

Fund 40080: Integrated Pest Management Program

Mission To suppress forest pest infestation and pests of public health concern throughout the County through surveillance, pest and insect control, as well as public information and education, so that none of the County tree cover is defoliated and human morbidity and mortality are minimized while protecting the environment.

Focus Fund 40080, Integrated Pest Management Program, includes two separate programs – the Forest Pest Program (FPP) managed by Stormwater Services and the Disease-Carrying Insects Program managed by the Health Department. Integrated Pest Management (IPM) is an ecological approach to pest control that combines appropriate pest control strategies into a unified, site-specific plan. The goal of an IPM program is to reduce pest numbers to acceptable levels in ways that are practical, cost-effective, and safe for people and the environment. FPP focuses on preventing the spread of state approved forest insects and diseases in the County. DCIP focuses on protecting citizens from public health pests and maintaining a low incidence of the West Nile virus, Lyme disease, and other tick-borne diseases as the prevention of epidemics and spread of disease is one of the core functions of the Health Department.

A countywide tax levy financially supports Fund 40080 activities, and this levy is subject to change annually due to funding requirements based on the level of infestation. Since FY 2001, the Board of Supervisors approved tax rate has been \$0.001 per \$100 assessed value and has provided support for both the Forest Pest and the Disease-Carrying Insects Programs. In FY 2023, the same tax rate, along with the existing fund balance, will continue to support both programs. An amendment to the service district's enabling legislation in Appendix I of the County Code was approved by the Board of Supervisors at the May 7, 2019, Board of Supervisors Meeting to allow revenue collected by the fund to be used for removal and/or remediation of hazardous trees. Prior to this change, Appendix I of the County Code only allowed funds to be used for control of infestations of forest pests and disease-carrying insects and not for tree removal and/or remediation as a result of those pests. An increase to the service district tax rate has not been required as taxes levied after July 1, 2019, were sufficient for this new purpose.

Forest Pest Program

The Forest Pest Program is a cooperative program with the United States Department of Agriculture (USDA) Forest Service and the Virginia Department of Agriculture and Consumer Services (VDACS). VDACS maintains a list of insects that are eligible for control by this program. Currently, six insects and two diseases are listed: the gypsy moth, cankerworm, emerald ash borer, hemlock woolly adelgid, Asian long-horned beetle, spotted lanternfly, sudden oak death, and thousand cankers disease of black walnut. The proposed treatment plan and resource requirements for all listed pests are submitted annually to the Board of Supervisors for approval. The County may also be eligible for partial reimbursement for treatment costs from the federal government (if funding is available). Throughout the year, staff conducts an extensive outreach program with the goal of educating Fairfax County communities about pest suppression methods and measures that they may take to alleviate potential forest pest population infestations. As part of the FY 2023 Adopted Budget Plan, \$300,000 of the FPP budget has been allocated to the removal and/or remediation of hazardous trees. This activity will be limited to instances where the hazard is a direct result of pests included in the list of insects and diseases eligible for control by the program. Additionally, \$50,000 has been allocated for the removal and remediation of tree of heaven. Tree of heaven is a preferred host tree for spotted lanternfly and is thought to be an effective management strategy for minimizing the impact of this pest. The FPP is exploring a pilot program to find a partner to manage concerns with forest health effectively and address multi-disciplinary research questions that staff have limited resources to address.

Fund 40080: Integrated Pest Management Program

Gypsy Moth

In FY 2021, gypsy moth (*Lymantria dispar*) caterpillar populations remained very low. There was no measurable defoliation reported in Fairfax County. Active control programs in conjunction with the naturally occurring fungal pathogen *Entomophaga maimaiga* may explain the extremely low gypsy moth populations in Fairfax County and other areas. Staff continues to monitor gypsy moth, but no control treatments have been applied in recent years. Gypsy moth populations are cyclical, and it is not uncommon for outbreaks to occur following dormant phases that are similar to current conditions in Fairfax County. Presently, the common name “gypsy moth” is being reconsidered by the scientific community to address cultural sensitivities.

Fall Cankerworm

Fall cankerworm (*Alsophila pometaria*) is an insect native to the eastern United States that feeds on a broad variety of hardwood trees. Periodic outbreaks of this pest are common, especially in older declining forest stands. The Mount Vernon, Mason, and Lee magisterial districts have, in recent years, experienced the most severe infestations and associated defoliation. Staff observed population outbreak levels in the winters of 2012 and 2013 and declining populations since 2014.

Since 2014, staff has received input from civic groups regarding the strategies that are used to implement the fall cankerworm control program. Based on community concerns, staff identified several approaches to gauge community sentiment about the treatment program and refine and improve the methods used to monitor and administer treatments. The following processes were undertaken in support of these efforts:

- Parasite and Egg Viability Study – Fall cankerworms have natural predators that can be influential in their population levels. One explanation for outbreak populations in these areas is a lack of predators such as *Telenomus (T.) alsophilae*, an egg parasitoid wasp. Measuring the viability (successful larval hatch) of these eggs can provide insight into existing population control factors such as parasites, predators, and adult nutrition quality. The purpose of this survey was to monitor for the presence of *T. alsophilae* as well as measure overall fall cankerworm egg viability in Fairfax County as indicators of population trends.
- During the 2020-2021 season, staff found very few egg samples; this is likely due to low population levels. Over the past five years of the study, there has been an observed reduction in egg viability along with a steady parasitism rate by *T. alsophilae*, which suggests that the population of fall cankerworms remains low, causing no detectable defoliation. The data acquired from this survey assists staff to better understand overall cankerworm population dynamics in Fairfax County as well as locating areas of concern for monitoring and potential control in the subsequent years.



- Defoliation Survey – FPP conducted an extensive defoliation survey to measure the damage caused by fall cankerworm in 2020. The purpose of this survey was to determine those areas of Fairfax County where fall cankerworm larvae have impacted the County's urban forest resources through foliar feeding and to quantify this feeding damage as a percentage of canopy defoliated. The data acquired from this survey contributed to knowledge of overall cankerworm population dynamics in Fairfax County as well as locating areas of concern to be targeted in the ensuing year's fall cankerworm banding survey.

Fund 40080: Integrated Pest Management Program

The defoliation surveys for fall cankerworm were done in grids in the known areas of fall cankerworm activity in the southeastern portion of the County. Defoliation was quantified using a visual survey at each grid point. The results of this survey indicated that there was no significant defoliation from fall cankerworm in calendar year 2021.

Fall cankerworm populations have decreased in recent years and no treatment was required in calendar year 2021 and the first half of calendar year 2022. The FY 2023 budget provides capacity to treat 500 acres of ground treatment and up to 5,000 acres of aerial treatment, should insect surveys conducted between November 2022 and January 2023 indicate the need.

Emerald Ash Borer

The emerald ash borer (EAB), *Agrilus planipennis*, is an exotic beetle introduced from Asia and was first discovered in the state of Michigan in the early 2000s. This beetle attacks ash trees (*Fraxinus* sp.) and can cause mortality in native ash species in as little as two years. Recently, researchers in Ohio also observed EAB attacking white fringetree (*Chionanthus virginicus*), a close relative of ash. In July 2008, two infestations of emerald ash borer were discovered in Fairfax County. The USDA's Science Advisory Council did not recommend eradication in Fairfax County. The recommendation was based on the consistent lack of success of eradication programs in other eastern states. On July 11, 2008, the County was put under federal quarantine for emerald ash borer. Subsequently, interstate movement of ash wood and ash wood products from Fairfax County was regulated, including all ash firewood, nursery stock, green lumber, waste, compost, and chips. During the summer of 2012, VDACS found EAB in many other areas of the state, and all of Virginia became subject to state and federal quarantines. Movement of ash wood and products is permitted only within the contiguous multi-state, federal quarantine area.

Trapping efforts revealed that beetle populations extend to all areas of Fairfax County. Staff is responsible for educating the public on how to manage the impending mortality and replacement of many thousands of ash trees. Education efforts emphasize hiring a private contractor to remove dead and dying trees and options for effective pesticides that may conserve ash trees in the landscape.

In March 2015, the Board of Supervisors authorized staff to begin a control program for EAB on trees on publicly owned land, including fire stations, parks, schools, and libraries. Since 2015, staff have treated roughly 200 ash trees for EAB. Yearly assessments are made on treated trees to evaluate their health and crown conditions based on parameters set in the EAB Management Plan.

Since 2016, FPP has made efforts to request and release emerald ash borer parasitoid wasps from the USDA: *Oobius agrili*, *Spathius agrili*, and *Tetrastichus planipennisi*. As part of the release process, an inventory was conducted of ash stands within the County, including a survey of regional park land by boat along the Occoquan River. Several potential sites were identified, and the FPP has released emerald ash borer parasitoid wasps in several County properties. In accordance with the EAB parasitoid release agreement, staff will continue to monitor and report on the establishment of these wasps as part of a national network at www.mapbiocontrol.org. FPP planted ash seedlings in release sites in an effort to reestablish the County ash population in calendar year 2021. Staff will continue to identify additional areas that qualify for parasitoid release. The wasps were produced and supplied from the USDA's Animal and Plant Health Inspection Service (APHIS) at the Plant Protection and Quarantine (PPQ) EAB Parasitoid Rearing Facility in Brighton, Michigan. For more information on the parasitoids, please call 866-322-4512.

Fund 40080: Integrated Pest Management Program

Thousand Cankers Disease

In August 2010, a new disease was detected in black walnut trees (*Juglans nigra*) in Tennessee. During the spring of 2011, the same disease was observed near Richmond, Virginia. The disease complex called thousand cankers disease (TCD) is the result of an association of a fungus (*Geosmithia morbida*) and the walnut twig beetle (WTB) (*Pityophthorus juglandis*) native to the southwestern United States. This disease complex causes only minor damage to western walnut species; however, Eastern black walnut trees are very susceptible and infested trees usually die within a few years. Staff established monitoring sites for the WTB during the summer of 2012. WTB and disease symptoms were found in the County and VDACS was petitioned to include TCD on the list of organisms that can be controlled by service districts in Virginia. Following disease discovery, VDACS listed Fairfax County under quarantine that prohibited the transportation of walnut wood and its products. The FPP will continue to monitor walnut tree health and educate homeowners on this condition. Recently, staff learned that statewide and regional efforts yielded no WTB in traps deployed. To monitor the insect's presence more closely, staff deployed WTB traps in confirmed locations for calendar year 2020. WTB was positively identified from the traps that were deployed. Staff continue to monitor walnut tree health and follow the disease status elsewhere in Virginia.

Sudden Oak Death

Sudden oak death is caused by a fungus (*Phytophthora ramorum*) that has resulted in wide-scale tree mortality in the western United States since 1995. Fortunately, this disease has been found only in isolated locations in the eastern United States and officials feel that these infestations have been contained. Diligent monitoring is critical in slowing the spread of this disease and testing methods have been developed. Consequently, staff has implemented these monitoring methods in areas of the County where nursery stock that could have been shipped from areas known to have the pathogen is being sold. Staff continue to educate private and public groups on this disease and its control.

Asian Longhorned Beetle

The Asian longhorned beetle (ALB) (*Anoplophora glabripennis*) is an invasive, wood-boring beetle that, like EAB, has the potential to have drastic economic and social impacts should it be introduced in Fairfax County. The larvae will infest and kill trees by boring into the heartwood of a tree and disrupting its nutrient flow. Imported into the United States via wood packing material used in shipping, infestations of ALB in or near Chicago, New York, Boston, and Ohio have been discovered since the mid-1990's. In June 2020, an infestation was found in Hollywood, South Carolina. These pests will infest many hardwood tree species but prefer maple species, one of the predominant trees in Fairfax County's urban forest ecosystem. According to the United States Forest Service, most of the infestations found in the United States have been identified by tree care professionals and informed homeowners. Staff has developed a basic management plan to address such monitoring and outreach for this invasive species.

Hemlock Woolly Adelgid

Hemlock woolly adelgid (HWA) (*Adelges tsugae*) is a sap-feeding insect that infests and eventually kills hemlock trees. Staff employ various control options for this pest, including injected pesticide treatments and releasing predatory insects that feed on HWA. Native eastern hemlock is relatively rare in Fairfax County. The rarity of this tree species and the natural beauty that it imparts make it worthy of protection. Staff will continue to inventory the County and identify the natural stands of eastern hemlock. Staff continued to manage trees in two native stands, the Dranesville and Springfield magisterial districts. Staff monitored the condition of treated hemlocks in calendar year 2021. Staff is continuing to research management options for hemlocks and HWA.

Fund 40080: Integrated Pest Management Program

Spotted Lanternfly

Spotted lanternfly (SLF) (*Lycorma delicatula*) is an insect native to Asia and was found in suburban Philadelphia, Pennsylvania, in 2014. In January 2018, this insect was found in Frederick County, Virginia, and since then it has been found in many other localities in Virginia. Due to the destructive nature of this pest, VDACS in cooperation with USDA APHIS have begun eradication efforts in areas with known infestation.

VDACS has established a quarantine for Warren County, Clarke County, and Frederick County, Virginia, as well as the City of Winchester, Virginia. Under the quarantine, the movement of articles capable of transporting spotted lanternfly is restricted. This insect feeds on a broad range of host trees and has a strong preference for tree of heaven (*Ailanthus altissima*). Tree of heaven is an invasive tree species and native to Asia. This insect is not known to be in Fairfax County but has the potential to cause an impact if it were to become established here. Staff monitored for this insect and inventoried tree of heaven in high-risk introduction areas in calendar year 2021. The removal of tree of heaven could minimize the negative impact of this pest once it arrives. The FPP is conducting a pilot program to remove tree of heaven on County properties.

Staff anticipates the need for significant public education and community engagement will be in high demand once spotted lanternfly is established in the County. Given the broad host range for this pest, staff in the Urban Forest Management Division (UFMD) anticipates most residents in the County will be impacted. Given current staffing, FPP may not be able to meet the demand for an effective outreach program.

Quarantine Status

Agricultural quarantines are implemented for invasive pests to eradicate or slow their spread. The quarantines currently in effect in Fairfax County are intended to slow the spread of the target insects and not intended to eradicate them. In the United States, eradication is only attempted when an invasive species is discovered early, and its populations are small enough to be contained. There are no set end dates to the quarantines in Fairfax County.

Typically, a quarantine is established by the state and by the USDA on a county-by-county basis. Once a sufficiently large enough area is infested, the state will determine that all the state is generally infested, and the issue is taken over by USDA. Forest pest quarantines are not an unusual or a historically recent method of controlling the spread of pests. The gypsy moth was first quarantined by state and federal governments in 1912 and continues to be quarantined today. Research has proven that by slowing the spread of an invasive insect, uninfested localities can avoid the extraordinary costs of attempting to control it.

Emerald ash borer was first quarantined in Northern Virginia in 2008. Since that time, numerous sites around the state have been confirmed as infested with EAB. In the summer of 2012, the Virginia Department of Agriculture and Consumer Services determined that the entire state was generally infested and became part of the USDA quarantine; however, the USDA removed the federal domestic EAB quarantine regulations effective January 14, 2021, because the domestic quarantine was not proven effective in stopping its spread.

Thousand cankers disease is spread by a tiny bark beetle and is very difficult to detect. Staff found the bark beetle in Fairfax County in the summer of 2012, and VDACS implemented a statewide quarantine of all walnut products. There is no existing federal regulation regarding TCD.

Spotted Lanternfly is not yet known to be found in Fairfax County. In January 2018, this insect was found in Frederick County, Virginia, and since then it has been found in many other localities in the

Fund 40080: Integrated Pest Management Program

commonwealth. VDACS has established a quarantine for Warren County, Clarke County, Frederick County, Virginia, as well as the City of Winchester, Virginia. Under the quarantine, the movement of articles capable of transporting spotted lanternfly is restricted. Unfortunately, SLF has been found around the Mid-Atlantic including Pennsylvania, West Virginia, Maryland, and Delaware. All states with known SLF infestations have their own quarantine in hopes to limit the spread of this pest.

Outreach

The FPP conducts and participates in multiple outreach and education efforts. Staff fosters an appreciation for trees and the urban forest to inspire citizens, County agencies, and the development industry to protect, plant, and manage greenscape resources. Targeted audiences for education and training include Fairfax County Public Schools, County staff, citizen scientists, homeowner's associations, and natural resource professionals. Through public events such as Fairfax County Earth Day Celebration, Fall for Fairfax, and town hall meetings, staff educate the public about the County's urban forest resources and programs. Staff develop hands-on activities and displays that help convey the importance of the stewardship of the County's natural resources.

Staff reaches out to students in the County through various school programs which encourage students to advocate for protection and support of the County's urban forest. FPP education programs include:

- **Alien Invaders** - Staff introduces native and invasive species. Students learn what qualities make invasive species destructive and how to reduce their impacts on the landscape.
- **Career Day** - Students learn what an urban forester is and the importance of protecting the County's urban forest.
- **Meaningful Watershed Experience** - Staff explain the importance of an urban forest and how it impacts stormwater runoff at Hidden Oaks Nature Center.
- **Science Fairs** - Urban foresters judge high school science fairs and discuss students' projects.
- **Tree Planting** - Students learn about the value of trees and how to properly plant them.
- **Trees Please** - Students learn about the value of trees and simple measures they can take to protect them.
- **Tree-ting Your Water** - How Trees Act as Nature's Water Filtration and Storage System: an interactive activity to engage 5th grade students on how water is filtered through various substrates: sand, gravel, clayey topsoil, turf, and a simulated forest. The goal of the activity is to foster appreciation for trees as natural flood and erosion mitigation.

The FPP continues to improve messaging and communication with County residents by utilizing a variety of media to reach multiple audiences and demographics in the County. Such methods include fact sheets/brochures, podcasts, videos, social media, webinars, County website, newspaper articles, and television, radio, and YouTube interviews.

Management Plans

The nature of invasive insects and diseases is such that it is difficult to make long-term predictions on monitoring techniques and response plans. USDA has drafted a management plan for ALB; it outlines a role for localities consistent with what staff had envisioned. For example, County staff can play a critical role in public meetings, notification, and mapping. VDACS and the FPP have drafted

Fund 40080: Integrated Pest Management Program

basic management plans for ALB and EAB. The management plans will act in concert with plans in place by USDA and VDACS.

Disease-Carrying Insects Program

Mosquitoes, ticks, and other vectors are responsible for transmitting pathogens that can result in life-changing illnesses such as West Nile virus, Zika, and Lyme disease. The Health Department's Disease-Carrying Insects Program (DCIP) was established in 2003 and works to protect County residents and visitors from vector-borne diseases. The DCIP uses an integrated approach to monitor and manage vectors. The program continuously promotes personal protection and vector prevention methods in the community to raise awareness of these public health pests, the diseases they transmit, and what residents can do to protect themselves and their families.

Operational Changes

The DCIP historically hires seasonal staff to support its vector surveillance and control operations, including adult mosquito surveillance activities and the systemic evaluation of County maintained stormwater "dry ponds" for mosquito production. Due to the ongoing impact of COVID-19, only five seasonal staff were hired per season in calendar year (CY) 2020 and CY 2021 in comparison to the 16 seasonal staff that were hired during CY 2019. Due to reduced seasonal staffing levels, only Gravid traps were set at 73 of 74 locations in CY 2020, a 60 percent reduction in trapping effort from pre-COVID-19 operational levels. This effort continued into CY 2021; however, as additional staff were relieved from COVID-19 response deployments, BG Sentinel trapping was resumed at 28 routine locations. Stormwater inspections also decreased during CY 2020 with sites producing the highest numbers of vector species in previous years prioritized for inspection. In CY 2021, the DCIP obtained a permit to perform immature mosquito surveillance and control activities in areas managed by Virginia Department of Transportation (VDOT) and began to evaluate VDOT "dry ponds" for immature mosquitoes. Depending on available resources, the DCIP may expand its evaluations to include additional stormwater structures including outfalls, stream restoration projects, and detention/retention ponds in FY 2022 and beyond.

West Nile virus

West Nile Virus (WNV) is transmitted from birds to humans through the bite of infected mosquitoes. First detected in humans in the U.S. in 1999, it continues to be a national public health concern with more than 52,000 human WNV cases and 2,400 deaths reported through CY 2020. There have been 62 human cases and seven deaths reported in Fairfax County since CY 2002. In CY 2021, there was one reported case in the County and zero reported cases in CY 2020. The most recent WNV associated death occurred in CY 2019. CY 2021 data are preliminary and subject to final approval by the Virginia Department of Health (VDH).

Preparation and planning to address WNV risk are essential to effective integrated mosquito management, which combines a variety of tools to reduce the abundance of mosquitoes to levels that minimize the risk of WNV infection to the public.

Other mosquito-transmitted pathogens of public health concern

In addition to WNV, VDH's reportable disease list includes other mosquito-borne illnesses: dengue, Zika, chikungunya, yellow fever, eastern equine encephalitis, LaCrosse encephalitis, St. Louis encephalitis, and malaria. The Health Department's Division of Epidemiology and Population Health investigates reported cases of these illnesses and notifies the DCIP. The DCIP conducts entomological investigations for these cases, as appropriate, providing education and information as well as controlling mosquitoes as necessary to protect public health.

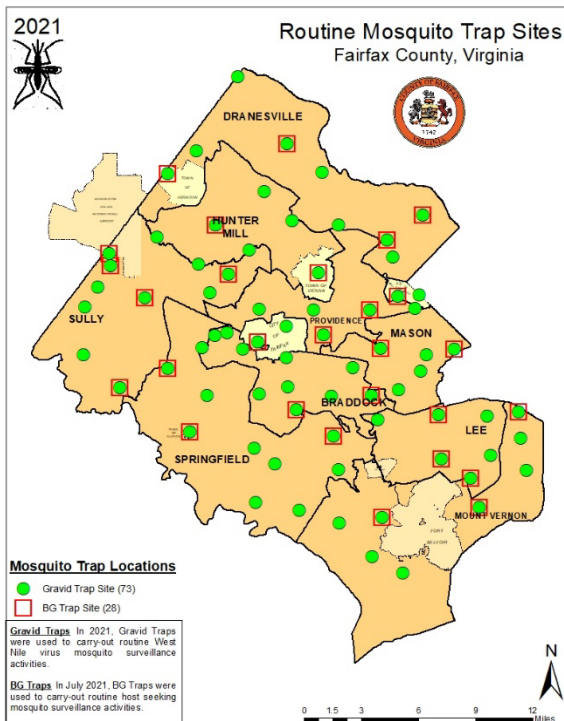


Figure 1. Routine mosquito trap sites.

Adult Mosquito Surveillance and Control Activities

Adult mosquito surveillance is a vital component of integrated mosquito management for monitoring mosquito abundance and viral activity. On its own, or in conjunction with investigations of human disease, mosquito surveillance provides information that can trigger control efforts for immature and/or adult mosquitoes. These actions, along with sharing information about the risk of disease with the public, can help to prevent or limit outbreaks of mosquito-borne disease in the community.

Program activities may include public education, elimination of larval habitats, larvicide applications, and/or spraying to kill adult mosquitoes. Adult mosquito control may be conducted via backpack barrier treatments or ultra-low volume (ULV) spraying via backpack or truck. Barrier treatments apply pesticide to areas where adult Tiger mosquitoes (*Aedes albopictus*) rest, providing extended control after the treatment. ULV treatments target flying mosquitoes, and break down quickly in the environment, typically within 24 hours. Area-wide adult mosquito control (e.g., ULV treatment by truck or aircraft) has not been conducted to date but is an option as a part of the County’s response if the need arises. The program performed pesticide resistance testing in CY 2019; however, due to space and staffing limitations caused by the HD response to the COVID-19 pandemic, resistance testing was not conducted during CY 2020 and CY 2021.

Inter-jurisdictional cooperation is a key component of the program, allowing for coordination of surveillance and management activities on public lands and with surrounding jurisdictions. Adult mosquitoes are trapped weekly from May through October using gravid mosquito traps at 73 sites, and BG Sentinel traps at 28 of those sites in Fairfax County and the Cities of Fairfax and Falls Church (Figure 1). Action thresholds for targeted adult mosquito control efforts (“spraying”) are flexible, as recommended by organizations such as the American Mosquito Control Association and the National Association of County and City Health Officials (NACCHO). It may be necessary to utilize adult control methods even with few, or no, human cases if environmental surveillance thresholds are met. The following indicators may trigger adult mosquito spraying by the Health Department:

- Results of mosquito surveillance and testing,
- Environmental factors that impact mosquito or disease cycles,
- Detection of medically important invasive species, and
- Reported cases of human disease.

The DCIP conducts surveillance of the invasive yellow fever mosquito (*Aedes aegypti*) which is also the main vector of Zika, chikungunya, and dengue viruses. Despite being a tropical species, this mosquito is detected each season at multiple sites, usually as a single adult in a trap. Even with a reduction in trapping efforts, due to operational limitations described earlier, *Aedes aegypti* was still detected in CY 2021. The Tiger mosquito (*Aedes albopictus*), which is closely related to the yellow fever mosquito, is common and abundant throughout Fairfax County. It could potentially spread Zika, chikungunya, dengue, and yellow fever locally as a secondary vector if the mosquito were to pick up the virus from an infected traveler and then pass it to another human.

Mosquito Inspections

A community-level approach is vital to the success of mosquito reduction efforts on both public and private properties. Mosquitoes lay their eggs in containers that are often found in residential and commercial areas. Sharing knowledge of how to eliminate these mosquitoes through source reduction and creating good habits reduces the burden of mosquitoes as a nuisance and public health threat. In that way, an individual's actions support the community and can significantly improve the quality of life for everyone in the area.

The Health Department responds to complaints and requests for assistance about standing water and mosquitoes (primarily Tiger mosquitoes), and when appropriate, conducts site visits. DCIP staff may also visit properties and conduct inspections as a result of mosquito surveillance and testing, environmental factors that impact mosquito or disease cycles, detection of medically important invasive species, and/or reported cases of human disease. Staff only access private property with permission.

If standing water is found during inspections, the preferred way to resolve the issue is usually source reduction (i.e., the elimination of aquatic habitats that have potential to support larval mosquito development). Emphasis is also placed on mosquito bite prevention by dressing properly and using repellents, and information is provided about additional prevention and mosquito control options. When appropriate, bacterial larvicides that can be applied without a license are given to residents who can treat standing water on their property that cannot be eliminated. The following numbers of service requests (complaints, requests for assistance, and neighborhood surveys) were performed by the DCIP staff during the past three years: 96 in CY 2019, 78 in CY 2020, and 62 in CY 2021.

Larval Surveillance and Control Activities

Immature (egg, larval and pupal) mosquito surveillance and control efforts help identify aquatic habitats that support the development of mosquitoes. Timely treatments of those habitats are targeted and can be highly effective. It prevents the mosquitoes from reaching the flying adult stage, when they disperse from source larval habitats and are much more difficult to control. Larval surveillance and control activities are conducted from April through October. Health Department staff inspect each of the more than 1,400 County-maintained dry ponds six to seven times during the mosquito season (Figure 2), resulting in more than 9,000 estimated routine larval inspections in an average season.

Due to the COVID-19 pandemic, larval inspection and control operations were restructured in CY 2020 to prioritize sites with a history of producing large numbers of Culex mosquitoes. Site prioritization continued in CY 2021. This operational adjustment increased the frequency of inspection at specific sites. These known problematic sites were inspected more often because Culex are the primary vectors of WNV and WNV disease is the most reported locally acquired mosquito-borne infection in Fairfax County.

The DCIP capitalizes on the expanded suite of ArcGIS resources made available by the Department of Information Technology (DIT) in recent years. This replaces paper-based methods and records with an end-to-end mobile data collection management system that provides real-time inspection and treatment data. This systemic approach to larval mosquito

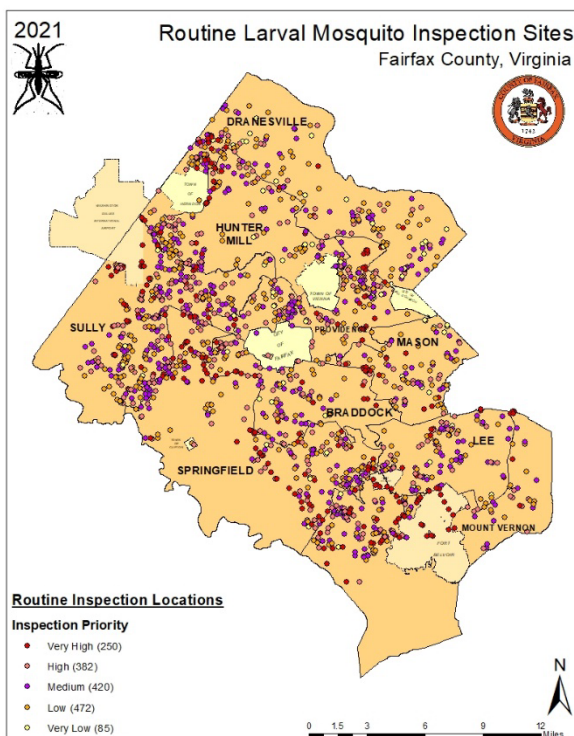


Figure 2. 2021 Routine larval mosquito inspection sites (dry ponds)

Fund 40080: Integrated Pest Management Program

surveillance and control is scalable and may be expanded to include additional sites such as storm drains, outfalls, roadside ditches, and additional dry ponds during FY 2022 and beyond.

The shift to systemic larval surveillance and control activities has increased operational efficiency and led to more sustainable use of mosquito control products and program resources. This is a collaborative effort between Department of Public Works and Environmental Services (DPWES) staff, who provide a list of County-maintained dry ponds, and DCIP staff, who conduct routine mosquito inspections at those sites. Inspections by Health Department staff help DPWES staff gather additional information about how the stormwater structures are functioning. When Health Department staff observe potential stormwater-related issues, they are reported to DPWES staff, who assist with response and remediation efforts.

Lyme disease and other tick-borne diseases

Lyme disease is the most commonly reported vector-borne illness in the United States, with an average of more than 30,000 cases reported annually. The bacterium that causes Lyme disease (*Borrelia burgdorferi*) is transmitted from small mammals, such as mice, to humans through the bite of an infected blacklegged tick (*Ixodes scapularis*), also known as the deer tick. In Fairfax County, 114 cases of Lyme disease were reported in CY 2019, 87 cases in CY 2020, and 98 cases in CY 2021. Other tick-borne diseases reported in Fairfax County include spotted fever group rickettsioses (nine cases in CY 2019, two cases in CY 2020, and zero cases in CY 2021) and Ehrlichiosis/Anaplasmosis (seven cases in CY 2019, 13 cases in CY 2020, and three cases in CY 2021). Data for CY 2020 and CY 2021 are preliminary and subject to final approval by VDH.

Tick Surveillance Activities

The DCIP collects and identifies ticks each month from several vet clinics and the Fairfax County Animal Shelter. Staff also work with local wildlife officials to attend deer management activities that occur in the County to remove and identify ticks from deer. In FY 2021, through a collaboration with the Fairfax County Police Department's Wildlife Management Specialist and Animal Services Division, DCIP began to receive ticks through the archery program that is used for deer management in the County. Tick surveillance may also be performed using other methods such as dragging, flagging, sweeping, and trapping. Blacklegged ticks collected by routine or response surveillance are tested for the Lyme disease bacteria at the Health Department laboratory. The data generated by tick surveillance and testing are used to inform the public about the seasonality of local tick species, the diseases they spread, and to reinforce messaging about the importance of preventing tick bites.

An invasive tick species, the longhorned tick (*Haemaphysalis longicornis*), was first reported in the western hemisphere in New Jersey in late 2017. Specimens of this tick have been identified in Fairfax County in both CY 2017, CY 2020, and CY 2021. It has also been detected in other areas of Virginia and the mid-Atlantic region in recent years. The longhorned tick transmits a variety of pathogens to humans and animals in other parts of the world; however, its medical significance in the western hemisphere is uncertain.

Tick Identification Service

The DCIP offers a free tick identification service. Through the service, County residents learn what type of tick they found, the diseases it can spread, symptoms of tick-borne illnesses, and ways to reduce exposure to ticks when outdoors. The tick identification service allows DCIP staff to track which ticks are found on humans and/or pets within the County and provide information about tick "seasonality" for the different species. This service does not provide tick testing or medical advice. During the previous three years, the following numbers of tick identifications were performed: 222 in CY 2019, 109 in CY 2020, and 189 in CY 2021.

Fund 40080: Integrated Pest Management Program

Outreach and Education

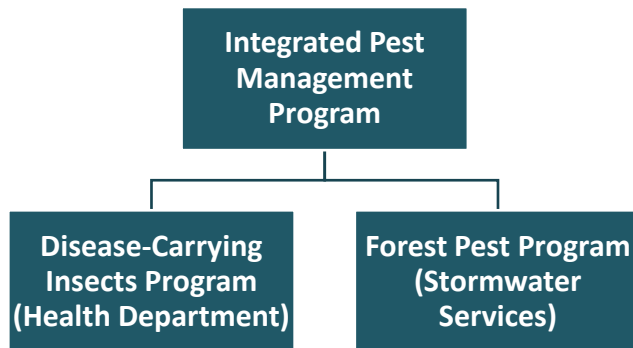
The Health Department is committed to increasing community awareness of personal protection actions that help prevent mosquito and tick-borne diseases as well as steps that can be taken to reduce mosquitoes and ticks. During the second half of FY 2020 and throughout FY 2021, outreach activities were greatly reduced due to the COVID-19 pandemic. Despite limitations imposed by the pandemic, staff were still able to distribute educational materials, offer yard inspections, and advise citizens about how to reduce their exposure to mosquitoes and ticks. DCIP staff also provide educational presentations for County workers, neighborhood and homeowners associations, schools, and other interested groups. Educational materials are available in multiple languages, both on the County’s website and at many County facilities.

During FY 2021, the DCIP staff produced the 17th edition “Fight the Bite” calendar, but printed fewer copies compared to past years. Many schools were either closed or open at limited capacity during the 2020-2021 academic year impacting regular calendar distribution. DCIP also continues to promote public health messaging in song form, including “West Nile Story” produced in CY 2019. Outreach and education efforts continued in FY 2022, as the best way to avoid vector-borne illness is through the prevention of mosquito and tick bites.

Management Plans

The DCIP Annual Report, which can be viewed on the Health Department website, provides a summary of program activities for each year. The report highlights the program’s integrated mosquito management practices, including information about mosquito surveillance and control, tick surveillance, and a review of outreach and education activities. The DCIP maintains relationships with professional and governmental organizations such as the American Mosquito Control Association and Centers for Disease Control and Prevention for guidance on mitigation of mosquito-borne diseases. Staff share information and network with regional counterparts throughout the year for situational awareness and to gather ideas for program improvements.

Organizational Chart



Fund 40080: Integrated Pest Management Program

Budget and Staff Resources

Category	FY 2021 Actual	FY 2022 Adopted	FY 2022 Revised	FY 2023 Advertised	FY 2023 Adopted
FUNDING					
Expenditures:					
Personnel Services	\$1,134,047	\$2,045,682	\$2,064,525	\$2,143,374	\$2,143,374
Operating Expenses	403,037	1,255,557	1,490,599	1,255,557	1,255,557
Capital Equipment	0	35,000	130,544	35,000	35,000
Total Expenditures	\$1,537,084	\$3,336,239	\$3,685,668	\$3,433,931	\$3,433,931
AUTHORIZED POSITIONS/FULL-TIME EQUIVALENT (FTE)					
Regular	14 / 14	14 / 14	14 / 14	15 / 15	15 / 15

Summary by Program

Category	FY 2021 Actual	FY 2022 Adopted	FY 2022 Revised	FY 2023 Advertised	FY 2023 Adopted
Forest Pest Program					
EXPENDITURES					
Total Expenditures	\$1,071,013	\$1,504,667	\$1,724,515	\$1,549,413	\$1,549,413
AUTHORIZED POSITIONS/FULL-TIME EQUIVALENT (FTE)					
Regular	7 / 7	7 / 7	7 / 7	8 / 8	8 / 8
Disease-Carrying Insects Program					
EXPENDITURES					
Total Expenditures	\$466,071	\$1,831,572	\$1,961,153	\$1,884,518	\$1,884,518
AUTHORIZED POSITIONS/FULL-TIME EQUIVALENT (FTE)					
Regular	7 / 7	7 / 7	7 / 7	7 / 7	7 / 7

FY 2023 Funding Adjustments

The following funding adjustments from the FY 2022 Adopted Budget Plan are necessary to support the FY 2023 program. Included are all adjustments recommended by the County Executive that were approved by the Board of Supervisors, as well as any additional Board of Supervisors' actions, as approved in the adoption of the Budget on May 10, 2022.

Employee Compensation \$97,692

An increase of \$97,692 in Personnel Services includes \$75,268 for a 4.01 percent market rate adjustment (MRA) for all employees and \$22,424 for performance-based and longevity increases for non-uniformed merit employees, both effective July 2022.

Position for Forest Pest Program \$0

An increase of 1/1.0 FTE new position is included due to increased departmental and programmatic requirements in the Forest Pest Program. The Urban Forester will coordinate all outreach and education activities as well as assist with field monitoring and treatment. The cost of this position will be accommodated within the current appropriation level of the fund.

Adjustment to Transfer Out

The FY 2023 Adopted Budget Plan Transfer Out to General Fund was increased by \$10,000, for a total of \$151,000, to partially offset central support services supported by the General Fund which benefit Fund 40080, Integrated Pest Management. These indirect costs include support services such as Human Resources, Purchasing, Budget, and other administrative services.

Fund 40080: Integrated Pest Management Program

Changes to FY 2022 Adopted Budget Plan

The following funding adjustments reflect all approved changes in the FY 2022 Revised Budget Plan since passage of the FY 2022 Adopted Budget Plan. Included are all adjustments made as part of the FY 2021 Carryover Review, FY 2022 Mid-Year Review, FY 2022 Third Quarter Review, and all other approved changes through April 30, 2022.

Carryover Adjustments \$349,429

As part of the FY 2021 Carryover Review, the Board of Supervisors approved funding of \$349,429, including \$18,843 in Personnel Services for a one-time compensation adjustment of \$1,000 for merit employees and \$500 for non-merit employees paid in November 2021. The remaining amount of \$330,586 is due to encumbered funding in Operating Expenses for contractual obligations in both the Forest Pest Program and the Disease-Carrying Insect Program.

Position Detail

The FY 2023 Adopted Budget Plan includes the following positions:

INTEGRATED PEST MANAGEMENT PROGRAM - 15 Positions			
Forest Pest Program			
1	Urban Forester IV	1	Urban Forester I
2	Urban Foresters III [+1]	1	Administrative Assistant III
3	Urban Foresters II		
Disease-Carrying Insects Program			
1	Epidemiologist III	2	Environmental Health Specialists II
1	Environmental Health Supervisor	1	Environmental Technician II
2	Environmental Health Specialists III		
+	Denotes New Position(s)		

Performance Measurement Results

Forest Pest Program

The FPP recently expanded the list of pests that are monitored and treated. The new performance measures are more inclusive of the work completed by staff. There was no aerial treatment for the gypsy moth in the spring of 2021. The number of forest pest surveys and related activities in FY 2021 is 14 percent lower than the previous fiscal year. This decrease is largely due to a reduction of staffing as a result of the COVID-19 pandemic. Monitoring and treatment projects were modified in order to adapt to the change in staffing levels. Defoliation surveys for listed insects conducted in the summer of 2020 indicated that there will be no defoliation in Fairfax County in FY 2022.

Disease-Carrying Insects Program

The cost per capita of the DCIP was \$0.54 in FY 2021, \$0.23 lower than the cost per capita in FY 2020 and \$0.38 lower than the cost per capita in FY 2019. Much of this decrease was due to a reduction in staffing during the second half of FY 2020 and continued staff reduction through FY 2021 as a result of the COVID-19 pandemic. Overall, the numbers of routine stormwater structures inspected and treatments to control immature mosquitoes were lower than estimated for FY 2021. Fewer numbers of inspections were completed as a result of reduced seasonal staffing in response to the COVID-19 pandemic.

Fund 40080: Integrated Pest Management Program

The percentage of stormwater structure inspections that resulted in treatments to control immature mosquitoes was 10 percent in FY 2021, down five percentage points from FY 2020 and on target with the 10 percent estimate. This increase in the proportion of stormwater structures treated is partially due to an operational shift toward more frequent inspections of sites that have historically been known to produce large numbers of *Culex* mosquitoes, as described earlier. Future estimates for this outcome have been raised slightly from 10 percent to 12 percent based on the average proportion of stormwater structures that required treatment during the past three years.

Indicator	FY 2019 Actual	FY 2020 Actual	FY 2021 Estimate	FY 2021 Actual	FY 2022 Estimate	FY 2023 Estimate
Percent of County tree defoliation resulting from listed Forest Pest infestation	0%	0%	0%	0%	0%	0%
Percent of stormwater structure inspections that resulted in treatments to control immature mosquitoes	13%	15%	10%	10%	12%	12%

A complete list of performance measures can be viewed at
<https://www.fairfaxcounty.gov/budget/fy-2023-adopted-performance-measures-pm>

Fund 40080: Integrated Pest Management Program

FUND STATEMENT

Category	FY 2021 Actual	FY 2022 Adopted Budget Plan	FY 2022 Revised Budget Plan	FY 2023 Advertised Budget Plan	FY 2023 Adopted Budget Plan
Beginning Balance	\$4,202,358	\$3,188,413	\$5,154,993	\$4,028,808	\$4,028,808
Revenue:					
General Property Taxes	\$2,617,743	\$2,692,792	\$2,692,792	\$2,692,792	\$2,692,792
Interest on Investments	12,976	7,691	7,691	7,691	7,691
Total Revenue	\$2,630,719	\$2,700,483	\$2,700,483	\$2,700,483	\$2,700,483
Total Available	\$6,833,077	\$5,888,896	\$7,855,476	\$6,729,291	\$6,729,291
Expenditures:					
Forest Pest Program	\$1,071,013	\$1,504,667	\$1,724,515	\$1,549,413	\$1,549,413
Disease-Carrying Insects Program	466,071	1,831,572	1,961,153	1,884,518	1,884,518
Total Expenditures	\$1,537,084	\$3,336,239	\$3,685,668	\$3,433,931	\$3,433,931
Transfers Out:¹					
General Fund (10001) - Forest Pest Program	\$66,453	\$66,453	\$66,453	\$67,609	\$67,609
General Fund (10001) - Disease-Carrying Insects Program	74,547	74,547	74,547	83,391	83,391
Total Transfers Out	\$141,000	\$141,000	\$141,000	\$151,000	\$151,000
Total Disbursements	\$1,678,084	\$3,477,239	\$3,826,668	\$3,584,931	\$3,584,931
Ending Balance²	\$5,154,993	\$2,411,657	\$4,028,808	\$3,144,360	\$3,144,360
Tax Rate Per \$100 of Assessed Value	\$0.001	\$0.001	\$0.001	\$0.001	\$0.001

¹ Funding in the amount of \$151,000 is transferred to the General Fund to partially offset central support services supported by the General Fund which benefit Fund 40080, Integrated Pest Management. These indirect costs include support services such as Human Resources, Purchasing, Budget, and other administrative services.

² Due to the cyclical nature of pest populations, the treatment requirements supported by this fund may fluctuate from year to year. Therefore, Ending Balances may also fluctuate depending on the level of treatment necessary to suppress gypsy moth, cankerworm, emerald ash borer, or West Nile Virus-carrying mosquito populations in a given year.