

City of Davis
Integrated Pest Management Program
2014 Annual Report of Pesticide Use

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1.0 Introduction and Background

The Integrated Pest Management policy requires that an annual report be presented to the City's commissions each year. This report includes a review of pesticide records and the methods used to reduce the reliance on chemical controls. As part of the City's most recent reorganization in 2014, the IPM program currently resides within the Parks and Community Services Department. Though the organizational structure has changed during the past several years, the IPM program continues working with all divisions that utilize pesticides in the City of Davis.

Since the IPM program was formally adopted by the City, several successful activities have been implemented as part of the program. These activities include coordination of various citywide IPM practices, evaluation and training of field staff and landscape contractors on alternative pest control methods, such as reduce usage of toxic pesticides, in addition to assisting with the maintenance and monitoring of pesticide use and training records for all City Departments.

Current pest control response is dictated by the results of pest population monitoring by field staff. Weed abatement is not the primary function of field staff, which must tend to other priorities of their job description. As a result, pest control efforts are often impacted by competing priorities, thus occasionally missing the window of opportunity for efficient weed control that sometimes can result in extra labor or additional use of herbicides.

2.0 Pest Control Activities

2.1 Weed management

The City currently manages 1,616 acres of land that are subject to IPM. This acreage is divided into 6 major management areas including: parks, greenbelts, facilities and streetscapes (483 ac.); open space (519 ac.); transportation (20 ac.); stormwater (100 ac.); wastewater treatment plant/wetlands (489 ac.). The following control methods are used by the City of Davis:

Mechanical Removal: Mowing, weed trimming, hoeing, hand removal and tilling are used by City crews to control weeds. Mowing and tilling are used throughout the WWTP, wetlands, drainage channels and open space areas. In parks and greenbelts, weed trimming, hoeing and hand pulling are the principal methods of mechanical weed controls.

Mulching: It is the single most successful cultural practice that reduces herbicide applications. Parks maintenance staff and volunteers continue to maintain mulch around landscaped areas and in some tree wells. Besides smothering weeds, mulch reduces the need for fertilizer, water and stimulates soil microorganisms that aid in plant growth. In 2014, the City's maintenance staff and contractors distributed over 466 tons of wood chips in parks and throughout the community.

Solarization: Soil solarization is a non-chemical method for controlling soil pests and weeds using high temperatures produced by capturing radiant energy from the sun. The method involves heating the soil by covering it with a clear plastic tarp for 4 to 6 weeks during a hot period of the year when the soil will receive the most direct sunlight. The plastic sheets allow the sun's radiant energy to be trapped in the soil, heating the top 12 to 18 inches and killing a wide range of soilborne pests, such as weeds, pathogens, nematodes, and insects. One acre of ground

at the Mace Ranch Passive Recreation area was successfully solarized during the late summer and early fall of 2013. Native grasses were sown and only one broad leaf weed species (filary) survived requiring a broadleaf selective application early in 2014. This method saved time, pesticide applications and labor advancing the native grass establishment by a year.

Grazing: Livestock grazing has successfully reduced weeds and the need to spray them at the South Fork Preserve along Putah Creek and at the wetlands. Sheep are free ranged for periods of time, keeping grass and weeds down. Current livestock grazing practices continue to be cost-free for the City, unlike some other agencies.

Use of Native Vegetation in Landscaping Projects: The City utilizes native and drought tolerant trees, shrubs, and grasses when possible in municipal landscape projects. Native and drought plants are demonstrated in the UC Davis Arboretum and in the landscaping of the Central Park Gardens. The use of perennial fescue around tree wells, under fences and other structures in park areas has reduced or eliminated herbicide applications resulting in efficient maintenance of the area. The Mace Ranch Passive Recreation area has been planted with native perennials and grasses.

Weed Flaming: Propane flamers are utilized to reduce the options for other forms of weed control. This technique is effective on small, recently germinated broadleaf weeds. In parks, small 5 gallon propane tanks are used to control weeds around tree wells or between cracks.

Green Herbicides: Successful use of the soap based herbicide (Scythe) in the green zones and sensitive areas and the combination with Roundup has contributed to the reduction of our conventional pesticide use. The recommended rate for a Scythe Roundup mixture is 1 ounce of roundup per gallon mix with 2-3 ounces of Scythe. Roundup alone is mixed at 2.66 ounces to achieve a 2% solution. The use of an iron based herbicide that selectively kills broadleaves will continue to be evaluated.

Irrigation: Actively capping sprinkler heads that are unnecessarily irrigating decomposed granite, concrete or bare areas exasperating the weed problem. Parks maintenance staff are also replacing inappropriate sprinkler heads and fixing broken lines to reduce water use and weed growth. In 2014, over 1,000 sprinkler heads have been capped in parks and greenbelts. Controllers have been upgraded and the irrigation crew has attended various training courses on controller programs.

3.0 City of Davis Pesticide Use

The following table lists the most used pesticides in the City of Davis along with the common names, characteristics and uses.

TABLE 1. Pesticide names, characteristics and uses.

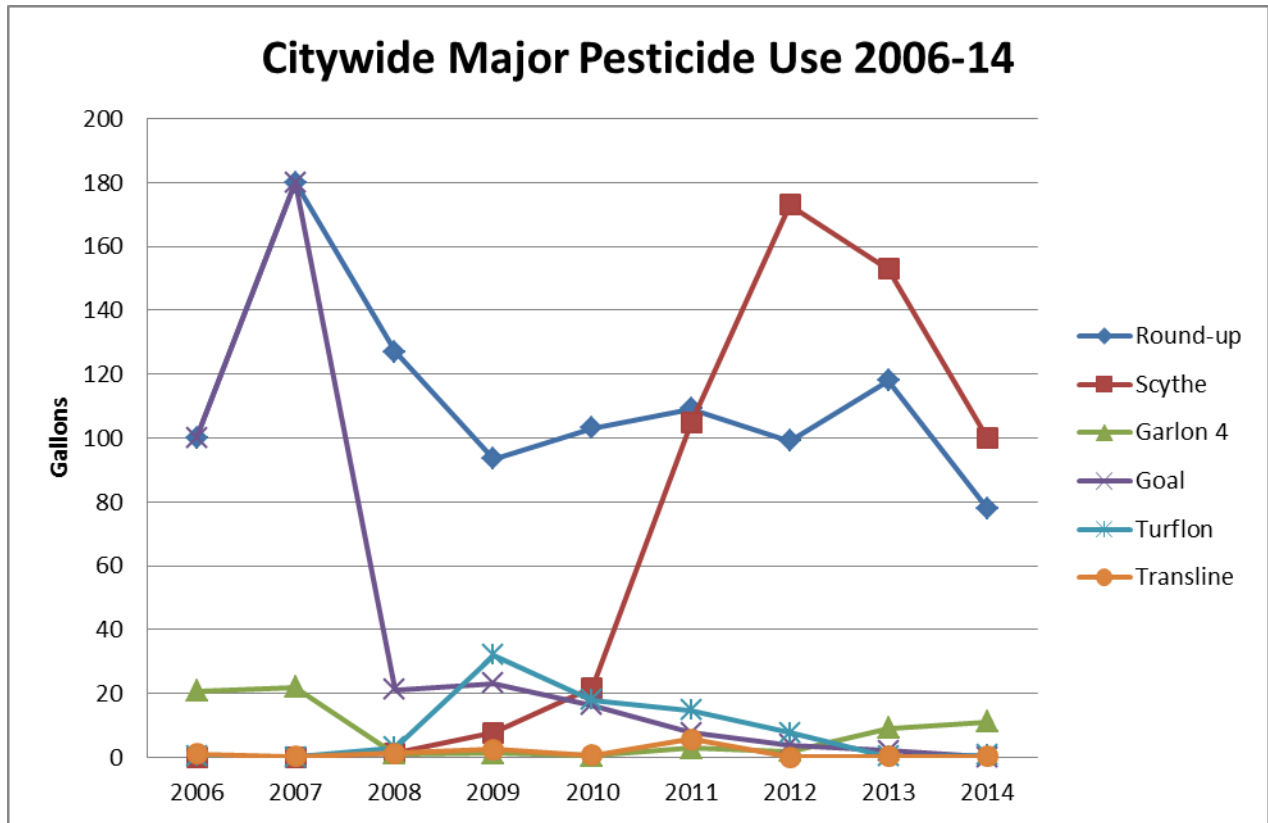
Commercial Name	Common Name	Type	Category	Characteristics
Roundup	Glyphosate	Herbicide	3	Post emergent, non selective
Scythe	Pelargonic Acid	Herbicide	2	Post emergent, non selective, used in green zones
Garlon 4	Triclopyr	Herbicide	3	Post emergent, broadleaf selective and brush, Right of way apps
Turflon	Triclopyr	Herbicide	3	Post emergent , broadleaf selective in landscaped areas
Snapshot	Trifluralin & isoxaben	Herbicide	3	Pre emergent, non selective in landscaped areas
Goal 2XL	Oxyfluorfen	Herbicide	2	Pre & post emergent non selective, Goaltender used in landscapes
Transline	Clopyralid	Herbicide	3	Post emergent used in open spaces and right of way for starthisle control
Telar	Chlorsulfuron	Herbicide	3	Post emergent used in open spaces and right of way for pepperweed
Fusilade	Fluazifod-P-butyl	Herbicide	3	Post emergent control of grassy weeds in landscapes
Milestone VM	aminopyralid	Herbicide	3	Post emergent control of grasses in open space and right of way
Sedgehammer	Halosulfuron	Herbicide	3	Post emergent selective on nutsedges in landscapes
R-11	Alkylphenol ethoxylate	Adjuvant	2	Nonionic surfactant, spreader sticker
Cayuse Plus	Ammonium sulfate	Adjuvant	2	Ammonium sulfate and surfactant
Choise	Ammonium sulfate	Adjuvant	3	Ammonium sulfate

TABLE 2: Summarizes pesticide use¹ by product for calendar year 2014 with comparison to 2006 through 2014.

Product	2006	2007	2008	2009	2010	2011	2012	2013	2014
Round-up	100 gal	180 gal	127 gal	93.5 gal	103.1 gal	109.2 gal	99 gal	118 gal	78 gal
Scythe	0 gal	0 gal	1.3 gal	7.7 gal	21.7 gal	104.8 gal	173 gal	153 gal	100 gal
Garlon 4	20.8 gal	22 gal	1.1 gal	1.3 gal	0.52 gal	2.9 gal	1.8 gal	9 gal	11 gal
Goal	100 gal	180 gal	21.2 gal	23.1 gal	16.3 gal	7.7 gal	3.9 gal	2 gal	3 oz
Turflon	0.2 gal	0.03 gal	3.1 gal	32 gal	17.9 gal	14.6 gal	7.7 gal	.2 gal	.7 gal
Transline	1 gal	0.3 gal	1.3 gal	2.4 gal	0.64 gal	5.7 gal	11 oz	18 oz	36 oz
Telar	17 oz	36.1 oz	8.7 oz	32.4 oz	0.64 oz	0.4 oz	36 oz	0	0
Fusilade	0.02 gal	0.06 gal	0.25 gal	4.25 oz	10 oz	0 oz	1 oz	43 oz	1.5 gal
Aquamaster	1.5 gal	3.9 gal	1.8 gal	0.3 gal	0 gal	2.5 gal	0	0	0
Merit / Zenith	8.5 gal	0.3 gal	0.4 gal	0 gal	0 gal	0 gal	0	26.5 oz	0
Direx 4L	2.5 gal	4.7 gal	0.5 gal	0 gal	0 gal	0 gal	0	3 gal	0
Snapshot	2922 lbs	3325 lbs	5900 lbs	0 lbs	337 lbs	1170 lbs	1992 lbs	66 lbs	0
Barricade	0.2 gal	5.2 gal	2.3 gal	0 gal	0.30 gal	.5 gal	32 oz	0	0

¹ Includes City contracted pest control applications.

CHART 1. Graphic representation of major pesticides used citywide from 2006 to 2014.



3.1 Comparison of Citywide Usage 2013- 2014

Total pesticide use citywide declined in 2014 as compared to 2013, due to drought conditions and the prior uses of cultural and mechanical controls methods such as mulching and mowing. The use of Roundup and Scythe non-selective herbicides were reduced by 34% and 65% respectively. Garlon, a broadleaf selective herbicide used to control broadleaf weeds in grass stands, increased by two gallons compared to 2013 primarily used by the Waste Water Treatment Plant and Stormdrain divisions. Fusilade, a grass herbicide used mostly to control Bermuda grass in parks, increased from 43 ounces in 2013 to 187 ounces in 2014 (See TABLE 2 and CHART 1).

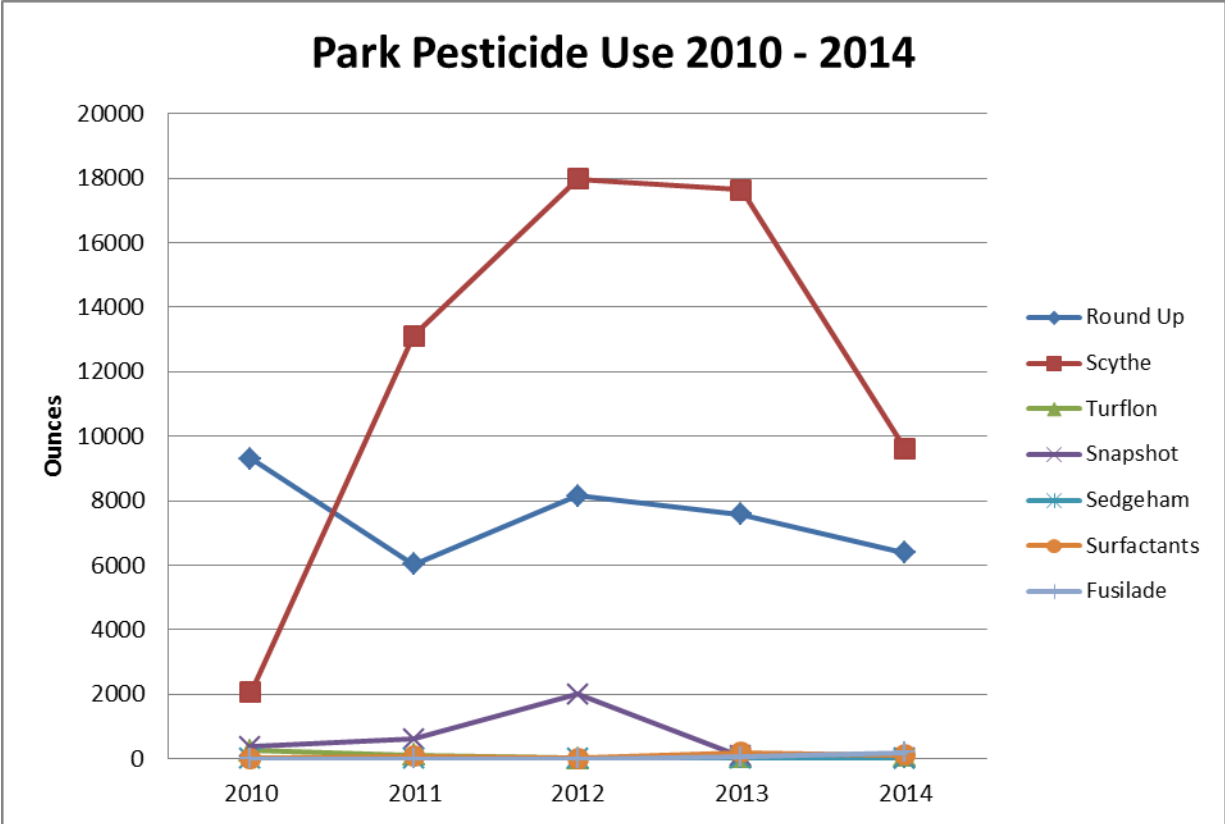
TABLE 3. Parks Pesticide use 2013 and 2014 in ounces.

Parks 2013	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
Round Up	60	703	1654	924	900	729	706	892	243	713	54	2	7580
Scythe	90	1271	4783	2350	1724	1648	1729	1555	752	1563	152	8	17625
Turflon	0	9	2.5	0	5	1	0	0	0	0	5.6	0	23.1
Surfactants	0	96	58	0	5	20	0	0	4	0	5.5	0	188.5
Fusilade	0	12	4	0	0	0	0	0	8	19.5	0	0	43.5
Fiesta	0	0	0	0	0	0	0	0	0	0	0	0	0
Sapphire	0	0	0	0	0	0	3	0	0	0	0	0	3

Parks 2014	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
Round Up	330	575	712	1208	935	117	787	804	434	428	0	56	6386
Scythe	376	1482	1781	2135	1067	128	974	792	428	428	0	0	9591
Turflon	19	24	0	8	0	34.6	0	0	0	0	8	0	93.6
Surfactants	0	36	18	17	14	16.3	3.5	0	0.5	0	13.5	0	118.8
Fusilade	0	0	0	156	6	0	5.3	0	0	0	20.25	0	187.55
Fiesta	0	0	0	0	0	12	0	30	0	0	0	0	42
Sapphire	0	0	0	0	0	0	0	0	0.5	0	0	0	0.5

CHART 2 and 3.

Parks Use	2010	2011	2012	2013	2014
Round Up	9297.5	6029.5	8149	7580	6386
Scythe	2060	13115	17970	17625	9591
Turflon	259.3	114	8.9	23	93.6
Snapshot	377	600	1992	66	0
Sedgeham	0	5	4.4	6	0
Surfactants	15.5	70.5	22	188	119
Fusilade	0	0	1	43	187.5



3.2 Comparison of Pesticide use by City Parks in 2013 and 2014.

The use of glyphosate based herbicide decreased in 2014 by 1,194 oz. or slightly over 9 gallons. Scythe, the soap based herbicide, decreased by 8,034 oz. or roughly 63 gallons (See TABLE 3 and CHART 2 & 3). The grass selective herbicide, Fusilade used to control mostly Burmuda grass and Italian ryegrass in landscaping, increased by 144 ounces compared to 2013 to 187 ounces or a little less than 1.5 gallons.

3.3 Time Spent on IPM Activities in Parks.

When IPM practices are employed, results such as healthier plants, reduced application of potentially toxic chemicals and the ensuing exposure and runoff are obtained. It is a long-term control of the pest populations. The public must understand that IPM tolerates a certain amount of pest damage, and it is up to the individual worker to determine the threshold level. To prevent the crossing of these threshold levels and the application of pesticides; cultural, mechanical and biological controls must be engaged. The time involved in these IPM activities has begun to be documented by staff and the initial results are shown on the following page (See TABLE 4 AND CHART 4).

TABLE 4. Hours Spent on IPM Activities in Parks.

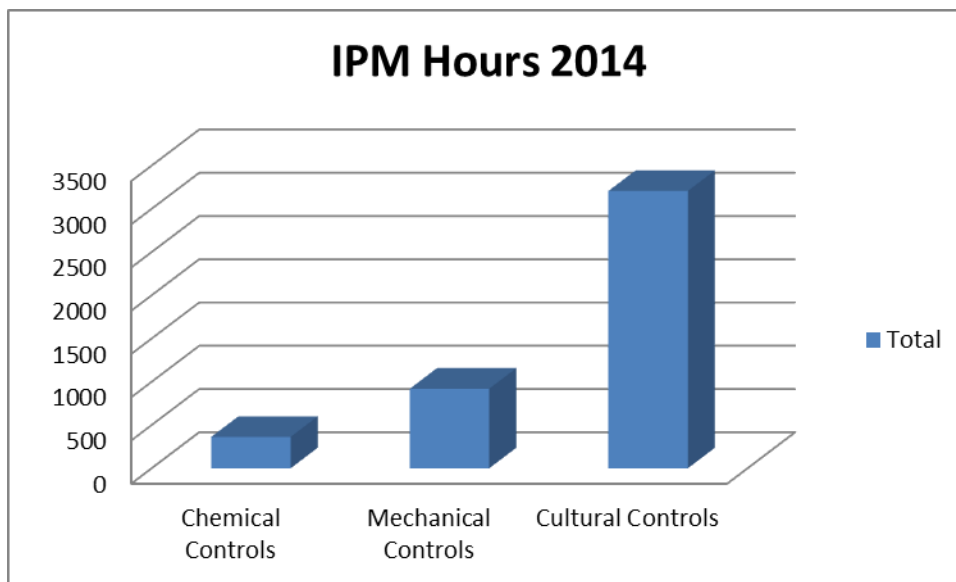
2014	Northwest	Southeast	Contractors	Total
Chemical Controls	68	63	232	363
Mechanical Controls	311	188.5	421	920.5
Cultural Controls	193	189.5	2825	3207.5

Chemical controls consist of green or less toxic pesticide and yellow or conventional pesticides use.

Mechanical control consists of string trimming, hoeing, flaming, mowing or hand pulling.

Cultural control consists of mulching, mulch spreading and re-vegetation.

CHART 4.



3.4 Comparison of Pesticide use by the City's Open Space Division in 2013 and 2014.

The City's Open Space division manages 548 acres of open space areas which include: South Fork Putah Creek preserve, Wildhorse Agricultural buffer, El Macero Agricultural buffer, Lincoln Hwy bike path, Putah Creek parkway, Woodbridge and Willowbank natural preserve, tank project by John Jones Rd. and Russell Blvd west of Hwy 113.

TABLE 5. Open Space Pesticide Use 2013 and 2014 (in ounces).

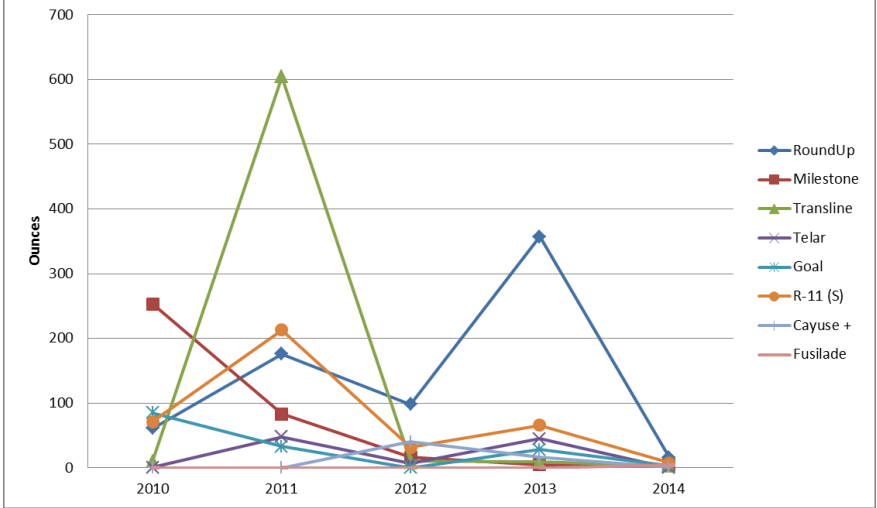
Open Space 2013	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
RoundUp	0	6	50	4.5	3	12	0	0	0	6	6	0	87.5
Milestone	0	0	0	1	1	0	0	2	0	2	0	0	6
Transline	0	1	0	0	3	2	1	2	0	0	0	0	9
Garlon	0	0	0	0	0	0	0	0	0	0	0	0	0
Telar	0	0	0	0	0.13	0	0	0	0	0	0	0	0.13
Goal	0	3	25	0	0	0	0	0	0	0	0	0	28
Cayuse (S)	0	0	16	0	0	0	0	0	0	0	0	0	16
R-11 (S)	0	2	8	1	3	2	1	2	0	1	0	0	20

Open Space 2014	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
RoundUp	0	3	0	0	0	7.5	0	6	0	0	0	0	16.5
Milestone	0	1	1	1	0	1	1	0	0	0	0	0	5
Transline	0	0	0	1	0	0	2	0	0	0	0	0	3
Goal	0	0	3	0	0	0	0	0	0	0	0	0	3
Telar	0	0	0	0	0	0	0	0	0	0	0	0	0
Fusilade	0	4	0	0	0	0	0	0	0	0	0	0	4
Cayuse	0	0	0	0	0	1	0	0	0	0	0	0	1
R-11 (S)	0	3	1	1	0	1	2	0	0	0	0	0	8

The Open Space division's weed abatement program has minimized its use of herbicides achieving a delicate balance between maintaining the scenic and recreational components of these lands and controlling invasive weed species. Every year they manage the open space areas with forethought on the long term weed abatement strategy utilizing, mowing, grazing and precise herbicide application.

CHART 5.

Open Space Use 2010 - 2014

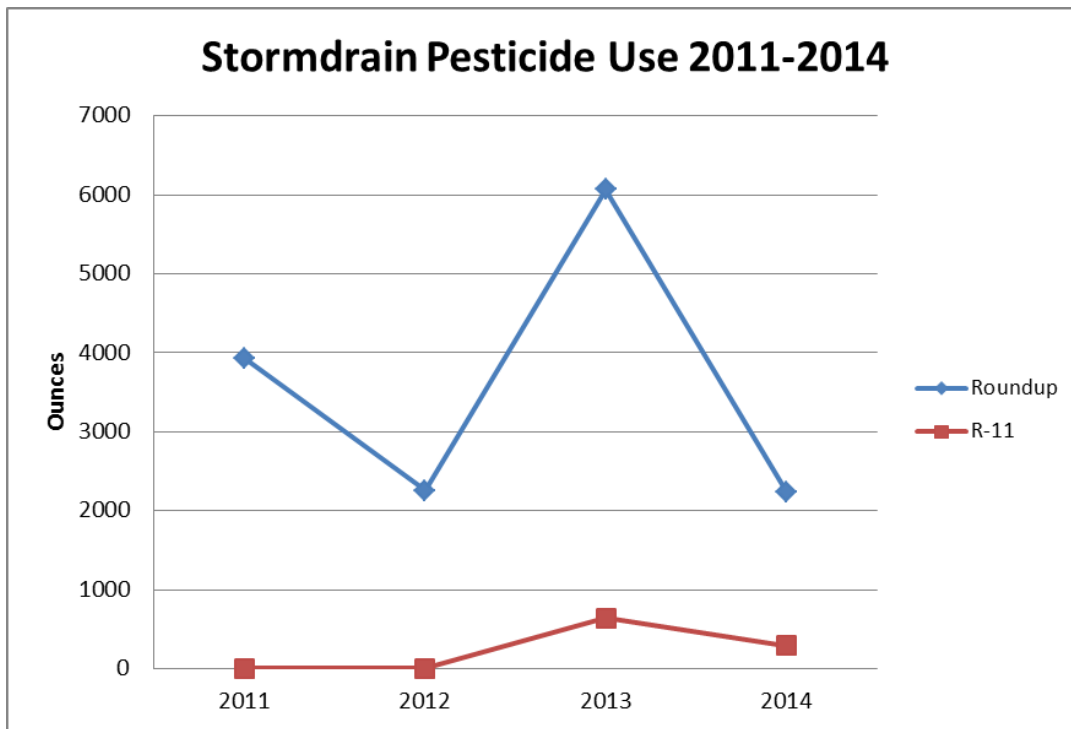


3.5 Comparison of Storm Water Usage 2013 and 2014.

Stormwater runoff is generated when precipitation flows over land or impervious surfaces such as concrete driveways, sidewalks, streets, parking lots and rooftops, and does not percolate into the ground. Storm water flows untreated into surrounding creeks, ponds and rivers. Most of the 15 miles of channels in the City of Davis and storm drain ponds are maintained by the crew of 2 with tractor mounted mowers and herbicide applications keeping these channels clear from obstruction when rain events occur and as right of way clearance to access some of these areas.

TABLE 6. Stormdrain Pesticide Use (in ounces) 2013- 2014.

Stormwater 2013													
Roundup	0	1200	950	200	580	2300	200	640	0	0	0	0	6070
R-11	0	0	0	0	128	320	64	128	0	0	0	0	640
Stormwater 2014													
Roundup	0	232	200	700	0	0	200	0	900	0	0	0	2232
R-11	0	0	0	0	0	0	0	0	288	0	0	0	288



3.5 Comparison of Wastewater Treatment Plant Usage 2013 and 2014

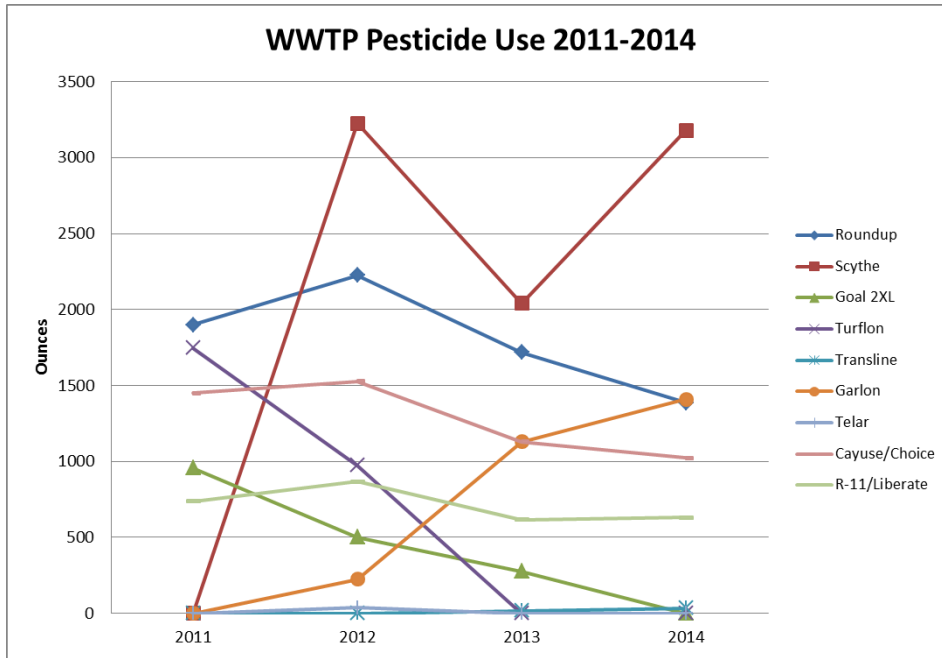
Weed abatement at the Wastewater Treatment Plant (WWTP) is a year round challenge. In the overland flow weeds must be cleared to allow treated waste water to be sprayed on fescue grass which draws nitrates from the treated water. The settling lagoons are kept free of vegetation to deter rodents and other animals. The wetland areas have weeds like mustards, bristly ox tongue, knotweed, malva, filaree and the invasive weeds star thistle and perennial pepper weed. The weed abatement process helps the native grasses and other native vegetation become established providing habitat for wildlife.

TABLE 7 Waste Water Treatment Plant (WWTP) Pesticide Use 2013-2014.

WWTP 2013	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Roundup	0	0	305	230	125	630	113	220	0	95	0	0	1718
Scythe	0	0	620	340	450	210	0	0	0	420	0	0	2040
Goal 2XL	0	0	0	75	0	200	0	0	0	0	0	0	275
Turflon	0	0	0	0	0	0	0	0	0	0	0	0	0
Transline	0	0	0	18	0	0	0	0	0	0	0	0	18
Garlon	455	675	0	0	0	0	0	0	0	0	0	0	1130
Telar	0	0	0	0	0	0	0	0	0	0	0	0	0
Cayuse	244	297	92	124	33	185	50	33	0	73	0	0	1131
R-11	122	147	81	77	16	106	25	44	0	0	0	0	618

WWTP 2014	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Roundup	90	0	0	300	420	195	160	110	110	0	0	0	1385
Scythe	0	0	0	550	979	600	480	240	330	0	0	0	3179
Goal 2XL	0	0	0	0	0	0	0	0	0	0	0	0	0
Turflon	0	0	0	0	0	0	0	0	0	0	0	0	0
Transline	0	0	0	0	0	0	33	0	0	0	0	0	33
Garlon	20	38	901	300	0	150	0	0	0	0	0	0	1409
Telar	0	0	0	0	0	0	0	0	0	0	0	0	0
Cayuse/Choice	12	17	395	198	9	122	164	32	74	0	0	0	1023
R-11/Liberate	35	8	198	99	68	77	82	28	37	0	0	0	632

CHART 6 WWTP Pesticide Use 2011-2014.



3.5 Comparison of Transportation Division Usage 2013 and 2014.

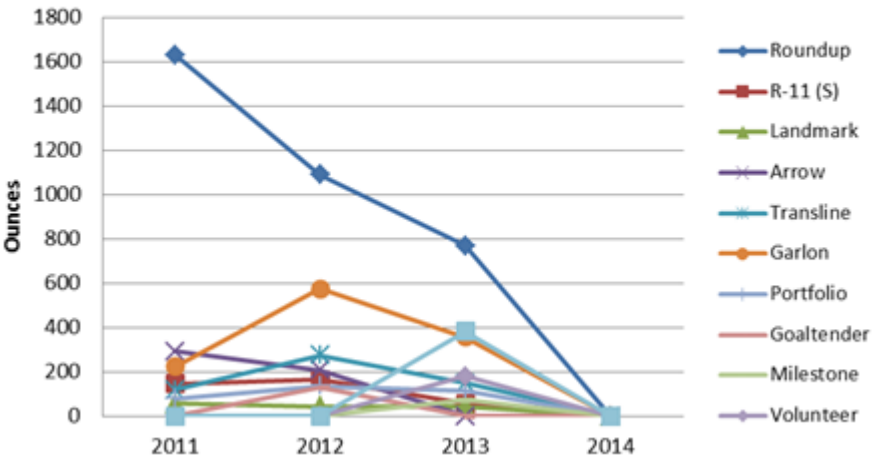
The Transportation division operates and maintains the City’s transportation infrastructure for the safe and efficient use by bicyclists, pedestrians, automobiles and public transit. Most weed abatement is conducted by local contractors that treat streets, sidewalks, curbs and gutters, bike paths, parking lots, non-landscaped traffic medians, the old dump-go cart track and empty lots owned by the city. In 2014, there were no pesticide applications due to the division’s applicator being out most of the season. The drought played a major role in keeping weeds down and mechanical control was the primary form of weed abatement this year.

TABLE 8 Transportation Pesticide use 2011-2014.

	2011	2012	2013	2014
Roundup	1632	1092	770	0
R-11 (S)	147	164	58	0
Landmark	57	45	44	0
Arrow	294	208	0	0
Transline	120	275	150	0
Garlon	224	576	357	0
Portfolio	80	138	114	0
Goaltender	0	128	0	0
Milestone	0	0	72	0
Volunteer	0	0	180	0
Direx	0	0	384	0

CHART 7. Transportation Pesticide use 2011-2014.

Trans. Pesticide Use 2011-2014



The IPM Coordinator meets with transportation staff and the contractors, inspecting sites and suggesting specialized herbicide applications that will reduce the need for continuous applications in the future. Re-vegetation of some of the areas with native grasses was proposed but due to primary activities and the drought these projects will be considered in the following seasons.

4.0 Public Outreach and Education

Public outreach and education continues to make up half of the programs activities. The OWOW (Our Water Our World) continues to be implemented at three pesticide retail stores in Davis (Davis Ace, Redwood Barn and Nursery, and CVS Pharmacy) in 2014. This program provides “Less Toxic” fact sheets and shelf tags set adjacent to pesticides. In addition to the written materials, store employees are given training regarding what products are environmentally conscience alternatives for pest control.

IPM educational literature and materials such as trifolds, comic book and owl boxes and gopher traps are provided and displayed at community events like Farmers Market, Celebrate Davis and Duck Days. Posting continues at locations where alternative to chemical pest control are in use and at centrally located kiosks around the City of Davis.

Pesticide Hazard and Exposure Reduction (PHAER) zones program provides maps online of parks and adjacent greenbelts providing information about the general level of pesticide hazard present on a site-by-site basis.

Central Park Gardens demonstrate the use of drought tolerant and native plants, zone irrigation, and alternative pest control. The City continues to collaborate with the arboretum with public outreach events related to the garden. In the Community Gardens, participation continues in meetings and talks related to pest management and other gardening issues such as water conservation.

The City’s IPM website includes access to the City’s IPM and pesticide use policies, details on how to deal with local pests, links to other useful sites as well as details on the Pesticide Hazard and Exposure Reduction (PHAER) zones program. Currently, the City’s web page is undergoing renovations and the IPM page is scheduled to be up and running by June 2015.

Presentations on the City’s IPM program have been conducted at professional meetings such as the Pesticide Applicators Professional Association; California Association of Pest Control Advisors; UC Davis bi weekly weed seminars, Ecological Farming Conference and the City’s sponsored Horticultural Pest Control Seminar.

Pesticide safety training of City staff is conducted continuously for various divisions within the Public Works and Parks & Community Services Departments. Additional workshops have been conducted in Spanish for the landscape contractors and staff with about 20 participants. A yearly, half day seminars with continuing education credits are conducted for staff, contractors and other pest control professionals in the area with roughly 55 participants. Preparatory courses for City of Davis staff seeking Qualified Applicators Certificates have been conducted covering materials such as pesticide safety, laws and regulations, and IPM practices.

5.0 Goals for 2015

- Continue pesticide safety training for staff and contractors.
- Expand adoption of successful alternative techniques like mulching and less toxic pesticides.
- Update existing, and expand the Pesticide Hazard and Exposure Reduction (PHAER) zone maps into greenbelts citywide.
- Seek more opportunities for reduced pesticide use.
- Expand use of native and drought tolerant vegetation for weed displacement and water use efficiency.
- Continue collecting information on time allocation with staff and contractors for IPM activities.
- Provide information to management, staff and the community on current IPM and water efficient technologies through professional development seminars.
- Evaluate various sites in coordination with the park planner in parks and greenbelts for turf reduction scenarios.
- Resume attending continuing education meetings.
- Manage procurement of pesticides for Parks & Open Space divisions.