

Integrated Pest Management Annual Report 2021



CCC staff helping with the pollinator garden
at Oyster Bay Regional Shoreline, San Leandro.

Preserving Open Space for the Future

The East Bay Regional Park District (Park District) manages a diverse landscape of 125,000 acres in Alameda and Contra Costa counties. The regional system comprises 73 parks, 1,333 miles of trails, and 55 miles of shoreline. Serving 2.8 million East Bay residents with approximately 25 million visits per year, the Park District is the nation's largest regional park agency.

Managing the large expanse of open space requires strategic planning and effective policies. Governed by a seven-member elected Board of Directors that set policy for the implementation of the Park District Master Plan, our workforce of 1,000 employees from diverse professional sectors contribute to the management of the regional parks.

The second year of the COVID-19 pandemic continued to change the way we manage the parklands, but the results were similar to non-pandemic years. We continued to work with due diligence and strategic planning, protecting our parklands and the environmental and recreational resource; engaging in Integrated Pest Management (IPM) training; assisting in projects that improved habitat; assisting in recovery of sensitive species and using adaptive management practices within an ecological framework.

This annual report provides accurate and transparent information about the various pest control practices that make up our IPM program. We prioritize the prevention and effective control of pests in a continual, sustainable, and ecologically focused manner while using scientific and evidence-based best practices. The IPM program is an essential component of the ongoing support of healthy ecosystems that benefit the vitality of wildlife and the quality of park experiences for our visitors.



Mission Peak Regional Preserve
Fremont



Yellow mariposa lilies on Mission Peak
Regional Preserve, Fremont

Commitment to Natural Resource Management

The Park District's mission statement continues to be an inspiration and an enduring testimonial to the Park District's commitment to protect open space resources and to provide environmentally responsible outdoor recreation opportunities for present and future generations.

“The East Bay Regional Park District preserves a rich heritage of natural and cultural resources and provides open space, parks, trails, safe and healthful recreation and environmental education. An environmental ethic guides the District in all of its activities.”

– East Bay Regional Park District Mission Statement

Consistent with this mission, the Park District's IPM policy fosters the protection of natural and recreational resources, while minimizing the use of chemicals.

“In accordance with the accepted principles of ecology, the District will strive to implement an integrated pest management program which eliminates the use of chemicals as much as feasible whenever alternative methods are effective.”

– Pest Management Policy and Practices, EBRPD,
October 1987 Resolution #1987-11-325

Keystone Tenets of Integrated Pest Management (IPM)

- The Park District strives to manage pests in the most effective and safest manner for our park visitors and our employees by following an IPM program.
- This IPM program is a multidisciplinary and cross-departmental effort that is based on an environmental ethos, accountability, and transparency.
- The management and operation of public parklands is rooted in key principles of honoring the land, its ecological systems and cultural heritage, as well as honoring our park visitors and the people who conduct sustainable park and landscaping operations, our employees.
- Prevention is the key to safe and effective pest management.
- Pest management actions are guided by best science, weight of evidence principles, best practices, and the Park District's environmental ethos.
- Control of invasive vegetation is an essential, adaptive management tool that helps our ecology be more resilient to drought, provides habitat benefits, and reduces risks of wildfire.

Integrated Approaches in the Park District

What is Integrated Pest Management?

Integrated Pest Management (IPM) is a scientific approach to pest management. A pest is any organism that causes damage to human health, safety, recreation, or environmental function. In the Park District, the bulk of pests are nuisance weeds that limit public access to open spaces, pose a fire risk, and degrade recreation access. IPM targets noxious weeds that threaten biological diversity and ecological function. Additionally, other organisms such as ticks, yellow jackets, rattlesnakes, rats, and mice are also managed to reduce threats to public health. IPM effectively reduces pest populations while minimizing human health and environmental hazards.

Principal Goals of the IPM Program

These goals, listed below, help define the purpose behind IPM actions and facilitate the collection of data used to refine objectives and provide quantitative data for adaptive management. The IPM program supports and enhances the environment, diverse habitats, and public health and recreation through strategic pest management.

FIRE SAFETY

Fire safety at the Park District includes vegetation management to support wildfire prevention. Examples include:

- **Creating safe access** through vegetated areas on trails and roads for emergency vehicles to effectively respond to and prevent wildfires.
- **Establishing vegetation-free perimeters** around potential ignition sources such as fire pits and camp grounds.
- **Maintaining vegetation-free perimeters** around buildings.

HEALTHY FORESTS

District-wide vegetation reduction and restoration projects to reduce risk of catastrophic fire in the wildland-urban interface.

- **Vegetation reduction** to increase spacing between trees.
- **Control and removal** of ladder fuels and resprouting woody, invasive vegetation.
- **Control and removal** of invasive plants to maintain a healthy shaded fuel break.
- **Support** the recruitment (plants growing on their own) and maintenance of native vegetation.

PUBLIC HEALTH

Ongoing control of pests to reduce threats to public health and remediation of conditions under which these pests thrive. Examples of diverse pests include blue-green algae (cyanobacteria) that cause harmful algal blooms, ticks that carry Lyme disease, E. coli from waterfowl that create unhealthy swimming conditions, and rodents that are vectors of hantavirus in Park District buildings.

ECOLOGICAL FUNCTION

Promoting and maintaining sensitive natural resources to increase biodiversity and ecological functioning in our parklands. This broad category includes:

- **Habitat enhancement and restoration projects** such as planting and maintaining pollinator gardens at our parks, removing monocultures of invasive plants.
- **Endangered species recovery projects**, such as least tern and other breeding shorebird islands.
- **Preventive weed treatment** at habitat restoration sites such as the Alder and Huckleberry Creek restoration projects.

SAFE AND ACCESSIBLE RECREATION

Managing vegetation to enhance recreational use, including trail access, landscaping, and gardens. Operations staff manage the bulk of the recreation infrastructure with IPM staff supporting this effort. Examples include:

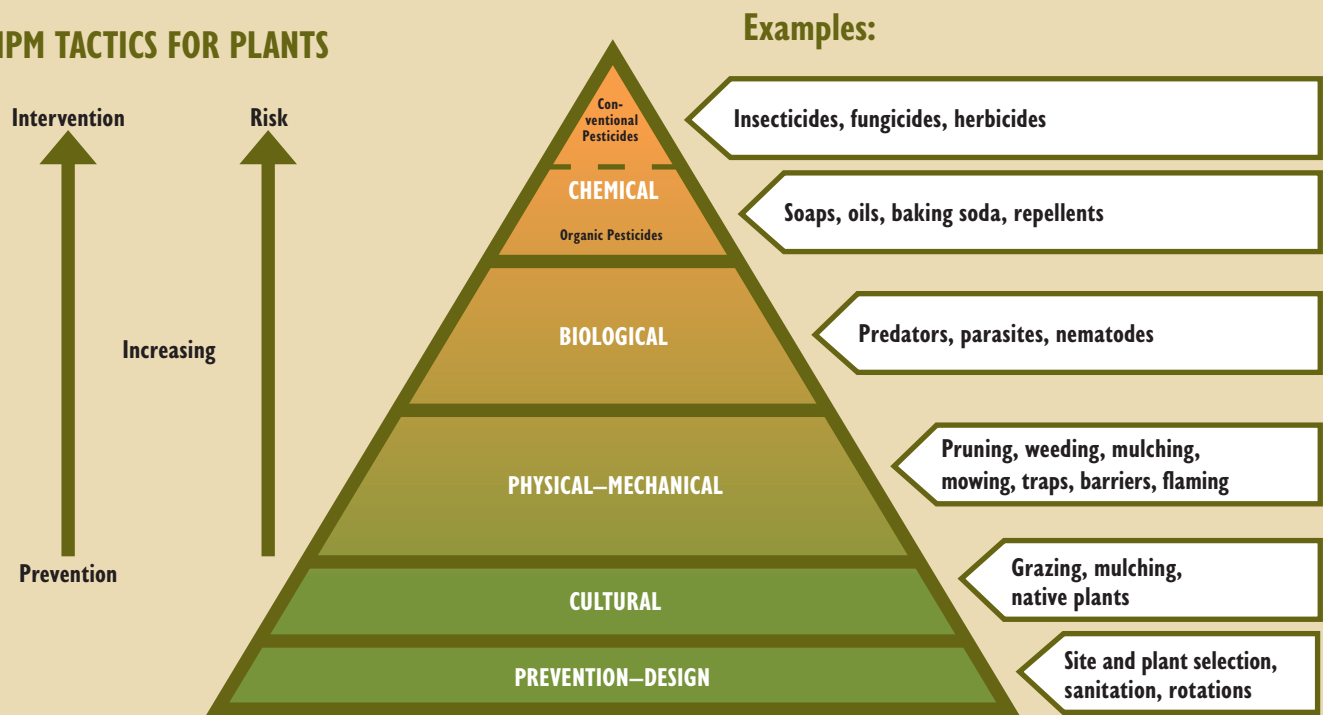
- **Control of poison oak** near trails and playgrounds.
- **Maintaining access** to fishing areas, docks and swimming areas by removing excess aquatic vegetation.

Foundations of IPM

At the Park District, IPM is a management practice based on an ecological framework that is used to identify, understand, and solve pest problems. Thoughtful design and prevention practices provide the foundation of the program. Science guides and provides the structure for an ecologically-sound IPM program.

Since the inception of its Integrated Pest Management policy in 1984, the Park District's management of pests has been based on regularly reviewed science standards, weight of evidence principles, and best industry practices guided by an environmental ethos. Research is used to identify safe, effective, and efficient management practices to ensure an enhanced park and trail environment for our park visitors, surrounding neighbors, and park employees.

IPM TACTICS FOR PLANTS



Integrated Pest Management hierarchy of methods

IPM Methodology

IPM is not a single pest control method but, rather, a series of pest management evaluations, decisions, and integrated actions. It is a non-linear process that relies heavily on an adaptive management framework. The management and operation of public parklands are rooted in key principles of honoring the land, ecological systems and protecting the public and staff through safe, sustainable park operations.

Prevention, Monitoring, and Identification of Potential Pests

As a first line of pest control, the IPM program works to prevent the introduction and spread of pests. It monitors for pests and identifies them accurately, so that appropriate control decisions can be determined and acted on early. Prevention is the foundation of all our methodologies and projects.



Methods

IPM methods of control fall under one of several categories: cultural, mechanical, biological, or chemical, and are listed in the order that indicates their importance and sustainability. Adaptive management provides feedback to this dynamic cycle of land management. Integrating the following approaches provides for a resilient and sustainable program. The Park District prioritizes mechanical, cultural, and biological controls or a combination of these before considering chemical controls.

- **Cultural controls** applied to reduce pests are mulching, grazing, and competitive planting with native plants. These methods are used on a park and landscape-scale across our diverse parks. Annual resource burns are performed at Point Pinole to enhance the coastal prairie. The Park District manages 70,000 acres of public land for ecological **functions through grazing**.
- **Mechanical controls** include weeding, line trimming, mowing, hand pulling, grubbing, etc. The Park District continues to prioritize the use of mechanical methods as the fundamental tool to control vegetation along roads and trails, to reduce fire risk while providing park maintenance. Most fire roads and trails are rough mowed, or line trimmed and much of the Park District's fencing is line trimmed, as are most group camps and other recreational areas. Often vegetative growth is heavy enough to warrant two or more mowings per growing season.
- **Biological controls** utilize natural or introduced enemies of the identified pest. The Park District's efforts to increase biodiversity through invasive weed management and competitive native plantings increase insect diversity that provide natural levels of biocontrol. Additionally, the IPM program works collaboratively with the US Department of Agriculture's Agricultural Research Service (USDA-ARS) and their biocontrol programs in various parks.
- **Chemical controls** include the use of organically registered and conventional products that are used to control plants, insects, fungi, or other pests. Conventional and organic herbicides pesticides are used when mechanical and cultural methods are insufficient or ineffective. Conventional or organic products are never used in and around play structures and drinking fountains.

Preventing the Introduction and Spread of Pests

Prevention is the cornerstone of any IPM program. The first line of defense is a robust program of prevention that includes clean equipment, weed free materials such as clean rock stockpiles and pathogen-free soils. Prevention minimizes introduction of new pests. Every year staff are trained in Best Management Practices (BMPs) to conduct pest monitoring for new threats to our parklands and recreational activities with methods to minimize introduction of those threats.

Soil Born Pathogen Prevention

Introductions of virulent *Phytophthora* species have occurred in the Bay Area and in our parklands through infected nursery stock as well as the use of contaminated equipment in our parklands. In 2021, the Park District updated its contracting procedures to require new projects to utilize phytosanitary practices and clean nursery stock from approved nurseries. This new requirement will help protect our wildlands. We continue to build on this prevention program, expanding these practices to all areas of the District.

Early Detection Rapid Response (EDRR)

Invasive, non-native plants have negative impacts on recreation and ecosystem function. EDRR programs are a critical second line of defense against the establishment of newly arrived invasive plants. The goal of EDRR programs is to find new populations of highly invasive plants early, to map and replace them before they spread in the parklands. EDRR identifies invasive plants that have been recently introduced, are found adjacent to management areas, are likely horticultural escapees and are known to be aggressive or potentially so. An EDRR program then focuses specific surveys and/or daily observations to detect and map these species for timely removal. Where feasible, EDRR surveyors may “rapidly respond” by hand pulling and disposal if the work can be done in a few minutes or less.

In 2021, the Park District partnered with other agencies to analyze EDRR programs in the greater Bay Area and formulated an EDRR program for the Park District. This program divides the Park District into geographic areas that have similar environmental conditions, producing specific EDRR species list based on known and potential invaders. Providing these focused areas allows for a more specialized species list and allows staff to be more effective and efficient at detecting new invaders.

In 2022, we will launch the EDRR program including an update to the Park District’s Invasive Weed Identification Guide and EDRR educational materials.

Sudden Oak Death

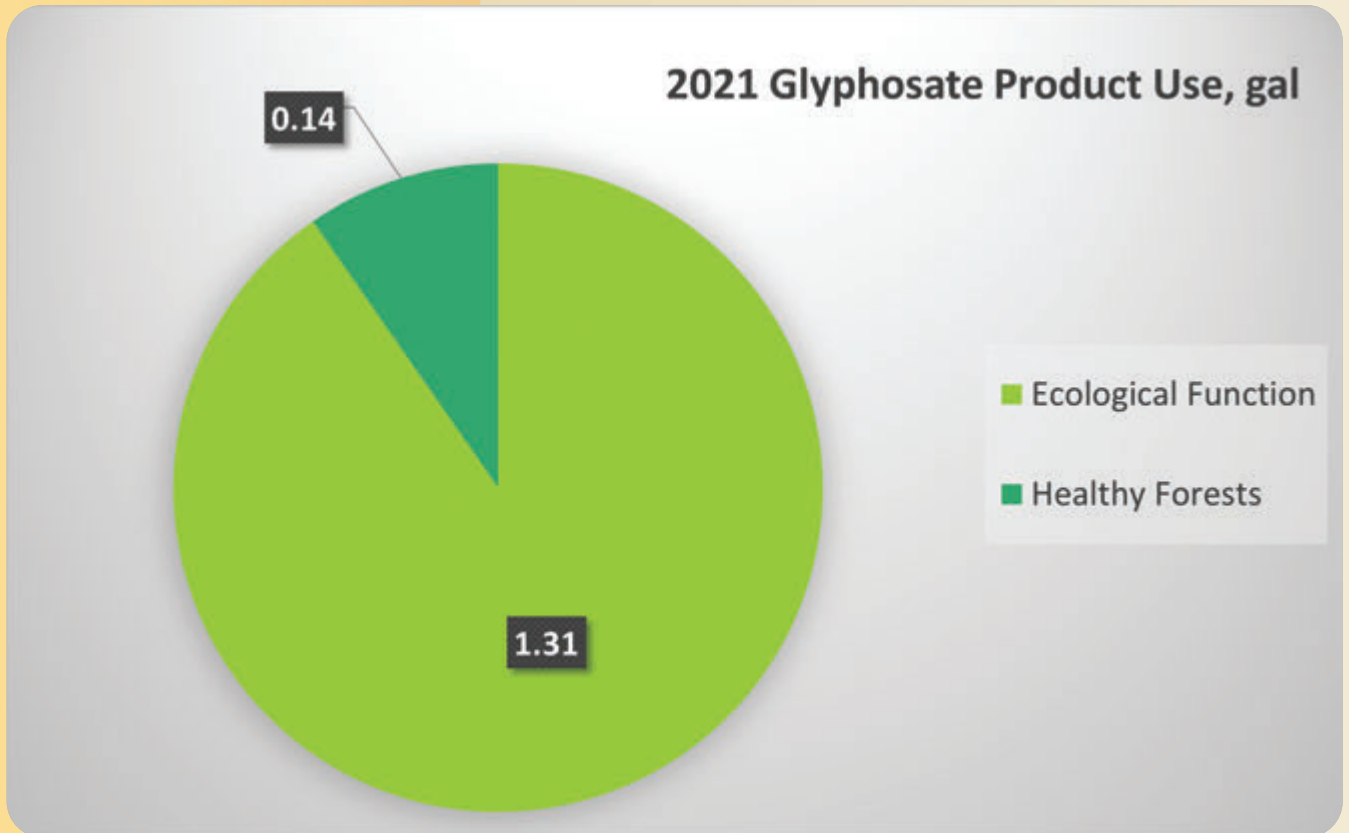
Infection by *Phytophthora* species, microscopic water molds, will continue to be a significant threat to many plant species, special plant communities and the wildlife food webs that depend on them. Sudden Oak Death (SOD), caused by the airborne *Phytophthora ramorum* will continue to have negative impacts on the East Bay’s oak woodlands. The Park District emphasizes best management practices to stop the introduction and spread of this airborne pathogen that has killed millions of oak trees since it was first identified in the mid 1990’s. With the new understanding that some individual oaks are resistant to the disease, prevention of further introduction and facilitation of spread is essential to give this critical plant community an opportunity to survive and persist.

Additional District management recommendations have expanded with new research that indicates that SOD can be slowed with selective bay tree removal around oaks. Staff has begun to incorporate these recommendations along with supportive treatments with phosphite applications, a more proactive approach in oak management around important recreational sites. For more information on this complex disease and current status – Bay Area wide – visit the website for the California Oak Mortality Task Force at suddenoakdeath.org.



Glyphosate Use

The use of herbicide products with the active ingredient glyphosate is not permitted in developed areas in the Park District (Resolution No. 2019-07-187). Developed Areas, as defined by Ordinance 38, include picnic areas, campgrounds, and swim beaches.



Glyphosate product use in 2021

Glyphosate products are prohibited in developed areas and used only when necessary to support the goal of improving ecological function. These products are used in landscape scale habitat enhancements, restoration, and mitigation projects. Each exemption to the glyphosate restriction is carefully reviewed and vetted by multiple departments before application.

Please see **Appendices A-F** for more information about herbicide use trends, approved general use products, and a list of products used in the Park District.

Controlling Cyanobacteria Algae

Management of Harmful Algal Blooms (HABs) in 2021 continued to be complicated by rising temperatures and a decrease in freshwater inputs due to the drought. Many lakes had closures due to cyanotoxin levels.

Lake Temescal

Lake Temescal experienced a nutrient rebound from deep sediments in 2020 requiring a Phosphorous binding treatment with Alum in June 2021. This nutrient remediation tactic was very successful in immediately reducing bioavailable phosphate in the water column and cyanobacteria was effectively controlled for the remainder of the year. As a result, Lake Temescal had very few cyanobacteria complications.

The Nanobubble pilot project at the lake was removed due to insufficient gas exchange during critical periods in the lakes cycling of nutrients. Dredging continues to be the long-term goal of a more sustainable solution to water quality at Lake Temescal.



Treatment to reduce nutrients and prevent harmful algal blooms in Lake Temescal.

Lake Anza

In late 2019, a Hypolimnetic Oxygenation System (HOS) was installed at Lake Anza. This system is designed to work with the natural stratification of this deep lake, oxygenating the nutrient laden sediments, binding phosphorous. In 2021, the Park District continued making fine-tune adjustments to the HOS at Lake Anza. Additionally, improvements were made to the HOS system to target oxygen delivery to the deepest part of the lake. Park District installed a valve in the diffuser system to focus this oxygen delivery to the deeper part of the lake. Unfortunately, stratification continued to be weak in 2021 and did not maintain itself despite reduction in oxygen delivery to help reduce mixing. Lake Anza continued to be plagued by cyanobacteria in 2021. We are hopeful that Lake Anza will improve over time, however it may need further remediation to manage the legacy nutrients in the sediments as well as the external input of naturally occurring phosphorous.



Cape ivy before restoration.



Cape ivy after restoration.

2021 Highlights

Training

- Improved the delivery of annual safety training in a virtual format.
- Increased in-person field trainings.
- Training for Civicorps members on the ecology and identification of weeds and the importance of community stewardship.
- Publication of the Best Management Practices for Non-Chemical Weed Control in partnership with California Invasive Plant Council and Department of Pesticide Regulation: www.cal-ipc.org/resources/library/publications/non-chem/
- Partnership in trainings on non-chemical weed management techniques with California Invasive Plant Council, UC IPM and other land managers from throughout California.

Research

- Partnered with USDA-ARS on research for novel treatment for barb goatgrass, a noxious weed, to be implemented in 2022.

Restoration

- Completed the 18th consecutive year of invasive hybrid *Spartina* cord grass in partnership with the California State Coastal Conservancy and the California Invasive Plant Council.
- Provided invasive weed control in fuels treatment areas throughout the East Bay hills Wildland Urban Interface, helping to maintain more native habitat and defensible spaces along our borders.
- Contributed to vegetation management for the recovery of the endangered least tern for the tenth consecutive year.
- Supported vegetation management and riparian restoration projects in Huckleberry and Alder Creeks, Leona Canyon, Pleasanton Ridge, Crown Beach and Point Pinole.
- Created a Monarch Habitat Nectar Garden at Oyster Bay.

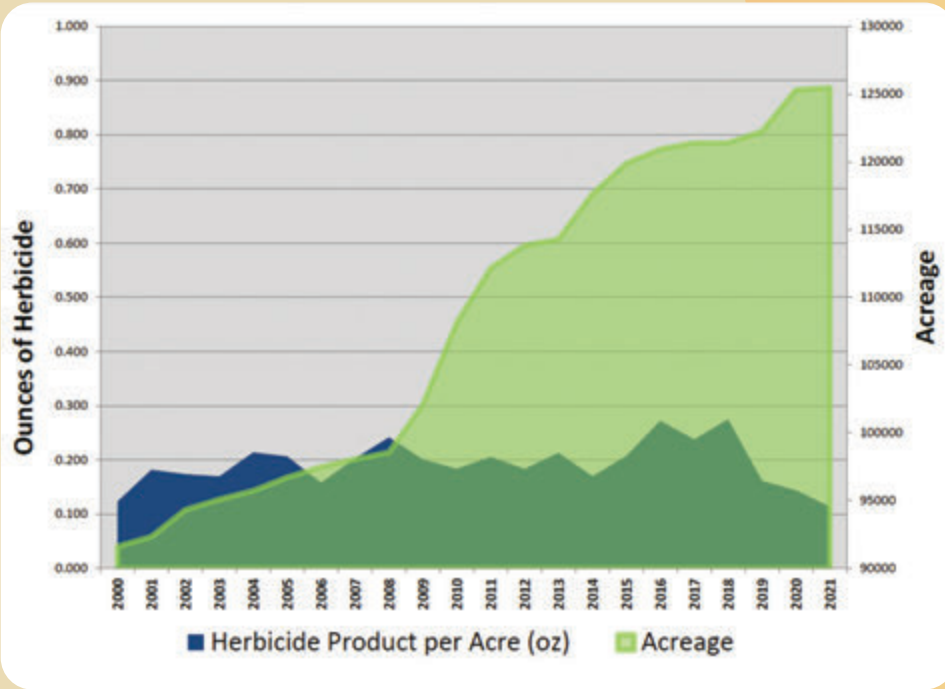
Conventional and Organic Product Trends

For a list of all products used throughout the Park District, see **Appendices A through F**.

- ALL of our children play areas and water fountains are free from pesticides.
- The second year of the pandemic continued to challenge staffing and applications of pre-emergent weed treatments during early winter in critical Fire Safety areas were reduced. Staff responded by increasing mechanical methods where feasible.
- The Park District continues to increase its proficiency in the use of organic herbicides to supplement its cultural and mechanical practices. Application timing is critical in the effective use of these products.
- Habitat Restoration projects were ongoing throughout the year.

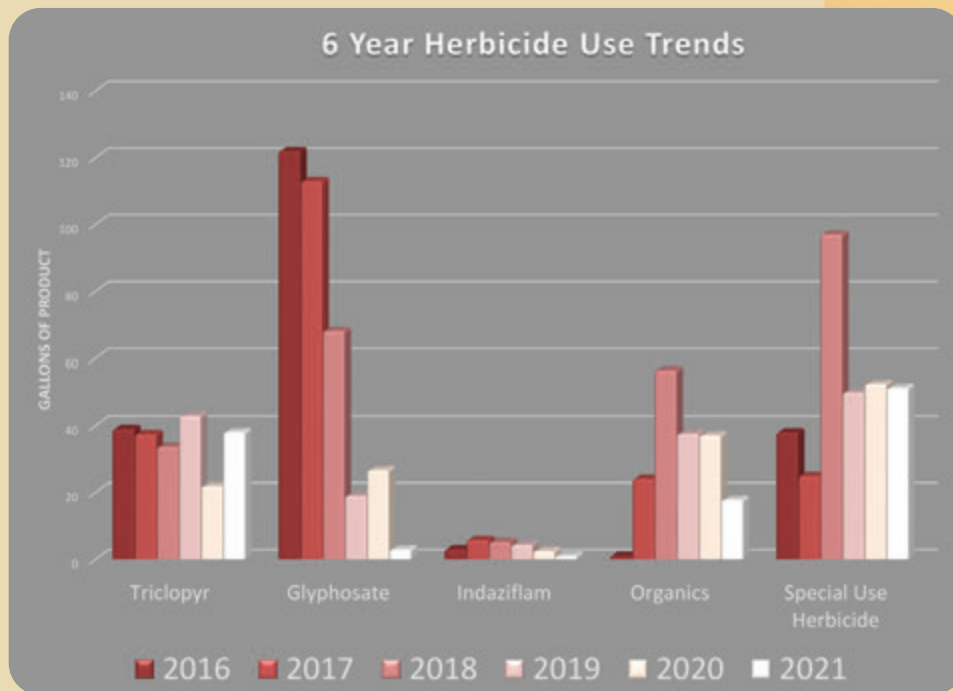


Reinhardt Redwood Regional Park
Oakland



Chemical control of vegetation per acreage.

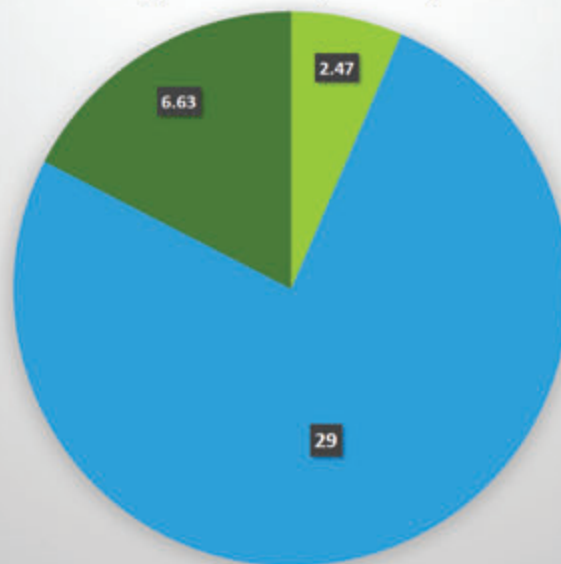
The Park District continues to grow, acquire, and protect more land every year. This graph demonstrates that the Park District continues to meet its commitment to reduce use of herbicides while still providing recreational opportunities and managing essential habitat.



Six-year herbicide trends following five main herbicide categories for Fire Safety, Recreation and Ecological Health Goals. (Golf Course and Conventional Farm use are not included in this graph.)

This graph illustrates a decrease in general herbicide product use. Special Use herbicide products are used primarily in the category of Ecological Function. For a complete list of all products by park see **Appendix A**.

2021 Triclopyr Products (Garlon) in Gallons



Gallons of products used with active ingredient Triclopyr for IPM goals.

Triclopyr (Garlon) products are an effective tool in the selective control of broadleaf noxious weeds in grassland habitats, restoration, and mitigation sites. Triclopyr is used for treatment of woody resprouting species such as eucalyptus and acacia species in the Healthy Forests category. Triclopyr is also used to promote safe recreation access including controlling perennial plants like poison oak.

IPM Programs

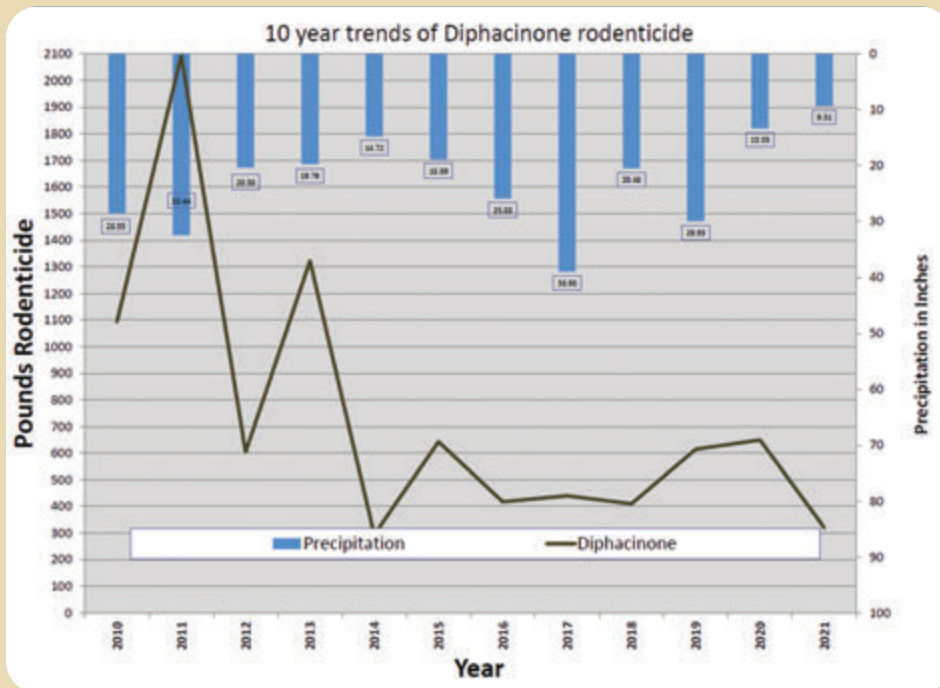


Hand application of herbicides in Wildcat Canyon to control isolated populations of artichoke thistle, a noxious weed.

Pro-Active Weed Control

The Park District continued its commitment to training by offering the annual worker safety online course augmented by in-person field trainings. Pro-active, early weed treatment programs, weed identification and prevention measures were emphasized. Early winter season weed treatments focus on organic burn down in combination with a reduced risk, pre-emergent herbicide. This combination provides bare ground around critical infrastructure and high ignition sources like barbecues. This strategy requires treatment timing just before and shortly after the first rains of the growing season. Organic burn-down herbicides are very effective at the very early growth stage and controls recently emerged weeds. Pre-emergent herbicide prevents the emergence of recently germinated weeds, helping reduce the seed bank.

The pandemic continued to challenge staff during 2021. In line with our commitment to fire safety and accessible recreation, we used mechanical treatments to meet safety goals.



10-year trends of Diphacinone use.

This figure shows substantial decrease in rodenticide use over the last decade. Populations of rodents fluctuate widely from year to year based on the environmental conditions that drive vegetation growth. By implementing mechanical control methods, we have reduced the use of rodenticide.

Staff continue to add alternative control methods, leaning heavily on habitat modification and trapping to reduce the need for this first-generation rodenticide. When active control measures are needed, the first course of action is habitat modification and mechanical trapping as feasible. Staff may also use treatment with a carbon monoxide machine in areas that are not inhabited by sensitive species. In some areas, rodenticides continue to be necessary as a last resort and only when public health and safety or critical infrastructure are threatened. Examples of these include protecting the structural integrity of levees, landfills, roads and trails, and playground structures. In these cases, many precautions are taken to ensure there is no risk to non-target species. The Park District prohibits the use of second-generation rodenticides in our wildlands as these have been shown to cause secondary poisoning. Staff use first-generation rodenticides in parkland settings only when necessary, monitoring to ensure that off-target impacts are avoided.

Noxious Rangeland Weed Control District Wide

The Park District continued its multi-year, multi-park commitment to control artichoke and purple star thistles in all parks, with an intense focus on areas within Wildcat Canyon Regional Park and its pervasive artichoke thistle populations. This weed has the potential to create extensive and long-lived monocultures. After 25 years, we have reduced the population by 95 percent. Biologists continue to seek out remnant populations and isolated plants over the entire extent of the project area and we have noted impressive recovery of native perennial grasses.

Extensive field surveys are now required to find and treat elusive populations of wild artichoke thistle in back county.

Current control measures are resource intensive and require exhaustive cross-county travel and bush whacking. However, substantially less chemical treatment is required as we focus in on the last 5 percent of this tenacious weed.

The IPM department continues to treat threats to rangeland ecosystems that include other noxious weeds like purple star thistle, barb goatgrass, medusahead, and yellow star thistle. In 2021, The District partnered with the USDA-ARS to test a novel chemical treatment on barb goatgrass. With seeds provided from District infestations, scientists with the USDA utilized extremely low concentrations of Milestone, a selective herbicide, that targets a very narrow timing in the development of this noxious grass that threatens the functionality of our grassland habitats.



Wild artichoke thistle

Eric Nicholas

Training and

Collaboration

Annual Worker Safety Training

The IPM program conducted its annual training in 2021 for over 200 field staff and supervisors again in an online format. Due to COVID-19 restrictions, staff pivoted to an online format for this required annual training. The virtual format allowed staff to complete the training independently and monitored their completion with a graded quiz. With a virtual format, staff focused on complementing virtual training with onsite trainings on product safety, spray equipment calibration, and vegetation management strategies. These park-specific trainings provided park staff with individualized help and advice tailored to their park's vegetation management needs.

California Invasive Plant Council

The Park District partnered with scientists from the California Invasive Plant Council (Cal-IPC), other Bay Area land managers, UC IPM practitioners and the Department of Pesticide Regulation to produce a comprehensive manual on the Best Management Practices of non-chemical weed management techniques.

This guidance manual is available to download from: cal-ipc.org/resources/library/publications/non-chem/

The publication of this guidance manual was accompanied by a live training for Bay Area land managers focusing on weeds and wildlife management at the Park District's Bay Bridge Event Center. This training, hosted by the District and Cal-IPC, was well attended by members of the public, District staff and other partner organizations.



Park District IPM and Cal-IPC joint training on weed management techniques.

Principal Goals of the IPM Program:

Case Studies

The IPM program goals guide the Park District's management of structural, recreational, and wildland pests. Below are case studies illustrating examples of how the IPM program achieves each of its goals.

#1: FIRE SAFETY

Using research to better understand vegetation management needed for fire safety

CASE STUDY

Late in 2020, reports emerged of a potential new pathogen and drought conditions that were causing acacia trees to die. By 2021, it was clear that many other species, including bay and pine trees, were being affected. The hardest hit were the defunct plantations of eucalyptus in Anthony Chabot as well as Tilden, Miller/Knox and other parks. This event created a tremendous amount of fuels posing concerns for their structural integrity and for catastrophic fire. The Park District partnered with other Bay Area land managers and the Garbelotto Lab at UC Berkeley to investigate the pathogens and environmental conditions that led to the region-wide tree decline that affected hundreds of acres of eucalyptus. Eucalyptus, largely blue gum and to a lesser extent red gum, were planted in plantations throughout the East Bay hills in the early 1900's. Today, the Park District manages several hundred acres of these defunct plantations where recreational activities are conducted, including camping, hiking and picnicking. The health of these dense stands is of critical importance as they pose a unique fire risk.

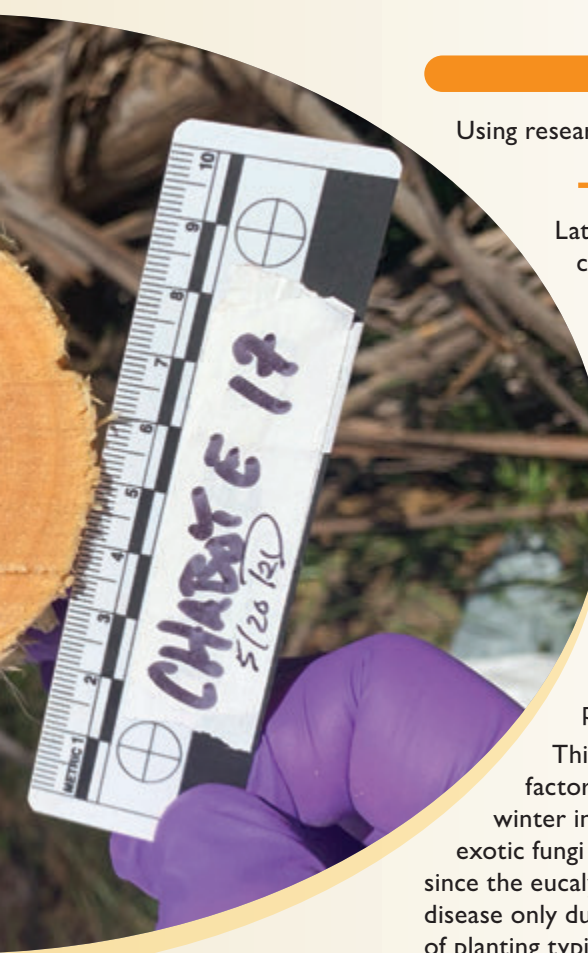
This research indicates that the die back is strongly driven by environmental factors that include prolonged drought, extreme temperatures, and a very wet winter in 2017 that resulted in proliferation of a variety of endophytic fungi. Native and exotic fungi were isolated from the eucalyptus. These exotic fungi have been present likely since the eucalyptus was introduced into California wildlands. These fungi tend to cause disease only during periods of extreme stress. The prolonged drought, the very high density of planting typical of plantations, and the naturally dry conditions of these sites are all factors that greatly exacerbated the stress on these trees, driving these normally more benign pathogens to become more active, contributing to the decline of the trees.

The results of this study are available here:



[https://nature.berkeley.edu/matteolab/wp-content/uploads/2022/02/Eucalyptus DiebackReport UC Berkeley WEBSITE.pdf](https://nature.berkeley.edu/matteolab/wp-content/uploads/2022/02/Eucalyptus_DiebackReport_UCBerkeleyWEBSITE.pdf)

Park District and Cal IPC joint training ... UC Berkeley forest pathologists sample eucalyptus for disease. Here you can see the evidence of a fungal pathogen in the heartwood of this young eucalyptus.



#2: HEALTHY FORESTS

Controlling invasive weeds to help combat risk of wildfire.

CASE STUDY

IPM ecologists and fire department personnel work collaboratively to tackle tenacious wood invasive vegetation like Mayten in our wildland urban interface. This exotic street tree, originating from Chile, readily escapes into parklands where it grows and reproduces unchecked. When management actions such as fuels reduction and shaded fuel break creation occur, these and other troublesome horticultural escapees are discovered. New control strategies and timings are required to stop these invasives from dominating the landscape again. Using a combination of mechanical mastication and targeted herbicide application, these mayten resprouts are stopped and native grasses and forbs quickly re-establish.



Highly invasive horticultural escapee, Chilean mayten tree, readily spreads from resprouting roots and seeds when dense woody vegetation is removed mechanically. Here you can see many knee-high resprouts throughout the masticated hillside. Left alone, the landscape can quickly revert to its previous state of high fuel loading.

#3: PUBLIC HEALTH

Using preventative structural controls to manage potential threats to public health.

CASE STUDY

As a rule, the Park District focuses on cultural methods to help control the populations of rodents in District structures and developments. Preventative efforts, such as rodent-proofing structures and trash receptacles, are goals for all parks. In 2021, the Park District requested proposals for District-wide Structural Pest Control contractor with demonstrated experience in implementing a robust IPM program in and around buildings. The IPM program treats the causes of pest infestations by correcting persistent conditions conducive to pest activity (access to food, water, and shelter). Chemical control measures are used as a last resort. IPM focuses on pest prevention and pest management over the long term, avoiding quick-fix solutions to pest infestations that do not provide lasting results. This contract was awarded in December and rollout began in early 2022.

#4: ECOLOGICAL HEALTH



Partnerships to enhance natural resource habitats and improve biodiversity sites such as the Alder and Huckleberry Creek restoration projects.

CASE STUDY

The IPM and Wildland Vegetation and Operations Departments partnered with the Alameda County Resource Conservation District and the California Conservation Corps to create a ¼-acre Monarch overwintering nectar garden at Oyster Bay Regional Shoreline. Park District staff installed an irrigation system and with volunteers, planted over 300 fall and wintering plants which comprised nine different native species. They were chosen because of their flowering period – fall through winter, right when overwintering monarchs need nectar to help them survive the winter and migrate in the spring.



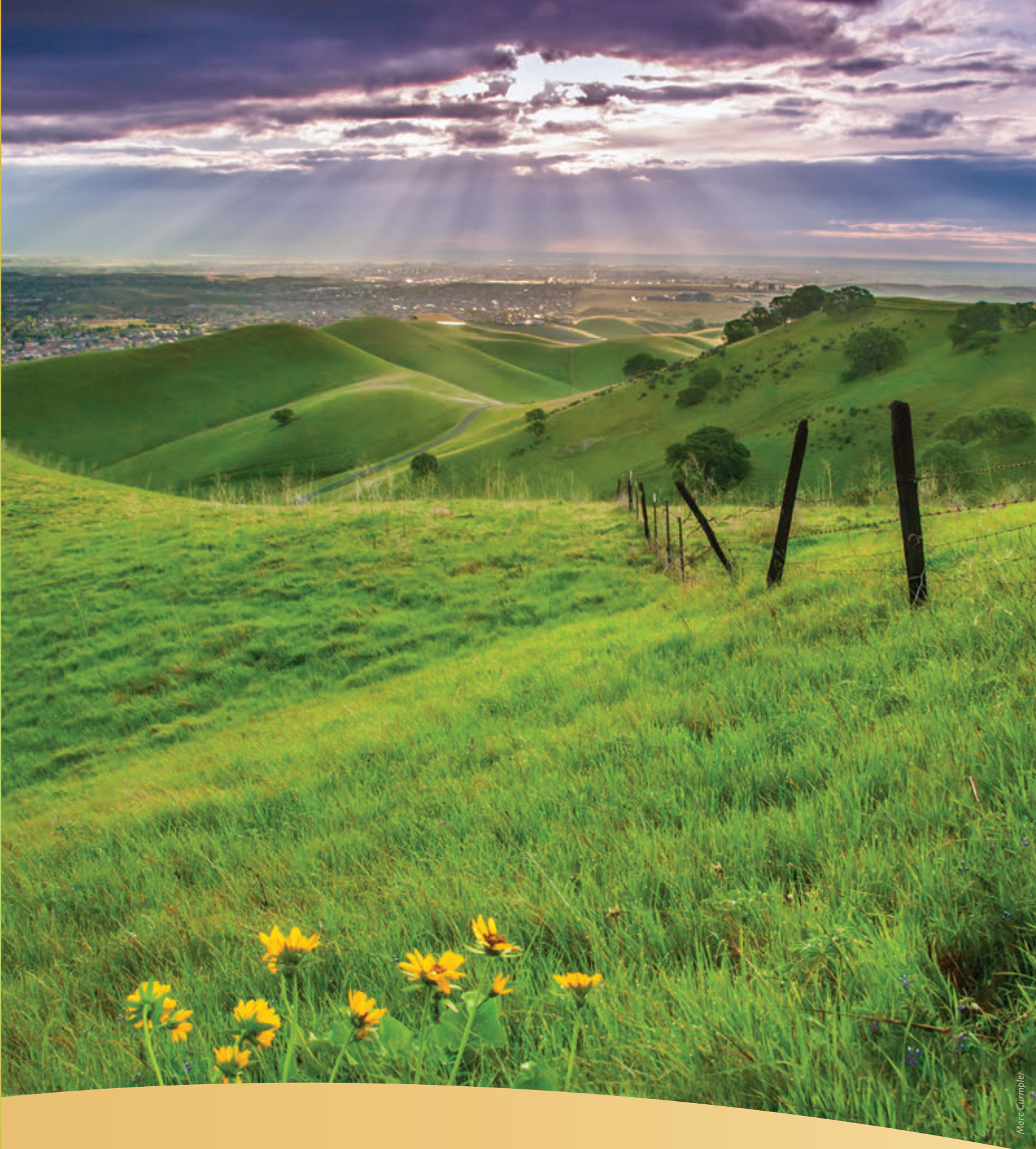
A variety of Park District volunteers, Conservation Corps members and park rangers were instrumental in the installation of irrigation, plants, compost, and mulch, to create a ¼-acre nectaring habitat for the monarch butterfly at Oyster Bay Regional Shoreline.

#5: SAFE AND ACCESSIBLE RECREATION

The Park District opened a new segment of the McLaughlin Eastshore State Park and employed landscaping and picnic furnishings to help reduce maintenance needs and enhance safe access.



*McLaughlin Eastshore State Park
Berkeley*



Marc Cummpler

*Black Diamond Mines Regional Preserve
Antioch*

Appendices

Appendix A: Approved General Use Products

Organic and Safer Products

Organic products continue to be an important part of the Park District's IPM tool box (see below). The IPM program continues to expand its product list with organically-derived pesticide products.

- **Civitas Turf Defense** is a mineral oil product (EPA Reg. No. 69526-17) that is used to protect golf course greens from insect and fungus damage.
- **Competitor** is a modified vegetable oil that does not contain nonylphenol ethoxylate, a suspected endocrine disruptor (CA Reg. No. 2935-50173). It is used as a surfactant and penetrant with triclopyr products.
- **Fiesta** is a turf weed killer, caution signal word, with the active ingredient Iron HEDTA (EPA Reg. No. 67702-26-87865). It works as a burndown product, causing iron toxicity to broad-leaved weeds.
- **Green Clean Algaecide** is a hydrogen peroxide-based product with a danger signal word that is used by contractors to treat public health threats such as harmful algal blooms and *E. coli* outbreaks at swim beaches (EPA Reg. No. 70299-4).
- **Suppress EC** is an OMRI registered non-selective, foliar burndown herbicide (EPA Reg. No. 51517-9). This product contains 79 percent of the active ingredients caprylic and capric acids and has a warning signal word.
- **Terad3 Rodenticide** with the active ingredient Cholecalciferol, is an acute toxin that does not cause secondary poisoning. It is used around food service buildings in tamper proof bait boxes.

Conventional Products

Conventional or synthetic, pesticide use continues to decline. This is due in large part to the continued emphasis on mechanical and cultural methods that are the backbone of pest management at the Park District. Additional contributing factors include the focus on early weed control using organic products, rate reduction, and application footprint reduction of conventional products.

- **Bee Bopper** is a knockdown insecticide with the active ingredients of Tetramethrin and 3-Phenoxybenzyl, that is used on late season yellow jacket nests that are public health threat (EPA Reg. No. 7754-44).
- **Diphacinone** is an anticoagulant rodenticide dispensed in bait stations specifically for the control of ground squirrels and commensal rodents (rats and gophers). Products in this category include treated grain bait (0.001 percent active ingredient) manufactured by Alameda County Agricultural Department (CA Reg. No. 10965-50001). This product has a caution signal word.
- **Gas Cartridges** are an asphyxiant rodenticide is manufactured by the USDA with active ingredients of sodium nitrate and charcoal (EPA Reg. No. 56228-2). It has a warning signal word and is primarily used for gopher control in turf.
- **Indaziflam** is a broad spectrum pre-emergent herbicide used in landscape and right of ways. This product is sold as Specticle Flo (EPA Reg. No. 432-1518). It contains 7.4 percent of the active ingredient indaziflam and has no signal word.
- **Triclopyr** (i.e. Garlon) is a broadleaf, selective, post-emergent herbicide used principally for the control of resprouts from woody plant species such as eucalyptus, mayten, acacia and broom species. Products in this category include Garlon 4 Ultra (EPA Reg. No. 62719-527) with 60.45 percent active ingredient and a caution signal word and Pathfinder (EPA Reg. No. 62719-176) with 13.6 percent active ingredient and a caution signal word and Vastlan (EPA Reg. No. 62719-687) with 54.72 percent active ingredient.



Appendix B: All Products

B: All Products

Park	Purpose	Applicator	Bee Bopper, oz	Clearcast, oz	Competitor, gal	Dimension 2EW, oz	Diphacinone, lbs	Garlon 3A, gal	Garlon 4 Ultra, gal	Hasten Oil, gal	Milestone, oz	Nufilm, oz	Pathfinder II, gal	Physan 20	Polaris, gal	Pro-Iron, oz	RoundUp Custom, oz	Roundup Pro Concentrate, oz	Roundup Pro Max, oz	Sapphire, oz	Sluggo	Specticle Flo, oz	Suppress, gal	Transline, oz	Vastlan, gal	
Anthony Chabot	Fire Safety	Park Staff																				5.2	1.13			
	Health Forests	Fire Staff			1.59				1.05																	
	Ecological Function	Contractor			0.13				0.13																	
		IPM				0.41														192					26	
Recreation	Park Staff			0.08																					0.04	
Alameda Creek Trails	Fire Safety	Park Staff			0.94																	10	2.50			
Black Diamond Mines	Ecological Function	Contractor			0.95						71															
	Ecological Function	County Ag							0.66		3.75	5.5				9.5										
Botanic Garden	Landscaping	Park Staff			0.003				0.008																	
Briones	Ecological Function	County Ag							0.67		4.122	0.1				9.5										
Crown Beach	Ecological Function	IPM			0.07																				0.14	
Cull Canyon	Landscaping	Park Staff			0.06				0.04																	
	Fire Safety	IPM			0.42										0.39										0.38	
	Recreation	Park Staff			2.34																	25	6.25			
Contra Costa Trails	Fire Safety	Park Staff																				57				
	Ecological Function	County Ag							2.38		30	56														
Carquinez Strait and Radke Martinez	Ecological Function	County Ag							0.50		2.743	3.66				6.11										
Don Castro	Recreation	IPM			2.08		2		0.70						0.08											
	Landscaping	Park Staff																							1.00	
Diablo Foothills	Fire Safety	Park Staff																				1	0.25			
Del Valle	Recreation	Park Staff																				3	0.75			
East Contra Costa County Trails	Ecological Function	Contractor								0.47	6							117.25							0.56	
	Recreation	Park Staff			1.00				2.03	0.016																
Garin/Dry Creek	Ecological Function	County Ag									15															
Hayward Shoreline	Ecological Function	Contractor			2.50										26.17											
		IPM			0.11	13.5					12.6							13.5								
Las Trampas	Ecological Function	Park Staff			0.35				0.19																	
		County Ag							0.62		3.4	10.7				2.6										
	Recreation	Park Staff							0.19																	

B: All Products, Continued

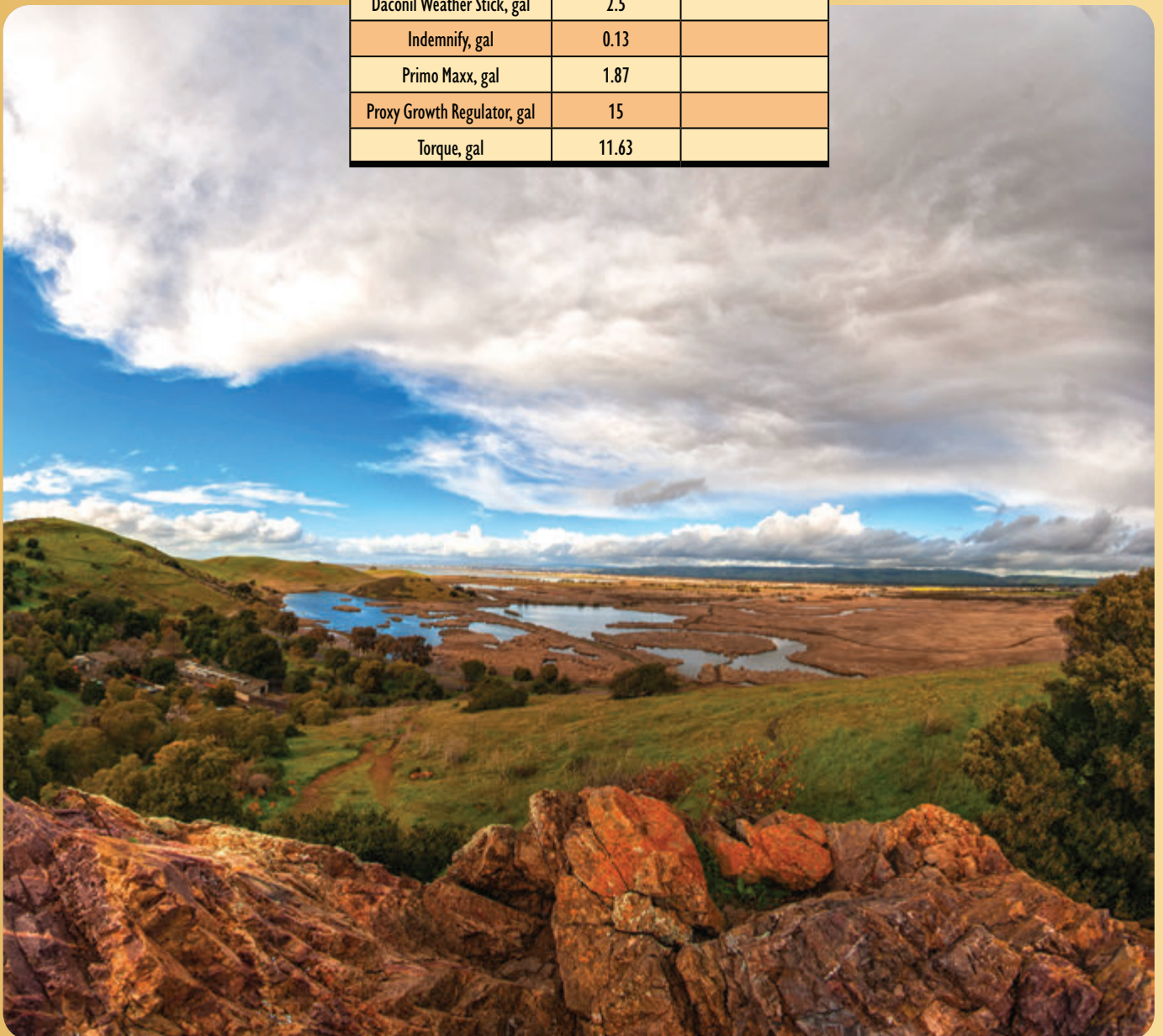
Park	Purpose	Applicator	Bee Bopper, oz	Clearcast, oz	Competitor, gal	Dimension 2EW, oz	Diphacinone, lbs	Garlon 3A, gal	Garlon 4 Ultra, gal	Hasten Oil, gal	Milestone, oz	Nufilm, oz	Pathfinder II, gal	Physan 20	Polaris, gal	Pro-Iron, oz	RoundUp Custom, oz	Roundup Pro Concentrate, oz	Roundup Pro Max, oz	Sapphire, oz	Sluggo	Specticle Flo, oz	Suppress, gal	Transline, oz	Vastlan, gal	
Miller/Knox, Point Isabel, and McLaughlin Eastshore State Park	Fire Safety	Park Staff			0.60																	7.5	2.40			
	Ecological Function	Park Staff																				12.5	2.50			
		Contractor													0.54											
	Recreation	County Ag					320																			
Park Staff					0.14			0.09																		
Martin Luther King Jr. and Oyster Bay	Ecological Function	Contractor													15.82											
		IPM			0.15	19.5											19.5			26	130					
	Recreation	IPM			2.11										3.52											
		Park Staff			0.21				0.07																	
Point Pinole	Ecological Function	Contractor									174				0.69										7.84	
		Park Staff			7.80				4.78																1.2	
		IPM			0.047												18									
	Recreation	Park Staff	14		3.66				1.31																	
	Public Health	Park Staff	1																							
Pleasanton Ridge	Ecological Function	County Ag									33.5															
		IPM			6.35			5	0.23																	2.00
Roberts	Recreation	IPM			2.25			0.75							0.016											
Reinhardt Redwood	Healthy Forests	Park Staff											0.68													
	Park Maintenance	Park Staff											0.38													
Sibley, Claremont Canyon, and Huckleberry	Healthy Forests	Contractor			0.09			0.03																		
		Fire Staff			0.06			0.02																		
	Recreation	Contractor						0.25																		
	Ecological Function	County Ag						0.07		0.375					1.5											
Sunol, Mission Peak and Vargas Plateau	Ecological Function	County Ag								49															0.25	
Tilden	Healthy Forests	Fire Staff			0.19			0.06																		
		IPM			0.02											18										
	Recreation	Park Staff			0.25																					
	Ecological Function	IPM		25.6	0.51			0.012																	0.81	
Temescal	Ecological Function	IPM			0.023		0.023																			
Vaso Hills Corridor Parks	Recreation	Park Staff						0.78	1.17																	
	Ecological Function	County Ag						0.73	4.125	15					0.5											
Wildcat Canyon	Healthy Forests	IPM			0.13																				0.25	
	Ecological Function	Park Staff																				4	1.00			
		County Ag							1.43	7.625	30.5															

Appendix C: Special Use Products

All products are listed by brand name and volume of product use. Golf course, farming, and structural uses tables are shown:

Golf Course Products

Product	Tilden	Redwood Canyon
Pesticide	Amount	
Banner Maxx II, gal	3	0.55
Civitas, gal	150	
Daconil Weather Stick, gal	2.5	
Indemnify, gal	0.13	
Primo Maxx, gal	1.87	
Proxy Growth Regulator, gal	15	
Torque, gal	11.63	



View of the main marsh at Coyote Hills Regional Park, Fremont.

Appendix C: Special Use Products, *Continued*

Conventional Farming Products

Pesticide	Amount
Cayuse Plus surfactant, gal	1.48
Crosshair drift agent, gal	5
Express herbicide, lbs	4.5
Osprey, lbs	4.45
R-11 surfactant, gal	3.41
Rhomene MCPA Broadleaf, gal	29.00



An endangered salt marsh harvest mouse on pickleweed.

Structural Pest Control Products

Pesticide	Active ingredient	Amount
Advion Ant Gel, oz	indoxacarb	1
Arilon, oz	indoxacarb	0.25
Fastrac, oz	bromethalin	2928
Essentria, oz	botanical oils	222
Termidor SC, oz	fipronil	0.8
Onslaught, oz	cyano-methyl-chloro-alpha-benzeneacetate	1
TakeDown, gr	bromethalin	1986
Bifen I/T, oz	bifenthrin	6.59
Altriset, gr	cholrantraniliprole	51
Onslaught Fastcap, oz	esfenvalerate-prallethrin-piperonyl butoxide	1.625
Contrac CA, oz		1204
Bora Care, oz	disodium octaborate	30
Niban Granular Bait, oz	orthoboric acid	5

Integrated Pest Management Annual Report 2021



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Wildflowers in Sunol Wilderness Regional Preserve, Sunol.