

ANNUAL PESTICIDE USE REPORT

2014

IPM Department

EAST BAY REGIONAL PARK DISTRICT

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Stewardship Department



2014 Integrated Pest Management Report

EXECUTIVE SUMMARY

This annual report provides the Board of Directors of the East Bay Regional Park District (EBRPD), Ecology Committee (advisory to the Board), and the interested public with a summary, analysis, and evaluation of pesticide use for 2014. This report provides a brief introduction to the District's Integrated Pest Management (IPM) program and summarizes IPM techniques utilized by park staff that provide more sustainable and effective pest control while reducing the amount of pesticides used. A detailed analysis of District wide pesticide use by park and program follows this executive summary.

IPM PROGRAM

IPM is a strategic approach for preventing and suppressing pests before they reach unacceptable levels. An IPM model uses an ecological framework to analyze and treat pest problems and mandates the selection and integration of the most appropriate combinations of available pest control methods. These include cultural, mechanical, chemical, and biological strategies in ways that minimize risk to public safety, health and the environment. The goal of the IPM program is to provide long-term resolution to pest problems. However, the strategies selected will vary by location, timing, pest species, environmental considerations, level of desired control and cost factors.

Implementation of the EBRPD IPM program involves seven major components:

1. Pesticide Application Safety Training: required, annual safety training for all pesticide handlers in the District.
2. Supplemental IPM Training: training on alternative pest control strategies that focus on mechanical and cultural techniques.
3. Pest Control Recommendation Request: a detailed description of the problem, history, desired objective of pest problems submitted by park staff to IPM.
4. Pest Control Recommendation (PCR): a legal requirement for pesticide application that ensures safe, effective and environmentally sensitive application of pesticides.
5. Pesticide Use Report: report generated by park staff detailing the amount and type of pesticide applied, allowing the IPM department to track, report, analyze and manage the IPM program.
6. Contracts and Maintenance Agreements: pest management services directed and tracked by IPM department to control or eradicate invertebrate, plant, and vertebrate pests.
7. Data Analysis and Presentation in the Annual Pesticide Use Report: compilation, analysis and presentation of all pesticide use and trends within District parklands presented to the Board, Ecology Committee, Park Staff and interested public.

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GENERAL USE PESTICIDE TRENDS 2014

Table 1 illustrates the total volume of general use pesticide products and not active ingredients (glyphosate, oryzalin, triclopyr, diphacinone) applied to district parklands in 2014.

- Glyphosate products (non-selective, broad spectrum herbicide) continue to constitute the bulk of herbicide use in the District with a long-term average of 53 percent of all use. Total use of glyphosate products for the District in 2014 totaled 65 gallons, down by 13% from the previous year. (Figure 4).
- Oryzalin (Surflan), a pre-emergent, non-selective herbicide, is our second highest volume use herbicide at 31% of all herbicide use. Oryzalin use was up somewhat (16 %) from the previous year. Although oryzalin use has remained relatively constant over the years, this slight increase is likely due to increase in newly opened parkland and infrastructures that requires right of way treatments. This product will be replaced with the reduced risk, pre-emergent herbicide, Specticle (indaziflam).
- Garlon (triclopyr), a post-emergent, selective herbicide, experienced higher than average use in 2014 due to increased activity of fuels management and similar operational activities, but decreased by 49% from 2013. It remains the third highest volume of general use herbicide used in the District.
- Treated bait (diphacinone) decreased by a substantial 81%, largely due to the drought conditions that decreased forage opportunities for ground squirrels. Staff throughout the district also noticed a significant amount of ground squirrel predation by raptors and coyotes during the 2014 season, further reducing the need for rodenticide use in protection of the structural integrity of district properties.

	Diphacinone (lbs)	Triclopyr (gal)	Glyphosate (gal)	Oryzalin (gal)
2014	254	36	65	52
2000-2014 Mean	1133	24	80	46
Standard Deviation	532	16	18	8
Relative SD	0.47	0.67	0.22	0.17

Table 1. General use pesticide long-term means and standard deviations (2000-2014) and tracked pesticide totals for 2014.

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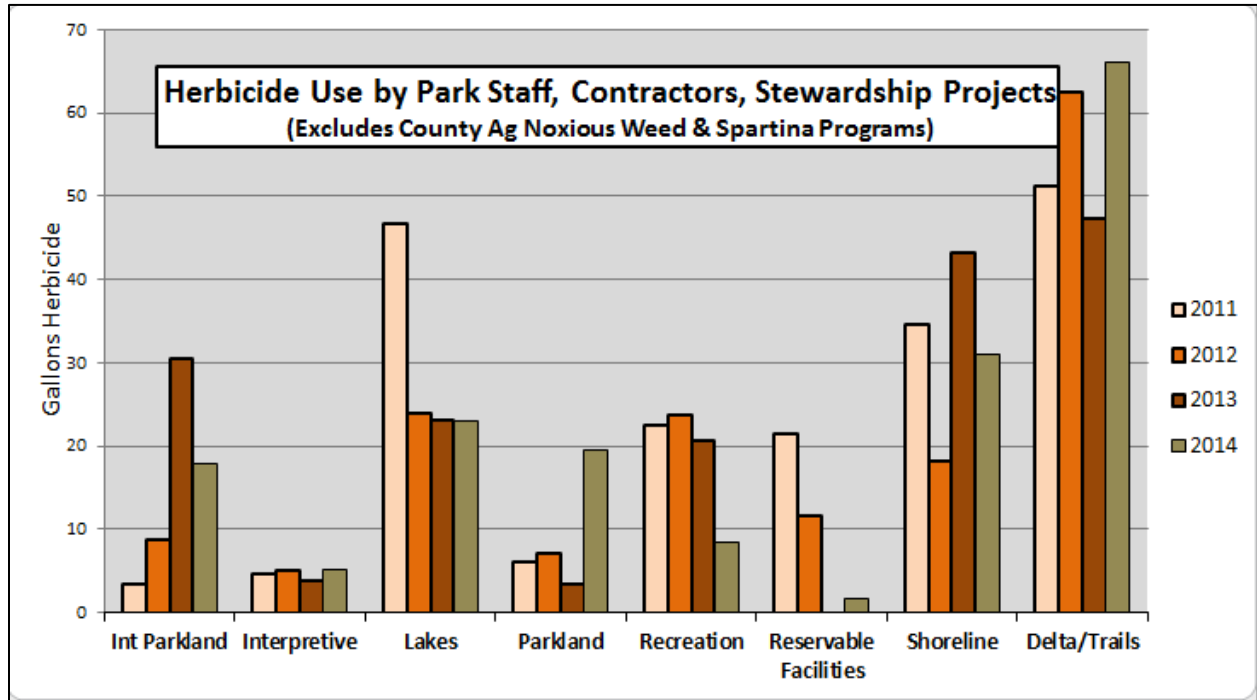


Figure 1. Volume of herbicide used by organizational unit, 2011-2014.

The comparative volume of all herbicide use (2011-14) by organizational unit indicates that Trails/Delta unit uses the most herbicide followed by Shoreline, Lakes, Recreation, Parkland and Interpretive Parklands in that order (figure 1). These top four units provide recreational activities that require intensive vegetation management and necessitate the use of this effective tool. Trails/Delta unit has over 150 miles of trail that require right of way clearance along multi-use trails for safety, fuel reduction and recreational enjoyment. The Shoreline and Lakes units have many miles of multi-use trails and hundreds of high use picnic areas, campgrounds and group camps and essential infrastructure that also require vegetation management.

Park operations and other District departments often use herbicides for habitat enhancement and resource projects and are detailed in following sections. Operations and Stewardship have increased the number and magnitude of habitat enhancement projects in 2014 and herbicide use has correspondingly increased. However, park maintenance continues to comprise the bulk of herbicide use, followed by right of way in 2014 (figure 2). Figure 2 includes all herbicide use, not just general-use herbicide in order to analyze use across objective and department. Park maintenance activities include vegetation management around picnic areas, around campground developments, around buildings and fence lines, unpaved parking lots, trail right of way, etc.

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Fuels and Hazardous tree work have also increased and attendant herbicide use has increased slightly in 2014. Triclopyr use increased substantially, due to increased fuel management in 2012-13, but decreases slightly in 2014 from the previous year. The increased use of garlon is due in great part to the completion of the Wildfire Hazard Reduction and Resource Management Plan that was finalized in 2012 and the subsequent grant funding for this much need fuel reduction along the urban interface in the Berkeley and Oakland Hills. The goal of the WHRRMP is to mitigate future catastrophic wildfires that can and will one day result from the warm, drying Diablo winds such as those that drove the devastating 1991 Oakland Hills Firestorm. It is anticipated that with the ongoing drought and pending FEMA grant funding, this herbicide use will remain high for the next few years. Figure 3 illustrates, however, that park operations continues to use the bulk of triclopyr products (over fuels) for park maintenance, right of way, habitat enhancement and hazardous tree programs combined.

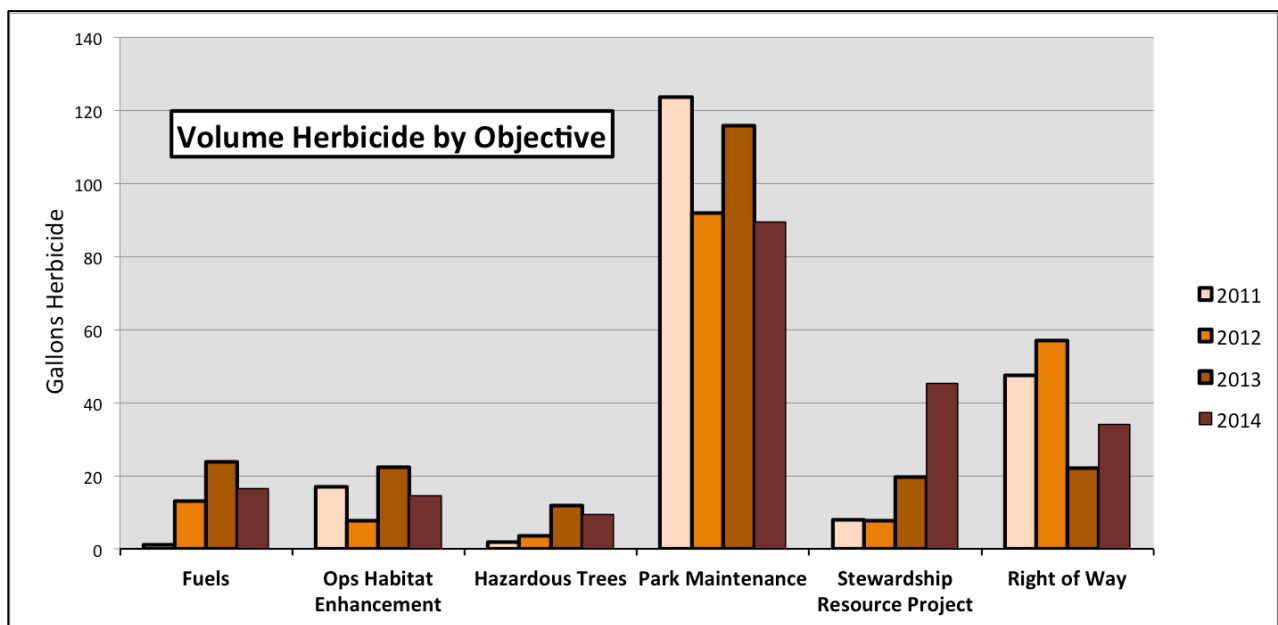


Figure 2. Herbicide use by purpose from 2011-2014.

LONG-TERM AND DISTRICT WIDE TRENDS

Precipitation

RAWS stations throughout the district were analyzed for precipitation patterns. The Briones RAWS weather station (37.934, -122.118; elevation 1450') was chosen as it most closely tracks the overall precipitation monthly averages calculated from all RAWS stations in the District. February and December were the wettest months of 2014 with 6 and 11 inches respectively with a very dry January (figure 5). 2014 followed a very dry 2013 (5.75 inches) that had precipitation that was more evenly distributed throughout the year, including June.

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Reporting Statistics

In 2014, 38 parks and special units, 1 concessionaire and 13 staff resource projects submitted PURs. The fuels program submitted a total of three PURs for Tilden Park and one for Wildcat in 2014. Approximately 196 PURs were submitted by operations staff capturing 320 application events. 7 resource projects administered by IPM & Environmental Programs submitted PURs for applications by contractors in 18 parks.

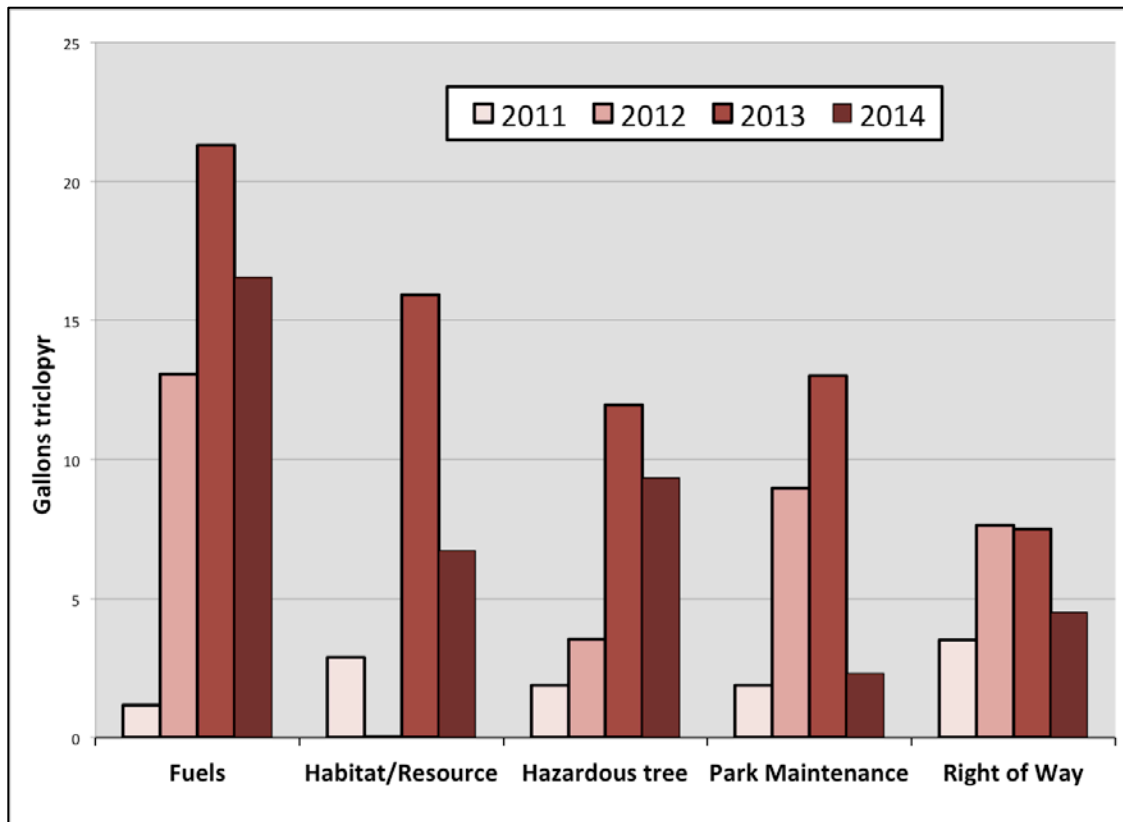


Figure 3. Comparative triclopyr use by objective 2011-2014.

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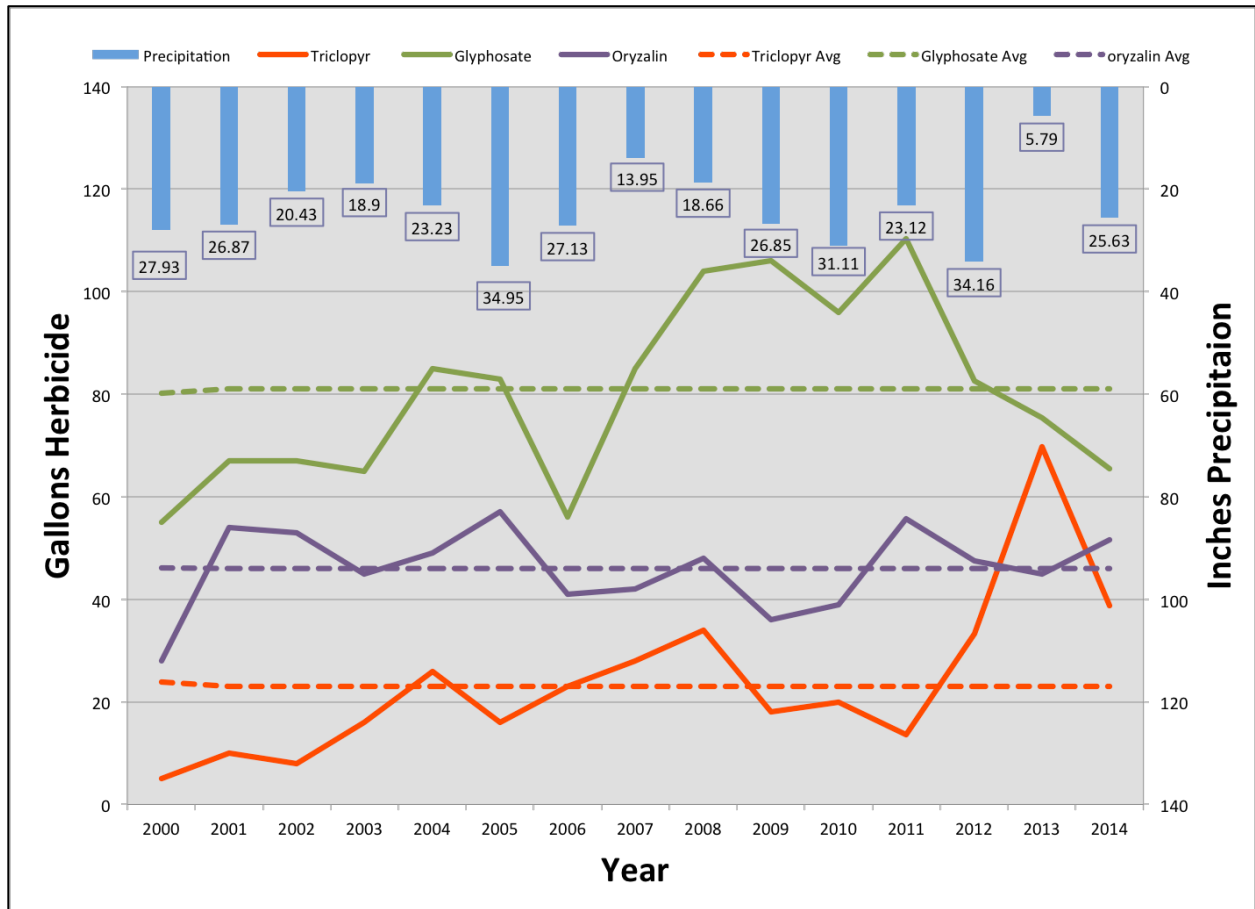


Figure 4. Herbicide use trends and their long term averages from 2000-2014.

Acreage

The District has continued to grow significantly over the decades, to its current acreage of 117,644.49 acres. From 2000 to present the District has increased by an average of 1,860 acres annually with the largest increases in the year 2009-2011 and then again in 2014 with a total of 3,358 acres. Figure 7 illustrates that despite the exponential growth in acreage, the District’s pesticide use has remained relatively stable.

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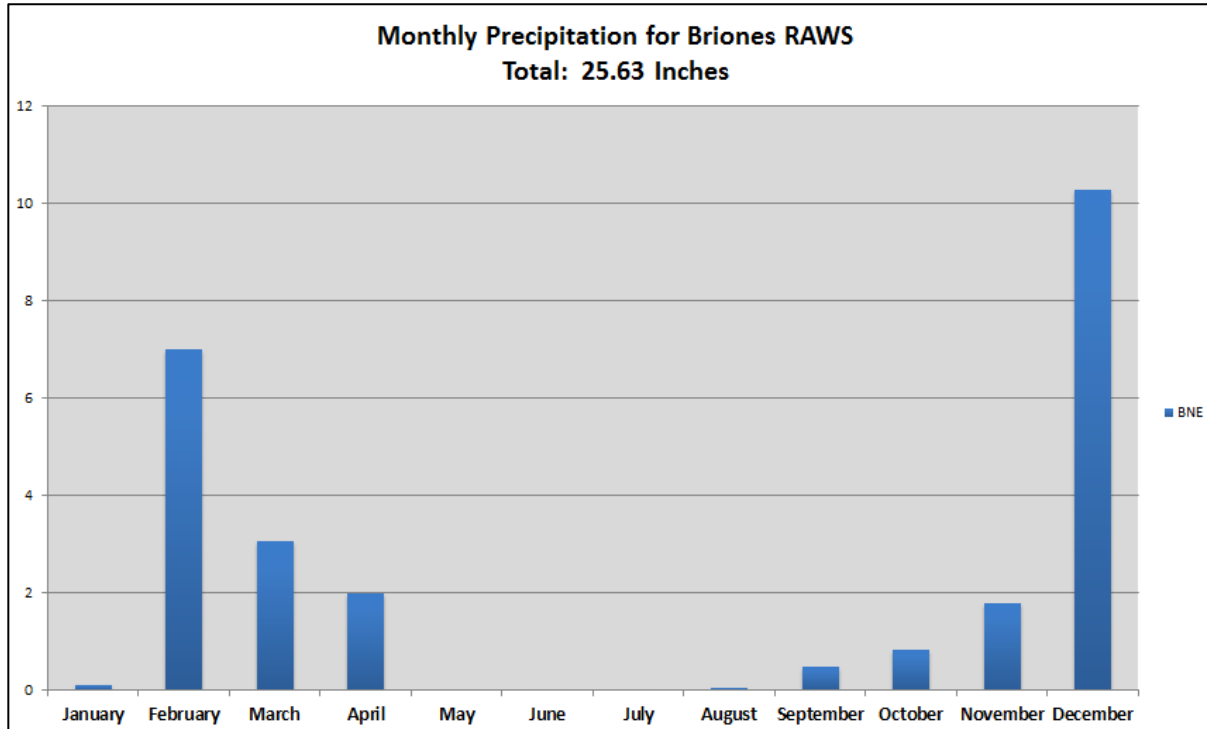


Figure 5. Monthly precipitation patterns at Briones in 2014.

Pesticide Use

Glyphosate and triclopyr use was reduced in 2014 by 13% and 44% respectively. Oryzalin applications increased by 15%. However, visual inspection of figures three (herbicide) and four (rodenticide) reveals that long-term trends fluctuate about the mean. This oscillation of pesticide use is to be expected given that use is driven largely by changes in annual precipitation over time. Remarkably, despite the District's exponential growth, pesticide use remains stable exhibiting little or no growth. Triclopyr usage is the only exception to this, growing substantially with the increase in funding for the District's fuels program. Overall, low pesticide use District wide is due largely to the fact that less than one tenth of a percent (0.01%) of the District is classified as developed and potentially subject to pest management activities. Additionally, pest management activities on developed properties are often subject to integrated approaches that include behavioral (education), cultural (burning), and mechanical (mowing, trapping, etc.). Further, herbicide treatments for the remainder of the District include treatment to control and eradicate noxious weeds, habitat enhancement and listed species recovery.

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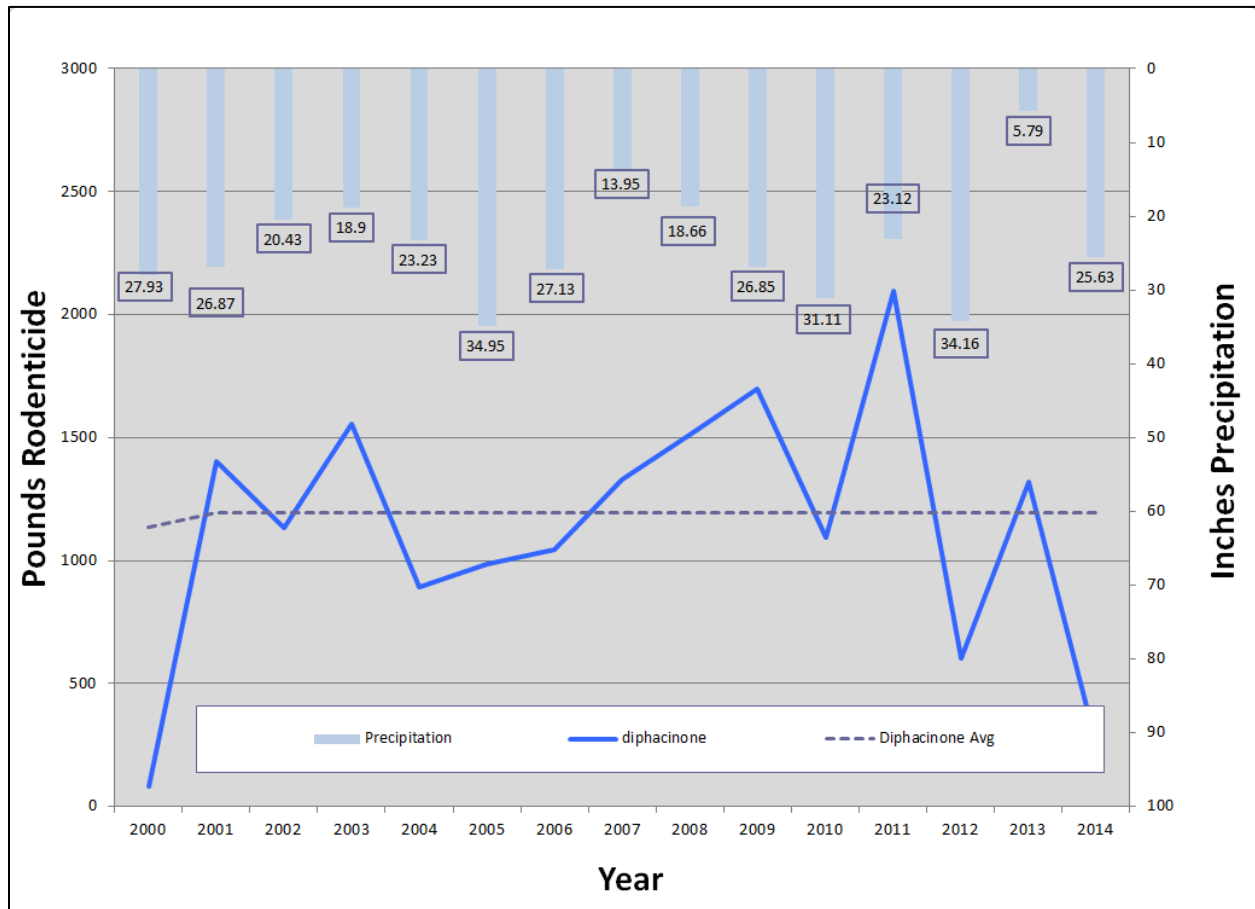


Figure 6. Rodenticide use trends and its long term average from 2000-2014.

SPECIAL USE PESTICIDES: RESOURCE PROJECTS & PUBLIC SAFETY

The District and IPM continue to lead and support a number of special resource projects with the intent of eradicating exotic invasive plants that degrade the quality of habitat in District parklands and facilitating endangered species recovery. Often, habit enhancement projects are purely mechanical, employing timed mowing, sheet mulching, torching etc. At times, staff must resort to some of the regular use herbicides. The District’s IPM policy allows the use of pesticide products outside of the approved general use list with the approval of the IPM Specialist for special projects and needs. Furthermore, the IPM program contracts with the Alameda and Contra Costa Departments of Agriculture to control pests that threaten buildings, park infrastructures and public health throughout District parklands. These county biologists and contractors assist park staff in the control of gophers, ground squirrels and yellow jackets. In 2014, IPM worked collaboratively with park operations and water management on three new large scale projects at Lake Temescal, Lake Chabot and Briones, detailed below.

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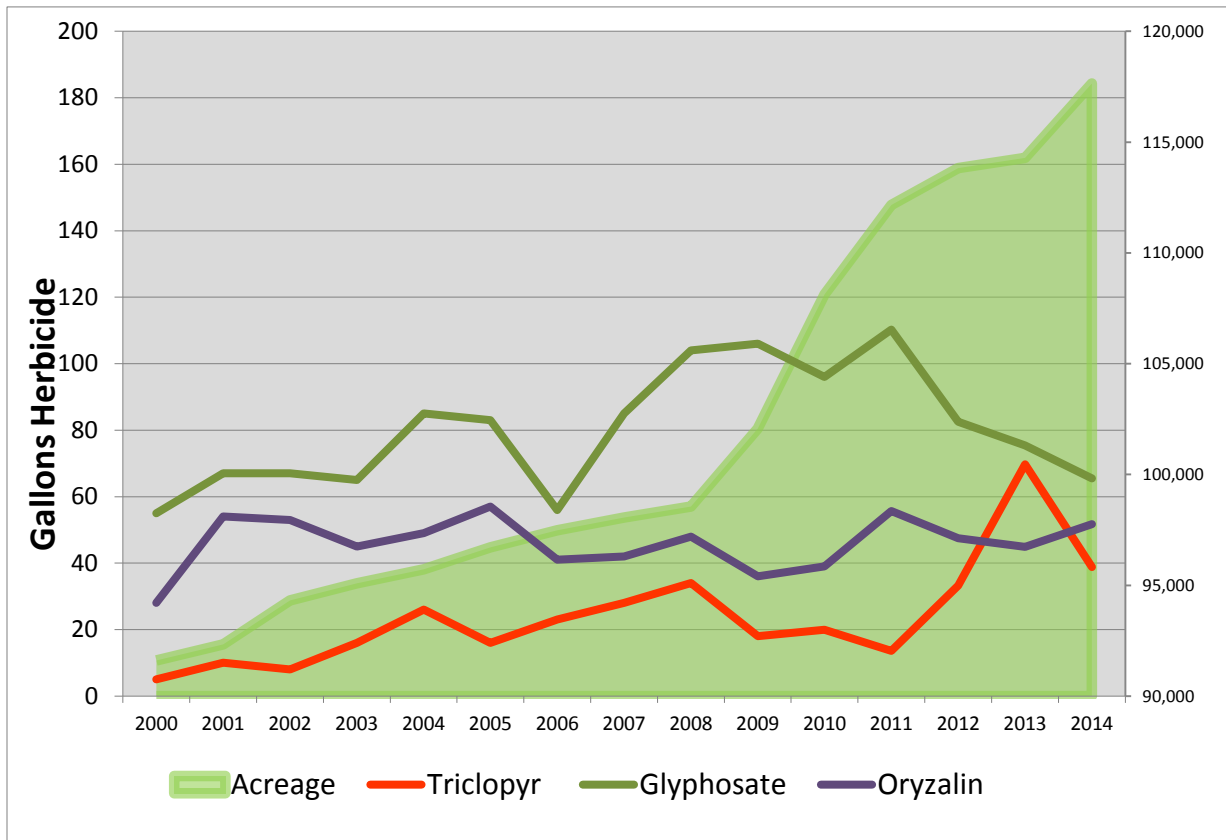


Figure 7. District acreage increase from 2000 through 2014 with respect to herbicide usage.

Operations continues to implement a number of habitat enhancement projects on a park scale that target invasive, non-natives. Examples include perennial pepper weed, yellow star thistle, pampas grass, eucalyptus, acacia, puncture vine, tree of heaven, fennel, *Dittrichia*, medusa head, barbed goat grass, etc. These non-native exotics substantially reduce habitat, forage, groundwater availability and recreational opportunities in rangelands, wetlands, parklands and trails. Park staff primarily utilizes herbicides from the general use list. Operations and IPM programs are detailed below by pest species.

Vertebrate Control in High Use Turf

In 2014, Alameda County Department of Agriculture controlled gopher populations in several, high use lawns at Del Valle, Quarry Lakes in an effort to provide more stable playing surfaces, reduce broad-leaved weeds in the turf areas and reduce damage to turf infrastructure at these very popular parks. The use of aluminum phosphide in irrigated lawns by county biologists has proven to be an effective means of controlling this pest species while keeping the public safe during recreational activities. Crown Beach also contracted with the County to control ground squirrels along the rip rapped shoreline trails near the visitor center.

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Least Tern Island Vegetation Management

The IPM department has worked with wildlife since 2008 in the management of various weedy species, most notably chamomile mayweed on Least Tern Island. These exotic weeds reduce the nesting area of the Least Tern, *Sternula antillarum browni* on a man-made island in the Hayward Regional Shoreline brackish water marsh complex. A mix of pre and post-emergent product applied by IPM staff maintain the low vegetative cover that this federally endangered species requires for successful nesting. 2014 brought another successful breeding season with increasing nesting success due to the cooperative vegetation management and predator reduction. Weed control was achieved using a specialized mix of pre and post emergent herbicides (Dimension Ultra, Milestone and Roundup Custom) to control invasive vegetation.

Spartina

The Invasive Spartina Project (ISP) completed its 11th consecutive season of treatment with a net treatment of 2.2 net acres with 23.83 gallons of Polaris (imazapyr) primarily at Martin Luther King, Jr. Shoreline and Hayward Regional Shoreline. Treatment acres are down by 2.2 acres from the previous year. IPM is now using net acres in lieu of gross acres. This data reflects the actual net coverage of the non-native spartina and its hybrids and is supplied by the ISP. Consecutive treatment, guided by the ISP, has resulted in an impressive reduction of Spartina coverage accomplishing the goal of recovery of valuable open mudflat marsh habitat for foraging shoreline birds and maintaining critical, open channel foraging habitat for endangered California clapper rail.

Pampas Grass

IPM and park staff at Lake Chabot and Oyster Bay worked together to treat a total of 0.50 acres of pampas grass infestation using imazapyr.

Dittrichia

IPM and park staff worked collaboratively to treat over an acre of *Dittrichia graveolens*, Stinkwort, along the shoreline of Lake Chabot. Lake Chabot intensively targeted dittrichia with mechanical and chemical methods and continued its treatments of teasel and yellow star thistle. Several other parks began to target dittrichia, a relatively recent exotic that is increasing in distribution and density. These parks include Don Castro, Diablo Foothills, Anthony Chabot, Vasco Hills Parks and Las Trampas.

Euphorbia

Tilden Park began a new program to treat Euphorbia along South Park Drive, adding glyphosate products to the already robust pulling regime. Redwood volunteers continue to hand pull euphorbia along East Ridge Trail.

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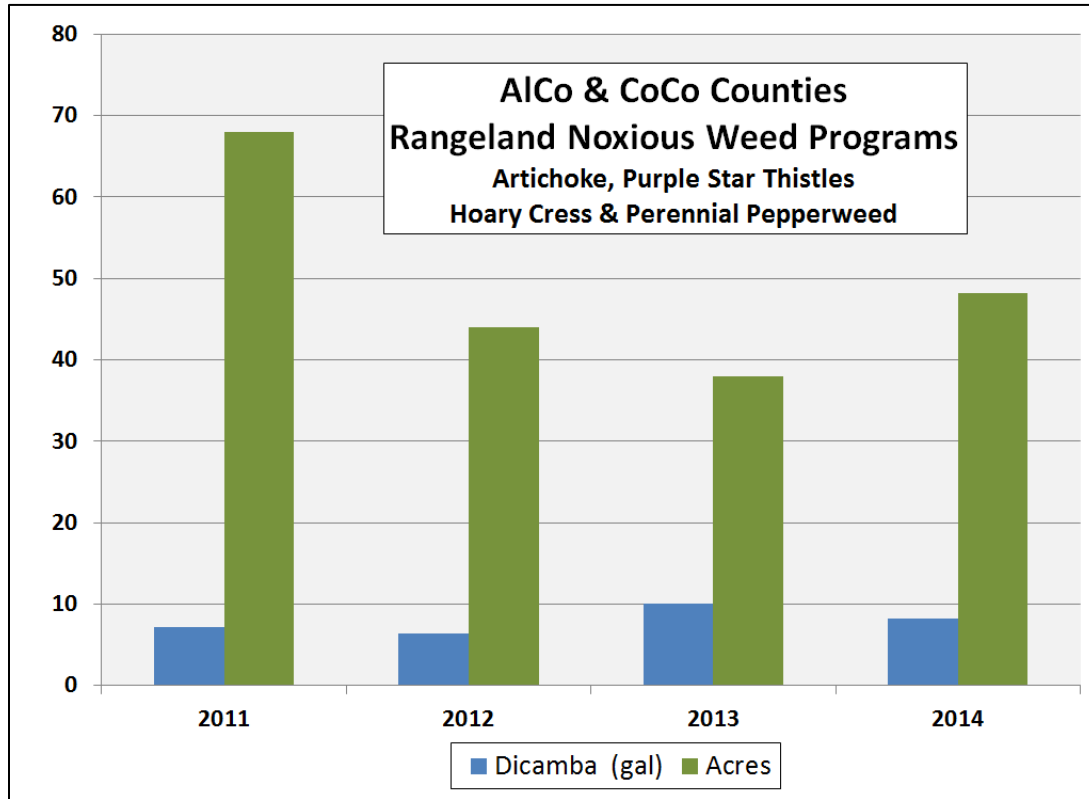


Figure 8. Priority resource management project for rangeland noxious weeds: artichoke, purple star thistles, perennial pepperweed, hoary cress, Russian knap weed, etc.

Yellow Star Thistle

IPM and operations successfully treated 500 acres with Milestone (aminopyralid). In several grazing units that were heavily infested with yellow star thistle. Success was estimated at 95% or more based on an ocular estimate, providing a striking visual impact to park visitors. Park staff in several parks that include Del Valle, Sunol, Lake Chabot and Point Pinole, have active yellow star thistle control programs using Milestone. These parks treated this state listed noxious weed chemically and mechanically throughout 2014. East Contra Costa Trails targeted yellow star thistle in several problem areas along trails with glyphosate. Lake Chabot continued to use the remaining Transline (clopyralid) stock on hand as we transition to the more effective Milestone.

Noxious Rangeland Weeds

The IPM department works closely with the Agriculture Departments in Contra Costa and Alameda counties on the eradication of several noxious rangeland weeds: artichoke and purple star thistles, perennial pepperweed, hoary cress and Russian knapweed. This program is ongoing and continues to make progress in reduction of older established populations and eradication of smaller populations in newly acquired parklands. Treatment of artichoke thistle in these areas continues to benefit and protect the federally listed Santa Cruz Tar plant

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(Holocarpa macradenia). A total of 48 net acres were treated in both counties for these priority noxious rangeland weeds, using 4.6 gallons of products with the active ingredient dicamba and 0.9 gallons of Milestone (aminopyralid). Total treatment area increased in 2014 due to the acquisition of several key properties in Contra Costa County that occurred in late 2013 and the identification of new infestations of hoary cress and Russian knapweed (Figure 6). Point Pinole continued its comprehensive attack on Teasel in coastal prairies with triclopyr.

Blue Green Algae

IPM and Water Management staff worked cooperated frequently to tackle high levels of mycrocystin in Lake Temescal and *E. coli* at Shadow Cliffs during the 2014 summer swim season. Staff and contractors applied Pak 27, a hydrogen peroxide derived algaecide product that is commonly used in the treatment of drinking and recreational waters.

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Pesticide	Active Ingredient	Applicator	Type	Signal Word	Pest	Parks	Purpose	2009	2010	2011	2012	2013	2014
Aluminum phosphide	dithiopyr	Counties	Rodenticide	Danger	Gophers	Del Valle, Camp Arroyo, Quarry Lakes, Shadow Cliffs	Safety	6.5 lbs	8 lbs	7 lbs	17 lbs	11 lbs	9.66 lbs
		Stewardship	Herbicide	Caution	Mayweed	Least Tern Island	Endangered species habitat enhancement	12 oz	12 oz		15 oz	24 oz	15 oz
Milestone	amino pyralid	Stewardship Counties	Herbicide	Caution	YST, AT, PST, Teasel,	District Wide	Habitat Enhancement	1.5 gal	2.5 gal	2.4 gal	2.8 gal	3.4 gal	15.06 gal
Transline	clopyralid	Staff contractors	Herbicide	Caution	YST	Lake Chabot, Sunol, Del Valle	Habitat Enhancement			1.8 gal	0.4 gal	1.4 gal	47 oz
Polaris	Imazapyr	Staff contractors	Herbicide	Caution	Non-native spartina	MLK, Hayward Shoreline, Point Pinole, ESSP	Habitat Enhancement		57 gal	35 gal	44 gal	32 gal	24 gal
Vanquish/Clarity	dicamba	Counties	Herbicide	Caution	AT, PST	District Wide	Habitat Enhancement	2.29 gal	5.72 gal	7.1 gal	6.36 gal	10.03 gal	8.19 gal
Garlon 3A & 4 Ultra	triclopyr	Stewardship Contractors	Herbicide	Warning	Dittrichia	Lake Chabot	Habitat Enhancement						5.2 gal
Polaris	Imazapyr	Staff & IPM	Herbicide	Caution	Pampas grass	MLK, Lake Chabot	Habitat Enhancement						1.2 gal
Pak 27	Sodium Carbonate Peroxyhydrate	IPM & Contractors	Algaecide	Danger	E. coli, Blue green algae	Temescal, Shadow Cliffs	Public Safety						3750 lbs.

Table 2. Pesticide use for special needs and resource projects 2009-14.

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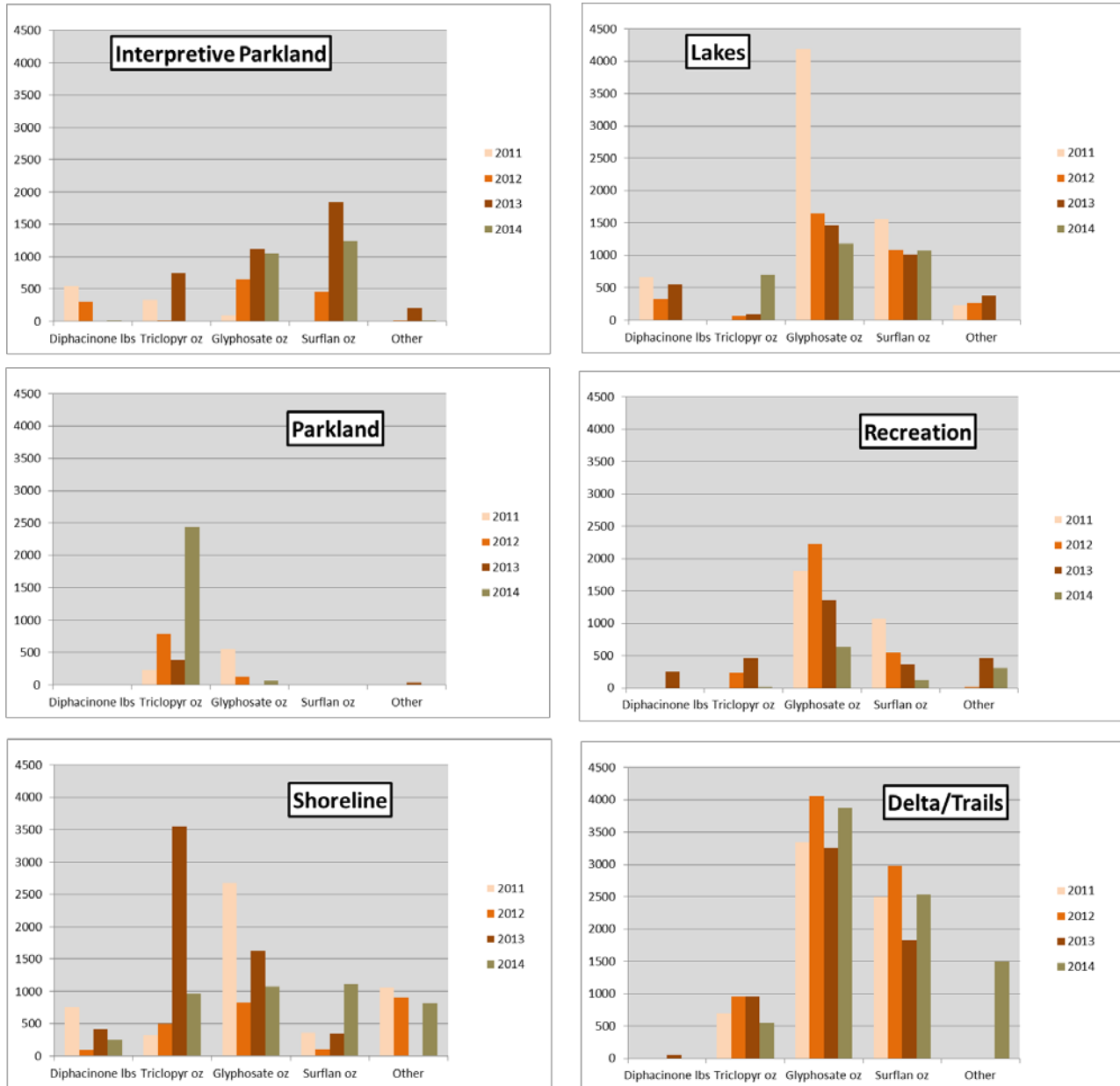


Figure 9. Detailed herbicide use by organizational unit 2011-14.

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SUMMARY OF PESTICIDE ALTERNATIVE USES

Operations and IPM led Volunteers

Park staff continued to utilize an integrated and adaptive management approach to weed management that minimized pesticide use. These methods included propane torching of seedlings, mechanical brush removal (pulling and grubbing) and mechanical mowing with line trimmers, scythes and weed whips. Mechanical and Cultural methods are difficult to quantify and are not currently tracked. Park staff report their activities that are accounted for here.

Figure 10 illustrates total volunteer hours in 2014 (6,518) in which mechanical control methods were utilized to remove invasive plants including fennel, broom and various thistles were utilized. Park staff, volunteers and park users report substantial improvement in recreational enjoyment and desirable species coverage in areas that were mechanically treated. Most importantly, volunteers led by park staff continue to maintain these areas with mechanical control until weed seed banks are depleted and a more sustainable vegetation composition is achieved.

Anthony Chabot and Leona Canyon removed approximately 140 cubic yards of invasive plants mechanically with 160 volunteer hours and 50 staff hours. Moreover, staff torched weeds around campground fire rings, picnic tables, signs with a propane torch. They hand pulled stinkwort (dittrichia), mowed and weed whipped trail edges, road sides, staging areas, gravel parking lots and group camps.

Black Diamond Mines began an aggressive program to control tree of heaven mechanically using 60 hours of volunteer help, 300 hours of staff time and civic corps (480) hours.

The Botanical Garden continues to rely heavily on hand pulling and mulching to control weeds.

Crown Beach continues to utilize the propane torch to control weeds around picnic tables and worked with volunteers to remove invasive plants in the dunes.

Interpretive staff led volunteers on several events to pull yellow star thistle and stinkwort (dittrichia) at Sunol Regional Park.

Martin Luther King Jr. Shoreline has a robust volunteer program led by Save the Bay that includes transplanting natives in the nursery, pulling invasive species, spreading mulch, planting, and removing trash (detailed in table 2).

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Total Hours	# Volunteers	# Adults	# Youth	#Native plants planted	Pounds invasives removed	Pounds of trash removed
7,569	2,434	1,068	1,366	3,407	10,610	3,543

Table 3. 2014 Summary of volunteer hours and accomplishments by Save the Bay at MLK.

Vasco Hills Corridor parks staff continued their program of timed mechanical mowing and torching to control noxious weeds and grasses, exhausting the weed seed bank in and around staging areas and parking lots. They have accomplished a great deal of conversion from weedy monocultures to more maintainable native grass cover that provides a beautiful introduction to our diverse grasslands at these parkland entrances.

Point Pinole continued its maintenance of coastal prairies, augmenting its chemical approach with hand pulling of yellow star thistle (about 325 plants), eucalyptus seedlings (820 small trees), sea fig (350 volunteer hours), French broom (36 plants), teasel (about 84 plants). Additionally, Pinole staff utilized timed mowing on 2 small patches of medusa head grass.

Pleasanton Ridge mowed trail side edges and pulled broom with volunteers in Kilkare woods.

Vertebrate control in recreational areas is achieved primarily through mechanical trapping by park staff. Many rangers and gardeners report that trapping is the most effective gopher control in turf.

Stewardship Programs

Stewardship, partnering with park operations, monitors over 35 bat colonies, 14 of which were installed by park staff. Bat boxes provide important habitat for colonial roosting bats in our regional parks. Bats are the primary predator of night-flying insects and are considered a beneficial resource. Healthy populations of bats consume vast quantities of insects including mosquitoes and costly agricultural pests.

IPM led a number of volunteer groups removing invasive French broom, thistles, forget-me-nots and euphorbia for a total of 429 volunteers contributing 3,562 hours in parks that include Miller Knox and Redwood, Huckleberry, Sibley.

Park staff and IPM have installed and maintain several dozen barn owl boxes, providing additional vertebrate pest control in District lawns and picnic areas. The IPM Barn Owl Box program is currently being inventoried and updated, to include data collection on occupancy and ensure yearly maintenance.

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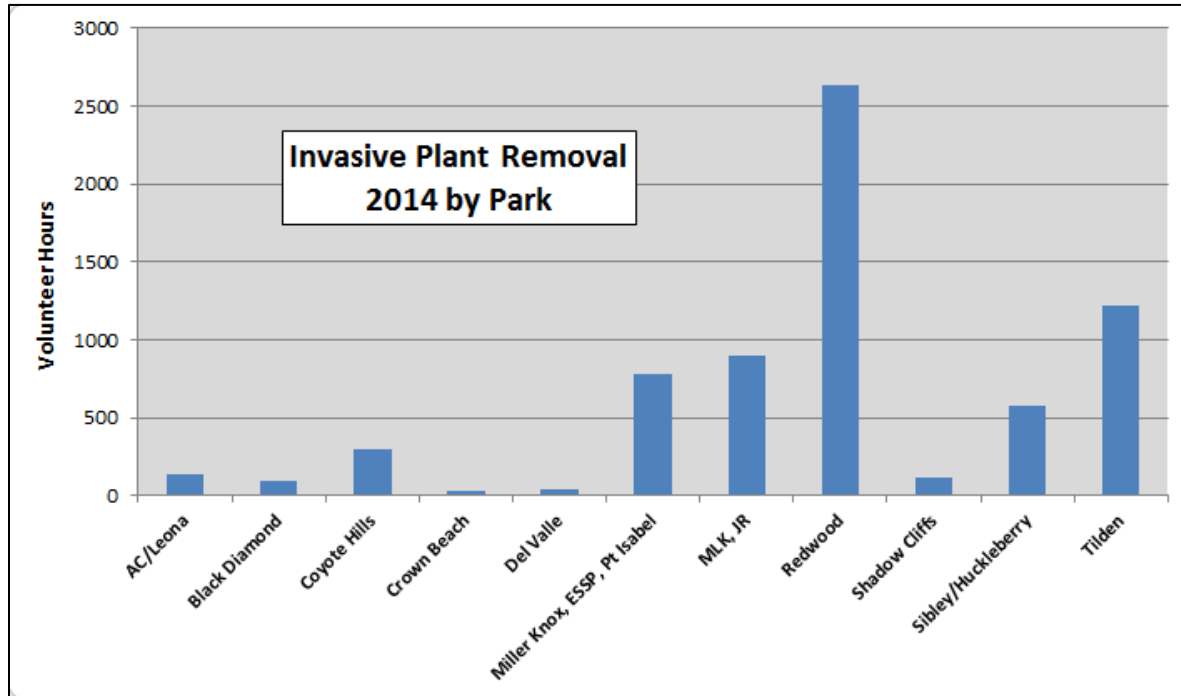


Figure 10. Mean volunteer hours for invasive plant removal in District parks for 2014.

GENERAL USE PESTICIDE DESCRIPTIONS

Glyphosate is a broad spectrum, non-selective post-emergent herbicide used in landscape, right-of-ways and open space. Products in this category include: Roundup Pro (EPA Reg. No. 524-475), Roundup Custom (formerly Aquamaster) (EPA Reg. No. 524-343), Roundup Pro Max 524-579. Most inventory left of Roundup Pro (EPA No. 524-475) has been phased out for the slightly more concentrated Roundup ProMax.

Oryzalin is a broad spectrum, somewhat selective pre-emergent herbicide used in landscape and right of ways. Products in this category include Surflan AS (EPA Reg. No. 70506-44). This product is being replaced with the reduced risk, pre-emergent herbicide, Specticle (indaziflam).

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). This product is anticipated to be reported the 2015.

Triclopyr 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), Garlon 3A (EPA Reg. No. 62719-37) and Pathfinder (EPA Reg. No. 62719-176).

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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 (0.005%) manufactured by Alameda County Agricultural Department (CDFA Reg. No. 10965-50001) and Ditrac (EPA. Reg. No. 12455-80).

SPECIAL-USE PESTICIDES DESCRIPTIONS

Aluminum phosphide is a rodenticide products with this active ingredient include Fumotoxin (EPA Reg. No. 72959-1) and Phostoxin (EPA Reg. No. 72959-4)

Dimension 40WP is a pre-emergent (EPA Reg. No. 62719-445) pyradine pre-emergent herbicide

Milestone is a selective herbicide (EPA Reg. No. 62719-537) active ingredient aminopyralid that targets certain families of broadleaved weeds.

Transline (EPA Reg. No. 62719-259) is a selective, broad leaf herbicide whose active ingredient is clopyralid and is used to control tough perennial and annual invasive weeds.

Polaris is a broad spectrum, post-emergent herbicide (EPA Reg. No. 228-534) whose active ingredient is imazapyr.

Dicamba is a broadleaf, selective, post-emergent herbicide in the chlorophenoxy family used principally for rangeland noxious weed. Products in this category include Vanquish (EPA Reg. No. 228-397) and Clarity (EPA Reg. No. 7969-137) and are applied by both county noxious weed programs.

Pak 27 (EPA Reg. No. 68660-9-67690) is an algaecide and derivative of hydrogen peroxide that is commonly used to treat blue green algae in reservoirs and lakes.

TABLES

Table 1. General use pesticide long-term means and standard deviations (2000-2014) and pesticide totals for 2011-2014 (in text).

Table 2. Pesticide use for special needs and resource projects 2009-14.

Table 3. Pesticide use for golf course concessionaires at Tilden and Willow Park (2011-2014).

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FIGURES

Figure 1. Volume of herbicide used by organizational unit, 2011-2014.

Figure 2. Herbicide use by purpose from 2011-2014.

Figure 3. Triclopyr use by objective 2011-2014.

Figure 4. Herbicide use trends and their long term averages from 2000-2014.

Figure 5. Precipitation patterns at Briones in 2014.

Figure 6. Rodenticide use trends and its long term average from 2000-2014.

Figure 7. District acreage increased from 2000 through 2013.

Figure 8. Priority resource management project for rangeland noxious weeds: artichoke, purple star thistles, perennial pepperweed, hoary cress, Russian knap weed, etc.

Figure 9. Comparative Use of detailed herbicide use by organizational unit 2011-14.

Figure 10. Mean volunteer hours for invasive plant removal in District parks for 2014.

Figure 11. Fillable PDF for PCR request and PUR reporting.

Figure 12. Access data base PUR reporting portal

Figure 13. Comparative pesticide use at District Golf Courses 2011-14.

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By Park Or Program

Alameda Creek Trails

Staff used Roundup and Surflan products to control nuisance weeds under fences, around structures in staging areas and along gravel trails.

Anthony Chabot

Park staff used Garlon for park maintenance, right of way and hazardous tree applications that include the following: cut stump treatment and control of eucalyptus resprouts from hazardous tree removals around the campground, poison oak control around the campground and trails.

Ardenwood Farm

Contractors controlled weeds in the picnic areas, parking lots and railways with Roundup Pro Max, Milestone and Surflan. Park staff baited with diphacinone treated oats for ground squirrel control in spinach field flats and controlled poison oak with Roundup Pro Max.

Black Diamond Mines

Staff applied Roundup Pro Max and Surflan to parking lots, the corporation yard and residences to control nuisance weeds and grasses.

Botanical Garden

Staff gardeners applied very small amounts of Roundup Pro Max to control woody perennial weeds and tree sprouts such as Himalayan black berry, poison oak, etc.

Briones

Staff applied Roundup Pro Max and Surflan to control broadleaf weeds and annual grasses in gravel parking lot and staging areas. Rangers also targeted stinkwort (*Dittrichia*) along trail edges with Garlon.

Camp Arroyo

In order to discourage ground squirrel and consequent rattlesnake activity around camp cabins, recreational areas and offices, Rangers at Camp Arroyo used Roundup Pro Max and Surflan to control vegetation.

Concessionaires

Golden Gate Live Steamers used small volumes of glyphosate products to control weeds along tracks, trails and around buildings.

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Contra Costa Trails

Park staff applied Roundup Pro Max and Surflan to control of weedy annuals for right of way, recreational use on multiple regional trails. The trails crew also used Garlon to control poison oak along the Old Moraga Ranch Trail.

Coyote Hills

Staff applied Roundup Pro Max and Surflan to control poison hemlock, mustard, stinging nettles and other nuisance weeds along fence lines, picnic areas, benches, road and trail sides. Staff also controlled fennel, crab grasses and annual grasses with Roundup applications.

Crown Beach

Park staff applied Roundup to control problem weeds around picnic areas, tables, parking lots and curbs.

Cull Canyon

Park Staff used Roundup and Surflan to control nuisance weeds around picnic tables, in overflow parking lots, around buildings, fences, etc.

Del Valle

Park staff and gardener applied Surflan and Roundup to various elements throughout the picnic areas, recreational areas and campgrounds. These include tables, fire pits, curb stops, overflow and gravel parking lots, maintenance structures, roadsides, etc. A Contractor continued to treat yellow star thistle and other thistle infestations with Milestone throughout the campground. Alameda County Department of Agriculture biologists fumigated highly impacted lawns with aluminum phosphide for gophers.

Design & Construction

Design and Construction submitted no PURs for 2014.

Diablo Foothills

Environmental Programs continued their treatment of noxious rangeland weeds (artichoke thistle, teasel, mustard, etc.) using Milestone, Telar. Park staff used Roundup to control broadleaf and grass weeds in Castle Rock. Rangers also treated stinkwort around the office and near the barn.

Don Castro

Park staff applied Surflan and Roundup around parking lots, picnic areas, trail sides to control stinkwort and other nuisance weeds. Staff also used gas cartridges to control gophers in turf around and in the swim complex.

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East Contra Costa Trails

Staff used consistent amounts of glyphosate and Surflan for control of weedy annuals for right of way, recreational use on multiple regional trails, vegetation control along fence lines and gravel parking lots. Rangers also targeted yellow star thistle in several problem areas with Roundup.

Fuels

The Fuel Break Maintenance Program, currently under the management of the District's fire department, increased herbicide application for fuel abatement activities by 62 % from long term average (2000-2014). However, herbicide application in 2014 decreased from the previous year by 44% and consisted entirely of Garlon applications along the Wildland Urban Interface in Tilden and Wildcat Canyon parks. Triclopyr products are applied after cutting for efficient kill of below ground root mass and to prevent resprouting. Unmaintained eucalyptus, black acacia, pines, scotch and French broom and other non-native trees and shrubs are the focus of these fuel reduction and vegetation management efforts.

Garin/Dry Creek

Park staff used Roundup Pro Max to control nuisance weeds around interpretive displays, parking lots, picnic sites, infrastructure, etc. Staff also treated ground squirrel infestations by baiting with diphacinone treated grain in the heritage apple orchard.

Golf Courses

Table 4 lists the all fungicides, herbicides and plant growth regulators and rodenticides reported by both golf courses from 2011-2013.

Fungicide Use:

Maintenance of high quality turf grass on golf courses such as Tilden and Willow Park require the use of fungicides due to the potential development of genetic resistance. Cultural management strategies do not provide adequate prevention and control of the many diseases that can affect turf grasses.

Tilden Park Golf Course's primary use of pesticides is that of fungicides that protects putting greens from fungal disease. The average golf course has 3 acres of putting greens where the majority of pesticide use occurs. Tilden has natural soil greens that were constructed in the 1930's and has 100 percent *Poa annua* grass as the putting surface. *Poa* is a very aggressive natural grass but unfortunately is susceptible to many diseases. Tilden's strategy is to diversify the types of fungicides used in order to deter resistance development. Fungicide use at Tilden Park Golf Course remained relatively similar to the previous years use.

Willow Park appears to use the same diversification of fungicide use though using fewer options. Willow Park fungicide usage appeared to be slightly higher in 2014

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Growth Regulators:

Tilden Park Golf Course's use of plant growth regulators on tees and greens to suppress seed production of *Poa annua* (annual bluegrass) has remained relatively consistent. This is a novel strategy to reduce maintenance and increase quality of the putting greens.

Herbicides Use:

Tilden Park Golf Course utilized glyphosate products for tree wells and rough areas while using Powerzone, a broad leaf herbicide for control of English daisy on the fairways. Herbicide use was reduced substantially in 2014 from 2013 levels.

Willow Park reported very little herbicide use other than for control of broad leaved turf weeds and an algaecide for the water features.

Rodenticide Use:

Willow Park continued its battle with gophers and moles, although bait use was slightly reduced in 2014. Tilden Golf course had no reported use of rodenticides.

Hayward Shoreline

Rangers applied Polaris to treat Castor Bean and stinkwort as well as Roundup Custom to control cattails and bulrushes along levies.

Kennedy Grove

Staff used Roundup to control various nuisance weeds around recreational areas.

Lake Chabot

Park Staff applied Surflan and Roundup around picnic sites, parking lot islands, staging areas, trail edges, buildings and infrastructures. Additionally, rangers targeted milk thistle, stinkwort, teasel and pampas grass in grasslands and lakeshore areas with Roundup, Garlon and Polaris

Las Trampas

Staff applied Surflan and Roundup to control various weeds along roads, staging areas, buildings and parking lots.

Martin Luther King, Jr. Shoreline/Oyster Bay

Park staff applied glyphosate along high frequency trails, picnic areas and parking lots to control weedy annuals. Park staff and IPM treated noxious perennial weeds, pampas grass and fennel with Polaris (imazapyr). Vertebrate control consisted of diphacinone baiting for ground squirrels in and around lawn areas and trail edges at Oyster Bay.

Miller Knox

Rangers applied Roundup and Garlon to control nuisance weeds along trail sides and parking lots. Staff treated Himalayan blackberry using Garlon. Environment Programs continued their control of

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broadleaf weeds and annual grasses within the Berkeley Meadow Restoration site and along trails and fence lines using Roundup, Surflan and Milestone.

Pleasanton Ridge

Park staff treated staging areas with Surflan and Roundup to control nuisance weeds at Pleasanton Ridge and Dublin Hills. Environmental Programs treated noxious rangeland weeds, primarily thistles, with Milestone at the Owen's property.

Point Pinole

Contractors treated picnic areas trail sides and fence lines with Surflan, Roundup Pro Max and Telar XP for nuisance weeds throughout the park. Staff and contractors controlled poison oak, blackberry and broom, as well as eucalyptus sprouts and cut stumps with Garlon. Contractors and park staff targeted teasel in the coastal prairies with Garlon and Milestone. Rangers treated gopher infestations in turf areas with gas cartridges.

Quarry Lakes

Staff applied OMRI approved Stylet oil to control insects in the rose garden. Contractors from the Agricultural Department controlled vertebrate pests in high use turf areas aluminum phosphide and diphacinone treated bait.

Roberts

Staff applied Roundup to control nuisance weeds in and around the ball field and picnic sites.

Shadow Cliffs

Park Staff treated broadleaf and grass weeds with Roundup and Surflan in the picnic areas, overflow parking lots and beach areas.

Sibley/Huckleberry

Rangers treated morning glory and various broadleaf weeds with Roundup as well as eucalyptus stumps with Garlon.

Temescal

Park Staff treated broadleaf and grass weeds with Roundup in the parking lots.

Tilden

Park Staff treated broadleaf weeds and eucalyptus stumps and sprouts with Garlon and begin a Roundup treatment for euphorbia to complement hand pulling.

Vasco Hills Parks

Environmental Programs treated various thistles and dock at Brushy Peak with Milestone.

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UPDATE TO IPM PROCEDURES FOR 2014

Changes to IPM reporting procedures were implemented in 2014 to refine and gather more data regarding pesticide use. Updated procedures are included in this report again for the benefit of new committee members. The changes include fillable PDF documents for the Pest Control Recommendation request and Pesticide Use Report (figure 10). New fields of data entry in both forms include the purpose for application, target species, area to be treated or number of plants. These fields will allow the IPM department to collect and analyze data in order to increase efficacy and inform management decisions. An access Database was designed to capture pesticide use data and these new data fields (figure 11). This data was used in the majority of data analysis for this report.



<div style="text-align: center;">  <h3>PCR Request</h3> <p>Date: <input style="width: 50px;" type="text"/></p> <p>EAST BAY REGIONAL PARK DISTRICT 2950 Peralta Oaks Court, P.O. Box 5381 Oakland, CA 94605 Office: (510) 544-2343 Fax: (510) 635-3478</p> <p>Park staff applicators attend annual safety training! No pesticide application without PCR and training!</p> <p>Pa rk: <input type="text" value="Alameda Creek Trails"/> County: <input type="text" value="Contra Costa"/> Contract #: <input type="text"/></p> <p>Pest Species to be Controlled: <input style="width: 100%;" type="text"/></p> <p>Location of Application: <input style="width: 100%;" type="text"/></p> <p>Timing of Application: <input style="width: 100%;" type="text"/></p> <p>Narrative: <small>History Public sensitivity Cause of application Existing vegetation types Other pertinent info</small></p> <div style="border: 1px solid black; height: 60px; width: 100%;"></div> <p>Purpose: <input type="text" value="Right Of Way"/> Preferred Application Method: <input style="width: 100%;" type="text"/></p> <p>Map Attached? <input type="checkbox"/> Pix Attached? <input type="checkbox"/> Table Attached? <input type="checkbox"/></p> <p>Total Treatment Area (TA) (acres): <input style="width: 50px;" type="text"/> % of TA to be TREATED: <input style="width: 50px;" type="text"/></p> <p>Total Area of Treatment(acres): <input style="width: 50px;" type="text"/></p> <p>Hazards: <small>Potential run-off Nearby water Desirable vegetation Wildlife considerations Grading present in TA</small></p> <div style="border: 1px solid black; height: 40px; width: 100%;"></div> <p>Submit PCR request, maps, pictures and tables as needed to IPM via email or District mail as soon as possible.</p> </div>	<div style="text-align: center;">  <h3>PUR</h3> <p>Date: <input style="width: 50px;" type="text"/></p> <p>EAST BAY REGIONAL PARK DISTRICT 2950 Peralta Oaks Court, P.O. Box 5381 Oakland, CA 94605 Office: (510) 544-2343 Fax: (510) 635-3478</p> <p>Park staff applicators attend annual safety training! No pesticide application without PCR and training!</p> <p>P a r k : <input type="text" value="Alameda Creek Trails"/> County: <input type="text" value="Contra Costa"/> Contract #: <input type="text"/></p> <p>Target species: <input style="width: 100%;" type="text"/></p> <p>Location of Application: <input style="width: 100%;" type="text"/></p> <p>Dates of Application: <input style="width: 100%;" type="text"/></p> <p>Applicator's Name, Lic # <input style="width: 100%;" type="text"/></p> <p>Pesticides Used Adjuvants Used EPA Reg #s Total Product Used</p> <div style="border: 1px solid black; height: 60px; width: 100%;"></div> <p>Purpose: <input type="text" value="Right Of Way"/> Application Method: <input style="width: 100%;" type="text"/></p> <p>Spray Water pH check? <input type="checkbox"/> Haz Comm Training <input type="checkbox"/> Area/plants treated: <input style="width: 50px;" type="text"/></p> <p>Supervisor Review: <input style="width: 50px;" type="text"/> Unit Manager: <input style="width: 50px;" type="text"/></p> <p>PCR, Label, MSDS, Emergency Info, Worker Safety Training Form on site? <input type="checkbox"/></p> <p>Environmental Conditions at time of Application Additional Notes</p> <div style="border: 1px solid black; height: 40px; width: 100%;"></div> <p>Submit PUR by the 5th of the month following application.</p> </div>
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Figure 11. Fillable PDF for PCR request and PUR reporting.

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The screenshot shows the Microsoft Access interface for the 'PUR' form. The form is displayed in 'Form View' and contains the following data:

Field	Value
Year	2014
Month	3
Pesticide	Surflan AS
Amount	1050
Unit	Ounces
No of Applications	6
ParkAbbr	LT
Property	
County	Contra Costa
Applicator	Park Staff
Purpose	Park Maintenance
Area Treated	3.56
Units	acre
Pest Target	10

The interface includes a ribbon with options like Filter, Sort & Filter, and Text Formatting. The left pane shows 'All Access Objects' with a tree view of Tables, Queries, and Forms. The bottom status bar indicates 'Record: 1 of 1062 of 1066'.

Figure 12. Access database Pesticide Use Reporting portal.

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Course	Year	Fungicides gallons														Affirm WDG lbs			
		Chlorothalonil (gal)	Instrata (Chloro/Propo)	Propiconazole	Concert II (Propo/Chloro)	Confront (Triclo/Clopy)	Iprodione	Metenoxam	myclobutanil	Thiophanate-methyl lbs	Thiophanate-methyl oz	Triticonazole	PCNB	Fosetyl-Aluminum lbs	Mancozeb lbs		azoxystrobin lbs	Metaconazole lbs	
WPGC	2011	9.02		1												96			
	2012	30			0.5											120			
	2013	0	7.5	1.25												72			
	2014		10.43				5									120			
TGC	2011	45		16							1	3.375				63	143	30	3
	2012	44		2							2					48	132		1
	2013	20		2	5						4					66	192		
	2014	16.5	5	4.06			8.00				8					66	36		6

Course	Year	Growth Regulators			Rodenticides			Herbicide gallons							
		Ethephon gal	Trinepac-	Gopher Getter	Aluminum Phosphide lbs	Talpid g	Lonrel (clopyralid)	Powerzone	Prosecutor (glyphosate)	Vanquish (Dicamba)	Orazalin 4 Pro	Copper Sulfate lbs	Roundup Pro Max	Quinclorac	
WPGC	2011					76									
	2012			120		90	0.05			0.38	0.09	0.16			
	2013			266		176									
	2014			215		20	6.00								
TGC	2011	15	3.375		2							6.41	0.13		0.18
	2012	20	2												
	2013	20	0.41									17.80			
	2014	20	0.84									3			22

Figure 13. Comparative pesticide use at District Golf Courses 2011-14.

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EVALUATION AND CONCLUSION

While the bulk of pesticide use is for park maintenance, critical habitat enhancement and fuel reduction constitutes a significant amount and necessary use of pesticides. Additionally, chemical control of pest species has remained relatively constant over the last decade with respect to the long-term mean, despite continued growth. The bulk of pesticide use (glyphosate and Diphacinone) is largely driven by moisture inputs in the form of winter rains. Oryzalin use, a pre-emergent whose rate is determined by area, is driven by the amount and size of recreational areas that require vegetation management. Thus, use of oryzalin or a similar and less toxic new product will remain relatively constant and increase slowly with the acquisition and development of new and land banked properties. Triclopyr use will continue to grow as fuel reduction activities increase. Over the very long term, once fuel reduction levels are achieved and maintained, triclopyr use should decrease and remain relatively consistent.

The IPM department anticipates replacing older pesticides with newer, safer and more effective chemicals in the next few years. Furthermore, IPM staff is actively working on expanding the suite and scope of training offerings for staff in IPM practices. District park staff does an excellent job of balancing the physical demands of park maintenance and land management while ensuring a safe and enjoyable environment for park users and healthy habitats for the flora and fauna that attract so many visitors to district parklands. The IPM department is proud to assist the hardworking park staff serving the diverse public that recreates in the East Bay Regional Park District.

WORKING GOALS AND COMMITMENTS

1. Continue to replace older pesticides with more effective, less toxic products.
2. Update the District's IPM policy.
3. Continue to provide annual pesticide safety training to all District applicators.
4. Continue to work with individual parks to develop and refine park specific IPM programs.
5. Develop and implement a series of IPM related trainings for park staff, including weed identification and control techniques, vertebrate control, invertebrate control, etc.
6. Continue to monitor and improve pesticide applications by outside agencies in District parklands.
7. Continue to identify and procure funds to expand the control of non-native invasive plants in order to enhance habitat, increase native cover and biodiversity and support recreational activities.

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8. Increase volunteer opportunities to control and/or eradicate non-native, invasive species in District parklands through habitat enhancement projects.
9. Work with golf course concessionaires to develop and implement IPM programs.
10. Develop a program to track and quantify the use of IPM techniques (pesticide alternatives).