2002-2016

County of Santa Clara Integrated Pest Management Program

Progress Report

County of Santa Clara

Integrated Pest Management Program

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

Progress Report 2002-2016

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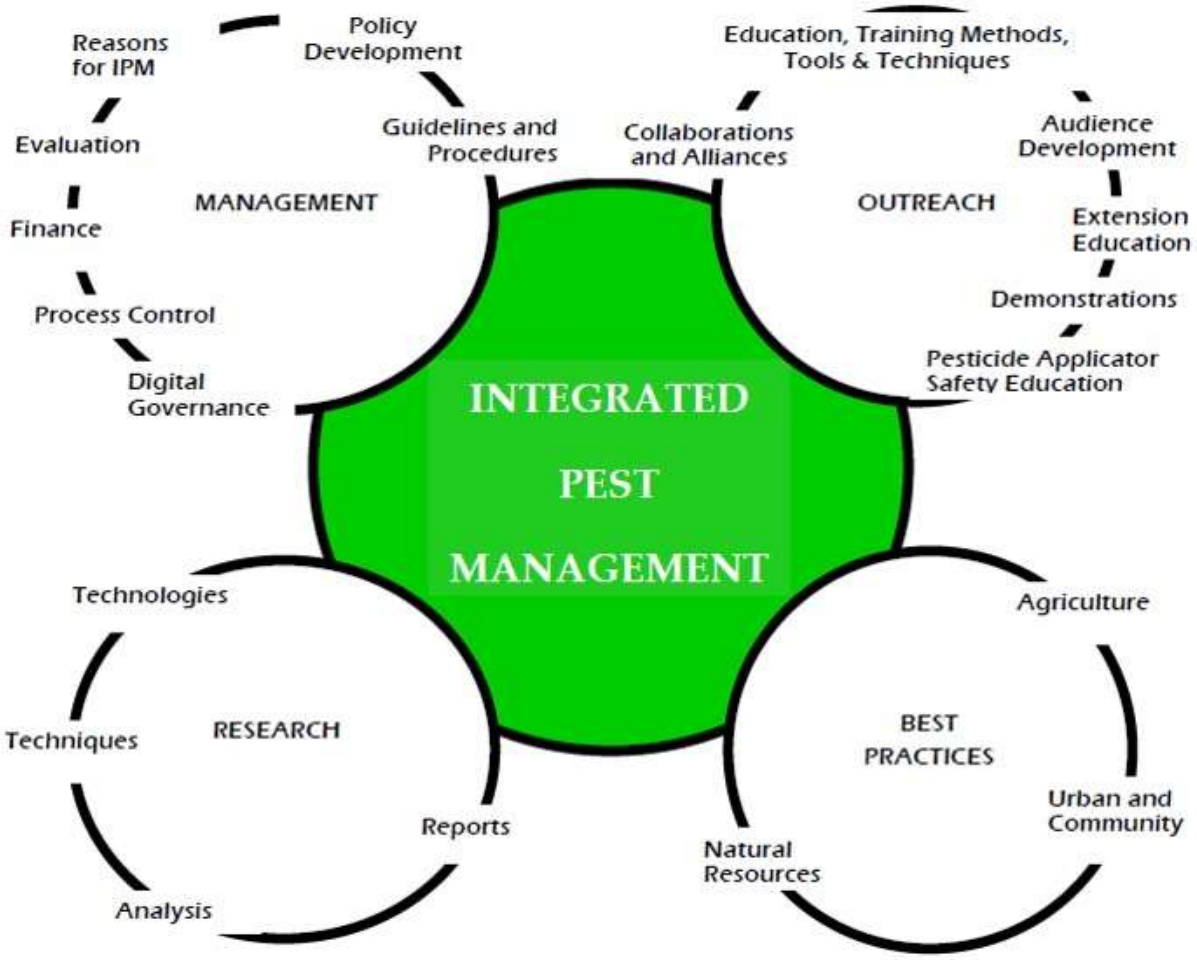
EXECUTIVE SUMMARY

The Santa Clara County Integrated Pest Management (IPM) Program, implemented in 2002, helps protect the health and safety of County employees and the general public, the environment, and water quality, as well as prevent and solve pest problems on County property with the least unintended impacts on people and their surroundings. The program seeks to eliminate or reduce pesticide applications on County property to the maximum extent feasible through available non-pesticide alternatives

IPM is a sustainable approach to preventing and suppressing pest problems while minimizing risks to human health and the environment. IPM practitioners use a judicious blend of biological, cultural, mechanical and chemical controls.



The program draws best information from IPM research across the world on managing pests using safe and effective techniques and strategies. These techniques and strategies are the basis of integrated pest management, or IPM.

The IPM program continues to institute effective leadership through:

- Building coalitions and partnerships
- Outreach to IPM practitioners and the public
- Increasing the predictability and effectiveness of pest management techniques
- Developing science-based pest management projects that are low-risk, sustainable affordable and socially appropriate

This report provides the program's accomplishments in 2016, in particular pesticide use reduction, staff training and other sustainable initiatives taken.

2016 Highlights

Pesticide Use Reduction

VMC Milpitas

- ✓ **Pesticide use in structures** has been significantly reduced and can be stated as "minuscule use (statistically insignificant) of reduced risk pesticides". Regular site inspections followed by building occupant education, sanitation, housekeeping and maintenance improvements, has been the cornerstone to alter many pest situations that would have otherwise resulted in pesticide applications.

- ✓ **Pesticide use in urban landscapes** has been significantly reduced and can be described as "minuscule use (statistically insignificant) of reduced risk pesticides". Since 2008, no pesticide was used in urban landscapes around County office complexes with an exception in 2012 when two pesticide applications were warranted, one to treat Magnolia scale infestation and the other case to remove an unwanted Bamboo species that was compromising pedestrian walkway in a facility.

- ✓ **Parks without Pesticide Use** In 2002, a pilot project was launched at Ed Levin Park (approx. 1,500 acres) using reduced risk pest management strategies, and eliminating use of all conventional pesticides, with a plan to adopt the model in all 29 Regional Parks

Los Gatos Creek Trail

representing ~52139 acres of recreational, open space, and rangelands. In 2016, 24 parks were managed using non-chemical methods. In 2016, **99.99% of the total landscape under regional parks was managed without using pesticides.**

Weed Control*:* It should be noted that slight increase or decrease in acreage under chemical management from year to year is cyclic and need-based. However, it is safe to say that chemical intervention in invasive weed management projects throughout the parks system is maintained at a very low level. Emphasis on using non-chemical alternatives continued throughout recreational areas of the parks. These alternatives include chips, disk, flail, hand hoe, rough, slope and turf mow, weed barriers (weed fabric, mulch), grazing, landscape maintenance and manual weeding.

Vertebrate Pest Control*:* Since 2003, no rodenticide was used in open space of 29 regional parks, except in 2016, the use of 60 lbs. of Aluminum Phosphide, a burrow fumigant to control ground squirrels in non-agricultural areas of the Martial Cottle Park. This use was warranted due to ground squirrel infestations that have moved beyond the scope of what is possible to control with non-chemical treatments. The infestations are priorities to deal with in Martial Cottle Park as they are an economic threat to the urban farm that is there. At Penetencia the infestation is within proximity to several areas of where human interaction is likely, including children's play areas. Due to the pests' ability to carry disease pathogens, it will be necessary to address the problem with diligence and thoroughness. Additional chemical intervention in the future may be warranted on a case-by-case basis.

In general, vertebrate control (e.g. ground squirrels, pocket gophers, feral pigs) throughout park system is also managed non-chemically.

Aquatic pest management*:* Since 2002, no pesticide has been used by Department of Parks and Recreation on County-owned ponds, lakes, and creeks to control aquatic weeds except what is reported under Arundo donax control project managed by Santa Clara Valley Water District.

- ✓ **Roadside Right-of-Way vegetation management**: Since 2005, **significant reduction (75%) in acreage** has been achieved under chemical management (use of herbicides) to control vegetation on Road's rights-of-way. The slight increase or decrease in acreage under chemical management from year to year is cyclic and need-based. Herbicide applications based on weed scouting has helped the Department to maintain these levels.

Roadside Management

- ✓ **General Aviation Airports** did not use any pesticides in 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 and 2016.

- ✓ **Use of 25 conventional pesticides** has been phased out, while the total number of pesticide applications and overall volume of reduced risk pesticides is also significantly reduced.

In Sustainability

UC Extension Master Garden

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. Many of these initiatives brought about positive outcomes, not only solving pest issues and reducing pesticide use, but are also helping address many of our current environmental challenges. These include global climate change, air and water quality, water management, habitat conservation and concerns about the waste stream.

Examples of Current IPM Sustainability focus:

- ✓ Promotion and education in sustainable landscaping
- ✓ Furthering awareness in water conservation
- ✓ Organic urban agriculture

- ✓ Pollution prevention
- ✓ Stakeholder outreach and training

The core of all this is working together on conservation principles and smart resource management to bring about sustainable outcomes complementing one or many of these environmental issues inclusive of many challenges posed by pests and pesticides.

Water Conservation

A significant portion of 2016 saw the County in a severe drought. IPM Staff continued to work to find opportunities to improve countywide water management in the areas of conservation, efficiency, wastewater utilization, pollution prevention, education/outreach and operational efficiencies.

Drip Irrigation Timer

Our staff has assisted in implementation of the County Sustainable Landscape Ordinance compatible with the State Model Water Efficient Landscape Ordinance (MWELO).

This action requires significant efforts on several fronts bringing together a variety of stake-holders, compliance to State and local regulations, researching water efficiency, outreach, promotion of water efficiency, monitoring and evaluation, tracking progress and periodic/timely reporting to the management and Board of Supervisors. These actions will bring systematic and permanent changes with sustained outcomes addressing long-term effects of drought across the region.

Urban Organic Farming

In 2014, the County Department of Parks and Recreation took a giant step forward in pesticide reduction and environmental health by opting for organic farming as the preferred choice for farm operations at Martial Cottle Park.

Martial Cottle Park

The former Martial Cottle Family Ranch is now Santa Clara County's newest urban park and working farm (covering 180 acres), a rare opportunity to bring fresh fruits and vegetables to the community directly from "field to fork."

The park also serves as a showcase for the latest in sustainable farming techniques and water conservation. It is a center for innovation and learning about organic farming, conservation, and food production as well as an ongoing community education center through cooperative partners

such as UC Cooperative Extension Master Gardeners, 4H, Our City Forest, and City of San Jose Community Organic Gardens.

IPM Practices at Martial Cottle Park

Under an organic framing approach, management methods are carefully selected in order to restore, and then sustain ecological stability within the enterprise and the surrounding environment. Pest management methods are selected in the following order:

a) Identifying pests before any pest management practice is used, determine a cause of economic damage;
b) Monitoring pests and beneficial to determine a pest population's size and location, crop damage and natural enemy populations, and evaluate the efficacy of management practices;
c) Developing action thresholds to decide when a particular pest management practice is needed to prevent economic damage; and
d) Modify farm ecosystem management to encourage a habitat that is conducive to efficient pest control.

The use of conventional pesticides and synthetic fertilizers is not allowed in organic farming. IPM practices are selected based on principles of resistance, exclusion, prevention/protection and eradication.

A few examples of these practices are described in the following table:

IPM Principles	IPM Practices in Organic Farming
Resistance	• The use of cultivars known to be genetically resistant to several or specific pests. The use of methods to trigger innate protective responses of a crop to pests
Exclusion	• Pre-plant inspection of transplants for pests • Use of certified stock or seed • Weeding of pathogen hosts

	• Hedgerows used as trap crops for arthropod pests and as bankers Mass trapping of pests • Bird netting and repellent ribbon • Insect sticky traps
Protection/ Prevention	• Sanitation of tools, equipment, clothing, soil and application of pest-free amendments • Insect vector control: virus vectoring thrips and Tomato SWV • Selection of planting dates to reduce the incidence of the germination of pathogens • Canopy management for humidity • Soil moisture management for soil-borne pathogens • Preventative OMRI fungicides • Management of soil fertility for proper growth rate • Soil disinfestation to reduce weed seed bank and pathogens
Eradication	• Pruning of diseased or infested tissue hand weeding and cultivation • Compost and compost tea application • Biological Control: releases of arthropod natural enemies. • Planting of banker plants to increase and retain populations of native and introduced natural enemies.

An organic farm eco-system is managed by maintaining and enhancing soil fertility, promoting optimal biological activity within the soil, building the soils with natural inputs like compost, cover crops, worms, and healthy fungi. These rich soils encourage strong root growth, which leads to healthy plants. These healthy plans produce healthy fruit and abundant flavors. The rich, water-retaining soil at the park is perfect for dry-farming, which uses a small amount of water to get the plants started, and then very little once they are established. In addition to conserving water, the practice of dry farming produces exceptional tomatoes with irresistible, concentrated flavors.

Crop selection and rotation as well as recycling of plant and animal residues are practiced to help manage nutrient cycling. Water management, augmentation of beneficial insects are also practiced to encourage a balanced predator–prey relationship and the promotion of biological diversity and ecologically based pest management.

When the practices described above are insufficient to prevent or control crop pests, weeds and diseases, a biological or botanical substance or a substance allowed for use in organic farming are applied to prevent, suppress, or control pests.

Santa Clara Valley has a rich agricultural history. Land owned by public agencies offers many near-term opportunities to promote and expand agriculture for both health and heritage. Application of organic farming by the County can be seen as a dual strategy. First, to help expand agriculture wherever possible within County's natural resource management areas, and second to prevent environmental problems caused by land development and management. In providing the necessary resources and information, the IPM program is working toward a goal of fostering sustainable landscaping practices which is gradually taking root, growing and yielding progressive qualitative and quantitative results.

Sustainable Landscape Management Resource Guide

Guided by the County's 2015 sustainable landscaping policy, IPM program staff began, and are now currently in the process of completing a website to be available as a county-wide resource for learning sustainable landscape design, implementation and maintenance. The site is expected to go-live by the end of October 2017. Sustainable landscaping outreach addresses following principles:

1. Landscape Locally
2. Landscape for less to landfill
3. Nurture the Soil
4. Conserve Water
5. Conserve Energy
6. Protect Water and Air Quality
7. Create and Protect Wildlife habitat

Sustainable Landscape Maintenance and Related Pest Management in Parks

In 2016, other non-chemical efforts to control pest in regional parks included lawn/turf conversion to landscape 3 acres, flail mowing 358 acres, mowing 80 acres, disking 48 acres, aeration 80, fertilizing 80, managed goat grazing 99 acers, managed cattle grazing 10,760 acres and prescribed burn 207 acres.

While 28 trees were removed due to variety of reason. Fifty-nine trees were saved through careful pruning and trimming. Mechanical traps and CO2 injectors are used to control vertebrates, such as, ground squirrels and pocket gophers. Attractant traps are used to control yellow jackets.

The Department is continuing its efforts incorporating IPM and pesticide refresher trainings, utilizing bay-friendly landscaping maintenance principles and practices, and looking forward to reducing non-functional (turf without purpose) lawns and improving irrigation systems in the coming years.

Invasive Weed Management in Parks

It should be noted that slight increase or decrease in acreage under chemical management from year to year is cyclic and need- based. However, it is safe to say that chemical intervention in invasive weed management projects throughout the parks system continues to be maintained at a very low level. Emphasis on using non-chemical alternatives throughout recreational areas of the parks has continued. These alternatives include:

Cattle Grazing

Carefully managed selective grazing is used to manage and promote perennial native grasses and wildflower stands in the parks. Grazing is used to reduce non-native invasive species such as yellow starthistle, Italian thistle, other broadleaf weed infestations and annual non-native grasses which compete with native annual wild- flowers and grasses.

Grazing is also used to reduce fire fuel loads and minimize wildfire risks from encroaching invasive weeds into grasslands such plants as coyote brush, chamise or greasewood and California sage.

Goat Grazing

Goats are used to reduce or eradicate invasive plants in areas where cattle cannot go or to eat plants that cattle avoid. These weed-mower goats at Ed Levin (10 acres) cleared poison hemlock, teasel, and coyote brush plus grasses on the dam face at Sandy Wool Lake.

Goat Grazing

The Goats at Grant Lake (26 acres) cleared poison hemlock, yellow starthistle, and teasel near the creek corridor and grasses around old buildings to protect them from wildfire. Goats along the Coyote Creek Trail (up to 63 acres) eat primarily yellow starthistle in fields where we have very serious infestations.

Prescribed Fire

Prescribed burns are conducted with the guidance and assistance of CalFire and San Jose Fire and other fire districts at two of our parks. At Santa Teresa, a training burn in an area infested with coyote brush, teasel, milk thistle and annual grasses occurs in most years. This year 10 to 15 acres were burned. At Grant Park, burns are used to control medusahead, yellow starthistle, coyote brush, and annual grasses. In June of this year, 36 acres were burned in the Halls Valley area of Gran Park.

Prescribed Fire

Controlling Medusahead grass with Compost Tea

An experiment was conducted in Ed Levin Park this year to apply compost tea onto an area infested with Medusahead to evaluate if compost tea and its associated soil bacteria, fungus and mycorrhizae improve the soil conditions and degrade the Medusahead. Even though the treatment was not economically viable, significant drop (86%) in percent cover of Medusahead was noted in the area mowed and treated with compost tea.

Compost Tea Sprayer

Collaboration between Agencies to Maximize Outreach

The County IPM Program continues to seek public and private alliances to strengthen IPM

policies, research, best practices and outreach. In 2016, the Program presented IPM concepts at various platforms:

California Department of Pesticide Regulations Grant

The Program staff went through several stages of securing a California Department of Pesticide Regulation grant. Collaborators included staff from University of California Cooperative Extension Santa Clara County, County Department of Agriculture, Department of Parks and Recreation, and Jacobs Farm.

As our state and county develop, it is inevitable that people will be living closer to farms. This funding would have been focused on agricultural research and educating the public, schools and the agricultural community on pest control techniques that focus on minimizing health concerns and maximizing production near schools.

Although ultimately, the grant was not awarded to the Program, the research and collaboration done should prove to be valuable in the future.

Drought-Ravaged Tree Program

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

Young Trees

The Program staff administered the selection of and then worked closely with the non-profit groups, Our City Forest and Canopy as organizations that can implement community outreach projects promoting tree planting, and tree-health care. This includes the locating, planting and aftercare of 200 climate-appropriate drought tolerant shade trees. Preference will be given to Santa Clara County native trees and planting in community areas such as street, roads, and educational institutions, industrial and commercial areas.

The services also include engaging diverse community groups (Santa Clara County policy makers, and other local government service providers, public and private landowners, and residents) in first-hand tree care experience, and educate children, parents, local residents, and school staff on benefits of planting and caring for trees on their properties by disseminating educational material and conducting educational workshops.

Extending IPM to Urban Audiences

Outreach to Nursery Outlets and Local Landscapers and public

The important focus of IPM outreach has been the urban audience through distribution of information about how to manage pests using sustainable landscape practices, promoting structural sanitation, housekeeping and maintenance to manage or control pests. Since 2011, several IPM trainings were conducted by the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), of which the County is a member.

In 2016 through this outreach thirty-six gardeners were trained under Green Gardener training project. The Santa Clara Valley Green Gardener certification program is a ten-week course that trains landscape professionals to meet the demand for green gardening practices.

Green Gardener Program

Since 2009 when the program began, 356 participants have completed the training. Green Gardeners are proficient in landscape maintenance practices that use resources wisely, conserve water, protect the soil, and reduce waste, urban runoff pollution and storm water pollution from landscape maintenance activities.

The list of Green Gardeners in distributed to consumers at outreach events, advertising on radio and is also made available online. These Santa Clara Valley Green Gardeners provide professional landscape maintenance and/or design services throughout Santa Clara County.

In 2016, the Program continued to maintain literature racks displaying less-toxic pest management literature at 35 hardware retail stores and nurseries in Santa Clara Valley. To help customers identify less-toxic products, the program continued to maintain literature racks displaying less-toxic pest management literature “shelf-talkers” (product identification tags) at several hardware retail stores and nurseries in Santa Clara Valley.

The Program also funded less-toxic pest control trainings that 76 employees attended in 2016. The goals of this project are to increasing awareness and changing behaviors, and make green products more mainstream.

Extending IPM to Pest Control Professionals

Annual IPM-Pesticide Applicator Safety Education 2016

Reaching pest control with science-based information about how to manage pests is a key goal of IPM outreach. In 2016, eighty-three (83) county employees engaged in pest (primarily weed) management activities were trained. These included training in Sustainable Landscaping: 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.

Future Challenges

Sustainable Landscape Operations

In order to properly assess future decisions on landscape sustainability and pest control, it is necessary to have a good understanding of current landscape makeup (mulch, turf, ground cover, hardscape, etc.), plant palette and irrigation system.

Additionally, it is necessary to know what the current and future operational needs (type of labor, how much labor, type of material, what kind of material etc.) for County landscapes are and will be.

The Program staff is working with the Department of Fleet and Facilities to select a vendor to complete that assessment and provide the required information in visual form through PDF maps and through a database. The study will help the departments allocate adequate resources and implement sustainable landscaping projects (design, implementation, maintenance).

Wildlife Control in Parks

There are areas of Martial Cottle Park and Penetencia Creek Park have ground squirrel infestations that have moved beyond the scope of what is possible to control with non-chemical treatments. The infestations are priorities to deal with in Martial Cottle Park as they are an economic threat to the urban farm that is there. This resulted in using 60 lbs. of Aluminum Phosphide fumigant to control ground squirrel in non-agriculture areas of the park. At Penetencia the infestation is within proximity to several areas of where human interaction is likely, including

children's play areas. Due to the pests' ability to carry disease pathogens, it will be necessary to address the problem with diligence and thoroughness. Chemical intervention in the future may be warranted on a case-by-case basis.

In general control of wildlife including gophers and ground squirrels at parklands, correctional facilities, and roads and airports is in need of a strategic approach and investments.

Rodent Control in Buildings

Increased rodent (rats and mice) activity in office complexes is another challenge we are facing due to variety of causative reasons including facility sanitation, housekeeping and maintenance. The complex cultural and sociological components of office complexes is also indirectly and in some cases directly causing rodent populations to proliferate. This will require concerted efforts towards on-going customer (building occupants and facility maintenance group) education - for them to help themselves resolve these pesky issues.

This includes segregating food storage away from work space, eating food only in designated breakrooms (not in work space), and daily removing garbage from receptacles etc., thus eliminating conditions that lend to the proliferation of rodents. The program staff is working closely with the Structural IPM contractor to identify these conducive conditions on a case-by-case basis, and seeking help from department staff and facilities maintenance group to help resolve rodent issues.

Bedbug Control in Buildings

Like other states and cities, IPM for Bed bugs is also becoming 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.

Bedbug Sniffing Dog

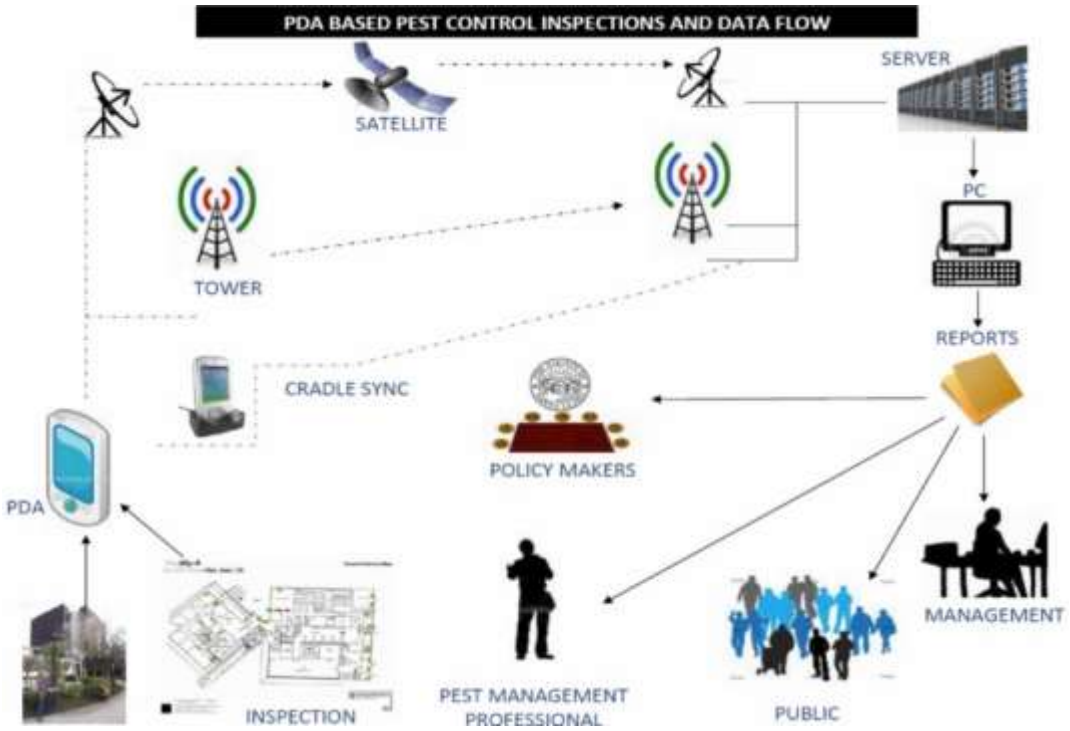
We are responding to this re-emerging pest through due diligence on a case by case basis and using non-chemical approaches, such as, conducting canine inspections to help identify localized bedbug activity, using vacuums, steam, and dry heat to control bedbug activity. The coordination at all levels has helped achieve the desired results. Additional funding will be required for on-going customer education and control efforts.

Tree Health-Care

The Program staff also worked with procurement to select a vendor that can provide consulting arborist services on an as-needed basis upon request by County departments. Services include consulting related to hazardous tree management, sustainable tree management training, and tree preservation and removal.

Additionally, this vendor will perform a tree inventory and assessment that includes all County owned or managed trees within the developed areas of County facilities and parks. Recent drought conditions have left County trees susceptible to pest and disease. This assessment will help identify hazardous County trees and create a tree inventory that will help calculate tree needs and benefits in the future. This assessment will include: GIS mapping coordinates, species, trunk size, height and spread, condition, hardscape damage, overhead utilities, heritage status and recommended maintenance.

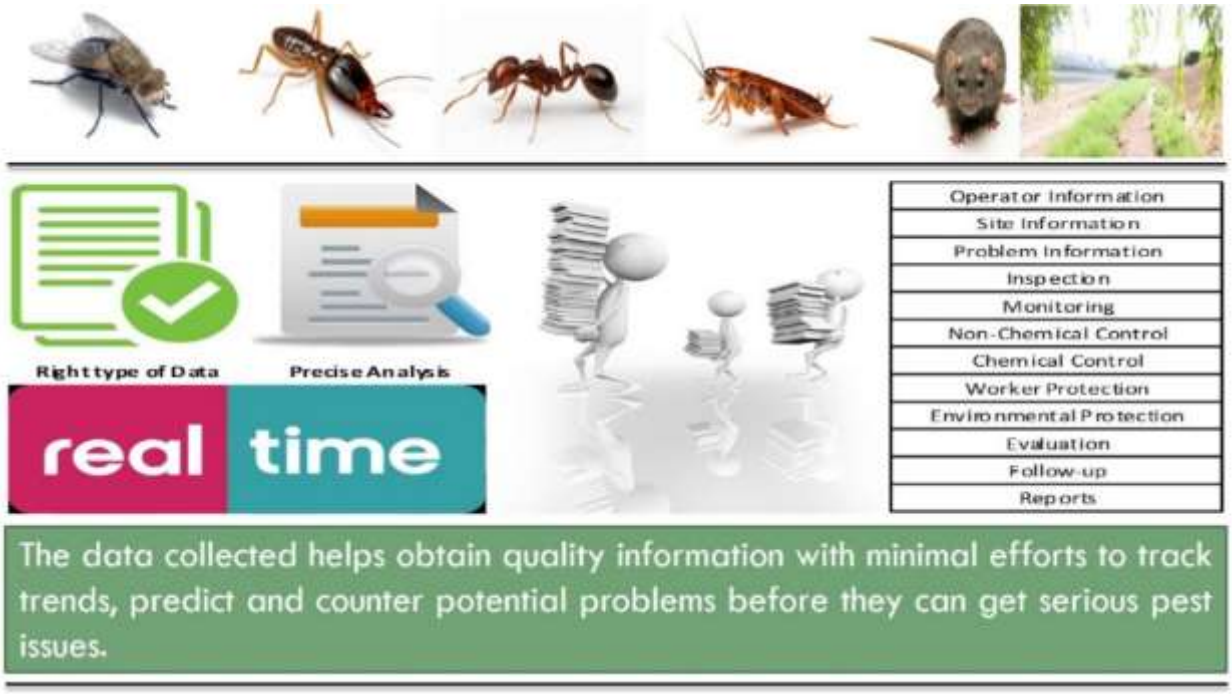
IPM Spatial Monitoring and Data Management Project



Collection of IPM data not only helps to in the creation of effective integrated pest management plans, it is also required by the California Department of Pesticide Regulation. The project

received funding through the Santa Clara County Business Information Technology Steering Committee.

The IPM Program staff is currently working with the Procurement and Information Services Department to seek a vendor to create a software as a service cloud solution. This solution will help address the need for field data collection and data management. It will also integrate spatial



monitoring for geolocation of IPM related data, such as site locations, infestation maps, pest control activities and endangered species zones, etc. Accurate information can help provide better risk assessments and illuminate pest management practices that are particularly problematic so they can be targeted for development of alternatives.

COUNTY OF SANTA CLARA IPM PROGRESS REPORT 2002-2016

BACKGROUND

Most public agencies have some type of responsibility for pest control associated with public health, natural resource management, maintenance of open spaces, maintenance of turf and landscape, maintenance of rights-of-way around roads, airports, parks, and facilities, public works, maintenance of structures, such as, office complexes, libraries, correctional facilities, hospitals, schools, yards, animal shelters etc. These pest control services include use of pesticides.

Consumers have diverse views and preferences about pesticide use. In the last two decades, the public has become increasingly concerned about the impact of pesticides on their health and the local ecosystem. The public generally believes that insects, diseases, and other pests need to be controlled but also believes that there are effective alternatives to pesticides. These beliefs have important implications for public policy, marketing, and risk communication.

Regulatory agencies are also highly concerned about the effects of pesticide use relative to non-point source pollution (NPS)[1] and its effect on air, land and water resources. Local governments have a particularly difficult job of complying with new regulations due to the size and complexity of the areas they maintain. Pesticide use in highly populated urban municipalities increases the risk and probability of pesticide exposures. Increasingly public agencies managers are challenged to develop pest management plans for many different ecosystems, from unincorporated open spaces and parks to rights of way around roads, airports, trails and urban landscapes to public buildings.

Santa Clara County, the largest County in the San Francisco Bay Area of California also faces these challenges. In May 2002, the County Board of Supervisors passed an Integrated Pest Management (IPM[2]) and pesticide use reduction ordinance with the intent of reducing human and environmental exposure to physical and chemical hazards associated with pest management products and services by employing environmental services operations that focus on pest prevention emphasizing non-chemical strategies.

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[1] **Non-Point Source Pollution (NPS)**, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water. Pesticides from agricultural lands and residential areas are one of the pollutants; and are leading causes of water quality impairments in the nation's rivers and streams. To reduce NPS contamination from pesticides, people can apply Integrated Pest Management (IPM) techniques. IPM helps limit pesticide use and manages necessary applications to minimize pesticide movement from the target area.

[2] As defined in the National IPM Roadmap, "**Integrated Pest Management**, or IPM, is a long-standing, science-based, decision-making process that identifies and reduces risks from pests and pest management related strategies. It coordinates the use of pest biology, environmental information, and available technology to prevent unacceptable levels of pest damage by the most economical means, while posing the least possible risk to people, property, resources, and the environment. IPM provides an effective strategy for managing pests in all arenas from developed residential and public areas to wild lands. IPM serves as an umbrella to provide an effective, all encompassing, low-risk approach to protect resources and people from pests."

This annual report summarizes activities from 2002 to 2014, The report reviews and discusses how the County of Santa Clara addresses a wide spectrum of program needs through development of program administration, management, outreach tools and best practices, in order to produce effective, low-risk, sustainable and affordable outcomes.

PROGRAM IMPLEMENTATION

The County of Santa Clara IPM program attempts to provide all elements of a Countywide IPM program: leadership commitment, administration, management, budgeting, system development, evaluation, demonstrations, technical guidance, training, education and outreach. It is a unique task to create a "Team Approach" among several user and interest groups in the complex world of pest management, ensuring sustainability and providing solutions through "Real World Examples". Several of the elements, are creative, unique, innovative and exemplary, and are widely practiced by SCC IPM practitioners. By contrast, some are suited to one microenvironment versus some to others.

The program implementation priorities are divided into three broad categories 1) **Development of Management Tools**, 2) **Development of Outreach Tools** and 3) **Development of Best Practices**.

A. Development of Management Tools
    1. Governing Policy and related activities
    2. Digital Governance – System Automation Tools
    3. Explain Reasons for IPM – Pest and Pesticide Risk Analysis
    4. Developing Administrative/Management Guidelines, Procedures and Resources
    5. Establishing Pesticide Use Exemption Process
B. Development of Outreach Tools
    1. Forming Collaborations and Alliances
    2. Conducting Research, Trials and Demonstrations
    3. Conducting Education, Awareness and Outreach
    4. Participation in Subject Matter and Related Sustainable Workshops
C. Development of Best Practices in
    1. Structural IPM project
    2. Sustainable urban landscape maintenance, plant health care and related IPM project
    3. Urban wildlife (vertebrate pests) IPM project
    4. Right-of-way vegetation management project
    5. Aquatic pest management project
    6. Invasive pest management project

Materials and methods used to develop program implementation priorities are as follows:

A. DEVELOPMENT OF MANAGEMENT TOOLS

An in-depth understanding of roles and responsibilities and availability of management tools is necessary to implement a successful IPM Program in a large public agency such as Santa Clara County. The primary focus of this project is to develop tools for **governing policy** and related activities, **digital governance** – system automation tools, explain **reasons for IPM** – pest and pesticide risk analysis, **developing administrative and management guidelines**, procedures and resources, search and identify project specific grants, grant facilitation and collaboration, establishing **pesticide use exemption process** for IPM user groups.

Program implementation has included a wide array of activities over the last nine years (2002-10). This includes policy development through establishment of regular reports to the Board of Supervisors, inception of a technical advisory group, and identification of department IPM coordinators. In addition the IPM Manager has developed digital governance tools such as the IPM Website and the Web based IPM-Pesticide Use Reporting System), reduced risk pesticide selection criteria and approved list of pesticides, SCC IPM administrative guidelines and procedures (Department IPM Plans, IPM logbook, pesticide use exemption process, purchasing controls and RFP's for IPM related products and services, IPM quality system evaluation process, facility manager's and building occupants IPM guidance manual and DVD, vegetation management guidelines), use of proprietary contractor's developed/based structural IPM electronic inspection data recording system, subject matter specific IPM training templates and presentations, grant facilitation, collaboration and cost analysis of various IPM projects, IPM subject matter specific presentations.

Most of the above-mentioned tools are available for reference on website.

Governing Policy

County of Santa Clara IPM and Pesticide Use Ordinance The County of Santa Clara Board of Supervisors adopted the IPM and pesticide use reduction ordinance directing County Executive Office to develop an IPM Program and start the process of promoting reduced risk pest management practices. Specific goals of Santa Clara County's IPM and pesticide use ordinance can be found at http://www.sccgov.org/scc_ordinance/TOC074.HTM).

Issues Addressed by Ordinance The intent of this division is to protect the health and safety of County employees and the general public, the environment, and water quality; to provide sustainable solutions for pest control on County property. The ordinance seeks to eliminate or reduce pesticide applications on County property to the maximum extent feasible and to provide preference to available non-pesticide alternatives, where feasible, before considering the use of pesticides on County property. It also restricts the use of following groups of pesticides:

a) Toxicity Category I or II pesticide products.
b) Any pesticide containing a chemical identified by the State of California as a chemical known to the State to cause cancer or reproductive or developmental toxicity pursuant to the California Safe Drinking Water and Toxic Enforcement Act of 1986.
c) Pesticides identified by the State of California on the Groundwater Protection List (Food and Agricultural Code § 13145(d)).

d) Pesticides classified by active ingredient as organophosphate type pesticides as identified by the United States Environmental Protection Agency (Office of Pesticide Programs, Document 735-F-99-14, May 1999), or California Environmental Protection Agency, Department of Pesticide Regulation, Chemical Inquiries Database.
e) Pesticides containing carbamate-type chemicals (California Environmental Protection Agency, Department of Pesticide Regulation, Chemical Inquiries Database).
f) Any pesticide classified as a human carcinogen, probable human carcinogen or possible human carcinogen by the United States Environmental Protection Agency, under procedures established in "Proposed Guidelines for Carcinogen Risk Assessment," EPA/600/P-92/003C, April 1996, or equivalent documents.
g) Any pesticide group officially designated by the California Environmental Protection Agency Department of Pesticide Regulation or by the United States Environmental Protection Agency as posing significant hazard to human health or the environment.

Benefits of the Program The IPM approach integrates preventive and corrective measures to keep pest from causing significant problems, with minimum risk or hazard to humans and desirable components in their environment. It is a flexible, dynamic strategy, which needs updating periodically as information is received from results. IPM programs have a proven track record of significantly reducing the risks and related to pesticides, while improving quality, health and welfare of environment. Adoptions of IPM strategies also provide an economic from sustained development, increased productivity and reduced pest damage. The options that IPM can offer make sole reliance upon synthetic pesticides a thing of the past. In the long term, everyone benefits through a healthier environment. Some of the benefits of an integrated approach are as follows:

- Eliminates pest threat
- Promotes sound structures and healthy plants
- Promotes the sustainable bio based pest management alternatives.
- Reduces the environmental risk associated with pest management by encouraging the adoption of more ecologically benign control tactics
- Reduces the potential for air, ground water and storm water contamination
- Protects the non-target species through reduced impact of pest management activities.
- Reduces the need for pesticides by using several pest management methods
- Reduces or eliminates issues related to pesticide residue
- Reduces or eliminates worker re-entry interval restrictions
- Decreases workers, tenants and public exposure to pesticides
- Alleviates concern of the public about pest and pesticide related practices.
- Maintains or increases the cost-effectiveness of pest management programs

Elements of the Program The mission of Santa Clara County's IPM Program is promoting pesticide pollution prevention (both source and point source) through effective and efficient leadership, communication, coordination, training and evaluation of various reduced risk pest management projects. Developing and/or improving pest management practices, through public education, education of IPM practitioners, and implementation of IPM projects will accomplish this mission. Specific Elements include:

Mission

A. Leadership: to enable uptake of sustainable development practices, lead by example to demonstrate activities that have adaptability to others in the pollution prevention communities. Thinking globally and acting locally; recognize global sustainability issues and work in conjunction with its partners to address such issues in County's IPM program context and strengthen linkages between sustainable development and pollution prevention, clean production and sustainable consumption.

B. Coordination: Pursue opportunities for positioning key environmental strategies as a means of achieving pesticide pollution prevention and sustainable development. Establish a mechanism that effectively coordinates System Development in IPM focused on the Department IPM activities and setting priorities, facilitate cooperation with universities, public and private sector partners at the local, state, regional, and national level to meet County IPM ordinance objectives and achieve IPM implementation and Pesticide Use Reduction goals.

C. Training and Implementation: Establish and conduct a process for identifying the IPM implementation needs of user Departments, provide support and resources necessary to design and conduct educational programs for interdisciplinary training on IPM, a coordinated program of research, technology development, and of education and information delivery to meet IPM implementation and Pesticide Use Reduction needs. Support demonstration research in pest control management in non-production agriculture, landscapes and structures.

D. Evaluation and Accountability: Develop methods and conduct programs to accurately measure progress toward the goal and assess the economic, environmental, public health, and social impacts of IPM implementation. Integrating social benefit considerations into our decision-making framework and encouraging informed decision making towards sustainable development.

E. Communication: Increased visibility and acceptance of IPM through information dissemination; Implement a communication, information exchange program that involves IPM stakeholders and increases understanding of program objectives, progress, impacts, and benefits of IPM to the public and policy-makers through direct communication, print, internet and broadcast media.

Goals

a) Prepare County of Santa Clara for Transformational Leadership-"Enduring IPM" and Implementation through
   i. IPM system development and project automation
   ii. Department IPM implementation plans
   iii. Selecting qualified IPM vendors to provide IPM services
   iv. Adopting proven reduced Risk Pest Management Alternatives
   v. Adoption of sustainable development practices as an organization

b) Develop Relational Pesticide Information Data Base to
   i. Evaluate and Eliminate Hazardous Pesticides
   ii. Provide "Approved List of Pesticides"
   iii. Analyze Specific Pesticide Use for Overall Use Reduction

c) Achieve Health and Welfare of Environment through
   i. User groups and Beneficiaries IPM Awareness, Education and Training

ii. Promotion of a path, which includes pollution prevention, to achieve sustainable development
iii. Minimizing or Eliminating Pesticide Exposure
iv. Pest Free Environment
v. Pesticide Use Reduction

d) Provide Financial Impact Studies and Quality Assurance through
i. Record Keeping, Document and Data Control
ii. Qualitative and Quantitative Project Management
iii. Performance Management

Program Organizational Structure The IPM Program is a Countywide program providing IPM guidance and coordination to all County owned or managed facilities and grounds. It is an inclusive process, administered through the County IPM Manager, Office of the County Executive and the manager is advised by an IPM-Technical Advisory Group[3]. The Program provides coordination to several user departments in various pest management and pesticide related projects. Primary department users are: Facilities and Fleet (FAF), Health and Hospital (HHS), Roads and Airports (Rand A), Parks and Recreation (PRK), Social Services Agency (SSA) and Libraries (LIB). Each user is represented by a designated Department IPM Coordinator who provides coordination in consultation with the County IPM Manager on various sustainable structural and non-production agriculture IPM related projects, developing alternatives to chemical intensive structural and non-agriculture pest management based on the need of their user group. IPM Projects based on implementation priorities by each user groups are as follows:

Department (User Group)	IPM Projects
CEO	Countywide Management of IPM program and Advisory Role, Development of Management and Outreach Tools and Best Practices
FAF	Implement/Manage Structural, Urban Landscape Pest Management Projects
PRK	Implement/Manage Structural, Recreational Landscapes, Right of Way, Aquatic, Wildlife, Invasive Pest Management Projects
RDA	Implement/Manage Structural, Landscapes, Right of Way Pest Management Projects
HHS	Implement/Manage Structural, Urban Landscapes Pest Management Projects
SSA	Implement/Manage Structural, Urban Landscapes Pest Management Projects
LIB	Implement/Manage Structural, Urban Landscapes Pest Management Projects

[3] **IPM-Technical Advisory Group: An Inclusive Process:** IPM-TAG meets (open to public) at least four times per year to review the County's IPM program and provide comments to the County Executive. The following representatives participate on the TAG: two from Pesticide Alternatives of Santa Clara County; one from the Santa Clara Valley Water District; one from the County Agricultural Commissioner; one from the Santa Clara County Pollution Prevention Committee; one County employee representing a labor organization; and one representative from each of the following Santa Clara County agencies and departments: Roads and Airports, Parks and Recreation, the General Services Agency, Valley Health and Hospital System, and Occupational Safety and Environmental Compliance.

Digital Governance: IPM System Development and Project Automation

The use of digital governance technology in complex program/project management increases communication among and between individuals and institutions.

Some of the operational/management benefits of DG are:

- Information is acquired, analyzed and used strategically for program purposes.
- Well-informed decision-making is informed by the timely information.
- Automation of repetitive tasks, simplifies and streamlines complex multijurisdictional projects, improves efficiency, consistency, performance, productivity and reporting by reducing time and the risk of clerical errors, decreasing cost of governance processes and reducing time and energy required to maintain data and documents, improves
- Complements existing efforts and processes to improve governance.
- Initiates new mechanisms for improved service delivery
- Makes user groups more responsive to everyone´s needs.
- Reduces paper usage in data maintenance.

In 2002, as the County began development of the IPM program, DG tools would be critical to provision of effective and efficient multijurisdictional program management and information dissemination. This included tools such as a web site and web-based IPM information and pesticide use reporting. PDA based software, bar code scanners and web based applications have been added this year to conduct inspections. A brief on these important management tools is described below:

SCC IPM Web Site

An educational website provides a far cheaper and much more flexible resource than print media. It serves as an information clearing house, where content can be updated through a content management system. It offers the convenience of research on subject matter, breakthrough geographical barriers and reaches a wider audience in real time. This is not to say that one should not use other forms of outreach tools to engage program beneficiaries. SCC IPM website is designed to meet these objectives.

County of Santa Clara IPM Program Web Site

SCC Web Based IPM Activities and Pesticide Use Reporting Database (IPM-PUR)

Sustainable pest management requires an integrated approach. Pesticides are one of many tools used in IPM. Majority of non-agriculture and structural pest management focuses on pesticide applications for right of way, turf and landscape, rangelands and indoors. Understanding the initial distribution in the environment at the landscape scale requires information on pesticide use practices. Timely data such as the identity of pesticide, amount, target pest and site can be enormously useful both in the protection of human and environmental health.

Accurate information can help provide better risk assessments and illuminate pest management practices that are particularly problematic so they can be targeted for development of alternatives. In situations where more toxic chemicals must be used, the data will help managers to employ training and technologies specifically designed to protect applicators, workers, and the environment. It is also useful in making short and long-term policy and budgeting decisions related to IPM and best management practice.

SCC IPM Activities and Pesticide Use Reporting System IPM-PUR

SCC Integrated Pest Management – Pesticide Use Reporting System (IPM-PUR) a web-based relational database discusses framework, user data entry process, provides analytical tools for IPM decision making processes, cost-economics, worker safety, environmental data, compliance to signage posting and regulatory reports to data for structural and non-agriculture pest management.

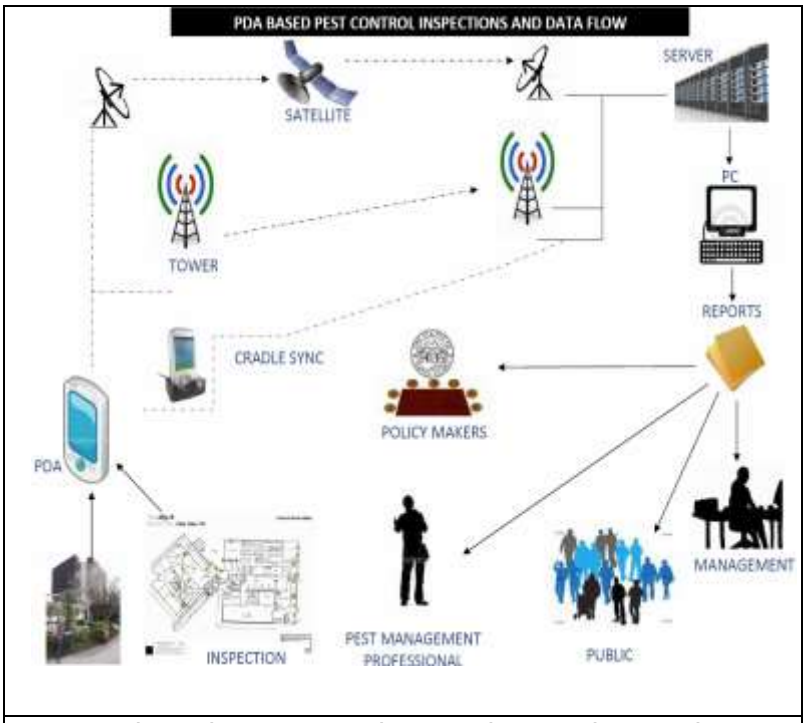
The IPM Program in collaboration with County's Information Services Department, developed the IPM-PURS, a central data bank of pest management activities and pesticide use information (non-production agriculture and structural) that includes most of the information as mentioned above to facilitate analytical reporting by applicators, departments focusing pesticide use reduction, as well meeting all legal and administrative reporting requirements. Other requested fields (not mandatory) available in the reporting system includes weather conditions, information on neighboring locations, protective equipment used, nearby wells, sensitive areas (water, wetlands, schools), water application.

Once fully developed, the information usability of pesticide use data captured from SCC IPM-PUR will have wide range of uses in both the environmental and health sectors including practicing IPM, water quality, drinking water, fish and wildlife, human epidemiology, risk assessment, public health, worker health and safety, food quality protection.

We expect its greater adoption, as we improve system capabilities and interfaces including GIS/GPS interface and make it available for adoption by larger user base and accessibility features in public domain. The project is under review for adoption of newer technology.

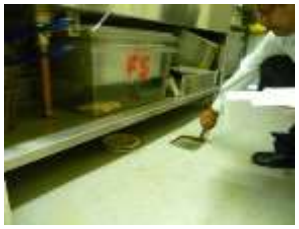
PDA based software, bar code scanners and web based applications to conduct inspections

In 2008, a trial project used PDA based software, bar code scanners and web based applications to conduct structural IPM inspections. The successful trial was followed by a full-scale adoption in 2009. The adoption of this technology is a move from primarily paper-based methods of pest traceability to consolidated digital methods that provide greater immediacy and accessibility of temporal and spatial pest data. In practice, the internet-PDA based inspection tool collects field observations on a unique handheld PDA platform synchronizing those data to an internet-based server, then allowing a data modeling tool to track trends, predicting and countering potential problems before they can become serious.



PDA based Pest Control Inspections and Data Flow

The data and reports are now made available to Department IPM coordinators/facility managers through desktop application for pest trend analysis, spatial distribution, and rapid response and mitigation efforts for sanitation, housekeeping and maintenance.



Centralized Data Collection: Structural IPM Inspections using PDA based software, bar code scanners and web based applications

The application of PDA based DG technology in Structural IPM allows:

- Accountability for work done, time spent on site, and observations made.
- Transparency of service, giving the IPM professional the control to effectively monitor and track exactly what is being done on site real time.
- Transition of all information from the PDA to tables and graphs, which allows the system operator and the client to monitor the infestation levels
- Time-stamps of each station inspected that can be monitored whenever the IPM professional scans the barcode attached to that station.

- Data analysis and trending
- More efficient implementation of a systematic way of inspecting and monitoring, as designed under the general IPM plan/service index in the PDA.
- The setting of pest parameters for instant alerts when pest thresholds are breeched.
- Information to examine which pesticides, if at all used, accounted for most of the increase, and the underlying causes of this increase. These factors are important for identifying emerging pest management challenges and focusing attention on strategies for their resolution.
- Development of a service index which is versatile and can be modified to cater to the requirements and specifications of the various sites.
- Data capture in real time and presentation in a manner that illustrates conditions conducive to pest >> a primary and most important element of pest control service.
- Information provisions to the clients (facility management groups) in real time and in a snapshot on conditions conducive to pests in order to assist pest control operators in solving pest problems and preventing reoccurrence.
- Pest control operators to manage multiple sites, monitoring stations, define the job, schedule and execute tasks, generate reports and follow up
- Department IPM Coordinators to educate building occupants, budget managers, policy makers on their role in pest management and related environmental issues.

Reasons for IPM

A variety of pesticides are used in the US in production agriculture, non-production agriculture, and urban environments. People use insecticides, herbicides and chemical fertilizers to eliminate insects and weeds from their gardens or buildings, but these limiting agents have the potential to harm our health and the environment.

While oftentimes beneficial, pesticides are risky by nature. Misuse of pesticides and accidents involving pesticides occur regularly. And even when used correctly, some pesticides can harm the environment and non-targeted living things. Because of this, a rational approach to pesticide use must include a risk analysis. The SCC IPM program’s pesticide risk analysis is explained as follows:

Risk Analysis: Pesticide Environmental Risk Analysis, Risk Indicators and Pesticide Selection Criteria and Development of Approved List of Pesticides

"Pesticide risk indicators" (PRIs) are tools for assessing, comparing, and communicating the characteristics and effects of different pest control products and methods. They are used to promote "reduced risk" pest management practices, to provide guidance to pest control professionals, farmers/growers and other property managers in choosing among pest control options, to help researchers and policy-makers track trends in risk reduction, and as the basis for "ecolabeling" systems designed to influence consumer opinion and market behavior. Typically, pesticide risk indicators generate an index or ranking of pest control options, or compare pesticide risks over time or in different places. PRIs are also known as "pesticide impact assessment systems," "pesticide ranking systems," and by other names.

In 2002, the County in collaboration with Cornell University performed a pesticide environmental risk analysis, developed risk indicators and pesticide selection criteria and evaluated 350+

pesticide products. This resulted in an approved list of reduced risk pesticide products. The County also promoted this project for various pest management user groups throughout the bay area counties. See more details at http://IPM.sccgov.org (Go to Resources>Best Practices>SCC Administrative Guidelines>Are you deciding to use pesticide>click on relevant attachment. Since 2002, twenty four (24) pesticide products are phased out and total number of applications, volume, and toxicity pesticides are significantly reduced.

Administrative Guidelines and Procedures

The Program's Administrative Guidelines and Procedures provide user groups an in-depth understanding of policy, management and outreach tools available, their roles and responsibilities necessary to implement a successful IPM Program for a multi-jurisdictional public agency. A few are explained as follows:

Department IPM Implementation Plans

User groups (departments) are responsible for planning, budgeting and executing IPM projects in consultation with the County IPM Manager. The implementation plan is a living document where components are customized for each facility as needed. The Department IPM Coordinators ensure that plans are updated annually; budgets are planned, in anticipation of maintenance of existing projects or expected new demonstrations or projects. The County IPM Manager assists them to explore and avail grant or funding opportunities.

The Department IPM Implementation Plan is a working document that includes following components:

- ✓ Planning: Needs for each year; Communicating plans to Department Heads for approval,
- ✓ Budgets and Economics: Continuously improve and make the process feasible and economical to the facilities; Working with the County IPM Manager to find alternative sources of funding (grants); writing grants and follow up;
- ✓ Educate, train and communicate with facility managers, Department IPM Coordinators/Safety Coordinators and facility tenants
- ✓ Procure Qualified IPM Contractors
- ✓ Develop IPM service plan
- ✓ Maintain records of Pesticide use exemptions
- ✓ Maintain data and document Control (IPM Log Book - Record Keeping - Electronic); Submit IPM activity/Pesticide use reports
- ✓ Emphasize overall pesticide use reduction: physical, mechanical and cultural control – A non-chemical approach
- ✓ Program Performance Management: Ensure Quality Control through periodic auditing of IPM projects
- ✓ Safety and Communication
- ✓ Work with Property Management Group and County IPM Manger to negotiate IPM Clauses for New Leases and Lease renewals; capital improvement projects, contract provisions, lease negotiations etc.

Purchasing Controls

Selecting Qualified Vendors to provide IPM Products and Services The County has developed comprehensive purchasing guidelines (PU) and launched a proactive approach to contracted or in house services in IPM for structures, urban turf and landscape, wildlife pest management, aquatic pest management, rights-of-way vegetation management, and indoor plant maintenance.

The Request for Proposals (RFP) for each IPM subject matter reflects the underlying objectives to establish green products purchasing and services according to Bay Friendly landscape principles, maintenance practices and related IPM. For greater regional adoption, model RFP's are also made available to other interested public agencies at no cost.

Monitoring toxic chemical reduction in purchasing All pesticide products and pest control services that include pesticide applications comply with the IPM ordinance and can only be purchased through the County Procurement Department, with a review and approval by the County IPM Manager. The approval and exemption process mandates that departments/user groups requesting pesticide use exemptions will demonstrate good faith efforts/alternative methods to mitigate pest problems prior to any such request. Use of petty cash or direct pay methods are prohibited and controlled at the purchasing level.

Inclusion of IPM policy directive and environmental preferable purchasing (EPP) in all County Contracts The County is also continuing inclusion of IPM ordinance requirements in all new and renewed County contracts and provisions related to leases, easements, capital project planning, design, and renovations. This has strengthened the precautionary principles/concepts to mitigate pest problems before they happen. The IPM requirements are also included for all buildings undergoing LEED certification. An example is inclusion of IPM structure and landscape requirements in the design of the County's new Crime Lab, which is now LEED Gold Certified.

Pesticide Use Exemption

Santa Clara County took a cautious approach by restricting use of certain categories of pesticides. In 2004, pesticides currently in use or intended to be used by departments were screened based on set criteria, in order to create an Approved List of Pesticides. Per the priorities established in the IPM Ordinance, pesticides are to be used as a last resort and are approved for use through a pesticide use exemption process.

Review of the Approved Pesticide List is a continuous process based on data availability from variety of sources. As new data is made available, the County IPM Manager reviews additional products based on criteria adopted by the County.

More information on approved pesticides and the exemption process is available on the IPM website http://IPM.sccgov.org in the Administrative Guidelines and Procedures section.

Pesticide Use Exemption/Approval Process: Department IPM Coordinators contact the County IPM Manager for necessary approval prior to pesticide use. A pesticide use exemption form provides an explanation for such requests. The County IPM Manager works with the

department to determine the necessity of pesticide usage and related non-chemical alternatives, to achieve overall pesticide use reduction.

B. DEVELOPMENT OF OUTREACH TOOLS

A lack of shared awareness and goals amongst policy makers, management, IPM practitioners and the public regarding alternatives to pesticides is commonly cited as a challenge to pesticide reduction. Successful outreach programs are based on a solid understanding of the needs of the targeted audience and the use of appropriate techniques to disseminate the needed information. Outreach in the field of IPM involves connecting with practitioners of pest management, as well as their customers - policy makers, budget managers, and building occupants who have the potential to influence the direction of product and service markets through demand. Ultimately this addresses the interests of environmentally concerned citizens who support reducing the use of pesticides.

The IPM program first approached outreach by exploring and identifying the diverse array of stakeholders including policy makers, regulators, management, IPM practitioners and the public. The stakeholder group also includes non-traditional audiences such as professionals in the fields of air, land and water quality control, public health and safety, occupational safety and environmental compliance, climate change and sustainability, health and environmental advocates, community groups, the elderly, and children. The program has explored partnerships to leverage financial resources, creating efficiencies for staff, data and information sharing. This also assists with development of regionally consistent messages that are less confusing, easily recognized, and less likely to include conflicting practices.

Outreach tools have been developed through 1) **forming collaborations and alliances**, 2) **conducting research, trials and demonstrations**, 3) **conducting training**, and 4) **participating and sharing ideas** in variety of educational platforms.

Collaborations and Alliances

Regional IPM Alliance

Regional IPM Alliance

Establishment of a collaborative IPM training program and conference, inclusive of several bay area agencies, has been a long-term goal of the program. A jointly produced and attended event allows education and outreach to a greater community, as well as an efficient use of scarce resources. The County's leadership realized the importance of this collaborative approach among the bay area counties as a logical next step in expanding integrated pest management and also mentioned that working together; we can address issues that go beyond city or County boundaries.

As original sponsor for this creative approach, Santa Clara County formed the first Northern California Regional IPM Alliance. The County took a leadership and fiscal management role in setting up a Regional IPM Trust fund to promote establishment of collaborative education and outreach activities. An Annual Regional IPM Conference was rotated among participating jurisdictions in Northern California. This collaborative approach helped leverage scarce resources

and addressed issues that go beyond city or County boundaries, to promote pest prevention and minimize pesticide use and to outreach a greater community.

Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP): Pesticide Outreach Group

Santa Clara Valley Urban Runoff Pollution Prevention Program

Pesticides used in landscape maintenance are a known source of pollution in local waterways. Many landscaping companies who serve are not aware of less toxic methods that can be used to control pests and minimize pesticide runoff. Through Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) a coalition in which the County is a member, the IPM program has collaborated on outreach to this group of practitioners through the Green Gardener training program.

The SCVURPP also promotes pesticide use reduction strategies through various outreach projects, such as promoting IPM education at commercial nursery outlets, media campaigns etc.

Bay-Friendly Landscaping and Gardening Coalition (BFL&G)

The challenges to climate change, water supply, and pollution are both global and regional in scale. Solutions to these challenges require collaboration among the public agencies, organizations, and individuals. The San Francisco Bay Area now has an exciting coalition devoted exclusively to promoting sustainable landscaping and gardening practices that conserves water and resources and reduces pollution to benefit both the economic and environmental health of the greater Bay Area.

Launched in 2007, the BFL&G coalition provides the tools that assist public agencies meeting environmental mandates, provide landscape professionals with a unique set of eco-friendly qualifications, and home gardeners the knowledge to reduce their impact on the environment and their communities. Bay-Friendly is one of the few programs to take a holistic approach to promoting the design, construction, and maintenance of sustainable landscapes and gardens by creating a common understanding among consumers, professionals, regulators, and local governments. Launched in 2007, the Coalition has already realized several successes.

Bay Friendly Gardening and Landscaping Coalition

Over 24 organizations from around the Bay including Santa Clara County have signed a Declaration of Support for the Seven Bay-Friendly Principles: Landscape locally, landscape for less to the landfill, nurture the soil, conserve water, conserve energy, protect water and air quality, create and protect wildlife habitat). The County IPM Manager participated (2010) in the Bay-Friendly Coalition's Board of Directors committee to promote Bay-Friendly landscaping practices as an additional means of creating and leveraging outreach opportunities.

This alliance is now an independent non-profit organization known as ReScape California. For

more information visit the website: http://www.rescapeca.org

State Pest Management Alliance - Urban Pest Ant Management Project

The IPM Program is a partner in the California Department of Pesticide Regulation Pest Management Alliance (PMA) – Urban Pest Ant Management Project, coordinated by the Entomology Department of the University of California, Riverside. The Project was made possible through a grant from the California Department of Pesticide Regulation. The project's goal is to reduce the use of synthetic insecticides to control ants in urban areas. Through participating pest control companies, the project demonstrated 50% reduction in synthetic pyrethroid use in their service routes.

State Pest Management Alliance – City of San Jose: Nature's Inspiration Gardens Project

In 2010, the California Department of Pesticide Regulation awarded a $200,000 grant to the City of San Jose to create a model, pesticide-free urban park in its Courtyard Gardens within Guadalupe River Park. The County IPM Program participated as an alliance partner. On September 22, 2012, the garden was opened for public view and educational outreach. Today, Nature's Inspiration Gardens feature low-maintenance, drought-tolerant and native plants that invite beneficial insects and wildlife and help prevent contamination of waterways. Pest control has shifted from pesticide-based to integrated pest management (IPM), a combination of natural and preventive strategies that focus on long-term pest prevention and are as benign as possible to people, pets and the environment. Besides a great outreach to Santa Clara County residents, funds from this project were also effectively used to train the City and County staff on Bay-Friendly Landscaping and Gardening principles and practices.

Pesticide Runoff Mitigation and Education Project

The IPM Program Manager also sits on the advisory board of the University of California Davis, "Pesticide Runoff Mitigation and Education" project funded by the California Department of Pesticide Regulation. The goals of the project are to develop educational materials related to pesticide runoff mitigation, and to target four specific audiences for the educational outreach: the general public, retail nurseries, commercial landscapers, and professional structural pesticide applicators. Available outreach products are posted on web: http://groups.ucanr.org/PesticideMitigation/

California Department of Pesticide Regulations Grant

The Program staff went through several stages of securing a California Department of Pesticide Regulation grant. Collaborators included staff from University of California Cooperative Extension Santa Clara County, County Department of Agriculture, Department of Parks and Recreation, and Jacobs Farm.

As our state and county develop, it is inevitable that people will be living closer to farms. This funding would have been focused on agricultural research and educating the public, schools and the agricultural community on pest control techniques that focus on minimizing health concerns and maximizing production near schools.

Although ultimately, the grant was not awarded to the Program, the research and collaboration done should prove to be valuable in the future.

Drought-Ravaged Tree Program

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

Young Trees

The Program staff administered the selection of and then worked closely with the non-profit groups, Our City Forest and Canopy as organizations that can implement community outreach projects promoting tree planting, and tree-health care. This includes the locating, planting and aftercare of 200 climate-appropriate drought tolerant shade trees. Preference will be given to Santa Clara County native trees and planting in community areas such as street, roads, and educational institutions, industrial and commercial areas.

The services also include engaging diverse community groups (Santa Clara County policy makers, and other local government service providers, public and private landowners, and residents) in first-hand tree care experience, and educate children, parents, local residents, and school staff on benefits of planting and caring for trees on their properties by disseminating educational material and conducting educational workshops.

Water Conservation

A significant portion of 2016 saw the County in a severe drought. IPM Staff continued to work to find opportunities to improve countywide water management in the areas of conservation,

efficiency, wastewater utilization, pollution prevention, education/outreach and operational efficiencies.

Our staff has assisted in implementation of the County Sustainable Landscape Ordinance compatible with the State Model Water Efficient Landscape Ordinance (MWELO).

This action requires significant efforts on several fronts bringing together a variety of stake-holders, compliance to State and local regulations, researching water efficiency, outreach, promotion of water efficiency, monitoring and evaluation, tracking progress and periodic/timely reporting to the management and Board of Supervisors. These actions will bring systematic and permanent changes with sustained outcomes addressing long-term effects of drought across the region.

Sustainable Landscape Management Resource Guide

Guided by the County's 2015 sustainable landscaping policy, IPM program staff began, and are now currently in the process of completing a website to be available as a county-wide resource for learning sustainable landscape design, implementation and maintenance. The site is expected to go-live by the end of October 2017. Sustainable landscaping outreach addresses following principles:

7. Landscape Locally
8. Landscape for less to landfill
9. Nurture the Soil
10. Conserve Water
11. Conserve Energy
12. Protect Water and Air Quality
13. Create and Protect Wildlife habitat

Research, Trials and Demonstrations

Planning and demonstrating reduced risk pest management strategies is a continuous process. Demonstrations and field trials on new innovative ideas, products and services are effective tools to train the User Groups. IPM demonstration sites helps to provide hands-on education coupled with a relevant, "real-world" example.

Ed Levin, County Park (1500 acres) was the first park in Santa Clara County to practice reduced risk pest management practices. Demonstrations, research and trials on innovative and creative alternative pest management practices through “real world examples”, have been conducted on this land, before adopting for larger scale application on County lands. Successful pilot projects are gradually adopted in all 29 County Parks representing approximately 52,139 acres of recreational, open space and rangelands. As a result, in 2016, twenty-five county parks were managed using non-chemical methods. Acreage under chemical management is also at statistically insignificant levels in remaining 4 parks. Other County owned sites are also used to conduct short-term trials.

Clove Oil Trials	Solarization	Mechanical Tools for Weed Control
Yellow Jacket Trapping Trial	Use of Living Systems (Cattle, Goats) to Control Invasive Weeds	Rubber and Wood Mulch Efficacy and Cost-Life Cycle Trials Research
KMPro Ant Baiting Trials	Weed Control using Waipuna Steam System Demonstration	Herbicide Use Volume Reduction using WeedSeeker Technology – Demonstration

Use of Vacuums to Control Ground Nesting Yellow Jackets – Trial	Use of Mint Oil to Control Wasps - Trial	Yellow Jacket Trap and Lure Efficacy Trial – Santa Teresa Park
Use of Mechanical Harvesters to Control Aquatic Weeds – Demonstration		

Some noteworthy examples of research, demonstrations and trials area as follows:

<u>Research on stinging arthropod (Ground nesting Yellow Jacket) management</u> The IPM Program set up collaborative research with the Department of Entomology, UC Riverside, to develop bait matrices that are environmentally friendly, investigate effective lures and develop traps, monitoring and abatement protocols for the control/suppression of Ground Nesting Yellowjackets in sensitive areas such as parks, schools, and recreational areas.

Ground Nesting Yellow Jacket Management – Research

The study showed that traps should be an integral part of yellowjacket management strategy. While they may be used strategically to divert foragers in certain situations, they should be used primarily as monitoring devices to detect presence and intensity, and to help determine if and when baiting is to be undertaken. Through this study, insecticides with promise as yellowjacket bait were identified, including fresh and canned minced chicken and one particular canned fish-flavored pet food. Two pesticides were also identified as good candidates as ingredients for yellowjacket bait. The details of this study on were included in a published paper presented at the 6th International Conference on Urban Pest by Donald A. Reierson, Michael K. Rust, Richard S. Vetter, Department of Entomology, University of California, and Riverside.

Efficacy and Cost-Benefit Trials on use of Mulch for Weed Control The County has successfully completed a five year study on the efficacy and cost-benefit ratio of using rubber mulch (recycled rubber from waste tires) and wood mulch in controlling weeds in recreational and urban landscapes and rights-of-way.

Wider use of mulch is now being phased in for urban landscapes. The Departments of Parks and Recreation and Facilities and Fleet have applied weed barrier technology (rubber mulch, wood mulch and ground covers) to control weeds in several park renovation projects. The use of mulch in urban landscapes and recreational parklands has demonstrated reduced maintenance cost as well as minimizing herbicide use.

Mulch

Ground Cover

Efficacy and Cost-Benefit Trials on Clove Oil as alternative to conventional post emergent herbicide: The Department of Parks and Recreation conducted trial in 2005, in partnership with EcoSmart Technologies. Reduction of the product cost and formulation to increase the economic viability of its use was discussed with the manufacturer.

Ed Levin Park: Clove Oil Efficacy Trials

The product application under optimum conditions did provide total burnout of weeds in early stages (height 6-8 inches of plant growth). However, ongoing unusual weather and record rainfall in 2005-06 resulted in setback for this project. Factors included issues related to timing of product application in early stages of weed growth and finding ideal weather conditions during the rainy season.

The desired outcome was to provide a cost-effective, viable alternative that would minimize the use of conventional herbicides on County owned right of ways. However, adoption of this product on wide scale is impacted by a limited seasonal opportunity for application, which limits product effectiveness.

Controlling Medusahead grass with Compost Tea

An experiment was conducted in Ed Levin Park this year to apply compost tea onto an area infested with Medusahead to evaluate if compost tea and its associated soil bacteria, fungus and mycorrhizae improve the soil conditions and degrade the Medusahead. Even though the treatment was not economically viable, significant drop (86%) in percent cover of Medusahead was noted in the area mowed and treated with compost tea.

Compost Tea Sprayer

Training

Regional IPM Conference: The County took a leadership role in developing a Regional IPM Conference and training event. An ideal outcome is to bring as many Northern California public agencies together as possible to consider IPM issues that reach beyond jurisdictional boundaries. Read more about benefits of this approach at website http://IPM.sccgov.org. As the original sponsor of this innovative idea, Santa Clara County hosted the First Regional IPM Conference, held on June 7, 2004 and assisted the neighboring County of Alameda to organize the second annual conference in 2005. The City of San Jose and the Santa Clara Valley Water District organized the third annual conference in 2006. Approximately 1500 diverse audience representing 150+ Public Agencies, 100+ Private Industry, 55+ Speakers attended last three successful well-received conferences. Planning for fourth regional conference in 2014 is

underway; also developed a comprehensive Regional IPM Resource Manual (CD-ROM). Over 1500 plus copies were distributed to various interest groups at no cost.

Example of Regional IPM Conferences 2004, 2005, 2006

Green Gardener & Retail Store Employee Training, Increasing Retail Shelf Space for Reduced Risk Products, and Going Native Garden Tours:

The important focus of IPM outreach has been the urban audience through distribution of information about how to manage pests using sustainable landscape practices, promoting structural sanitation, housekeeping and maintenance to manage or control pests. Since 2011, several IPM trainings were conducted by the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), of which the County is a member.

In 2016 through this outreach thirty-six gardeners were trained under Green Gardener training project. The Santa Clara Valley Green Gardener certification program is a ten-week course that trains landscape professionals to meet the demand for green gardening practices.

Green Gardener Program

Since 2009 when the program began, 356 participants have completed the training. Green Gardeners are proficient in landscape maintenance practices that use resources wisely, conserve water, protect the soil, and reduce waste, urban runoff pollution and storm water pollution from landscape maintenance activities.

The list of Green Gardeners in distributed to consumers at outreach events, advertising on radio and is also made available online. These Santa Clara Valley Green Gardeners provide professional landscape maintenance and/or design services throughout Santa Clara County.

Example of Green Gardener Professional Worker Training Organized by SCVURPPP in Santa Clara County

Retail Store Employees Training and Increasing Shelf Space for Reduced Risk Products: This training (managed/hosted under the SCVURPPP program) provides 1 to 2-hour store employee trainings covering topics like IPM, current pest problems in Santa Clara County, including information on less-toxic abatement products, water quality problems due to pesticides with a focus on pyrethroids, problems with nutrient runoff of chemical fertilizers, how to read a pesticide label, beneficial insects etc. The objective of the "Increasing Shelf Space" project is to work with pesticide buyers and distributors at selected stores to encourage them to buy less toxic products. Examples of stores that participated are Los Altos Garden Supply, Home Depot, OSH, Yamagami's Nursery, Los Altos Nursery, SummerWinds, Alameda Valley Nursery, Home Depot, OSH and Ace Hardware.

In 2016, the Program continued to maintain literature racks displaying less-toxic pest management literature at 35 hardware retail stores and nurseries in Santa Clara Valley. To help customers identify less-toxic products, the program continued to maintain literature racks displaying less-toxic pest management literature "shelf-talkers" (product identification tags) at several hardware retail stores and nurseries in Santa Clara Valley.

The Program also funded less-toxic pest control trainings that 76 employees attended in 2016. The goals of this project are to increasing awareness and changing behaviors, and make green products more mainstream.

The program also continued to maintain literature racks displaying less-toxic pest management literature at hardware retail stores and nurseries in Santa Clara Valley. To help customers identify less-toxic products, Program staff placed "shelf-talkers" (product information tags) on store

shelves. The goals of this project are to increasing awareness and changing behaviors, and make green products more mainstream.

Going Native Garden Tour: In 2015, the Program organized the13th annual Going Native Garden Tour. The tour featured 56 gardens. Of these, 23 gardens (41%) were on the tour for the first time. This year 7 public native gardens and 2 school gardens were included in the tour. Most of the gardens were located in Santa Clara County, and a few gardens were in southern San Mateo County. The southernmost gardens were in Los Gatos and southeast San Jose. The 6478 registrants who signed up for the tour made 11572 visits to the open gardens. There were 275 volunteers participating on tour day, serving as docents and greeters at the 56 open gardens.

Bay-Friendly Landscaping Conference: In February, 2008 the Bay-Friendly Coalition partnered with StopWaste.org to host the first Bay-Friendly Landscaping and Gardening conference in Oakland, California, attended by over 450 participants. Second conference was hosted on September 17, 2010 in San Francisco, attended by 493 participants. The event was a great success, featured interactive sessions, professional networking, and a marketplace of cutting-edge technologies and products. Experts offer practical tools and solutions to creating landscapes that conserve natural resources, prevent pollution, and cut greenhouse gas emissions while working with the uniqueness of the San Francisco Bay watershed. Several subject matter specific sessions reflected a sustainable approach to landscaping. Examples include: drip and subsurface irrigation techniques, stormwater management through capture and infiltration; sourcing and specifying sustainable materials; using Bay-Friendly ordinances as resources and opportunities; designing and building regenerative landscapes; how Bay-Friendly rated landscapes conserve and protect water resources; urban soils for successful stormwater practices; designing landscapes for water conservation and WELO; top integrated pest management (IPM) techniques; edible landscaping with minimal irrigation; Greywater strategies and regulations; California native plants for urban landscapes; Bay-Friendly softscape garden rooms.

Bay-Friendly Landscaping Conference 2010 and Bay-Friendly Gardening Workshops 2009-2010

Bay-Friendly Professional Landscaping Maintenance Training and Qualification Project: The Bay-Friendly Landscape Maintenance Training and Qualification is a well-established and successful 7-week, 21-hour training for public and private sector landscape maintenance professionals. Individuals who attend all classes and pass a final exam become part of the pool of Bay-Friendly Qualified Landscape Maintenance Professionals. The Training is providing: sustainable practices for the landscape professionals. The program enhances the participant's knowledge of the Bay-Friendly principles and the maintenance practices that allow professional landscapers to offer profitable and environmentally sound landscaping services. Since 2007, 201 private and 85 public sector landscape professionals have received training. The County IPM program in collaboration with the City of San Jose co-hosted this engaging interactive training for Santa Clara County landscape professional in March 2011.

The County IPM program in collaboration with the City of San Jose co-hosted this engaging interactive training for Santa Clara County landscape professional in March 2011 and September, 2012. Sixty-nine (69) landscape professionals were trained including 19 landscape professionals from the County of Santa Clara Parks and Recreation and Facilities and Fleet departments.

This training is now through ReScape California, an independent non-profit organization. For more information visit the website: http://www.rescapeca.org. The County landscape maintenance staff is encouraged to attend these trainings in order to continue to enhance their skills in sustainable landscape management.

Example of Bay Friendly Landscaping Professional Worker Training Organized by StopWaste..org Alameda County

Bay-Friendly Training and Qualification for Designing New Landscape project: This project was developed with the input of innovative landscape design professionals from around the Bay. It is based upon the landscape principles and practices described in Bay-Friendly landscape guidelines. The program enhances the participant's knowledge of methods offering profitable and environmentally sound landscaping designs. A qualified landscape design professional will be able to provide many benefits to the residents and communities of the Bay-Area. Discussion with other public agencies is underway to bring this training to Santa Clara County public and private sector landscapers in 2015.

This training is now through ReScape California, an independent non-profit organization. For more information visit the website: http://www.rescapeca.org. The County landscape maintenance staff is encouraged to attend these trainings in order to continue to enhance their skills in sustainable landscape management.

Bay-Friendly Gardening Workshops: In 2009, nine BFL gardening workshops sponsored by the County of Santa Clara and the City of San Jose were conducted. In addition, nine were conducted in 2010. The workshop series teaches design and maintenance practices that reduce the generation of plant debris, conserve water and prevent pollution including pesticides. The interactive workshops were held in natural settings, in 3 hours participant gain multiple opportunities to practice techniques on-site and bring home resources to begin implementing lessons learned. All workshops were open to the public and offered throughout Bay Area.

Facility Managers, Safety Coordinators and Building Occupant Education and Awareness

The County took a leadership role in promoting proactive and preventive principles in mitigating structural pest problems by establishing a training program and developed a training DVD in collaboration with Orkin Pest Control titled “ABC’s of Structural Pest Habitat Modifications”, accompanied by a manual titled “Facility Manager’s IPM Guidance Manual **-** ‘Sanitation, Housekeeping and Maintenance – Role of Facility Managers and Building Occupant in preventing pest problems”. Originally 1500 copies were distributed to individuals, agencies, and interest groups at no cost. The manual is now posted on the IPM website.

This training was also provided to facility managers at their annual workshops and managers are encouraged to address the topic in staff meetings. The goal is to increase the IPM awareness of the County’s 15,000 employees, who occupy 180+ buildings, to achieve reductions in pesticide use. The Program staff is currently working to reengage building occupants and facility maintenance groups to seek appropriate help in facility sanitation, housekeeping and maintenance to solve pesky issues.

Pesticide Applicator Safety Education

Training of front line pesticide applicators and pest control technicians is often identified as a major need or bottleneck in IPM projects. Urban IPM requires a generally knowledge intensive approach. In Santa Clara County’s IPM program, it was realized that training on the basics of the IPM policy and specific department maintenance standards, and IPM strategies, will help ensure that they are understood and consistently followed. Implementing an IPM approach from design through daily maintenance eliminates unnecessary applications of chemicals. In addition, full implementation of a well-understood IPM approach will create a more efficient and safe environment, saving time and money and increasing worker safety.

Annual IPM and Pesticide Applicator Safety Education

The SCC Annual Pesticide Applicator Safety Education (IPM-PASE) is designed to educate pesticide applicators to minimize self and environmental exposure to pesticides. The 4 hours training strives to educate all pesticide applicators, maintenance workers and users across Santa Clara County about pest management alternatives, including the safe, proper, and legal use of pesticides. This project promotes responsible decision-making, which will protect pesticide users, public health, plant and animal health, and the environment. It also discusses case-studies on alternative pest management practices and projects. The training is available to pest control license holders, pest control maintenance workers, County management staff, and IPM Contractors, as well as to city staff and others interested. The California Department of Pesticide Regulation - Pest Management and Licensing branch has assigned 4 hours of continuing

education units (CEU) to SCC IPM-PASE training. The training also meets the State mandated training requirements. The training is mandatory to all pesticide applicators and IPM practitioners, who are involved in providing services on county owned or managed facilities and grounds. Approx. 80 plus workers undergo this training annually. In 2012, the City of San Jose also showed interest in attending this training by sending four of their employees.

In 2016, eighty-three (83) county employees engaged in pest (primarily weed) management activities were trained. These included training in Sustainable Landscaping: 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.

CA DPR Pest Management Alliance (PMA): Urban Pest Management Workshop

CA DPR Pest Management Alliance: Urban Pest Management Workshop 2010

The County IPM program assisted in hosting the California Department of Pesticide Regulation Pest Management Alliance (PMA) – Urban Pest Ant Management Workshop at the County Government Center in 2010. The goal of the PMA project is the local adoption of least toxic IPM strategies to control ants in urban environments, to reduce the amount of insecticide used to control ants, and to develop strategies that prevent or significantly reduce the amount of insecticide in water runoff. The primary goal of this workshop was to train pest management professionals to adopt these practices. Approximately seventy (70) professionals representing regulatory, academia and pest management industry attended the workshop.

Area-wide EBIPM 2012 Field School and Learning Fair*: **The*** IPM Program Manager participated in Ecologically-based Invasive Plant Management (EBIPM) 2012 field school held at Reno, Nevada. EBIPM is a regional project funded by the USDA Agricultural Research Service (ARS). This program is a collaborative effort of the 5-state region of the Great Basin. The goal of this project is to bring EBIPM systematic framework to improve management of invasive weeds, provide a roadmap, and train local stakeholders to develop effective programs to manage invasive weeds. The IPM Program is actively pursuing bringing this training program to California and also encouraging staff from Parks, Roads and Airports to attend this training.

International IPM Symposiums: The IPM Program actively participated and also assisted in organizing the International IPM Symposium 2012 and 2015 to garner broader support for funding and resource development in non-production agriculture and non-agriculture IPM projects. Outreach at large conferences allows interaction with the regional, national, and international pest management professional community including industry, government organizations and policy makers at these important technical platforms. The 7th IPM Symposium – "IPM on the World Stage-Solutions for Global Pest Challenges," held in March, 2012 attracted more than 630 research, education, government, industry and environmental and health professionals from 36 countries for three days of presentations, networking and organizational meetings on key pest management issues. The 8th IPM Symposium – "IPM: Solutions for a Changing World," was attended by nearly 450 professionals from 27 countries. The County IPM Manager Co-Chaired 2015 symposium, and also helped organize/moderate professional development session on "Applications of Geo-Technologies in Agricultural and Non-Agricultural IPM Decision Support."

Participation and Sharing Ideas in Workshops, Symposiums, Conferences and Conventions and Outreach Material

In order to gain knowledge and experience, it is also necessary that practicing IPM professionals have exposure to the latest updates in IPM communities and subject matters. It helps to create a bridge among IPM practitioners and to share information regarding challenges and obstacles in implementing IPM projects as well as on what is available in the marketplace. In this context, the County has also promoted IPM at Regional IPM Conferences, Exhibits, International IPM Symposium, International Conference on Urban Pest (ICUP), Indian Pest Control Association (IPCA), Federation of Asian and Oceanic Pest Management Association (FAOPMA), Mexico Pest Control Expo 2009 and XXV Congress ANCPU, National Recreation and Park Association (NRPA) Academy, Parents for Safer Environment (Town of Moraga), Northern California Turf and Landscape Convention, Annual Employees Wellness Fair, Annual Santa Clara Safety Seminar, Urban Pesticide Committee (Regional Water Quality Control Board), Marin County IPM Workshop, Contra Costa County, EOA (Urban Runoff Pollution Prevention Program), Professional Association of Pesticide Applicators (PAPA), California Association of Pest Control Advisors (CAPCA), COAST Agriculture Commissioners meeting, Ecology Based IPM Field School and several other local workshops.

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<tr>
<td>Annual SCC Employee Wellness Fair</td>
<td colspan="2">Pesticide Free Park Dedication – IPM Earth Day Event at Ed Levin Park</td>
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Workshops, Conferences, Conventions, Exhibits

Examples of Publications, Training and Outreach Material

The licensed pest control advisors (PCA) and pesticide applicators (in-house staff) also attended various IPM workshops and meetings to upgrade their skills and continuing education units.

The County's IPM program presentations in various workshops are well received by the audience as an advanced IPM program for the pest management industry. We have also learned from others at several IPM fronts and made progress through collaborations and also assisted others in implementing similar ideas/technologies/projects at their jurisdictions.

C. DEVELOPMENT OF BEST PRACTICES

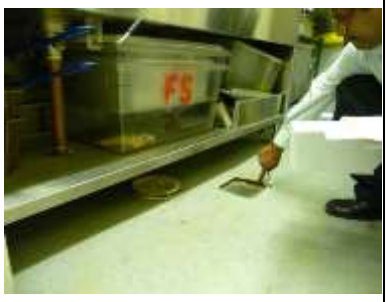
Research, demonstrations, field trials, regular inspection/scouting, and monitoring are effective tools to develop project specific best practices. These activities also train the user groups and help establish acceptance and adoption of new or proven innovative ideas, products and services. In 2002, it was realized that real world examples are key to creating consensus for adoption of new pest management alternatives within the County. This strategy has been effective in increasing employee and stakeholder awareness and participation in the program.

Structural Pest Management Projects

General Pest Control Proactive and preventive facility maintenance is critical to mitigation of chronic pest problems. Examples of some of the pest problems encountered in the last seven years are cockroaches, ants, bed bugs, flies, fleas, spiders, fungus gnats, feral honey bees, wasps, yellowjacket, mice, and rats.

Control measures such as sanitation, and building maintenance and modifications are strong elements in structural IPM project. Pest issues are addressed by eliminating or reducing sources of food, water, and harborage that are available to pests, and limiting pest access into and throughout buildings. Control methods include use of traps, vacuum, steam, heat, dehumidifiers, refrigeration, precision baiting techniques, Bio-enzymes and reduced risk-pesticides.

Addressing Facility Sanitation, Housekeeping and Maintenance Issues



Since 2003, regular pest control inspection and monitoring service has been provided by the structural pest control contractor. In 2009, the program started using PDA based software, bar code scanners and web based applications to conduct inspections.

The County IPM Manager closely monitors the efficacy of control strategies to ensure that a pest free environment is maintained for building occupants. The County IPM Manager also conducts site-specific inspections, addressing issues related to sanitation, housekeeping, and building and landscape maintenance to mitigate pest problems.

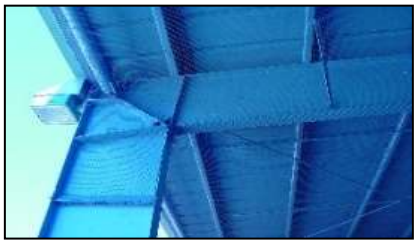
Examples of Control Measures

Controlling Ants through Precision Baiting

Use of Vaccum to Control Ground Nesting Yellow Jackets

Use of Steam to Control Wasps/Bees

Use of Bio-Enzymes to control Small Flies by Cleaning Drains



Rodent and Bird Exclusion

Use of Cold Temperature (Refrigerator) to control Cockroaches in Returned Electronic Surveillance Units

Use of Heat and Dehumidifier to Control Psocids (Book Lice)

Use of Bed bug sniffing dogs to pinpoint localized infestations	Use of Heat to Control Termites

Facility Managers and Department IPM Coordinators also review and follow up on the inspection reports and recommendations on pest activity and related sanitation, housekeeping and maintenance issues. “IPM Guide for Facility Managers”, a companion manual to “SCC IPM Administrative Guidelines and Procedures” is available as reference document throughout the County, providing a sampling of techniques and procedures to illustrate facilities management approaches to pest control. All of the methods cited in this manual have been tried previously, and proven successful in real-world situations.

Delusory Parasitosis When we see a bug, it bugs us. It creates anxiety, panic, and brings out stories of our lifetime experiences with bugs. We call it a “Rat of a size of Cat” and sometime “Delusory Parasitosis”. Since 2002, prompt attention followed by proper identification of hundreds of such pest sightings, and subsequent outreach to County employees has helped defuse several such bug encounters thus averting unwarranted pesticide use. “Paper mites” is the most common one. We appreciate the candid eyes of the County staff; altering pest issues at an early stage, helping IPM solve the “Bug” problem when it’s not a bug.

Bedbug Control Bedbugs are making a big “comeback” in the United States. In the last few years, some of our facilities have been affected. The County’s bedbug control protocol includes using canine help pinpoint localized bedbug activity, positive identification by entomologist, a coordinated outreach armed with information helped defuse anxiety among County staff, while the departments engaged contractors to achieve control using vacuum, steam, and dry heat. The coordination at all levels helped achieve the desired results … and now as a team, we are well equipped with knowledge and skills to follow this protocol, and keeping the bedbug “comeback” in check.

Termite Control The County owns or manages approximately 180 structural facilities. These structures are prone to termite attack. Termite control and management requires many special skills, including a working knowledge of building construction and an understanding of termite biology and identification. Management techniques vary depending on the species causing an infestation. Multiple colonies of the same species of termite or more than one species of termite can infest a building. Any of these variables will influence control approach. Subterranean, and

less frequently, dampwood termites can have nests at or near ground level, so control methods for these can be similar. However, drywood termites nest above ground; therefore, the approach for eliminating them is unique.

For many years, the standard treatment for control of drywood termites has been fumigation with Vikane (Active Ingredient - Sulfuryl fluoride) and for control of subterranean termites is soil and barrier treatment using conventional insecticides (e.g. Premise: Active Ingredient - Imidacloprid).

While termite baiting is a very complex subject, baits have become an important tool for controlling subterranean termites, which are the most common type of termites found in the United States. Structural IPM projects have replaced damaged wood and used application of reduced risk pesticides (e.g. borates, termite baits); heat treatment has also been considered in some cases. Bait is an appealing approach to termite control because it does not require extensive site preparation (drilling or trenching) or extensive application of insecticide to the soil or structure. Research is still ongoing to develop the most effective baits and delivery systems. Because subterranean termites in California vary in their foraging and in the times, that they will take baits, the placement of bait stations and the time of installation is a crucial component in a successful baiting program. Once a termite infestation is controlled, it is essential that the bait stations continue to be monitored monthly.

No Countywide structural termite control system has yet been established. Therefore, alternative technologies, which are still in approach and can only, be used on case-by-case basis. Transition from the conventional approach to adoption of reduced risk alternatives will continue to require development of effective and affordable products.

Drywood Termite Control Using Heat and Borates

Sanborn Park Drywood Termite Control

The County Contractor also successfully demonstrated application of heat to eradicate drywood termites at the ranger office at Ed Levin Park This is an alternative form of pest control that involves safely raising the temperature of an affected area to a level no pest can survive. Aside from being an effective non-toxic pest control method, heat is unique in that it can be used to treat specific areas as well as entire structures.

In another trial, we successfully completed drywood termite control using reduced risk borate treatment (reduced risk pesticide) at the historic barn at Ed Levin Par and heat treatment at a large historical building in Sanborn park. These trails have demonstrated that these low impact treatments can be successfully applied and help to have less reliance on Sulfuryl Fluoride fumigations and other conventional approaches to termite control.

Sustainable landscape maintenance and related IPM projects

Most County property, including regional parks already has established landscapes. An IPM objective for established areas is maintenance of healthy landscapes through timely monitoring, plant health care (PHC) and sound practices to preserve investments, effectively manage recurring maintenance costs, and avert continued use of pesticides. Implementation of landscape maintenance IPM projects and services are ongoing.

The Facilities and Fleet gardeners manage approximately 78 acres of urban landscapes around County owned or managed facilities/buildings. Since 2008, no pesticide is used on urban turf and landscapes except a “miniscule amount “as reported in 2014. The Department of Parks and Recreation staff also maintains approximately 200 plus acres of pesticide free recreational areas of regional parks.

Urban turf and landscapes best practices address a wide variety of pests including:

- turf weeds (annual, biennial, perennial broadleaf and grasses)
- plant insects (ants, aphids, mites, moths, thrips),
- plant diseases (Sudden oak death, Leafy spot, Blight, Sooty mold, Armillaria, Phytopthora, Anthracnose),
- invasive weeds (Russian thistle, Bull thistle, Canadian thistle, Mustard, Puncture vine etc.),
- poisonous plants (Poison oak),
- aquatic weeds (Algae, Sago pond weed, Water milfoil, Coontail),
- insects other than plant insects (Argentine ants, Carpenter ants, Feral Honeybees, Yellow jackets, Paper wasps, Houseflies, Phorid flies, Fungus gnats, Fleas, Subterranean termites, Drywood termites),
- vertebrate pests (rats, mice, California ground squirrel, pocket gophers, moles, feral pigeon, English sparrows, Starlings, Swallows, Geese and Gulls) and
- other wild life (Wild Boars)

Once immediate pest problems have been dealt with, solutions must be identified for the underlying conditions that led to the problem. This might mean developing a long-term plan to replace problem plants, rebuild ground, redesign planters or make other changes. In order to implement the "designing in" of good growing conditions, existing landscapes need to be evaluated to determine project life cycle costs, and a budgeting and implementation plan needs to be developed.

In 2009, the County adopted the “7 Principles” of bay-friendly landscaping and gardening and joined the Bay-Friendly Coalition to strengthen and promote sustainable landscaping practices the County adopted the “7 Principles” of bay-friendly landscaping and gardening and joined the Bay-Friendly Coalition to strengthen and promote sustainable landscaping practices. The Coalition works in partnership to reduce waste and pollution including pesticides, conserve natural resources, and create vibrant landscapes and gardens.

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natural resources, and create vibrant landscapes and gardens. It is now time to adopt "Sustainable Landscaping" as the county policy to advance gains made in the last six years.

Sustainable landscape maintenance and related pest management on urban turf and landscapes around office complexes

Since 2009, the Facilities and Fleet gardeners continued their efforts of transforming landscapes on County properties by using sustainable practices and improving plant health care. Use of mulch is promoted as an alternative to herbicides to control weeds. Since then, approximately 12.66 acres of urban landscape around County facilities were mulched. Installation of weed barrier and mulch on this acreage is projected to save thousands of labor hours annually on recurring weed-removal work using physical/mechanical methods. Recycling mulch on site is also practiced. At several facilities, non-functional lawns were also converted to landscapes by applying mulch and planting drought tolerant plants. This further helps improve soil conditions in favor of desired plant community and less reliance on chemical inputs for pest management. Besides decreasing or eliminating the cost associated with herbicide applications, it will reduce weeds, thus significantly reducing maintenance cost. In addition, an estimated total of 4,080 irrigation valves on these landscapes were shutoff over three years (2010-2013), **now saving approximately 41 million gallons of irrigation water annually**, should these be allowed to run on regular schedules. These projects were results of a well-coordinated team effort among the County Facilities and Fleet gardeners and the WWP Program of the Department of Correction has also helped weeds without using pesticides in landscapes around office complexes. A few additional lawn conversion projects were planned in 2014 using rebates made available from the Santa Clara Valley Water District, of which one project was implemented at the Juvenile Hall. Additional data on water savings for the year 2014 to 2016 was not quantified.

"These irrigation water savings were reflected in the County's overall water conservation activities which was recognized in 2013 by the Silicon Valley Water Conservation Awards Coalition for its efforts and leadership in water conservation." - Jason Gorman, Lead Gardener.

Besides lawn conversion projects, in 2012-2013, the Facilities and Fleet Department has also engaged goats as bio-control agent in their operations to help them manage invasive weed on hilly terrains of communication towers. In 2012, use of compost and bio-agents like Mycorrhizae

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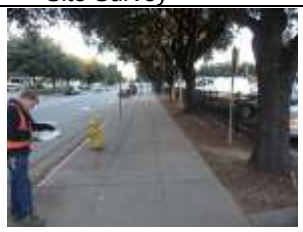
Compost tea and mycorrhizae fungi: Improving soil food-web to manage plant diseases: *Compost tea contains all the soluble nutrients extracted from the compost, but also contains all the species of bacteria, fungi, protozoa and nematodes in the compost. Most plant species exploit the soil with the help of beneficial microorganisms called mycorrhizal fungi. The fine threads that make up the fungus branch between soil particles grow into decomposing organic matter, even explore the shells of dead insects, where they find phosphorus and other vital nutrients. The nutrients are then passed back to the roots of the plant. Mycorrhiza offers several benefits to the host plant, including faster growth, improved nutrition, greater drought resistance, and protection from pathogens.*

are also added to the IPM Too-Box to help improve tree vigor to combat plant diseases such as powdery mildew and anthracnose of sycamore trees and root rot of coast live oaks. Significant improvement in the sycamore tree-health has been noted after these applications.

Sustainable Landscaping Projects	
Site Survey	Sun and Shade Survey
	
Plant and Turf Inventory	
Irrigation and Irrigation Equipment Audit	
Soil Analysis and Soil Improvement	Plant Selection

Implementation		
Resource Efficient Landscaping Project		

Sustainable Landscape Operations Need Assessment Study

In order to properly assess future decisions on landscape sustainability and pest control, it is necessary to have a good understanding of current landscape makeup (mulch, turf, ground cover, hardscape, etc.), plant palette and irrigation system.

Additionally, it is necessary to know what the current and future operational needs (type of labor, how much labor, type of material, what kind of material etc.) for County landscapes are and will be.

The Program staff is working with the Department of Fleet and Facilities to select a vendor to complete that assessment and provide the required information in visual form through PDF maps and through a database. The study will help the departments allocate adequate resources and implement sustainable landscaping projects (design, implementation, maintenance).

Sustainable Landscape Maintenance and Related Pest Management in Parks

In 2016, other non-chemical efforts to control pest in regional parks included lawn/turf conversion to landscape 3 acres, flail mowing 358 acres, mowing 80 acres, disking 48 acres, aeration 80, fertilizing 80, managed goat grazing 99 acers, managed cattle grazing 10,760 acres and prescribed burn 207 acres.

While 28 trees were removed due to variety of reason. Fifty-nine trees were saved through careful pruning and trimming. Mechanical traps and CO2 injectors are used to control vertebrates, such as, ground squirrels and pocket gophers. Attractant traps are used to control yellow jackets.

The Department is continuing its efforts incorporating IPM and pesticide refresher trainings, utilizing bay-friendly landscaping maintenance principles and practices, and looking forward to reducing non-functional (turf without purpose) lawns and improving irrigation systems in the coming years.

Urban Wildlife (Vertebrate) IPM Projects

Because of its great diversity of habitat types, Santa Clara County is home to many wildlife species. Some of examples of urban nuisance wild life in Santa Clara County include California ground squirrels, rabbits, pocket gophers, pigeons, sparrows, swallows, bats, feral pigs, feral cats, and snakes.

Ground Squirrel Trapping in Regional Parks Using Black Fox Trap	Ground Squirrel Trapping near Airport Taxiways Using McBee Trap	Pigeon Trapping
Raising Height of Trash Bins to Prevent Rodents Entry	Park User Awareness to Prevent Attracting Wildlife	Installation of Bird Barriers

Most of the urban wildlife conflicts under Santa Clara County's IPM program are resolved through prevention such as animal/vermin of proofing buildings, or sanitation improvement, improved housekeeping physical removal and trapping. For example, bird populations at all facilities are managed through seasonal trapping and installation of bird barriers. California ground squirrel populations at regional airports, parks, and correctional facilities are primarily managed through seasonal trapping and burrow destruction to prevent re-infestation. Feral pigs are controlled using archery and traps. Feral cat populations are managed through trapping, spay-neuter, and release. Geese are managed using vegetation barriers, lasers to herd geese, egg addling and sometime capturing and removing non-native geese and use of dog chasers.

Since 2003, no rodenticide is used in open space of 27 regional parks. Vertebrate control (e.g. ground squirrels, pocket gophers, feral pigs) throughout park system is managed non-chemically. In the last 10 years, the only use of rodenticide on grounds is reported by Department of Agriculture to control ground squirrels near Animal Shelter adjacent to South County Airport. The reason for use is to prevent transmission of vector borne and zoonotic diseases from ground

squirrels to shelter population. The Agriculture Department is currently exploring opportunities of adding non-chemical methods such as trapping in combination with collapsing rodent burrows to overcome this ongoing challenge. Resulting outcomes will be shared in the 2013 annual report.

Control of wildlife including gophers and ground squirrels at parklands, correctional facilities, and roads and airports is in need of a strategic approach and investments. The IPM Program is closely working with the Departments and contractors on need assessment. The project will require funds in the near future at the department as well as IPM Program level for consulting, developing protocols, and implementing controls. The resulting protocols and outcomes will be shared in 2013 IPM progress report.

Right of Way Vegetation Management Projects

The Departments of Roads and Airports, Parks and Recreation, and Facilities and Fleet have traditionally used herbicides, along with mechanical means such as mowing and grading, to manage vegetation along roadsides, highways, airport taxiways and park trails. This practice is known as Right of Way Integrated Vegetation Management (IVM).

Approximately 3500 plus right of way acres are managed by the Department of Roads and Airports under this project. Historically, herbicide use has been focused on areas directly adjacent to pavement edge, typically to maintain a 2-to 4 foot strip as a vegetation-free zone. Maintenance involves annual herbicide applications or alternative non-chemical maintenance practices. Vegetation-free zones help preserve pavement, allow storm water drainage, and increase safety along roadsides.

<table>
<tr><td> </td><td> </td></tr>
<tr><td>Vegetation Obstructing Sign – Visibility Hazard</td><td>Safety Recovery Zone</td></tr>
<tr><td> </td><td> </td></tr>
<tr><td>Dry Vegetation Near Roadside – Fire Hazard</td><td>Tall Growing Weeds Impeding Water Movement off the Roadway</td></tr>
<tr><td> </td><td> </td></tr>
<tr><td>Encroaching Trees across the Curve – Visibility Hazard</td><td>Vegetation Free Pipeline Inspection and Maintenance Zone</td></tr>
<tr><td colspan="2">Examples of Priority Zones</td></tr>
</table>

Right of Way Vegetation Control Using Mechanical Mowers, Hand Weeding to Suppress Seed head

IVM decision making prioritizes need for vegetation-free areas, and considers cost effectiveness, safety, and appropriateness of alternatives based on specific situations, there is no single method for control of vegetation; what appears to work best is implementation of a series of control techniques. These may include both non-chemical alternatives such as release of biological agents and mechanical removal, hand removal, mulching, and grading. Herbicides continue to be utilized when no feasible alternative exists, and exemptions are considered on a case-specific basis. However, the departments are committed to continued assessment of IPM alternatives and strategies. Department-specific review and analysis of both needs and emerging alternatives continues to be an important area of development for the IPM program. Even after identification of workable, IPM-friendly alternatives, implementation will be a function of feasibility from a resource perspective, and continues to be subject of dialog, with the goal of achieving the most rapid possible implementation that is consistent with operational necessities.

A few of the noteworthy projects implemented to reduce pesticide use in right-of-ways are as follows:

Use of mulch on right of ways in medians and intersections The Department of Roads and Airports has completed 2 years of application of wood mulch in the median/intersections of County expressways. The work was projected to complete in 7 years, however, stopped due to budget constraints. The ongoing annual program was to excavate existing dirt and weeds and applying mulch to reduce herbicide spraying. The project is under currently under re-evaluation, seeking opportunities through grant funds. Use of certified compost and re-vegetation on right-of-ways and other landscapes is also under consideration.

Vegetation Control through Mulch Application on Roads Medians and Intersections

Vegetation Control by Installing Hardscapes around Signage

Adoption of precision application technology to reduce overall pesticide use The County has invested in pesticide volume reduction technologies such as Weedseeker. The patented WeedSeeker technology uses advanced optics and computer circuitry to sense if a weed is present. When a weed enters the 12"-wide field of view of the Sensor, it signals a spray nozzle to deliver a precise amount of herbicide. The WeedSeeker spray only weed, not bare ground, and is effective where weeds occur intermittently. This technology can be used along roadsides, along irrigation canals and roadbeds, and on railroad rights-of-way. Other potential uses include airport runways, golf courses, paved parking lots with medians, dirt and gravel parking lots, parks and hiking trails.

Reducing Post Emergent Herbicide Volume up to 85% Using WeedSeeker Technology

The County's Department of Roads and Airports has adopted this technology on one spray rig for right-of-way vegetation management program – this has contributed to 70-85% herbicide use reduction annually on Roads rights of way. The use of this technology is now discontinued due issues related to operational design of spray boom to maneuver around the obstacles like guard rails and road signage. Future use of this technology will require additional research and

investments in boom technology that can overcome this challenge.

Since 2002, significant reduction has been achieved acreage under chemical management as well as use of herbicides to control vegetation on road's rights-of-way. The slight increase or decrease in acreage under chemical management from year to year are cyclic and need based. Herbicide applications based on weed scouting has helped the Department to maintain these levels.

Aquatic Weed Management Project

When present in small quantities, algae and other aquatic vegetation are beneficial to lakes and ponds. However, when these plants become overabundant, they can lower the recreational and aesthetic qualities in a body of water, and create hazards for swimming, fishing, boating, and waterskiing. They also clog water intake systems of industries, municipalities and irrigators, provide breeding habitat for mosquitoes and other pests, divert water flows causing erosion and flooding, and also alter some of the natural qualities such as fish community structures. These plants become more difficult and expensive to control if ignored.

Algae blooms are sometimes a symptom of a more basic problem of over fertilization, as too many nutrients cause phytoplankton to reproduce at extremely fast rates, producing heavy persistent blooms that can shut off sunlight, killing submerged rooted plants. Dense blooms can rob the pond of enough oxygen to kill fish. In extreme cases, algae themselves die in masses, using even more oxygen as they decompose. This decomposition is even more likely to occur after the pond has been treated with an algaecide.

Most ponds and lakes in Santa Clara County are naturally eutrophic (full of nutrients, and very productive of plant material). Warm water, plentiful nutrients, and shallow depth combine to encourage luxuriant plant growth. Algal "blooms" in the spring and autumn are natural occurrences and sometimes clear themselves.

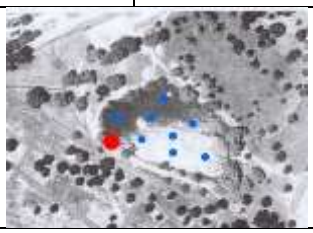
However, eutrophication problems arise when plant nutrients are added to a pond through human activity. This could include manure from domestic animals on property near a watercourse. Septic tank leachates and garden fertilizers that enter lakes and streams are another example. Bird droppings are also very high in nutrients, and can add significantly to pond nutrient levels. Additionally, erosion deposit as sand and dirt from roadway runoff also creating shoal areas that can foster growth of nuisance aquatic plants.

Once a pond is suffering from algal blooms and or submerged aquatic weeds, treatment is desirable. In 2002, this algae bloom occurred in the Sandy Wood pond at Ed Levin Park. In 2003-04, algal blooms and submerged aquatic weed problems were also reported in the lakes at Vasona and Hellyer Park.

Although chemical treatment was popular before 2002, it was realized that killing the algae and/or submerged weeds is only a temporary cure. The vegetation decomposes, consuming oxygen and returning nutrients to the water to fertilize new blooms. In addition, many chemical treatments for weeds in ponds may be unnecessary or inadvisable. Several alternative options were discussed to effectively manage algal blooms and sub-merged aquatic weeds. These include reducing flow of nutrients into ponds and lakes, lowering the water level and exposing roots, vegetative parts, and susceptible seeds of certain aquatic plant species, dredging and excavation, shading submerged weeds, weed harvesting, use of barley straw to prevent and treat algae, use of Triploid grass carp (sterile grass carp, a herbivorous fish), nutrient precipitation, use of biological agents and enzyme combined with aerators to emulsify and digest algal blooms.

Application of Bio-Enzyme

Aerator



Aerial Map of Spring Vally Pond at Ed Levin indicating placemnt (Blue Dots) of Aerators

Placement of Aerators

No Algal Blooms for more than 6 years

Use of Biological Control Agents and Aerators to Control Algal Blooms in Sandy Valley Pond at Ed Levin Park

In 2002, the County stopped using herbicides to control weeds in the ponds, lakes and creeks on the County owned parcels. The following year, algal blooms in Spring Valley Pond were controlled using biological agents and pond rejuvenation (aerators). The results were very encouraging. This pilot supported overall project goals of demonstrating pesticide source reduction/pollution prevention through adopting cleaner technologies and or use of safer alternatives.

Mechanical Harvesting of Aquatic Weeds at Hellyer and Vasona Park

In year 2005-06, mechanical harvesting was used for removal of aquatic weeds in lakes at Vasona and Hellyer parks. After promising results both protocols are now expanded to all other water bodies throughout the 27 County parks. Since 2002, no aquatic herbicides are used in lakes and ponds except what is reported under Arundo Donax control project managed by Santa Clara Valley Water District.

Invasive Pest Management Project

Invasive pests, primarily weeds on approximately 51,000 plus acres of County-owned or managed natural resource lands are managed by the Natural Resource Management group under the Department of Parks and Recreation.

Most invasive weed management projects use non-chemical or bio-rational approaches such as hand removal, torching, prescribed burns, grazing, solarization, shading, use of biological agents, mowing, seed head cutting, and re-vegetation for desired plant species. The Parks and Recreation department continuously explores/adopts target specific and interagency participation to create sustainable solutions to invasive pest management.

Pesticide use (using only reduced risk pesticides) has been reduced to statistically insignificant amounts. In 2016, 99.99% of the total landscape under regional parks was managed without using pesticides including 25 parks out of 29 with no pesticide applications.

It should be noted that slight increase or decrease in acreage under chemical management from year to year is cyclic and need- based. However, it is safe to say that chemical intervention in invasive weed management projects throughout the parks system continues to be maintained at a very low level. Emphasis on using non-chemical alternatives throughout recreational areas of the parks has continued. These alternatives include:

Cattle Grazing

Carefully managed selective grazing is used to manage and promote perennial native grasses and wildflower stands in the parks. Grazing is used to reduce non-native invasive species such as yellow starthistle, Italian thistle, other broadleaf weed infestations and annual non-native grasses which compete with native annual wild- flowers and grasses.

Grazing is also used to reduce fire fuel loads and minimize wildfire risks from encroaching invasive weeds into grasslands such plants as coyote brush, chamise or greasewood and California sage.

Goat Grazing

Goats are used to reduce or eradicate invasive plants in areas where cattle cannot go or to eat plants that cattle avoid. These weed-mower goats at Ed Levin (10 acres) cleared poison hemlock, teasel, and coyote brush plus grasses on the dam face at Sandy Wool Lake.

The Goats at Grant Lake (26 acres) cleared poison hemlock, yellow starthistle, and teasel near the creek corridor and grasses around old buildings to protect them from wildfire. Goats along the Coyote Creek Trail (up to 63 acres) eat primarily yellow starthistle in fields where we have very serious infestations.

Prescribed Fire

Prescribed Fire

Prescribed burns are conducted with the guidance and assistance of CalFire and San Jose Fire and other fire districts at two of our parks. At Santa Teresa, a training burn in an area infested with coyote brush, teasel, milk thistle and annual grasses occurs in most years.
This year 10 to 15 acres were burned. At Grant Park, burns are used to control medusahead, yellow starthistle, coyote brush, and annual grasses. In June of this year, 36 acres were burned in the Halls Valley area of Grant Park.

Controlling Medusahead grass with Compost Tea

An experiment was conducted in Ed Levin Park this year to apply compost tea onto an area infested with Medusahead to evaluate if compost tea and its associated soil bacteria, fungus and mycorrhizae improve the soil conditions and degrade the Medusahead. Even though the treatment was not economically viable, significant drop (86%) in percent cover of Medusahead was noted in the area mowed and treated with compost tea.

Compost Tea Sprayer

Urban Organic Farming

One of the concepts that has won acceptance in the debate relating to agriculture, the environment and health, and the associated legislation, is the precautionary principle **'grow organic'.** According to this principle, responsibility for future generations demands that the natural basis for life must be preserved, and that irreversible damage must be avoided.

In 2014, the County Department of Parks and Recreation took a giant step forward in pesticide reduction and environmental health by opting for organic farming as the preferred choice for farm operations at Martial Cottle Park.

Martial Cottle Park

The former Martial Cottle Family Ranch is now Santa Clara County's newest urban park and working farm (covering 180 acres), a rare opportunity to bring fresh fruits and vegetables to the community directly from "field to fork."

The park also serves as a showcase for the latest in sustainable farming techniques and water conservation. It is a center for innovation and learning about organic farming, conservation, and food production as well as an ongoing community education center through cooperative partners

Jacobs Farms Site

such as UC Cooperative Extension Master Gardeners, 4H, Our City Forest, and City of San Jose Community Organic Gardens.

IPM Practices at Martial Cottle Park

Under an organic framing approach, management methods are carefully selected in order to restore, and then sustain ecological stability within the enterprise and the surrounding environment. Pest management methods are selected in the following order:

Bug-Vaccum

a) Identifying pests before any pest management practice is used, determine a cause of economic damage;

b) Monitoring pests and beneficial to determine a pest population's size and location, crop damage and natural enemy populations, and evaluate the efficacy of management practices;
c) Developing action thresholds to decide when a particular pest management practice is needed to prevent economic damage; and
d) Modify farm ecosystem management to encourage a habitat that is conducive to efficient pest control.

The use of conventional pesticides and synthetic fertilizers is not allowed in organic farming. IPM practices are selected based on principles of resistance, exclusion, prevention/protection and eradication.

A few examples of these practices are described in the following table:

IPM Principles	IPM Practices in Organic Farming
Resistance	• The use of cultivars known to be genetically resistant to several or specific pests. The use of methods to trigger innate protective responses of a crop to pests
Exclusion	• Pre-plant inspection of transplants for pests • Use of certified stock or seed • Weeding of pathogen hosts • Hedgerows used as trap crops for arthropod pests and as bankers Mass trapping of pests • Bird netting and repellent ribbon • Insect sticky traps
Protection/ Prevention	• Sanitation of tools, equipment, clothing, soil and application of pest-free amendments • Insect vector control: virus vectoring thrips and Tomato SWV • Selection of planting dates to reduce the incidence of the germination of pathogens • Canopy management for humidity • Soil moisture management for soil-borne pathogens • Preventative OMRI fungicides • Management of soil fertility for proper growth rate • Soil disinfestation to reduce weed seed bank and pathogens
Eradication	• Pruning of diseased or infested tissue hand weeding and cultivation • Compost and compost tea application • Biological Control: releases of arthropod natural enemies. • Planting of banker plants to increase and retain populations of native and introduced natural enemies.

An organic farm eco-system is managed by maintaining and enhancing soil fertility, promoting optimal biological activity within the soil, building the soils with natural inputs like compost, cover crops, worms, and healthy fungi. These rich soils encourage strong root growth, which leads to healthy plants. These healthy plans produce healthy fruit and abundant flavors. The rich, water-retaining soil at the park is perfect for dry-farming, which uses a small amount of water to get the plants started, and then very little once they are established. In addition to conserving water, the practice of dry farming produces exceptional tomatoes with irresistible, concentrated flavors.

Crop selection and rotation as well as recycling of plant and animal residues are practiced to help manage nutrient cycling. Water management, augmentation of beneficial insects are also practiced to encourage a balanced predator–prey relationship and the promotion of biological diversity and ecologically based pest management.

When the practices described above are insufficient to prevent or control crop pests, weeds and diseases, a biological or botanical substance or a substance allowed for use in organic farming are applied to prevent, suppress, or control pests.

Santa Clara Valley has a rich agricultural history. Land owned by public agencies offers many near-term opportunities to promote and expand agriculture for both health and heritage. Application of organic farming by the County can be seen as a dual strategy. First, to help expand agriculture wherever possible within County's natural resource management areas, and second to prevent environmental problems caused by land development and management. In providing the necessary resources and information, the IPM program is working toward a goal of fostering sustainable landscaping practices which is gradually taking root, growing and yielding progressive qualitative and quantitative results.

RESULTS

SUMMARY OF MEASURABLE RESULTS (2002-2016)

There are a variety of avenues available to measure the progress we are making in fulfilling our goals and objectives. A few measures, success stories and accomplishments of the last seven years are as follows:

a. Management Toolkit Examples of management tools developed are:	**b. Outreach Toolkit** Examples of outreach tools developed are:
• IPM Website • Web based IPM-Pesticide Use Reporting System (IPM-PURS) • Sustainable Landscaping Resource Guide • PDA based Structural IPM Inspection Tool • Regional IPM resource manual • IPM administrative guidelines and procedures • Facility Manager's and Building occupants IPM guidance manual and DVD • Vegetation management guidelines • Specific use guidelines for the protection of riparian corridors, waterways and corridors • Environmental preferable purchasing guidelines and RFP's for IPM related products and services • Reduced risk pesticide selection criteria and approved list of pesticides • Pesticide use exemption process • IPM quality system evaluation process • Proprietary contractors developed/based structural IPM electronic inspection data recording system • Grant facilitation, collaboration and cost analysis of various IPM projects • Subject matter specific IPM training and presentation templates	• Regional Park for Trials and Field Demonstrations • Regional IPM Alliance • Regional IPM Trust Fund • Regional IPM conference and training • Annual IPM and Pesticide Applicator Safety Education (IPM-PASE), • Pesticide Environmental Risk Analysis, Risk Indicator and Pesticide Selection Criteria workshop • Facility Managers and Building Occupant and Safety Coordinator IPM Awareness Trainings • Green Gardener Training Program Working Group • Bay-Friendly Landscaping and Gardening Coalition and Training • Providing assistance to other public agencies and concerned groups to set their IPM projects, policy and procedures • Educational outreach to various IPM user groups through presentations at various educational platforms. • Publications (IPM web site, newsletter, brochures, scientific papers, DVD).

c. Pesticide Use Reduction

- ✓ **Pesticide use in structures** has been significantly reduced and can be stated as "minuscule use (statistically insignificant) of reduced risk pesticides". Regular site inspections followed by building occupant education, sanitation, housekeeping and maintenance improvements, has been the cornerstone to alter many pest situations that would have otherwise resulted in pesticide applications.

- ✓ **Pesticide use in urban landscapes** has been significantly reduced and can be described as "minuscule use (statistically insignificant) of reduced risk pesticides". Since 2008, no pesticide was used in urban landscapes around County office complexes with an exception in 2012 when two pesticide applications were warranted, one to treat Magnolia scale infestation and the other case to remove an unwanted Bamboo species that was compromising pedestrian walkway in a facility.

- ✓ **Parks without Pesticide Use** In 2002, a pilot project was launched at Ed Levin Park (approx. 1,500 acres) using reduced risk pest management strategies, and eliminating use of all conventional pesticides, with a plan to adopt the model in all 29 Regional Parks

representing ~52139 acres of recreational, open space, and rangelands. In 2016, 24 parks were managed using non-chemical methods. In 2016, **99.99% of the total landscape under regional parks was managed without using pesticides.**

Weed Control*:* It should be noted that slight increase or decrease in acreage under chemical management from year to year is cyclic and need-based. However, it is safe to say that chemical intervention in invasive weed management projects throughout the parks system is maintained at a very low level. Emphasis on using non-chemical alternatives continued throughout recreational areas of the parks. These alternatives include chips,

disk, flail, hand hoe, rough, slope and turf mow, weed barriers (weed fabric, mulch), grazing, landscape maintenance and manual weeding.

Vertebrate Pest Control*:* Since 2003, no rodenticide was used in open space of 29 regional parks, except in 2016, the use of 60 lbs. of Aluminum Phosphide, a burrow fumigant to control ground squirrels in non-agricultural areas of the Martial Cottle Park. This use was warranted due to ground squirrel infestations that have moved beyond the scope of what is possible to control with non-chemical treatments. The infestations are priorities to deal with in Martial Cottle Park as they are an economic threat to the urban farm that is there. At Penetencia the infestation is within proximity to several areas of where human interaction is likely, including children's play areas. Due to the pests' ability to carry disease pathogens, it will be necessary to address the problem with diligence and thoroughness. Additional chemical intervention in the future may be warranted on a case-by-case basis.

In general, vertebrate control (e.g. ground squirrels, pocket gophers, feral pigs) throughout park system is also managed non-chemically.

Aquatic pest management*:* Since 2002, no pesticide has been used by Department of Parks and Recreation on County-owned ponds, lakes, and creeks to control aquatic weeds except what is reported under Arundo donax control project managed by Santa Clara Valley Water District.

- ✓ **Roadside Right-of-Way vegetation management**: Since 2005, **significant reduction (75%) in acreage** has been achieved under chemical management (use of herbicides) to control vegetation on Road's rights-of-way. The slight increase or decrease in acreage under chemical management from year to year is cyclic and need-based. Herbicide applications based on weed scouting has helped the Department to maintain these levels.

- ✓ **General Aviation Airports** did not use any pesticides in 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015 and 2016.

- ✓ **Use of 25 conventional pesticides** has been phased out, while the total number of pesticide applications and overall volume of reduced risk pesticides is also significantly reduced.

d. Collaborations with other government jurisdictions, industry

The Santa Clara County IPM program created and/or participated in unique collaborative involving public agencies, non-profits groups, and private industry for various projects. Subject-matter-specific talent and leveraged resources brought heightened awareness and developed consensus, to address environmental issues that go beyond city or County boundaries, to promote, pest prevention and minimize pesticide use and to outreach a greater community. The examples mentioned above reflect the multijurisdictional collaboration, coordination and implementation.

The Program conducted successful collaborative research, trial and demonstration work with public agencies, universities and private industry partners[4]. Several of the technologies currently in use as mentioned above under this program, are the positive outcomes of these collaborations.

Development of Customized IPM Training Programs: The Program developed customized training programs (management training) for pesticide applicators, IPM coordinators, project control specialists, facility managers, and safety coordinators, building occupants to let them understand their role in administrative/operational management of pest control projects.

Assistance to Other Public Agencies: The Program assisted other public agencies and concerned groups[5] providing/sharing information, for them to set their IPM projects, programs and policies, IPM procedural documents policies and procedures. This effort has assisted in bringing larger community under the IPM umbrella. Several agencies have successfully developed and implemented their own IPM programs and projects with programmatic assistance from the County IPM staff at no cost. A few examples are as follows:

The Regional IPM Alliance[6] and three successful Regional IPM conferences (collaborative work of over 45 public agencies and private industries[7]) are examples of a successful model of

[4] **Research Partners:** Department of Entomology-University of California, Riverside, Environmental Risk Analysis Program-Cornell University, Private Industry (Orkin Exterminating Inc., Eco-Smart Technologies Inc., KM-Pro Ant, Cleanlakes Inc., N-Tech Industries) and several City agencies in Santa Clara County and others in the San Francisco Bay Area.

[5] **Public Agencies and Concerned Groups**: (e.g. Contra Costa County, Safer Pest Control Project of Chicago, Parents for Safer Environment of Town of Moraga, Town of Saratoga and Los Altos Hills)

[6] **Regional IPM Alliance**: (Santa Clara County, Santa Clara Valley Water District, City of San Jose, Alameda County Clean Water Program, City of Morgan Hill, Orkin Exterminating Inc.)

[7] **Regional IPM Conference Partners**: A Growing Concern Landscape, Alameda, CA, Agra Quest, StopWaste.Org, Alameda Countywide Clean Water Program, Aquatic Environments Inc., BAICOR Inc., Bio-Integral Resource Center, Breast Cancer Action, California Department of Pesticide Regulation School IPM Program, CamCo, Canadian Center for Pollution Prevention, Center for Environmental Health, City of Morgan Hill, Santa Clara County, City of Oakland Environmental Services, Clean Lakes Inc, Contra Costa Clean Water Program, EcoSmart Technologies Inc., Fairfield-Suisun Sewer District Urban Runoff Management Program, Federation of Canadian Municipalities, Flame Engineering, Hedgerow Farms, Integrated BioControl Systems, Mark Plonsky - High Definition Images of Insects, Medallion Landscape Management Inc., Monsanto, Nisus Corporation, Orange Guard Inc., Orkin Extermination Company, Our Water Our World, Pestec Exterminator Company, Pesticide Alternatives of Santa Clara County (PASCC), Regional Water Quality Control Plant Operated by the City of Palo Alto for the East Palo Sanitary District, Los Altos Hills, Mountain View, Palo Alto and Stanford, Responsible Pest Management, Sacramento County, Sacramento Stormwater

sustainable technical/educational platform, developed under the leadership of Santa Clara County IPM program.

Outreach Work with Regional, National and International IPM Subject Matter Experts: The IPM Program actively participated in organizing symposium on Structural IPM at the Entomological Society of America conference 2011, and also assisted in organizing International IPM Symposium 2012 and 2015 to garner broader support for funding and resource development in non-production agriculture and non-agriculture IPM projects. Outreach at large conferences allows interaction with the regional, national and international pest management professional community including industry, government organizations and policy makers at these important technical platforms. The 7th IPM Symposium – "IPM on the World Stage-Solutions for Global Pest Challenges," held at Memphis, TN on March 27-29, 2012 attracted more than 630 research, education, government, industry and environmental and health professionals from 36 countries for three days of presentations, networking and organizational meetings on key pest management issues. The 8th IPM Symposium – "IPM: Solutions for a Changing World," was attended by nearly 450 professionals from 27 countries. The County IPM Manager Co-Chaired 2015 symposium, and also helped organize/moderate professional development session on "Applications of Geo-Technologies in Agricultural and Non-Agricultural IPM Decision Support."

Developing IPM Training Modules: In 2010 and 2011, the County IPM Program Manager participated on an advisory board for the UC IPM Statewide Program, to develop on-line continuing education training resources on protection of water quality in pesticide applications for pest control professionals.

The Green Gardener Training and Outreach Program[8], ***Bay-Friendly Landscaping Coalition***[9] , and ***Outreach to Nursery Outlets and local landscaper[10], Urban Pest Ant Management Project[11]*** , ***Nature's Inspiration Gardens Project[12], and*** several other IPM

Quality Partnership, San Mateo Countywide Storm Water Pollution Prevention Program, Santa Clara County IPM Program, Santa Clara Valley Urban Runoff Pollution Prevention Program, Santa Clara Valley Water District, Target Specialty Products, TruGreen Landcare, Union Sanitary District, University of California Cooperative Extension, Vallejo Sanitation and Flood Control District, Western Exterminator Company, Whitmire Micro-Gen, Woodstream Corporation – Professional Pest Management Products

[8] **Green Gardener Coalition Partners**: Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) agencies, EOA Inc. (the SCVURPPP program management firm), and curriculum advisors from Ecology Action of Santa Cruz, the Metropolitan Adult Education Program of San Jose, members of the Santa Clara County Master Gardener (SCCMG) Program

[9] **Bay Friendly Coalition Public Agency Partners:** California Plant Council, Alameda County Source Reduction and Recycling Board, Alameda Countywide Clean Water Program, Alameda County Water District, City of Fremont, City of Hayward, City of Napa, Alameda County Waste Management Authority, American Society of Landscape, Architects, Northern California Chapter, East Bay Municipal Utility District, Ecology Center, City of El Cerrito, City of Palo Alto, City of San Pablo, Life Garden, Marin Municipal Water District, North Marin Water District, Marin County Stromwater Pollution Prevention Program, Mt. View Sanitary District, Napa County Resource Conservation District, Napa Flood Control and Water Conservation District, City and County of San Francisco Department of the Environment, San Francisco Public Utilities Commission, San Francisco Estuary Project, The Watershed Project, University of California Agriculture and Natural Resources Department, University of California Cooperative Extension Urban Horticulture Dept., Zone 7 Alameda County and Water Conservation District, City of San Jose, City of Pittsburg, City of Walnut Creek, Contra Costa County Clean Water Program, San Mateo Countywide Water Pollution Prevention Program, Santa Clara County, West Contra Costa IWM Authority.

[10] **Outreach to Nursery Outlets and Local Landscapers**: Santa Clara Valley Urban Runoff Pollution Prevention Program

[11] **Urban Pest Ant Management Project**: CA DPR Pest Management Alliance Project

[12] **Nature's Inspiration Gardens by City of San Jose**: CA DPR Pest Management Alliance Project

outreach and training projects are examples of successful collaborative work of IPM Program participation in initiatives started or led by other agencies.

RECOGNITIONS AND AWARDS

The SCC IPM program has gained a wide publicity in its uniqueness and innovations. The County IPM Manager has been invited by several organizations (Local, National, and International) to share the program information for adoption by their management groups. A few noteworthy recognitions and awards are as follows:

- **Recognition by US EPA auditing team** During a cross program audit of SCC Storm Water Pollution Prevention Program, the auditing team reported: *"The County IPM Program was well implemented and organized….The IPM program has implemented innovative techniques for regular field activities….model for implementing and organizing other programs."*
- **Recognition by County Board of Supervisor and Environment Watch Group-Pesticide Alternatives of Santa Clara County** The County IPM Manager was recognized for his outstanding contribution to the advancement of Integrated Pest Management in Santa Clara County and the Bay Area.
- **Recognition by Department of Pesticide Regulations of California Environmental Protection Agency** The Department of Pesticide Regulations of California Environmental Protection Agency recognized Santa Clara County's IPM Program as **"California IPM Innovator for Year 2005"**, for its leadership and creativity in advancing the use of reduced-risk programs for pest management in urban settings. *"Santa Clara County has created a comprehensive IPM Program that serves as a model for other local governments,"* said Mary-Ann Warmerdam, Director of the California Department of Pesticide Regulation. *"Beyond collaborative pest management research and cutting-edge demonstration of reduced-risk pest management, Santa Clara backed IPM with a local ordinance and financial support, providing a foundation for continued success and setting an example for surrounding communities."*
- **Recognition by Green California Leadership Advisory Board** The Santa Clara County's IPM Program was recognized by Green California Summit Advisory Board to receive **"Green California Leadership Award 2009"** for its "Environmentally Preferable Procurement (EPP) of Integrated Pest Management (IPM) products and services" at Green California Summit held at Sacramento, CA, from March 16-19, 2009. *"The Award recognizes County's IPM Program progressive green approach towards EPP procurement of IPM product and services by identifying and procuring environmentally superior goods and services to reduce the environmental impact of pest management activities on County's owned or managed operations".*

In cooperation with the Advisory Board for the Green California Summit, the Green California Leadership Awards have been established as a forum to recognize outstanding environmental achievements in state and local governments. The Award highlights and celebrates successful public sector projects implemented in California that are publicly financed and executed, and have provided a measurable benefit to the natural or human environment.

❖ Recognition by International IPM Symposium Award Committee

Santa Clara County IPM Program was recognized by the International IPM Symposium Awards Committee to receive **"International IPM Symposium Award of Recognition 2009"**at the International IPM Symposium held at Portland, Oregon, from March 24-26, 2009. Individuals or teams who have made significant contributions to the advancement of integrated pest management (IPM) are chosen every three years for this award. Criteria for award include at least one extraordinary achievement that has increased IPM in agriculture, communities or natural areas, non-agricultural - such as schools and other institutions, recreational areas, municipalities, and waterways. *"Santa Clara County's IPM Program is recognized for increasing economic benefits of IPM activities, reducing potential human health risks through IPM and minimizing environmental impacts of pest management practices."*

❖ A "Model IPM Program"

In review of Municipal Regional Stormwater NPDES Permit Provision C.9, Pesticide Toxicity Control, Sections of the 2010 Annual Report, the California Regional Quality Control Board – San Francisco Bay Area Region has identified the County IPM Program as **"Model IPM Program".** The review included C.9.a (Integrated Pest Management (IPM) Policy or Ordinance), C.9.b (Implementation of IPM Policy or Ordinance), C.9.c (Require Contractors to Implement IPM), and C.9.h (Public Outreach).

❖ Recognition by United States Environmental Protection Agency

Santa Clara County IPM Program received **"PestWise Shining Star"** Award from the United States Environmental Protection Agency at the 7th International IPM Symposium at Memphis, TN held from March 27-29, 2012. The award recognizes accomplishments in implementing IPM principles. PESP is the Agency's premier partnership program dedicated to pest and pesticide risk reduction through IPM. The award is based on evidence of impacts in risk reduction, education/promotion, and economic benefits.

Recognition of collaborative projects with other jurisdictions/ programs

- **Recognition by California Storm Water Quality Association (CASQA)** **The Green Gardener Training Outreach project**[13] of Santa Clara Valley Urban Runoff Pollution Prevention Program – Pesticide Outreach Workgroup[14] has been selected as an **"Outstanding Regional Stormwater News, Information, Outreach, and Media Project"** by CASQA. The group was recognized at the CASQA annual conference held at Oakland, CA, from September 23-24, 2008. The CASQA is voluntary association, a leader since 1989. Its membership is composed of a diverse range of storm water quality management organizations and individuals, including cities, counties, special districts, industries, and consulting firms throughout the state. A large part of our mission is to assist water quality programs in California to learn collectively from the individual experiences of its members, to learn from the mistakes and avoid the pitfalls. It assists the State Water Resources Control Board (SWRCB) and municipalities throughout the state of California in implementing the National Pollutant Discharge Elimination System (NPDES) storm water mandates of the Federal Clean Water Act.

- **Recognition by Department of Pesticide Regulations of California Environmental Protection Agency** The Department of Pesticide Regulations of California Environmental Protection Agency recognized Santa Clara Valley Urban Runoff Pollution Prevention Program - Pesticide Outreach Workgroup - as **"California IPM Innovator for Year 2008".**

- **Recognition of Bay-Friendly Landscaping Coalition Work by Grow-California** At the 2011 Grow California Conference in Oakland, CA, the Bay-Friendly Landscaping Coalition work, of which the County is a member, was recognized among the "Top 40". "**The California Clean Tech 'Top 40' Innovators"** represent the 'best of the best' in California and by virtue of that, are critical to California's economy now and in the future.

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[13] **Green Gardener Training Outreach project**: Members of the group include the County IPM Manager, representatives from the IPM Pesticide Outreach Workgroup of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) agencies, EOA Inc. (the SCVURPPP program management firm), and curriculum advisors from Ecology Action of Santa Cruz, the Metropolitan Adult Education Program of San Jose, members of the Santa Clara County Master Gardener (SCCMG) Program.

[14] **Santa Clara Valley Urban Runoff Pollution Prevention Program** (SCVURPPP) is an association of thirteen cities and towns in the Santa Clara Valley, together with Santa Clara County and the Santa Clara Valley Water District. Program participants (Campbell, Cupertino, Los Altos, Los Altos Hills, Los Gatos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, Sunnyvale) share a common permit to discharge storm water to South San Francisco Bay, California. The Program is organized, coordinated and implemented in accordance with Memorandum of Agreement (MOA) signed by each agency or co-permittee. The Management Committee, consists of one designated representative from each Co-permittee, is the official decision-making body of the Program. In September 1997, the Management Committee retained EOA, Inc. to provide program management services.

CONCLUSION

Future Challenges and Direction

Sustainable Landscape Operations

In order to properly assess future decisions on landscape sustainability and pest control, it is necessary to have a good understanding of current landscape makeup (mulch, turf, ground cover, hardscape, etc.), plant palette and irrigation system.

Additionally, it is necessary to know what the current and future operational needs (type of labor, how much labor, type of material, what kind of material etc.) for County landscapes are and will be.

The Program staff is working with the Department of Fleet and Facilities to select a vendor to complete that assessment and provide the required information in visual form through PDF maps and through a database. The study will help the departments allocate adequate resources and implement sustainable landscaping projects (design, implementation, maintenance).

Wildlife Control in Parks

There are areas of Martial Cottle Park and Penetencia Creek Park have ground squirrel infestations that have moved beyond the scope of what is possible to control with non-chemical treatments. The infestations are priorities to deal with in Martial Cottle Park as they are an economic threat to the urban farm that is there. At Penetencia the infestation is within proximity to several areas of where human interaction is likely, including children's play areas. Due to the pests' ability to carry disease pathogens, it will be necessary to address the problem with diligence and thoroughness. Chemical intervention may be warranted on a case-by-case basis.

In general control of wildlife including gophers and ground squirrels at parklands, correctional facilities, and roads and airports is in need of a strategic approach and investments.

Rodent Control in Buildings

Increased rodent (rats and mice) activity in office complexes is another challenge we are facing due to variety of causative reasons including facility sanitation, housekeeping and maintenance. The complex cultural and sociological components of office complexes is also indirectly and in some cases directly causing rodent populations to proliferate. This will require concerted efforts towards on-going customer (building occupants and facility maintenance group) education - for them to help themselves resolve these pesky issues.

This includes segregating food storage away from work space, eating food only in designated breakrooms (not in work space), and daily removing garbage from receptacles etc., thus eliminating conditions that lend to the proliferation of rodents. The program staff is working closely with the Structural IPM contractor to identify these conducive conditions on a case-by-case basis, and seeking help from department staff and facilities maintenance group to help resolve rodent issues.

Bedbug Control in Buildings

Like other states and cities, IPM for Bed bugs is also becoming 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.

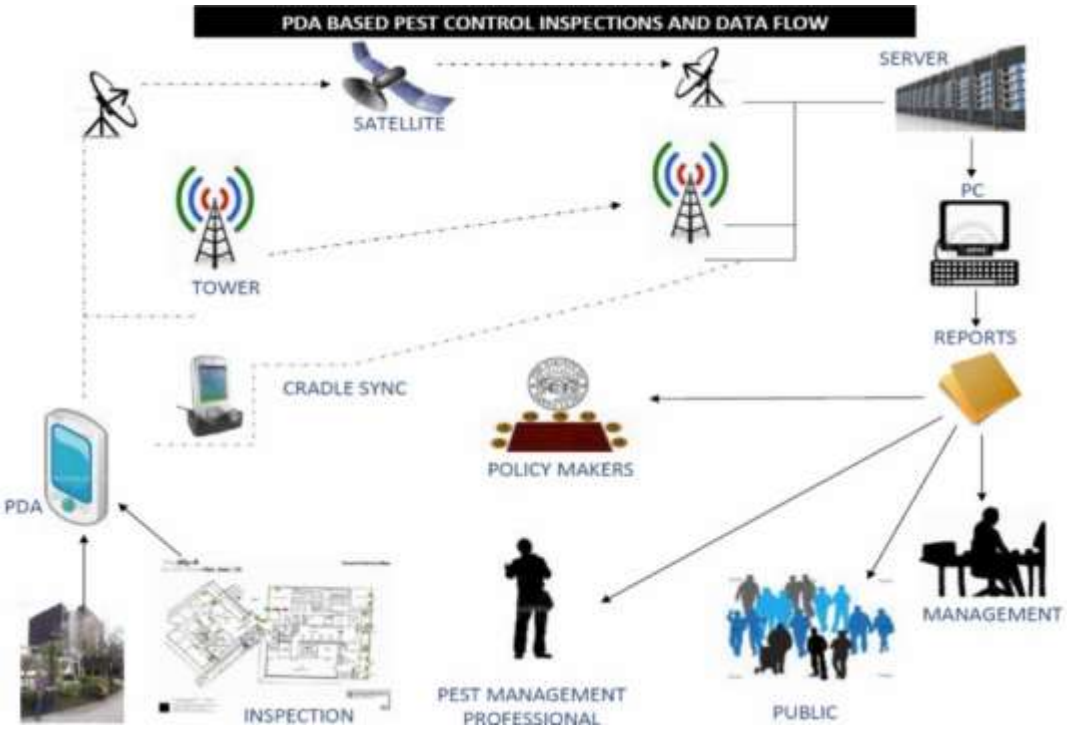
We are responding to this re-emerging pest through due diligence on a case by case basis and using non-chemical approaches, such as, conducting canine inspections to help identify localized bedbug activity, using vacuums, steam, and dry heat to control bedbug activity. The coordination at all levels has helped achieve the desired results. Additional funding will be required for on-going customer education and control efforts.

Tree Health-Care

The Program staff also worked with procurement to select a vendor that can provide consulting arborist services on an as-needed basis upon request by County departments. Services include consulting related to hazardous tree management, sustainable tree management training, and tree preservation and removal.

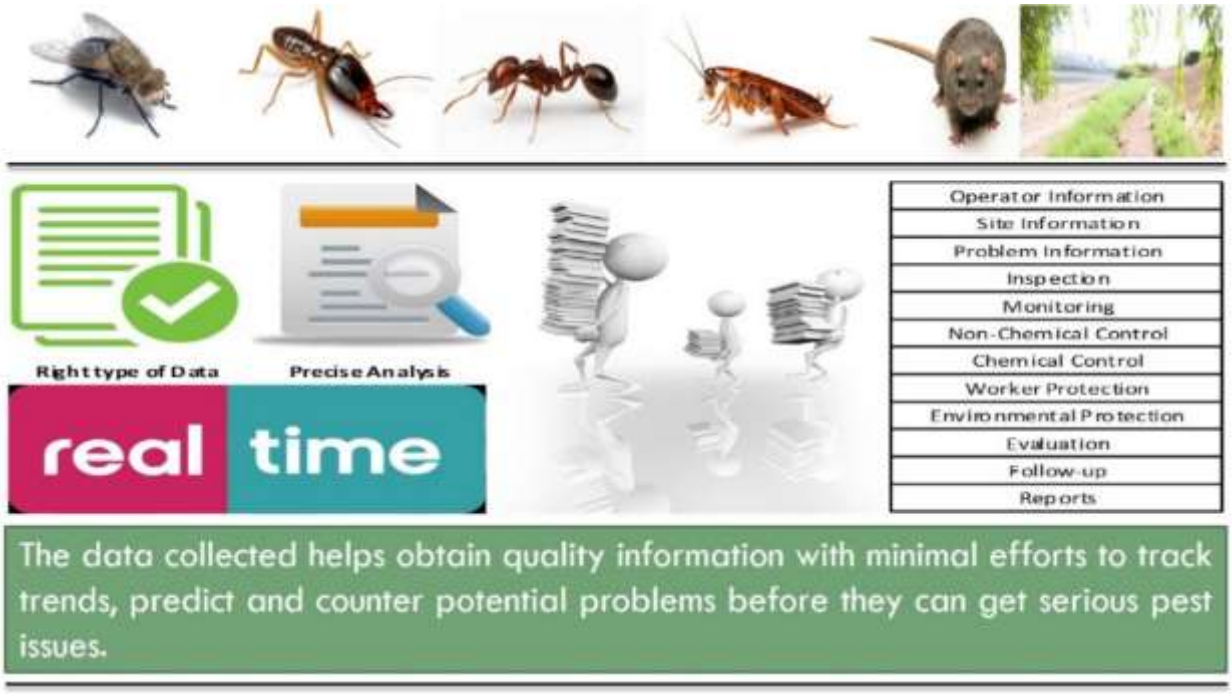
Additionally, this vendor will perform a tree inventory and assessment that includes all County owned or managed trees within the developed areas of County facilities and parks. Recent drought conditions have left County trees susceptible to pest and disease. This assessment will help identify hazardous County trees and create a tree inventory that will help calculate tree needs and benefits in the future. This assessment will include: GIS mapping coordinates, species, trunk size, height and spread, condition, hardscape damage, overhead utilities, heritage status and recommended maintenance.

IPM Spatial Monitoring and Data Management Project



Collection of IPM data not only helps to in the creation of effective integrated pest management plans, it is also required by the California Department of Pesticide Regulation. The project received funding through the Santa Clara County Business Information Technology Steering Committee.

The IPM Program staff is currently working with the Procurement and Information Services Department to seek a vendor to create a software as a service cloud solution. This solution will help address the need for field data collection and data management. It will also integrate spatial



monitoring for geolocation of IPM related data, such as site locations, infestation maps, pest control activities and endangered species zones, etc. Accurate information can help provide better risk assessments and illuminate pest management practices that are particularly problematic so they can be targeted for development of alternatives.

Shaping a Sustainable Future and Maintaining a Successful Culture

Since the days of the world's earliest inhabitants, pests and humans have co-existed. However, methods of keeping pests in their place have varied widely and evolved over time. Now more than ever, it is critical to make thoughtful and appropriate changes and sustain positive outcomes like Integrated Pest Management.

Constructing a multidisciplinary, sustainable pest management program requires an integrated operational approach. It is far more complex than setting up IPM project in agriculture. In farming, a farmer is the single decision maker and most of the decisions are singly based on economics. In non-agriculture setting there are multiple stakeholders and decision makers and economics is not the only driving factor. There are unique infrastructure complexities in a large organization such as Santa Clara County. Program sustainability requires the coordinated efforts of many individuals and groups, strong leadership, effective governing policy, resources, cooperation among user groups, and alliances among these groups and the wider community.

Continued success of the IPM Program will require effective and efficient management, continued adoption of best practices, and synergies with other sustainable development projects.

Benchmark surveys, regular inspections and monitoring, interoperable and immediately accessible digital information among stakeholders regarding pest traceability and prevalence, conducive-conditions, trends, and control practices are critical to address pest issues rapidly in a sustainable way.

Forming alliances and collaborations helps to leverage financial resources, and will increase efficiencies in use of staff, as well as data and information sharing. Larger groups will also have a greater ability to influence markets and research. Collaborations will also help with development of consistent messages and tools, and lower the possibility of conflicting practices in different communities. All of these factors will contribute to low-risk, sustainable, and affordable alternatives.

Outreach efforts will continue to be required for effective communication, research, trials, and demonstrations. Training will be necessary to overcome psychological and institutional barriers to changes in long established practices.

Some sustainable trends take time to establish themselves, while others set down roots in the marketplace and grow quickly. In both long and short term results, the IPM program has made a paradigm shift in how we look at pests and a pesticide free environment. Initiated in 2002, within nine years the County's IPM program is able to demonstrate noteworthy sustained achievements in how we think about pest management and pesticide pollution prevention.

This represents a significant stride toward building a greater, sustainable future.

ATTACHMENTS

1. PEST PROBLEMS ENCOUNTERED

A variety of pest problems were encountered on County properties since the implementation of IPM Ordinance as reviewed in tables below:

Pest Problems Encountered by FAF, HHS, SSA, ROADS and AIRPORTS AND LIBRARIES							
Pest Category	**Pest**	**FAF**	**HHS**	**SSA**	**ROADS**	**AIRPORT**	**LIB**
Weeds in urban landscapes	**Annual Broadleaf** (Low amaranth, California Burclover, Common Chickweed, Common knotweed, Field Madder, Little mallow, Black medic, Common purslane, Persian speedwell)	X	X	X	X	X	n/a
	Biennial Broadleaf (Bristly Oxtongue)	X	X	X	X	X	n/a
	Perennial Broadleaf (Mouseear chickweed, White clover, English daisy, Dandelions, Dichondra, Birdseye pearlwort, Pennywort, Broadleaf plantain, Buckhorn plantain, Common yarrow)	X	X	X	X	X	n/a
	Annual grasses (Annual bluegrass, Large Crabgrass, Smooth Crabgrass, Italian ryegrass, Goosegrass)	X	X	X	X	X	n/a
	Perennial grasses (Bermuda grass, Kikuyugrass)	X	X	X	X	X	n/a
Unwanted Plant or Tree	**Bamboo**	X					
Weeds in Right of Way	Marestail, Puncture vine, Russian thistle, Stinkwort, Scotch broom, Bull thistle				X		
Insects	**Ants**						
	Argentine ants	X	X	X	X	X	
	Carpenter ants						
	Pavement ants	X	X	X	X	X	

	Cockroaches						
	German cockroaches	X	X	X			
	American cockroaches	X	X	X			
	Oriental cockroaches	X	X	X			
	Flies						
	Houseflies	X	X	X			
	Fruit flies	X	X	X			
	Phorid flies	X	X	X			
	Fungus gnats X	X	X	X			
	Non-Biting midges			X			
	Termites						
	Subterranean	X	X	X	X	X	X
	Drywood	X	X	X	X	X	X
	Others						
	Fleas	X	X	X			
	Feral Honeybees	X	X	X			
	Ground nesting yellow jackets						
	Paper wasps	X	X				
	Psocids (Book Lice)						
	Bird mites	X					
Vertebrates	**Rodents**						
	Rat – Norway rat	X	X	X	X		
	Mice – House mouse	X	X	X	X		
	California Ground Squirrel	X		X	X		
	Pocket gophers	X	X	X	X		
	Moles					X	
	Birds						
	Feral Pigeon	X	X	X	X		
	English Sparrows	X	X		X	X	
	Starlings	X					
	Swallows	X				X	
	Gulls						
	Other Wildlife						
	Wild bores	X					
	Skunks		X				

Pest Problems Encountered by Department of Parks and Recreation			
Pest Category	**Pest**	**PRK Recreational Maintenance areas**	**PRK Natural Resource Management areas**
Plant Pests	**Plant Insects**		
	Aphids	X	
	Wooly aphids		X
	Tulip tree aphids		X
	Elm leaf beetle	X	
	Mites	X	
	Oak Moths	X	
	Thrips	X	
	Snails and Slugs	X	
	Ants	X	
	Beetles		X
	Sycamore tree scale		X
	Long horn borers		X
	Eucalyptus long horn borer		X
	Psyllids		X
	Tussock moth		X
	Plant Disease		
	SOD (Sudden Oak Death)	X	X
	Leaf Spot	X	
	Blight	X	
	Sooty Mold	X	
	Armilaria	X	X
	Phytothora	X	X
	Anthracnose	X	X
	Twig and branch blight		X
	Pitch canker		X
	Ganoderma spp.		X
	Arbutus canker		X
	Powdery mildew		X
	Dutch Elm Disease		X
	Wetwood or Slime flux		X
	Abiotic Factors		
	Water excess or deficiency		X
	Mineral deficiency		X
	Frost		X
	Snow load weight		X
	Sunscald		X
	Sunburn		X
	Air pollution		X

	Lightening		X
	Soil Compaction		X
	Poor Cultural Care		X
	Mowing wounds		X
	Irrigation piping		X
	Construction		X
	Poor pruning		X
	Not cleaning tools (fungus vector)		X
	Park visitors (wounding and compaction)		X
Weeds in Recreational landscapes and Natural Resource Management Areas	**Invasive**		
	Russian thistle	X	X
	Bull thistle	X	X
	Canadian thistle	X	X
	Mustard	X	X
	Puncturevine	X	
	Yellow star thistle		X
	Cape Ivy		X
	Medusahead		X
	Tree of Haven		X
	Pepperweed/White top		X
	Dittrichia		X
	Arundo Donex		X
	Foxtail		X
	Sow thistle		X
	Pao annua		X
	French broom		X
	Barbed goat grass		X
	Purple star thistle		X
	Milk thistle		X
	Black mustard		X
	Italian thistle		X
	Poisonous Weeds		
	Poison oak	X	
	Aquatic Weeds		
	Algae	X	
	Sago pond weed	X	
	Watermilfoil	X	
	Coontail	X	
Insects in Recreational Park areas	**Ants**		
	Argentine ants	X	X
	Carpenter ants	X	X
	Flies		

	Houseflies	X	
	Blowflies	X	
	Fruit flies	X	
	Phorid flies	X	
	Fungus gnats	X	
	Stable flies	X	
	Termites		
	Subterranean	X	
	Drywood	X	
	Others		
	Fleas	X	
	Feral Honeybees	X	
	Ground nesting yellow jackets	X	
	Paper wasps	X	
Vertebrates in Recreational Park areas	**Rodents**		
	Rat – Norway rat	X	
	Mice – House mouse	X	
	California ground squirrel	X	
	Pocket gophers	X	
	Moles	X	
	Birds		
	Feral Pigeon	X	
	English Sparrows	X	
	Starlings	X	
	Swallows	X	
	Gulls	X	
	Other Wildlife		
	Wild bores	X	

2. PESTICIDE USE ANALYSIS (2002-2016)

Fig 1 Structural IPM Project: General Pest Control- Liquid Formulations (2005-2016)

Fig 2 Structural IPM Project: General Pest Control - Dry Formulations (2005-2016)

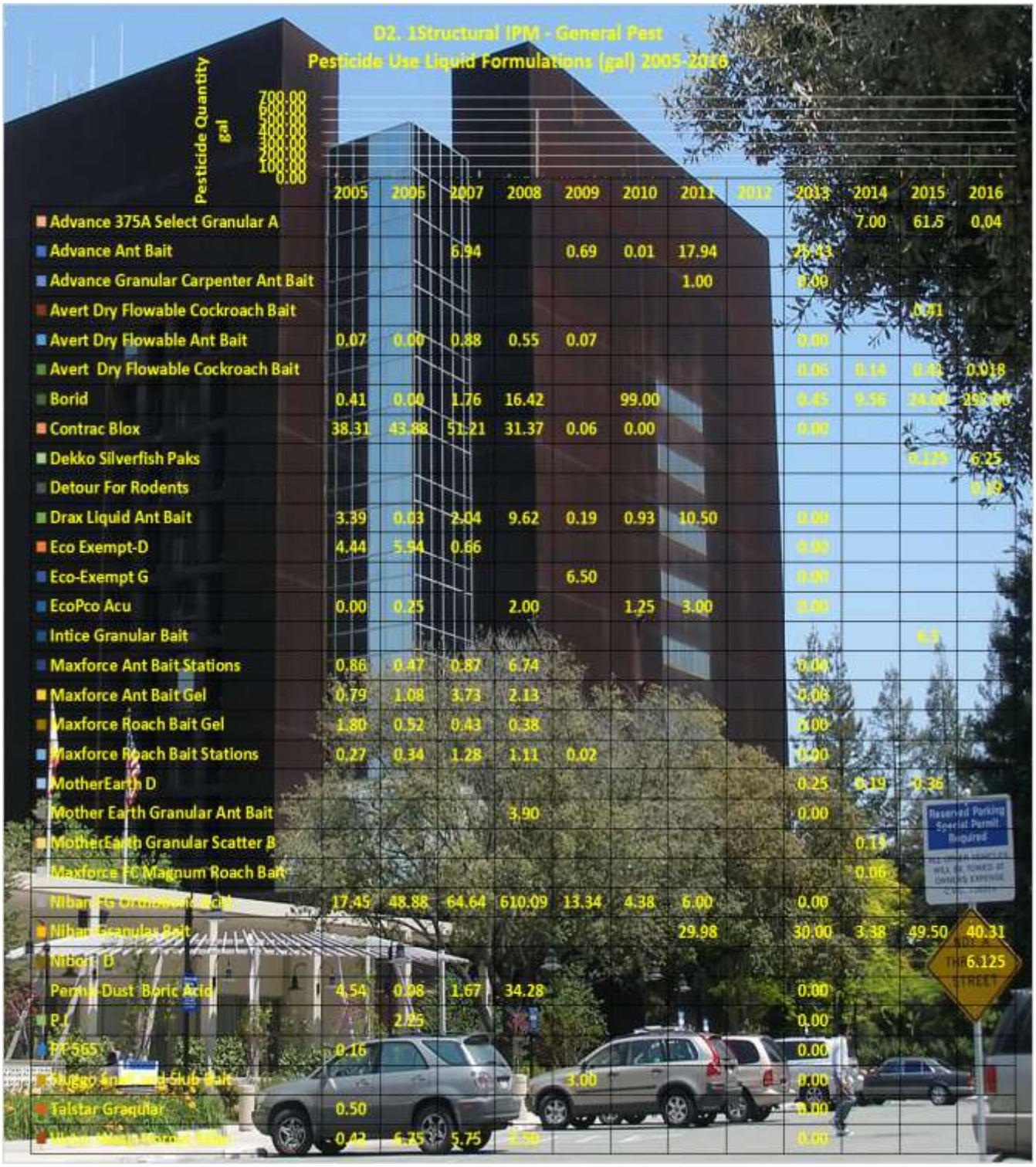
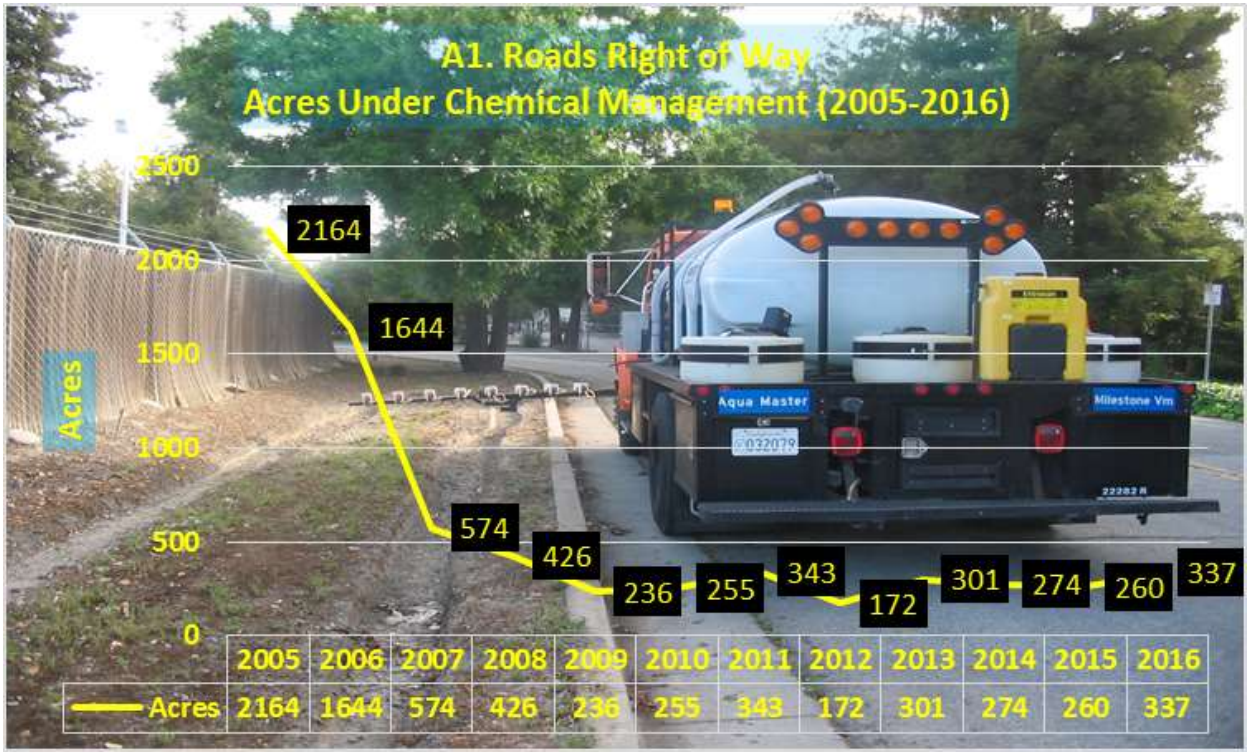
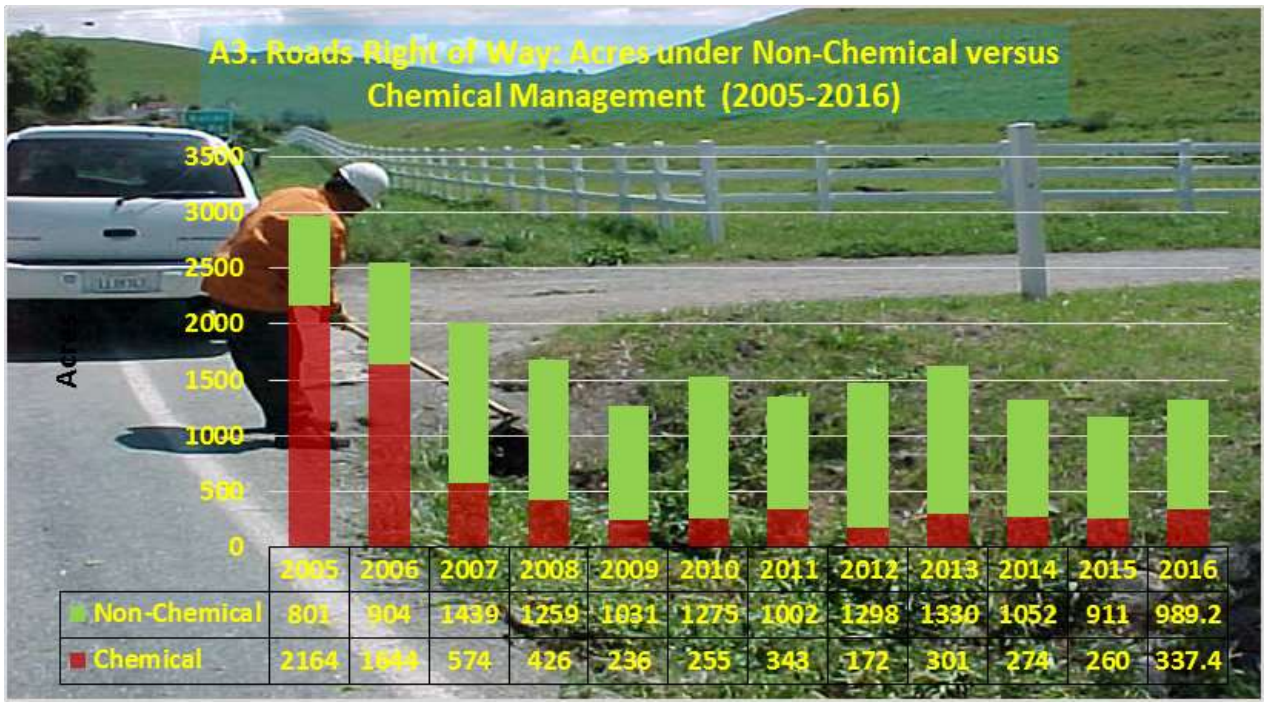


Fig 3 Structural IPM Project: Termite Control (2003-2016)

	2003	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Vikane (lb)	185	30.9	285	18	2	0	0	0	0	0	0	0	0
Precise (gal)		0.68	0.62	0.11	2.49	0	0	0	0	0	0	0	0
Termicon Monitors (#)		52	0	0	0	0	0	0	0	0	0	0	0
Termidor (gal)		0.07	0	0	0	0	0	0	0	0	0	0	0
Tim-bor	0	0	0	0	0	0	0	0	0	0	0	0	0.01

Fig 4 (Plot A1-A4) Integrated Vegetation Management Project: Road's Right of Way: Acres under Chemical versus Non Chemical Management (2005-2016)




A3. Roads Right of Way: Acres under Non-Chemical versus Chemical Management (2005-2016)
3500
3000
2500
2000
1500
1000
500
0
Acres
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Non-Chemical 801 904 1439 1259 1031 1275 1002 1298 1330 1052 911 989.2
Chemical 2164 1644 574 426 236 255 343 172 301 274 260 337.4

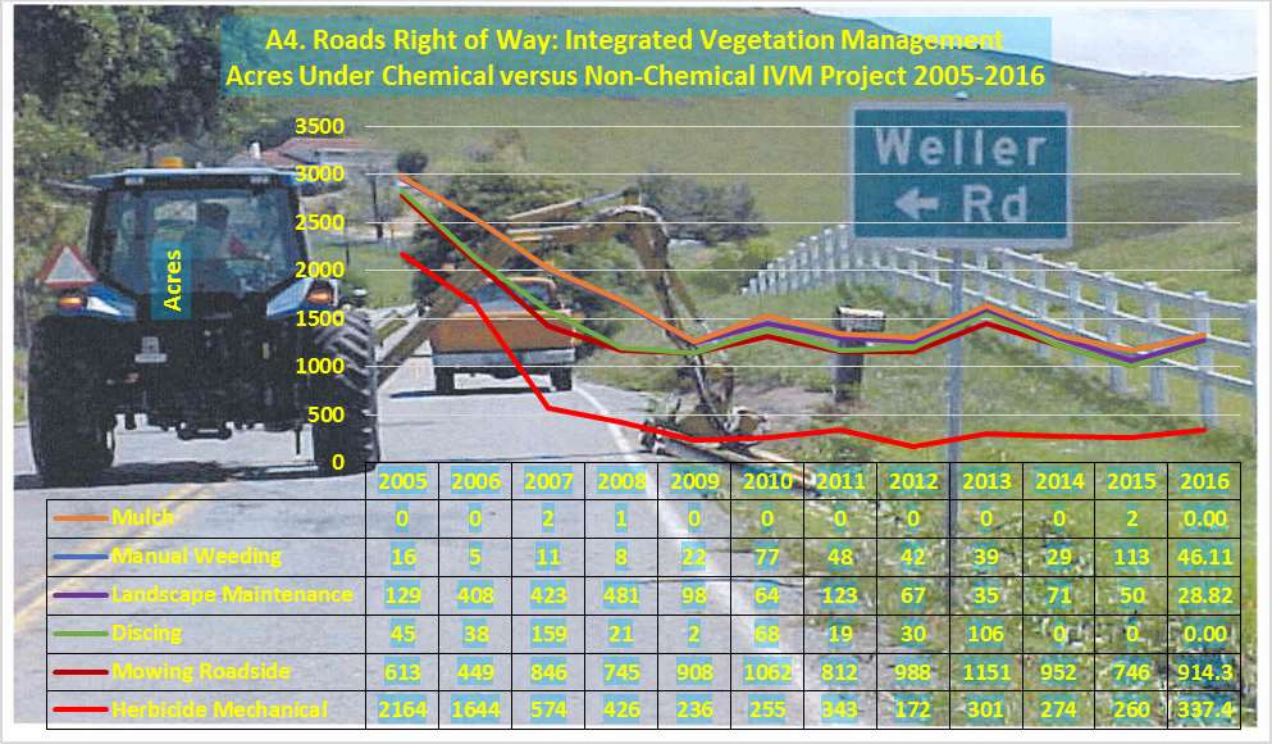

A4. Roads Right of Way: Integrated Vegetation Management
Acres Under Chemical versus Non-Chemical IVM Project 2005-2016
3500
3000
2500
2000
1500
1000
500
0
Acres
Weller
Rd
2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Mulch 0 0 2 1 0 0 0 0 0 0 2 0.00
Manual Weeding 16 5 11 8 22 77 48 42 39 29 113 46.11
Landscape Maintenance 129 408 423 481 98 64 123 67 35 71 50 28.82
Discing 45 38 159 21 2 68 19 30 106 0 0 0.00
Mowing Roadside 613 449 846 745 908 1062 812 988 1151 952 746 914.3
Herbicide Mechanical 2164 1644 574 426 236 255 343 172 301 274 260 337.4

Fig 5 Integrated Vegetation Management Project: Road's Right of Way: Pesticide Use (2003-2016)

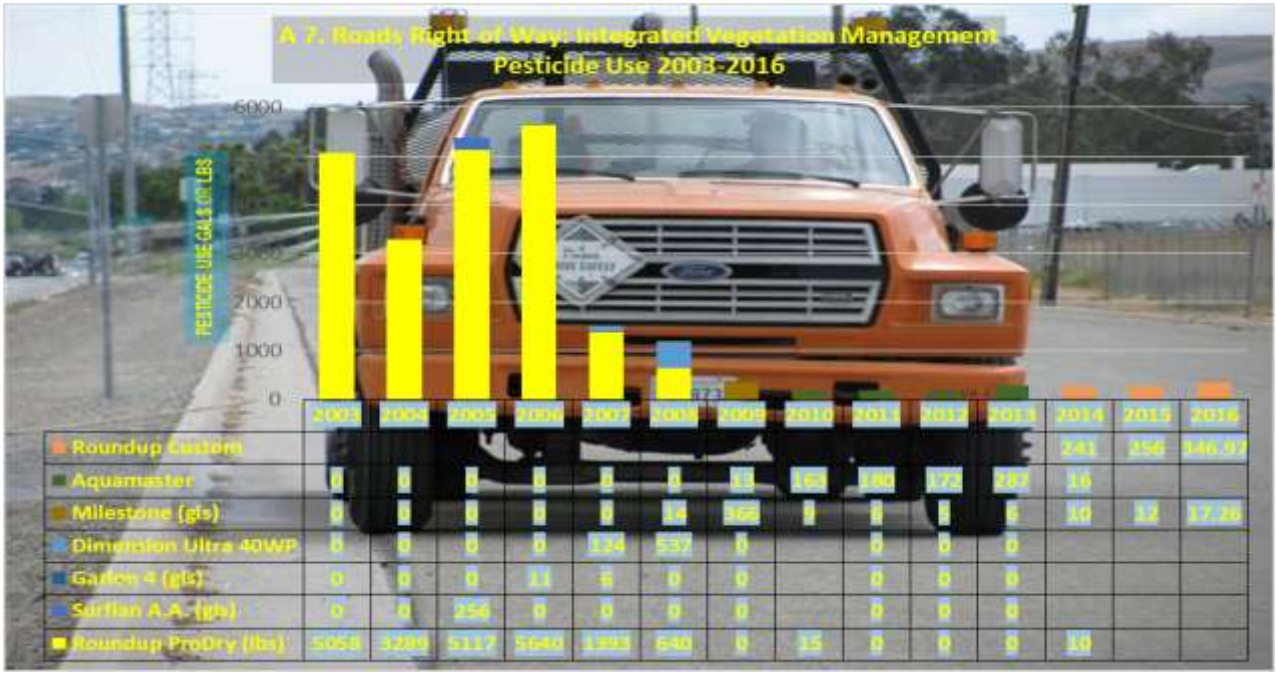


Fig 6 Integrated Vegetation Management at Regional Airports (2002-2016): (Reid Hillview, Palo Alto and South County Airports)

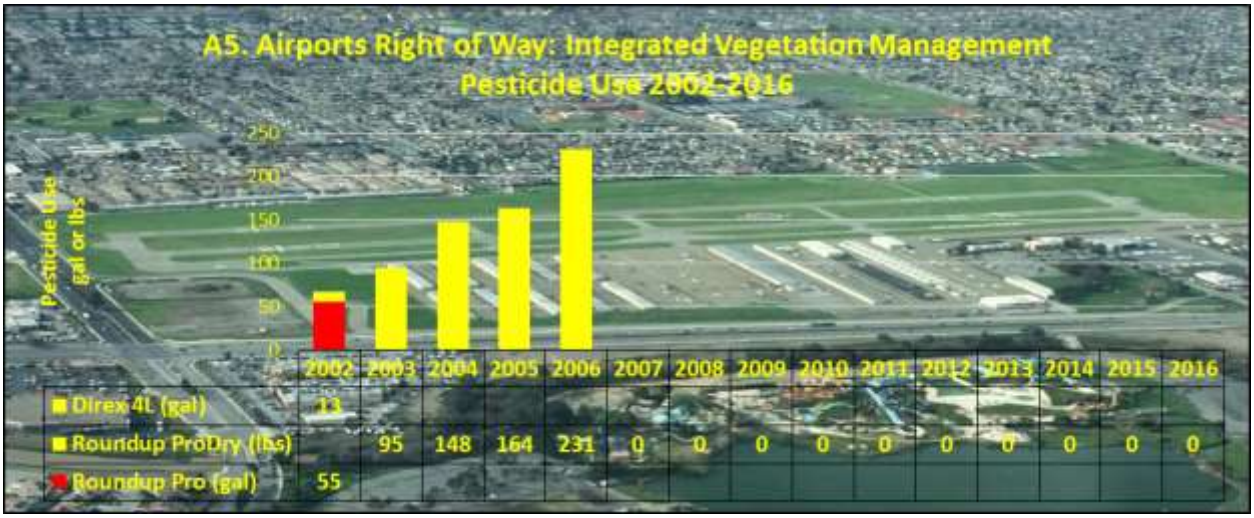
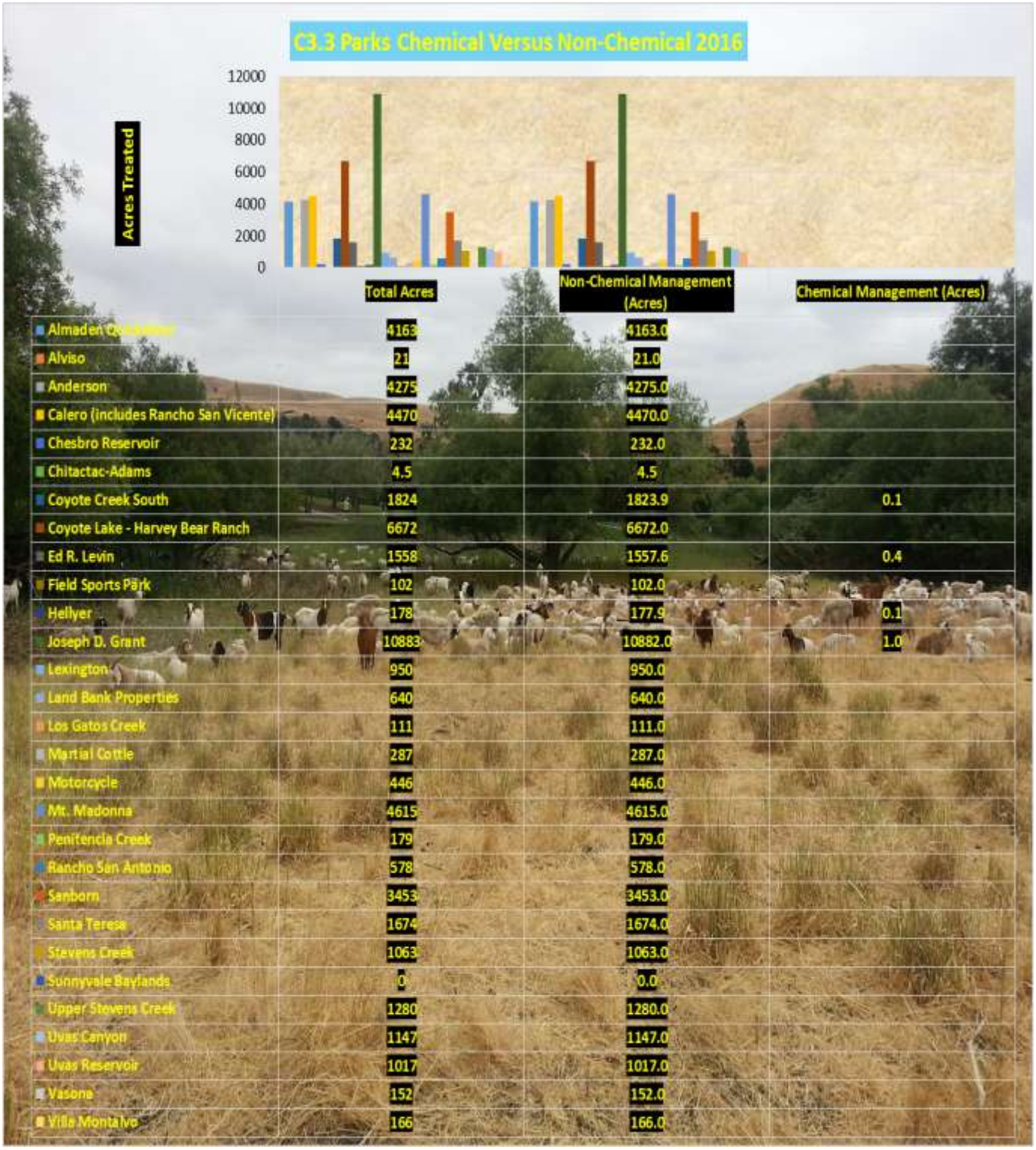


Fig 7.1 Department of Parks and Recreation IPM Project: Percent of Total Acres under Chemical Management (2016)



	Total Acres	Non-Chemical Management (Acres)	Chemical Management (Acres)
Almaden [illegible]	4163	4163.0	
Alviso	21	21.0	
Anderson	4275	4275.0	
Calero (includes Rancho San Vicente)	4470	4470.0	
Chesbro Reservoir	232	232.0	
Chitactac-Adams	4.5	4.5	
Coyote Creek South	1824	1823.9	0.1
Coyote Lake - Harvey Bear Ranch	6672	6672.0	
Ed R. Levin	1558	1557.6	0.4
Field Sports Park	102	102.0	
Hellyer	178	177.9	0.1
Joseph D. Grant	10883	10882.0	1.0
Lexington	950	950.0	
Land Bank Properties	640	640.0	
Los Gatos Creek	111	111.0	
Martial Cottle	287	287.0	
Motorcycle	446	446.0	
Mt. Madonna	4615	4615.0	
Penitencia Creek	179	179.0	
Rancho San Antonio	578	578.0	
Sanborn	3453	3453.0	
Santa Teresa	1674	1674.0	
Stevens Creek	1063	1063.0	
Sunnyvale Baylands	0	0.0	
Upper Stevens Creek	1280	1280.0	
Uvas Canyon	1147	1147.0	
Uvas Reservoir	1017	1017.0	
Vasona	152	152.0	
Ville Montalvo	166	166.0	

Fig. 7.2 Department of Parks and Recreation IPM Project: Total Acres under Chemical versus Non-Chemical Acres (2016)

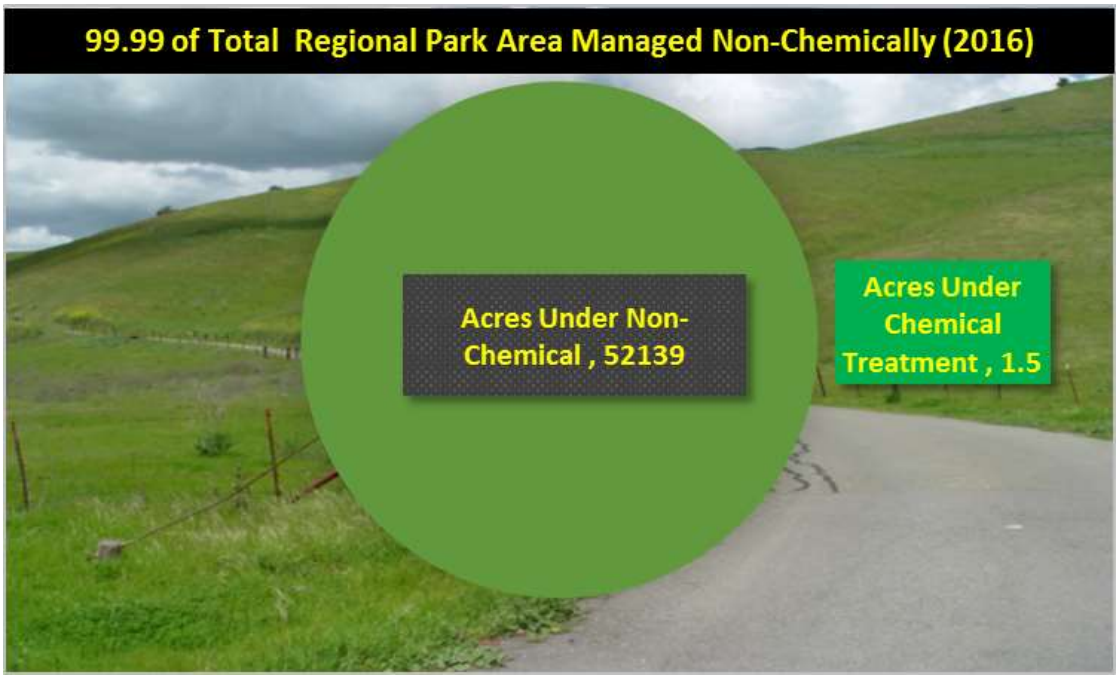
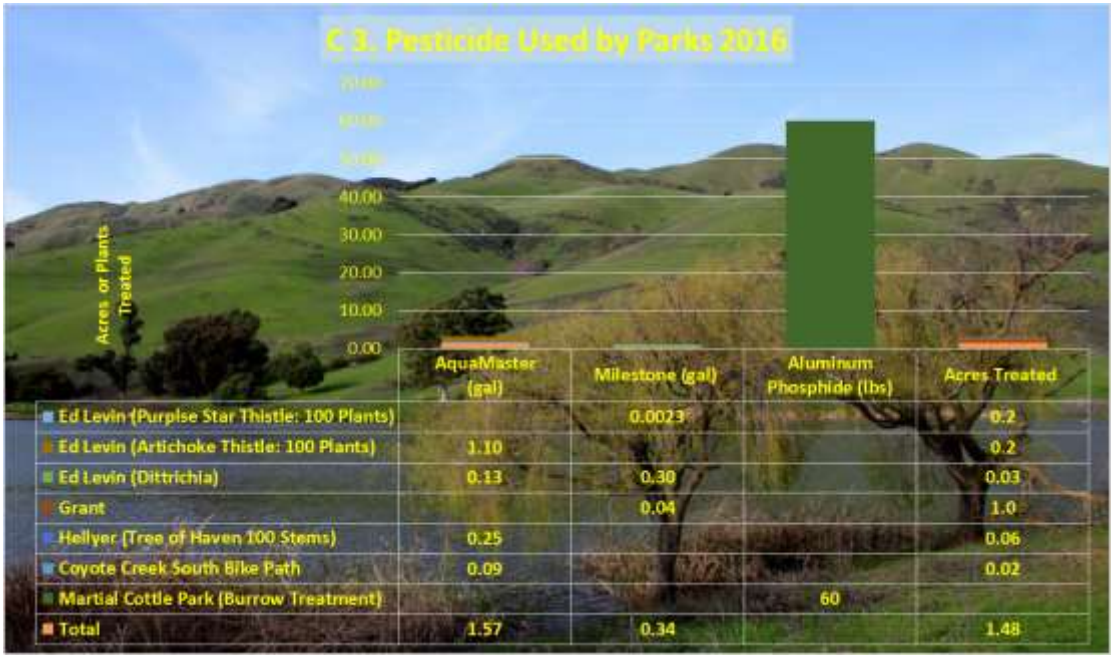


Fig 7.3 Department of Parks and Recreation: Acreage under Chemical Management (2002-2016)

Fig 8 Department of Parks and Recreation IPM Project: Pesticide Use in Invasive Weed Management (2016)



	AquaMaster (gal)	Milestone (gal)	Aluminum Phosphide (lbs)	Acres Treated
Ed Levin (Purplse Star Thistle: 100 Plants)		0.0023		0.2
Ed Levin (Artichoke Thistle: 100 Plants)	1.10			0.2
Ed Levin (Dittrichia)	0.13	0.30		0.03
Grant		0.04		1.0
Hellyer (Tree of Haven 100 Stems)	0.25			0.06
Coyote Creek South Bike Path	0.09			0.02
Martial Cottle Park (Burrow Treatment)			60	
Total	1.57	0.34		1.48

Note: All herbicide applications were targeted for invasive weed management (see plot C3). **No herbicide was applied on the recreational turf and landscape areas and ponds/lakes.**

Fig 9 Number of Parks without Pesticide Use (2002-2016)

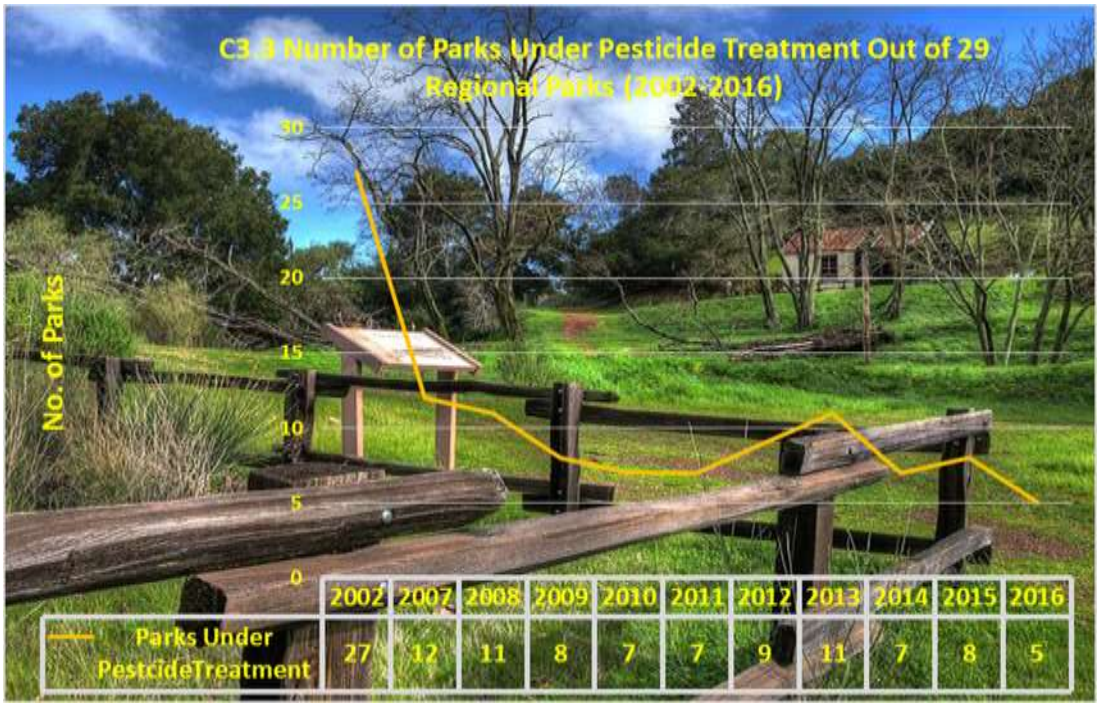


Fig 10 Urban Turf and Landscape Pest Management -All Facilities (2002-2016)

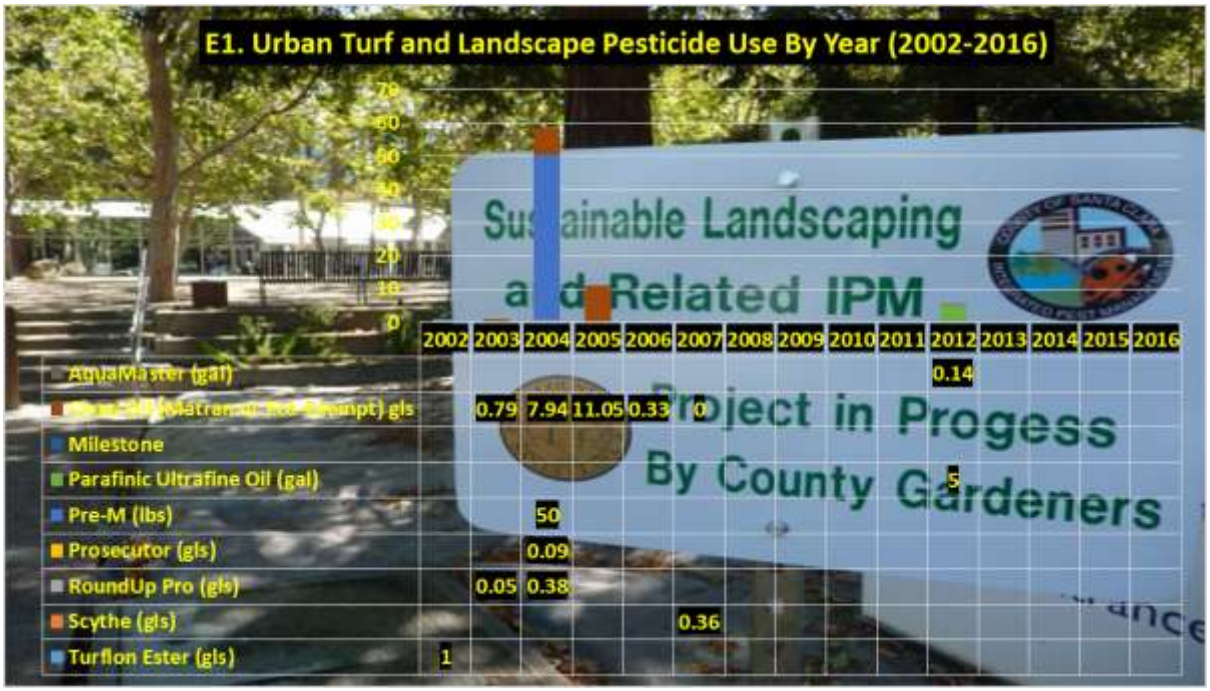


Fig 11 California Ground Squirrel Control around South County Animal Shelter: Pesticide Use by Department of Agriculture (2006-2016)

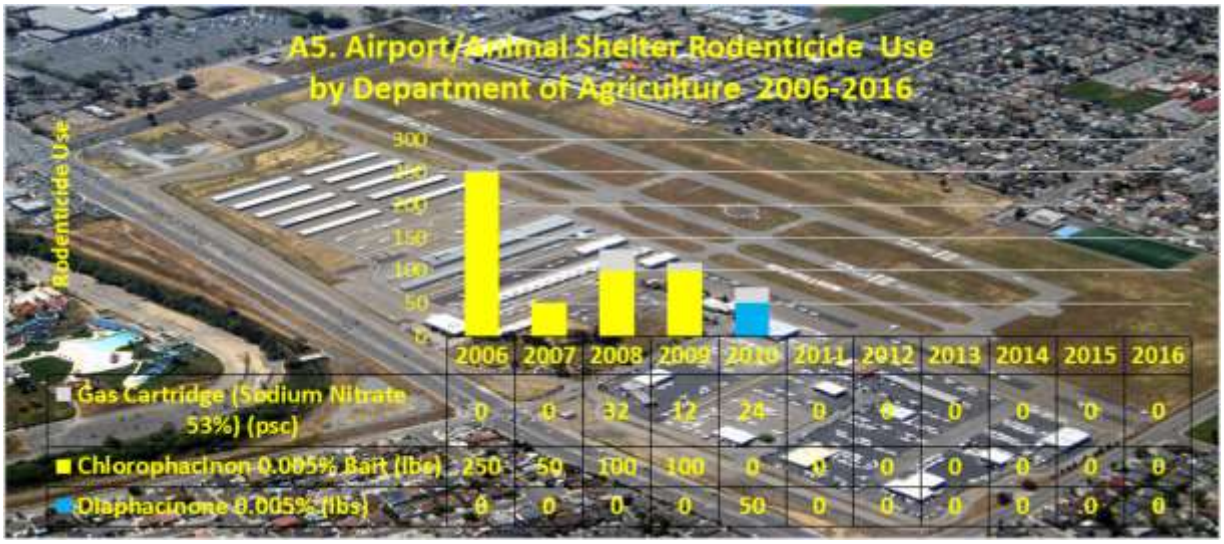
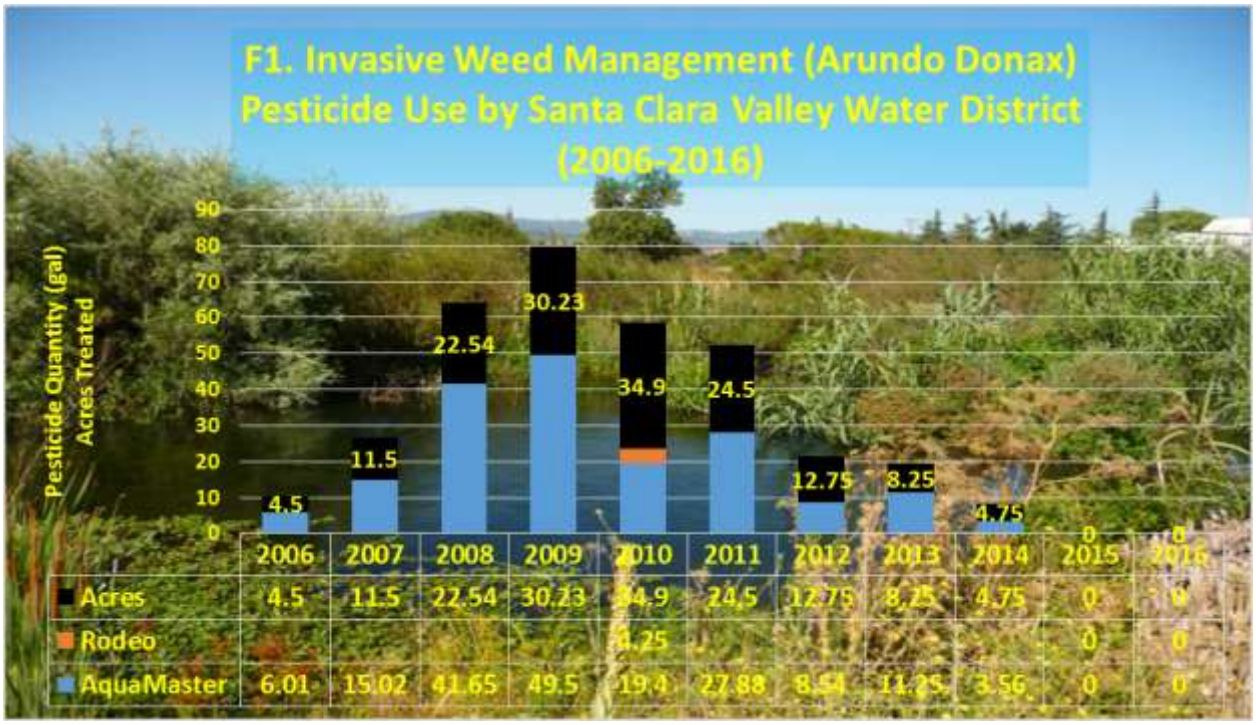


Fig 12 Invasive Weed Management (Arundo Donax): Pesticide use by Santa Clara Valley Water District on County Properties (2006-2016)



Arundo Donax control at Cayote Creek

3. CONTROL OF ARUNDO DONAX ON SANTA CLARA COUNTY PROPERTY

UPDATE FOR 2014 SEASON

By Rick L. Austin, Vegetation Programs Specialist II, Santa Clara Valley Water District
June 15, 2014

The purpose of this brief report is to update ongoing invasive species control activities on property owned by Santa Clara County. The Santa Clara Valley Water District entered into a license with the County in 2005 to control Arundo donax (Giant Reed) on specific properties owned by the county. Most of the work is located on Coyote Creek between Anderson Dam in Morgan Hill to Hellyer Park in San Jose. Limited work has been done on Llagas Creek in San Martin and on Los Gatos Creek in Los Gatos. The work on Llagas Creek has been minimal of late due to an upcoming flood control project in the control area and the requirement to coordinate control efforts for ongoing Arundo management.

Work in the 2014 control season consisted of re-treatment of prior control areas on Coyote Creek between Anderson Dam and Hellyer Park. All initial control efforts had been completed in 2011. Re-treatment was done on all re-growth areas throughout the project reaches in 2012 as well as some limited work in 2013. District staff and the contractor did a pre-project survey in early summer of 2014 to evaluate control efficacy from the previous year's work. The District's contractor did limited control work in August of 2014. Work was very limited due to the limited re-growth to the target species due to the protracted drought. Surveys were done by a qualified biologist prior to any work being undertaken. Once an area was cleared, the contractor was able to go in to perform the work.

Control consisted primarily of foliar application of herbicide to actively growing Arundo donax. The technique used is called a low volume foliar application. This technique has shown to be the most effective method to control Arundo (initial control and re-growth). In some locations, crews did limited hand or mechanical removal of dead biomass to provide access to the target vegetation. The contractor was able to do an early treatment this year. There have been times where a follow up late treatment was desirable but, due to the severely stressed condition of the plant, re-treatment was not part of the 2014 control strategy. A total of 4.75 acres of Arundo donax was treated throughout the overall project area in 2014. Treatment was done using 3.56 gallons of Aquamaster herbicide. No control is planned for 2015.

No work was done on other county properties and no work outside of Coyote Creek was included in the 2014 or 2015 work plan. Work was not scheduled to occur on Llagas Creek in San Martin and on Los Gatos Creek in Los Gatos within Vasona County Park. Llagas Creek has an upcoming flood control project that will address some of the Arundo in that area. Los Gatos Creek through Vasona Park has very low re-growth and did not reach a treatment threshold. These conditions, as well as other factors, made follow-up control a lower priority.

There has been very positive research in an effective bio-control agent for Arundo donax. District staff was able to meet with Dr. Patrick Moran as he visited Santa Clara County in search of potential pilot sites for release of two parasitic insects that have shown good results on Texas control sites. Dr. Moran worked with District staff to identify sites that met release criteria and is continuing to develop an initial release plan. One site within the County project area has high potential as a release site. There is a good deal of optimism that, should these insects prove successful, they will be an excellent tool for the ongoing management of control sites where target densities have been reduced. This would further reduce the ongoing reliance on chemical pesticides for long term management of this invasive species. District staff will continue to work with Dr. Moran in his Northern California planning effort and staff will propose that project funding be made available for some initial work.

Projected work for 2016 will consist of monitoring of all previously treated sites where re-growth is active. This will include all Coyote Creek sites from Anderson Dam to Hellyer Ave. It will also include the Llagas Creek sites in San Martin as well as the Los Gatos Creek sites in Vasona Park as these were not addressed last year. Work will be planned as field conditions meet treatment thresholds.

All work will be addressed with the following consideration in mind: Arundo donax, like other vegetation, suppresses many of its vascular functions in response to extreme drought. With the ongoing drought, we fully expect to see significant drought stress on target vegetation. Our experience has been that these conditions do not offer a good opportunity for chemical control as there is little to no translocation of the herbicide into other parts of the plant. In situations where these conditions exist, we will elect not to treat as it is a waste of resources and is contributing herbicide to the environment with no reasonable benefit. We will look at mowing some of these areas as an alternative. While this does not provide the same level of control, it is an effective alternative for ongoing management as it further reduces carbohydrate stores and impedes the plants ability to regenerate. It is a very effective IPM measure in these circumstances.

Future work will depend heavily on whether the projected rainfall occurs in the winter of 2015/16.

4. PARKS: LIST OF INVASIVE WEED MANAGEMENT PROJECTS 2016

Parks: NRM
Invasive Weed Management

Year 2016

Table 1. Department of Parks and Recreation: Invasive Weed Management Projects 2016

Region	Park	Location	acres	goals (Control)	Target Weeds	Cattle Grazing	Bio control	Herbicide	Burning	Torching	Seeding	Manual	Mowing	Goats	Disking	Shading
Region 1																
	Coyote Creek Trail		63	yellow starthistle	yellow starthistle									x		
	Ed Levin		10	poison hemlock, teasel, and coyote brush plus grasses	poison hemlock, teasel, and coyote brush plus grasses									x		
	Grant		26	poison hemlock, yellow starthistle, and teasel	poison hemlock, yellow starthistle, and teasel									x		
	Grant		32	Control invasives, promote native plants	YST, Italian Thistle	x										
	Grant		192	Control invasives, promote native plants	Invasive weeds				x							
Region 2																
	Santa Teresa		7	Control invasives, promote native plants	YST, Italian Thistle	x										
	Santa Teresa		15	Control invasives, promote native plants	Invasive weeds				x							

5. PARKS: SUSTAINABLE TREE MANAGEMENT PROJECT 2016

Santa Clara County Parks
Hazardous Tree Management
Year 2016

Site	Plant Name	If Non-Chemical Methods Used, provide name or description	Number of Trees Removed	Number of Trees Saved
Almaden Quick Silver	2 Stem Blue Oak	Cut tree part		1
Almaden Quick Silver	2 Stem Valley Oak	Raise Crown		1
Almaden Quick Silver	2 Stem White Popular	Remove	1	
Almaden Quick Silver	3 Stem Coast Live Oak	Remove	1	
Almaden Quick Silver	5 Stem Sycamore	Cut tree part		1
Almaden Quick Silver	6 Stem Valley Oak	Clean Crown		1
Almaden Quick Silver	5 Stem Coast Live Oak	Cut Tree Part, Crown Cleaned		1
Almaden Quick Silver	6 Stem Bay	Remove	1	
Almaden Quick Silver	7 Stem Bay Tree	Remove	1	
Almaden Quick Silver	Blue Oak	Crown cleaned		1
Almaden Quick Silver	Blue Oak	Remove	1	
Almaden Quick Silver	Coast Live Oak	Add mulch around tree to drip line		1
Almaden Quick Silver	Coast Live Oak	Crown cleaned		1
Almaden Quick Silver	Coast Live Oak	Crown cleaned, Reduce Crown		1
Almaden Quick Silver	Coast Live Oak	Remove	1	
Almaden Quick Silver	Coast Live Oak	Remove	1	
Almaden Quick Silver	Coast Live Oak	Remove	1	
Almaden Quick Silver	Coast Live Oak	Remove	1	
Almaden Quick Silver	Cypress	Crown cleaned		1
Almaden Quick Silver	Cypress	Remove	1	
Almaden Quick Silver	Cyress	Remove	1	
Almaden Quick Silver	Eucalyptus	Remove table away from tree fall zone		1
Almaden Quick Silver	Prune	Crown Cleaned		1
Almaden Quick Silver	Prune	Remove	1	
Almaden Quick Silver	Prune	Remove	1	
Almaden Quick Silver	Prune	Remove	1	
Almaden Quick Silver	Prune	Remove	1	
Almaden Quick Silver	Prune	Cut tree part		1
AQ- Casa Grande	2 Stem Black Walnut	Crown cleaned		1
AQ- Casa Grande	2 Stem Black Walnut	Crown Cleaned		1
AQ- Casa Grande	2 Stem Mex Fan Palm	Crown Cleaned		1
AQ- Casa Grande	2 Stem Mex Fan Palm	Crown cleaned		1
AQ- Casa Grande	2 Stem Privet	Remove	1	
AQ- Casa Grande	2 trees E Magnolia	Remove	1	
AQ- Casa Grande	2 trees E. Magnolia	Remove	1	
AQ- Casa Grande	3 Stem Ginko	Crown cleaned		1
AQ- Casa Grande	5 Stem Privet	Crown Cleaned, Remove hanger		1
AQ- Casa Grande	5 Stem Privet	Remove	1	
AQ- Casa Grande	Bay	Crown cleaned		1
AQ- Casa Grande	Black Walnut	Crown cleaned		1
AQ- Casa Grande	Black Walnut	Crown cleaned		1
AQ- Casa Grande	Black Walnut	Crown cleaned		1
AQ- Casa Grande	Black Walnut	Crown cleaned		1
AQ- Casa Grande	Black Walnut	Crown Cleaned		1
AQ- Casa Grande	Black Walnut	Crown Cleaned		1
AQ- Casa Grande	Cottonwood	Cut tree part, Crown Cleaned, Reduced Crown		1
AQ- Casa Grande	Deodar Cedar	Crown Cleaned		1
AQ- Casa Grande	Deodar Cedar	Crown cleaned		1
AQ- Casa Grande	Eucalyptus	Crown cleaned, Reduce Crown		1
AQ- Casa Grande	Eucalyptus	Crown cleaned, Reduce Crown		1
AQ- Casa Grande	Eucalyptus	Crown cleaned, Reduce Crown		1

Santa Clara County Parks
Hazardous Tree Management
Year 2016

Site	Plant Name	If Non-Chemical Methods Used, provide name or description	Number of Trees Removed	Number of Trees Saved
AQ- Casa Grande	Eucalyptus	Crown cleaned, Reduce Crown		1
AQ- Casa Grande	Eucalyptus	Cut tree part, Crown Cleaned, Reduced Crown		1
AQ- Casa Grande	Incense Ceder	Crown Cleaned, Cable/Bracing		1
AQ- Casa Grande	Incense Ceder	Remove	1	
AQ- Casa Grande	Locust	Remove	1	
AQ- Casa Grande	Locust	Remove	1	
AQ- Casa Grande	Mex Fan Palm	Crown Cleaned		1
AQ- Casa Grande	Mex Fan Palm	Crown Cleaned		1
AQ- Casa Grande	Mex Fan Palm	Crown Cleaned		1
AQ- Casa Grande	Mex. Fan Palm	Crown cleaned		1
AQ- Casa Grande	Mex. Fan Palm	Crown cleaned		1
AQ- Casa Grande	Mex. Fan Palm	Crown cleaned		1
AQ- Casa Grande	Mex. Fan Palm	Crown cleaned		1
AQ- Casa Grande	Mex. Fan Palm	Crown cleaned		1
AQ- Casa Grande	Mex. Fan Palm	Crown cleaned		1
AQ- Casa Grande	Mex. Fan Palm	Crown Cleaned		1
AQ- Casa Grande	Monkey Puzzle	Crown cleaned		1
AQ- Casa Grande	Redwood	Crown cleaned		1
AQ- Casa Grande	Sycamore	Crown cleaned		1
AQ- Casa Grande	Sycamore	Crown cleaned		1
AQ- Casa Grande	Sycamore	Crown cleaned		1
AQ- Casa Grande	Sycamore	Crown cleaned		1
AQ- Casa Grande	Sycamore	Crown Cleaned		1
AQ- Casa Grande	Sycamore	Crown Cleaned		1
AQ- Casa Grande	Sycamore	Crown Cleaned		1
AQ- Casa Grande	Sycamore	Crown Cleaned		1
AQ- Casa Grande	Sycamore	Remove	1	
AQ- Casa Grande	Sycamore	Remove	1	
AQ- Casa Grande	W. Sycamore	Cut tree part		1
AQ- Casa Grande	Willow	Crown cleaned		1
AQ- Casa Grande	Willow	Crown Cleaned		1
Calero	White Poplar	Remove	1	
Grant Park	Alder	Remove	1	
Grant Park	Eng. Walnut	Remove	1	
Grant Park	Eng. Walnut	Remove	1	
Grant Park	Valley Oak	Cut tree part		1
Total			28	59

Santa Clara County Integrated Pest Management Program

Putting IPM into Practice through Real World Examples

2005 CA IPM Innovator Award
CA Dept of Pesticide Regulation

2009 Green California Leadership Award
Green California Summit

International IPM Sysmposium 2009

2012 PestWise Shining Star Award
United States Environmental Protection Agency

Exploring Sustainable Tools and Technologies For Pest and Pesticide Free Environment