Prepared by
Marin County Parks

INTEGRATED PEST MANAGEMENT

2019 ANNUAL REPORT

2019 Summary

Marin County continues to build upon an already-successful Integrated Pest Management (IPM) program.

Marin County continues to lead the way in utilizing non-chemical IPM alternatives. In 2019, Marin County continued to use zero glyphosate and zero rodenticide across all 147 sites governed by the County's IPM ordinance. To achieve this, volunteer, staff, and contractors worked a total of 46,254 hours dedicated to non-chemical IPM. County staff, including volunteer coordinators, landscape managers, and the IPM specialist focused on providing educational opportunities for the public and other professionals in the Bay Area through workshops, trainings, and community events throughout the year.

In general, our landscape IPM promotes a tolerance for weeds in appropriate settings. This approach can be seen at the Civic Center lagoon park, where mowing can manage weeds such as mallow and purslane on an ongoing basis.

2019 IPM Achievement Awardee: To be announced

2019 IPM Achievement award winner will be announced during the January 24, 2020 IPM Commission meeting.

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

Keeping Marin County safe and healthy.

Marin County Integrated Pest Management

Integrated Pest Management (IPM) is a system of managing pests using careful consideration and integration of all available pest control tools and techniques. The target pest, goals, and site conditions guide a systematic decision-making process on what control methods to use. Mechanical and physical pest controls include weeding, mulching, weed-whipping, and mowing. Cultural control means changing work practices to reduce pests, such as altering irrigation practices to reduce weeds. Biological controls are natural enemies (predators, parasites, pathogens, and competitors) that control pests. Pesticides are used only after it is determined that alternative methods will not be effective. A pesticide is a natural or synthetic chemical preparation used to destroy plant, fungal, insect, or animal pests, and all pesticides used by the county are reported to the California Department of Pesticide Regulation.

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

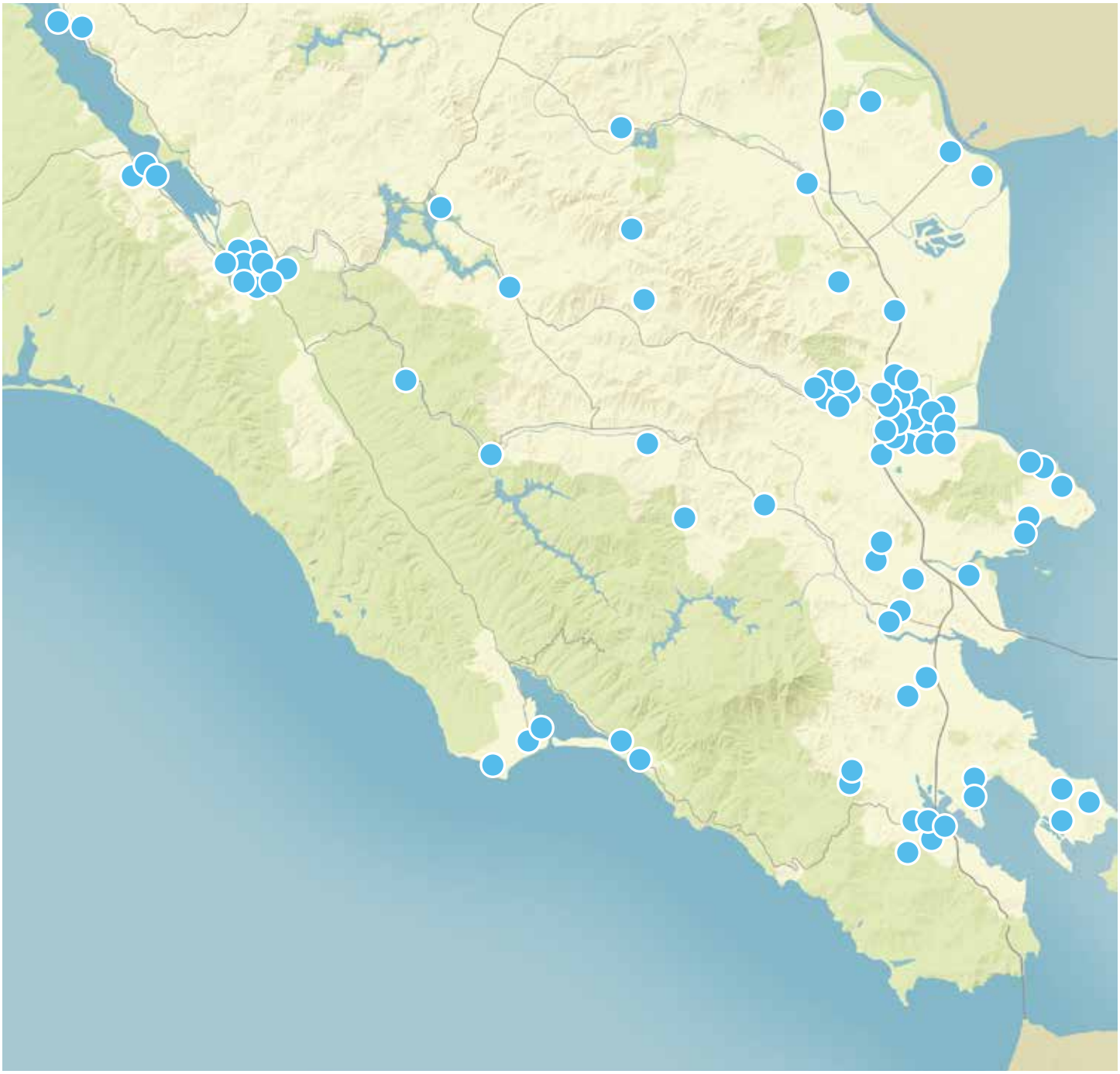
The Integrated Pest Management Commission oversees the implementation of the Marin County Integrated Pest Management ordinance and policy. The nine-member Commission also advises and makes recommendations to Marin County's IPM Coordinator and the County Board of Supervisors as needed. Commission meetings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

The County's IPM policy applies to 147 sites that include county parks and libraries, Marin County government offices, Marin County Health and Human Services sites, County Service Areas, roadsides, and traffic medians throughout Marin. Common IPM challenges in these locations include wasps, ants, roaches, rodents, and weeds. In addition to managing pests, 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, insects, and weeds may present a public health and safety hazard.

IPM Governance

In 2019, Marin County maintained 147 locations including 128 without pesticides.



County ordinance 3598 governs IPM for parks, libraries, fire stations, office buildings, traffic medians, other buildings, and ornamental landscapes on county properties across Marin. The Marin County Open Space Preserves are governed by the Parks and Open Space Commission and the Open Space District Board of Directors. They are not covered in this report. Visit marincountyparks.org to view the Vegetation and Biodiversity Report and Work Plan for more information on IPM in the preserve system.

2019 Achievements

Trainings, workshops, and educational events fostered collaboration with the public and other agencies.

IPM Specialist Kat Knecht leads children in a "bugology" themed afterschool program at the Novato Library.

Prevention and building maintenance are key to structural IPM.

Marin County's structural IPM focuses is on eliminating the root causes of pest infestation, in preference to simply applying chemicals for a short-term result.

Firewise IPM can also achieve pest prevention goals. In 2019, flammable juniper and acacia was removed from some landscaped areas of the Marin Civic Center. The removal of this brush simultaneously functions as a non-chemical method for reducing rodent populations near the building by removing potential habitat for rats, mice, and squirrels.

In 2019, crews removed flamable juniper from the Marin Civic Center campus in order to reduce fire risk and remove potential habitat for rodents. Before (left) and after (right).

Staff continually improve Marin County's IPM Program.

Treating competitive weeds without herbicides. In 2019, the IPM program continued to manage the highly invasive Uruguayan creeping water primrose (Ludwigia peploides sp.) at the Civic Center Lagoon Park. This plant has invaded aquatic habitats worldwide, and is typically only able to be managed with glyphosate. However, with a combination of early detection and careful hand-pulling by staff, contractors from Forest and Kroger, and California Conservation Corps North Bay, the plant was removed from Lagoon park. While it is expected to return in 2020, continued hand pulling should soon eradicate the species form the site entirely.

The IPM program continues to focus on organic and minimum-risk products. The IPM policy sets a goal of replacing non-organic products with those certified organic by the USDA's National Organic Program. In 2019 IPM staff researched organic insecticides, including wasp treatments using peppermint oil and bedbug treatments using soybean oil, both of which will be added to the program in 2020. While these products are only effective for small infestations, careful monitoring can ensure that populations are treated as quickly as possible.

Top 5 Park Pests

Some common pests are attracted to food. Others are found near paths of travel, like roadside landscapes and medians.

- European paper wasp *(Polistes dominula)*
- Canada goose *(Branta canadensis)*
- California ground squirrel *(Otospermophilus beecheyi)*
- Invasive annual grasses — various species
- Common mallow *(Malva neglecta)*, little mallow *(Malva parviflora)*

Invasive Ludwigia sp. was removed by hand from the civic center lagoon. Before (left) and after (right).

Non-chemical IPM is a team effort.

In 2019, Marin County collaborated on best practices and shared resources for non-chemical IPM with regional partners and local organizations. There continues to be interest in non-chemical IPM across the bay area, with several organizations reaching out to Marin County and/or sending staff to our annual IPM training. IPM staff gave multiple trainings and/or presentations to groups including students, nonprofits, professional associations, public agency staff, neighborhood groups, and project partners. IPM staff also participated in symposiums and workshops as trainees in order to stay up to date on the latest successes and challenges being experienced by local leaders in IPM. A highlight was PA-PA's multi-day symposium, which focused on the reduction of acutely toxic chemicals in the environment via IPM-focused practices. Additionally, staff reached out to other organizations including San Francisco Department of the Environment, UC Davis and the UC Cooperative Extension, Marin County Department of Agriculture, CAL-IPC, Golden Gate National Recreation Area, the Marin Resource Conservation District, and Non-toxics Irvine to learn how other organizations are approaching non-chemical IPM.

Marin County parks continues to participate in the Marin Knotweed Action Team (MKAT), which was formed in response to sightings of Japanese knotweed (Fallopia japonica). This class A noxious weed is considered to be one of the most invasive plant species in the word, and is currently spreading along San Geronimo Creek, which is home to endangered salmonids. Because this environmentally important watershed is managed by multiple agencies, collaboration is crucial to effective management. In addition to MKAT, IPM staff represent the department in the newly reconvened Sonoma/Marin Weed Management Area, and the Maintenance and Superintendents Association's Redwood Empire Chapter.

Partnerships

The Marin County IPM program would not be possible without community partners and their volunteers including but not limited to:

- Hungry Owl Project and Wildcare
- Linking Individuals to their Natural Community (LINC) youth stewardship program
- Marin Knotweed Action Team (MKAT)
- Students and Teachers Restoring a Watershed (STRAW)
- Marin Master Gardeners
- Marin County's Adult Work Offender Program
- Yardsmart Marin
- California Conservation Corps North Bay
- California Invasive Plant Council

2019 Achievements

In 2019, volunteers contributed 11,694 hours in support of non-chemical IPM.

The Marin County Parks community of volunteers make it possible to successfully manage our parks, playgrounds, and picnic areas without herbicides. They receive and provide education related to IPM, and perform services including trash cleanup, sheet mulching, hand-pulling, weed whipping.

2019 Achievements

Overall IPM labor hours slightly increased in 2019 and volunteer hours increased by 9%.

Labor Hours by Month

Month	Staff IPM	Volunteer IPM	Contractor IPM	Total Hours
JANUARY	1,379	861	1,041	3,280
FEBRUARY	1,552	1,063	1,005	3,619
MARCH	1,557	890	1,103	3,550
APRIL	1,594	976	1,002	3,571
MAY	2,268	519	841	3,628
JUNE	2,559	555	994	4,108
JULY	2,013	1,433	888	4,334
AUGUST	3,247	1,094	800	5,141
SEPTEMBER	2,186	1,321	995	4,501
OCTOBER	2,008	870	837	3,715
NOVEMBER	1,426	1,093	842	3,361
DECEMBER	1,542	1,019	886	3,447
Total Hours	**23,328**	**11,694**	**11,232**	**46,254**

Labor Hours Year-Over-Year

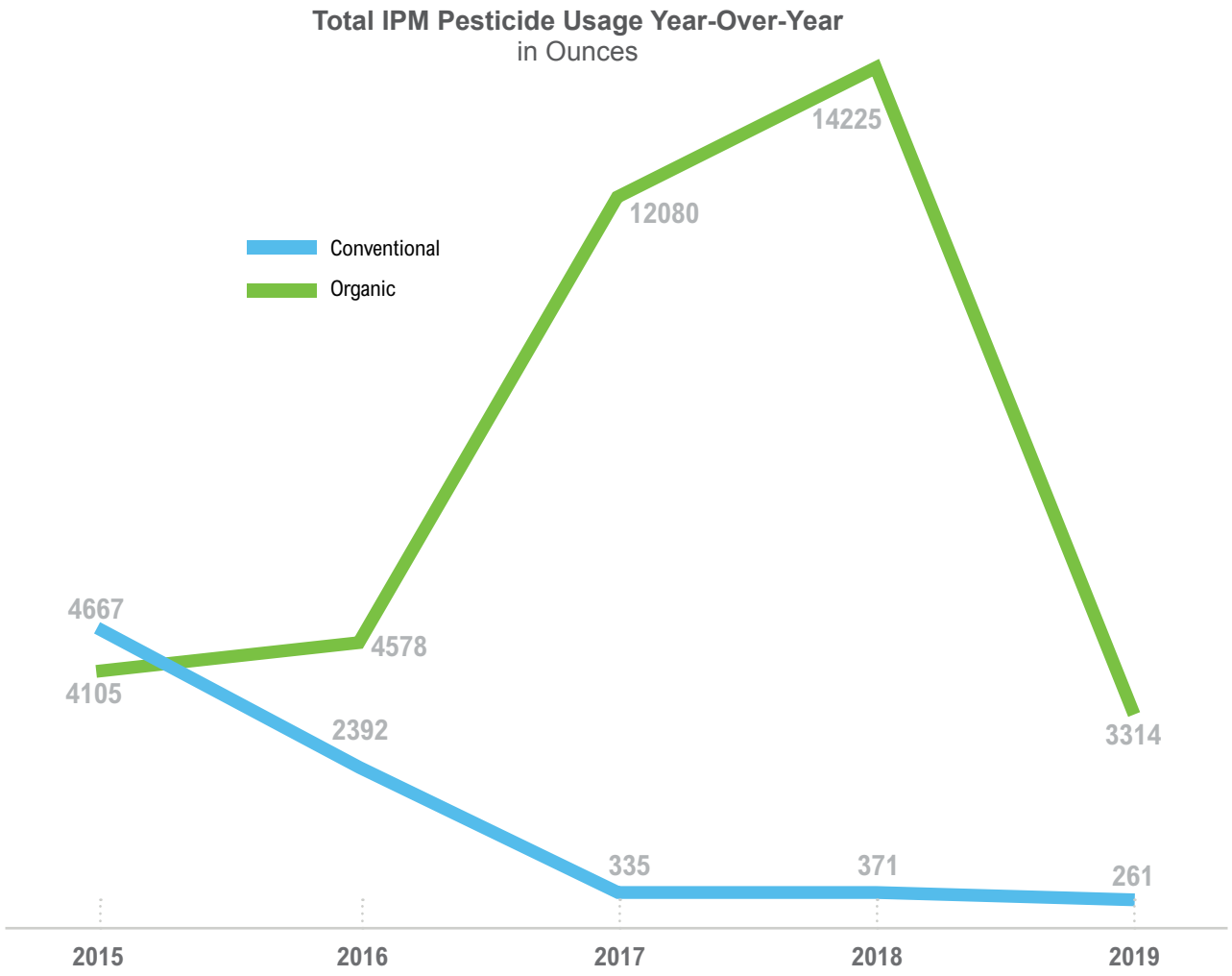
Year	Staff IPM	Volunteer IPM	Contractor IPM	Total Hours	% Change
2014	15,774	6,678	8,201	30,653	**3.7%**
2015	20,718	7,983	8,687	37,388	**21.9%**
2016	26,888	7,086	8,808	42,782	**14.4%**
2017	25,052	9,439	8,542	43,033	**.58%**
2018	21,970	10,766	10,563	43,299	**.62%**
2019	**23,328**	**11,694**	**11,232**	**46,254***	**6.83%**

The County maintains a strong commitment to Integrated Pest Management that emphasizes non-chemical, 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 23 full-time staff.

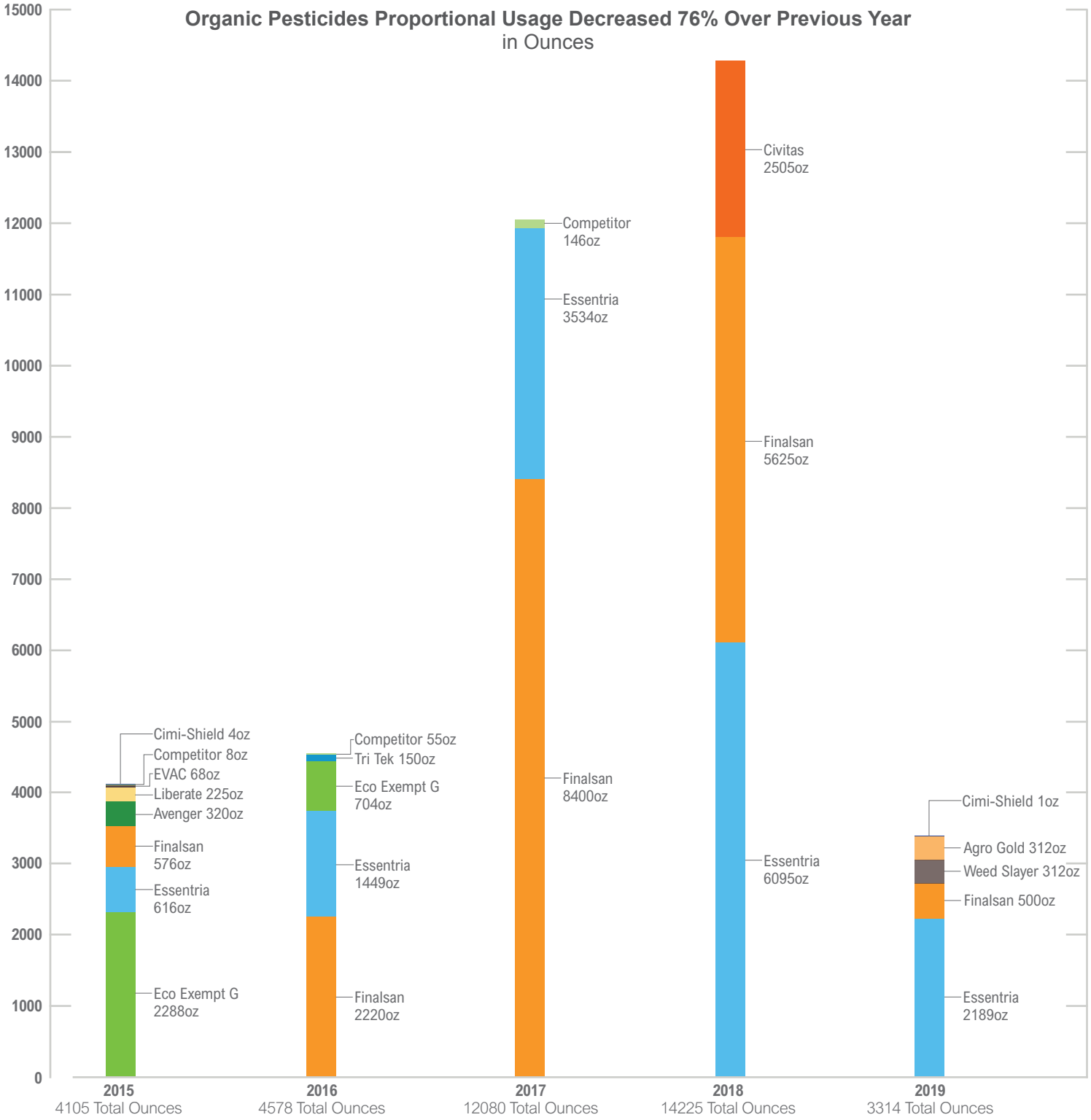
Total Pesticide Use

In 2019 conventional and organic pesticide use decreased.



Conventional pesticide use dereased by 29% in 2019 over the previous year while organic pesticide use decreased by 76%. Organic alternatives require a significantly higher application volume 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



2019 saw a dramatic decrease in overall pesticide volume applied to IPM sites, which is also reflected in a decrease in the ounces of organic products applied. One reason for the decrease in organic ounces of pesticides is due to a switch from Finalsan herbicide to a mix of Weedslayer and Agro Gold, which is a product that uses far fewer ounces per acre than Finalsan, in addition to being less acutely toxic to applicators. While Finalsan is registered organic with OMRI, Weedslayer and Agro gold are FIFRA 25B Minimum Risk products.

Organic Pesticides Applied in 2019

Organic and minimum risk product alternatives were an integral component of IPM in 2019.

Organic and minimum risk* Products Used for Outdoor Landscape Maintenance

Finalsan is a fast-acting herbicide used to control weeds. Its active ingredient is ammoniated soap of fatty acids. It was applied to weeds growing at Sir Francis Drake medians and Rush Creek medians, where hand-pulling near vehicle traffic can be dangerous for landscape staff.

Weed Slayer and Agro Gold WS mix to form the Weedslayer herbicide that was most commonly used in 2019. With active ingredients Eugenol (clove oil) and Bacillus megaterium (a bacteria found commonly in many environments), Gardener's Guild used this product more than any other pesticide.

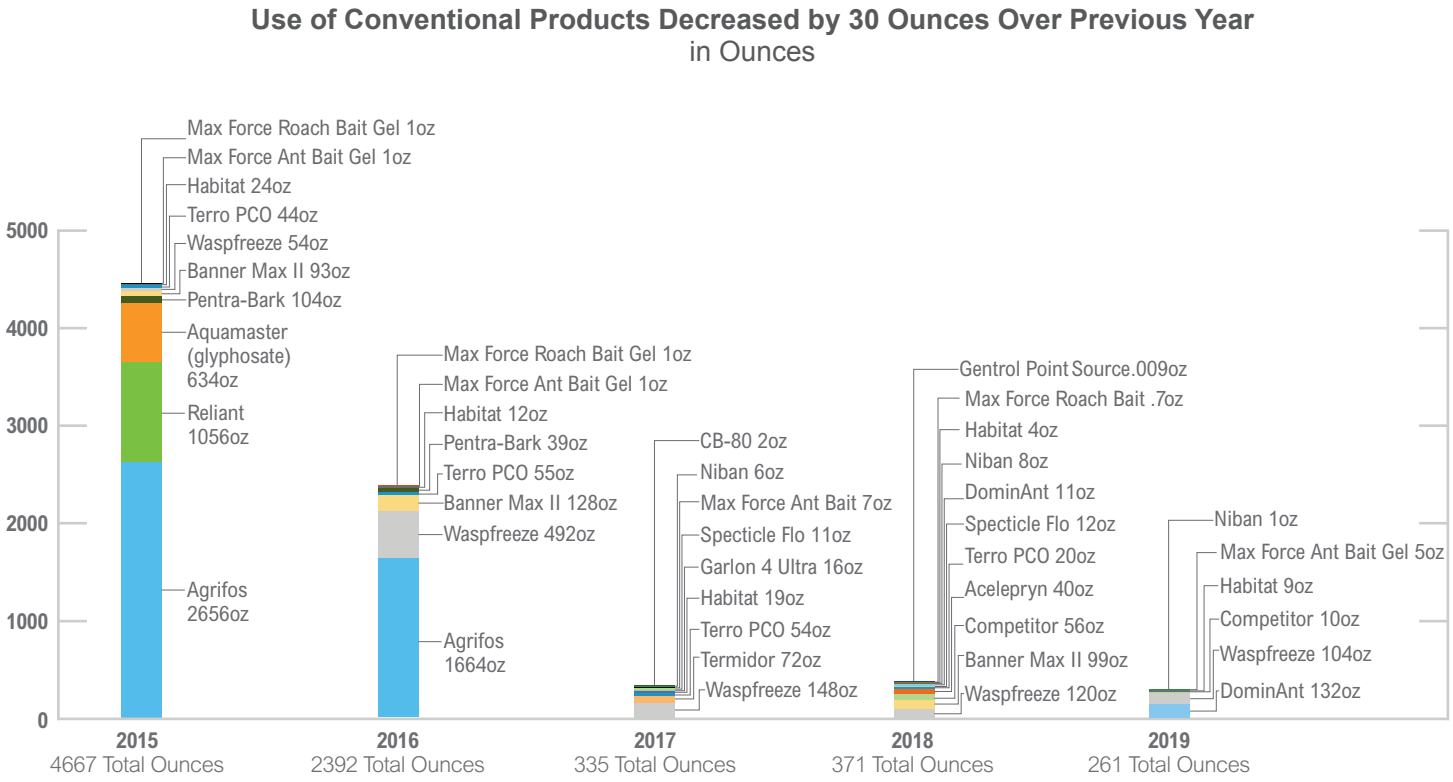
Organic and minimum risk* Products Used for Indoor Structural Pest Control

Essentria IC 3† is an insecticide with active ingredients comprised of rosemary oil, genaniol, and peppermint oil. When applied to the perimeter of a building, this product can prevent insect pest problems from affecting structures. This product was used at McInnis Clubhouse, juvenile hall, the road department building and others.

* Product verified by the Organic Materials Review Institute (OMRI) to meet federally-regulated organic standards used by certified organic food and fiber producers, or is exempt from EPA registration by qualifying for the FIFRA 25B Minimum Risk ingredients list (aka "Eco-Exempt").

† Essentria IC3 contains active ingredients that fall under FIFRA 25B Minimum Risk category, and the active ingredients consist exclusively of rosemary oil, geraniol, and peppermint oil. However, this product was not certified by OMRI.

Conventional Pesticide Use



In addition to decreasing the total ounces of organic* pesticides applied to our parks, fewer ounces of conventional pesticides were applied in 2019 than in 2018. This is in part due to the fact that the IPM program no longer has jurisdiction over San Geronimo Golf Course, which did apply a small amount of conventional pesticides in 2018. The most commonly used conventional pesticides on IPM sites are small ant bait stations filled with boric acid, and are the same product commonly used in households to manage ants.

Information from previous years and the full list of allowable organic and conventional pesticides is available at www.marincountyparks.org.

Conventional Pesticides Applied in 2019

In 2019, Marin County Parks decreased application of conventional products.

Conventional* Products Used for Outdoor Landscape Maintenance

Competitor is a surfactant with active ingredient ethyl oleate. It is a substance that is added to a liquid to reduce its surface tension, thereby increasing its spreading and wetting properties. It is mixed with other products like Finalsan to increase efficacy and was applied to weeds growing at Sir Francis Drake and Rush Creek medians in 2019.

Habitat, an herbicide with active ingredient imazapyr, is formulated specifically for aquatic and riparian areas. It is used in spot treatment as part of the Bay area wide invasive Spartina project. Only 4 oz were applied this year to Hal Brown Marsh as part of the final stages of the battle against Spartina densiflora.

WaspFreeze II, with active ingredient prallethrin, was applied to as few nests as possible, and only when a yellowjacket nest posed a health risk to the public or staff. These products were applied in limited quantities at various park sites during the summer and fall.

Conventional* Products Used for Indoor Structural Pest Control

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

Nibor-D uses boric acid, a low-toxicity mineral, to control insects. It was used to treat fruit flies at McInnis Park clubhouse.

DominAnt also uses boric acid and was used to aid controlling ants and other crawling insects at multiple structural sites including the civic center interior and Gnoss Field buildings. 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, or is not on the EPA's FIFRA 25B Minimum Risk ingredient list (aka "Eco-Exempt"), the Marin County IPM program lists it as "conventional".

Proposed Changes to 2020 Allowed Products List

County IPM staff reviewed the IPM policy and ordinance in 2019 and proposed edits.

Proposed Product Removal

The following products were removed from the county's list of allowed products:

- Rat Ice (EPA # 12455-148)
- Tempo 20 WP (EPA # 3125-380-AA)
- Termidor SC (EPA # 7969-210)
- Acelepryn G (EPA # 7969-210)
- Affirm WDG (EPA # 7969-210)
- Banner Maxx II (EPA # 7969-210)
- Turflon Ester (EPA # 7969-210)
- Garlon 4 Ultra (EPA # 62719-527)
- Habitat (EPA # 241-426-A)

Proposed Product Reclassification

The goals of the IPM policy outline that a "Special Use" list shall be maintained, and shall contain any allowed products that contain carcinogens, groundwater contaminants, or fall under the EPA pesticide toxicity categories I and II. Therefore, the county IPM coordinator recommends to the commission that some products are moved from the "regular use" and "exempted use" lists to the "special use" list. Those products include:

- Suppress (EPA # 51517-9)
- Safer Soap (EPA # 42697-59)
- Finalsan-O (EPA # 67702-34-70051)
- Finalsan (EPA # 67702-8)
- Drione (EPA # 432-992)
- Fusilade II (EPA # 100-1084)
- Heritage (EPA # 100-1093)

Proposed Product Reclassification

In addition to re-classifying some products to better fit the IPM policy language, IPM staff proposed the addition of the following products:

- Agro Gold WS (FIFRA 25B exempt)
- Weedslayer (FIFRA 25B exempt)
- Essentria Wasp and Hornet Spray (FIFRA 25B exempt)
- Cimishield Protect (FIFRA 25B exempt)

Marin County Parks IPM Team

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 FireSafe 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).

Katherine Knecht
Integrated Pest Management Specialist

Katherine joined the IPM team in February 2018, bringing experience with education programming, habitat restoration planning, and volunteer coordination. After growing up in Mill Valley, San Rafael, and Novato, she obtained a B.S in Environmental Studies with an emphasis on ecological systems and habitat restoration from UC Santa Barbara. Her graduate thesis focused on salmonid habitat restoration project planning on the Columbia River, which was accompanied by work managing Japanese knotweed in Clark County Washington. In 2015, she worked as a program coordinator and educator at an outdoor and environmental education facility and is thrilled to have the opportunity to bring these skills and experience home to serve Marin County as IPM specialist.

Kirk Schroeder
Volunteer Program Coordinator

Kirk Schroeder has worked at Marin County Parks for 18 years, and has 12 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. Active ingredients are the chemicals in a pesticide product that act to control the pests. Active ingredients must be identified by name on the pesticide product's label together with its percentage by weight. An "active ingredient" 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 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 man-made by a synthetic or chemical process 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 USDA National Organic Program 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. Each pesticide product label is required to bear hazard and precautionary statements. These 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.