

PESTICIDE APPLICATION 2022 REPORT

Pesticide Applications to Boise Parks and Recreation Managed Properties in 2022



PARKS AND
RECREATION

Executive Summary

After a general return to normal applications in 2021, 2022 saw a marked reduction in pesticide use as a result of practices implemented through the third and final year of the Pesticide Use Reduction Pilot Program. Use of glyphosate-based herbicides continued to fall in 2022 continuing the trend from previous years. This is due, in large part, to a shift away from post-emergent herbicide use and toward the use of preemergent granular products. Turf damage from white grubs remains to be an issue. To protect pollinator species, the department discontinued the use of nearly all neonicotinoid-based insecticides in 2021. To achieve control of white grub populations the department is instead using a product named Acelepryn G with the active ingredient chlorantraniliprole. The last stored product containing imidacloprid (a neonicotinoid insecticide) was applied in 2022.



2022 was the final year of the Pesticide Use Reduction Pilot Program. In this final year the program was expanded to include nearly all sites maintained by Boise Parks and Recreation. The targets of this expansion were glyphosate-based herbicides and broadleaf selective turf treatments. These are the two most highly used chemicals by department applicators. As a result there was a large reduction in chemical use.

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Pictured: A photo taken at Peppermint Park in the Summer of 2022. Reduced application of broadleaf selective herbicides at this site led to greater diversity of plants in the turf. This can be seen clearly marked by the white clover flowers.



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1. Introduction

The 2022 growing season saw record breaking heat. This added stress to plant material across sites managed by Boise Parks and Recreation (BPR). The Pesticide Use Reduction Pilot Program (PURPP) which was launched in Spring of 2020 entered its third and final year. Use of BPR facilities was relatively normal throughout the season despite the heat.

The following report details pesticide use by BPR in fiscal year 2022 (October 1, 2021 – September 30, 2022). This document also provides an update on the Pesticide Use Reduction Pilot Program. The PURPP continues to be successful in accomplishing its primary goal of investigating potential routes for the reduction of glyphosate-based herbicides (GBH) at BPR managed sites. Additionally, through lessons learned in the PURPP, BPR dramatically reduced the use of broadleaf selective herbicides in 2022. Broadleaf selective herbicides are most often applied to turf for esthetic purposes. This use of broadleaf herbicides was the target of reductions in 2022. Please refer to Section 4 for more information

2. Changes to 2022 Maintenance:

- The use of Chaser 2 Amine for broadleaf control in turf was curtailed at most sites within the parks system. Exceptions on this reduction were made for sites with sports fields, special events and some other considerations. For a full list of exceptions please refer to Section 4.

3. Pesticide Applications

In 2022, BPR applied an equivalent of 163 gallons of liquid formulated pesticides and 5444 lbs. dry formulated pesticides. The liquid formulation total includes approximately 48 gallons of GBH. As can be seen in Figure 1, product applications continued to shift away from liquid formulated pesticides and toward dry formulations. GBH applications fell drastically in absolute terms, but the relative percentage increased because of the drop in overall pesticide application. GBH applications dropped by nearly 50% again in 2022 from 2021 levels. This is an 80% reduction in GBH application from average levels before the PURPP was implemented.

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 2021 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,

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



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. Dichlobenil
2. 2,4-D
3. Glyphosate
4. Trifluralin
5. Triclopyr
6. Chlorantraniliprole
7. Glufosinate-ammonium
8. Pendimethalin
9. Dithiopyr
10. Ethephon*

*Note: Ethephon, a growth regulator, is applied only at golf courses managed by BPR: Warm Springs Golf Course and Quail Hollow Golf Course.

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 Dichlobenil – pre-emergent, nonselective herbicide. Dichlobenil applications made up 65% by weight of all active ingredient applied to BPR sites in 2022. This was followed by 2,4-D

(postemergent, selective), and glyphosate (postemergent, broad spectrum). 2,4-D and glyphosate applications made up 9% and 7% by weight respectively of all active ingredient applied. All other active ingredients applied in 2022 made up significantly less. Total amounts of active ingredient applied can be found in Appendix B.

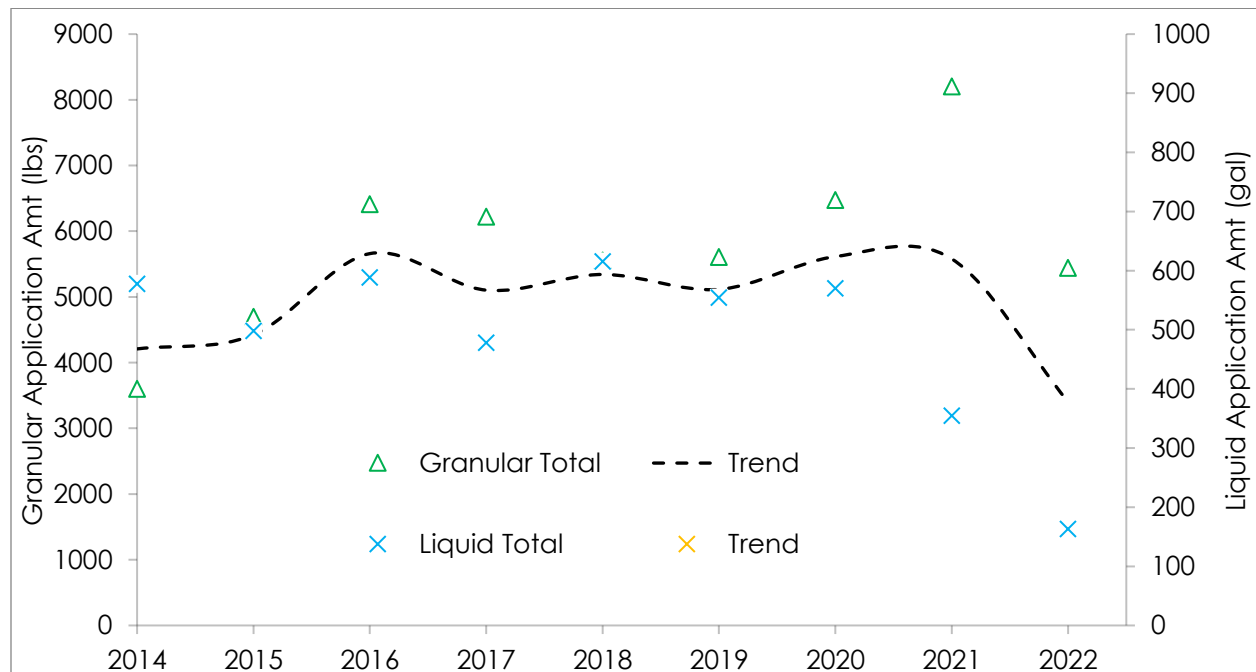


Figure 1: Total equivalent amounts of liquid and dry formulated pesticides from application logs. Dry formulated pesticides are measured in pounds (lbs) on the left-hand axis. Liquid formulated pesticides are measured in US gallons (gal) on the right-hand axis. Dotted line indicates the trend and does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



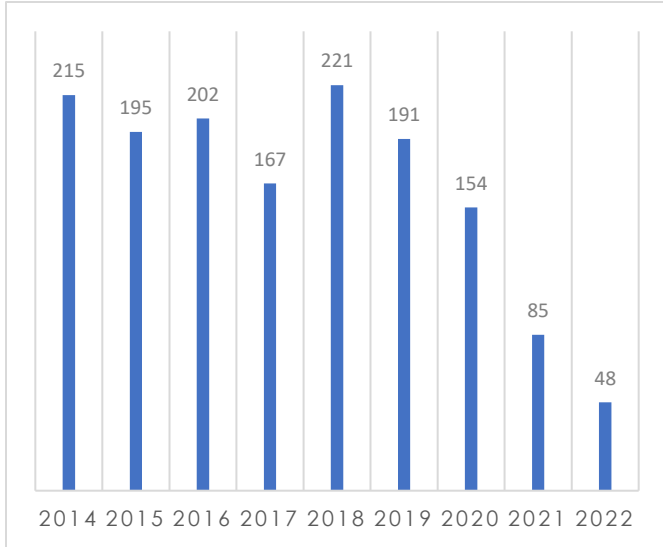


Figure 2 (Left): Proportion of total liquid formulated applications that contain glyphosate as an active ingredient.

Broad spectrum herbicide use is shown in Figure 3. As can be seen the use of Casoron continued to rise in 2022 along with a fall in GBH use. Casoron is a pre-emergent herbicide used mainly to control vegetation growth in public rights of way. The use of granular pre-emergent herbicides in these areas greatly reduces the maintenance and keeps BPR employees from spending more time in these relatively hazardous working conditions. Broadleaf selective

herbicide use is shown in Figure 4. As discussed above the use of broadleaf controls was heavily reduced in 2022. The primary product used was Chaser 2 Amine which has the active ingredient 2,4-D.

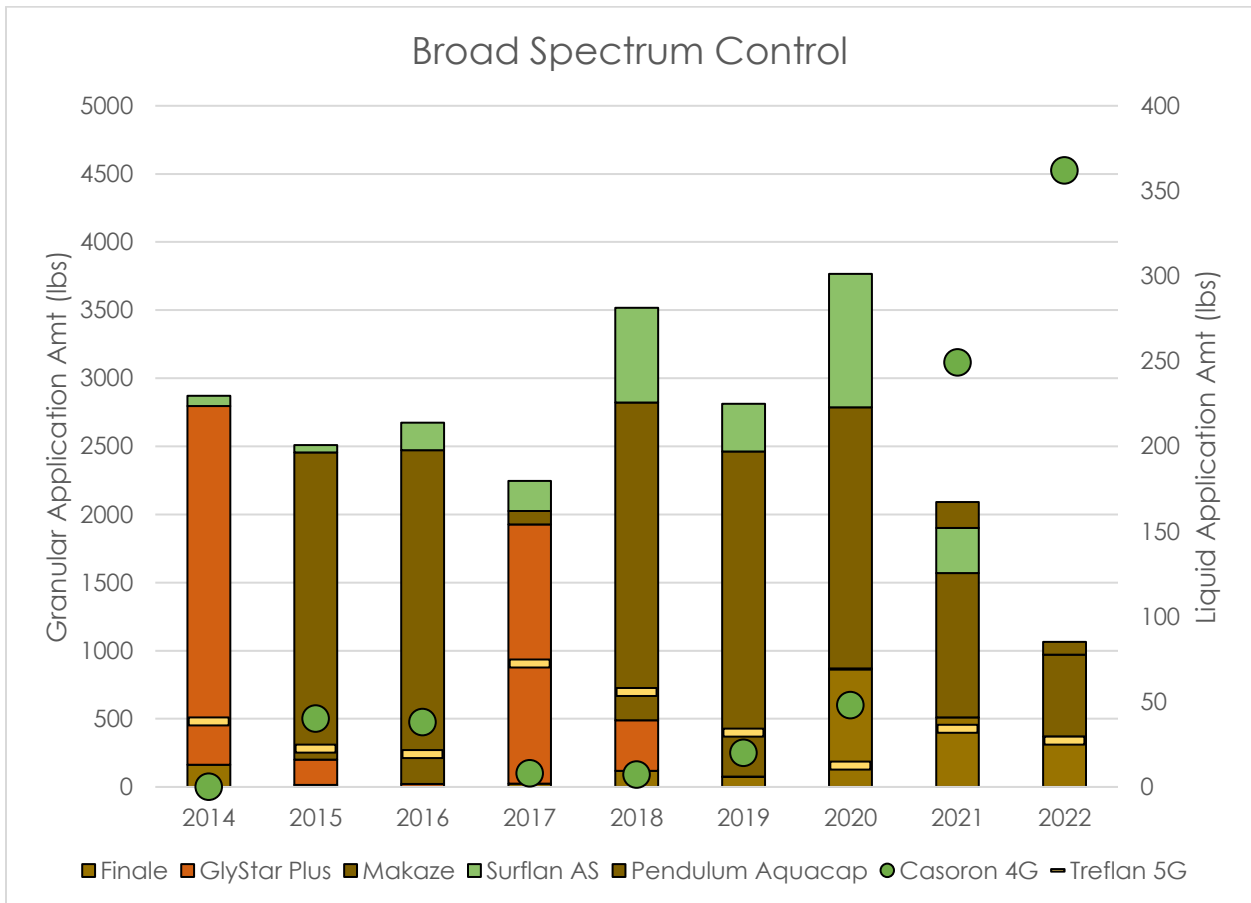


Figure 3: Broad Spectrum herbicide applications. Treflan 5G and Casoron 4G are dry formulated products and are measured in lbs on the left-hand axis. All other products are measured in gal. on the right-hand axis.

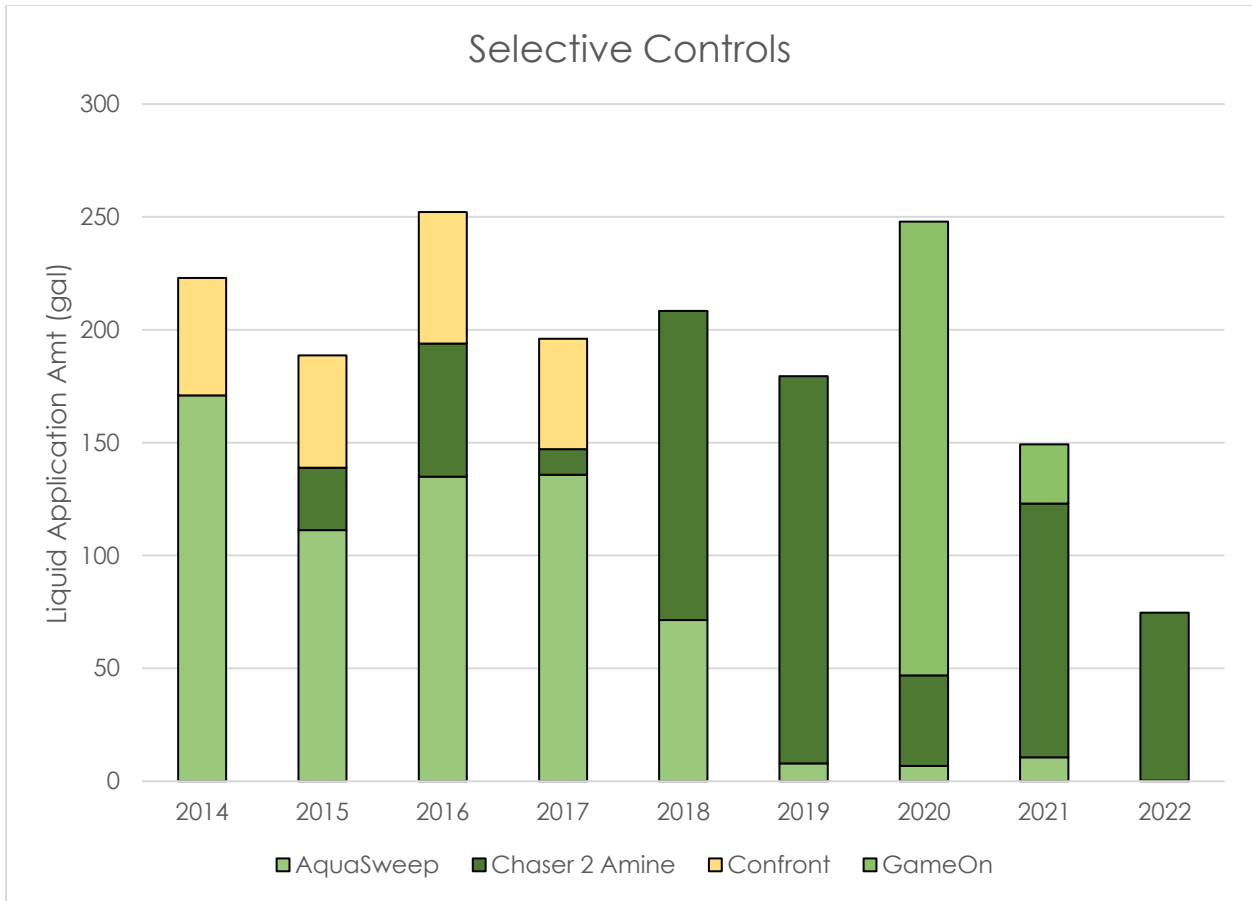


Figure 4: Broadleaf selective herbicide applications. All products are liquid formulated.

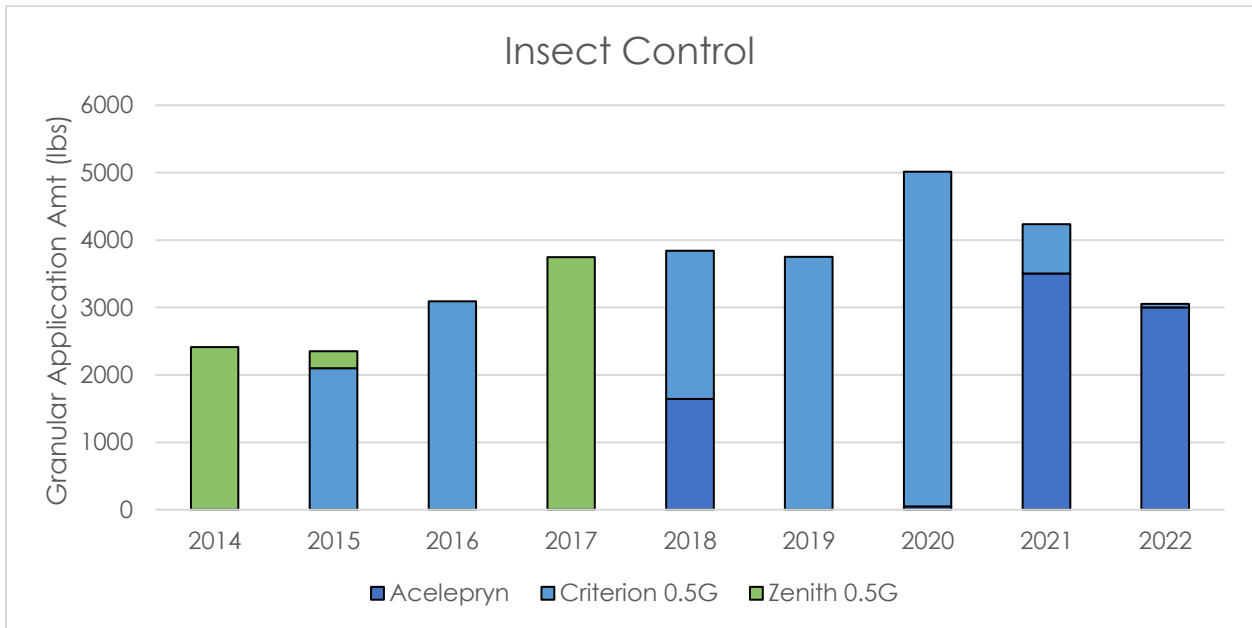


Figure 5: Insecticide application amounts. All products are dry formulated.



Pesticide use for insect control has been trending upwards for the past several years (See Figure 5) but remained steady in 2021. The trend is 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 a 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 several 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 well below average in 2022 (See Figure 6). A total of 738 combined hours were spent applying pesticide products in with only 30% of those hours dedicated to the application of GBH. This is consistent with last year but lower than before the PURPP was implemented when GBH applications made up over half of total labor hours. 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.

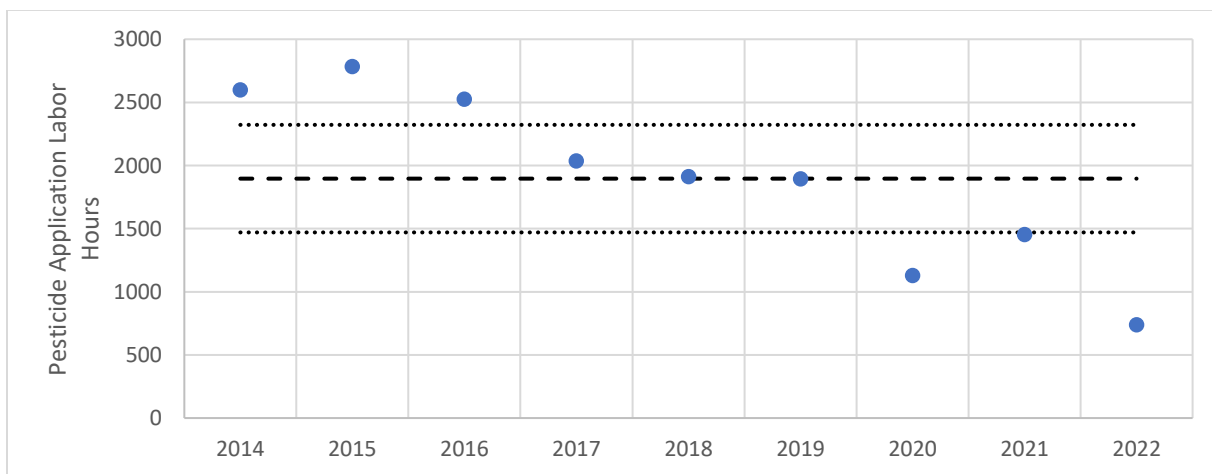


Figure 6: Labor hours spent applying pesticides. Dashed line represents the average hours spent over the 7 data points. The dotted lines represent upper and lower limits of a 95% confidence interval around the mean.



3. Discussion and Future Direction for Pesticide Applications

The proportion of total liquid applications with glyphosate continued to decline in 2022. Additionally, the amount of product applied for control of billbug continued to decline. Finally, the time spent applying pesticides dropped significantly in 2022 along with the overall amount of product applied. 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, though they come with a significant increase in cost. In 2021 the landscape chemical budget roughly doubled to provide resources for the purchase of more ecologically sound products. The budget remained consistent in 2022 though less was ultimately spent.

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.

As was discussed in the 2020 and 2021 Pesticide Application Reports, GBH use was significantly offset in 2022 by increasing the use of Casoron 4G, a broad spectrum, preemergent herbicide (Figure 3). BPR also continued 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.

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 3. 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 some pollinators, BPR discontinued the use of imidacloprid based insecticides in 2021. All leftover stock of imidacloprid based insecticides were used and then applications shifted to 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). Some few products remain in BPR inventory that contain imidacloprid. These products are used as needed in places like the Julia Davis Rose Garden. These products will take longer to use to completion, but overall applications of imidacloprid containing products will be very low in the future.

3.3 Labor Hours Spent Applying Pesticides

Labor is the greatest expense associated with the application of pesticides. Labor hours associated with application fell significantly in 2022 along with the significant decrease in the total amount of product applied. A far greater proportion of all applications were made up of granular, preemergent products in 2022. It is likely that this approach, though it takes careful and considered planning, is more efficient from a labor perspective.

4. Update on Pesticide Use Reduction

The 2022 growing season concluded the Pesticide Use Reduction Pilot Program (PURPP). The focus of the PURPP in Year 1 was to investigate routes of reducing GBH use at BPR managed sites. This goal was highly successful and revealed several reduction strategies that BPR will implement more broadly in 2023. In 2021, reduction of imidacloprid use was implemented across all BPR sites.

In 2022 BPR trialed reductions of 2,4-D. Because it was suspected that reductions in broadleaf control in turf will generate more public interest, BPR felt that it was necessary to trial these reductions outside of the PURPP at as many sites as possible. This allowed BPR to gauge public support for these actions before adjusting policy. The amount of public feedback did increase in 2022. Comments were collected and assessed for support or criticism of the program. Overall comments had the following breakdown: 75% in support of pesticide reduction efforts and 8% critical of pesticide reduction efforts with the remainder being neutral.

BPR plans to continue reduction 2,4-D use by creating a distinction between esthetic and non-esthetic uses of pesticides. Esthetic uses include all uses that are intended for the sole purpose of achieving a specific appearance in a landscape. Esthetic uses serve little to no functional purpose, such as benefitting public or environmental health, and generally promote certain plant types over others based on subjective ideals.

Non-esthetic uses include all uses intended to benefit public health and safety, improve environmental quality, preserve public or private property, or provide some



other functional benefit to the property owner. Applications made to maintain the functionality of a landscape for its intended use are considered non-esthetic.

In 2023 only non-esthetic applications of 2,4-D based pesticides will be performed except at sports fields, golf courses, special event sites, rights of way and pools where esthetic applications will be continued. With this approach, it is estimated that 2,4-D applications will remain at levels seen in 2022.



References

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The Xerces Society. (2021, January). *Western Monarchs in Crisis*. Retrieved from xerces.org: <https://xerces.org/western-monarch-call-to-action>

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Appendix A: Pesticides Used in 2022 by BPR

Trade Name – EPA Reg. #	Formulation
Acelepryn - 100-1500	Granular
Aqua Neat - 228-365	Liquid
AquaSweep - 228-316	Liquid
Casoron 4G - 400-168	Granular
Chaser 2 Amine - 34704-930	Liquid
Criterion 0.5G - 432-1328	Granular
Dimension 270G - 7001-375	Granular
Enforcer Wasp & Yellow Jacket Foam - 40849-4	Liquid
Finale - 432-1229	Liquid
Makaze - 34704-890	Liquid
Milestone - 62719-519	Liquid
Pathfinder II - 62719-176	Liquid
Pendulum Aquacap - 241-416	Liquid
QuickSilver - 279-3265	Liquid
Treflan 5G - 961-405	Granular
Wasp-Freeze II - 499-550	Liquid



Appendix B: Amount Active Ingredient Applied by Product

Product	Active Ingredient	Amt Applied (lbs)	% Total
Casoron 4G	Dichlobenil	1508.08	67%
Chaser 2 Amine	2,4-D	211.9196	9%
Makaze	Glyphosate	164.2012	7%
Treflan 5G	Trifluralin	140.902	6%
Chaser 2 Amine	Triclopyr	94.18648	4%
Acelepryn	Chlorantranilprole	50.00166	2%
Finale	Glufosinate	27.93026	1%
Pendulum Aquacap	Pendimethalin	24.15264	1%
Dimension 270G	Dithiopyr	11.92023	1%
Criterion 0.5G	Imidacloprid	0.89131	<1%
AquaSweep	2,4-D	0.807808	<1%
Pathfinder II	Triclopyr	0.690349	<1%
AquaSweep	Triclopyr	0.359026	<1%
QuickSilver	Carentrazone-Ethyl	0.070001	<1%
Aqua Neat	2,4-D	0.044513	<1%
Wasp-Freeze II	Prallethrin	0.016985	<1%
Milestone	Aminopyralid-Tripromine	0.008983	<1%
Enforcer Wasp & Yellow Jacket Foam	Phenothrin	0.005662	<1%
Enforcer Wasp & Yellow Jacket Foam	Tetramethrin	0.005662	<1%

