County of Santa Clara
Office of Sustainability
Integrated Pest Management Program

‘In pursuit of positive change, embracing evolution through innovations, smart solutions and maintaining a successful culture’
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A. Executive Summary

The County of Santa Clara Office of Sustainability (OOS) administers the Integrated Pest Management (IPM) Program for the County of Santa Clara, in collaboration with other County departments. Overseen by the County IPM Coordinator and IPM Technical Advisory Group, the program is governed by County IPM and Pesticide Use Reduction Ordinance Division B-28. The Ordinance governs and guides the control of pests on properties owned and managed by the County, such as regional parks, roads, airports, office complexes, hospitals, correctional facilities, and animal shelters. Common IPM challenges in these locations include: ants; bedbugs; flies; roaches; wasps; termites; rodents; birds; weeds; and plant insects and diseases. The IPM ordinance does not apply to private property or other jurisdictions.

IPM is a sustainable approach to preventing and suppressing pest problems while minimizing human health and environmental risks. IPM practitioners use a judicious blend of biological, cultural, mechanical and chemical controls. Since established in 2002, the County IPM program continues to evolve based on science and best practices, shared knowledge, and pilot projects. As a result, the program has achieved significant progress in minimizing forest and agricultural losses from pests, and reducing pesticide use to protect the public and the environment. This report covers the IPM Program’s performance on reducing pesticide use in 2017 and the Program activities from January 2017 through October 2018.

Not all pests are a problem. By continuously monitoring plant and animal populations, the County IPM Program focuses on pests that affect safety or are likely to damage locations used for public recreation and County services. Each location is individually assessed.

Treatment choices are based on level of risk, severity, timing, effectiveness, and available resources. Multiple, non-chemical integrated methods are often employed including: client awareness and outreach; pest proofing;
improved sanitation and housekeeping; mulching; hand-pulling; trimming and mowing; compost tea; and many more. The IPM program also provides oversight for several countywide IPM contracts and coordinates communication and reporting with user departments. The County is a well-recognized regional, national and international leader in ecologically sound IPM.

B. 2017 Highlights

1. Pesticide Usage

The long-term pesticide usage strategy is to favor non-chemical integrated methods to minimize the need for chemical applications, and supplement when necessary with the least toxic organic treatments. IPM will vary each year based on the types of pests, risks, and conditions in the field. Pesticide use in 2017 declined significantly throughout the use scenarios as described below:

a. Pesticide Use in Structures

The use of reduced-risk pesticides in structures has been lowered to statistically insignificant levels. Regular site inspection followed by building occupant education, sanitation, housekeeping and maintenance improvements, has significantly altered many pest situations that would have otherwise required pesticide applications.

b. Pesticide Use in Urban Landscapes

Since 2008, no pesticide was used in urban landscapes at County office complexes with one exception in 2012 when two pesticide applications were required; one to treat Magnolia scale infestation and the other to remove an unwanted Bamboo species that was compromising a pedestrian walkway.
c. Pesticide Use in Parks

In 2002, a pilot project was launched at Ed Levin Park (~ 1,500 acres) using reduced-risk pest management strategies to eliminate the use of all conventional pesticides, with the plan to extend the pilot to all 29 regional parks (~52,140 acres). In 2017, 25 parks representing recreational, open space, and rangelands were managed by non-chemical methods, which resulted in 99.9 percent of the total County park landscape being managed non-chemically. For example, attractant traps are used to control yellow jackets.

i. Vegetation Management

Chemical intervention in invasive weed management projects throughout the parks system is maintained at a very low level (only 53.1 of 52,140 acres), and the emphasis is on using non-chemical alternative throughout park recreational areas. However, a slight increase or decrease from year to year in the acreage under chemical management is cyclic and need-based.

In 2017, other non-chemical means to control pests in regional parks included: lawn/turf conversion to landscape (2.5 acres); flail mowing (17 acres); mowing (8.5 acres); disking (58 acres); aeration (8.5 acres); fertilizing (8.5 acres); managed cattle grazing (10,721 acres); installation of weed fabric (.25 acres); string trimming (6.47 acres); mulch application (1.9 acres); and closing 61
irrigation valves and repairing 20 irrigation valves. While 20 trees required removal for a variety of reasons, 45 trees were saved with careful pruning and trimming.

The OOS will continue to offer IPM and pesticide refresher trainings and promote the use of Bay-Friendly landscaping maintenance principles and practices, as well as plans to reduce non-functional lawns (i.e., turf without purpose) and improve irrigation systems.

**ii. Vertebrate Pest Control**

Since 2003, no rodenticide was used in the open space of County regional parks, except during 2016 and 2017 when Aluminum Phosphide, a burrow fumigant, was used to control ground squirrels in two County parks. The use of fumigant was required because the ground squirrel infestations exceeded what is possible to control with non-chemical methods within the required economic threshold. Typically, mechanical traps and CO₂ injectors are the preferred choice used by the County to control vertebrates, such as ground squirrels and pocket gophers.

In 2016, 60 pounds of fumigant was used on 45 acres of Martial Cottle Park's non-agricultural area. In 2017, 18.24 pounds of fumigant was used. Controlling infestations is a priority at the Martial Cottle Park to prevent an economic threat to the urban organic farm located at the park.

At Penitencia Creek Park, there are ground squirrel infestations close to several areas where human interaction could be likely, including near children's play areas. Due to the pests’ ability to carry disease pathogens, chemical intervention was necessary. Burrows at Penitencia were fumigated with 4.03 pounds of Aluminum Phosphide in 2017.

In general, vertebrate control (e.g., raccoons, pocket gophers, feral pigs) throughout the park system is also managed non-chemically. In addition to the fumigation, animal traps were used to catch 939 ground squirrels at Martial Cottle, 71 at Penitencia, and a total of 642 more in other County parks. Burrows in all parks were also removed by collapsing.
iii. Aquatic pest management

Since 2002, no pesticide has been used to control aquatic weeds on County-owned ponds, lakes, and creeks, except what was reported in 2006-2014 under the Arundo donax control project managed by Santa Clara Valley Water District.

d. Roadside Right-of-Way Vegetation Management

Since 2005, the County has significantly reduced by 75 percent the acreage under chemical management (use of herbicides) to control vegetation on County rights-of-way. (See Attachment F figure 4). The slight increase or decrease in acreage under chemical management from year to year is cyclic and need-based. Tailoring herbicide applications based on weed identification has helped to maintain appropriate, low chemical use levels.

Pursuant to the County IPM ordinance, the addition of Glyphosate (Roundup®) to the California Proposition 65 list has prompted the product’s removal from the County’s list of approved pesticides. The remaining stock of Glyphosate was depleted, and further purchase is not authorized. Site inspections and IPM research into safe alternative options to glyphosate is an on-going process.

Selecting chemicals for roadside vegetation management is becoming more challenging. As the market for organic products expands, these products continue to evolve and improve offering alternatives to conventional chemical applications. Pre-emergent, non-carcinogenic, organic or reduced-risk herbicides may eventually be effective for weed control. However, such products are not yet proven effective and/or are not available to meet the needs of commercial scale roadside vegetation management. Therefore, a successful ecological IPM strategy currently requires more physical labor techniques such as mowing, digging out, hand pulling, weed wrenching, use of living systems (cattle, goats, sheep grazing), and design improvements.
e. General Aviation Airports

County airports did not use any pesticides in 2007 through 2017.

f. Conventional pesticides

The County has completely phased out the use of 26 high-risk conventional pesticides and significantly reduced the total number of pesticide applications and the volume used of reduced-risk pesticides.

2. In Sustainability

Sustainability is based on a simple principle; everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment.

The IPM program has evolved over the years and has adopted several sustainability initiatives. By working together on conservation principles and smart resource management, many of these initiatives have resulted in positive outcomes that solve pest issues, reduce pesticide use, and address many of our current environmental challenges such as climate change, air and water pollution, water management, habitat conservation and waste stream concerns. Sustainability concepts that compliment IPM program goals include pesticide pollution prevention outreach, increased collaboration between
regional educational organizations and County departments to maximize outreach, and actively promoting and educating the community about:

- a. Sustainable landscaping
- b. Organic agriculture
- c. Sustainable forestry
- d. Green building sustainable landscape design and LEED certification
- e. Water conservation

a. Promotion and education in sustainable landscaping

Many pest issues can be reduced or avoided by using sustainable landscaping practices. For example, landscape plants that are native, or otherwise well-suited for the Santa Clara Valley, will be stronger and less susceptible to pest infestation. Features such as mulch, efficient irrigation, and wildlife habitat designed into sustainable landscapes reduce the ability of pests to establish and flourish. A sustainable landscape will require less fertilizer and pesticides, therefore, will be overall better for the environment.

i. Sustainable Landscape Management Resource Guide

Guided by the County’s sustainable landscaping policy, the IPM program developed a new website in October 2017 to educate the community and promote sustainable landscape design, implementation, and maintenance. The webpage can be accessed at: [https://www.sccgov.org/sites/slm/Pages/Home.aspx](https://www.sccgov.org/sites/slm/Pages/Home.aspx)

The sustainable landscaping principles covered include: landscaping locally; landscaping to reduce waste to the landfill; nurturing the soil; conserving water; conserving energy; protecting water and air quality; and creating and protecting wildlife habitat.
This outreach is designed to provide step-by-step sustainable gardening education for the novice, the avid, and the professional gardener. The site has a searchable database that provides a “one-stop shop” to select the right plant for the right place based on type, size, sun, soil and other factors. It also provides information about where to buy native plants locally and water smart landscaping including water harvesting, efficient irrigation systems, and greywater usage. The goal of this educational outreach is to encourage local communities to improve their gardening practices, to protect and enhance the natural environment, and to increase sustainable practices.

b. Promotion and education in organic agriculture

Organic farming systems rely on ecologically-based practices such as cultural and biological pest management, and virtually exclude the use of synthetic chemicals in crop production.

The goal is to design the production system using integrated non-chemical techniques so that pests do not find plants, are controlled by natural enemies (biological control), or their damage is kept to a minimum. Vigorous, healthy plants are more able to withstand damage caused by arthropods and disease. Therefore, a “plant positive” (as opposed to “pest negative”) approach of managing the system to enhance beneficial processes and cycles and create healthy soil and plants, is at the foundation of integrated pest management in organic systems.

The integrated non-chemical techniques used in organic farming systems are carefully planning planting and harvesting dates, providing habitats that supply resources for beneficial organisms, managing soil fertility and crop nutrients through tillage and cultivation practices, crop rotations, cover crops, and supplementing with manure, composts, crop waste material, and other allowed substances.
Urban Organic Farming at Its Best

In 2014, the County committed to organic farming by leasing its open space agricultural land at Martial Cottle Park to Jacobs Farm. Since then, this newest urban park and working farm is producing flavorful, local, organic fruits and vegetables that go directly from “field to fork.” Locally grown farm produce and products includes:

- strawberries
- melons
- sweet corn
- sweet peppers
- bell peppers
- shishito peppers
- beets
- Carrots
- fresh salsa
- heirloom lettuce
- arugula
- kale
- heirloom tomatoes
- cherry tomatoes
- cucumbers
- onion
- sugar snap peas
- raw honey
- edible flowers
- lavender
- cilantro
- mint
- thyme
- rosemary
- ginger
- jams

The farm has become a showcase for the latest in sustainable farming techniques, conservation and food production, and now is moving into the “dry farming”\(^1\) of Heirloom and Early Girl tomatoes to conserve water. All produce is grown using IPM principles and practices which include:

\(^1\) Dry farming refers to crop production during a dry season, utilizing the residual moisture in the soil from the rainy season, usually in a region that receives 20 inches or more of annual rainfall. Dry farming works to conserve soil...
• Maintaining and enhancing soil fertility and promoting optimal biological activity within the soil by building the soils with natural inputs like compost, cover crops, worms, and healthy fungi;
• Crop selection and rotation, and plant and animal residue recycling to manage nutrient cycling;
• Water management and the augmentation of beneficial insects to encourage a balanced predator–prey relationship, and promote biological diversity and ecologically-based pest management; and
• When these good management practices are unable to prevent or control crop pests, weeds and diseases, a biological or other substance allowed for use in organic farming is applied to prevent, suppress, or control pests.

No Pesticides were applied at Martial Cottle farming operations in 2017

moisture during long dry periods primarily through a system of tillage, surface protection, and the use of drought-resistant varieties.
Community outreach by the farmer about farming activities is extensive. On daily basis, the farm team responds directly to park visitors’ questions about farming practices including all public inquiries received through the visitor center, by phone, and by email. School field trips, public events, wagon ride tours, a “U-pick” field program, and farm dinners are also organized to engage the public and share information on sustainable farming practices. Social media is also used to inform the public about farming practices and activities.

c. Promotion and education in sustainable forestry

Forest ecosystems are vital County “green infrastructure.” Forests contribute greatly to a high quality of life and provide important resources and services including timber, livestock grazing, water, wildlife habitat, recreational opportunities and biomass inputs. Sadly, threats to forest health from wildfire, insects, disease and development are increasing because of climate change and population growth. The negative impacts of deforestation can be devastating to the environment.

The most dramatic impact is the loss of habitat for millions of species. Tree loss deprives the forest of its canopy, which beneficially blocks the sun’s rays and holds in heat at night. Forest soils need to stay moist. Without sun-blocking tree cover, soil quickly dries out leading to forest losses and eventually making former forest lands barren deserts. Trees also help perpetuate the water cycle by returning water vapor to the atmosphere. Cycle disruption from tree loss leads to more extreme temperature swings that can
be harmful to plants and animals. Trees absorb and sequester greenhouse gases that increase global warming. Forested lands are the County’s largest land-based carbon sink, drawing carbon from the atmosphere and storing it in wood and in forest soils. Fewer or smaller forests result in larger amounts of greenhouse gases remaining in the atmosphere—which can increase the speed and severity of global warming.

Managing County forests sustainably can help mitigate the adverse impacts of climate change and improve local conditions and quality of life. The ongoing health and fortitude of County forests will require cohesive, comprehensive, long-term strategies involving countywide restoration and sustained maintenance strategies.

_i. County Forest Guidelines and Departmental Plans_

County forest ecosystems (natural resource areas, rangelands, recreational parklands, and urban tree populations) can be categorized in different ways and to different degrees of specificity, with different operational goals and objectives. The County of Santa Clara’s forest operational categories that are managed by County departments include:

<table>
<thead>
<tr>
<th>Department</th>
<th>Forest Ecosystem Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilities and Fleet</td>
<td>Urban and Community Forest</td>
</tr>
<tr>
<td>Parks and Recreation</td>
<td>Natural Resource Area Forest</td>
</tr>
<tr>
<td>Parks and Recreation</td>
<td>Rural Recreation Area Forest</td>
</tr>
<tr>
<td>Parks and Recreation</td>
<td>Urban Recreation Area Forest</td>
</tr>
<tr>
<td>Parks and Recreation</td>
<td>Historic Sites Forest</td>
</tr>
<tr>
<td>Parks and Recreation</td>
<td>Countywide Trails Right-of-Way Forest</td>
</tr>
<tr>
<td>Roads and Airports</td>
<td>Rural Roads Right-of-Way Forest</td>
</tr>
<tr>
<td>Roads and Airports</td>
<td>Mountain Roads Right-of-Way Forest</td>
</tr>
<tr>
<td>Roads and Airports</td>
<td>Expressways Right-of-Way Forest</td>
</tr>
<tr>
<td>All Departments</td>
<td>Heritage Trees</td>
</tr>
</tbody>
</table>
To improve County forest and tree management throughout County departments the OOS, Roads and Airports (RDA), Facilities and Fleet (FAF), and Parks and Recreation (PRK) have formed a workgroup to develop County forest management guidelines and departmental plans. Expected outcomes include the identification of individual departmental challenges, problem-solving, and increased collaboration. The guidelines and plans are also anticipated to assist in achieving Environmental Stewardship Goal #10, which involves increasing the number of County trees through planting. The OOS IPM Program drafted forest and tree management guidance and provided it to FAF, RDA, PRK, and HHS for review in October. The guidance is expected to be completed by the end of 2018 and can serve as a foundation for developing department-specific plans.

**ii. Drought-Ravaged Tree Program**

The recent drought may be over, but the massive tree die-off is having lasting effects on water supply and forest ecosystems. To address the effects of drought on the tree population, the County provided one-time funding of $80,000 to replace drought-ravaged trees with climate appropriate species and provide outreach to educate the public about appropriate tree care.

The IPM Program administered selection of, and worked closely with, two non-profit groups: Our City Forest and Canopy. Services include planting 200 trees and conducting outreach to engage diverse community groups (including policy-makers, public and private residential landowners, and schools) in tree care by disseminating educational materials and conducting educational workshops about the benefits of planting and caring for trees.

In partnership with the IPM Program, the above-mentioned groups created a program event hosted at the County Government Center on Arbor Day March 9, 2018. The event included expert speakers and drew 85 attendees from multiple urban forestry organizations.
including: the Western Chapter of the International Society of Arboriculture; the Californian Urban Forestry Council; the State of California's Save our Water, Our Trees Campaign; UC IPM Hortiscience; and others. The event audience was primarily composed of professionals likely to enhance the impact of the outreach because they interact with and impact the County's urban and natural environment (e.g., county and city elected officials and policymakers, and county and city planning, public works, urban forestry staff and associations).

Over the grant period, Canopy held 16 educational tree walks for high school students and two educational field trips for 4th grade students. Wellness Tree Walk programs are designed to encourage students to spend more time with trees and natural greenery to relieve stress, prevent depression and improve overall health and wellness. In total, 387 students benefited from this program. Canopy organized two “Our Tree, Our History” field trips for 73 elementary school participants. These trips included hands-on activities such as acting as arborists for the day by measuring trees and learning about the native ecology (which they help restore). They also learned about the area’s history from the perspective of a 1,000-year-old redwood tree.
Canopy distributed the brochure, *Save Our Water and Our Trees: Tips for Water-Wise Tree Care*. The brochure includes in-depth information and tips on when to water, how to water, and how to mulch to conserve moisture. There are also tips for lawn removal, how to assess moisture levels, and the various factors to take into consideration when determining how much water a tree needs. The brochure is disseminated at all Canopy events and to all municipal tree departments in the northern area of County. The brochure can also be found on their website.

Canopy also gave eight community presentations on topics including: *Trees to Plant Now*; and *Tree and Infrastructure: Minimizing Conflicts*. The presentations were widely promoted through e-newsletters and social media and are now available at Canopy’s Tree Library: [http://canopy.org/tree-info/canopy-tree-library/](http://canopy.org/tree-info/canopy-tree-library/).

Seventy trees were planted during the 2017 calendar year by Our City Forest on behalf of the County. The planting of an additional 130 trees will continue during the 2018/2019 rainy season with the completion of planting expected by Spring 2019.
d. Promotion and education of green building design and LEED certification

Sustainable building design requires a big-picture view of how choices affect facilities’ pest management efforts. Prevention of pest problems at the design level is the heart of any state-of-the-art integrated pest management program. Pest proofing, in conjunction with sanitation efforts, provides the best long-term management and prevention of pest infestations. Relatively simple design features can substantially reduce long-term pest control costs in buildings and landscapes, while also eliminating the health and environmental impacts of pesticide use.

i. Landscape Inventory and Operational Needs Assessment

The FAF landscape labor and materials assessment was contracted to a vendor in December 2017 to provide a landscape inventory and operational needs assessment. The on-site landscape assessments began in April 2018 and were completed by August 2018. The contractor collected data on current plant palettes, irrigation systems and landscape categories (e.g. turf, mulch, hardscape). By December 2018, the contractor will provide maps of current and recommended low-water plant palettes, current and recommended irrigation systems, and recommendations for required labor and landscaping materials including irrigation efficiency upgrades, low water-use replacement plants, and employee training.

ii. Review of Built Environments - From the Eyes of an IPM Professional

In 2018, the OOS IPM Program participated in Building Envelope eco-charrettes organized by FAF. The IPM Program’s goal during these meetings was to offer support and serve as trusted IPM resources to educate architects, engineers, builders and the green building community on ways to design pests out of buildings.
The pest prevention recommendations at the design and/or retrofit stage of construction can help improve indoor air quality and save money over the life of the building.

Pest prevention principles at the design level require architects and builders to rethink their design strategies in a more holistic fashion. This rethinking is needed both for established design approaches, such as the standard acoustical gaps in ceilings that can also serve as rodent or cockroach hotels, and for emerging approaches, such as the promotion of living walls that will have unknown impacts on pest infestations. In other examples, tactics needed to conserve energy such as sealing, and weatherization will likely harmonize very well with tactics for designing out pests.

Clearly, an opportunity exists to both provide definitive design guidelines for pest prevention, to incorporate these guidelines into existing design frameworks, and in the end, to reduce long-term costs and pesticide use in the built environment. Also, the recent explosion of interest in green building standards, such as the Leadership in Energy and Environmental Design (LEED®) program and the International Green Construction Code provides new opportunities for integrating pest prevention into a holistic design framework. LEED credits are available for IPM integration.

e. Furthering awareness in water conservation

Water conservation relates to IPM program goals in several ways. Landscape weeds thrive in disturbed and poorly irrigated land. Drip and sub-surface irrigation techniques that are targeted to desired landscape plant species can alleviate weed issues. Additionally, trees that have adequate water will maintain the health and vigor necessary to prevent insect and pathogen attacks.
1. **County of Santa Clara Sustainable Landscape Ordinance**

In 2015, the State of California enacted major changes to the Water Efficient Landscape Ordinance, marking a groundbreaking shift toward landscape design and management practices better suited to the state’s climates and conditions. New development and retrofitted landscape water efficiency standards are governed by the State Model Water Efficient Landscape Ordinance (MWELO), established to promote water efficiency. About half of California’s urban water use is from landscape irrigation. Therefore, with proper landscape design, installation and maintenance, substantial water savings can be achieved. All California agencies are required to either adopt, implement, and enforce the MWELO, or adopt a more stringent ordinance.

The County of Santa Clara adopted a modified version of MWELO with some changes in the language and definitions best suited to the local area. The IPM Program assisted the County Department of Planning and Development to revise the *County of Santa Clara Sustainable Landscape Ordinance* (Landscape Ordinance) to be compatible with the MWELO, including the development of landscaping permit application forms. The State intends to update the MWELO every three years, and the County's Landscape Ordinance will be updated to reflect these MWELO updates.

MWELO updates will require significant engagement on several fronts including: convening diverse stakeholders; complying with State and local regulations; researching water efficiency; outreach and promotion of water efficiency; monitoring and evaluation; tracking progress; and periodic/timely reporting to County management and the Board of Supervisors. These actions are expected to bring systematic and permanent change by mitigating drought conditions across the region.

The OOS IPM Program will continue to review opportunities to improve countywide water management for conservation, efficiency, wastewater utilization, pollution prevention, education/outreach, and operational efficiencies.
f. Pesticide pollution prevention outreach

Numerous pesticides are used in the U.S. for production agriculture, non-production agriculture, and in the urban environments. People use insecticides, herbicides and chemical fertilizers to eliminate insects and weeds from their gardens or buildings, but these have the potential to harm our health and the environment. While oftentimes beneficial, pesticides are also risky. Misuse of pesticides and accidents involving pesticides occur regularly. Pesticide pollution can harm the environment and non-targeted living species. Because of this, the County works with the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), to educate citizens on how to manage pesticides to minimize the harmful impacts and prevent point source and non-point source pollution.

i. Outreach to Nursery Outlets and Local Landscapers and Public

The SCVURPPP’s target audience for outreach has primarily been the urban audience. Outreach is achieved by distributing information about how to manage pests using sustainable landscape practices, promoting structural sanitation, housekeeping and maintenance to manage or control pests. Established in 2011, the SCVURPPP, of which the County is a member, continues to conduct IPM educational programs and trainings.

In the 2017/2018 fiscal year, the SCVURPP in collaboration with the Watershed Watch consultant and Co-permittees, staffed twelve events in several Santa Clara County cities at which IPM outreach was conducted. Event staff distributed the brochures and fact sheets: Less-Toxic Pest Management; 10 Most Wanted Backyard Bugs; and Manage Pests in your Home and Garden.

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2 Member agencies (co-permittee) include Campbell, Cupertino, Los Altos, Los Altos Hills, Los Gatos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, Sunnyvale, the County of Santa Clara, and the Santa Clara Valley Water District.
pocket guides. The SCVURPPP contributed funds to, and actively participated in, the Bay Area Stormwater Management Agencies Association (BASMAA) IPM Store Partnership Program (also known as the Our Water, Our World program (OWOW)). The aim of the OWOW program is to partner with retail stores and nurseries to provide less-toxic pest control information to residents at the point of purchase. Through OWOW, the SCVURPPP provides stores with new display materials, stocks literature racks with Less-Toxic Pest Management fact sheets, and updates “shelf-tags.” Shelf tags are small product identification signs that are placed on store shelves to help customers identify less-toxic products.

The OWOW program also includes a training component where store employees are trained on IPM and how to provide information on less-toxic pest control products to customers. Currently, 31 local stores in Santa Clara Valley participate in the OWOW program. In 2017, the SCVURPPP program used a consultant to train 91 employees representing ten stores. These on-site trainings informed attendees about stormwater issues and IPM and supplied them with informational handouts and lists of less-toxic products. The program continues to conduct outreach about less-toxic pest control to teach residents who use or hire for structural pest control or landscape pest control services, and professionals in these services areas.

In the 2017/2018 fiscal year, IPM advertisements were placed online and on local radio stations and television channels as part of the Watershed Watch Campaign media advertising. Overall, Watershed Watch Campaign advertising included 4,110 total spots on IPM topics, including 1,788 spots on hiring an eco-friendly pest control professional, and 586 spots on the Santa Clara Valley Green Gardener program. Messages about less-toxic pest management information, including the list of Green Gardeners, IPM certification programs, OWOW fact sheets, and the list of stores selling less-toxic products were posted on the website throughout the year. The website also promotes proper disposal of pesticides and refers users to the County Household Hazardous Waste Program’s website (www.hhw.org) to find a disposal location near them.

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3 Information is provided on: pesticide use and water quality; proper use and disposal of pesticides; IPM; the Green Gardener Program; trained Green Gardeners; IPM certification programs; and the OWOW Program.
Additionally, the SCVURPPP and Watershed Watch Campaign conducted IPM outreach at seven events. Funding was provided to support the Going Native Garden Tour (GNGT) held on April 7 and 8, 2018. This tour featured 51 gardens that demonstrated environmentally friendly gardening practices with an emphasis on reduced water use, reduced chemical and pesticide use, and improved habitat using California native plants. The SCVURPPP funded a South Bay Green Gardens (formerly the Bay Area Eco Gardens Program) website to educate residents, landscape construction maintenance professionals, and municipal staff on sustainable landscaping techniques. Information on the Green Gardener Program is available at www.southbaygreengardens.org. Twelve participants completed the Green Gardener training and 16 Green Gardeners were re-certified.

Finally, in the 2017/2018 fiscal year the SCVURPPP distributed a letter to structural pest control companies registered in Santa Clara County to inform them about pesticide pollution in local creeks, IPM-certification programs, and the availability of *Less-Toxic Pest Management* facts sheets.

g. Collaboration Between Agencies to Maximize Outreach

The IPM Program continues to seek public and private alliances to strengthen IPM policies, research, best practices and outreach. In 2017, the Program presented IPM concepts at various venues including at Martial Cottle park as follows:

i. Sustainable Farming Education

Besides organic farming, Martial Cottle park’s community education center is a showcase for ongoing education through cooperative partners such as UC Cooperative Extension Master Gardeners, 4H, Our City Forest, and City of San Jose Community Organic Gardens.

*Although difficult to fathom right now, California’s future under a changing climate promises to be hotter and drier. UCCE projects at Martial Cottle Park will be testing and applying adaptive strategies like drip irrigation, rainwater harvesting, rain gardens, mulching, and improving soil organic matter to help farmers and home gardeners to conserve water in drought and store and manage water use in rainy seasons - Jessica Schweiger, UCCE Educator.*
The Martial Cottle Park’s *Master Gardener* program extends research-based knowledge and information on home horticulture, pest management, and sustainable landscape practices to county residents.

In 2017, UCCE hosted 17 field workshops in several Santa Clara County cities on a wide array of IPM topics such as weed management, IPM and Beneficial Insects, and Vertebrate Pests and Pollinators.

### ii. Education and Knowledge Sharing Strengthen the IPM Program

County parks, roads, and urban landscape employees involved in IPM activities participate in an annual “IPM and Safe Handling and Use of Pesticides” training program. In 2017, thirty-three county employees
working in pest (primarily weed) management activities were trained. Trainings in sustainable landscaping included: Plant Health Care, and IPM through Landscape Design, Implementation, and Maintenance; Invasive Weed Management in Right-of-Ways and Natural Resource Management Areas; and Pesticide Applicator Safety education.

IPM Program attended educational workshops, certification courses, and meetings with other Bay Area IPM personnel to learn about and discuss current issues, alternative IPM methods, new products, best management practices, and the science behind IPM. The IPM Program Senior Analyst attended BayFriendly courses to obtain educational certificates in landscape maintenance, design and rating, and Purdue University for Urban and Industrial IPM and Wildlife Management.

**C. Living Systems Helps Managing Pests**

*Bacillus spp. (Bio-remediation of drains to control flies)*

Grease and organic buildup in drains are primary feeding and breeding sites for drain flies/small flies. The county facilities use bio-remediation process to eliminate these fly breeding sites. It is an innovative technology, which uses microorganisms (Bacillus spp.) and enzymes injected into drain lines. These microorganisms digest fat, oil and grease and convert them into water and carbon dioxide, which helps to minimize fly breeding sites and food sources. This living system should be explored more to keep our facilities drainage system clean.

*Sniffer dogs to aid in bedbug control*

Like other states and cities, bedbugs are an emerging challenge in the County facilities. In the past few years, some of our facilities have been affected by the resurgence of bedbug activity causing anxiety among county staff. The most difficult and important step in eliminating bed bugs is early detection and identification to correctly recognize these blood-feeding pests. While adult bed bugs can be easy to see, bed bug eggs (which are white) and nymphs (which are virtually colorless) are nearly microscopic.
The IPM Program is responding to this re-emerging pest diligently on a case by case basis and using non-chemical approaches, such as conducting canine inspections to help identify localized bedbug activity, and using vacuums, steam, and dry heat to control bedbug activity. A dog can quickly locate bed bug trouble spots, ensuring that treatments can efficiently target and eliminate bed bug infestations. A canine bed bug inspection can also be used to follow-up after treatment to ensure that all bed bugs have been killed. Coordination at all levels (departments and contractors) has helped achieve the desired results. The IPM Program plans to continue to use canines (intelligent living system) for pest detection.

Cattle Grazing
Carefully managed selective grazing in County parks is used to manage and promote perennial native grasses and wildflower stands. Grazing is used to reduce non-native grasses and invasive species such as yellow star-thistle, Italian thistle, other broadleaf weed infestations, which compete with native annual wildflowers and grasses. Grazing is also used to reduce fire fuel loads and minimize wildfire risks from invasive weeds and plants such as coyote brush, chamise or greasewood and California sage, that encroach into grasslands.

Goat Grazing
Goats can be used to reduce or eradicate invasive plants in areas where cattle cannot roam, or to eat plants that cattle avoid. These “weed-mower” goats can clear yellow star-thistle, poison hemlock, teasel, coyote brush, and grasses. Goats eat primarily yellow star-thistle in fields where Santa Clara County has
serious infestations. Goats can also clear creek corridors and grasses around old buildings, protecting these properties from wildfire.

**Barn Owl**

Barn owls have long provided a natural way to control destructive gophers and ground squirrels. Supplying habitat for these predators is another excellent IPM technique to control rodents. Barn owls occupy nesting boxes year-round. A family of owls will consume several thousand rodents in a year. Therefore, owls can help keep rodent populations at a manageable level, preventing spiking to the point where other measures become necessary. Owl boxes at Martial Cottle park continue to house owls to aid ground squirrel and gopher control.

**D. IPM Data Collection**

**IPM Spatial Monitoring and Database Solution**

The County IPM ordinance specifies electronic collection of pesticide use data. Software is currently being procured that will enable spatial data monitoring, collection, and management of County IPM projects. During 2017 the OOS IPM Program worked with representatives from RDA, FAF, PRK, and the Information Services Department-GIS unit to evaluate proposals submitted by vendors for IPM spatial mapping and data collection software. The software system is expected to eliminate paper-based data collection and provide a cost-effective and efficient system that all departments can
use. Vendor selection was completed on September 21, 2018. Software development will begin upon contract award.

**Tree Inventory**

The County contracted with Davey Resource Group to conduct a tree inventory on sites managed by the FAF and PRK departments. This inventory documents trees and their condition, combined with a digital map of the tree locations. It will provide tree risk-assessment and maintenance requirements to better manage trees in specific areas, track and combat tree pests and diseases, and plan future tree plantings.

![TreeInventory](image)

By acquiring this data, the County will be better equipped to monitor tree attributes and health and begin to plot the eco-system value of County trees. The FAF tree inventory was completed in September 2018. FAF tree data is expected to be fully processed by October 30, 2018. The vendor is awaiting information from PRK department to begin the inventory of trees in developed park areas.

**E. Future Challenges**

**Emerging Trends**

To minimize conventional pesticide application, IPM is increasingly data-driven, strategic, and creative. Targeted sites often require phased, multiple methods, with higher levels of monitoring, analysis and integrated ecologically sound non-chemical solutions. County pesticide applications continue to decline,
being reserved for critical use when other options are unfeasible. As mentioned previously, selecting less-toxic chemicals for roadside vegetation management is challenging. Pre-emergent, non-carcinogenic, organic, or reduced-risk herbicides may offer efficacy in weed control but may not be available for the commercial scale needs of roadside vegetation management. Therefore, successful ecological IPM currently requires more physical labor such as mowing, digging out, hand pulling, weed wrenching, use of living systems (cattle, goats, sheep grazing), and design improvements. Furthermore, climate change, drought, temperature shifts, extreme weather, and flooding are bringing new challenges which alter ecosystems and make them more susceptible to pests, disease, and non-native plant infiltration.

Rats and Mice

Increased rodent (rats and mice) activity in buildings is another challenge due to a variety of reasons including poor facility sanitation, housekeeping, and maintenance. The complex cultural and sociological behaviors of people inhabiting buildings indirectly, and in some cases directly, cause rodent populations to proliferate. Rodent control will require concerted ongoing customer (i.e., building occupants and facility maintenance group) education to help customers help themselves to resolve these pesky issues. Rodent prevention includes segregating food storage away from work space, eating food only in designated breakrooms (not in work space), and removing garbage daily from receptacles etc., thereby eliminating the conditions that lead to rodent proliferation. The IPM Program is working closely with the Structural IPM Contractor to identify these conditions on a case-by-case basis and seeking help from the departments and the facilities maintenance group to resolve rodent issues.

Bedbugs

Like other states and cities, bedbugs are an emerging challenge in the County facilities. The IPM Program is responding to this re-emerging pest diligently on a case-by-case basis and using non-chemical approaches, such as conducting canine inspections to identify localized bedbug activity and using vacuums, steam, and dry heat to control bedbug activity. Coordination at all levels has helped achieve desired results, but funding will be required for ongoing customer education and control efforts.
American and Oriental Cockroaches

Managing American cockroaches is not easy. They prefer warm and humid environments, readily live outdoors under mulch and other vegetative covers, and are common in irrigation boxes, sewers, steam tunnels, and masonry storm drains. Occasionally they forage from sewers and other areas into the ground floor of buildings. These intrusions in many county buildings have become more common in the last four years due to drought conditions because sewers and exterior grounds are running dry.

There is no conventional approach that is effective in controlling cockroaches in sewers or similar habitats. The IPM Program’s current approach to prevent infestations involves close monitoring and applying insecticide baits. While an effective bait program does not give immediate results (it may take seven or more days to be effective), baits can be effective for long-term cockroach control. The primary keys to controlling cockroaches are sanitation and exclusion. Cockroaches are likely to reinvade if a habitat is suitable to them (i.e., food, water, and shelter are available); therefore, the conditions that promoted the infestation must be changed.

The Structural IPM Contractor is identifying and addressing these conditions so that the County maintenance staff can take corrective action. Also, the Structural IPM Contractor is currently exploring an experimental opportunity to apply either Metarhizium anisopliae or Beauveria bassiana, two fungi that are capable of infecting and killing American cockroaches, to sewers to control cockroaches.⁴ This approach is already used in Europe. If successful, a new product may soon be available to the American market to address this issue.

⁴ Use of an entomopathogenic biopesticide would be under a research permit issued by the U.S. Environmental Protection Agency and the California Department of Pesticide Regulation.
F. Attachments

1. PESTICIDE USE ANALYSIS (2002-2017)

Fig 1 Structural IPM Project: General Pest Control- Liquid Formulations (2005-2017)
Fig 2 Structural IPM Project: General Pest Control - Dry Formulations (2005-2017)

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Fig 3 Structural IPM Project: Termite Control (2003-2017)

A1. Roads Right of Way

A2. Roads Right of Way Acres Under Chemical and Non-Chemical Management 2017
Fig 5 Integrated Vegetation Management Project: Road’s Right of Way: Pesticide Use (2003-2017)

Fig 6 Integrated Vegetation Management at Regional Airports (2002-2017): (Reid Hillview, Palo Alto and South County Airports)
Fig 7 Department of Parks and Recreation IPM Project: Percent of Total Acres under Chemical Management (2017)

Fig 8 Department of Parks and Recreation: Acreage under Chemical Management (2002-2017)
Fig. 9 Department of Parks and Recreation IPM Project: Total Acres under Chemical versus Non-Chemical Acres (2017)

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Fig 10 Number of Parks without Pesticide Use (2002-2017)

C3.3 Number of Parks Under Pesticide Treatment Out of 29 Regional Parks (2002-2017)

C3.4 Parks: Rancho San Antonio Open Space Preserve Chemical versus Non-Chemical Acres (2017)
Fig 11 Urban Turf and Landscape Pest Management - All Facilities (2002-2017)

Fig 12 California Ground Squirrel Control around South County Animal Shelter: Pesticide Use by Department of Agriculture (2006-2017)
Fig 13 Invasive Weed Management (Arundo Donax): Pesticide use by Santa Clara Valley Water District on County Properties (2006-2017)
Office of Sustainability
Integrated Pest Management Program
Putting IPM into Practice through Real World Examples

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Exploring Sustainable Tools and Technologies For Pest and Pesticide Free Environment