

PESTICIDE APPLICATION 2020 REPORT

Pesticide Applications to Boise Parks and Recreation Managed Properties in 2020



PARKS AND
RECREATION

EXECUTIVE SUMMARY

Despite disruptions to maintenance schedules in the early spring of 2020, application targets were met and goals for the Pesticide Use Reduction Pilot Program were largely achieved by Boise Parks and Recreation. There was a marked reduction in the use of glyphosate-based herbicides overall by the department in 2020. Though it remains to be seen whether this indicates a trend or was due to the unique challenges of the year due to the coronavirus pandemic. Department staff have seen increased turf damage from white grubs over the past two years which has prompted increased use of imidacloprid as a control. This is concerning because of issues with imidacloprid surrounding pollinator protection. Boise Parks and Recreation plans to shift to a control with less potential for harm in 2021. There was also a significant decrease in labor hours reported for pesticide application in 2020. This is likely due to time constraints faced in the early part of the year and is related to the decrease in glyphosate use.

The Pesticide Use Reduction Pilot Program was successful in eliminating glyphosate use from planned areas with one major exception. At Comba Park in west Boise, the department had planned to hand pull undesirable vegetation along the margins of the site with a combination of volunteers and the Ada County Sheriffs Labor Detail. Because of restrictions due to COVID-19 this plan was not realized and in late spring typical maintenance practices resumed. Overall, the program was met with primarily positive feedback from community members and local organizations.

In 2021, Parks and Recreation plans to focus the program on pollinator protection as a main benefit of pesticide use reduction.



Pictured: An example of a marginal area at Mariposa Park. At the base of the sign is a mixture of desirable and undesirable vegetation. Areas such as these pose a challenge for maintenance. Common practice in the past has been to use broad spectrum herbicides to control vegetation growth. New practices, planting materials and controls are being trialed by the Boise Parks and Recreation Department to create healthy urban habitats.

A NOTE REGARDING PESTICIDE USE ON PUBLIC LANDS

Pesticides are powerful tools for the management of public parks and open spaces. They provide a means for land managers and horticulturalists to swiftly and effectively prevent or respond to undesirable organisms in our public spaces. As with any tool, pesticides have drawbacks. It is becoming clearer that broad use of pesticides has negative effects, especially on often unseen but vital components of ecology: soil microbes, pollinating insects and biodiversity.

As stewards of public land Boise Parks and Recreation must not become complacent in the application of pesticides. For every application there must be a clear and defensible reason for the use of that substance. Integrated pest management principles must be observed, and minimal impact solutions should always be prioritized.

Boise Parks and Recreation is tasked with the maintenance of more than 7,000 acres of public land. Responsible use of pesticides is vital to the health and usability of these communal spaces. With continued judicious use of these tools we can meet the needs of our community now and ensure that our natural resources are available for generations to come.

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1. INTRODUCTION

The 2020 growing season was unique for Boise Parks and Recreation (BPR). The Pesticide Use Reduction Pilot Program (PURPP) was launched in early Spring and pilot sites were identified at eight parks and several right of way and garden sites. The season was significantly disrupted by the global pandemic caused by COVID-19. Despite these challenges BPR staff were able to make nearly all scheduled applications with minor adjustments to maintenance programs.

The following report details pesticide use by BPR in fiscal year 2020 (October 1, 2019 – September 30, 2020). This document also provides an update on the Pesticide Use Reduction Pilot Program launched by BPR in Spring 2020 and conducted throughout the 2020 growing season. The PURPP was largely successful in accomplishing its primary goal of investigating potential routes for the reduction of glyphosate-based herbicides (GBH) at BPR managed sites. Some changes to planned actions were made primarily in response to circumstances surrounding the response to COVID-19. These changes are detailed in Section 4.

2. CHANGES TO 2020 MAINTENANCE:

- Mowing height was raised from 2.5” to 4” at all park sites except for Willow Lane Sports Complex, Simplot Sports Complex and Fort Boise Park. This was done with the intent of decreasing maintenance time and was prompted by the loss of available labor hours in the Spring due to the pandemic.
- GameOn, a new product for the control of broadleaf plants in turf was approved and adopted.

3. PESTICIDE APPLICATIONS

In 2020, BPR applied an equivalent of 570 gallons of liquid formulated pesticides and 6475 lbs. dry formulated pesticides. The liquid formulation total includes approximately 154 gallons of GBH. As can be seen in Figure 1, total product applications varied little from previous years with slightly higher than average use of dry formulated pesticides and slightly lower than average liquid formulated. Relative amounts of GBH applications, however, fell below average from the last several years. GBH made up only 28% of total liquid formulated applications in 2020 (See Figure 2).

The most highly applied products in use by BPR can be broadly separated into three distinct groups. Products used for broad spectrum control of unwanted vegetation, those used for selective control of broadleaf species in turfgrass and products used to control insects, primarily billbug¹. Figure 3 shows the amount of broad-spectrum herbicide products applied in 2020 compared with previous years. It should be noted that Treflan 5G and Surflan AS are not technically broad-spectrum herbicides. They are both preemergent, selective products that target annual plants. However, their use on BPR managed sites primarily offsets the use of broad-spectrum herbicides so they have been categorized as such.

MOST HIGHLY APPLIED ACTIVE INGREDIENTS BY WEIGHT:

- | | | |
|----------------------|-------------------------|--------------------|
| 1. 2,4-D | 5. Glufosinate-ammonium | 9. Chlorothalonil* |
| 2. Glyphosate | 6. Triclopyr | 10. Ethephon* |
| 3. Oryzalin | 7. Imidacloprid | |
| 4. Fluroxypyr-meptyl | 8. Dichlobenil | |

*Note: Chlorothalonil, a fungicide and ethephon, a growth regulator are applied only at golf courses managed by BPR: Warm Springs Golf Course and Quail Hollow Golf Course.

¹ Several species of Sphenophorus, a genus of weevil. Billbug feed on turfgrass roots and stems. Kentucky Bluegrass (*Poa pratensis*) is especially susceptible.

For better understanding of the chemical load on managed properties, product applications were also broken down into amount of active ingredient applied. This differs from the figures given above because the amount of active ingredient varies broadly between products. The most highly applied active ingredient was 2,4-Dichlorophenoxyacetic acid (2,4-D) - a postemergent, selective broadleaf herbicide. 2,4-D applications made up 37% by weight of all active ingredient applied to BPR sites in 2020. This was followed by glyphosate (postemergent, broad spectrum), and oryzalin (preemergent, selective). Glyphosate and oryzalin applications made up 30% and 15% by weight respectively of all active ingredient applied. All other active ingredients applied in 2020 made up significantly less. Total amounts of active ingredient applied can be found in Appendix B.

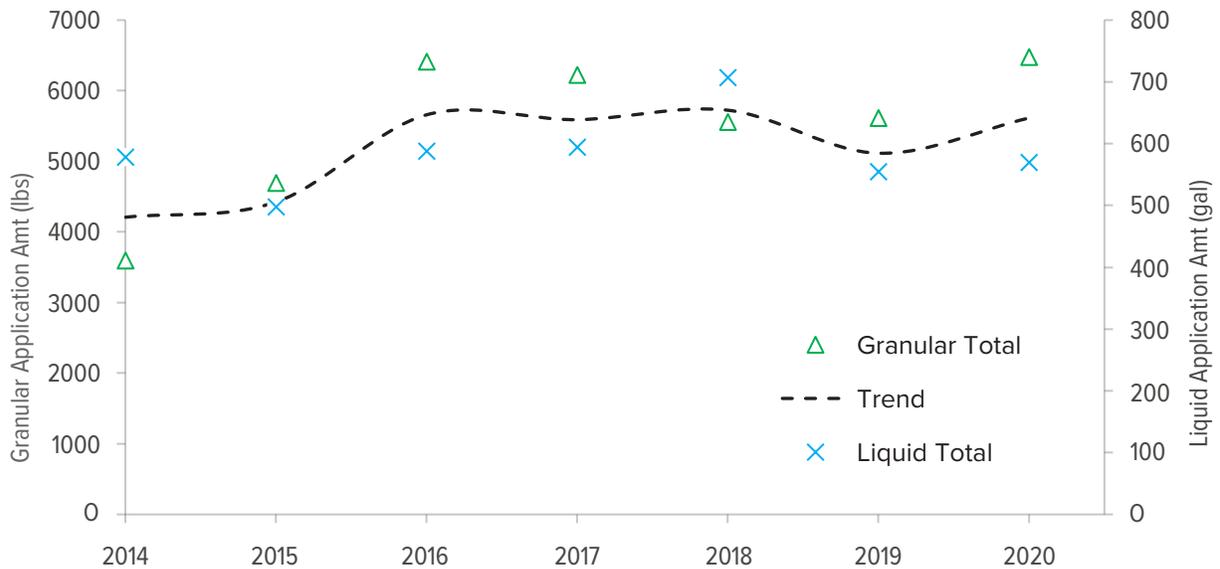


Figure 1: Total equivalent amounts of liquid and dry formulated pesticides from application logs. Dry formulated pesticides are measured in pounds (lbs) on the left-hand axis. Liquid formulated pesticides are measured in US gallons (gal) on the right-hand axis. Dotted line indicates the trend and does not represent any actual application amount.

TOTAL APPLICATIONS CONTAINING GBH



Broadleaf selective herbicide use is shown in Figure 4. The use of Confront which contains the active ingredient clopyralid, an environmentally persistent chemical, was stopped in 2017. GameOn was introduced as the primary broadleaf control product in 2020. The higher rate of use for GameOn in 2020 is explained by the lower amount of active ingredient in the product. Broadleaf selective active ingredient application amounts were roughly equivalent with those from 2018-19.

Figure 2: Proportion of total liquid formulated applications that contain glyphosate as an active ingredient.

BROAD SPECTRUM

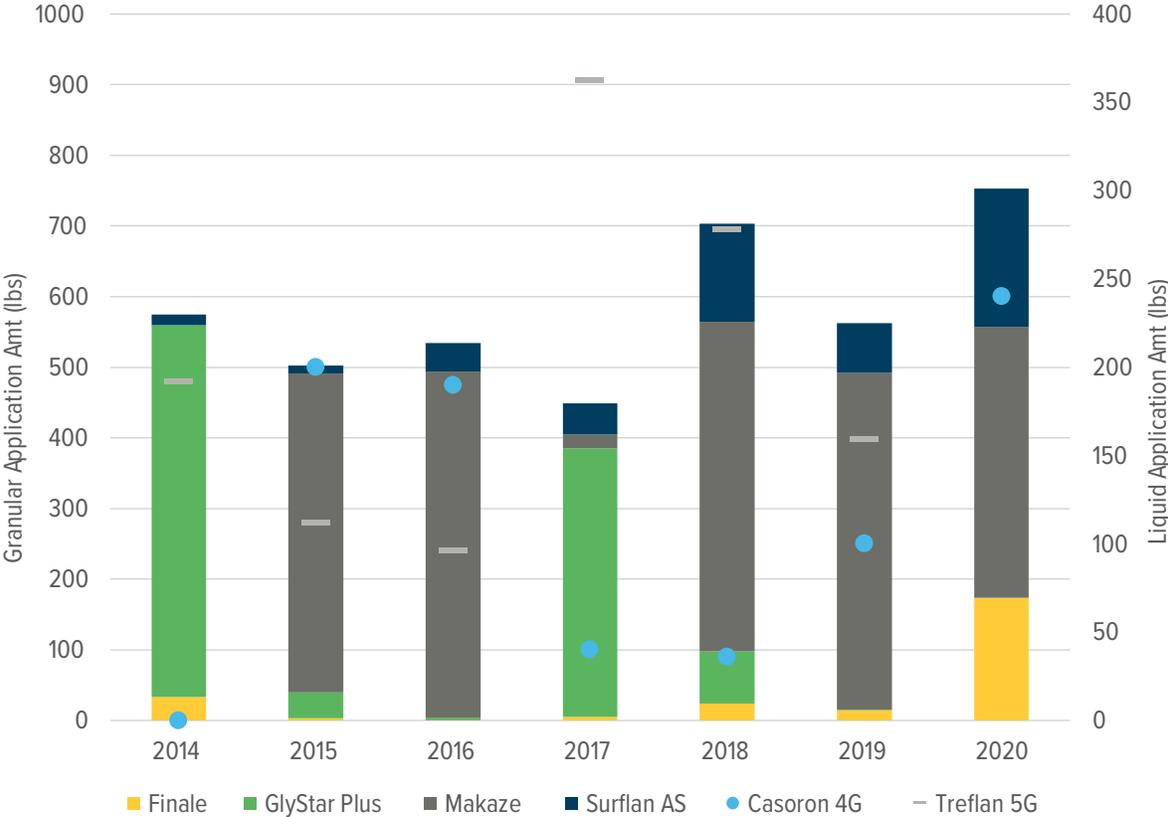


Figure 3: Broad Spectrum herbicide applications. Treflan 5G and Casoron 4G are dry formulated products and are measured in lbs on the left-hand axis. All other products are measured in gal. on the right-hand axis.

SELECTIVE CONTROL

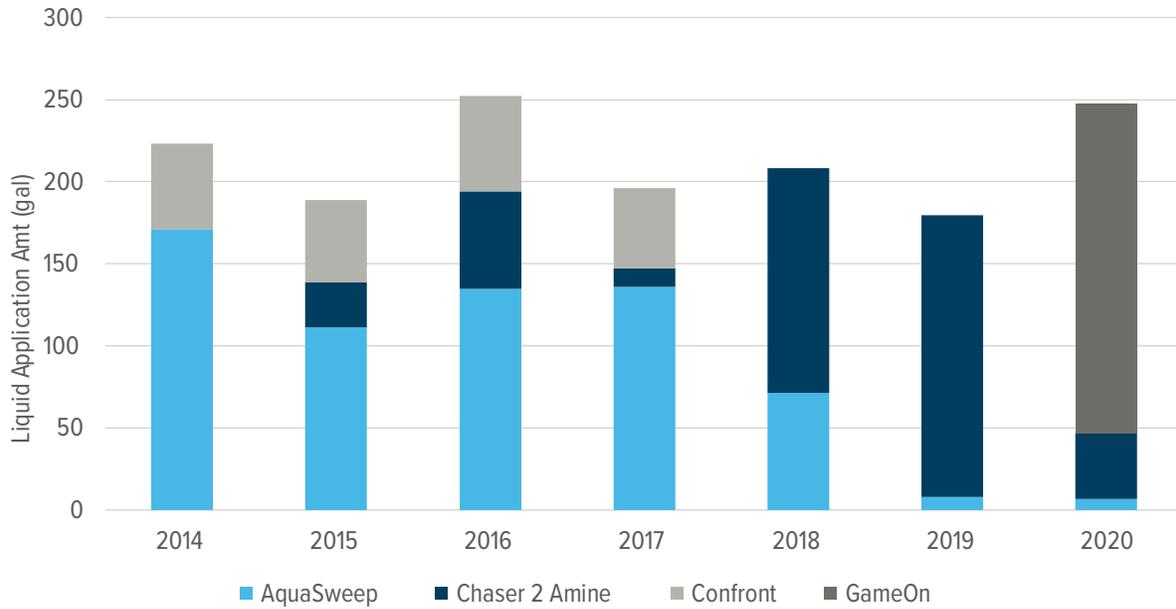


Figure 4: Broadleaf selective herbicide applications. All products are liquid formulated.

INSECT CONTROL

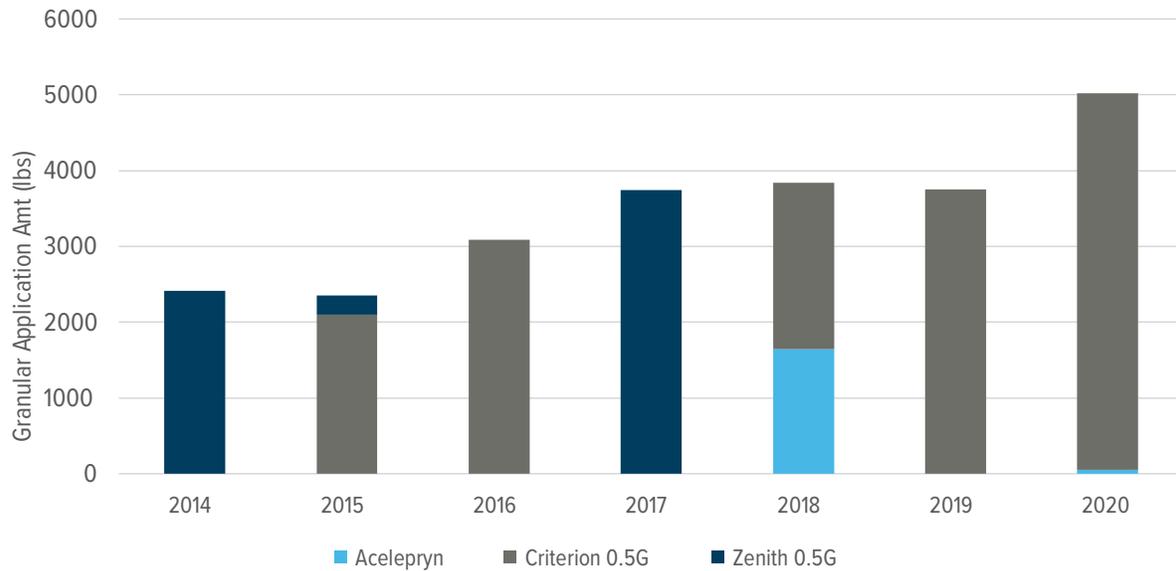


Figure 5: Insecticide application amounts. All products are dry formulated.

Pesticide use for insect control has been trending upwards for the past several years (See Figure 5). This trend has been caused primarily by increased billbug treatments across BPR managed sites. Billbug populations are controlled to avoid damage to turfgrass which is their primary food source. The decision to implement chemical control of billbug is made on a case by case basis according to careful site monitoring when dense populations are found. The cause of increased billbug prevalence at BPR managed sites is unclear but is thought to have two primary explanations. First, between 2013 and 2018, many BPR managed sites were treated as part of the Idaho State Department of Agriculture (ISDA) Boise Japanese Beetle Eradication Program. Japanese Beetle (*Popillia japonica*) is an emergent invasive species to Idaho and is highly destructive pest to many ornamental and agricultural plants. Japanese Beetle grubs feed on grass roots much like billbug. Adult Japanese Beetle characteristically feed in large groups leaving plant leaves “skeletonized” with only veins remaining. Treatments made through the eradication program had the additional effect of reducing billbug populations until treatments were scaled back in 2018. Second, mild winters over the past two years have been conducive to billbug survival and recovery leading to a rebound in the local population.

LABOR HOURS

Total labor hours spent applying pesticides was significantly lower than average in 2020 (See Figure 6). A total of 1128 combined hours were spent applying pesticide products in 2020 with just over half of those hours (51%) dedicated to the application of GBH. The relative amount of time spent applying GBH is typical for BPR. Time spent applying GBH is disproportionate to the amount of product applied because GBH are almost always applied using a backpack or handheld sprayer which is more time intensive than using a broadcast sprayer as is typically the case for broadleaf selective herbicides. It should be noted that the values shown in Figure 6 are indicative of total time spent applying but do not account for time spent training, preparing, mixing, recording, cleaning equipment or any other duties associated with the application of pesticides.

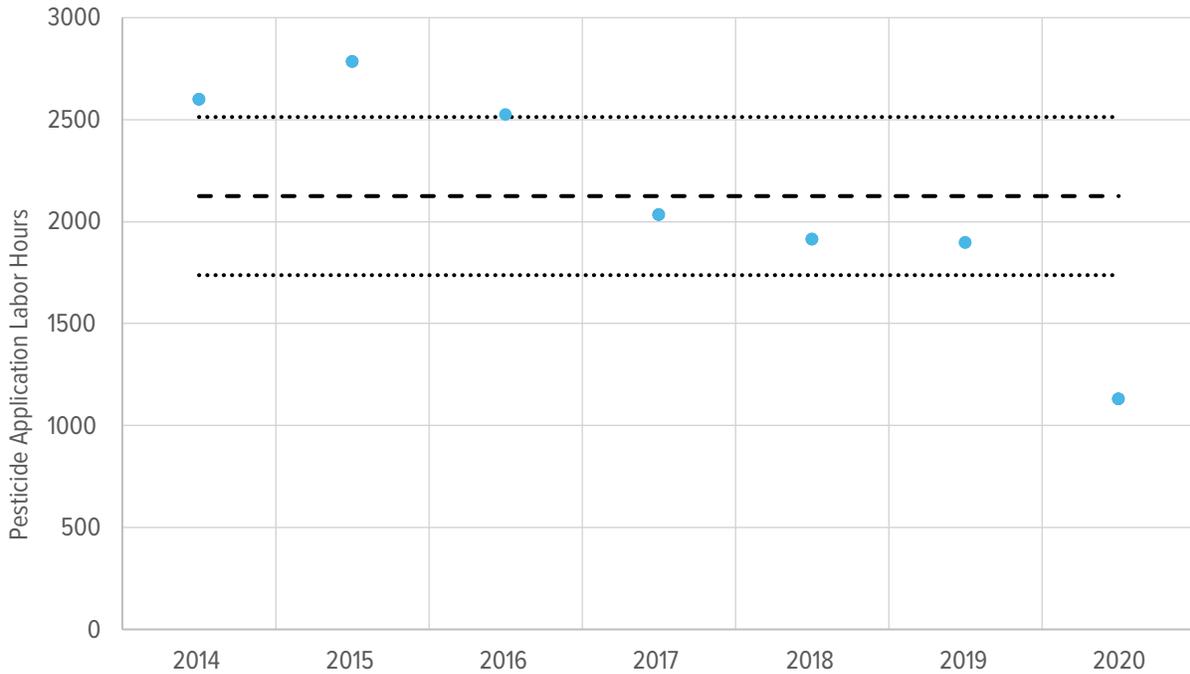


Figure 6: Labor hours spent applying pesticides. Dashed line represents the average hours spent over the 7 data points. The dotted lines represent upper and lower limits of a 95% confidence interval around the mean.

3. DISCUSSION AND FUTURE DIRECTION FOR PESTICIDE APPLICATIONS

The proportion of total liquid applications with glyphosate fell in 2020 from a several year plateau. Additionally, the amount of product applied for control of billbug has been rising over recent years. Finally, the time spent applying pesticides was significantly lower than average in 2020. In the following sections these aspects of the data are discussed as well as some product substitutions, such as offsetting GBH use with preemergent herbicides and replacing neonicotinoid insecticides with more environmentally friendly options. BPR strongly believes that these are the correct choices for Boise's community and the health of its urban environment, however they come with a significant increase in cost. Moving forward BPR plans to roughly double its budget for herbicides to provide resources for the purchase of more ecologically sound products.

3.1 REDUCTION IN USE OF GLYPHOSATE BASED HERBICIDES

There has been a concerted effort within BPR to reduce the amount of GBH applied to managed sites over the past several years. This has been done primarily by increasing the use of other broad-spectrum and preemergent herbicides. The effort has been made more difficult by the adoption waterwise designs for newer sites that incorporate less turf and more planter bed areas which tend to require more broad-spectrum herbicide application due to a lack of vegetative competition for undesirable species. The broad adoption of drip irrigation in planter beds across BPR managed sites has ameliorated this effect somewhat by limiting water to unvegetated areas.

In general, BPR plans to continue increasing the use of preemergent herbicide products such as Casoron 4G, and Treflan 5G. BPR will continue to use Finale Herbicide which uses the active ingredient Glufosinate-ammonium preferentially at appropriate sites. It is reasonable to expect the proportion of GBH to continue falling in coming years, but then level off. GBH remain very important in combatting invasive species, performing restoration in open space reserves and managing pesticide resistance in rights of way and medians.

Finally, it should be noted that the amount of GBH applied in 2020 may have been artificially low due to circumstances surrounding COVID-19. In early spring, 2020 when BPR usually begins applications, the City sent home all non-essential employees due to COVID-19. Maintenance, applications and a number of other aspects of land management were disrupted. GBH are among the most time-consuming products to administer because they are used to spot-treat specific plants and must be applied with care. Therefore, applications may not have been performed due to time constraints in 2020.

3.2 INCREASE IN BILLBUG ACTIVITY AND USE OF NEONICOTINOID INSECTICIDES

The increase in billbug activity has been noted at BPR managed sites over the past several years. Potential causes are discussed in Section [INSERT]. The industry standard treatment for billbug has been imidacloprid based insecticides for the past 20 years. Imidacloprid is a neonicotinoid insecticide which acts systemically on plants, meaning that, once absorbed into plant tissue, it will translocate throughout the organism. This aids in the control of target pests but is problematic for the protection of beneficial insects such as pollinators.

Pollinator decline has been documented globally (Kluser & Peduzzi, 2007) (Rhodes, 2018) and locally (The Xerces Society, 2021). Emerging research suggests that the way in which BPR utilizes imidacloprid is likely not dangerous to pollinators (Protecting Bees, 2021). However, given the severity of the plight of the pollinator, BPR plans to discontinue the use of imidacloprid based insecticides in 2021 to avoid unnecessary burdening of local pollinator populations. BPR will shift to using chlorantraniliprole based insecticides as the primary chemical control for billbug and other insect pests. Chlorantraniliprole is also systemic but less harmful to pollinators (Williams, Swale, & Anderson, 2020).

3.3 LABOR HOURS SPENT APPLYING PESTICIDES

Labor is the greatest expense associated with the application of pesticides. In 2020 there was a significant drop in labor hours associated with application without a corresponding drop in amount of product applied. Time constraints were present in 2020 due to COVID-19 and the temporary stay at home order in early Spring. Once maintenance staff were determined to be essential, they had to work more quickly to meet typical maintenance targets. This was a necessity of 2020, but likely isn't indicative of a future trend. Care should be taken in pesticide use and adequate time should be allowed to promote this goal.

4. UPDATE ON PESTICIDE USE REDUCTION

The first year of the Pesticide Use Reduction Pilot Program (PURPP) has ended. 2020 was a challenging year in which to begin the program for many of the same reasons outlined in Section 1. The focus of the PURPP in Year 1 was to investigate routes of reducing GBH use at BPR managed sites. Despite the difficulties faced, the program was largely successful in achieving this goal. With two exceptions BPR was able to avoid the use of GBH entirely in areas designated for the PURPP.

Two areas had glyphosate products applied in a manner that was not consistent with the plans laid out for the PURPP. The first was Ivywild Park where 15 ounces of Makaze was mistakenly applied to tree wells. This was due to a misunderstanding and was expected due to the shift in maintenance policy. The second site was Comba Park. At this site BPR staff had planned on working with volunteers and the Ada County Sheriff's Labor Detail (SLD) to mechanically remove undesirable vegetation around the perimeter of the site. Because of restrictions put in place to combat the spread of COVID-19 these resources were unavailable. In late Spring, after assessing vegetation growth at the site, BPR staff made the decision to work with a contractor to apply GBH to the perimeter of the site to control undesirable vegetation and prevent seeding and spread to the Boise Urban Garden School (BUGS) teaching and demonstration garden. Pesticide use in 2020 for each of the PURPP sites can be found in Appendix C and compared to historic use.



Figure 7: Puncturevine seedlings plucked from planter beds surrounding Mariposa Park.



Figure 8: Example of prickly lettuce (*Lactuca serriola*) outbreak at Comba Park

PURPP sites were monitored every two weeks throughout the 2020 season from April 16th to September 30th. The form used to record observations is shown in Appendix D. For small sites such as the pollinator garden at Terry Day Park the entire site was observed each time. For larger sites, a different section was chosen and observed every iteration. Results from the observations can be found in Appendix E. In the summary sheets provided in Appendix E, the “Observation Rate” describes the percentage of iterations in which the plant was observed. “Prevalence” refers to how frequently the plant occurred within the observation areas on average.

Tree condition is not reported in the summary sheets in Appendix E, but it should be discussed. One of the primary uses for GBH in urban parks is the treatment of areas around the bases of trees to maintain unvegetated perimeters. This is done for two reasons: to decrease competition with tree roots and to minimize the potential for mechanical damage to tree trunks from grass mowers and trimmers. Mechanical damage to tree bark was observed on at least one tree at every PURPP site except for Comba Park and Mariposa Park. It is difficult to determine the cause of this damage. Trees are one of the most valuable landscape assets maintained by BPR. This will be closely monitored in the second year of the PURPP.

Feedback from Boise citizens in 2020 regarding the PURPP was mostly positive. Out of 33 direct communications with members of the public 79% had positive comments about the program, 12% were negative with the remainder being neutral or inquisitive. Additionally, the PURPP has received attention from the Northwest Center for Alternatives to Pesticides and Conservation Voters of Idaho. BPR plans to coordinate with these organizations moving forward on issues surrounding pesticide management.

4.1 FUTURE FOR THE PURPP

In the second year of the PURPP BPR plans to focus heavily on pollinator protection as a primary target and benefit of pesticide use reduction. In addition to shifting from imidacloprid to chlorantraniliprole for billbug control in 2021, BPR also plans to investigate public acceptance of turfgrass companion plantings and continue increasing habitat with new pollinator garden additions.

At the end of 2021, the PURPP will be evaluated to determine whether another year of trial is required. If so, the program will continue through the growing season of 2022, otherwise feedback and data will be compiled and changes to overall maintenance of BPR managed sites will be recommended. Regardless of program continuation, BPR plans to update its Integrated Pest Management Guidelines at the end of 2021 to better reflect the future direction of the department.

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APPENDIX A: PESTICIDES USED IN 2020 BY BPR

ID	TRADE NAME	DIVISION	EPA REG #	CATEGORY	PESTICIDE ACTIONS	ACTIVE INGREDIENTS	FORMULATION	PRIMARY TARGET
2	Acelepryn G	Parks	100-1500	Insecticide	Systemic	Chlorantraniliprole	Granular	Billbug, Japanese Beetle
7	Aquasweep	Parks	228-316	Herbicide	Postemergent, Selective	2,4-D (dimethylamine salt), Triclopyr (trimethylamine salt)	Liquid	Annual Broadleaf
15	Casoron 4G	Parks	400-168	Herbicide	Postemergent, Non-selective	Dichlobenil	Granular	Broad Spectrum
16	Chaser 2 Amine	Parks	34704-930	Herbicide	Postemergent, Selective	2,4-D (dimethylamine salt), Triclopyr (trimethylamine salt)	Liquid	Annual Broadleaf
22	Clear Zone Double Impact	Parks	499-320	Insecticide	Contact	Permethrin, Piperonyl butoxide, Pyrethrins Pyrethrins	Aerosol	Mosquitos
27	Criterion 0.5G Insecticide	Parks	432-1328	Insecticide	Systemic	Imidacloprid	Granular	Billbug, Japanese Beetle
28	Criterion 2F Insecticide	Parks	432-1312	Insecticide	Systemic	Imidacloprid	Liquid	White Grub
35	Dimension 270G	Parks	7001-375	Herbicide	Preemergent, Selective	Dithiopyr	Granular	Crabgrass
38	Dorado	Golf	100-741	Fungicide	Pre/Postemergent, Systemic	Propiconazole	Liquid	Powdery Mildew
40	Enforcer Wasp and Yellow Jacket Foam V	Parks	40849-4	Insecticide	Contact	Phenothrin, Tetramethrin	Aerosol	Wasps
42	Ez-Ject™ Diamondback Herbicide Shells	Forestry	83220-1	Herbicide	Postemergent, Non-selective	Glyphosate (isopropylammonium)	Direct Inject (Liq)	Broad Spectrum
46	Finale Herbicide	Parks	432-1229	Herbicide	Postemergent, Non-selective	Chlorothalonil, Fludioxonil, Propiconazole Propiconazole	Liquid	Broad Spectrum
48	Foundation	Golf	2217-921-2935	Herbicide	Postemergent, Selective	Triclopyr (triethylamine salt), Sulfentrazone, 2,4-D (diethanolamine salt)	Liquid	Annual Broadleaf
52	GameOn	Parks	62719-724	Herbicide	Postemergent, Selective	Selective 2,4-D (choline salt), Fluroxypyr-meptyl, Halauxifen-methyl	Liquid	Annual Broadleaf
54	GlyStar Plus	Parks	42750-61	Herbicide	Postemergent, Non-selective	Glyphosate (isopropylammonium)	Liquid	Broad Spectrum
68	Instrata	Golf	100-1231	Fungicide	Pre/Postemergent, Contact	Chlorothalonil, Fludioxonil, Propiconazole	Liquid	Molds
73	Lake Pak WSP	Parks	N/A	Biological		Bacillus Bacteria	Water Soluble Packets	Algae
74	Lebanon Treflan 5G Herbicide	Parks	961-405	Herbicide	Preemergent, Selective	Trifluralin	Granular	Annual Plants
78	Makaze	Parks	34704-890	Herbicide	Postemergent, Systemic	Glyphosate (isopropylammonium)	Liquid	Broad Spectrum
80	Malice 2F Insecticide	Parks	34704-893	Insecticide	Systemic	Imidacloprid	Liquid	Billbug
86	Milestone	Open Space	62719-519	Herbicide	Postemergent, Selective	Aminopyralid-tripromine	Liquid	Russian Knapweed
94	Pathfinder II	Open Space	62719-176	Herbicide	Postemergent, Selective	Triclopyr (butoxyethyl ester)	Liquid	Russian Olive
101	Plateau Herbicide	Open Space	241-365	Herbicide	Postemergent, Non-selective	Imazapic (ammonium salt)	Liquid	Broad Spectrum
102	Podium	Golf	100-937	Growth Regulator		Trinexapac-Ethyl	Liquid	
106	Preen The Weed Preventer	Parks	961-280	Herbicide	Preemergent, Non-selective	Trifluralin	Granular	Broad Spectrum
113	Proxy	Golf	432-1230	Growth Regulator		Ethephon	Liquid	
115	PT Wasp-Freeze II Wasp and Hornet Insecticide	Parks	499-550	Insecticide	Contact	Prallethrin	Aerosol	Wasps
119	QuickSilver T&O Herbicide	Parks	279-3265	Herbicide	Postemergent, Selective	Carfentrazone-Ethyl	Liquid	Canada Thistle
131	Shepherd Fungicide	Forestry	69117-3	Fungicide	Pre/Postemergent, Selective	Propiconazole	Direct Inject (Liq)	Dutch Elm Disease
144	Surflan AS Specialty Herbicide	Parks	70506-44	Herbicide	Pre/Postemergent, Systemic	Oryzalin	Liquid	Annual Plants
148	Telar XP Herbicide	Open Space	352-654	Herbicide	Pre/Postemergent, Selective	Chlorsulfuron	Dry Flowable	Puncturevine, Russian Knapweed
150	Tenacity	Parks	100-1267	Herbicide	Pre/Postemergent, Selective	Mesotrione	Liquid	Annual Plants

APPENDIX B: AMOUNT ACTIVE INGREDIENT APPLIED BY PRODUCT

TRADE NAME	ACTIVE INGREDIENT	AMT APPLIED (LBS)	PERCENT TOTAL
GameOn	2,4-D (choline salt)	535.9	30%
Makaze	Glyphosate (isopropylammonium)	523.7	30%
Surflan AS Specialty Herbicide	Oryzalin	263.8	15%
Chaser 2 Amine	2,4-D (dimethylamine salt)	114.1	6%
GameOn	Fluroxypyr-meptyl	72.0	4%
Finale Herbicide	Glufosinate-ammonium	65.2	4%
Chaser 2 Amine	Triclopyr (trimethylamine salt)	50.7	3%
Criterion 0.5 G Insecticide	Imidacloprid	24.8	1%
Casoron 4G	Dichlobenil	24.0	1%
Aquasweep	2,4-D (dimethylamine salt)	19.5	1%
Instrata	Chlorothalonil	14.9	1%
Proxy	Ethephon	9.0	1%
Aquasweep	Triclopyr (trimethylamine salt)	8.7	<1%
Foundation	2,4-D (diethanolamine salt)	8.0	<1%
Lebanon Treflan 5G Herbicide	Trifluralin	7.8	<1%
GameOn	Halauxifen-methyl	3.5	<1%
Ez-Ject™ Diamondback Herbicide Shells	Glyphosate (isopropylammonium)	2.7	<1%
Dorado	Propiconazole	2.4	<1%
Instrata	Propiconazole	2.4	<1%
Foundation	Triclopyr (triethylamine salt)	1.9	<1%
Dimension 270G	Dithiopyr	1.9	<1%
GlyStar Plus	Glyphosate (isopropylammonium)	1.6	<1%
QuickSilver T&O Herbicide	Carfentrazone-Ethyl	1.6	<1%
Foundation	Dicamba (dimethylamine salt)	0.7	<1%
Instrata	Fludioxonil	0.6	<1%
Malice 2F Insecticide	Imidacloprid	0.5	<1%
Pathfinder II	Triclopyr (butoxyethyl ester)	0.4	<1%
Criterion 2F Insecticide	Imidacloprid	0.3	<1%
Preen The Weed Preventer	Trifluralin	0.2	<1%
Shepherd Fungicide	Propiconazole	0.2	<1%
Foundation	Sulfentrazone	0.2	<1%
Plateau Herbicide	Imazapic (ammonium salt)	0.2	<1%
Podium	Trinexapac-Ethyl	0.1	<1%
Telar XP	Chlorsulfuron	0.1	<1%
Acelepryn G	Chlorantraniliprole	0.1	<1%
Milestone	Aminopyralid-tripromine	<0.1	<1%
PT Wasp-Freeze II Wasp & Hornet Insecticide	Prallethrin	<0.1	<1%
Tenacity	Mesotrione	<0.1	<1%
Enforcer Wasp And Yellow Jacket Foam V	Phenothrin	<0.1	<1%
Enforcer Wasp And Yellow Jacket Foam V	Tetramethrin	<0.1	<1%
Clear Zone Double Impact	Piperonyl butoxide	<0.1	<1%
Clear Zone Double Impact	Permethrin	<0.1	<1%
Clear Zone Double Impact	Pyrethrins	<0.1	<1%

APPENDIX C: HISTORIC PRODUCT APPLICATION AMTS TO PURPP SITES

ADMIN / DESIGN

CONTROL	ACTIVE INGREDIENT	YEAR										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Broad Spectrum	Glyphosate (oz)		2.5	0.5			4					
	Turf/planter (oz)			0.5			4				6	
	Hard Surface (oz)		2.5									
Broadleaf	2,4-D (oz)			100							30	
	Triclopyr, Clopyralid (oz)			20								
	Trifluralin (lb)				3							
Grass	Fluaxifop-P-Butyl, Butyl Propanoate (oz)									3		
	Dithiopyr, 3,5-Pyridinedicarbothioic Acid (lb)			25	25						4	100
White Grub	Imidacloprid (lb)			25								
	Chlorantraniliprole (lb)				50							

BOISE HILLS PARK

CONTROL	ACTIVE INGREDIENT	YEAR										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Broad Spectrum	Glyphosate (oz)								45	2	3	
	Turf/planter (oz)									2	3	
	Hard Surface (oz)								45			
Broadleaf	2,4-D (oz)						13		40	80	65	56
	Triclopyr, Clopyralid (oz)						3		8			
White Grub	Imidacloprid (lb)					5						
Wasp/Hornet	Prallethrin (cans)								1		1.5	
	Tetramethrin, Sumithrin (cans)				50							

BOWDEN PARK

CONTROL	ACTIVE INGREDIENT	YEAR										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Broad Spectrum	Glyphosate (oz)	75.5	12	39	58.5		61	9.5	12	268		
	Turf/planter (oz)	69.5	6	36	58.5	0	53	6.5	12	268	86	
	Hard Surface (oz)	6	6	3			8	3				
Broadleaf	2,4-D (oz)		120	80	120	120	27	313	106	115	62.5	56
	Triclopyr, Clopyralid (oz)		24	16	24	24	5	63.5	22			
White Grub	Imidacloprid (lb)					90	180					

COMBA PARK

CONTROL	ACTIVE INGREDIENT	YEAR										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Broad Spectrum	Glyphosate (oz)				105	6	13.5	3	1		8	
	Turf/planter (oz)										8	
	Hard Surface (oz)											
Broadleaf	2,4-D (oz)			4	195	206		40	27	88	44	56
	Carfentrazone-Ethyl (oz)									1		
	Triclopyr, Clopyralid (oz)				68	40		8	5			
White Grub	Imidacloprid (lb)							30	50	15		
	Chlorantraniliprole (lb)											50
Gopher	Strychnine Alkaloid (lb)				0.6							
Wasp/Hornet	D-Trans Allethrin, 3-Phenoxybenzyl (cans)			2								

ELM GROVE PARK

CONTROL	ACTIVE INGREDIENT	YEAR										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Broad Spectrum	Glyphosate (oz)	233.5	137.5	178.5	190	247	223	65	62	30	45	
	Turf/planter (oz)	225	116	162.5	168	246	202	54	60	30	45	
	Hard Surface (oz)	8.5	21.5	16	22	1	21	11	2			
Broadleaf	2,4-D (oz)	58.2	120	80	120	40	100	40	80	44	154	121
	Triclopyr, Clopyralid (oz)	101.1	24	16	24	8	20	8	16			
Grass	Dithiopyr, 3,5-Pyridinedicarbothioic Acid (lb)							100				
White Grub	Chlorantraniliprole (lb)					500	400					
	Imidacloprid (lb)		15	60		300	60					15
Wasp/Hornet Spray	Prallethrin (cans)							0.25				
	Pyrethrins (cans)			1	2							
	D-Trans Allethrin, 3-Phenoxybenzyl (cans)			1								

FAIRVIEW PARK

CONTROL	ACTIVE INGREDIENT	YEAR										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Broad Spectrum	Glyphosate (oz)	127		29	54.5	80.5	139	5	90	18	52	
	Turf/planter (oz)	117	0	27	39	69	120	1	73	18	45	
	Hard Surface (oz)	10		2	15.5	11.5	19	4	17		7	
Broadleaf	2,4-D (oz)	53	40		100	40	27	40		66	74	
	Triclopyr, Clopyralid (oz)	11	8		20	11	5	8	11			
Grass	Dithiopyr, 3,5-Pyridinedicarbothioic Acid (lb)		100		60		100	50				
White Grub	Chlorantraniliprole (lb)									150		
	Imidacloprid (lb)									150		

IVYWILD PARK

CONTROL	ACTIVE INGREDIENT	YEAR										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Broad Spectrum	Glyphosate (oz)	330.5	234.5	298	378	518	486	118	236	158	227	15
	Turf/planter (oz)	308	165	249.5	356	417	482	58	111	156	187	15
	Hard Surface (oz)	22.5	69.5	48.5	22	101	4	60	125	2	40	
Broadleaf	2,4-D (oz)	320	220	200		373.32	40	213.7	400	444	396	336
	Carfentrazone-Ethyl (oz)					0.54						
	Triclopyr, Clopyralid (oz)	64	44.5	4		74.66	8	43	80			
Grass	Dithiopyr, 3.5-Pyridinedicarbothioic Acid (lb)										50	
White Grub	Imidacloprid (lb)	195	60	90	255	130	30	30	150	90	30	90
Wasp/Hornet Spray	Permethrin, Tetramethrin (cans)					1						
	Prallethrin (cans)							0.25			2	
	Pyrethrins (cans)	0.33	1.25					1				

MARAPOSA PARK

CONTROL	ACTIVE INGREDIENT	YEAR										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Broad Spectrum	Glyphosate (oz)						93	60	122	105	141	114
	Turf/planter (oz)						93	60	122	105	141	114
	Hard Surface (oz)											
Broadleaf	2,4-D (oz)										44	
	Carfentrazone-Ethyl (oz)										1	

MEMORIAL PARK

CONTROL	ACTIVE INGREDIENT	YEAR										
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Broad Spectrum	Glyphosate (oz)	173	40	51	104	120	42	27	45	39	3	
	Turf/planter (oz)	155	40	33	9	99	39	21	15	39	3	
	Hard Surface (oz)	18		18	95	21	3	6	30			
Broadleaf	2,4-D (oz)	80	83.2		220	6.5	150	40	40	84	52	56
	Carfentrazone-ethyl (oz)	3										
	Triclopyr, Clopyralid (oz)	16	45.3		44	65.6	30	8	8			
Grass	Dithiopyr, 3.5-Pyridinedicarbothioic Acid (lb)				280							
White Grub	Chlorantraniliprole (lb)					475	400	500				
	Imidacloprid (lb)	65	90	130	420	390	60	420				

APPENDIX D: PURPP SITE EVALUATION FORM

SITE: _____

DATE: _____

ACCESSOR: _____

TURF:

Days since last mowing: _____

Length of grass: _____

Turf condition (visable stresses, issues, concerns): _____

Profile measurements:

Water Penetration	Rood Depth	Thatch	Turf

Non-turf plant species present:

[Occurrence measured in ratio of plants to square foot area. Rare: <1:25, Moderate: 1:25-1:10, Frequent: >1:10]

*Note: if multiple occurrence rates exist in one site call out in comments

Species	Occurrence			Comment
	Rare	Moderate	Frequent	

HARD SURFACE:

Undesirable plant species present:

[Occurrence measured in ratio of plants to linear foot. Rare: <1:25, Moderate: 1:25-1:10, Frequent: >1:10]

*Note: if multiple occurrence rates exist in one site call out in comments

Species

Occurrence		
Rare	Moderate	Frequent

Comment

PLANTING BEDS:

Mulch type and depth: _____

Undesirable plant species present:

[Occurrence measured in ratio of plants to linear foot. Rare: <1:25, Moderate: 1:25-1:10, Frequent: >1:10]

*Note: if multiple occurrence rates exist in one site call out in comments

Species	Occurrence			Comment
	Rare	Moderate	Frequent	

TREES:

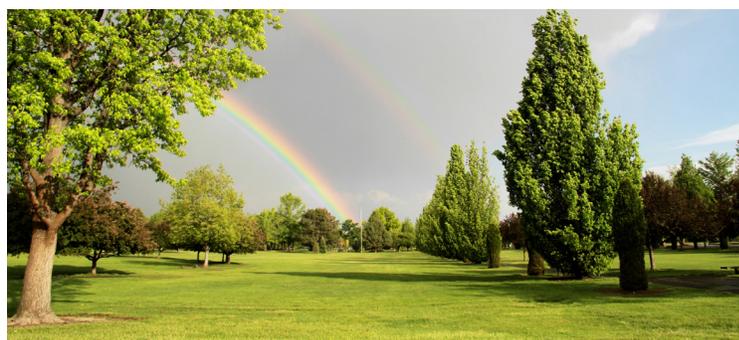
Tree conditions (Note any damage, potential pest issues or other notable irregularities):

APPENDIX E: PURPP SITE OBSERVATIONS

ANN MORRISON MEMORIAL PARK

Site Type: Park (portion)

Observation Period: 4/16/2020-9/30/2020



TURF

Average Turf Length: 4.4 in

Average Root Depth: 3.4 in

Average Water Penetration: 4.7 in

Average Thatch Thickness: 0.1 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Common Dandelion	Taraxacum officinale	100%	Frequent
Common Plantain	Plantago major	100%	Moderate
White Clover	Trifolium repens	100%	Frequent
Common Mallow	Malva neglecta	35%	Rare
Creeping Thistle	Cirsium arvense	24%	Rare
Mushroom	Various	24%	Rare
Creeping Buttercup	Ranunculus repens	12%	Moderate
Mouse-ear Chickweed	Cerastium vulgatum	12%	Rare
Tree Seedling	Various	6%	Rare

PLANTING BEDS

Mulch Type: Bark

Average Mulch Thickness: 2.1 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Grass	Various	100%	Frequent
Common Dandelion	Taraxacum officinale	76%	Rare
White Clover	Trifolium repens	76%	Moderate
Prickly Lettuce	Lactuca serriola	47%	Moderate
Tree Seedling	Various	47%	Rare
Common Plantain	Plantago major	35%	Rare
Mushroom	Various	29%	Rare
Common Mallow	Malva neglecta	24%	Rare
Moss	Various	12%	Moderate
Canada Lettuce	Lactuca canadensis	6%	Moderate
Rush Skeletonweed	Chondrilla juncea	6%	Rare
Shepherds Purse	Capsella bursa-pastoris	6%	Rare

HARD SURFACE

Average Undesired Plant Frequency (All Plants): Moderate

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>
Common Dandelion	Taraxacum officinale	100%
Grass	Various	100%
White Clover	Trifolium repens	71%
Prickly Lettuce	Lactuca serriola	29%
Tree Seedling	Various	29%
Common Mallow	Malva neglecta	18%
Common Plantain	Plantago major	12%
Moss	Various	12%
Mushroom	Various	6%

BOISE HILLS PARK

Site Type: Park

Observation Period: 4/16/2020-9/30/2020



TURF

Average Turf Length: 2.7 in

Average Root Depth: 2.6 in

Average Water Penetration: 3.7 in

Average Thatch Thickness: 0.4 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Common Dandelion	Taraxacum officinale	100%	Moderate
White Clover	Trifolium repens	100%	Moderate
Common Mallow	Malva neglecta	94%	Rare
Common Plantain	Plantago major	88%	Moderate
Redstem Filaree	Erodium cicutarium	76%	Rare
Creeping Thistle	Cirsium arvense	41%	Rare
Prickly Lettuce	Lactuca serriola	18%	Rare
Mushroom	Various	12%	Rare
Russian Thistle	Salsola tragus	6%	Frequent

PLANTING BEDS

Mulch Type: Bark/Wood Chip

Average Mulch Thickness: 1.3 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Grass	Various	88%	Moderate
Common Dandelion	Taraxacum officinale	82%	Moderate
Prickly Lettuce	Lactuca serriola	82%	Frequent
White Clover	Trifolium repens	82%	Moderate
Redstem Filaree	Erodium cicutarium	53%	Moderate
Common Mallow	Malva neglecta	47%	Rare
Common Plantain	Plantago major	47%	Rare
Tall Tumblemustard	Sisymbrium altissimum	41%	Rare
Rush Skeletonweed	Chondrilla juncea	29%	Rare
Russian Thistle	Salsola tragus	29%	Moderate
Creeping Thistle	Cirsium arvense	12%	Rare
Tree Seedling	Various	12%	Rare
Yellow Salsify	Tragopogon dubius	12%	Rare
Cheatgrass	Bromus tectorum	6%	Rare
Common Lambsquarters	Chenopodium album	6%	Rare

HARD SURFACE

Average Undesired Plant Frequency (All Plants): Rare

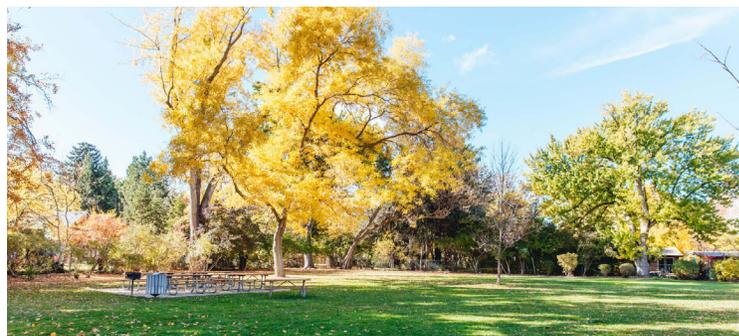
Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>
Grass	Various	88%
Prickly Lettuce	Lactuca serriola	71%
Common Plantain	Plantago major	41%
White Clover	Trifolium repens	29%
Redstem Filaree	Erodium cicutarium	12%
Biannual Lettuce	Lactuca ludoviciana	6%
Rush Skeletonweed	Chondrilla juncea	6%
Russian Thistle	Salsola tragus	6%

BOWDEN PARK

Site Type: Park (portion)

Observation Period: 4/16/2020-9/30/2020



TURF

Average Turf Length: 3.7 in

Average Root Depth: 4.4 in

Average Water Penetration: 6.2 in

Average Thatch Thickness: 0.3 in

Undesired Plant Observations

Common Name	Botanical Name	Observation Rate	Prevalence
Common Dandelion	Taraxacum officinale	100%	Frequent
Creeping Buttercup	Ranunculus repens	100%	Frequent
White Clover	Trifolium repens	100%	Frequent
Common Plantain	Plantago major	53%	Rare
tree seedling	Various	18%	Rare
Mouse-ear Chickweed	Cerastium vulgatum	12%	Rare
Creeping Thistle	Cirsium arvense	6%	Rare
Mushroom	Various	6%	Rare

PLANTING BEDS

Mulch Type: Wood Chip

Average Mulch Thickness: 1.9 in

Undesired Plant Observations

Common Name	Botanical Name	Observation Rate	Prevalence
Creeping Buttercup	Ranunculus repens	94%	Frequent
Common Dandelion	Taraxacum officinale	88%	Moderate
Tree Seedling	Various	88%	Frequent
Grass	Various	76%	Rare
Prickly Lettuce	Lactuca serriola	65%	Rare
Mushroom	Various	18%	Rare
White Clover	Trifolium repens	18%	Rare

HARD SURFACE

Average Undesired Plant Frequency (All Plants): Rare

Undesired Plant Observations

Common Name	Botanical Name	Observation Rate
Grass	Various	82%
Common Dandelion	Taraxacum officinale	6%

COMBA PARK

Site Type: Park

Observation Period: 4/16/2020-9/30/2020



TURF

Average Turf Length: 3.9 in

Average Root Depth: 3.4 in

Average Water Penetration: 4.8 in

Average Thatch Thickness: 0.2 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
White Clover	Trifolium repens	100%	Frequent
Common Dandelion	Taraxacum officinale	88%	Moderate
Common Mallow	Malva neglecta	59%	Rare
Prickly Lettuce	Lactuca serriola	35%	Moderate
Common Plantain	Plantago major	29%	Rare
Redstem Filaree	Erodium cicutarium	29%	Rare
Mushroom	Various	24%	Rare
Shepherds Purse	Capsella bursa-pastoris	12%	Rare

PLANTING BEDS

Mulch Type: Wood Chip

Average Mulch Thickness: 0.5 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Prickly Lettuce	Lactuca serriola	100%	Frequent
Common Mallow	Malva neglecta	94%	Frequent
Grass	Various	94%	Moderate
White Clover	Trifolium repens	94%	Rare
Redstem Filaree	Erodium cicutarium	71%	Frequent
Common Dandelion	Taraxacum officinale	65%	Rare
Field Burrweed	Soliva sessilis	53%	Moderate
Creeping Thistle	Cirsium arvense	47%	Rare
Common Plantain	Plantago major	41%	Rare
Tree Seedling	Various	41%	Moderate
Puncturevine	Tribulus terrestris	35%	Rare
Common Lambsquarters	Chenopodium album	24%	Rare
Russian Thistle	Salsola tragus	24%	Rare
Shepherds Purse	Capsella bursa-pastoris	24%	Rare
Moss	Various	18%	Rare

Undesired Plant Observations continued

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Mushroom	Various	12%	Rare
Tall Tumblemustard	Sisymbrium altissimum	12%	Rare

HARD SURFACE

Average Undesired Plant Frequency (All Plants):

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>
Grass	Various	76%
Prickly Lettuce	Lactuca serriola	59%
White Clover	Trifolium repens	24%
Creeping Thistle	Cirsium arvense	12%
Moss	Various	12%
Common Dandelion	Taraxacum officinale	6%
Field Burrweed	Soliva sessilis	6%

ELM GROVE PARK

Site Type: Park

Observation Period: 4/16/2020-9/30/2020



TURF

Average Turf Length: 4.1 in

Average Root Depth: 3.1 in

Average Water Penetration: 4.0 in

Average Thatch Thickness: 0.1 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Common Dandelion	Taraxacum officinale	100%	Moderate
White Clover	Trifolium repens	100%	Frequent
Common Plantain	Plantago major	76%	Moderate
tree seedling	Various	71%	Frequent
Prickly Lettuce	Lactuca serriola	29%	Rare
Common Mallow	Malva neglecta	24%	Rare
Mushroom	Various	18%	Rare

PLANTING BEDS

Mulch Type: Wood Chip

Average Mulch Thickness: 3.6 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Tree Seedling	Various	100%	Moderate
Grass	Various	76%	Moderate
Prickly Lettuce	Lactuca serriola	59%	Rare
Common Mallow	Malva neglecta	53%	Rare
Common Dandelion	Taraxacum officinale	47%	Rare
Common Plantain	Plantago major	24%	Rare
Redstem Filaree	Erodium cicutarium	24%	Moderate
Rush Skeletonweed	Chondrilla juncea	24%	Moderate
Russian Thistle	Salsola tragus	18%	Rare
Field Burrweed	Soliva sessilis	12%	Frequent
Moss	Various	6%	Rare
White Clover	Trifolium repens	6%	Rare

HARD SURFACE

Average Undesired Plant Frequency (All Plants): Rare

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>
Common Dandelion	Taraxacum officinale	88%
Tree Seedling	Various	82%
Grass	Various	65%
Common Mallow	Malva neglecta	47%
Moss	Various	24%
Common Plantain	Plantago major	18%
Prickly Lettuce	Lactuca serriola	18%
Redstem Filaree	Erodium cicutarium	18%
Russian Thistle	Salsola tragus	6%
White Clover	Trifolium repens	6%

FAIRVIEW PARK

Site Type: Park

Observation Period: 4/16/2020-9/30/2020



TURF

Average Turf Length: 3.529411765 in

Average Root Depth: 3.647058824 in

Average Water Penetration: 5 in

Average Thatch Thickness: 0.147058824 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Common Dandelion	Taraxacum officinale	100%	Frequent
White Clover	Trifolium repens	100%	Frequent
Common Plantain	Plantago major	82%	Moderate
Mushroom	Various	29%	Rare
Common Mallow	Malva neglecta	24%	Rare
Creeping Thistle	Cirsium arvense	18%	Rare
Tree Seedling	Various	12%	Rare
Prickly Lettuce	Lactuca serriola	6%	Rare

PLANTING BEDS

Mulch Type: Wood Chip

Average Mulch Thickness: 3.7 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Tree Seedling	Various	88%	Rare
Grass	Various	71%	Rare
Common Dandelion	Taraxacum officinale	59%	Rare
Prickly Lettuce	Lactuca serriola	35%	Moderate
Common Plantain	Plantago major	29%	Moderate
White Clover	Trifolium repens	18%	Moderate
Mushroom	Various	6%	Moderate

HARD SURFACE

Average Undesired Plant Frequency (All Plants): Rare

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>
Grass	Various	88%
Common Dandelion	Taraxacum officinale	65%
Prickly Lettuce	Lactuca serriola	65%
White Clover	Trifolium repens	59%
Moss	Various	41%
Common Plantain	Plantago major	29%
Mouse-ear Chickweed	Cerastium vulgatum	29%
Common Mallow	Malva neglecta	24%
Rush Skeletonweed	Chondrilla juncea	6%
Russian Thistle	Salsola tragus	6%
Tree Seedling	Various	6%

IVYWILD PARK

Site Type: Park

Observation Period: 4/16/2020-9/30/2020



TURF

Average Turf Length: 3.1 in

Average Root Depth: 2.9 in

Average Water Penetration: 2.8 in

Average Thatch Thickness: 0.0 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
White Clover	Trifolium repens	100%	Moderate
Common Dandelion	Taraxacum officinale	94%	Moderate
Creeping Thistle	Cirsium arvense	47%	Rare
Common Plantain	Plantago major	41%	Rare
Prickly Lettuce	Lactuca serriola	29%	Moderate
Mushroom	Various	12%	Rare
tree seedling	Various	12%	Rare
Common Mallow	Malva neglecta	6%	Rare
Creeping Buttercup	Ranunculus repens	6%	Rare

PLANTING BEDS

Mulch Type: Wood Chip

Average Mulch Thickness: 3.3 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Prickly Lettuce	Lactuca serriola	100%	Rare
Common Dandelion	Taraxacum officinale	71%	Rare
Mouse-ear Chickweed	Cerastium vulgatum	59%	Frequent
Grass	Various	53%	Rare
Tree Seedling	Various	53%	Rare
Common Mallow	Malva neglecta	41%	Rare
Puncturevine	Tribulus terrestris	24%	Rare
Mushroom	Various	18%	Frequent
Spotted Spurge	Chamaesyce maculata	12%	Moderate
Redstem Filaree	Erodium cicutarium	6%	Moderate
Russian Thistle	Salsola tragus	6%	Rare
Shepherds Purse	Capsella bursa-pastoris	6%	Frequent
White Clover	Trifolium repens	6%	Rare

HARD SURFACE

Average Undesired Plant Frequency (All Plants): Moderate

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>
Grass	Various	88%
Tree Seedling	Various	71%
Common Dandelion	Taraxacum officinale	65%
Moss	Various	59%
Prickly Lettuce	Lactuca serriola	47%
Creeping Thistle	Cirsium arvense	18%
Russian Thistle	Salsola tragus	18%
White Clover	Trifolium repens	18%
Rush Skeletonweed	Chondrilla juncea	12%
Common Mallow	Malva neglecta	6%
Redstem Filaree	Erodium cicutarium	6%

MARIPOSA PARK

Site Type: Park

Observation Period: 4/16/2020-9/30/2020



TURF

Average Turf Length: 3.6 in

Average Root Depth: 3.1 in

Average Water Penetration: 3.7 in

Average Thatch Thickness: 0.4 in

Undesired Plant Observations

Common Name	Botanical Name	Observation Rate	Prevalence
White Clover	Trifolium repens	94%	Moderate
Common Dandelion	Taraxacum officinale	88%	Moderate
Common Mallow	Malva neglecta	76%	Rare
Prickly Lettuce	Lactuca serriola	53%	Rare
Common Plantain	Plantago major	47%	Rare
Redstem Filaree	Erodium cicutarium	41%	Rare
Creeping Thistle	Cirsium arvense	35%	Rare
Mushroom	Various	24%	Rare
Common Lambsquarters	Chenopodium album	6%	Rare
Puncturevine	Tribulus terrestris	6%	Rare
Rush Skeletonweed	Chondrilla juncea	6%	Rare
tree seedling	Various	6%	Rare

PLANTING BEDS

Mulch Type: Wood Chip/Chat

Average Mulch Thickness: 2.6 in

Undesired Plant Observations

Common Name	Botanical Name	Observation Rate	Prevalence
Grass	Various	100%	Frequent
Common Mallow	Malva neglecta	88%	Frequent
Prickly Lettuce	Lactuca serriola	88%	Moderate
Common Dandelion	Taraxacum officinale	76%	Moderate
Creeping Thistle	Cirsium arvense	65%	Rare
Tree Seedling	Various	59%	Moderate
Puncturevine	Tribulus terrestris	53%	Rare
Mushroom	Various	47%	Rare
Common Plantain	Plantago major	41%	Rare
White Clover	Trifolium repens	41%	Moderate
Redstem Filaree	Erodium cicutarium	29%	Rare

Undesired Plant Observations continued

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Rush Skeletonweed	Chondrilla juncea	18%	Rare
Common Lambsquarters	Chenopodium album	6%	Rare
Drummonds Thistle	Cirsium scariosum	6%	Moderate
Field Bindweed	Convolvulus arvensis	6%	Moderate
Mouse-ear Chickweed	Cerastium vulgatum	6%	Rare
Russian Thistle	Salsola tragus	6%	Moderate
Shepherds Purse	Capsella bursa-pastoris	6%	Rare
Tall Tumblemustard	Sisymbrium altissimum	6%	Rare

HARD SURFACE

Average Undesired Plant Frequency (All Plants): Rare

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>
Grass	Various	88%
Puncturevine	Tribulus terrestris	29%
White Clover	Trifolium repens	24%
Common Dandelion	Taraxacum officinale	12%
Common Plantain	Plantago major	12%
Prickly Lettuce	Lactuca serriola	12%

MEMORIAL PARK

Site Type: Park (portion)

Observation Period: 4/16/2020-9/30/2020



TURF

Average Turf Length: 3.8 in

Average Root Depth: 3.4 in

Average Water Penetration: 4.9 in

Average Thatch Thickness: 0.3 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Common Dandelion	Taraxacum officinale	100%	Frequent
Common Plantain	Plantago major	100%	Frequent
White Clover	Trifolium repens	100%	Frequent
Mushroom	Various	18%	Rare
Common Mallow	Malva neglecta	12%	Rare

PLANTING BEDS

Mulch Type: Wood Chip

Average Mulch Thickness: 4.2 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Tree Seedling	Various	94%	Frequent
Grass	Various	76%	Rare
Common Dandelion	Taraxacum officinale	59%	Rare
Prickly Lettuce	Lactuca serriola	18%	Rare
White Clover	Trifolium repens	6%	Rare

HARD SURFACE

Average Undesired Plant Frequency (All Plants): Frequent

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>
Grass	Various	100%
Common Plantain	Plantago major	94%
Common Dandelion	Taraxacum officinale	65%
Moss	Various	29%
Prickly Lettuce	Lactuca serriola	24%
Redstem Filaree	Erodium cicutarium	18%

PIONEER PATHWAY

Site Type: Right of Way

Observation Period: 4/16/2020-9/30/2020



PLANTING BEDS

Mulch Type: Wood Chip

Average Mulch Thickness: 1.3 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Grass	Various	100%	Moderate
Tree Seedling	Various	100%	Moderate
Common Dandelion	Taraxacum officinale	88%	Moderate
White Clover	Trifolium repens	88%	Moderate
Prickly Lettuce	Lactuca serriola	76%	Moderate
Common Mallow	Malva neglecta	71%	Rare
Common Plantain	Plantago major	53%	Moderate
Moss	Various	35%	Rare
Creeping Thistle	Cirsium arvense	24%	Rare
Redstem Filaree	Erodium cicutarium	18%	Rare
Mushroom	Various	6%	Rare
Rush Skeletonweed	Chondrilla juncea	6%	Rare
Russian Thistle	Salsola tragus	6%	Rare
Yellow Salsify	Tragopogon dubius	6%	Rare

HARD SURFACE

Average Undesired Plant Frequency (All Plants): Rare

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>
Grass	Various	47%
Prickly Lettuce	Lactuca serriola	47%
White Clover	Trifolium repens	47%
Tree Seedling	Various	29%
Common Dandelion	Taraxacum officinale	24%
Common Plantain	Plantago major	6%
Moss	Various	6%

TERRY DAY PARK

Site Type: Pollinator Garden

Observation Period: 4/16/2020-9/30/2020



PLANTING BEDS

Mulch Type: Wood Chip

Average Mulch Thickness: 1.5 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Tree Seedling	Various	82%	Moderate
Creeping Thistle	Cirsium arvense	71%	Moderate
Prickly Lettuce	Lactuca serriola	59%	Moderate
Common Dandelion	Taraxacum officinale	41%	Rare
White Clover	Trifolium repens	41%	Rare
Grass	Various	29%	Rare
Common Mallow	Malva neglecta	18%	Rare
Mushroom	Various	18%	Frequent
Russian Thistle	Salsola tragus	12%	Rare
Tall Tumblemustard	Sisymbrium altissimum	12%	Rare
Common Plantain	Plantago major	6%	Rare

HARD SURFACE

Average Undesired Plant Frequency (All Plants): Rare

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>
Grass	Various	6%
Prickly Lettuce	Lactuca serriola	6%
White Clover	Trifolium repens	6%

WARM SPRINGS PARK

Site Type: Pollinator Garden

Observation Period: 4/16/2020-9/30/2020



PLANTING BEDS

Mulch Type: Chat

Average Mulch Thickness: 1.8 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Grass	Various	76%	Moderate
Puncturevine	Tribulus terrestris	76%	Rare
Common Mallow	Malva neglecta	71%	Rare
Rush Skeletonweed	Chondrilla juncea	53%	Rare
Russian Thistle	Salsola tragus	53%	Rare
Prickly Lettuce	Lactuca serriola	47%	Rare
Tree Seedling	Various	35%	Rare
White Clover	Trifolium repens	35%	Rare
Tall Tumblemustard	Sisymbrium altissimum	29%	Moderate
Redstem Filaree	Erodium cicutarium	24%	Rare
Cheatgrass	Bromus tectorum	18%	Rare
Common Dandelion	Taraxacum officinale	18%	Rare
Common Lambsquarters	Chenopodium album	12%	Rare
Common Plantain	Plantago major	12%	Rare
Spotted Spurge	Chamaesyce maculata	12%	Rare
Switchgrass	Panicum virgatum	12%	Rare
Annual Kochia	Kochia scoparia	6%	Rare
Black Medick	Medicago lupulina	6%	Frequent
Medusahead	Taeniatherum caput-medusae	6%	Rare
Prostrate Knotweed	Polygonum aviculare	6%	Rare
Prostrate Pigweed	Amaranthus albus L.	6%	Moderate
Whitetop	Cardaria draba	6%	Rare

HARD SURFACE

Average Undesired Plant Frequency (All Plants): Rare

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>
Grass	Various	100%
Prickly Lettuce	Lactuca serriola	53%
Redstem Filaree	Erodium cicutarium	29%
Creeping Thistle	Cirsium arvense	6%
White Clover	Trifolium repens	6%

WHITEWATER PARK BLVD. RIGHT OF WAY

Site Type: Right of Way

Observation Period: 4/16/2020-9/30/2020



PLANTING BEDS

Mulch Type: Wood Chip

Average Mulch Thickness: 2.6 in

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>	<i>Prevalence</i>
Prickly Lettuce	Lactuca serriola	88%	Rare
Grass	Various	88%	Moderate
Tree Seedling	Various	65%	Moderate
Redstem Filaree	Erodium cicutarium	53%	Frequent
White Clover	Trifolium repens	47%	Rare
Creeping Thistle	Cirsium arvense	41%	Rare
Rush Skeletonweed	Chondrilla juncea	35%	Rare
Russian Thistle	Salsola tragus	35%	Rare
Tall Tumblemustard	Sisymbrium altissimum	35%	Moderate
Common Mallow	Malva neglecta	18%	Rare
Common Dandelion	Taraxacum officinale	18%	Rare
Shepherds Purse	Capsella bursa-pastoris	12%	Moderate
Common Lambsquarters	Chenopodium album	12%	Moderate
Common Plantain	Plantago major	6%	Frequent
Yellow Salsify	Tragopogon dubius	6%	Rare
Puncturevine	Tribulus terrestris	6%	Rare
Mushroom	Various	6%	Rare

HARD SURFACE

Average Undesired Plant Frequency (All Plants): Rare

Undesired Plant Observations

<i>Common Name</i>	<i>Botanical Name</i>	<i>Observation Rate</i>
Grass	Various	65%
Prickly Lettuce	Lactuca serriola	35%
Tree Seedling	Various	12%
Puncturevine	Tribulus terrestris	6%
Redstem Filaree	Erodium cicutarium	6%
Russian Thistle	Salsola tragus	6%
Tall Tumblemustard	Sisymbrium altissimum	6%



PARKS AND
RECREATION