

Pesticide Report – Parks Division 2017

The I.P.M. Coordinator for the Parks Division in 2017 was Charlie Romines, Assistant Parks Superintendent Charlie Romines. Lisa Laschinger, Parks Operations Manager will be the Parks Division's I.P.M. Coordinator in 2018 and can be reached at 608-266-9214. The Parks Division consists of several Sections with each Section Supervisor being responsible for complying with the City's Pesticide Policy. The Section Supervisors are also responsible for following the guidelines of Integrated Pest Management, establishing thresholds, considering alternative control measures, the application of any pesticide, and all record keeping as required.

The Park Division is happy to report that their 2016 Annual Report was reviewed and that Parks is compliant with the policy and regulations.

GENERAL PARKS

General Parks is comprised of a wide variety of properties with various uses. This includes small neighborhood parks, area parks, community parks, regional parks, natural areas, medians, bike paths, and specialty areas such as tennis courts, disc golf, football, soccer, baseball and softball fields. Total acreage of general parks is in excess of 4,000 acres.

Non-Pesticide activities in General Parks include hand weeding in flower and shrub beds, mowing of dandelions and thistles versus treatment, increased low maintenance acreage, string trimming and mulching around trees versus Round-up applications, regular sharpening of blades to reduce plant injury along with aerification of athletic fields to reduce compaction and thatch control.

Parks is thankful to all of the volunteers that assisted us in our non-pesticide control efforts.

Friends of Yahara River
Garlic Mustard removal
Yahara Park Place, Buckthorn removal
Friends of Hoyt Park
Friends of Monona Bay
Owen Park Restoration
Friends Cherokee Marsh- wetland restoration
Flower gardens

Several thousand hours of labor for mechanical and cultural control was provided by volunteers in 2017!

EAST PARKS Pesticide Report 2017

Pesticides are used only in places where residents, groups, or companies pay to use our athletic facilities/shelters or when we are treating invasive species in areas Parks maintains. We only use pesticides when mechanical and cultural methods prove to be ineffective or inefficient on their own.

Tenney Park Shoreline Construction Project (Eco-Resource Consulting, LLC)

Targeted species: Reed canary grass, buckthorn, grape, mulberry, foxtail sedge, barnyard grass, cattail, aspen, locust, and Canada thistle

Purpose: To control weed populations in areas that are being replanted with desirable species and to maintain planted rain gardens.

Locations:

Within 15' of the shoreline and rain garden (next to parking lot)

Amount of pesticides applied:

- Trycera: 1.094 Lbs a.i. of Triclopyr
- Polaris: .038 Lbs a.i. of Isopropylamine salt of Imazapyr
- Garlon 4: .875 Lbs a.i. of Triclopyr
- AquaNeat .324 Lbs a.i. of Glyphosate
- Roundup Weather Max: .270 Lbs a.i. of Glyphosate
- Milestone: .056 Lbs a.i. of Triisopropanolammonium salt

- Progeny: .0225 Lbs a.i. of MCPA Acid, .0022 Lbs a.i. of Triclopyr, .0022 Lbs a.i. of Dicamba Acid
- Intensity: .015 Lbs a.i. of Dicamba Acid

Ash Trees – Adopt a Tree Program

Targeted species: Emerald Ash Borer

Purpose: To save ash trees from dying from EAB.

Location:

Wirth Ct Park

Amount of pesticides applied:

- Tree-age: .0384 Lbs a.i. of Emamectin Benzoate

General Park Areas—Non-Selective Weed Applications

Targeted species: Weedy grasses and broadleaf annual and perennial weeds

Purpose: To control weed populations in areas that park users can rent and reserve, which includes park shelters and adjacent parking lots.

Locations:

Warner, Elvehjem, Olbrich, Burrows, OB Sherry, Brentwood, Kennedy, Hiestand, Sycamore, Richmond Hills, Lake Edge, Reindahl, Heritage Heights, Onyx, Hawthorne, Honeysuckle, Portland, Burrows, Door Creek, McClellan, Mayfair, and Demetral

Amount of pesticides applied:

- Roundup Pro Max: 10.49 Lbs a.i. of Glyphosate
- Dimension: .463 Lbs a.i. of Dithiopyr

General Park Areas—Selective Weed Applications

Targeted species: Crownvetch

Purpose: To control weed populations in managed meadows.

Locations:

Door Creek

Amount of pesticides applied:

- Milestone: 12 Lbs a.i. of Triisopropanolammonium salt

General Park Areas—Exotic Woody Species Applications

Targeted Species: Buckthorn, Honeysuckle, Boxelder, Black Locust, Russian Mulberry, European Alder

Purpose: To control invasive woody species growing in park borders, natural areas, planting beds and fence lines within the parks and impede further spread into general park areas.

Locations:

Warner Park and Door Creek Park

Amount of pesticides applied:

- Progeny: .03 Lbs a.i. of Triclopyr, .3 Lbs a.i. of MCPA Acid, .03Lbs a.i. of Dicamba Acid
- Pathfinder II: 1.16 Lbs a.i. of Triclopyr

Athletics--Broadleaf and Non-Selective Applications (Includes Mallards Stadium and Breese Stevens Field)

Targeted species: Broadleaf annual and perennial weeds in turf/weeds and grass in infields

Purpose: To control weed populations to improve the health of turf and playing conditions for user groups.

Locations:

Hoyt, Lucia Crest, Bordner, Pilgrim, Demetral, Warner, Breese Stevens Field, Olbrich, Country Grove, Waltham, Odana Hills, Odana School, Raymond Ridge, Rennobohm, Garner, Maple Prairie, Woodland Hills, Sauk Heights, Blackhawk, Midtown Commons, Cardinal Glenn, Haen Family, Meadowood, Quann, Penn, Dominion, Sycamore, Elver, Everglade, Walnut Grove, Wexford, High Point, Sunridge, Sauk Creek, Valley Ridge, Raemisch Homestead, Westhaven Trails, Flad, Marlborough, Sandstone, Kinswood, Manchester, Flagstone, Westmorland, Valley Ridge, Garner, Central, Reynolds, Olin, Brittingham, Wingra, and Vilas

Amount of pesticides applied:

- Trimec: 68.68 Lbs a.i. of 2-4D, 18.38 Lbs a.i. of Propionic Acid, 7.28 Lbs a.i. of 3,6-dichloro-o-anisic acid

- Roundup Pro Max: 53.59 Lbs a.i. of Glyphosate
- Speedzone: .151 Lbs a.i. of Carfentrazone e-ethyl, 5.437 Lbs a.i. of 2-4D, 1.296 Lbs a.i. of Mecoprop-p acid, .48 Lbs a.i. of Dicamba
- Defendor: 1.07 Lbs a.i. of Florasulam
- Dimension: 1.04 Lbs a.i. of Dithiopyr
- Drive xlr8: 1.07 Lbs a.i. of Quinclorac
- Snapshot: 10 Lbs a.i. of Trifluralin, .25 Lbs a.i. of Isoxaben

Non-Chemical Means of Pest Control

Both Park Staff and volunteers spend many hours hand weeding planting beds, athletic fields, and other areas in parks. We also use cultural and mechanical weed control methods such as aerating, overseeding, fertilizing and mowing to control weed growth and establishment.

Plan for 2018

The pesticide plan for 2018 will continue to use Integrated Pest Management (IPM) to determine what methods to use to produce a desirable product for our residents, paying users, and to meet management plan objectives. We will continue to use cultural and mechanical methods whenever possible. We will continue to use pesticides as needed when cultural and mechanical methods are not effective or efficient.

WEST PARKS Pesticide Report- 2017

Pesticides are used in the general parks on the west side of Madison to control invasive species and to enhance the functionality of the landscape, particularly in areas where individuals or groups pay a fee to use our facilities. We attempt to control invasive species and weeds with cultural methods such as mowing, aerating, and overseeding, but when these methods are ineffective or inefficient, pesticides may be applied by Parks staff and volunteers holding Pesticide Applicator Licenses, or by restoration companies contracted by the Planning Section staff, or by applicators contracted by residents to prevent or control the Emerald Ash Borer.

In addition, broadleaf herbicides are applied to ball diamonds and soccer fields in an attempt to counter many years of overplay resulting in compacted and weedy fields.

Exotic, invasive, or undesirable woody species, also select herbaceous weed control

Targeted species: Buckthorn, honeysuckle, black locust, poison ivy, teasel, burdock, Japanese knotweed, tansy, dame's rocket, garlic mustard, Canadian thistle, sumac, privet, elm, mulberry, Oriental bittersweet, maple, willow, ash, box elder, hawthorn, euonymus, raspberry

Purpose: To control invasive or exotic woody and herbaceous species growing in park borders, natural areas, buffer strips, planting beds, and fencelines, and to impede further spread into general park areas. Application often followed removal of the aboveground portion of the tree/shrub with chainsaw, handsaw, or loppers.

Locations: Elver Park, Garner Park, Glenway Woods, Haen Family Park, Hoyt Park, Marshall Park, Odana Golf Course, HWY PD frontages, Sunset Park, Tillotson Park, Verona Road frontages, Wexford Park, Westmorland Park, Woodland Hills Park,

Pesticides applied:

Triclopyr formulated as Element 4, Garlon 3A, Crossbow, or Pathfinder II – 11.377 pounds active ingredient used

Herbaceous weed control, also some undesirable woody species

Targeted species: Weedy grasses, broadleaf annual and perennial weeds, buckthorn, honeysuckle, poison ivy, mulberry, crown vetch, teasel, Japanese knotweed, Canadian thistle, tansy, Siberian elm, wild parsnip, Queen Anne's lace

Purpose: To control invasive or unsightly weeds in reservable and highly visible areas, including athletic fields, ball diamonds, shelter areas, parking lots adjacent to shelters, and signature sign beds

Locations: Barton Road, Blackhawk, Bordner, Britta Parkway, Cameron Dr., Elver, High Point Rd., Huegel, Lucy Lincoln, Manchester, Maple Prairie, Marlborough, Marshall, Meadowood, Odana Dog Park, Odana Golf Course, Pilgrim, Raemisch, Tillotson, Verona Rd., Walnut Grove, Waltham, Westmorland,

Pesticides applied:

Glyphosate formulated as KleenUp, RoundUp, RoundUp QuikPro– 22.17 pounds active ingredient Used

Diquat dibromide formulated as RoundUp QuikPro - .190 pounds active ingredient

Aminopyralid formulated as Milestone - .195 pounds active ingredient used

2,4-D - .318 pounds active ingredient used

Dithiopyr formulated as Dimension 2EW - .135 pounds active ingredient

Broadleaf weed control in Turf

Any broadleaf spraying of athletic turf areas in West Parks is contained this year in the Athletic Field Leadworker's report.

Cultural pest control alternatives

Parks staff prefers the approach of supporting healthy turf growth with the goal of encouraging the grass to out-compete the weeds. We aerify, overseed, strive to mow at a height of at least 3", leave clippings to decompose into the turf surface, and let playing fields "rest" periodically in this effort to support healthy turf growth. We continue these practices even when areas receive broadleaf spraying.

In planting beds and other non-turf areas, we pull weeds by hand, string-trim, and use organic mulch to cover the soil surface where possible. Additionally, we direct a lot of our summer volunteer labor to hand-weeding projects.

Complaints

West Parks received an inquiry about pesticide use in Walnut Grove Park on 6/29/2017. A park user saw signs posted and called for more information.

Planning ahead for 2018

West Parks plans to recommence the judicious use of broadleaf herbicides to control weeds in soccer and softball fields. This may be accomplished with the advice and assistance of our Athletic Field Leadworker. We also plan to continue the selective application of herbicides to control invasive and undesired woody species and weeds.

FOREST HILL CEMETERY

Forest Hill Cemetery contracts with Terminix Pest Control to address an historical phorid fly infestation in the mausoleum. These flies are a chronic problem, typically worse during the warm season, and are endemic to mausoleums in general. Terminix also addresses an ant problem in the cemetery office which sits atop a partial (dirt) crawl space.

Product: Temprid SC
Active Ing: Imidacloprid, Cyfluthrin

Total amount Cyfluthrin applied: .000015 pounds

Total amount Imidacloprid applied: .000063 pounds

Product: 211L Residual Aerosol
Active Ing: lambda-cyhalothrin

Total amount lambda-cyhalothrin applied: .025 fl oz (in aerosol)

In addition to sprayed pesticide, Forest Hill also uses ant baits in the cemetery office, as provided by Terminix:

Product: First Strike Soft Rodent Bait
Active Ing: difethialone

Total amount difethialone applied: .0125 pounds

Forest Hill Cemetery uses a variety of cultural practices to control or manage cemetery grounds as an alternative to chemical use. These mechanical and cultural control practices include, but are not limited to, the following:

- Increased mowing frequency of our approximately 73 acres as the weeds, such as dandelions, proliferate
- Mowing at a height of 3" or higher
- Spring- and hand-trimming around the thousands of headstones and trees
- Hand removal of volunteer trees, suckers and weeds that grow between markers and in flower/shrub beds
- Increased watering is used to establish acceptable turf without the use of chemical fertilizers
- Rodents are mechanically trapped in the cemetery office

We do receive complaints from family members and lot owners that have paid specifically for perpetual care in the lot purchasing process. Typically, these complaints involve problems with weeds growing in turf and around grave markers, and also with long grass growing around markers when we are occasionally unable to keep up with trimming schedules. We have not heard complaints from visitors to the mausoleum regarding the nuisance of live or dead phorid flies this year.

Forest Hill Cemetery anticipates that there may be some limited use of herbicides to control woody invasive vegetation in 2018. We also expect to continue the non-chemical means of pest management currently employed.

Adopt a Tree Program – West Parks

The Parks Division allows interested parties to contract with pre-qualified contractors to inject approved trees with insecticide. This is intended to protect the ash trees against the Emerald Ash Borer, and the application must be repeated every 3 years as long as the insect remains a concern (likely for the remaining life of the tree).

Targeted species: Emerald Ash Borer

Purpose: To control infestation of treated ash trees through injection of insecticide at base of trunk

Locations: Bordner, Garner, Lucia Crest, Lucy Lincoln Meadowood, Pilgrim, Walnut Grove, and Waltham.

Pesticide applied:

Emamectin Benzoate formulated as Tree-Age or ArborMectin - .2232 pounds Emamectin

CENTRAL PARKS Pesticide Report - 2017

Central Parks uses a number of practices to maintain our parks year-round. We are conservative in our use of pesticides and aim to use them only where reservation fees are collected (ie. athletic fields, shelters and immediately adjacent spaces) and in natural areas to control invasive species. We continue to work to enhance the surfaces of our athletic fields, as use and consequently wear of the fields continue to increase each year.

Exotic woody species control

Targeted Species: Buckthorn, Honeysuckle, Boxelder.

Purpose: To control invasive woody species growing in landscaped beds, managed meadows, overgrown natural areas, athletic fence lines, and natural shoreline buffers.

Locations: Applied as cut stump treatments at Vilas Park, Indian Springs, Olin, BB Clarke, John Nolen Shoreline, and Paunack.

Amount of pesticides applied:

- Pathfinder II, Garlon: 3.05 pounds of a.i. Triclopyr
- Progeny: .15# MCPA acid, .015 # Triclopyr, .015# Dicamba
- Roundup Pro: 2.75 pounds glyphosate

Herbaceous weed control

Targeted species: Weedy grasses and broadleaf annual and perennial weeds.

Purpose: To control weed populations in areas that park users rent and reserve, which include athletic fields, ball diamonds and areas of park shelters, adjacent parking lots, and landscaped planting beds. Also to control invasive species in newly established managed meadow plantings.

Locations: Applied as foliar applications at Goodman Pool, Olin Park, Brittingham Park, Bowman Field, Cypress Spray Park, James Madison Park, Vilas Park, Central Park, Law Park, Elver Park, Demetral, Indian Springs and Baxter.

Amount of pesticides applied:

- Round-up Quik Pro: 28.237 pounds of a.i. Glyphosate,
- Progeny: .6957# MCPA acid, .0697# Dicamba, .0697# Triclopyr
- Intensity: .135# Clethodin
- Milestone: .11# Aminopyralid
- Roundup Pro, Ranger Pro, Kleenup Pro and Aquaneat: 22.558# glyphosate

Adopt-A-Park Tree Program – Central Parks

Targeted species: Emerald Ash Borer

Purpose: To control insect populations in Ash trees and help prolong the life of trees by preventing harmful infestation.

Locations: Applied as trunk injections by certified/licensed contractors at Vilas, Brittingham, Wingra, and Orton,

Amount of pesticides applied:

- Tree-age: .967 pounds a.i. Enamectin

Non-Chemical Means of Pest Control

Numerous hours were spent by staff and volunteers hand-weeding in general park areas. In addition, staff controlled weeds by mowing and string trimming. Other methods used to improve the quality of turf grass and allow it to out-compete weeds and withstand heavy traffic included core aeration, aerivating, over-seeding, fertilizing, as well as returning mulched leaves and clippings to the turf. Mulch was used in areas to help decrease weed populations. Staff and volunteers removed seed heads from invasive species in managed meadow areas.

Complaints

We received no complaints in 2017 for pesticide use in Central Parks areas.

Plan for 2018

The overall land management and pesticide plan for 2018 is the same as that of 2017. We do intend to continue increasing our efforts on athletic fields by combining herbicide and fertilizer applications along with proper mowing, aeration and overseeding practices.

CONSERVATION PARKS Pesticide Report -2017

Woody Plant Control Applications by Parks Staff

Targeted Species: Buckthorn, honeysuckle, black locust, Asiatic bittersweet, porcelain-berry, white mulberry, box elder, and Siberian elm.

Purpose: In terms of aggressive exotics, the purpose of spraying is to reduce the presence of these species in Conservation Parks in order to preserve the native diversity of plants and animals. Controlling woody vines is becoming an increasing point of emphasis as these species are spreading rapidly. Trail maintenance projects also consume herbicide to prevent re-sprouting.

Locations: Cut stump treatment, spot foliar, and basal bark applications were made at Heritage Sanctuary, Cherokee Marsh (North, South & Mendota units), Edna Taylor, Turville Point, Prairie Ridge, Owen, and Stricker Pond Conservation Parks plus Elver Park.

Amount of pesticides applied:

- 2,4-D: 2.18 lbs. a.i. 2,4-dichlor-phenoxyacetic acid
- Aquaneat: 4.56 lbs. a.i. glyphosate
- Crop\$mart: 10.75 lbs. a.i. glyphosate
- Element 3A: 1.58 lbs. a.i. triclopyr
- Element 4: 9.61 lbs. a.i. triclopyr
- Makaze: 12.38 lbs. a.i. glyphosate
- Progeny: 1.31 lbs. a.i. MCPA, 0.13 lbs. a.i. triclopyr, and 0.13 lbs. a.i. dicamba
- Vanquish: 1.2 lbs. a.i. 3,6-dichloro-o-anisic acid

Exotic Herbaceous Plant Control Applications in Conservation Parks by Park Staff

Targeted Species: Bird's-foot trefoil, burdock, Canada thistle, crown vetch, cut-leaf teasel, dame's rocket, garlic mustard, Japanese hedge parsley, Japanese knotweed, *Miscanthus* spp. grass, hybrid cattail, reed-canary grass, and spotted knapweed.

Purpose: To control aggressive exotic plant species while populations are small. They threaten native plant diversity if left unmanaged.

Locations: Edna Taylor, Elvehjem, Heritage Prairie, Heritage Sanctuary, Knollwood, North Cherokee Marsh, South Cherokee Marsh, Mendota Cherokee Marsh, Owen, Prairie Ridge, Sandburg Woods, and Turville Point Conservation Parks.

Amount of pesticides applied:

- 2,4-D: 1.96 lbs. a.i. 2,4-dichlor-phenoxyacetic acid
- Crop\$mart: 9.85 lbs. a.i. glyphosate
- Element 3A: 1.58 lbs. a.i. triclopyr
- Escort XP: 0.04 lbs. a.i. metsulfuron methyl
- Makaze: 12.68 lbs. a.i. glyphosate

- Milestone: 0.56 lbs. a.i. aminopyralid
- Progeny: 0.38 lbs. a.i. MCPA, 0.04 lbs. a.i. triclopyr, and 0.04 lbs. a.i. dicamba
- Vanquish: 1.2 lbs. a.i. 3,6-dichloro-o-anisic acid

Exotic Plant (woody & herbaceous) Control Applications in Conservation Parks by Volunteers

Targeted Species: Buckthorn, honeysuckle, and garlic mustard.

Purpose: To control aggressive exotic plant species while populations are small. They threaten native plant diversity if left unmanaged. Also, to maintain the area around a Native American burial mound.

Locations: Meadow Ridge, Cherokee Marsh South Unit, and Cherokee Marsh North Unit, Owen, and Stricker's Pond Conservation Parks.

Amount of pesticides applied:

- Makaze: 0.38 lbs. a.i. glyphosate
- Pathfinder II: 0.54 lbs. a.i. triclopyr

Contractor Applications: Large Scale Oak Woodland, Prairie & Wetland Restoration Projects

Targeted Species: Woody species include buckthorn, honeysuckle, Asiatic bittersweet, and porcelain berry. Herbaceous species targeted include bird's-foot trefoil, burdock, Canada thistle, curly dock, garlic mustard, dame's rocket, motherwort, wild parsnip, and reed-canary grass.

Purpose: To control aggressive exotic plant species while populations are small. They threaten native plant diversity if left unmanaged.

Locations: North and South Cherokee Marsh, Heritage Prairie, Kettle Pond, and Owen Conservation Parks.

Amount of pesticides applied:

- AquaMaster: 3.40 lbs. a.i. glyphosate
- Aquaneat: 6.83 lbs. a.i. glyphosate
- Crossbow: 12.00 lbs. a.i. 2,4-D
6.00 lbs. a.i. triclopyr
- Element 3A: 17.78 lbs. a.i. triclopyr
- Element 4: 3.00 lbs. a.i. triclopyr
- Escort XP: 0.03 lbs. a.i. metsulfuron methyl
- Garlon 4: 5.00 lbs. a.i. triclopyr
- Intensity: 32.45 lbs. a.i. clethodim
- Milestone: 0.21 lbs. a.i. aminopyralid
- Progeny: 34.05 lbs. a.i. MCPA, 3.41 lbs. a.i. triclopyr, and 3.41 lbs. a.i. dicamba

Non-Chemical Pest Control Measures Selected as Part of IPM Program

Hand-pulling: Staff spent considerable time pulling garlic mustard, dame's rocket, Japanese hedge parsley, hybrid cat-tail, and sweet clover this year relative to years past due to a wet spring that prevented herbicide spraying. In total, staff spent **302 hours** hand pulling garlic mustard and dame's rocket, **60 hours** pulling Japanese hedge parsley, **63 hours** pulling sweet clover, and **24 hours** pulling hybrid cattail, most of which occurred at Edna Taylor, Owen, and South Cherokee Marsh Conservation Parks. Eight hours were spent collecting seed heads of wild parsnip at a new prairie planting at Heritage Prairie to prevent establishment.

The Friends of Cherokee Marsh and other volunteers spent **169 hours** hand pulling garlic mustard at North Cherokee Marsh, Heritage Sanctuary, and Owen Conservation Parks.

Hybrid Cattail Suppression: Staff continued control at the new storm water retention pond opposite Bonner Lane along Wheeler Rd. in South Cherokee Marsh. Cattails were cut below the water surface in during the growing season and seedlings were hand pulled along pond edges. The ponds were planted with native aquatic plants.

Prescribed Fire: The use of fire is an important land management practice which helps promote native species over exotics. The timing of burns can help set back exotics (e.g., late spring burns harm cool season weeds but promote native warm season plants). Burns can also cause mortality to small woody exotics like buckthorn and honeysuckle. If the timing is perfect, fire can even kill entire cohorts of first year garlic mustard seedlings. Unfortunately, the number of days suitable for burning is limited by both weather conditions and staffing levels. Conservation staff burned approximately 400 acres in the Conservation parks in 2017.

Mowing: Japanese hedge parsley was spot-mowed in July using brush cutters at Elvehjem and North and South Cherokee Marsh. Staff mowed several areas in South Cherokee Marsh to encourage seedling germination in areas previously interseeded. Other areas were mowed to facilitate future chemical control of reed-canary grass at North Cherokee Marsh. And extensive areas were mowed at North and South Cherokee to eliminate or reduce seed production of annual and biennial weeds (primarily wild parsnip). Additional areas were mowed for brush to set back succession to woody plant communities.

Plan for 2018

Conservation's IPM Program will be similar to 2017. As budgeting allows, we will continue to use hand brush control, mechanical tree removal, and/or tree girdling in lower quality oak woodlands to restore appropriate savanna structure to these areas. Prairie Ridge, Edna Taylor, Owen and Cherokee Marsh (North and South Units) will continue to be the focus of large scale restoration efforts. In 2018, we will continue follow-up herbaceous weed control in project areas already begun, and we will continue efforts to establish sustainable native plant communities in these areas at Heritage Prairie, Owen, and North Cherokee Marsh. Once weed populations are substantially reduced in subsequent years, native grasses, forbs, shrubs, and trees will be seeded or planted to complement recovery from the natural seed bank as part of the restoration process. Controlled fire will continue to be used as a management tool in spring and fall 2018.

OLBRICH BOTANICAL GARDENS Pesticide Report - 2017

Part 1: Overview /Update – Pesticide Use 2017

All chemical applications are made by, or under the supervision of, licensed or certified pesticide applicators including Wil-Kil Pest Control and Tree Health Management.

Pesticide Management Plan for the 2018 Season

The garden staff will continue to work with an Integrated Pest Management (IPM) program. Staff will monitor the Garden's indoor and outdoor plant collections for optimum health and vigor, strive to improve the cultural and biological environment, provide mechanical eradication if possible, use resistant plant varieties, eliminate the plant if the problem persists and, as a final option, use pesticides to control plant pests. This past year saw a continuation of the use of beneficial insects in the Bolz Conservatory and production greenhouses with satisfactory results. The quail will continue to be maintained in the conservatory, as they have been very effective at controlling the palmetto bug population. The outdoor garden staff will continue to seek out less toxic pesticides that will provide control of pests while providing a safe environment for visitors. Staff will continue to experiment with alternatives to the use of traditional pesticides, including the use of beneficial insects in the greenhouse.

Safe Handling, Application, Storage, and Disposal of Pesticides

Safe handling. Staff using pesticides are appropriately licensed or certified and properly trained to handle pesticides in a safe manner. All employees handling pesticides are provided proper personal protective equipment required for the safe transfer of pesticides.

Application. Staff using pesticides are appropriately licensed or certified and have been properly trained to apply pesticides on botanical collections. Pesticide label procedures are followed for application and re-entry periods.

Storage and Disposal. Pesticides are stored in a marked and locked chemical storage room, complete with a vented hood and handling facilities. Pesticide label procedures are followed for disposal of empty containers. Expired pesticides are disposed of through the Dane County Clean Sweep program.

Notification Plan

Outdoor Garden areas are posted prior to treatment and 24 hours following application of pesticides. Production greenhouse areas (non-public) are posted for at least 12 hours (24 hours for Orthene) following application of pesticides. Application information for the greenhouse is posted for at least 30 days.

Part 2: Eugenie Mayer Bolz Conservatory 2017 Insect Control

No chemical pesticides were applied to the plant collection in the Bolz Conservatory. Since the Bolz Conservatory opened to the public in November of 1991, the insect control program has strived to use the least toxic methods of insect and pest control. Several beneficial insects have been used to control the plant damaging insects. Over the years some target insect species have been all but eliminated while new pests continue to appear at various intervals. Some of the beneficial insects that we have released into the conservatory have a broad diet of target insects while others control a single insect. The control of plant damaging insects has not been as simple as releasing large numbers of ladybeetles. Some of the "good bugs" are actually parasitized by other insects so that timing of the release of the beneficial insects is very important. In addition, specific climatic conditions of temperature and humidity are needed for a successful release.

Some of the pest insects are also "farmed" by ants that protect them from our released beneficial bugs so ant control is done as needed in specific areas. Ant and palmetto bug control is practiced in areas where there is a known problem.

Maxforce FC Ant Bait Stations – 19 stations (0.01% fipronil; *Caution*) were used in the conservatory for ant control (not accessible to the public).

Maxforce FC Roach Bait Stations – 20 stations (0.05% fipronil; *Caution*) were used in the conservatory for palmetto bug control (not accessible to the public).

Wil-Kil Pest Control, a commercial pest control company, routinely checks and services the stations.

Following is a list of the beneficial insects that are released into the conservatory from time to time as the situation warrants. Some must be released when the population of a target insect is very low while others are only successful when there are a large number of insects for the beneficials to consume.

Beneficial Insect	Target Pest
<i>Amblyseius cucumeris</i> (predator)	Thrips, Mites
<i>Aphidoletes aphidimyza</i> (predator)	Aphids
<i>Aphytis melinus</i> (parasite)	Scale insects
<i>Atheta coriaria</i> (predator)	Soil insects, Thrips
<i>Chrysoperla</i> spp. (predator)	Several Insects
<i>Cryptolaemus montrouzieri</i> (predator)	Mealybugs, Scales, Aphids
<i>Encarsia formosa</i> (parasite)	Whitefly
<i>Eretmocerus eremicus</i> (parasite)	Whitefly
<i>Metaphycus helvolus</i> (parasite)	Scale insects
<i>Orius</i> spp. (predator)	Thrips, Aphids, Mites
<i>Rhyzobius lopanthae</i> (predator)	Scale insects
<i>Steinernema carpocapse</i> (parasite)	Gnats, Thrips, Soil insects

Birds, specifically Quail (*Coturnix coturnix*), have been effective at controlling the nuisance palmetto bugs found in the conservatory. Assorted frogs, toads, and geckos living in the conservatory also use the palmetto bugs as a food source. Populations of these animals are maintained as part of the pest control program.

Vigorous daily or weekly washing of the plants in the conservatory has also proven to be very effective at controlling unwanted insects. This practice will continue as part of the pest control program.

The conservatory insect control program will continue to evolve as new beneficial insect species and additional control methods are carefully trialed. It is obvious from past success that it is possible to maintain a healthy plant collection while relying on least toxic and non-traditional methods of insect control.

Part 3: Production Greenhouses (not open to the public)

The plant material in the greenhouses is checked daily for insect and disease activity. The staff develops a control plan depending on the seriousness of the situation. Some plant material is washed with water or pruned to control the problem. Other times manual removal or a treatment with oil, soap, hydrogen peroxide solutions or isopropyl alcohol is used for insect control.

In 2017, Olbrich continued its efforts to keep chemical pesticide use in the production greenhouses as low as possible. We continue to investigate and use additional least toxic or non-traditional pest control methods. Use of Rootshield Plus®, a non-chemical product that is composed of beneficial soil organisms, continues to be successful in reducing the need for traditional chemical-based soil fungicides. Since some of production and collection material has a threshold of zero tolerance we must resort to stronger chemicals. The mode of action and class of chemicals that are used are monitored as part of the chemical rotation control plan. The least toxic material available that will provide adequate control is selected for use. Beneficial insects are also released as the situation warrants for specific pest control.

Following is a list of the beneficial insects that were released into the greenhouses as the situation warranted, with an increase in use on a regular basis. Some must be released when the population of a target insect is very low while others are only successful when there are a large number of insects for the beneficials to consume. The use of specific beneficials is also supported by use of "banker plants" to provide nutritional support for the beneficial insect and attracting the pest. The 'Purple Flash' pepper plant was grown and placed amongst the crop plants as a "banker plant" to provide pollen as a food source for the *Orius* beneficial insect and to attract the thrips pest.

Beneficial Insect	Target Pest
<i>Amblyseius cucumeris</i> (predator)	Thrips, Mites
<i>Aphidius colemani</i> (parasite)	Aphids
<i>Chrysoperla</i> spp. (predator)	Several Insects
<i>Cryptolaemus montrouzieri</i> (predator)	Mealybugs, Scales, Aphids
<i>Encarsia formosa</i> (parasite)	Whitefly
<i>Hypoaspis miles</i> (predator)	Gnats, Thrips, Soil Insects
<i>Orius</i> spp. (predator)	Thrips, Aphids, Mites

Chemical names & amounts of active ingredients (a.i) used in the Production Greenhouses. The Production Greenhouses are not opened to the Public.

(Label signal words – Danger, Warning, or Caution - are included in parentheses. These words reflect the relative toxicity of the concentrated material, not necessarily the danger of the final diluted product as applied in the gardens.)

Marathon 1% Granules	0.025 lbs. of a.i. (1% imidacloprid)	applied for insect control (Caution)
Metarex 4%	0.34 lbs. of a.i. (4% metaldehyde)	applied for slug/snail control (Caution)
Ovation	0.072 lbs. of a.i. (42% clofentezine)	applied for mite control (Caution)
Rootshield Plus WP	0.045 lbs. of a.i. (1.76% <i>Trichoderma</i> strains)	applied for disease control (Caution)

Safari	0.18 lbs. of a.i. (20% dinotefuran)	applied for insect control (<i>Caution</i>)
Subdue Maxx	0.0031 lbs. of a.i. (22% mefenoxam)	applied for disease control (<i>Caution</i>)
Terraclor 400	0.10 lbs. of a.i. (40% pentachloronitrobenzene)	applied for disease control (<i>Caution</i>)
Ultra Pure Oil	14.24 lbs. of a.i. (98% mineral oil)	applied for insect control (<i>Caution</i>)

Part 4: Olbrich Botanical Gardens Rodent Control

Rodent control is practiced only in areas where there is a known problem. This may include many sites throughout the facility. The material is contained in bait stations which are concealed and tamper proof and are not accessible to the public. Some of the stations are used within the Conservatory. Wil-Kil Pest Control, a commercial pest control company, routinely checks and services the stations.

Contrac All-Weather Blox – 12 blocks (0.005% bromadiolone; *Caution*) applied to various sites in and around the facility for rodent control.

Generation Mini Blocks – 109 blocks (0.0025% difethialone; *Caution*) applied to various sites in and around the facility for rodent control.

Part 5: Outdoor Gardens Summary of 2017 Pesticide Use and Alternatives

In 2017, Olbrich continued its efforts to keep chemical pesticide use in the outdoor gardens as low as possible, with a significant reduction from the previous year. This can be challenging, given the high aesthetic standards expected at a highly regarded botanical garden. In addition, horticulturists continue to face new disease and insect attacks, some of which may be tied to our changing climate. As always, the principles of Integrated Pest Management (IPM) are applied to gardening practices. IPM stresses evaluating a wide range of criteria to decide when and what treatments are necessary for dealing with garden pests; and, selecting solutions that minimize the amount and types of products used to combat them. Below is a listing of some of the strategies that fall under the guidelines of Olbrich Botanical Garden's IPM program.

Select disease and pest resistant varieties. One good example is the collection of ornamental crab apples. Notoriously prone to fungal diseases such as rust and apple scab, varieties that are naturally resistant to these are selected -- minimizing, and in most cases eliminating, the need for pesticide applications. In 2017 the new Rose Garden removed all Hybrid Tea roses, which require larger amounts of chemicals, to emphasize the Shrub and Landscape roses that require lesser amounts of pesticide applications. With the long anticipated arrival of the emerald ash borer, new ash trees will not be added to the outdoor Gardens. Some ash trees have been removed, while other valuable specimens will be treated to ensure survival.

Assess damage thresholds. Staff are willing to 'live with' some levels of damage, both aesthetic and physical. For instance, minor cases of powdery mildew on ornamental plants, while easily cured by common fungicides, are usually ignored. The same would hold true for many of the minor insect problems that are present. Pesticides are applied only if the health of the plant is compromised or the visual attraction of the plant is greatly affected. Turf weeds are tolerated within the aesthetic standards of the Garden. Less toxic solutions are utilized before selecting a more toxic product. Minor localized problems may be pruned out rather than treating the entire plant with a chemical, for instance a single branch on a fruit tree with tent caterpillars.

Manual/cultural controls. While we do use Round-Up and related products, as well as small amounts of other herbicides, the great majority of weed control in the gardens is accomplished by manually pulling them and, also, preventing them in the first place by liberal and frequent applications of leaf and wood mulches. Olbrich's many volunteers help make this possible.

Choose less toxic pesticides. When possible, products such as insecticidal soaps and horticultural oil are utilized. Both are very effective against many insect pests but generally safer for the environment. When chemical alternatives are needed, products with lower toxicities are selected. Products such as Conserve, an insecticide, are welcomed as they contain synthetic versions of naturally occurring compounds.

Let nature help. When gardens are healthy, there is a natural balance between predator and prey that helps keep plant collections and gardens protected from visible damage. When the gardens function as an

ecosystem, there are natural checks and balances that minimize the amount of chemical inputs required to maintain the system. Birds and beneficial insects help keep pest insects in check and resident foxes, red-tail hawks and mink have helped reduce rodent and rabbit problems. Rabbits are live trapped and relocated when their population reaches damaging levels. A cyclical increase in the population causes an increase in efforts in this area, which continues into the winter. Continuing a program that began in the 2011 season, a contractor was engaged that specializes in applications of compost tea, a product that inoculates the soil with a multitude of beneficial microorganisms. This leads to healthier soils and more resilient plants, minimizing the need for synthetic fertilizers and pesticides. Multiple areas were given season long applications last year. These locations continue to be monitored for long term results.

Chemical names & amounts of active ingredients (a.i.) used in the Outdoor Gardens. (Label signal words – Danger, Warning, or Caution - are included in parentheses. These words reflect the relative toxicity of the concentrated material, not necessarily the danger of the final diluted product as applied.)

Ranger Pro	0.73 lbs. of a.i. (4 lbs. of glyphosate per gallon)	applied for weed control (<i>Caution</i>)
K-Tea	0.019 lbs. of a.i. (0.91 lbs. of elemental copper per gallon)	applied for algae control (<i>Danger</i>)
Lontrel	0.009 lbs. of a.i. (40.9% clopyralid)	applied for weed control (<i>Caution</i>)
Marathon 1% Granules	0.0126 lbs. of a.i. (1% imidacloprid)	applied for insect control (<i>Caution</i>)
Merit 75WP	0.0034 lbs. of a.i. (75% imidacloprid)	applied for insect control (<i>Caution</i>)
M-Pede Insecticidal Soap	0.07 lbs. of a.i. (49% potassium salts of fatty acids)	applied for insect control (<i>Warning</i>)
Orthene	0.0025 lbs. of a.i. (97% acephate)	applied for insect control (<i>Caution</i>)
Quick-Pro	2.55 lbs. of a.i. (73.3% glyphosate) and 0.101 lbs. of a.i. (2.9% diquat dibromide)	applied for weed control (<i>Caution</i>)
Reward	0.137 lbs. of a.i. (36.4% diquat dibromide)	applied for weed control (<i>Warning</i>)
Speedzone	0.007 lbs. of a.i. carfentrazone (0.05 lbs. per gallon), 0.07 lbs. of a.i. 2,4-D (1.53 lbs. per gallon), 0.0064 lbs. of a.i. dicamba (0.14 lbs. per gallon), 0.022 lbs. of a.i. MCPP (0.48 lbs. per gallon)	applied for weed control (<i>Caution</i>)
Treflan 5G	0.25 lbs. of a.i. (5% trifluralin)	applied for weed control (<i>Caution</i>)

Citizen Complaints:

There were no complaints regarding the use of pesticides in the Bolz Conservatory, production greenhouses, or outside gardens.

Forestry Pesticide Report 2017

Emerald Ash Borer

Targeted species: Emerald Ash Borer (*Agrilus planipennis*)

Purpose: Inject ash street trees to provide 3 years of protection

Locations: Forestry Tree Districts 1, 3, 5, 6, 7, 10, 12, 15, 16, 17, 18, 19, 20, 22, 24, 27, 28, 30, 31, & 37.

Amount of pesticide used: TREE-age: 37.6 lbs of active ingredient Enamectin Benzoate

Gypsy Moth

Targeted species: Gypsy Moth (*Lymantria dispar*)

Purpose: Suppression aerial spray to reduce populations of gypsy moth

Locations: 187.2 acres in three areas on the east side of Madison

Amount of pesticide used: Foray 48B: 140.4 gallons of Foray 48B (active ingredient *Bacillus thuringiensis*, subsp. *Kurstaki*, strain ABTS-351, fermentation solids, spores, and insecticidal toxins, 12.65%)

GOODMAN PARK MAINTENANCE FACILITY

No Applications were made in 2017

BEACHES

City beaches are not chemically treated to control lake weeds. Weeds are controlled by manual cutting and removal. Beach sand is raked daily to expose waterfowl droppings during the summer. Signs are also posted asking patrons not to feed waterfowl. The decision to close beaches and the actual posting are done by the Health Department.

In concessions, mechanical traps are used for rodent control. Staff stores all food items in pest proof containers and inspects all food deliveries. Keeping buildings clean and eliminating pest entrance points aid in the control of pests.

No pesticide applications were made in 2017.

Golf Enterprise Pesticide Report - 2017

Chemical Name	A.I. used in lbs.	Areas applied*
Insecticides		
Imidicloprid	50.33#	2,3
Chlorantraniliprole	4.52#	1,2
Plant Growth Regulators		
Ethephon	93.35#	1
Trinexapac-ethyl	28.71#	1,2,3
Prohexadione-Calcium	2.89#	1
Paclobutrazol	1#	3

Herbicides

Glyphosate	43.2#	4
2,4-D	45.2#	4
Dicamba	3.51#	4
Dithiopyr	44.13#	2,3,4
Carfentrazone-Ethyl	1.2#	1
MCPP	9.98#	4

* Areas = Greens 1, Tees 2, Fairways 3, Rough 4 and other areas

Chemical Name	A.I. used in lbs.	Areas applied*
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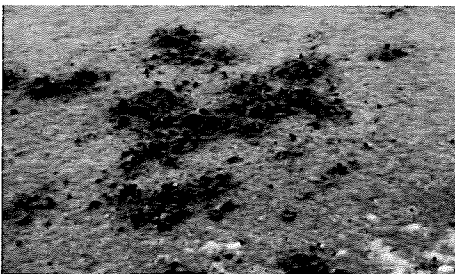
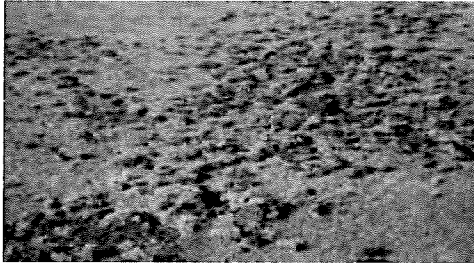
Fungicides

Chlorothalonil	832.75#	1,2,3
Iprodione	557.79#	1,2,3
Tebuconazole	240.46#	1,2,3
Propiconazole	3.6#	1,2
Pyraclostrobin	14.25#	1
Azoxystrobin	2#	1
Boscalid	13.73#	1,2
Thiophanate methyl	339.61#	1,2,3
Fluxapyroxad	15.19#	1,2
Penthiopyrad	5.38#	1
Mefenoxam	10#	1,2

* Areas = Greens 1, Tees 2, Fairways 3, Rough 4 and other areas

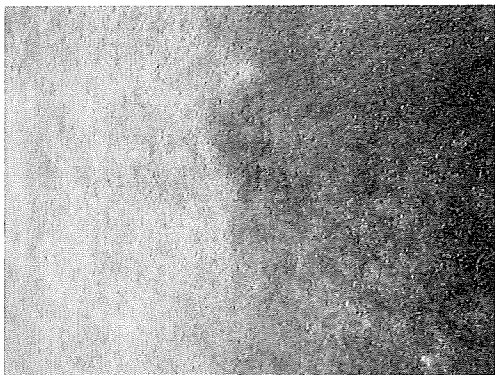
Notes**Turf Insect Management**

The 2017 golf season saw little in the way of major insect problems at our facilities. Some white grub damage, primarily resulting from secondary damage caused by animals (skunks, raccoons etc.) feeding on these grubs has been reported on areas of rough that currently we do not treat with insecticides. Should damage continue to increase in these non treated areas it may necessitate making preventative insecticide applications to rough areas. Additional future insecticide treatments will follow best management practices for protecting pollinators in turf settings. Recently published guidelines are available; (<http://ncipmc.org/action/bmpturf.pdf>) and will be implemented in our pest management programs. Typical damage associated with animals feeding on white grubs shown below.



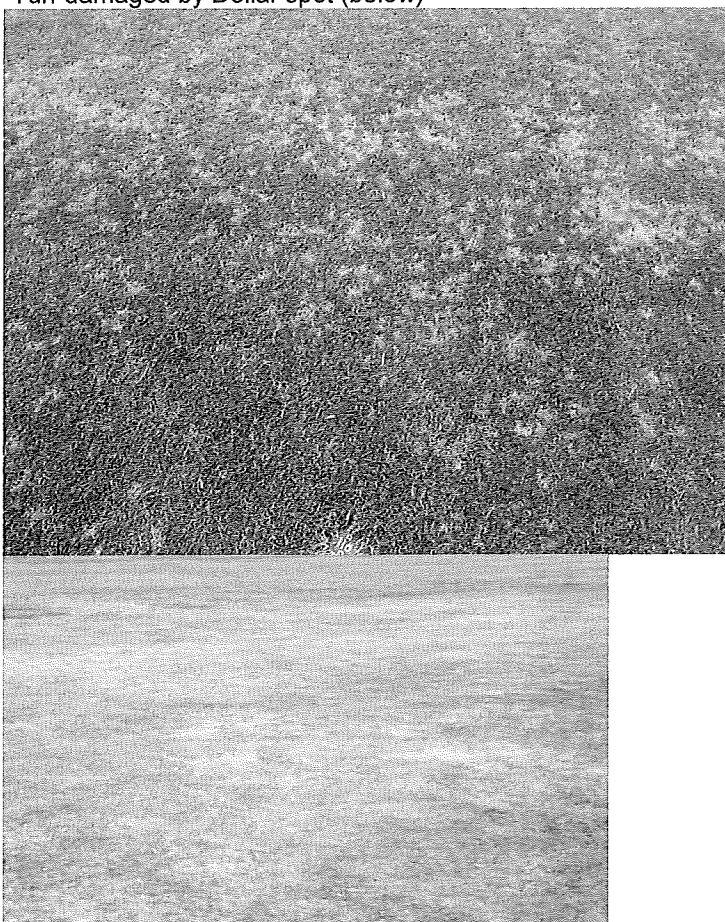
Turf Disease Management

The 2017 golf season was particularly challenging in terms of disease management. Turf diseases such as Pithium Blight, which are rarely observed made appearances this season again and necessitated fungicide treatments (mefenoxam). Persistent and heavy rain falls led to increased disease pressure and necessitated increases in some fungicides to combat these pathogens. It should be noted however; the department had an overall significant reduction in overall pesticide use this season. This is attributable to #1; the inability to make regularly scheduled fungicide applications to flooded turf areas (mainly fairways) at Yahara Hills and #2; the decision to cease making fungicide applications to fairway turf at Yahara Hills even on non-flooded areas as course closures due to flooding resulted in a significant financial strain to the department. In laymen's terms; it didn't make sense for us to control and prevent diseases on a course that wasn't open for play and revenue generation. This however did result in some thinning of the turf stand on some non-flood affected fairways but we do not think it will have a significant negative impact to turf quality in the long term. We should however anticipate an increase in the use of some fungicides in the 2018 season. While a good percentage of our focus of disease management relates to dollar spot and preventing the snow molds; increasing incidence of anthracnose on poa annua is becoming problematic. Some of the diseases spotted this season were pithium blight, brown patch, dollar spot, anthracnose (both foliar and basal rot), necrotic ring spot and fairy ring.



Turf damaged by pithium blight. (above)

Turf damaged by Dollar spot (below)



Anthrachnose damaged turf on fairways of Yahara Hills (above)

While technically not diseases; silvery thread moss and algae have been a serious problem on putting greens due to excessive moisture caused by the flooding and extreme weather patterns and rainfall experienced in 2017. They do however fall under the scope of disease management. Increases in chlorothalonil applications to greens are a direct result of algae invasion on these turf

areas. It should be noted that even though there was an increase in applications of chlorothalonil to greens at Yahara Hills; the department actually reduced chlorothalonil usage by 347 pounds of active ingredient this season as a result of not treating fairway turf areas. The putting green surfaces at Yahara Hills were treated with approximately 52# active ingredient per acre of chlorothalonil this season; which is still significantly less than the 73# allowed by law. Any increases in carfentrazone-ethyl are the result of attempts to control silvery thread moss which is also a symptom of persistently wet conditions.



Fig 1. Silvery thread moss (*Bryum argenteum*) on a putting green.



Silvery thread moss encroachment on putting green.



Algae encroachment on putting green

Plant Growth Regulation

Ethephon, paclobutrazol, trinexapac-ethyl and prohexadione-Calcium are all plant growth regulators that slow down the growth of turfgrass and used to suppress seed head formation on *Poa Annua*. They are being further implemented into our IPM programs. They are useful for their plant health attributes, as well as, the application resulting in a reduction of mowing frequency. Reducing mowing saves the city money in fuel, labor and equipment wear and tear, and reduces golf's carbon footprint.

Turf Weed Management

As a general rule; the necessity and application of herbicides to highly maintained turf grass stands such as found in a golf setting is significantly less than that of non-irrigated, non fertilized turf areas. A healthy actively growing turf is fairly good at out competing lawn weeds and it should come as no surprise the golf division's reliance and application of turf herbicides is fairly limited in scope. A significant decrease in herbicide treatments was observed in 2017. This is most likely the result of the inability to make herbicide treatments because of the extreme weather patterns observed in 2017. It is anticipated that due to some loss of turf in 2017 from flooding, scalping, and disease that this will allow for some weed encroachment in those turf areas and a slight increase in herbicide treatments should be expected during the 2018 growing season.

THE MALL CONCOURSE Pesticide Report 2017

No pesticides were used on the Mall Concourse service area in 2017.

Non-Chemical Means of Pest Control

Numerous hours were spent by staff hand-weeding landscaped beds as well as tree grates and cracks in the concrete sidewalks. In addition, staff controlled weeds by mowing and string trimming. Other methods used to improve the quality of turf grass and allow it to out-compete weeds and withstand heavy traffic included core aeration, compost topdressing, over-seeding, fertilizing, as well as returning mulched leaves and clippings to the turf. Mulch was used in areas to help decrease weed populations.

Complaints

We received no complaints in 2017 for pesticide use in Mall/Concourse Maintenance service areas.

Plan for 2018

The pesticide plan for 2018 is the same as that of 2016

