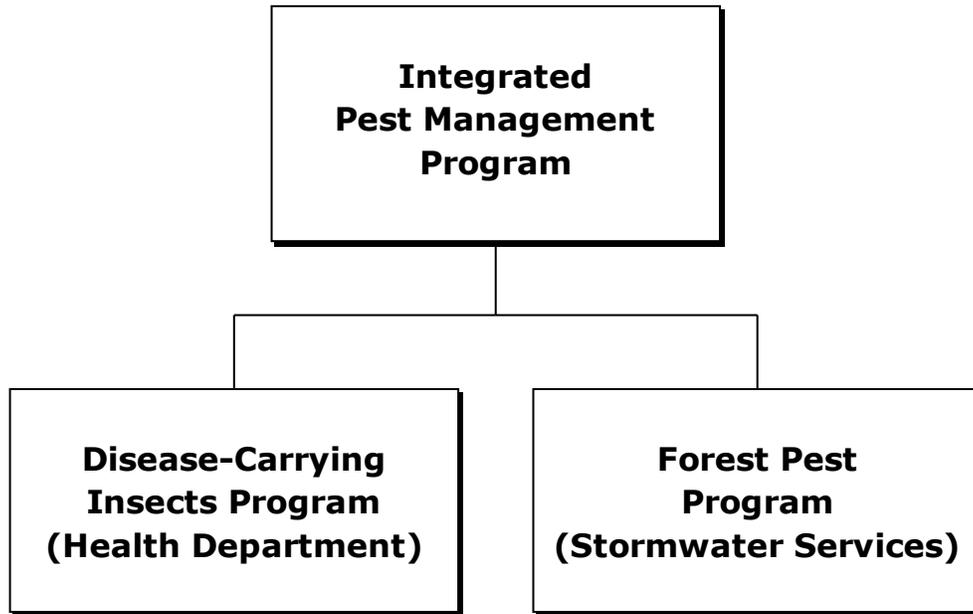


Fund 40080

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 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. The Forest Pest Program (FPP) focuses on preventing the spread of state approved forest insects and diseases in the County. The Disease-Carrying Insects Program 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 2019, the same tax rate, along with the existing fund balance, will continue to support both programs.

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Forest Pest Program (FPP)

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, five insects and two diseases are listed: the gypsy moth, cankerworm, emerald ash borer, hemlock woolly adelgid, Asian long-horned beetle, 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 (assuming 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.

Gypsy Moth

In FY 2018 gypsy moth (*Lymantria dispar*) caterpillar populations remained very low. There was no measurable defoliation reported in Fairfax County or elsewhere in the Commonwealth of Virginia. 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. The FPP 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 similar to current conditions in Fairfax County.

Fall Cankerworm

The fall cankerworm (*Alsophila pomataria*) is an insect native to the eastern United States that feeds on a broader variety of hardwood trees than the gypsy moth. 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. Forest Pest Management staff observed population outbreak levels in the winters of 2012 and 2013 and declining populations since 2014. As a result of monitoring efforts in winter 2017, staff determined that no insect populations warranted control measures in the spring of 2018.

Since 2014 staff has received input from civic groups in regard to the strategies that are used to implement the fall cankerworm control program. Based on community concerns, the Forest Pest Management 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 predator such as *Telenomus alsophilae*, an egg parasitoid wasp. Measuring the viability (whether larva hatch) of these insects 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.

Collection sites were located within cankerworm banding sites that amounted to 100 or more female moths over the course of one monitoring season. Egg masses were removed from survey bands when present and placed in protective cases to prevent predation in late March before the

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natural hatch. The egg masses were retrieved from trap trees and reared indoors. Staff counted the number of eggs which yielded larvae to produce both a site-based and overall percentage estimate of egg viability. Adult *T. alsophilae* wasps emerge from fall cankerworm eggs



approximately three weeks after fall cankerworm larva hatch. In addition to noting larval hatch, staff recorded which sample sites had eggs which were parasitized by *T. alsophilae*. The presence of *T. alsophilae* in samples that were collected remained at a steady level from 2016 to 2017. The observed reduction in egg viability along with a steady parasitism rate by *T. alsophilae* suggests that the population of fall cankerworms is in decline. The data acquired from this survey assists Urban Foresters to better understand overall cankerworm

population dynamics in Fairfax County as well as locating areas of concern or monitoring and potential control in the subsequent years.

- **Defoliation Survey** – The Fairfax County Forest Pest Management Program conducted an extensive defoliation survey to measure the damage caused by fall cankerworm beginning in 2016 and again in 2017. 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 will contribute 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.

The defoliation survey for fall cankerworm consisted of a 1,500 foot grid in the known area of fall cankerworm activity in the southeastern portion of the County. Defoliation was quantified using a visual survey at each grid point. Nearly 1,000 ground based surveys were conducted. The results of this survey indicated that there was no defoliation from fall cankerworm in 2017.

Cankerworm populations have decreased in recent years and no treatment was required in CY 2017. Staff anticipates no aerial treatment program in CY 2019; however, small amounts of ground treatment may be required. The FY 2019 budget provides capacity to treat 500 acres of ground treatment and up to 5,000 acres of aerial treatment, should insect surveys conducted between August and January 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. In 2014, 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 (EAB) were discovered in Fairfax County in the town of Herndon and the Newington area. The U.S. Department of Agriculture’s Science Advisory Council did not recommend eradication in Fairfax County. The recommendation was based on the consistent lack of success of

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eradication programs in other eastern states. On July 11, 2008, the County was put under federal quarantine for emerald ash borer. This meant that all 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, the Virginia Department of Agriculture and Consumer Services found EAB in many other areas of the state. All of Virginia is now subject to state and federal quarantines. Movement of ash wood and products is now 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. Forest Pest Management staff conducted a survey to locate trees on County property for possible candidates for treatment and found 80 that qualified as candidates for control.

In 2016, surveys for treatable ash trees were extended to include Northern Virginia Regional Park Authority (NVRPA) properties. An additional 100 ash trees were identified within NVRPA parks. In mid-May 2016, forest pest staff injected 89 of those 100, the remainder of which were not healthy enough to be treated. The now-protected trees are in Meadowlark Gardens Regional Park (13 trees); Fountainhead Regional Park (10 trees); Occoquan Regional Park (19 trees); and Pohick Regional Park (47 trees). To increase public awareness of EAB and successful ash treatment methods, signs were printed and displayed near treated ash trees. In 2017 all ash trees that were treated in 2015 and 2016 were evaluated to determine if reapplication was required. As a result of these evaluations, staff re-treated 46 trees that had been treated in 2015. Staff will continue to monitor these trees and provide treatment as needed.

The Forest Pest Management Branch made efforts in 2016 to request and release emerald ash borer parasitoid wasps from the United States Department of Agriculture (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 including the Confederate Fortifications Historic Site, Cub Run Stream Valley Park, and Bull Run Regional Park.

In 2017 the Forest Pest Management Branch requested and received approval to release emerald ash borer parasitoid wasps. The wasps were produced and supplied from the United States Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) at the Plant Protection and Quarantine (PPQ) EAB Parasitoid Rearing Facility in Brighton MI. For information on these parasitoids, please call 866-322-4512.

In early June 2017, Urban Foresters released a total of 2,400 *Oobius agrili*, an egg parasitoid, in addition to 821 *Spathius agrili* and 1,821 *Tetrastichus planipennisi*, both larval parasitoid wasp species. The wasps were released at four Fairfax County sites: Flatlick Stream Valley Park, two separate sites at Cub Run Stream Valley Park and the Confederate Fortifications Historic Site. In accordance with the EAB parasitoid release agreement, the Forest Pest Management Branch will continue to monitor and report on the establishment of these wasps as part of a national network at www.mapbiocontrol.org.

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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. Eastern walnut trees, however are very susceptible and infested trees usually die within a few years. Urban foresters established monitoring sites for the walnut twig beetle during the summer of 2012. Walnut twig beetle 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 Forest Pest Program will continue to monitor walnut tree health and educate homeowners on this condition. In 2016, Forest Pest staff learned that statewide and regional efforts yielded no presence of walnut twig beetles in traps that were deployed in 2015. To more closely monitor the insect's presence in Fairfax County, urban foresters monitored walnut tree health and followed the disease status elsewhere in Virginia.

The Integrated Pest Management Program supports the following County Vision Elements:



Maintaining Safe and Caring Communities



Connecting People and Places



Practicing Environmental Stewardship



Building Livable Spaces

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 recent testing methods that are simple and cost-effective have been developed. Consequently, staff has implemented these monitoring methods in areas of the County where nursery stock is being sold. Staff continues to educate private and public groups on this disease and its control.

Asian Longhorned Beetle

The Asian long-horned beetle (*Anoplophora glabripennis*) is an invasive, wood-boring beetle that, like the emerald ash borer, 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 this insect in or near Chicago, New York, Boston, and Ohio have been discovered since the mid 1990's. These pests will infest many hardwood tree species but seem to 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.

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Hemlock Woolly Adelgid

Hemlock woolly adelgid (HWA) (*Adelges tsugae*) is a sap-feeding insect that infests and eventually kills hemlock trees. Forest Pest Management staff employ various control options for this pest including injected pesticide treatments and releasing predatory insects that feed on HWA. In 2014, staff recommended that the Board of Supervisors approve a limited pilot treatment program for HWA. Plans to conduct small scale treatment efforts on naturally occurring hemlock stands found on public property are under way.

Native eastern hemlock is relatively rare in Fairfax County. The rarity of this species and the natural beauty that it imparts make it worthy of protection. Staff will continue to inventory the County in order to identify the natural stands of eastern hemlock. For this year's program, staff continued to treat trees in two native stands, Dranesville and Springfield magisterial districts. Trunk injection of the insect growth regulating pesticide, azadirachtin or TreeAzin® is an effective method providing control to the target trees. Once injected, the insecticide is transported throughout the tree and provides control for up to two years.

Quarantine Status

Agricultural quarantines are implemented for invasive pests in order 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 a state and by the United States Department of Agriculture on a county by county basis. Once a sufficiently large enough area is infested, the state will determine that all of 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 (EAB) 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 is generally infested and is now part of the USDA quarantine. It is anticipated that this quarantine will stay in effect indefinitely.

Thousand cankers disease (TCD) is relatively new in regard to forest health issues. This 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 in regard to TCD.

Outreach

The Forest Pest Program conducts and participates in multiple outreach and education efforts in support of Core Recommendation Number 1 of the Tree Action Plan, to Engage and Educate. FPP 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, Department of Public Works and Environmental Services

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staff, the Engineers and Surveyors Institute, volunteer groups, homeowner's associations and scouting groups. Through Fairfax ReLeaf and public events such as Fairfax Springfest, Fall for Fairfax, Fairfax 4-H Fair and town hall meetings, staff educate the public about the County's urban forest resources and programs. Urban foresters develop hands-on activities and displays that help convey the importance of the stewardship of the County's natural resources.

The FPP 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. The number of students reached through Forest Pest programs in school years 2015/2016 and 2016/2017 was 1,215 and 2,095, respectively. FPP education participation 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.
- **Forestry Badge** - Boy Scouts learn about what it is to be an urban forester from UFMD staff 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 storm water runoff at Hidden Oaks Nature Center.
- **Science Fair** - 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.

UFMD 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
- Television and YouTube Interviews
- Podcasts
- Videos
- Facebook postings
- Slideshare presentations
- Updating UFMD web content
- Newspaper articles and radio 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 basic management plans for ALB and EAB. The management plans will act in concert with plans in place by USDA and VDACS.

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Disease-Carrying Insects Program (DCIP)

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 was established in 2003 and works to protect County residents and visitors from vector-borne diseases. The program 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 family.

Operational Changes

From FY 2003 through FY 2017, the Health Department utilized a contractor to perform larval mosquito surveillance (inspection of larval mosquito habitats) and larval mosquito control activities (larvicide treatments to storm drains and other larval mosquito habitats). However, in recent years, the contractor was unable to fulfill the requirements of the contract. During FYs 2015, 2016 and 2017, the contractor completed 70 percent, 71 percent and 73 percent respectively, of expected storm drain treatments on-schedule. The contract was not renewed in late FY 2016, and these activities are now performed by Health Department staff in the DCIP.

The emergence of Zika during FY 2015 stressed the need for more Health Department/Environmental Health staff to be prepared to mount a public health response to the threat of mosquito-borne diseases should the need arise. The Health Department has increased the number of both merit and non-merit staff that are licensed by the Virginia Department of Agricultural and Consumer Services (VDACS) as pesticide applicators and/or registered technicians from five in FY 2016 to 22 in FY 2017.

Beginning in FY 2016, the Health Department began conducting a systematic evaluation of County-maintained dry ponds for mosquito production. This evaluation includes sampling for immature mosquitoes and treating to control immature mosquitoes when action thresholds are reached. To conduct these systematic evaluations, the Health Department increased its capacity to perform larval mosquito inspections and mosquito control activities leveraging internal resources and decreasing its dependence on contracted services. Based on the increased volume of work being done in FYs 2017 and 2018, the Department assigned additional resources to the DCIP and expanded the number of seasonal non-merit Environmental Technician I positions filled in the DCIP from five each mosquito season to 12. These changes improve the department's ability to respond to citizen concerns about mosquito issues, allow for an expansion of surveillance and control efforts, and help to prepare the County for an emergency response to mosquito-related issues if the need arises. Larval and adult mosquito surveillance are now more fully integrated, which has led to more effective mosquito control activities during FYs 2017 and 2018. In CY 2016, the Virginia Department of Health (VDH) negotiated contingency contracts for mosquito control response with two vendors that the County would be able to use if deemed necessary. FY 2018 was the first full fiscal year that Health Department staff conducted all mosquito-related surveillance, inspections and treatments without reliance on a contractor. These activities are planned to continue in FY 2019.

West Nile virus

West Nile virus (WNV) is transmitted from birds to humans through the bite of infected mosquitoes and has continued to be a public health concern in the U.S. since it was first detected in humans in New York City in 1999. Nationwide through calendar year (CY) 2017, there have been more than 48,000 human WNV cases and more than 2,000 deaths. The first sign of WNV in Fairfax County was in CY 2000 when a

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dead bird was found infected. The first human cases were identified in CY 2002 and through CY 2017, 45 human cases have been reported in the County. More recently eight cases were detected in CY 2015, zero cases in CY 2016 and four cases in CY 2017. In total, four WNV-associated deaths have occurred—one each in CY 2002, CY 2004, CY 2012, and CY 2015. Preparation and planning to address increasing WNV risk is essential to effective integrated mosquito management, which combines a variety of tools that reduce the abundance of mosquitoes to levels that minimize the risk of WNV infection to the public.

Zika virus

Local transmission of the Zika virus was detected for the first time in the Americas during early CY 2015. Zika is found in many tropical and subtropical areas around the world and limited local transmission by mosquitoes was seen in the continental U.S. (Miami, Florida, and south Texas) in CY 2016. Local transmission by mosquitoes has not yet been reported in Virginia. Zika is primarily transmitted between humans through the bite of an infected yellow fever mosquito (*Aedes aegypti*) or Asian tiger mosquito (*Aedes albopictus*). A woman can pass Zika virus to her fetus during pregnancy, which can lead to severe birth defects including microcephaly. The Centers for Disease Control and Prevention (CDC) is studying the full range of other potential health problems that Zika virus infection during pregnancy may cause. It can also be transmitted sexually. To limit the potential for local mosquito-borne transmission of Zika virus in Fairfax County, the Health Department developed a comprehensive Zika Action Plan that includes outreach activities, case investigations, facilitating testing for humans, collecting and testing mosquitoes, and initiating targeted mosquito surveillance and control activities as necessary to protect public health. This plan utilizes guidance from the CDC and VDH Zika response plans.

Other mosquito-transmitted pathogens of public health concern

In addition to WNV and Zika, VDH's reportable disease list includes other mosquito-borne illnesses: dengue, chikungunya, yellow fever, eastern equine encephalitis, LaCrosse encephalitis, St. Louis encephalitis and malaria. The Health Department's Communicable Disease and Epidemiology Unit investigates reported cases of these illnesses and collaborates with DCIP as necessary.



A female Asian tiger mosquito (*Aedes albopictus*), the main nuisance mosquito found in Fairfax County, and a potential vector of viruses like Zika and West Nile. Photo courtesy of CDC.

Adult Mosquito Surveillance and Control Activities

Adult mosquito surveillance is a vital component of integrated pest management that allows staff to monitor mosquito abundance and viral activity. When combined with Health Department investigations of human disease, mosquito surveillance provides information that can trigger control efforts of larval or adult mosquitoes to prevent or limit outbreaks of mosquito-borne disease to people in the community. Vector control equipment and supplies have been purchased in FYs 2016, 2017 and 2018 to increase

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capacity as program operations evolve. Vector surveillance and control equipment and supply requirements will be ongoing.

Adult mosquito trapping and testing are performed weekly at 73 sites from May through October in Fairfax County, City of Fairfax and Falls Church City. 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. The Health Department lab tests mosquitoes collected by DCIP for WNV and Zika. Action thresholds for targeted adult mosquito control efforts are based on the abundance of infected mosquitoes and/or human disease. Larval control efforts such as source reduction (elimination of larval mosquito habitats) and larviciding (applying pesticides to control mosquito larvae in water) can reduce vector abundance, but adult mosquito control treatments may also be necessary when action thresholds for adult mosquitoes are reached. When environmental surveillance indicates substantial WNV infection rates in local mosquitoes or when many human cases occur early in the season, timely treatments to reduce the number of WNV-infected adult mosquitoes can help minimize human WNV case incidence. It may become necessary to utilize adult control methods even with no or a few human cases if environmental surveillance thresholds are met.

In response to the threat of Zika in the Americas, during FYs 2016, 2017 and 2018, the DCIP has utilized an expanded network of BG-sentinel traps, which target the types of mosquitoes that can spread Zika. The yellow fever mosquito, a tropical species that is driving the majority of transmission of Zika, is rare in Virginia. However, the Asian tiger mosquito is common in our area and could spread Zika locally if the mosquito were to pick up the virus from an infected traveler and then pass it to another human. Suspected and confirmed cases of Zika (all travel-related to date) are investigated by the Health Department, and mosquito surveillance and control activities are conducted by the DCIP as necessary to protect public health. Control activities by the DCIP may include elimination of larval habitats, larvicide applications, or adult mosquito treatments. When human disease and/or adult mosquito surveillance indicates a need, treatments to control adult mosquitoes may be conducted via barrier or ultra-low volume (ULV) applications. Barrier treatments apply pesticide to areas where Asian tiger mosquitoes rest, providing control for up to three weeks after the treatment. ULV treatments target flying mosquitoes, and break down quickly in the environment. Area-wide adult mosquito control (e.g. ULV treatment by truck or aircraft) has not been conducted to date as a part of Zika response activities, but would be considered as a part of the County's response if local transmission of Zika by mosquitoes is detected in Fairfax County.

Mosquito Inspections

The Health Department responds to County service requests about standing water, and when appropriate, conducts site visits. Staff only access private property with permission. If standing water is found, the preferred way to resolve the issue is source reduction—the elimination of aquatic habitats that have potential to support larval mosquito development. Emphasis is 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 were performed by the DCIP staff during the past three years: 30 in CY 2015, 57 in CY 2016 and 109 in CY 2017.

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Larval Surveillance and Control Activities

Larval mosquito surveillance and control efforts help identify aquatic habitats that support the development of mosquitoes. Timely application of larvicides or pupicides to those habitats prevents the mosquitoes from reaching the flying adult stage. Larval surveillance and control activities are conducted from April through October. Health Department staff inspect each of the more than 1,300 County-maintained dry ponds six times during the mosquito season, for a total of more than 8,000 routine larval inspections. This systematic approach to larval mosquito surveillance and control is scalable, and could be expanded to include additional sites.

As stated above, larviciding of storm drains is no longer conducted. The shift to systematic larval surveillance and control activities from the storm drain-focused applications allows for the more efficient use of mosquito control products and program resources. DPWES staff provided the list of County-maintained “dry ponds” and described their function. Routine mosquito inspections at “dry ponds” by the Health Department help DPWES gather additional information about how the stormwater structures are functioning. When Health Department staff observe potential issues, they report them to DPWES in a timely fashion, assisting 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 is transmitted from small mammals to humans through the bite of an infected deer tick, also known as the blacklegged tick (*Ixodes scapularis*). In Fairfax County, 202 cases of Lyme disease were reported in CY 2015, 214 cases in CY 2016 and 166 cases in CY 2017. Other tick-borne diseases reported in Fairfax County include: spotted fever group rickettsioses (14 cases in CY 2015, 10 cases in CY 2016, and 20 cases in CY 2017), and Ehrlichiosis/Anaplasmosis (eight cases in CY 2015, five cases in CY 2016 and 12 cases in CY 2017). The CY 2017 data for human cases of tick-borne diseases is provisional and is subject to change as the state continues to finalize data and more information becomes available.

Tick Surveillance Activities

Routine tick trapping is performed using carbon dioxide-baited traps at four sites in the County each week from March through November. Ticks collected in weekly surveillance activities are identified to species and are counted. Deer ticks are tested for the Lyme disease bacteria at the Health Department laboratory. The DCIP also collects and identifies ticks each month from several vet clinics and the animal shelter, and removes ticks from deer at some of the managed deer hunts that occur in the County. The data generated by tick surveillance and testing are used to inform the public about the seasonality of the local tick species, the diseases they spread and to reinforce messaging about the importance of preventing tick bites.

Tick Identification Service

The DCIP offers a free tick identification service. Through the service, County residents learn what type of tick they found, its biology, 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 actually being found on humans within the County. During the previous three years, the following numbers of tick identifications were performed: 317 in CY 2015, 180 in CY 2016 and 281 in CY 2017.

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Outreach and Education

The Health Department is committed to increasing community awareness of personal protection actions that help prevent mosquito and tick-borne diseases, and steps that can be taken to reduce mosquitoes and ticks. Outreach materials are available in multiple languages. During FY 2017, DCIP staff participated in numerous outreach events, distributing educational materials and advising citizens about how to reduce their exposure to mosquitoes and ticks. DCIP staff provide educational presentations for County workers, neighborhood and homeowners associations, and other interested groups. Educational material is available on the County's website and at many County facilities.

During FY 2017, the DCIP staff produced and printed the 13th edition "Fight the Bite" calendar. These informative calendars are distributed annually to every fourth grade student in Fairfax County Public Schools, and are one of the most popular giveaways at outreach events. The arrival of Zika virus in the Americas also spurred the Health Department to create and update literature about mosquito prevention and control as it relates to this emerging mosquito-borne disease. These include a Zika web page, Zika fact sheet, several double-sided cards, themed posters, tips for mosquito control at home and homeowners association (HOA) newsletter inserts. The Health Department and Channel 16 developed mosquito prevention and mosquito bite prevention PSAs that were posted to the County website and a 30-second movie theater PSA that was shown throughout the County. DCIP staff also produced the Health Department's first-ever rap video, "Zika 101", which received more than 10,000 views during FY 2017 and garnered media attention from local and national print and radio outlets. Outreach and education efforts are expected to continue in FY 2019, as the best way to avoid vector-borne illness is through the prevention of mosquito and tick bites.

Management Plans

The [DCIP Annual Report](#) provides a summary of program activities for each year. The report highlights the program's integrated mosquito management activities, including mosquito surveillance and control activities, tick surveillance, and a review of outreach and education activities. The DCIP also maintains relationships with professional organizations such as the Virginia Mosquito Control Association, the Mid-Atlantic Mosquito Control Association and the American Mosquito Control Association (AMCA). Publications from CDC, such as "West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control," and "Zika Interim Response Plan (CONUS and Hawaii)", the VDH Zika Response Plan and the AMCA's "Best Management Practices for Integrated Mosquito Management" provide guidance on these important mosquito-borne diseases. Staff share information and network with regional counterparts throughout the year for situational awareness and to gather ideas for program improvements.

Fund 40080

Integrated Pest Management Program

Budget and Staff Resources

Category	FY 2017 Actual	FY 2018 Adopted	FY 2018 Revised	FY 2019 Advertised	FY 2019 Adopted
FUNDING					
Expenditures:					
Personnel Services	\$1,447,205	\$1,377,497	\$1,377,497	\$1,434,731	\$1,434,731
Operating Expenses	373,137	1,827,847	1,906,467	1,827,847	1,827,847
Capital Equipment	43,078	0	17,631	0	0
Total Expenditures	\$1,863,420	\$3,205,344	\$3,301,595	\$3,262,578	\$3,262,578
AUTHORIZED POSITIONS/FULL-TIME EQUIVALENT (FTE)					
Regular	11 / 11	11 / 11	11 / 11	11 / 11	11 / 11

Summary by Program

Category	FY 2017 Actual	FY 2018 Adopted	FY 2018 Revised	FY 2019 Advertised	FY 2019 Adopted
Forest Pest Program					
EXPENDITURES					
Total Expenditures	\$790,473	\$1,142,766	\$1,217,661	\$1,170,423	\$1,170,423
AUTHORIZED POSITIONS/FULL-TIME EQUIVALENT (FTE)					
Regular	6 / 6	6 / 6	6 / 6	6 / 6	6 / 6
Disease-Carrying Insects Program					
EXPENDITURES					
Total Expenditures	\$1,072,947	\$2,062,578	\$2,083,934	\$2,092,155	\$2,092,155
AUTHORIZED POSITIONS/FULL-TIME EQUIVALENT (FTE)					
Regular	5 / 5	5 / 5	5 / 5	5 / 5	5 / 5

FOREST PEST PROGRAM

1 Urban Forester IV
 1 Urban Forester III
 3 Urban Foresters II
 1 Administrative Assistant III

DISEASE-CARRYING INSECTS PROGRAM

1 Environmental Health Supervisor
 1 Environmental Health Specialist III
 2 Environmental Health Specialists II
 1 Administrative Assistant III

TOTAL POSITIONS

11 Positions / 11.0 FTE

Fund 40080

Integrated Pest Management Program

FY 2019 Funding Adjustments

The following funding adjustments from the FY 2018 Adopted Budget Plan are necessary to support the FY 2019 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 1, 2018.

- ◆ **Employee Compensation** **\$52,293**
 An increase of \$52,293 in Personnel Services includes \$32,594 for a 2.25 percent market rate adjustment (MRA) for all employees and \$19,699 for performance-based and longevity increases for non-uniformed merit employees, both effective July 2018.
- ◆ **Other Post-Employment Benefits** **\$4,941**
 An increase of \$4,941 in Personnel Services reflects required adjustments associated with providing Other Post-Employment Benefits (OPEBs) to retirees, including the Retiree Health Benefits Subsidy. For more information on Other Post-Employment Benefits, please refer to Fund 70030, OPEB Trust, in Volume 2 of the FY 2019 Adopted Budget Plan.

Changes to FY 2018 Adopted Budget Plan

The following funding adjustments reflect all approved changes in the FY 2018 Revised Budget Plan since passage of the FY 2018 Adopted Budget Plan. Included are all adjustments made as part of the FY 2017 Carryover Review, FY 2018 Third Quarter Review, and all other approved changes through April 30, 2018.

- ◆ **Carryover Adjustments** **\$96,251**
 As part of the FY 2017 Carryover Review, the Board of Supervisors approved funding of \$96,251 in encumbered funding for Operating Expenses for contractual obligations in both the Forest Pest Program and the Disease Carrying Insects Program.

Key Performance Measures

Indicator	Prior Year Actuals			Current Estimate	Future Estimate
	FY 2015 Actual	FY 2016 Actual	FY 2017 Estimate/Actual	FY 2018	FY 2019
Integrated Pest Management Program					
Percent of County tree defoliation resulting from gypsy moth and cankerworm infestation	0%	0%	1%/0%	0%	0%
Percent of stormwater structure inspections that resulted in treatments to control immature mosquitoes	N/A	N/A	N/A/8%	10%	10%

A complete list of performance measures can be viewed at
<https://www.fairfaxcounty.gov/budget/fy-2019-adopted-performance-measures-pm>

Fund 40080

Integrated Pest Management Program

Performance Measurement Results

Forest Pest Program

There was no aerial treatment for the gypsy moth in the spring of 2017. Based on field surveys of the gypsy moth population in the fall of 2016, no acres required treatment in the spring of 2017. Based on surveys for the cankerworm, no treatment was necessary in the spring of 2017. Defoliation surveys for both insects conducted in the summer of 2017 indicated that there was no defoliation in Fairfax County during FY 2017.

Disease-Carrying Insects Program (DCIP)

New performance measures have been introduced by the DCIP for FYs 2018 and 2019 to replace existing measures. The termination of contracted services at the end of FY 2017 and a systematic review of the larval surveillance and control program by DCIP has resulted in significant operational changes. Stormwater “dry ponds” are now inspected and treated by Health Department staff in lieu of storm drain treatments performed by a contractor. The replacement measures reflect the DCIP’s shift to using more routine mosquito surveillance to drive targeted control activities that seek to prevent or reduce the risk of disease transmission by mosquitoes in Fairfax County.

In FY 2017, there were zero cases of West Nile virus as reported by the Virginia Department of Health. Infection rates in mosquitoes were well-below average in FY 2017. DCIP operational costs are based on the number of pesticide treatments and other mosquito control measures completed in a given year, as well as education, outreach and surveillance activities. The total DCIP cost per capita was \$1.16 in FY 2017, \$0.27 lower than in FY 2016, when there was an increase in spending related to Zika response activities. This was less than the budgeted estimate of \$1.84 per capita for FY 2017, which is based on the spending the entire balance of the allotted budget.

Fund 40080

Integrated Pest Management Program

FUND STATEMENT

Fund 40080, Integrated Pest Management Program

	FY 2017 Actual	FY 2018 Adopted Budget Plan	FY 2018 Revised Budget Plan	FY 2019 Advertised Budget Plan	FY 2019 Adopted Budget Plan
Beginning Balance	\$2,481,302	\$1,462,706	\$2,805,322	\$1,740,973	\$1,740,973
Revenue:					
General Property Taxes	\$2,309,512	\$2,370,555	\$2,370,555	\$2,455,953	\$2,455,953
Interest on Investments	18,928	7,691	7,691	7,691	7,691
Total Revenue	\$2,328,440	\$2,378,246	\$2,378,246	\$2,463,644	\$2,463,644
Total Available	\$4,809,742	\$3,840,952	\$5,183,568	\$4,204,617	\$4,204,617
Expenditures:					
Forest Pest Program	\$790,473	\$1,142,766	\$1,217,661	\$1,170,423	\$1,170,423
Disease-Carrying Insects Program	1,072,947	2,062,578	2,083,934	2,092,155	2,092,155
Total Expenditures	\$1,863,420	\$3,205,344	\$3,301,595	\$3,262,578	\$3,262,578
Transfers Out: ¹					
General Fund (10001) - Forest Pest Program	\$66,453	\$66,453	\$66,453	\$66,453	\$66,453
General Fund (10001) - Disease-Carrying Insects Program	74,547	74,547	74,547	74,547	74,547
Total Transfers Out	\$141,000	\$141,000	\$141,000	\$141,000	\$141,000
Total Disbursements	\$2,004,420	\$3,346,344	\$3,442,595	\$3,403,578	\$3,403,578
Ending Balance²	\$2,805,322	\$494,608	\$1,740,973	\$801,039	\$801,039
Tax Rate Per \$100 of Assessed Value	\$0.001	\$0.001	\$0.001	\$0.001	\$0.001

¹ Funding in the amount of \$141,000 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.