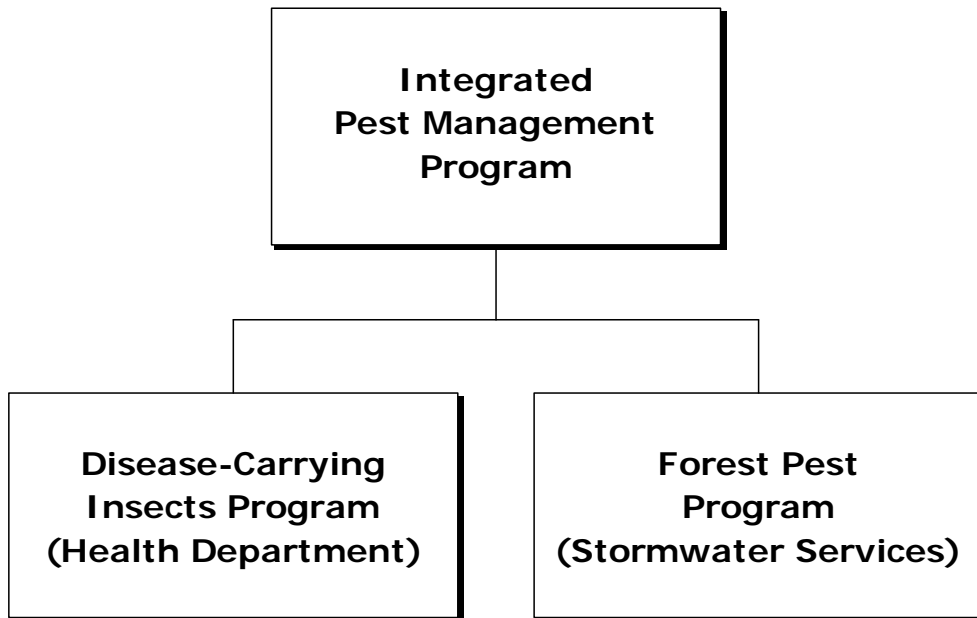


Fund 40080

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 2018, 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 in February. 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 2017 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 pometaria*) 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 2016, staff determined that no insect populations warranted control measures in the spring of 2017.

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 FPP 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 controls like *Telenomus alsophilae*, an egg parasitoid wasp. Insect egg viability can be effected by a number of factors including parasites, predators and adult nutrition. The purpose of this survey was to determine the presence of *T. alsophilae* as well as overall fall cankerworm egg viability in Fairfax County to use as one indicator of population trends.

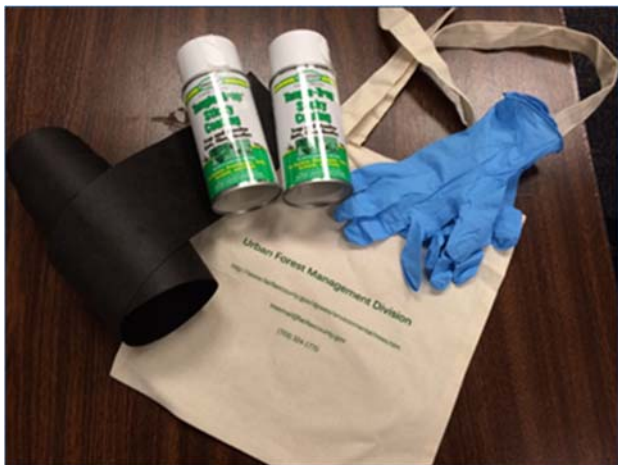
Collection sites were located in cankerworm banding sites that amounted to 100 or more female moths over the course of the monitoring season. Staff collected eggs from survey bands that had eggs on them as well as from small branches of trees located near the bands. Cankerworm eggs were reared indoors and the number of viable eggs were counted to determine the level of

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viability. Adult *T. alsophilae* emerges from fall cankerworm eggs approximately three weeks after fall cankerworm larva hatch. Staff recorded which sample sites had eggs where *T. alsophilae* emerged. Egg viability of collected samples has dropped from 53 percent to 30 percent. The presence of *T. alsophilae* in samples that were collected has remained relatively the same (56 percent in 2015 compared to 63 percent in 2016). This data helps confirm that fall cankerworm populations are declining. The data acquired from this survey should prove useful in obtaining a better understanding 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.

- **Fall Cankerworm Community Banding Campaign** – In December 2014 the Fairfax County Urban Forest Management Division (UFMD) implemented a fall cankerworm community banding program to mobilize and engage residents that were most affected by fall cankerworm,



focusing on the Mount Vernon District. The goal was to use efforts by volunteers to assist in Forest Pest Management's annual monitoring. Homeowner associations (HOA) that fell within the historical areas for high cankerworm populations were targeted for participation, and survey kits were distributed to organizations that requested to participate. Of the 100 kits that were disseminated, a total of nine completed responses were received by UFMD following the pilot program. The program was suspended and was not

conducted in FY 2016 because the manufacturer of Tanglefoot® discontinued the aerosol product needed to band the trees. Staff may continue this program in the future should the product become commercially available again.

- **Defoliation Survey** – The Fairfax County Forest Pest Management Program conducted an extensive defoliation survey to measure the damage caused by fall cankerworm beginning in 2015 and again in 2016. 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 two phases. The first phase of the survey consisted of a system of ground-observation points. A 1,500 foot grid was established 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 second phase of the defoliation survey was an aerial survey. An aerial survey was conducted to identify large areas of defoliation, as well as view large wooded tracts, such as Mason Neck and Huntley Meadows where a ground survey is impractical. The results of this survey indicated that there was no defoliation from fall cankerworm in 2016.

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Cankerworm populations have decreased in recent years and 70 acres of treatment using hydraulic ground spraying equipment were required in calendar year (CY) 2015 and no treatment was required in CY 2016. Staff anticipates no aerial treatment program in CY 2017; however, small amounts of ground treatment may be required. The FY 2018 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 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.

The Forest Pest Management Branch made efforts in 2016 to request and release emerald ash borer parasitoid wasps from the USDA: *Oobius agrili*, *Spathius agrili* and *Tetrastichus planipennis*. 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 have been identified including Cub Run Stream Valley Park, Bull Run Regional Park and Pohick Bay Regional Park. The process to request parasitoids is ongoing.

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In June 2016, a graduate student from the University of Maryland reached out to UFMD for assistance in identifying EAB parasitoid release sites in Fairfax County. The student is conducting research on the effect the parasitic wasps may have on the EAB population in more urbanized areas. As part of the research, a controlled number of wasps that prey on EAB eggs were released in Reston North Park and Cub Run Stream Valley Park. In spring 2017, four trees were cut down at each site to look for evidence of the effectiveness of the wasps. Preliminary results show evidence of native parasitic wasps present at these sites.

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 deployed WTB traps in confirmed locations during 2016.

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

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

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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.

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

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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 FPP 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 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 2014/2015 and 2015/2016 was 2,000 and 1,215, 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.

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.

Disease-Carrying Insects Program (DCIP)

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) 2016, there have been 45,875 human WNV cases and 2,003 deaths. The first sign of WNV in Fairfax County was in CY 2000 when a dead bird was found

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infected. The first human cases were identified in CY 2002 and through CY 2016, 45 human cases have been reported in the County. More recently no cases were detected in CY 2014, eight cases in CY 2015 and no cases in CY 2016. 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

Zika virus (ZIKV) was detected for the first time in the Americas during early CY 2015 and during CY 2016 it expanded to many countries in South America, Central America, the Caribbean, and parts of North America, such as Mexico and South Florida. The virus is primarily transmitted between humans through the bite of an infected yellow fever mosquito (*Aedes aegypti*) or Asian tiger mosquito (*Aedes albopictus*). Women infected during pregnancy can also pass the infection to the fetus, which may cause certain birth defects such as microcephaly, where babies are born with a smaller-than-average head. It can also be transmitted between sexual partners. Through CY 2016, there was no local transmission of the virus by mosquitoes in Fairfax County or Virginia, and all reported cases were travel-related. In order to limit the potential for local transmission of ZIKV in Fairfax County, the Health Department has developed a comprehensive Zika Action Plan that includes conducting outreach activities, case investigations, facilitating testing for humans, collecting and testing mosquitoes, and initiating targeted mosquito control activities as necessary to protect public health. This plan utilizes guidance from the interim Centers for Disease Control and Prevention (CDC) and Virginia Department of Health (VDH) Zika response plans.

Other mosquito-transmitted pathogens of public health concern

In addition to WNV and ZIKV, VDH's reportable disease list includes several other mosquito-borne illnesses. These "notifiable diseases" include 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.

Adult Mosquito Surveillance and Control Activities

Adult mosquito surveillance is a vital component of integrated pest management that aids the Health Department in determining the infection rate of mosquitoes that act as vectors of WNV. When combined with Health Department investigations of human WNV cases, this surveillance provides a consistent index of risk that can trigger control efforts of larval or adult mosquitoes to prevent outbreaks of WNV

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disease to Fairfax County residents. To increase in-house response capacity, vector control equipment and supplies were purchased in FY 2016 and FY 2017.

Adult mosquito and WNV surveillance activities are performed weekly at 71 sites from May through October. 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 for WNV using molecular diagnostics (reverse-transcriptase polymerase chain reaction or RT-PCR). By establishing action thresholds based on the abundance of WNV-infected mosquitoes and WNV disease, the Health Department can monitor the risk of WNV transmission to humans and may recommend targeted vector control efforts. 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 still be necessary if action thresholds 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. A limitation of human WNV case reporting is the amount of time from the onset of illness to the investigation and confirmation of a suspected case. This may delay intervention strategies that could reduce WNV transmission. 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 ZIKV in the Americas, during FY 2016 and FY 2017 the Health Department expanded its network of BG-sentinel traps, which target the types of mosquitoes that can spread ZIKV. The yellow fever mosquito, a tropical species that is driving the majority of transmission of ZIKV in the Americas, is rare in Virginia. However, the Asian tiger mosquito has the potential to play a role in the local transmission of ZIKV 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 being investigated by the Health Department, and mosquito surveillance and control activities are being conducted as necessary to protect public health. Control activities may include elimination of larval habitats, larvicide applications, or adult mosquito treatments. The Health Department lab tests mosquitoes for ZIKV. When adult mosquito surveillance indicates a need, targeted "barrier" treatments to control mosquitoes are conducted on case properties and/or nearby properties. These barrier treatments apply pesticide to areas where Asian tiger mosquitoes rest, providing control for up to three weeks after the treatment. Area-wide adult mosquito control, such as ultra-low volume (ULV) treatments by truck or aircraft are not being conducted at this time, but would be considered as one part of the County's response if local transmission of ZIKV by mosquitoes is detected in Fairfax County.

Larval Surveillance and Control Activities

Larval mosquito surveillance and control efforts help protect public health by identifying aquatic habitats that support the development of mosquitoes and, when indicated, treating those habitats with a larvicide that kills mosquito larvae. A contractor working for the County proactively treats storm drains in an effort to reduce the population of *Culex* mosquitoes that transmit WNV. An average of 35,000 storm drains are treated with a larvicide during three separate six-week cycles from May through October.

During FY 2016 and 2017, the DCIP built capacity to conduct its own larval monitoring and control activities in some of its County owned and/or maintained stormwater structures such as retention and detention ponds. The VDACS-licensed Health Department staff are equipped to respond more readily to citizen concerns about standing water and further target control efforts. Over time, these improvements will help integrate adult and larval surveillance data and lead to more effective mosquito control.

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Lyme disease and other tick-borne diseases

Lyme disease is the most commonly reported vector-borne illness in the United States. 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 black legged tick (*Ixodes scapularis*), and continues to be a public health concern. In Fairfax County, 284 human cases of Lyme disease were reported in CY 2014, 202 cases in CY 2015 and 189 cases in CY 2016. Other tick-borne diseases reported in Fairfax County include: Spotted Fever Group Rickettsias (20 cases in CY 2014, 14 cases in CY 2015, and 10 cases in CY 2016) and Ehrlichiosis/Anaplasmosis (five cases in CY 2014, eight cases in CY 2015 and six cases in CY 2016).

Tick Surveillance Activities

The County tick surveillance program was initiated to determine the distribution and infection rate of deer ticks (*Ixodes scapularis*) carrying the bacterium (*Borrelia burgdorferi*) that causes Lyme disease. It provides information about the presence of pathogens in local ticks that are capable of causing disease. Tick surveillance 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, counted and tested. With the establishment of a molecular diagnostic laboratory in the Health Department, tick pathogen testing for *Borrelia burgdorferi* is performed in-house. The data generated by tick surveillance and testing are used to inform the public about the pathogens present in local ticks, and reinforce messaging about the importance of preventing tick bites.

A collaborative tick control pilot project between the Police Department and the Health Department began in FY 2010. The project ended in late FY 2015 and the final report and executive summary were completed during FY 2016.

Additional Services

The DCIP offers a free tick identification service for County residents. Residents learn what type of tick they found, its basic biology, the pathogens it is capable of transmitting, 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: 394 in CY 2014, 317 in CY 2015 and 180 in CY 2016.

The Health Department may collaborate with the Department of Code Compliance to address service requests from County residents about standing water concerns. 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 also placed on mosquito bite prevention through the use of proper clothing and repellents. Information is provided about mosquito control options that can be performed by homeowners or tenants. The following numbers of service requests were performed by the DCIP staff during the past three years: 107 in CY 2014, 30 in CY 2015, and 57 in CY 2016.

Outreach and Education

The outreach and education component of the DCIP is aimed at increasing community awareness of personal protection actions that can be taken to prevent mosquito and tick bites, prevent vector-borne diseases, and steps that can be taken to reduce mosquitoes and ticks.

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The program provides outreach materials in multiple languages. In FY 2016, the DCIP staff produced and printed the 12th edition “Fight the Bite” calendar. The calendar provides helpful hints on preventing mosquito- and tick-borne diseases. General facts and brief descriptions of the County’s efforts are included to educate the public about basic mosquito and tick biology and inform them specifically about WNV and Lyme disease in Fairfax County. Calendars are distributed annually to every fourth grade student in Fairfax County Public Schools. An eighth children’s book about mosquitoes entitled, *Bite Buster’s Bug Time Stories* was printed in FY 2016 and is currently being distributed.

During FY 2016, DCIP staff participated in outreach events, distributing educational materials and advising citizens about how to reduce their exposure to mosquitoes and ticks. The 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.

Pests of Public Health Importance

A wide range of pests threaten public health in Fairfax County because they can transmit pathogens, or their stings or bites can cause reactions. Some of the most common public health pests in Fairfax County include: mosquitoes, house-frequenting insects (e.g. lice, fleas, bed bugs, cockroaches), ticks, mites, flies, and venomous arthropods (e.g. yellow jackets, hornets, wasps, bees, ants, spiders, centipedes). The manner in which public health pests are managed depends on the pests that are causing the problems, so proper identification is essential. Effective pest management also depends on knowledge of the pest’s ecology, biology, and life history. It is critical that pest populations are monitored routinely so that infestations can be detected as early as possible when they are smaller and easier to control.

Management Plans

The DCIP Annual Report and Plan of Action provides a summary of program activities for each year and a framework for the upcoming year. The report highlights the program’s integrated mosquito management plan, including mosquito and West Nile virus surveillance and control activities, tick and tick-borne disease 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. 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),” provide guidance on these important mosquito-borne diseases.

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Budget and Staff Resources

Category	FY 2016 Actual	FY 2017 Adopted	FY 2017 Revised	FY 2018 Advertised	FY 2018 Adopted
FUNDING					
Expenditures:					
Personnel Services	\$1,390,673	\$1,357,865	\$1,357,865	\$1,377,497	\$1,377,497
Operating Expenses	946,098	1,827,847	1,811,073	1,827,847	1,827,847
Capital Equipment	61,470	0	43,079	0	0
Total Expenditures	\$2,398,241	\$3,185,712	\$3,212,017	\$3,205,344	\$3,205,344
AUTHORIZED POSITIONS/FULL-TIME EQUIVALENT (FTE)					
Regular	11 / 11	11 / 11	11 / 11	11 / 11	11 / 11

Summary by Program

Category	FY 2016 Actual	FY 2017 Adopted	FY 2017 Revised	FY 2018 Advertised	FY 2018 Adopted
Forest Pest Program					
EXPENDITURES					
Total Expenditures	\$800,727	\$1,133,558	\$1,133,593	\$1,142,766	\$1,142,766
AUTHORIZED POSITIONS/FULL-TIME EQUIVALENT (FTE)					
Regular	6 / 6	6 / 6	6 / 6	6 / 6	6 / 6
Disease-Carrying Insects Program					
EXPENDITURES					
Total Expenditures	\$1,597,514	\$2,052,154	\$2,078,424	\$2,062,578	\$2,062,578
AUTHORIZED POSITIONS/FULL-TIME EQUIVALENT (FTE)					
Regular	5 / 5	5 / 5	5 / 5	5 / 5	5 / 5
FOREST PEST PROGRAM			DISEASE-CARRYING INSECTS PROGRAM		
1	Urban Forester IV		1	Environmental Health Supervisor	
4	Urban Foresters II		1	Environmental Health Specialist III	
1	Administrative Assistant III		2	Environmental Health Specialists II	
			1	Administrative Assistant III	
TOTAL POSITIONS					
11 Positions / 11.0 FTE					

Fund 40080

Integrated Pest Management Program

FY 2018 Funding Adjustments

The following funding adjustments from the FY 2017 Adopted Budget Plan are necessary to support the FY 2018 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 2, 2017.

- ◆ **Employee Compensation** **\$19,058**
 An increase of \$19,058 in Personnel Services is for performance-based and longevity increases for non-uniformed merit employees effective July 2017.
- ◆ **Other Post-Employment Benefits** **\$574**
 An increase of \$574 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 Fund, in Volume 2 of the FY 2018 Adopted Budget Plan.

Changes to FY 2017 Adopted Budget Plan

The following funding adjustments reflect all approved changes in the FY 2017 Revised Budget Plan since passage of the FY 2017 Adopted Budget Plan. Included are all adjustments made as part of the FY 2016 Carryover Review, FY 2017 Third Quarter Review, and all other approved changes through April 30, 2017.

- ◆ **Carryover Adjustments** **\$26,305**
 As part of the FY 2016 Carryover Review, the Board of Supervisors approved funding of \$26,305 in encumbered funding for Operating Expenses for contractual obligations for the treatment of storm drains and the tick testing program within the Disease Carrying Insect Program, and Capital Equipment.

Key Performance Measures

Indicator	Prior Year Actuals			Current Estimate	Future Estimate
	FY 2014 Actual	FY 2015 Actual	FY 2016 Estimate/Actual	FY 2017	FY 2018
Integrated Pest Management Program					
Percent of County tree defoliation resulting from gypsy moth and cankerworm infestation	1%	0%	1%/0%	1%	1%
Confirmed human cases of West Nile virus in Fairfax County, Fairfax City and Falls Church City as reported by the Virginia Department of Health	3	1	1/8	1	1

A complete list of performance measures can be viewed at www.fairfaxcounty.gov/dmb/fy2018/adopted/pm/40080.pdf

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 2016. 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 2016. Defoliation surveys for both insects conducted in the summer of 2016 indicated that there was no defoliation in Fairfax County during FY 2016.

Disease-Carrying Insects Program (DCIP)

The goal of DCIP in FY 2016 was to hold the number of human cases of West Nile virus as reported by the Virginia Department of Health to one case. In FY 2016, there were eight human cases of WNV. Infection rates in mosquitoes were also higher than average during FY 2016, both in Fairfax County and the northern Virginia region.

DCIP operational costs are based on the number of storm drain treatments and other mosquito control measures completed in a given year, as well as education, outreach and surveillance activities. Pesticide applications, although dependent on weather conditions, remain relatively constant throughout the years, maintaining a relatively stable program cost. The total DCIP cost per capita was \$1.43 in FY 2016, \$0.36 higher than in FY 2015. During FY 2016, DCIP filled a vacant position, replaced three vehicles, and incurred increased costs to test mosquitoes for West Nile virus. As part of the Health Department's response to the threat of Zika virus, there was an increase in the number of seasonal staff, number of outreach materials printed, and outreach activities conducted by DCIP staff. Despite these additional costs, this is still lower than the budgeted estimate of \$1.79 per capita for FY 2016.

Fund 40080

Integrated Pest Management Program

FUND STATEMENT

Fund 40080, Integrated Pest Management Program

	FY 2016 Actual	FY 2017 Adopted Budget Plan	FY 2017 Revised Budget Plan	FY 2018 Advertised Budget Plan	FY 2018 Adopted Budget Plan
Beginning Balance	\$2,769,053	\$1,488,819	\$2,481,302	\$1,462,706	\$1,462,706
Revenue:					
General Property Taxes	\$2,242,360	\$2,326,730	\$2,326,730	\$2,370,555	\$2,370,555
Interest on Investments	9,130	7,691	7,691	7,691	7,691
Total Revenue	\$2,251,490	\$2,334,421	\$2,334,421	\$2,378,246	\$2,378,246
Total Available	\$5,020,543	\$3,823,240	\$4,815,723	\$3,840,952	\$3,840,952
Expenditures:					
Forest Pest Program	\$800,727	\$1,133,558	\$1,133,593	\$1,142,766	\$1,142,766
Disease-Carrying Insects Program	1,597,514	2,052,154	2,078,424	2,062,578	2,062,578
Total Expenditures	\$2,398,241	\$3,185,712	\$3,212,017	\$3,205,344	\$3,205,344
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	\$2,539,241	\$3,326,712	\$3,353,017	\$3,346,344	\$3,346,344
Ending Balance²	\$2,481,302	\$496,528	\$1,462,706	\$494,608	\$494,608
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.