvania Department of Agriculture likes it.

Nicole: That is the risk: that the campaign is not effective biologically. It doesn’t address how these bugs got here, why they are thriving, what would stop their thriving or what could be an effective control effort for an insect. Instead, they’re just asking us to kill – toward what end? The fact that this insect’s primary host plant is tree of heaven, a noxious tree that we have been trying to control, wasn’t that a moment to pause and ask:

Might this insect be our friend?
Might we be able to use it as part of an
overall pest management strategy?
How might we incorporate it
into our community?”

I want to share some of my findings with the neighborhood focus group. First, some quotes from a conversation between two boys, nine and ten years old. One said, “I felt like a god the first time I stomped on one because it’s the only thing you can kill.” And the other immediately said, “Oh you can kill anything you want, but you just choose



"I am not angry. I am happy and there are some around me. That is what is happening. I am happily coexisting with them," age 12.
Prompt: draw a self-portrait with spotted lanternfly. Made during the Neighborhood SLF Focus Group organized by Nicole Heller and facilitated with Emily Newman.

not to if you’re a good person. Except the SLF. It’s good to kill them.” There was a general feeling of “Yes, it’s good to kill them. Thank goodness we have this one bug that we’re allowed to kill.”

So I asked, “What if you were a SLF, how would you feel?” And the kids paused, reflected and quickly said, “Well actually we humans do a lot of pollution ourselves. We’re really bad on the environment. Maybe we’re the invasive species? Maybe the SLF should be killing us?” They understood this larger contradiction immediately. They started to devise logics saying, “Well we’re smarter, and we planted the trees so we have to protect them, it’s our job to steward them”. Ultimately, they decided that SLF are too abundant, that is the problem, but we don’t need to kill them, just reduce their abundance. They decided if predators are eating them then we should take that into account. When I told them the science was revealing that trees were not dying from SLF, it was news to them. They felt angry and betrayed. They said, “Well why is our government telling us these lies?” They felt like they had been duped to participate in this effort, and they were not sure how to feel about it. When we discussed the potential impacts to grapes, they said, “Well, we do like grapes and we want to protect them.” Ultimately at the end they wanted to discuss killing at large. They began to develop a continuum of insects you could kill and those you couldn’t based on their “grossness.” We had incredible conversations. I was floored by the complexity of the dialogue. It’s important to have these nuanced, ethical dialogues with people of all ages around something like the SLF.



TRAVIS MITZEL is an artist focused on eco-anxiety, creating new eco-mythology and collaborating with non-humans in a post natural world. His work seeks simple ways to move forward and make kin in the face of a catastrophic future. Mitzel received his M.F.A. in Photography from the School of the Art Institute of Chicago in 2019.

My history and relationship with invasive species goes back to when I was a teenager. My neighbor was an exotic tortoise breeder, and I was often going to reptile shows with her. I started to notice that the tegus I was seeing for sale were on the news and had been released in the state of Georgia. The Burmese pythons that were for sale are now in the Everglades. Going to these reptile shows gave me precognition of what was about to be out in the world and the wild.

Nicole was pointing to temporality, and it's important to note that the SLF is not coming into a “pristine” “native” Pennsylvania. It is arriving in a Pennsylvania that has Chinese mantis, and the tree of heaven, SLF's main food source, was introduced in the 1700s. This is a long colonial history that we are dealing with.

I wanted to share some things that frustrate me with the language around invasive species. First, Charles Elton who invented the term “invasive species” was a British zoologist. He lived through WWI and WWII and had invasion on his mind. We need to consider how these bugs got here. They arrived on imported stone. Then you have to wonder, why don't industries quarantine their materials? I work as a photographer for Thermo Fisher, and we often have to quarantine packages or radiate, freeze, or heat things to kill biological contaminants. The technology exists to do it, but we want cheap materials, so here are the SLF eggs.

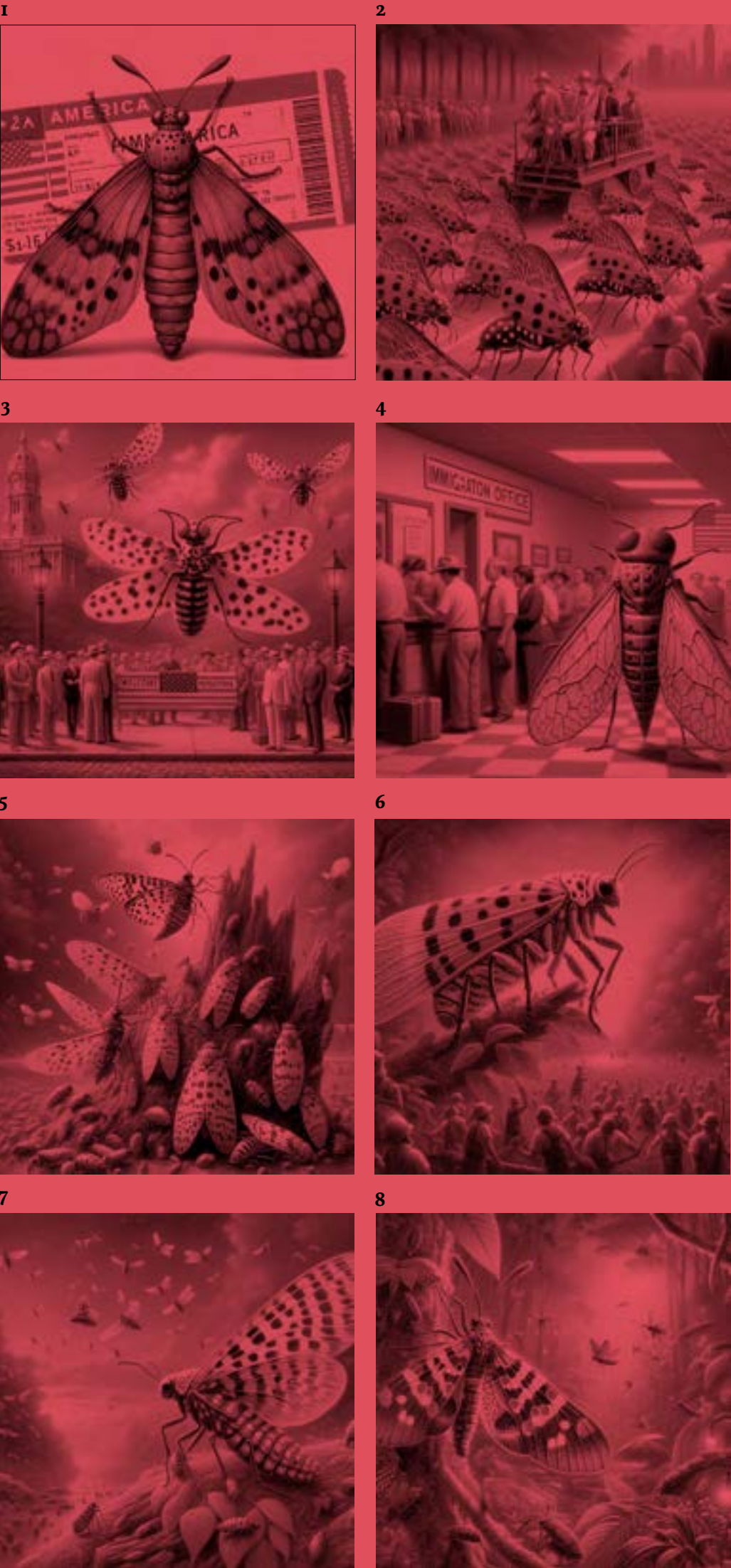
I created AI images with Bing Image Creator to help visualize what the internet thinks of Spotted Lanternfly. The image prompts are: Spotted Lanternfly coming to America (1), Celebrating Spotted Lanternflies in America (2), Welcoming Spotted Lanternflies to Pennsylvania (3), Spotted Lanternfly Immigrating to America (4), Dangerous invasive Spotted Lanternflies colonizing new territory (5), Invasive Spotted Lanternfly coming to a new ecosystem (6, 7), and Spotted Lanternfly living in a new ecosystem (8). In addition to the AI images, I made some memes. The image with of the “Stop this Invader” signs says:

Oh, that's major corporations and large scale monoculture agriculture using their PR department to shape official state positions to force pest control labor on citizens instead of investing into new farming practices.



ABOVE: Travis Mitzel, 2024

That's often how I feel about these campaigns. Very specific industry interests are put onto the individual. *On my one day off a week I'm supposed to go kill stuff while hiking in the woods?* I am not oblivious – I do believe there are plant and animal species that can be problematic. But as we've all pointed to, SLF wasn't all it was cracked up to be. I'm always interested in the intersection between the introduction of invasive species and who is to blame. I've done a lot of research on the invasive Asian carp, and when you look into it, they are all escaped farm animals. Fish farms in Louisiana flooded, and they got out. So again, an industry was not doing all the safety precautions, and now it's our problem. Instead of blaming animals, who as best we know are just trying to live their best lives – they aren't maliciously thinking, “I want to conquer North America.” They are just trying to be a bug or a fish. It's important to consider the larger language and point to the real villain. Remove the Scooby-Doo mask, and ask who is the actual bad guy here. 🐞



ABOVE: Travis Mitzel with Bing Image Creator images. All prompts had “oil painting” added at the end.

NOAH THERIAULT is a political ecologist whose work integrates methods from anthropology, geography, and history. Since 2006, his research has examined the collision of conservation, capitalism, and Indigenous rights in Palawan, an island widely coveted as the Philippines’ “last frontier.” More recently, he began investigating Manila’s apocalyptic traffic congestion, which has become a fulcrum for struggles over social and environmental inequality in the city. In addition to these place-based studies, Theriault has worked with scholars, practitioners, and activists from around the world to explore how collaborative research can serve as a form of collective action.

Theriault is Associate Professor of History at Carnegie Mellon University and earned his Ph.D. from the University of Wisconsin-Madison.

My interest in SLFs was irrevocably piqued when my then 18-month-old daughter learned, seemingly on her own, that they should be squashed. Everywhere we went, she would see SLFs and exclaim, “Bad bug!” while trying to stomp them with her tiny feet. Without fully understanding it, she had adopted this practice from peers or educators at her nursery school. It troubled me that one of her first interactions with wild animals involved killing them with license and delight.

In retrospect, I should not have been surprised to see a toddler enlisted in the effort to exterminate these alleged bad bugs. The state’s anti-SLF campaign has been almost as pervasive as the insects themselves. Official posters order us to “STOP THIS INVADER!” and there’s even a dedicated hotline - 1-888-4BADFLY - where citizens can report sightings. It’s no wonder so many of us feel compelled to “scrape, squash, stomp.” We are being told a simple, alarming story about the SLF: it’s an “invader” from Asia; a threat to our forests, gardens, and crops; a pest that must be exterminated or else. This is what scholars call an environmental narrative, an oversimplified account of ecological change that reflects society’s vested interests and biases.¹ So, how do we tell a more complex story about the SLF’s arrival in North America? What happens when we put this so-called invasion into historical perspective?

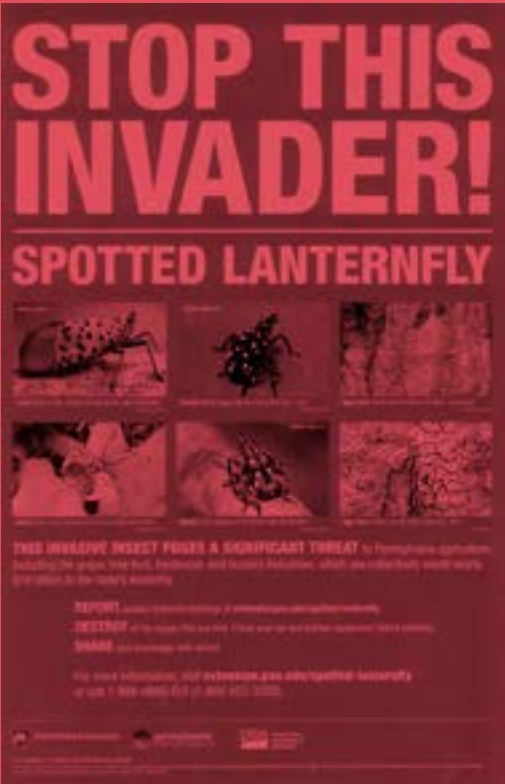
The logical place to start would be with European colonization of this continent and its escalation in the latter half of the 18th century. Western Pennsylvania, in particular, saw conflict during this period, as armed colonists spread westward and Native Nations sought to defend their lands. It was in roughly 1784, as Travis mentioned, that the tree of heaven was imported as an ornamental for the elites of Philadelphia to put in their gardens. Over the course of the next two-and-a-half centuries, the tree of heaven spread across the continent, in part, along railways built with lumber from the forests of these lands. Within a century of the Tree of Heaven being imported to Philadelphia, the entire state of Pennsylvania was virtually deforested for a variety of purposes including building railroads that transported invasive species and humans around the continent.²

If we fast forward to recent decades, the forests have regenerated in many parts of the region, but they are very different now. Prior to colonization, Native Peoples used fire to influence the location and composition of forests. Since the 1940s, the state has pursued a policy of fire suppression, which favors certain trees but reduces diversity and makes forests less resilient. Many of the species that thrive under fire suppression are the ones that make the forest less resilient from an ecological standpoint. We have already made many, many generations of changes to this landscape in ways that shape how a newly arriving species, like the SLF, is going to interact with it.³

The SLF came through the global commodity chain. It arrived on stone – something that was mined or quarried in East Asia and bought here with the eggs on it. As a scholar, I want to put that shipment of stone into a broader global and historical perspective and think about the systems that brought the species here rather than focusing so much on the species itself. How do we change, abolish, or repair those systems such that our vulnerability to this kind of disruption is addressed at the source rather than the symptom?

Meanwhile, let’s also reflect on what the SLF extermination campaign suggests about our culture, our politics. For me, this means facing the ongoing reality of settler colonialism. We often think of colonization as a thing that happened in the past, but as Patrick Wolfe has convincingly argued, “invasion is a structure not an event.”⁴ In settler-colonial societies, settlers like me have an impulse to nativize ourselves as the rightful occupants of the land and to deem newer arrivants, human and otherwise, as invaders. This is part and parcel of settler-colonial culture and governance. Jessica Catolino has observed that “invasive species management and the embrace of native species are affective projects that operate distinctly in settler-colonial societies like the United States, past and present.”⁵ Understanding why the Pennsylvania Department of Agriculture pushed citizens to exterminate SLFs - and why so many of us eagerly obliged - requires reckoning with our colonial condition and all of the violences that it entails.

That’s a much larger and longer conversation. Right now, though, we already have alternative frameworks for relating to so-called invasive species. One is a field called conciliation biology,⁶ which made a splash a decade ago. Another is reparation ecology,⁷ which has been proposed by researchers in Brazil. SLFs simply do not have a negative effect on everything they touch. They do devour tree of heaven, but that’s beneficial for ecosystems where they are crowding out other trees. And SLFs excrete a substance called honeydew that bees apparently like to eat. I don’t know if this is sustainable for keeping bees, but the point is that there is so much more going on with the ecology of SLF. It provides an opportunity to consider alternative ways of relating to other-than-human beings in a time of crisis and disruption. 🦋



ABOVE: Barnhart Log Loader, loading logs onto railcars at a log landing, Image courtesy of the Pennsylvania Lumber Museum Photo Collection, 777.17. **LEFT:** “Stop This Invader!” Spotted Lanternfly Poster, Penn State Extension, Pennsylvania Department of Agriculture and USDA.

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Michael C. Stambaugh et al., “Wave of Fire: An Anthropogenic Signal in Historical Fire Regimes across Central Pennsylvania, USA,” *Ecosphere* 9, no. 5 (May 2018), <https://doi.org/10.1002/ecs2.2222>.

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6 Scott P. Carroll, “Conciliation Biology: The Eco-Evolutionary Management of Permanently Invaded Biotic Systems.” *Evolutionary Applications* 4, no. 2 (2011): 184–99. <https://doi.org/10.1111/j.1752-4571.2010.00180.x>.
7 Andrea Lampis et al., “Reparation Ecology and Climate Risk in Latin-America: Experiences from Four Countries,” *Frontiers in Climate* 4 (October 13, 2022), <https://doi.org/10.3389/fclim.2022.897424>.



Age 5. Prompt: draw a self-portrait with spotted lanternfly. Made during the Neighborhood SLF Focus Group organized by Nicole Heller and facilitated with Emily Newman.



1

Drawings were made during the Neighborhood SLF Focus Group organized by Nicole Heller and facilitated with Emily Newman. Prompt: draw a self-portrait with spotted lanternfly.

IMAGE 1: *This is me and the spotted lanternfly. I am holding it at arm's length away from me because they are gross. But I am not going to crush it. That is the important thing.* Age 14

IMAGE 2: *Don't think of me as main character, think of the main character as the spotted lanternfly. We are making them angry. He has worried face. That is me. I am worried about the lanternfly and the pink clouds.* Age 12

2



4



3

IMAGE 3: *I drew myself and the lanternfly. I am disgusted and surprised. I am standing there and I spot one and I am surprised. I jump back. What a weird bug.* Age 14

IMAGE 4: *The spotted lanternfly is right on my face. I drew my face and put it on it.* Age 7



18

Robots Killing Spotted Lanternflies

When Robotics and Biological Ecosystems Meet

Maria Ryabova

Maria (Masha) Ryabova is a Ph.D. candidate in Cultural Anthropology at the University of Pittsburgh. Her current Ph.D. fieldwork examines robotics ecosystems in Pittsburgh and Boston. Her research is further informed by her experience working in Mainland China and Hong Kong prior to her Ph.D., and focuses on similar questions at a global scale.

“Everyday Federal scientists are looking for new ways to kill bugs”
Starship Troopers (1997)

An iconic scene from *Starship Troopers* (1997) could serve as a script for the recent wars on Spotted Lanternflies in America. Paul Verhoeven’s satire, set in the 23rd century, depicts the United Citizen Federation,¹ a globalized and distinctly American totalitarian state, fighting an endless war with an alien species of giant bugs. The scene portrays children rigorously stomping cockroaches while their female teacher joyfully jumps and claps her hands in an advertisement by the United Citizen Federation’s propaganda arm, the Federal Network or FedNet² (See Image 1). The film’s refrain, “Everybody is doing their part. Are you?” and FedNet’s educational campaigns instilling a duty to eradicate, echo Emily Wanderer’s presentation at the American Ethnological Society Conference earlier in this issue. In regards to the Spotted Lanternfly and Department of Agriculture’ calls to “stomp” and “squash,” Wanderer states, “people, particularly children, have been enrolled as bio-political subjects and laborers in invasive species responses in which they are asked to identify, to monitor, to collect, but primarily to kill.”³

In this essay, I examine the role of scientists — specifically roboticists — in the campaign against the Spotted Lanternfly through the creation of the “TartanPest” robot. Further, I explore how roboticists perceive biological ecosystems and what the TartanPest project reveals about the intersection of biological and robotics ecosystems. Following anthropologists who have examined the cultural discourses surrounding invasive species (Wanderer, 2020, Subramaniam, 2001), I situate the case of the Spotted Lanternfly-killing robot at the intersection of debates on otherness, nature and culture, and the role of roboticists and scientists as protectors of nature against a foreign, invasive threat.

1 Crim, B. E. “A World That Works: Fascism and Media Globalization in *Starship Troopers*.” *Film and History*, vol. 39, no. 2, 2009, p. 17.
2 “In *Starship Troopers*, the Federal Network is the ultimate source of social control and the agent of cinematic derealization, responsible not only for defining the enemy but for convincing Earth’s population that the war is going according to plan.” (Crim 2009, p. 23)
3 Emily Wanderer, “Long Live the Lanternfly” roundtable excerpt, American Ethnological Society Conference, April 5, 2024, *Tree News*, Issue 5, p. 13.



TOP: IMAGE 1 Children participating in the “stomp campaign” against bugs, as depicted in the satirical propaganda scene from *Starship Troopers* directed by Paul Verhoeven (1997). **BOTTOM: IMAGE 2** Robot “TartanPest,” photo from the PowerPoint of the pitch “Autonomous Robot Control for Spotted Lanternflies. Farm Robotics Challenge 2023 Lightning Talks”

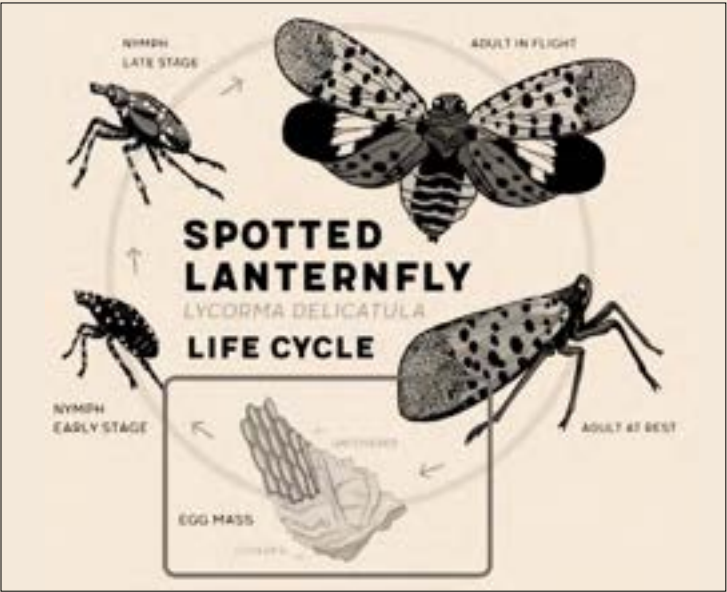
Methods

In my essay I rely on ethnographic data I collected during my ongoing fieldwork within robotics ecosystems in Pittsburgh and Boston beginning in January 2023. My data consists of a series of interviews, observations, and TartanPest project documentation including a project proposal and project report, generously shared with me by my informants. All interviews were anonymized to protect participants’ confidentiality.

TartanPest: Background

TartanPest is a robot (see Image 2) developed by a Field Robotics team at Carnegie Mellon University for Farm-ng’s 2023 Farm Robotics Challenge, an annual nationwide university robotics competition organized by the California company Farm-ng in collaboration with UC Agriculture and Natural Resources. The mission of the challenge is to “instigate positive change in America’s food system.”⁴ To participate in the competition, teams are required to purchase and integrate Farm-ng’s “research package” composed of the Amiga Developer Unit, an all-electric, battery powered micro tractor base with attached micro-computer. The TartanPest team consisted of a professor, researchers, and students, mostly undergraduates. The team modified the Farm-ng Amiga base by adding a robotic arm equipped with a nylon brush to scrape SLF egg masses off trees and a stereo camera to recognize egg masses (see Image 3). TartanPest software incorporated autonomous operation of the robotic arm and egg detection using a computer vision system trained on 3000 images of SLF egg masses. The project was officially titled “Autonomous Robot Control for Spotted Lanternflies” and pitched as “an innovative initiative dedicated to developing a robot to combat invasive species” that is “effectively safeguarding ecosystems from the detrimental impacts of invasive species.”⁵

4 “Farm Robotics Challenge,” farm-ng, <https://farm-ng.com/pages/farm-ng-uc-anr-farmbot-ai-challenge-details>.
5 Quote from the PowerPoint slide in TartanPest’s presentation “Amiga pitch”



TOP: IMAGE 3 SLF eggs depicted as TartanPest's target in project documentation.
MIDDLE: IMAGE 4 TartanPest scraping the SLF egg mockups on CMU's campus.
BOTTOM: IMAGE 5 TartanPest simulated environment.

Imitating Nature: Crafting SLF Eggs

Responding to insects in an ecosystem presented a number of challenges for the TartanPest team. At first the scientists attached a metal brush to a robotic arm, but it was destroying the tree's bark, so they changed it to a nylon brush. Because the project was developed during the late winter and early spring, there were no SLF egg masses for the robot to remove. To resolve this issue, roboticists had to imitate nature by crafting artificial egg masses, or "mockups".¹ They tried rice, wood glue, plaster, epoxy, foam and glue. After experimenting with combinations of materials, egg mockups were made out of plaster. TartanPest team members first replicated SLF's physical environment by attaching mockups to trees on campus (see Image 4). However, due to time constraints, it was impossible to conduct a full-scale experiment in real life, so the TartanPest team decided to continue the experiment in a laboratory and use a simulated environment: a computer program replicating the robot, "mockup" egg masses, and the scraping process (see Image 5).

¹ "Since we could not find an area with significant incidence of egg masses, we used mockups during the development of the project. Different materials that resembled the appearance of the egg masses were evaluated. As real egg masses were scarce in the vicinity of our campus, we couldn't validate the detection accuracy on authentic egg masses using the robot. However, the model consistently detected the artificial egg masses with high success rates." (from the TartanPest project report, 2023)

These actions reveal how the TartanPest team members understand the biological ecosystem and their role in safeguarding it. By initiating the project during the winter season — before eggs were even laid — creating "mockups" to imitate eggs, attaching these mockups to trees at a height of 1.5 feet (while SLF typically lay eggs higher up), and ultimately moving the experiment into the controlled environment of a laboratory and, later, into a virtual environment of computer simulations, the scientists demonstrated their perception of ecosystems as something controllable, malleable, and suitable for the safe confines of a lab. The project was disconnected from the natural cycles and interconnectedness of the seasons, the SLF life cycle, and the role of natural predators in balancing the ecosystem. These connections, which are fundamental to the concept of an ecosystem, were absent. At the same time, although the project received substantial media attention, the roboticists that I spoke to were well aware of the possible limitations of their project.

The scientists' approach to safeguarding the ecosystem involved deconstructing it into separate elements, bringing these into the lab, and running tests on them. This attempt to replicate nature within a controlled environment and further into computer simulations reflects the critiques of feminist scholars of science, such as Evelyn Fox Keller in *Reflections on Gender and Science* (1985). Keller critiques traditional scientific approaches for reinforcing a gendered mythology that casts "objectivity, reason, and mind as male, and subjectivity, feeling, and nature as female."² In this framework, TartanPest team members view nature as something to be controlled and its reproduction as something to be artificially replicated.

The scientists' role in "safeguarding" ecosystems from invasive species paradoxically involved both artificially creating and then, using a robot, destroying SLF eggs. This reflects a broader narrative in which scientists are portrayed as saviors of nature — while simultaneously engaging in its artificial reproduction and control.

Techno-strategic Language of Robotics Engineers: Combat, Attack and Destroy

I first heard about this robot from the graduate students of the Robotics Institute, who showed me an article entitled "CMU Team Develops Autonomous Robot To Stave Off Spotted Lanternflies."³ The words "combat," "stave off," and "control" are euphemisms for killing.⁴ As I was beginning to learn the specific language of roboticists, I was reminded of what feminist-antimilitarist scholar of gender and national security issues, Carol Cohn, calls "technostrategic language." In her article "Sex and Death in the Rational World of Defense Intellectuals" (1987) Cohn coins the term "technostrategic language" to examine how "nuclear strategic language and thinking are imbued with, indeed constructed out of, modes of thinking that are associated with technology."⁵

Although Cohn examined the military language of defense intellectuals at a workshop on nuclear weapons in the 1980s, the term she coined is useful today in analyzing the language of the engineers designing the SLF-killing robot. However, whereas Cohn demonstrates that scientists used euphemisms to hide the horror of nuclear weapons, TartanPest scientists did not euphemize their language. They instead used explicit terms related to killing: combat, attack, destroy.

When I asked how the TartanPest team came up with the idea of a SLF-killing robot, specifically one that scrubs the insects' egg masses, one of the team members reflected:

*Humans are not effective at killing them. There are a lot of them, they jump around. So we thought how can we **attack** them in a way that they are **vulnerable and [kill] all together?** And we came up with an idea to **kill** their eggs. But then we thought: how do we **destroy** them?⁶*

The words "attack" and "destroy" connote military combat. Even though TartanPest is a non-military robot (albeit the robotic arm was 'inherited' from a project funded by the DOD), the language the roboticists use to talk about this project is "technostrategic"

² Keller, Evelyn Fox. 1985. *Reflections on Gender and Science*. Yale University Press. p.7
³ Kayla Papakie, "CMU Team Develops Autonomous Robot To Stave Off Spotted Lanternflies," Carnegie Mellon University School of Computer Science, June 8, 2023, <https://www.cs.cmu.edu/news/2023/tartan-pest>.
⁴ While "control" can be understood as meaning "killing" by the general public, the TartanPest roboticists used this word in a more technical sense
⁵ Carol Cohn, "Sex and Death in the Rational World of Defense Intellectuals," *Signs: Journal of Women in Culture and Society* 12, no. 4 (July 1987): 687–718, <https://doi.org/10.1086/494362>.
⁶ A quote from the interview

due to a convergence of military strategic thinking and technological thinking. Another example of military strategic thinking is roboticists’ choice of words to demonstrate the sequence of finding, detecting, localizing and scraping the eggs:

“Navigate (Amiga) → Detect Eggs (Deep Learning) → Localize Eggs (Stereo Camera) → Scrape (6 DoF Arm)”¹

According to Cohn, one of the main functions of mastering technical language and disciplinary jargon is a sense of control and agency by those who have learned to speak it. Others (such as non-specialists) who are not ‘in the know’ are faced with a barrier that silences those who don’t speak the language of scientific rationalism.² In particular, roboticists involved in the SLF project emphasize their role in controlling a biological ecosystem by fighting off a foreign ‘invader.’ In the process, roboticists understand technological tools as ways of rationally managing and protecting natural ecosystems, as in the mission statement that concludes the Farm Robotics Challenge report: “By deploying this robotic solution, we can foster sustainable practices in agriculture while effectively safeguarding ecosystems from the detrimental impacts of invasive species.”³

Biological Ecosystems and the Threat of Invasion

In the interactions between roboticists and SLF, humans and non-humans become intertwined in questions of national (and natural) security. Even though there are no intended parallels between exterminating SLF as an expression of xenophobia, TartanPest fits into a wider discourse.

“The Aliens Have Landed! Reflections on the Rhetoric of Biological Invasions” by Banu Subramaniam explores the discourse surrounding biological invasions and how it mirrors societal anxieties about immigration and cultural integration. Subramaniam critiques the use of militaristic and xenophobic language in scientific and popular narratives about non-native species, highlighting how these terms reflect broader cultural fears and prejudices. In particular, given SLF’s origin in China along with media discourses about its mass reproduction, the SLF is associated with the “Chinese Threat,” a part of anti-Chinese discourse, caused by anxieties over the rise of China and recent instances of “Asian hate.” Drawing on Banu Subramaniam’s argument that fear of alien species invasion is similar to germ panics and a projection of “anxieties about economic, social, political, and cultural changes onto outsiders and foreigners,”⁴ I suggest that the campaign against SLF presents a case of projected xenophobia onto an insect. The fear of SLF is a projection of fears of immigrant invasion where “immigrants will take our jobs” against the background of recent germophobia based on the COVID-19 outbreak which provoked Asian hate, and is an expansion of the same xenophobic stance regarding SLF.

As cultural studies scholar Megan H. Glick writes in *Infrahumanisms: Science, Culture, and the Making of Modern Non/personhood* (2018), the term “alien” came into use in 1944 during the Cold War, with “alien invaders” originally referring to “communist brainwashers.”⁵ Then the term evolved to define non-citizen status within a nation state:

Any person not a citizen or national of the United States as the term ‘alien’ is defined in section 101(a)(3) of the Immigration and Nationality Act (8 U.S.C. 101(a)(3)). This term may include a stateless person and is synonymous with ‘noncitizen’ and ‘foreign national.’⁶

Similar terminology is used to describe alien species:

A species that enters the country for the first time is called an “alien” or an “exotic” species; after an unspecified passage of time they are considered residents; after a greater unspecified passage of time they are considered naturalized species.⁷

In short, the question of which species should be part of an ecosystem, and which are invaders to be killed, is linked to a broader discourse around xenophobia and immigration.

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1 A quote from TartanPest’s PowerPoint presentation “Amiga pitch”
2 “The dominant voice of militarized masculinity and decontextualized rationality speaks so loudly in our culture, it will remain difficult for any other voices to be heard until that voice loses some of its power to define what we hear and how we name the world — until that voice is delegitimized” Cohn, “Sex and Death in the Rational World of Defense Intellectuals,” pages 717-718.
3 TartanPest, Carnegie Mellon University, Farm Robotics Challenge Report, 2023
4 Subramaniam, Banu. “The Aliens Have Landed! Reflections on the Rhetoric of Biological Invasions.” *Meridians* 2, no. 1 (2001): 26–40, 34.
5 Glick, Megan H. *Infrahumanisms: Science, Culture, and the Making of Modern Non/Personhood*. Durham: Duke University Press, 2018, 103.
6 “Glossary,” U.S. Citizenship and Immigration Services, accessed August 21, 2024, <https://www.uscis.gov/tools/glossary>.
7 Banu Subramaniam, “The Aliens Have Landed! Reflections on the Rhetoric of Biological Invasions.” *Meridians* 2, no. 1 (2001): 26–40, 27.

Robotics Ecosystem

The case of TartanPest offers insights into the concept of a “robotics ecosystem.” In my fieldwork, I encountered the term “robotics ecosystem” repeated as a mantra. Despite the frequency of this term, there is no consensus on what it means: different “actors” within the so-called “ecosystem” say different things. However, most people agree the ecosystem is composed of a network of organizations from industry, government and universities, “talent” (professors, graduates, students) and, most importantly, funding (which, for scientists, is closely linked to a “publish or perish” model of productivity).

The university robotics ecosystem involves what one of my roboticist friends (who has preferred to remain anonymous) described to me as the “feeding-funding” cycle. In other words, a professor or PI “feeds” students via applications for lab funding, followed by research production, demonstrating results to the wider robotics community and funding organisms, leading (ideally) to a further cycle of funding. The “robotics ecosystem” typically refers to controlled environments, often laboratories, designed as safe spaces for experimentation. It highlights the accessibility of resources — both human and financial — and the connection between universities and industry, such as acquiring a base from Farm-ng. It also demonstrates the re-purposing of resources from other projects (like a robotic arm), funds to compensate team members, and the flexibility to abandon one project and start another, since the hardware remains in the lab.

When Robotics and Biological Ecosystems Meet

What happens when robotics and biological ecosystems meet? In my analysis, the SLF-killing robot underscores the convergence of both ecosystems, in the process reconfiguring them into what I identify as a “cyborg ecosystem” — a nature-culture-technological system that consists of cyborgs — amalgams of human, animal and the machine. Studying what Donna Haraway refers to as “naturecultures”⁸ means being aware of the interconnections between nature and culture and the humanities and the sciences.⁹

Unfortunately, the project was not nominated for a prize. Now TartanPest is deployed in testing corn (see Image 6). As one TartanPest team member shared, “Now this arm is upside down so we can reach the corn. [We collaborate with] plant scientists who developed a sensor that you have to insert in the corn stock to measure nitrogen in it.”¹⁰



IMAGE 6 TartanPest repurposed for corn testing.

One of the key principles in the history and philosophy of science is that the time and place of inventions are crucial to its cultural meanings and effects on the world.

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8 Donna Haraway, “A Cyborg Manifesto: Science, Technology, and Socialist Feminism in the Late Twentieth Century,” in *Simians, Cyborgs and Women: The Reinvention of Nature* (New York: Routledge, 1991), 149-181.
9 Banu Subramaniam, “The Aliens Have Landed! Reflections on the Rhetoric of Biological Invasions.” *Meridians* 2, no. 1 (2001): 26–40, 37.
10 A quote from the interview.

In the summer of 2023, Pittsburgh was overrun with Spotted Lanternflies (SLF), and many public conversations centered around both new AI technologies and SLF. It was during this period of heightened interest in the SLF crisis that TartanPest was launched. Moments of perceived crisis (and hype surrounding new technologies) make funding more accessible: ‘seizing the moment’ by linking an invention or technological solution to a crisis is a key step in pitching it effectively.

This is not to say that quantitative methods and laboratory testing aren’t worthwhile. Nor do I suggest that protecting nature from invasive species isn’t important, although there are many ecologists who have developed alternative frameworks to conservation biology and disagree with protective models that are dominant in the field. Instead, following Cohn and Subramaniam,¹¹

I advocate for a collaborative approach,
in which scientists, biologists, ecologists,
and anthropologists collectively
recognize that “robotics” and “biological”
ecosystems are not separate. An
awareness of the interconnectedness
between nature and culture means
taking a more nuanced approach to
invaders — alien or not.

Coda: “positionality statement”

Why do I care about SLF? There is an alien affinity between me and SLF. We are both aliens: SLF is an alien invader species, and I am a non-resident alien, temporarily residing in the US — simply speaking, an immigrant. Like a spotted lanternfly, I came from a ‘communist brainwashers’ country, one that no longer exists, and I feel kinship with this pest when I see myself in its spotted mirror.



Acknowledgements: I am grateful to my advisor, Dr. Emily Wanderer, whose work on multispecies ethnographies and whose class Humans and Other Animals inspired me to think about SLF for the first time. I also would like to thank my friends and colleagues Brendan Ezvan and Erin Mallea for contributing their thoughts and edits during the writing process.

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¹¹ “Many ecologists and conservation biologists have developed alternate models and disagree sharply with the dominant framework of conservation biology. Feminists in the humanities and social sciences can and must build alliances with progressive scientists in the natural and physical sciences. Further, women’s studies programs must make it a goal to produce a scientifically and technologically proficient group of students and faculty who are not relegated only to the role of “critics” (important though this is) but are also members of the scientific enterprise, producing knowledge about the natural world, a world that is deeply embedded in its social and cultural histories. Studying “naturecultures” means being cognizant of how science is embedded in these cultural contexts. Just as science does not mirror nature, we must not reduce science to mirroring politics either- right or left. Living in naturecultures means developing a self-reflexivity, continually wrestling with the interconnections of natures and cultures, politics and science, the humanities and the sciences, and feminisms and science.” Subramaniam, Banu. “The Aliens Have Landed! Reflections on the Rhetoric of Biological Invasions.” *Meridians* 2, no. 1 (2001): 26–40, 37.

MY FRIEND, THIS IS HOW MOTHS DIE...

My friend, this is how moths die –
tumbling to the ground, light
like snowfall at the end of July.
Bend down for a handful of white,
clench your palm so it doesn’t blow
back to earth, nor up high.

What you hold lives no longer than a day,
rather – a night, and the warmth of a flame
it always takes so literally.
You open your warm palm
and say with a farewell smile:
“Who among you was in love with whom?”

And the wind blows them away,
Away it blows, and the night remains
in your hand, stretched towards
nothingness. And I shrink entirely –
what will I say to you, how will I respond
and how will I end this poem – God knows.

So it seems this is how we will die,
the only difference being
no person will bend over us,
nor water us with tears, like rain,
nor be curious to know idly –
who among us was in love with whom.

Boris Ryzhy (1994)
Translated by ChatGPT, feat. Nikita Nemtsev, edited by Erin Mallea

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Handwritten notes on lined paper with yellow sticky tabs.



AILANTHUS or Tree of Heaven is a native of
 brought to this country as food for silkworms.
 spread rapidly, growing mainly in moist locations.
 survives in city backyards and lots, and seems invulnerable
 against smoke, dirt, and insects. Ailanthus is a short-lived
 "weed" tree which may temporarily crowd out more desirable
 species. The long, compound, fern-like leaves are
 from 15 to 31 leaflets, each lance-shaped with serrated
 edges. At the base of each leaflet is a small tooth, with a
 swollen, scent gland. The ill-smelling male flowers are
 small female flowers are borne on separate trees.
 The bark is smooth, striped, gray-brown bark cracks with age.
 Height: 50 to 80 ft. Quassia family

FURTHER READING

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IMAGES WITHOUT CAPTIONS

COVER FRONT: Travis Mitzel, Tree of Heaven and Spotted Lanternfly Relationship Sprawl across time, Pennsylvania and beyond, 2024. **BACK:** Erin Mallea, Spotted Lanternfly nymphs in Pittsburgh, PA, summer 2023.

PAGE 5 Travis Mitzel, detail of Tree of Heaven and Spotted Lanternfly Relationship Sprawl across time, Pennsylvania and beyond, 2024.

PAGE 6 Still from YouTube video "Spotted Lantern Fly verses propane torch," vLog Cabin Life, Aug 11, 2018, 4:41.

PAGE 8 Erin Mallea, found squashed Spotted Lanternfly, 2023.

PAGE 9 Travis Mitzel, detail of Tree of Heaven and Spotted Lanternfly Relationship Sprawl across time, Pennsylvania and beyond, 2024

PAGE 10 Erin Mallea, found squashed Spotted Lanternfly, 2023.

POSTER INSERT Travis Mitzel, Tree of Heaven and Spotted Lanternfly Relationship Sprawl across time, Pennsylvania and beyond, 2024.

PAGE 18 BACKGROUND IMAGE: Travis Mitzel, detail of Tree of Heaven and Spotted Lanternfly Relationship Sprawl across time, Pennsylvania and beyond, 2024.

PAGE 23 BACKGROUND IMAGE: Travis Mitzel, detail, Tree of Heaven and Spotted Lanternfly Relationship Sprawl across time, Pennsylvania and beyond, 2024. **TOP RIGHT:** TartanPest computer vision system trained on 3000 images to recognize SLF egg masses. Image courtesy of Maria Ryabova. **BOTTOM LEFT:** Erin Mallea, collection of found, dead Spotted Lanternflies in Pittsburgh, fall 2023.

PAGE 24 Travis Mitzel, Tree of Heaven leaf detail, Tree of Heaven and Spotted Lanternfly Relationship Sprawl across time, Pennsylvania and beyond, 2024.

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