

Prepared by
Marin County Parks

INTEGRATED PEST MANAGEMENT

ANNUAL REPORT 2017



Photo by Chuck Barnes
courtesy One Tam

Marin County Integrated Pest Management

Integrated Pest Management (IPM) is an system of managing pests using careful consideration and integration of all available pest control tools and techniques. The target invasive species, conservation goals, and site conditions guide a systematic decision-making process on what methods to use. Mechanical and physical pest controls include weeding, mulching, weed-whipping, mowing. Cultural control means changing work practices to reduce pests, such as altering irrigation practices to reduce weeds. Biological controls use natural enemies (predators, parasites, pathogens, and competitors) to control pests. Pesticides are used only after monitoring indicates they are needed according to established guidelines. A pesticide is a natural or synthetic chemical preparation used to destroy plant, fungal, insect, or animal pests.

Marin County Parks, in collaboration with other County departments, administers IPM for the County of Marin. The program is governed by County Ordinance 3598.

The Integrated Pest Management Commission oversees the implementation of the Marin County Integrated Pest Management ordinance and policy. The nine-member Commission also advises and makes recommendations to Marin County's IPM Coordinator and the County Board of Supervisors as needed. The Commission meets quarterly and meetings are open to the public.

The County's IPM program covers 147 sites including county parks and libraries, the Marin County Jail, Marin County government offices, Marin County Health and Human Services sites, and traffic median sites throughout Marin. These locations tend to be heavily populated and used for recreation or business. Common IPM challenges in these locations include wasps, ants, roaches, rodents, and weeds that may present a public health hazard. In addition to IPM, the county IPM program provides outreach to the public through volunteer opportunities and education.



The County's IPM program cares for heavily populated locations where rodents, weeds, or diseased trees may present a public health and safety hazard.



Marin County remains a leader in ecologically sound Integrated Pest Management (IPM).

Keeping Marin County safe and healthy.

Marin County is a regional and national leader in non-chemical IPM alternatives. In 2017, Parks successfully managed 126 sites without pesticide, and conventional pesticide use decreased 86% over the previous year. Marin County uses zero glyphosate and zero rodenticide across all 147 sites governed by the County's IPM ordinance. To achieve this, volunteer, staff, and contracted work hours increased to over 43,000 labor hours dedicated to non-chemical IPM, and organic pesticide use also increased. Parks networks with other regional IPM agencies on shared challenges and has become a resource for other agencies across the nation.

Sound IPM employs a creative, comprehensive strategy. Not all pests are a problem. By continuously monitoring plant and animal populations, Marin County's IPM team focused on pests that affected safety or were likely to damage public recreation sites and impair county services. Each location was individually assessed. Treatment choices were based on level of risk, severity, timing, effectiveness, available resources, and cost. Multiple methods were often employed, including hand-pulling, mulching, and mowing. The IPM program also consisted of contract oversight, reporting, communication, and coordination with the County's Agricultural Commissioner and the California Department of Pesticide Regulation.

Marin County's IPM program continues to evolve, based on best practices, shared knowledge, and pilot programs.

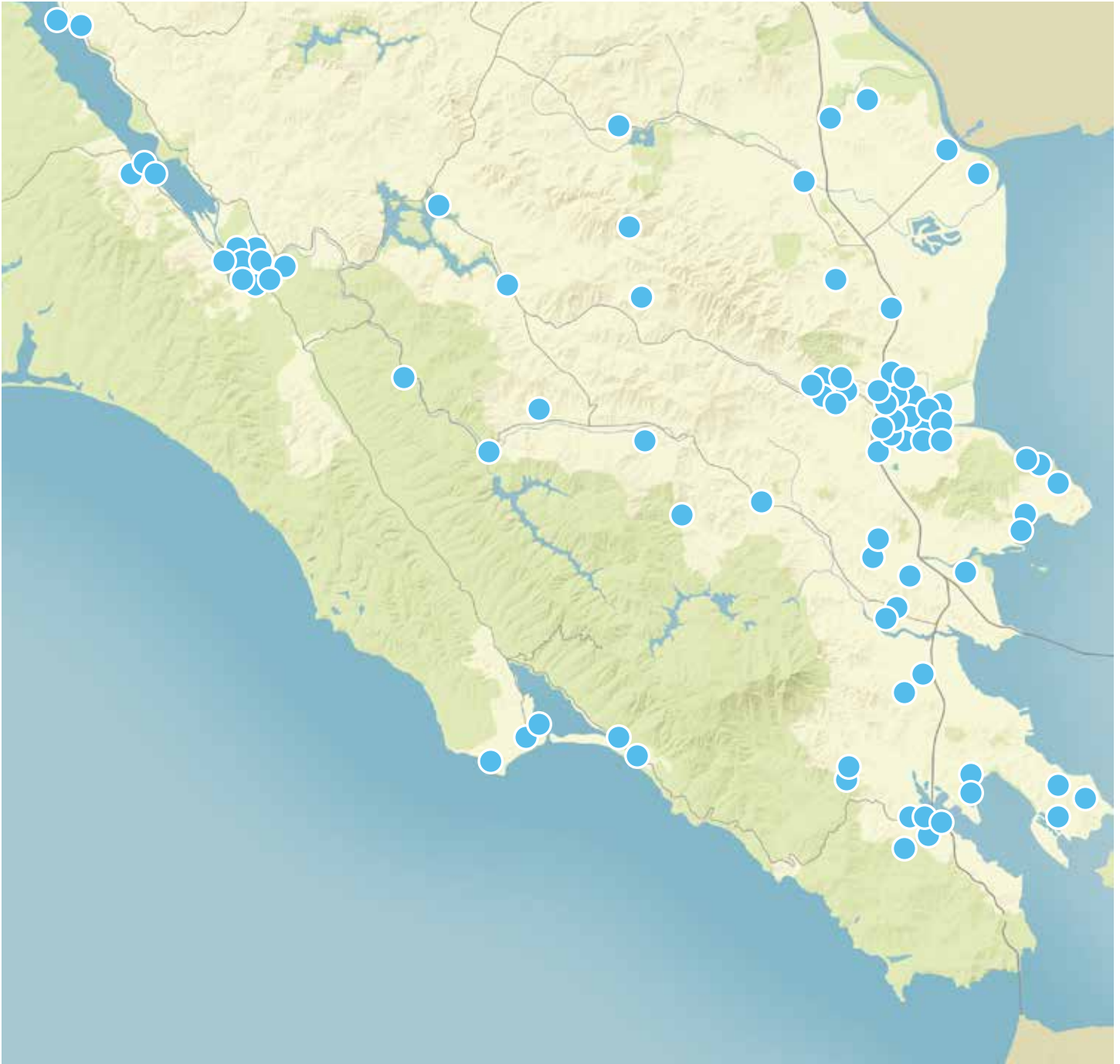
From July 2016 through July 2017, Marin County piloted a program to use zero glyphosate on traffic medians and roadside landscapes. The results of this study and other efforts continue to help refine the county's IPM program. Glyphosate has been removed entirely from the Marin County IPM program's list of allowable products for landscape and structural use in 2018.

Ornamental landscape IPM differs from wild land management. Keeping a playground or golf course healthy for recreational use is vastly different from managing large tracts of open space, where invasive plants can fuel wildland fires and put endangered species at risk. Marin County Open Space Preserves, which is governed by the Parks and Open Space Commission, are not covered in this report.

Nature is always changing. To optimize well-being for the people, plants, and animals in Marin County, our IPM solutions must be flexible, adaptable, varied, and specific to distinct and diverse locations.

IPM Governance

Marin County Ordinance 3598 governs park, structural, and ornamental landscape IPM for 147 locations.



County ordinance 3598 governs IPM for parks, libraries, fire stations, office buildings, traffic medians, other buildings, and other ornamental landscapes on county properties across Marin.

2017 Achievements

In 2017, Marin County maintained 147 locations including 126 without pesticides.

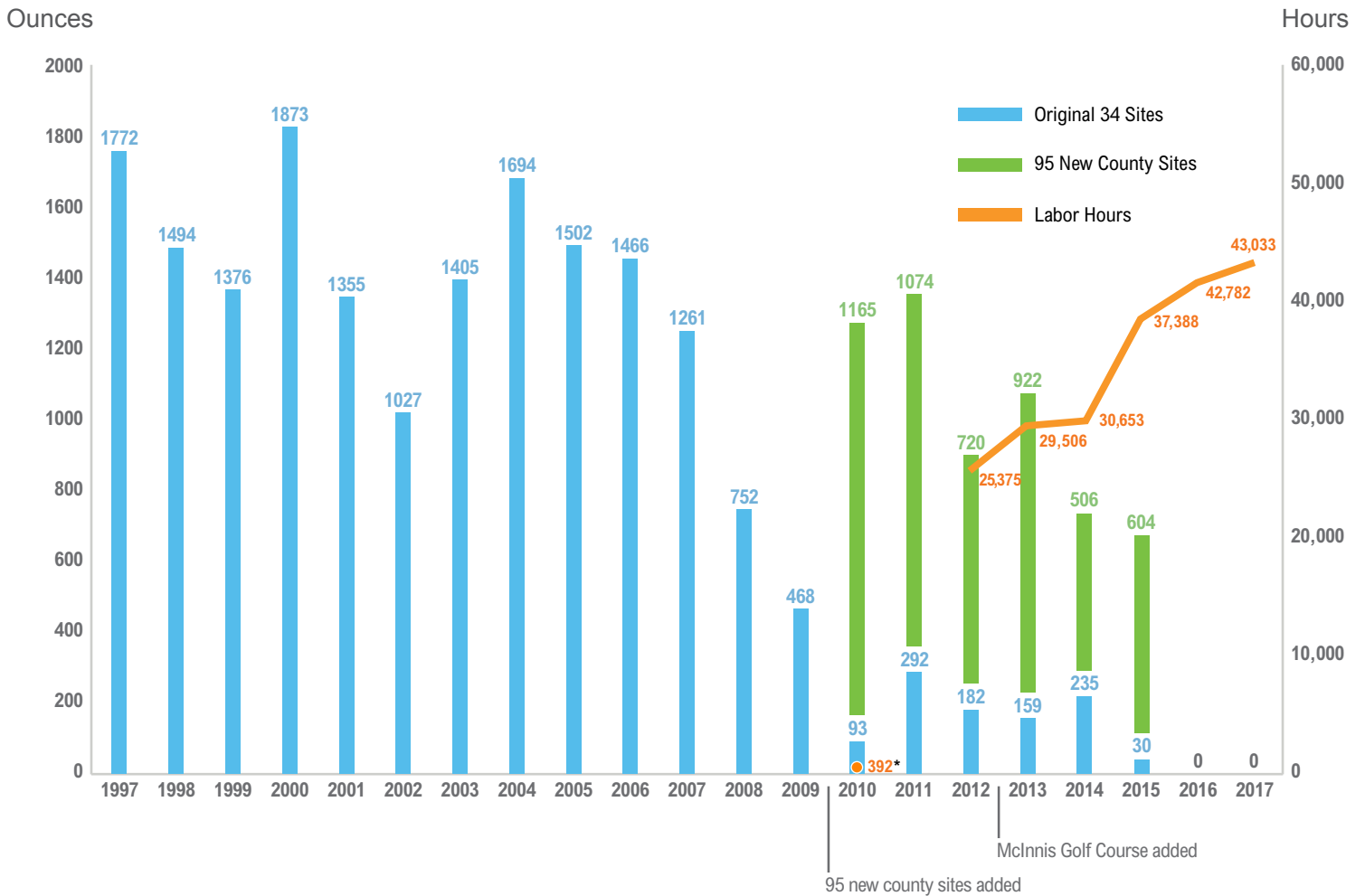


These sites include the Marin County Civic Center campus, 2 boat launches, 4 regional parks, the Marin Health and Wellness Campus, the McInnis Golf Course, dozens of neighborhood and community parks, 11 multiuse pathways, 27 traffic medians and roadside landscapes in 8 county service areas, county government offices, 2 libraries, and the county jail.

History of Glyphosate Use

Glyphosate Use Has Declined to Zero Over Time While Labor Continues to Increase

Yearly Glyphosate Use at County Sites vs Labor Hours
in Ounces of Glyphosate Concentrate



Over the past 20 years, glyphosate use has declined to zero. Gardeners Guild, a contractor that conducts Marin County IPM on median and roadways, has been an instrumental partner in achieving this goal.

The data for the years 1997-2014 is based on combined usage records at the original 34 county sites that were included in the 1998 IPM Ordinance. In 2009, 95 new county sites were added to the IPM Ordinance, and the McInnis Golf Course was added to the program in May 2012. Staff began comprehensively tracking labor hours in 2012.

* 2010 labor data is only available for the month of December.

2017 Achievements

In 2017, Marin County IPM program used zero glyphosate-based products.



No glyphosate was used in any Marin County Parks in 2017.

2017 Achievements

Marin County Parks is committed to rodenticide free IPM.

By eliminating rodenticides, Marin County keeps parks healthy for people, as well as wildlife that consume rats and mice. Rat and mice **trapping** continued to minimize rodent damage. In 2017 there were very few reports of rodent sightings or damage. Contractors like ATCO Pest Control and Crane Pest Control help control insects and rodents in a safe and environmentally sensitive manner.

Owl boxes at various park sites, including Civic Center, continued to be maintained and productive, housing owls that aided rodent control. Ground squirrel burrows can weaken building foundations, damage utility lines, and cause trip hazards. When a risk was identified, **burrow modification** and trapping helped manage ground squirrels.

Other pests are also addressed with an organic-first approach. Predatory yellowjackets have venom that can cause life-threatening anaphylactic shock. In an effort to protect the public and staff **yellowjacket traps** are systematically and routinely placed in early spring in nests adjacent to picnic areas, trails, or pathways. Other IPM options are used only when yellowjackets continue to threaten visitors or staff. Marin County IPM is bee-friendly and does not use any methods to treat bees.



Public health concerns require controlling rats, mice, and yellowjackets in County parks.

2017 Achievements

In 2017, a pilot project demonstrated that traffic medians could be maintained without glyphosate.



7 traffic medians were included in a zero glyphosate pilot project in 2017, for a total of zero glyphosate used for all 27 traffic medians and roadside landscapes.

2017 Achievements

Non-chemical IPM requires creative solutions and hard work.

Marin County IPM staff and contractors have shown great willingness to think outside the box and put in some elbow grease. A commitment to non-chemical IPM means more time spent mulching, weeding, weed-whipping, flaming, pruning, and adjusting irrigation to prevent weed growth. Contractors like The Shooter Co., Coast Landscape, Inc, and Gardeners Guild have been instrumental in helping us achieve our goals. Additionally, Marin County continues to network collaboratively with other government and regional agencies to navigate through shared challenges and share results.

From July 2016 through July 2017, Marin County conducted a pilot program using zero glyphosate on 7 traffic medians and roadside landscapes. Gardeners Guild, a contractor that conducts Marin County IPM on median and roadways, was willing to take up the challenge. Four seasons of data indicated that these methods can effectively address median weeds without affecting driver visibility and safety. The trade-off is that lane closures incur additional costs, additional labor is needed, and the visual aesthetics will change because some non-harmful weeds may be allowed to remain. Given the results, Marin County will continue to move forward without glyphosate on all 27 median and roadside landscapes in 2018.



2016 IPM Achievement Awardee: Pablo Rosales

Due to his persistence and willingness to work creatively, Pablo Rosales, groundskeeper at McInnis Golf Course, received a 2016 IPM Achievement Award. McInnis is one of the only golf courses in the north bay that is maintained with organic methods. Mr. Rosales received his award in April 2017.



Hand weeding, flaming, and hand mulching are all part of the Marin County IPM program.

2017 Achievements

While overall IPM labor hours slightly increased in 2017, volunteer hours increased by 33%.

Labor Hours by Month

Month	Staff IPM	Volunteer IPM	Contractor IPM	Total Hours
January	1857	1138	682	3677
February	1568	659	687	2914
March	2611	734	688	4033
April	2490	1274	720	4484
May	2717	639	747	4103
June	2683	453	737	3873
July	2292	802	730	3824
August	1963	802	758	3523
September	1902	1578	675	4155
October	2010	441	747	3198
November	1621	353	680	2654
December	1338	566	691	2595
Total Hours	25,052	9,439	8,542	43,033

Labor Hours Year-Over-Year

Year	Staff IPM	Volunteer IPM	Contractor IPM	Total Hours	% Change
2013	13,905	7,654	7,949	29,506	---
2014	15,774	6,678	8,201	30,653	3.7%
2015	20,718	7,983	8,687	37,388	21.9%
2016	26,888	7,086	8,808	42,782	14.4%
2017	25,052	9,439	8,542	43,033*	.58%

The County maintains a strong commitment to Integrated Pest Management that emphasizes alternative, least toxic methods. Mechanical and manual weed removal, sheet mulching, mowing, trapping, turf aeration, irrigation system improvements, and other site modifications are used in combination to help control various pest populations.

* Equal to 20 full-time staff.

2017 Achievements

Community partnerships are essential to Marin's IPM program.

In total, volunteers and community partners contributed almost 9,500 labor hours to the Marin County IPM program in 2017, up 33% from 2016.

The Marin County non-chemical IPM program would not be possible without community partners including the Invasive Spartina Project (ISP), the One Tam volunteer program, the Linking Individuals to their Natural Community (LINC) youth stewardship program, Students and Teachers Restoring a Watershed (STRAW), local STEM (Science, Technology, Engineering, and Math) students as well as other school groups, corporate groups, and other non-profit service and community groups.

Neighborhood-level partners are also contributing creative solutions.

A local community-driven project called Yard Smart Marin launched in 2017 to create a public service campaign called "Think Before You Spray" aimed at reducing pesticide use at the neighborhood level. While this is not a Marin County IPM effort, the community commitment is noteworthy.



2017 IPM Achievement Awardee: Broom Service

The IPM Achievement Award recognizes individuals and organizations that further the goal of eliminating pesticide use within the Marin County IPM Program.

The 2017 award was given to Broom Service, a group of volunteers who work tirelessly to eradicate invasive French and Scotch broom in San Geronimo Valley.



Community-driven efforts like Broom Service, the "Think Before You Spray" campaign, and One Tam volunteer events complement IPM staff and contractor efforts to reduce weeds, pests, and pesticide use in Marin County.

2017 Achievements

20 full-time employee equivalents supported non-chemical IPM.

In 2017, staff, contractors, and volunteers spent 43,033 hours conducting IPM, equal to 20 full-time employees.

Volunteers spent 9,439 hours **weeding, picking up litter, spreading mulch, removing invasive species,** and performing other non-chemical methods in support of the County's IPM program. Staff, contractors, and volunteers spread over **300 yards of mulch** and installed **hundreds of square feet of cardboard sheet mulching**, in an effort to offset synthetic herbicide use.

Turf management practices, including **fertilization, verti-cutting, topdressing, over-seeding and irrigation,** have maintained acceptable levels of weeds and disease in turf areas.



2016 IPM Achievement Awardee: Ann Spake

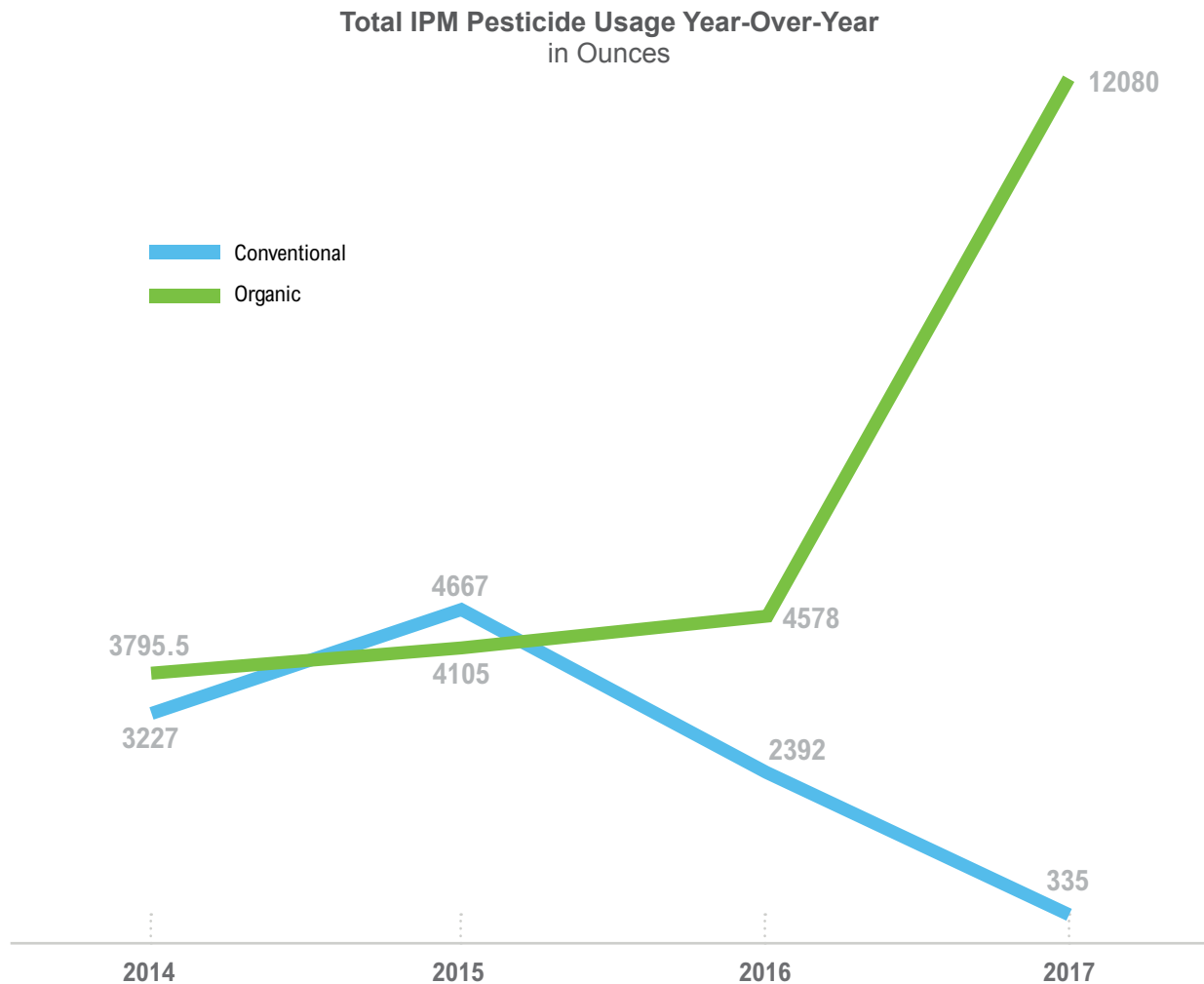
Ann Spake of Sustainable TamAlmonte vigorously advocated for the health of Marin residents, both domestic pets and wildlife, and use of the least harmful methods in IPM practices. She engaged the IPM Commission and organized members of the public to support and advocate a progressive approach to IPM that resulted in reduction of synthetic pesticide use within Marin County.



Non-chemical IPM requires hands-on field work and specialized tools.

Total Pesticide Use

Conventional pesticide use declined again in 2017 while organic use increased.

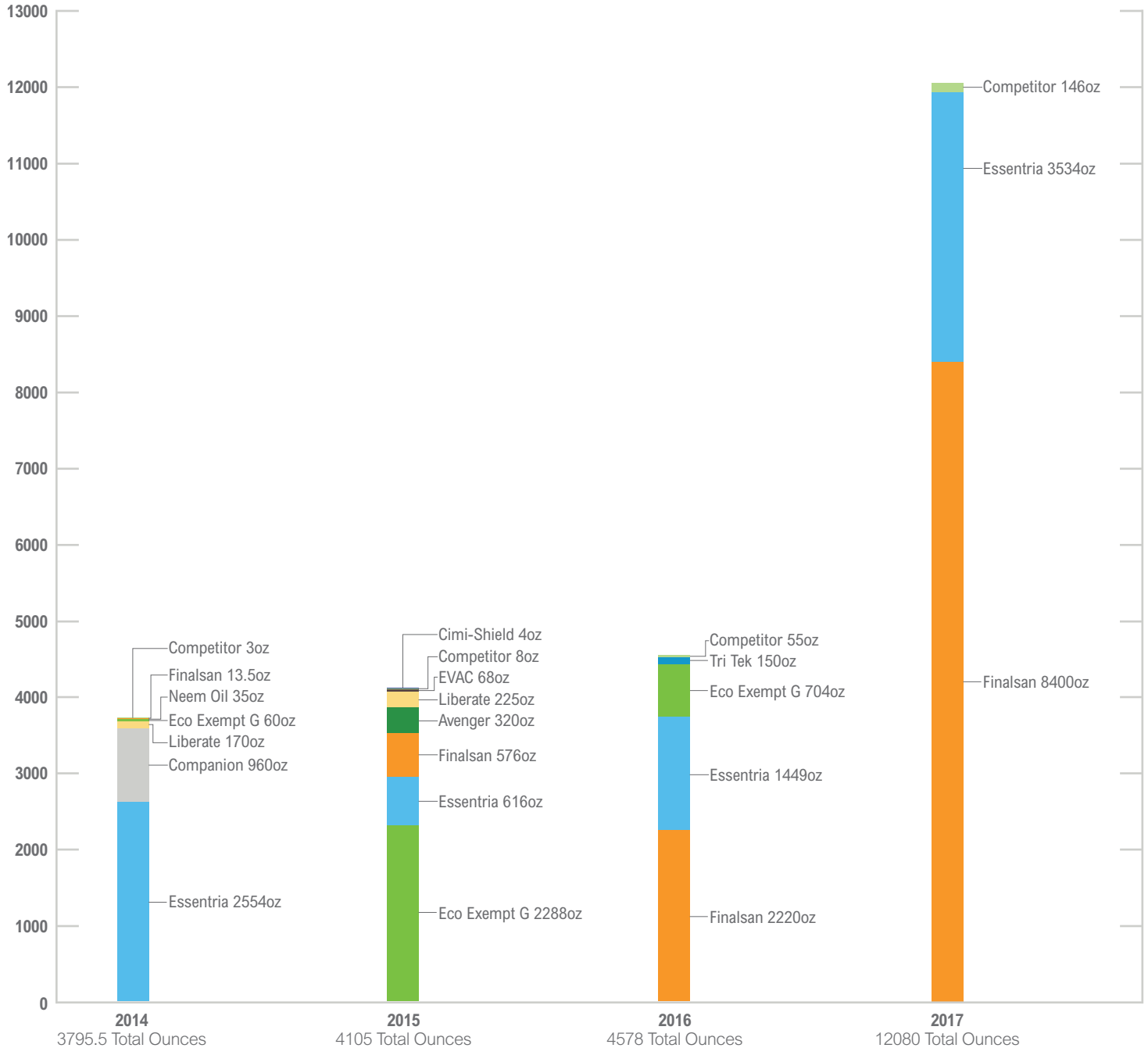


Conventional pesticide use declined by 86% in 2017 over the previous year while organic pesticide use increased by 164%. The long-term strategy is to favor manual methods supplemented with organic treatments while minimizing the need for synthetic chemical applications.

Conditions this year again allowed Marin County Parks to successfully implement IPM using a minimal amount of synthetic chemicals. Organic alternatives require a significantly higher application rate than conventional products, and are primarily used on traffic medians. IPM will vary each year based on the types of pests, risks, and conditions in the field.

Organic Pesticide Use

Organic Pesticides Proportional Usage Increased 164% Over Previous Year in Ounces



The diagram above shows organic pesticide applications over the past four years. The total amount of organic product usage increased by 164% in 2017, which is offset by the 86% decline in the use of conventional products. Organic alternatives require a significantly higher application rate than conventional products. Only 3 products were used in 2017, though this could change in future years depending on the conditions and type of pests.

Organic Pesticides Applied in 2017

Organic product alternatives were an integral component of IPM in 2017.

Organic* Products Used for Outdoor Landscape Maintenance

Competitor is a surfactant, a substance that is added to a liquid to reduce its surface tension, thereby increasing its spreading and wetting properties. It was mixed with other products like Finalsan to increase efficacy. It was applied to weeds growing at the Bon Air Road and Sir Francis Drake Boulevard traffic medians, the Health and Wellness Campus at Kerner Boulevard, County Service Area 16 in Greenbrae, Rush Creek Frontage Road, McInnis Park, the Health and Human Services building on North Redwood Drive, Alameda Del Prado, and Hal Brown Park.

Finalsan is a fast-acting herbicide used as a glyphosate alternative for weeds. Its active ingredient is ammoniated soap of fatty acids. It was applied to weeds growing at the Bon Air Road and Sir Francis Drake traffic medians, County Service Area 16 in Greenbrae, Rush Creek Frontage Road, McInnis Park, the Health and Human Services building on North Redwood Drive, Alameda Del Prado, and Hal Brown Park. This product has proven to be more effective than Avenger. However, efficacy is significantly reduced when ambient temperatures are cool and weeds are larger than two to four inches.

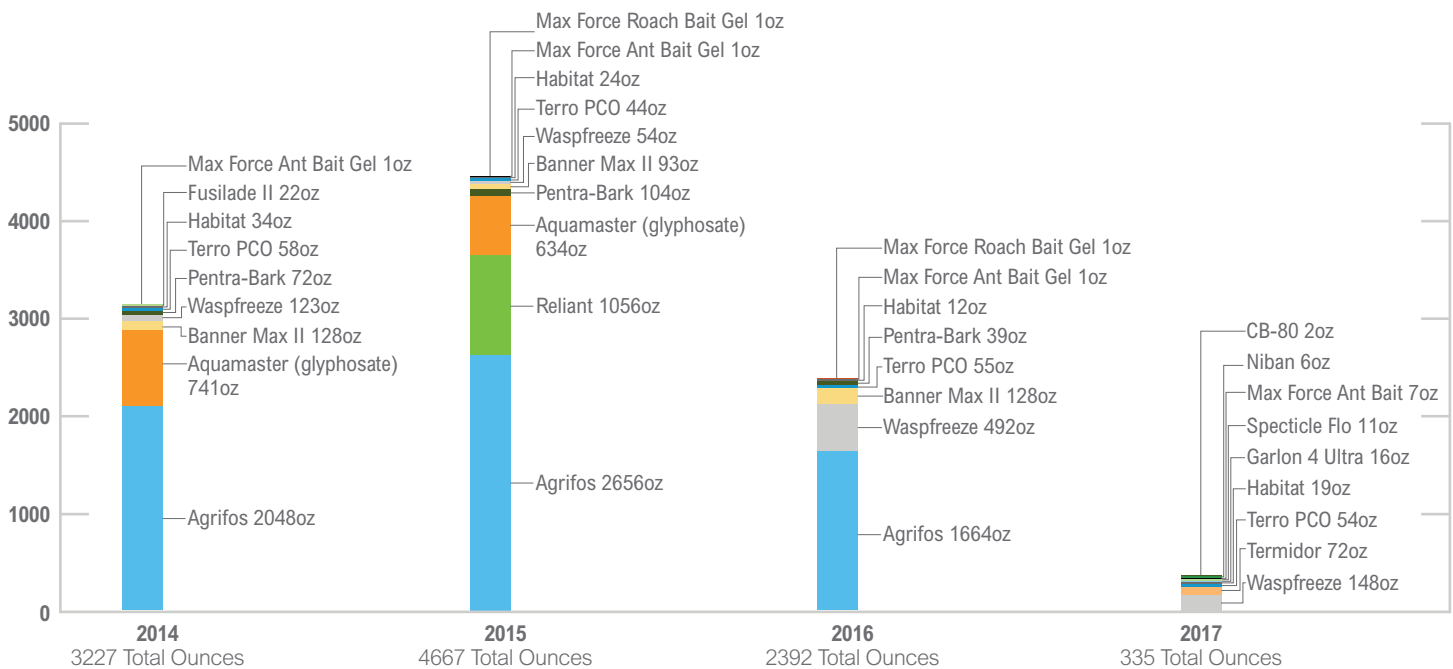
Organic* Products Used for Indoor Structural Pest Control

Essentria is an organic, broad-spectrum 25(b) insecticide available in liquid (IC3) or granular (G) form. Active ingredients include essential plant oils such as rosemary and peppermint. It was used to treat crawling insects at the Marin County Garage, Marin County Juvenile Services Center and the Marin County Juvenile Hall on Jeannette Prandi Way, the Marin County Civic Center, the county office building at 1600 Los Gamos Road, the Marin County Jail, Health and Human Services facilities, and Gross Airport.

* Product verified by the Organic Materials Review Institute (OMRI) to meet federally-regulated organic standards used by certified organic food and fiber producers.

Conventional Pesticide Use

Conventional Pesticides Proportional Usage Declined 86% From Previous Year in Ounces



The diagram above shows conventional pesticide applications over the past four years. Overall, the use of conventional pesticides dramatically declined with 86% less conventional product applied in 2017 compared to the previous year.

This is in keeping with the long-term strategy is to favor manual methods supplemented with organic treatments while minimizing the need for synthetic chemical applications. IPM will vary each year based on the types of pests, risks, and conditions in the field.

A full list of allowable organic and conventional pesticides is available at www.marincountyparks.org.

Conventional Pesticides Applied in 2017

In 2017, Marin County Parks decreased application of conventional products.

Conventional* Products Used for Outdoor Landscape Maintenance

Garlon 4 Ultra is used to treat woody weeds on a limited basis via spot treatment or injection. It was used on cut eucalyptus stumps at Ashton Lane in Tamalpais-Homestead Valley.

Habitat is an herbicide formulated specifically for aquatic and riparian areas. It is used in spot treatment as part of the Bay area wide invasive Spartina project as well as for other invasive grass and woody species. It was applied at McInnis Park to treat pepperweed and at Creekside Marsh at Hal Brown Park to treat Spartina.

Specticle FLO is a reduced-risk pre-emergent herbicide for the control of annual grasses, sedges, and broadleaf weeds. It was applied to traffic medians on Sir Francis Drake Boulevard.

Waspfreeze and WaspFreeze II applications were made to as few nests as possible, and only when a yellowjacket nest posed a health risk to the public or staff. WaspFreeze II was used after the Wasp Freeze product was discontinued. These products were applied in limited quantities at Paradise Beach Park, Stafford Lake Park, Lucas Valley Park, McNears Beach Park, the Corte Madera Library, and the county-owned building at 1600 Los Gamos Road.

In general, our landscape IPM promotes a tolerance for weeds in appropriate settings, since weeds can be a part of healthy ecosystems and play a key role in supporting pollinators.

Conventional* Products Used for Indoor Structural Pest Control

CB-80 was used to control flying insects. A very small amount (2 oz) was applied in violation of the IPM ordinance.

Max Force Ant bait gel was used to control insects at Marin Center Exhibit Hall through controlled bait stations.

Niban uses boric acid, a low-toxicity mineral, to control insects. It was used to treat fruit flies at the Marin County Jail.

Termidor SC was granted an exemption to be used to treat termites at the McNears Beach Park snack bar foundation. The exemption was granted because this product has been shown to be more effective against subterranean termites than other product alternatives.

Terro PCO was used to aid controlling ants and other crawling insects at Gross Airport, the Marin County Juvenile Hall, and two Health and Human Services Campus buildings on Kerner Boulevard. This product uses borax as its active ingredient and was used in protected bait stations.

* Conventional pesticides are pest control substances or mixtures that are generally produced synthetically. If a product has not been verified by the Organic Materials Review Institute (OMRI) to meet federally-regulated organic standards, the Marin County IPM program lists it as "conventional," even if the active ingredient is naturally occurring.

Violations and Exemptions

The number of violations and exemptions remained low in 2017.

County Ordinance 3598 governs the Marin County IPM program. Any events that differ from the policies laid out in the ordinance are considered violations.

Violations

1. On May 26, 2017, Crane Pest Control applied Essentria IC3—an exempt product with the active ingredients rosemary oil, peppermint oil, and geraniol—at the 1600 Los Gamos complex in order to control crawling insects. Although this product is on the 2017 Marin County Integrated Pest Management Allowed Pesticide List, Crane failed to follow protocol to request a pesticide application and submit the proper notifications to alert the occupants of the complex regarding the pesticide treatment. Failure to request permission and post notification of a pesticide application constitutes a violation of the IPM Ordinance and Policy and was reported as such at the July 28, 2017 IPM Commission Meeting.
2. On July 13, 2017, at the Marin Civic Center exterior landscapes, ATCO Pest Control made a 2oz. application of CB-80—a pesticide used to control flying insects. This product contains the active ingredient pyrethrin and is not on the 2017 Marin County Integrated Pest Management Allowed Pesticide List. Failure to request permission and post notification of a pesticide application—or to apply a pesticide that is not on the 2017 Marin County Integrated Pest Management Allowed Pesticide List—constitutes a violation of the IPM Ordinance and Policy and was reported as such at the October 27, 2017 IPM Commission Meeting

A product that is not on the list of allowable pesticides may be approved for a specific and limited purpose by the IPM coordinator. These are considered limited-use exemptions.

Exemptions

1. On April 3, 2017, an exemption was issued for the product WaspFreeze. This exemption was issued for use of the product with less than 4 days prior notice in emergencies due to the threat of severe allergic reactions from stings. The active ingredients are Allethrin and Phenothrin. Typical application is 17.5oz (1 can) per nest, and traps were also placed and monitored throughout parks.
2. On April 21, 2017, an exemption was issued for the product Termidor SC after an inspection of the snack bar structure at McNears Beach Park revealed the presence of a termite colony. ATCO Pest Control found evidence of termites in the foundation of the structure and recommended the use of Termidor SC. This product is effective against subterranean termites, while other alternatives contain a contact termicide and are ineffective against underground termites due to the lack of residual effects. The active ingredient is Fipronil (9.1%) and is listed by US EPA as a probable carcinogen. This product is applied by drilling borings into the ground adjacent to the structure, and injecting a liquid into the substrate.
3. On August 22, 2017, an exemption was issued for the product PT WaspFreeze II. This exemption was issued because our previous wasp product—Wasp Freeze—was discontinued. This new product contains a similar active ingredient (Prallethrin, a pyrethroid) but has a different EPA number. The exemption was granted for the remainder of 2017, for blanket use of the product with less than 4 days prior notice in case of emergencies. Typical application is 17.5oz (1 can) per nest.

Proposed Changes to 2018 Products List

Organic products continue to evolve.

2018 Proposed Product Addition

Marin County Parks proposes the addition of two organic landscape products, and one conventional product.

Azanguard is an Organic Materials Review Institute-certified (OMRI) Neem-based product for control of indoor and outdoor insect pests; this replaces the similar product Azatrol EC as it is no longer available.

Civitas is also an OMRI-certified product containing mineral oil, and is used as a fungicide and insecticide for turf on golf courses, sports and athletic fields.

PT Waspfreeze II is a conventional insecticide used for emergency wasp nest treatments in ground or aerial wasp nests posing a significant hazard to the public. This product replaces Wasp Freeze as it is no longer available.

There are two structural products proposed for use in 2018.

Rat Ice is an organic product containing dry ice, which controls rats in burrows by releasing CO₂.

DominAnt is an insecticide for treating ants and other crawling insect, and is applied in secured bait stations only. This product is listed as an EU Endocrine Disruptor, and replaces the product Terro PCO as it is no longer available.

2018 Proposed Product Eliminations

Marin County Parks proposes the elimination of **Roundup Custom** and **Rodeo**, both with the active ingredient glyphosate. Following the successful implementation of the glyphosate-free pilot program on traffic medians and frontages, staff have continued to focus on other manual (non-chemical) weed control and emerging organic chemical treatments in these areas.

Consistent with the IPM ordinance and policy, glyphosate and other synthetic chemicals will still be considered for use on IPM ordinance sites via the exemption process for emerging pest threats. These would only be used as a tool for **three critical uses**: 1. Protect critical habitats and endangered species; 2. Protect communities against the threat of wildfire, and; 3. Protect local agriculture from threats such as invasive barbed goatgrass.

Education and Training

Education and knowledge sharing strengthen the IPM program.

Annual Training

Ten Parks and Landscape staff currently hold their Qualified Applicators Certificate (QAC), which provides a technical and safe knowledge-base in the event pesticides applications are needed. Individuals holding this certificate are required to complete 10 hours per year of continuing education on the topics of IPM and other landscape-related issues. In addition to this cumulative 100 hours per year of staff development, approximately 25 Parks and Landscape staff members involved with IPM participate in an annual 4-hour training program focusing on the **Safe Handling and Use of Pesticides**. The four-hour class includes:

- use of OMRI (Organic Materials Review Institute) and commercial pesticide applications
- proper use of equipment
- personal protective gear
- organic alternatives to commercial chemicals
- best management practices to reduce the need for applications
- mapping sites
- monitoring
- reading pesticide recommendations
- reading a chemical label

Other training topics include:

- IPM methodology and practices
- calibration of equipment
- laws and regulations
- insect and weed identification

- turf management
- plant diseases
- proper sheet mulching
- best management practices

Ongoing Training

Throughout the year, staff also attended **trainings on emerging IPM products, laws and regulations, and best management** practices. This year topics included:

- Sudden Oak Death management and preventative treatment
- plant health care
- use and impacts of organic mulch
- use of owls as a component of an IPM program
- rodent control methods
- soil composition and analysis

Knowledge Sharing

Staff routinely participated in **meetings with other Bay Area IPM personnel** to discuss current issues, alternative IPM methods, new products, best management practices, and the science behind IPM. This included:

- City & County of San Francisco Department of the Environment Technical Advisory Committee
- California Weed Science Society meetings

Marin County IPM Trends and Emerging Threats

Proactive planning. Japanese Knotweed, a fiercely invasive plant from Asia, has been found in Marin County, but not yet on land owned by the County of Marin. Staff are working proactively to develop plans if highly invasive and extremely harmful pests like this emerges.

Early detection. Marin County's IPM staff works closely with the Marin County Department of Agriculture, Weights and Measures and the University of California Cooperative Extension to diagnose emerging threats. Once identified, Marin County responds rapidly to the threat while collaborating with other agencies on shared solutions.

Multi-faceted solutions. Targeted sites often require phased, multiple methods, with higher levels of monitoring and treatment frequency. Conventional product applications continued to decline, being reserved for critical use when other options are not feasible.

Data-driven IPM. Pilot programs, shared reporting among IPM practitioners, monitoring, and analysis of organic methods are helping to identify the most effective and ecologically sound solutions.

Physical labor. Non-chemical IPM depends on persistent hands-on work, such as digging out, hand pulling, and weed wrenching. Successful ecological IPM requires more person hours.

Weed tolerance. Public perceptions of a well-manicured ornamental landscape may need to shift, to accommodate healthy ecosystems maintained without pesticides that include non-harmful weeds.

Climate change. Drought, temperature shifts, extreme weather, and rising sea levels are bringing new challenges, as some ecosystems struggle to adapt and become more susceptible to pests and disease.

Fire. With increased temperature comes increased threat of fire. Because our parks, county offices, and roadside landscapes border residential areas, community safety must continue to be a top priority in our control of invasive pests. Plans must accommodate threats such as the accumulation of dead trees from sudden oak death and French broom, a plant that acts as a ladder fuel for fire.



Marin County Parks continuously tracks new developments in IPM, to evolve and adapt its program.

Marin County Parks IPM Team



Kirk Schroeder directs volunteer group at Hal Brown Park

Jim Chayka **Parks and Open Space Superintendent,** **Integrated Pest Management Program Coordinator**

Jim Chayka has worked for 20 years in the fields of natural resource management, watershed restoration, and environmental stewardship. Prior to joining Marin County Parks, Jim served as Director of Natural Resources at Conservation Corps North Bay—a regional program dedicated to developing and engaging youth through environmental stewardship. As a consultant with Watershed Sciences and the Urban Creeks Council, Jim spent 10 years as a fluvial geomorphologist supporting research and restoration efforts throughout Bay Area watersheds. Jim has also held leadership positions with Fire Safe Marin, East Bay Conservation Corps, the Student Conservation Association, and the Sonoma Ecology Center.

Jim holds the following degrees, licenses, and certifications: a BA in Political Science and a MS in Geosciences; Parks and Recreation Professional (CPRP) certification through the National Recreation and Parks Association; C-27 Landscape Contractors License; Qualified Stormwater Pollution Plan Developer & Practitioner (QSD/QSP); Certified Professional in Erosion and Sediment Control (CPESC).

Albert Hom **Integrated Pest Management Specialist**

Albert Hom has spent over 20 years in the field of Integrated Pest Management (IPM). Before joining Marin County as the Integrated Pest Management Specialist in 2014, he held positions as an Entomologist, IPM Coordinator, Senior Public Health Biologist and Program Manager. He has a Bachelor of Science in Biology and a Masters of Public Administration from California State University, Hayward. He is a Pest Control Advisor, Board Certified Entomologist, and a Registered Environmental Health Specialist.

Kirk Schroeder **Volunteer Program Coordinator**

Kirk Schroeder has worked at Marin County Parks for 17 years, and has 11 years of experience organizing volunteers. In his current role he coordinates volunteers to support non-chemical IPM in County parks, multiuse pathways, and other landscape service areas. He began his career as a seasonal extra-hire and moved up to Park Ranger and Supervising Ranger positions. Kirk graduated from University of California, Santa Cruz with a Bachelor's degree in Fine Art, and is a certified professional lifeguard.

Glossary

Active Ingredient. An active ingredient is the part of a substance or compound that produces its chemical or biological effect. In Integrated Pest Management, it is the ingredient that prevents, destroys, repels, or mitigates a pest, or is a plant regulator, defoliant, desiccant, or nitrogen stabilizer.

Biological Control. A method of controlling pests using natural enemies such as predators, parasites, pathogens, and competitors. An example of biological control is releasing green lacewings to control aphids.

Conventional Pesticide. Pest control substances or mixtures of substances that are generally produced synthetically. Synthetic products are made by a synthetic or chemical process by human origin as opposed to occurring naturally. To avoid confusion with organic standards, the Marin County IPM program lists all non-OMRI verified pesticides as “conventional” even if the active ingredient is naturally occurring.

Cultural Control. A method of controlling pests by changing work practices to reduce pest establishment, reproduction, dispersal, and survival. Changing irrigation practices to reduce the amount of root diseases and weeds is an example of cultural control.

Fungicide. A substance or preparation used to kill fungi, including blights, mildews, molds, and rusts.

Herbicide. A substance or preparation used to kill weeds and other plants that grow where they are not wanted.

Insecticide. A substance or preparation used to kill insects and other arthropods.

Integrated Pest Management (IPM). An ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of

techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment.

Mechanical Control. The management and control of pests using physical means such as weeding, mowing, fences, or barriers.

Organic Materials Review Institute (OMRI). A 501(c)(3) nonprofit organization providing organic certifiers, growers, manufacturers, and suppliers an independent review of products intended for use in certified organic production, handling, and processing.

Organic Pesticide. Pest control substances or mixtures of substances that are compliant with organic standards. In the United States, the term “organic” is federally regulated and governed by standards in the Code of Federal Regulations when used on food or fiber products. When the Marin County IPM program uses the term “organic,” it refers to pesticides verified by OMRI to meet federally-regulated organic standards used by certified organic food and fiber producers.

Pest. Pests are organisms that damage or interfere with desirable plants in fields and orchards, landscapes, or wildlands, or damage homes or other structures. Pests also include organisms that impact human or animal health. Pests may transmit disease or may be just a nuisance. A pest can be a plant (weed), vertebrate (bird, rodent, or other mammal), invertebrate (insect, tick, mite, or snail), nematode, pathogen (bacteria, virus, or fungus) that causes

disease, or other unwanted organism that may harm water quality, animal life, or other parts of the ecosystem.

Pesticide. A pesticide is any substance or mixture of substances intended for: preventing, destroying, repelling or mitigating any pest; use as a plant regulator, defoliant, or desiccant; or use as a nitrogen stabilizer. Fungicides, herbicides, insecticides, and rodenticides are all types of pesticides.

Pesticide Precautionary Statements. Written, printed, or graphic matter which provide the pesticide user with information regarding the toxicity, irritation and sensitization on hazards associated with the use of a pesticide as well as treatment instructions and information to reduce exposure potential

Pesticide Product Label. The written, printed, or graphic matter on, or attached to, the pesticide or device or any of its containers or wrappers. It provides critical information about how to safely and legally handle and use pesticide product. Unlike most other types of product labels, pesticide labels are legally enforceable, and all of them carry the statement: “It is a violation of Federal law to use this product in a manner inconsistent with its labeling.”

Pesticide Toxicity Category. The EPA established four Toxicity Categories for acute hazards of pesticide products, with “Category I” being the highest toxicity category. Acute toxicity studies examine a product’s toxicity as it relates to six different types of exposures (acute oral, acute dermal, acute inhalation, primary eye irritation, primary skin irritation, and dermal sensitization). The product is assigned a toxicity category (I–IV) for each type of exposure based on the results of five of the six studies.

Rodenticide. A substance or preparation used to control mice and other rodents.