

NON-HERBICIDAL WEED CONTROL STRATEGIES IMPLEMENTED BY CITY PARKS STAFF IN THE NORTHWEST: **Maintaining Turf**

Samantha Chirillo

Northwest Center for Alternatives to Pesticides



ACKNOWLEDGEMENTS

These strategies were identified and investigated by Samantha Chirillo, M.S., graduate student at the University of Oregon and intern for the Northwest Center for Alternatives to Pesticides (NCAP). Megan Kemple, Pesticide-free Parks Program Coordinator with NCAP, and Tim Stock, IPM Education Specialist at the Integrated Plant Protection Center, Oregon State University, supervised this project. The work was fully funded by a grant from the Western Region IPM Center (sponsored by USDA/CSREES). None of the strategies reported would have been developed without the curiosity, cleverness, and sheer dedication of individual parks maintenance staff who were such a joy to learn from, as well as their supportive and forward-thinking supervisors.

July 2008



NORTHWEST CENTER FOR
ALTERNATIVES TO PESTICIDES

P.O. Box 1393

Eugene, OR 97440-1393

(541) 344-5044

www.pesticide.org

info@pesticide.org

Cover Photo:

In Boise, turf is prioritized in high-use areas, such as this one in Camel's Back Park.

MAINTAINING TURF

TABLE OF CONTENTS

Introduction	page iv
Overview	1
Eugene	2
Portland	5
Seattle	7
Bend	8
Boise	10
Summary	12
Contact Information	12
References	13

INTRODUCTION

Purpose

Parks maintenance employees look to their peers for strategies that have worked well to control weeds. This report is one in a series that offers effective, non-herbicidal strategies used by city parks maintenance staff in the Northwest, in both wet and dry climates, to control weeds in and around the following park areas:

- shrub beds and landscaped areas
- hardscapes and fence lines
- tree wells
- turf (excluding golf courses and high profile athletic fields)

This report covers effective, non-herbicidal weed control strategies specifically for turf (excluding golf courses and high profile athletic fields). All reports are posted on the NCAP website: www.pesticide.org. The material in these reports is also being presented in training sessions for pesticide applicators, featuring parks maintenance staff whose practices are described in the reports.

Definitions of “effective” weed control is subjective, varying not only among cities but also among employees within a single parks department. A particular strategy was deemed effective if the maintenance employee using it and his or her supervisor felt satisfied with the degree of weed control, safety, resources, and environmental impact involved. This research study was not exhaustive, meaning that other effective strategies may be used currently in the Northwest. Also, what works in one location may not work in another location because of differences in climate, soil type, budget, planning processes, public opinion, or level of volunteerism. Nevertheless, a strategy that works in one city may be adapted without too much effort elsewhere. The intent of this report is to

share with you the expertise, innovations, and inspiration of other parks staff. We encourage you to experiment on your own as resources allow.

Methods

Cities from northern California, Oregon, Washington, Idaho, and Montana were selected to achieve variety in climate, geography, and size. Parks maintenance employees and their supervisors, who manage either developed parks or natural areas in the selected cities, were surveyed. Parks maintenance employees responded to an initial survey that asked which park areas they manage using herbicides and how often herbicides were applied in these areas. They were also asked for which areas in parks they are most interested in learning about effective, non-herbicidal weed control strategies. Upon receiving these responses, the five most problematic areas for weed control were identified: landscaped areas, fencelines, hardscapes, tree wells, and turf.

In a second survey, parks maintenance employees were asked to provide the names of weeds that are most problematic in these areas and to describe any effective, non-herbicidal strategies for these areas or to target a specific weed. Strategies that could be implemented by other parks staff with limited resources were selected from among these, with preference given to strategies that had been used over long periods of time or tested in an experimental setting. Also, strategies from both wet and dry climates were selected so that parks staff from both climates would benefit.

To witness the effectiveness of the strategies and document them firsthand, site visits were conducted during August and September of 2007 in the following cities: Eugene, Portland, and Bend, Oregon; Seattle, Washington; San Francisco, California; and Boise, Idaho. The results from the surveys and site visits are compiled in this and the other reports in this series.

OVERVIEW

Residents' expectations for turf aesthetics vary among cities and even among different neighborhoods within the same city. While turf can require substantial and costly inputs of fertilizer, water, and mowing time, turf grass is the only plant that withstands heavy foot traffic by city residents. Residents almost universally value having some open turf space for recreation. With limited budgets, city parks departments focus turf maintenance resources on parks with the most visitors and/or sports athletic fields. Meanwhile, some departments, especially in dry climates, like Boise, are removing turf from areas that do not receive much foot traffic, like medians and rights-of-way. By optimizing cultural practices and setting priorities wisely, city parks departments are able to achieve healthy turf even in sports athletic fields with little if any herbicide application.

In order to provide a comprehensive understanding of each city's integrated turf management program, this report is structured differently from others in this series. Rather than grouping techniques for managing similar problems, we have grouped techniques by city, including Eugene, Portland, Seattle, Bend and Boise. Limitations of staff availability and time for interviews created large variability in the level of research for each city's program. The report reflects that variability.

EUGENE

According to Rob Hallett, Turf and Grounds Supervisor with Eugene Parks and Open Space, "growing the healthiest turf possible" is the best strategy for minimizing weeds and maintaining attractive park turf.¹ Like all city parks employees interviewed, Eugene parks personnel cannot always maintain turf to ideal conditions because of staff and resource limitations. Yet Hallett says by carefully researching and choosing the best variety of grass species, Eugene parks personnel are able to maintain functional and attractive turf areas.

Moreover, sports fields are generally managed without using herbicides, focusing on cultural practices instead to prevent weeds.¹ Methods for mitigating weeds, like hand-pulling, can be labor-intensive or impractical and are not the best option when prevention is feasible. Although the maintenance protocol may describe a more rigorous maintenance schedule for all park types, in reality, sports fields and areas with the highest amount of foot traffic receive the most care.

Prioritizing which parks receive the most extensive care is important with a limited budget. To assist in the prioritization of park properties, the city has established a classification system for different turf areas city-wide.² This system has five different classifications or maintenance mode levels. Only the first two modes are included in this discussion. The other three are designed to distinguish sites that are non-irrigated or undeveloped. The target for Mode 1 Parks is high-quality turf, which is considered aesthetically pleasing in high-visibility sites or athletic fields that demand a smooth/dense playing surface. These areas include irrigated sports fields, community centers, pool areas and gateways into the city. The target for Mode 2 Parks is high quality of turf, including in general neighborhood parks.

Mode 1 Parks

In Mode 1 park areas, which are managed for the highest quality and aesthetic value, turf is mowed to 1.75-2.5 inches one or two times per week.¹ Fertilizer is applied as needed, usually at 3-5 pounds nitrogen per 1,000 square feet per year. Aeration is performed at least once per year (twice is typical), whereas overseeding is performed as needed. All sports fields are overseeded in the Fall.¹

Mode 2 Parks

Turf in Eugene's Mode 2 parks, which comprise 95 percent of the city's parks, is mowed at a 2.0 to 2.5-inch cut height once per week,

with clippings left on the ground.¹ Although the mowers do not have mulching blades, the mowing frequency minimizes the amount of clippings left behind.²

When asked about washing mowers between cuttings to reduce weed seed spreading, Hallett remarked, “Though this practice would be ideal in a more centralized operation, for example golf courses, our operation is spread throughout the city. Logistically, this practice would be unfeasible.”²



Mode 2 Level B turf in Scobert Gardens, a pesticide-free park in Eugene. “Level B” indicates that the frequency of cultural maintenance is lower than for other Mode 2 turf.

Eugene’s Maxicom centrally controlled irrigation system is an important part of the city’s weed control program, as over or under-watering will increase the number of weeds growing in the turf.¹ Fertilization, using a polymer-coated 70 percent slow-release 20-5-10 N-P-K (Nitrogen-Phosphorous-Potassium) blend synthetic, occurs only when a soil test detects a deficiency in one of these nutrients. Although Mode 2 turf would ideally be aerated twice per year, typically only sports fields and high-use areas receive such frequent treatment. Mode 2 turf is actually aerated only when compaction is obvious. As Hallett admits, non-aerated areas clearly get compacted and become stressed, allowing weed encroachment. Overseeding generally only occurs when bare spots are evident. Weeds are tolerated at different levels depending on the use level and

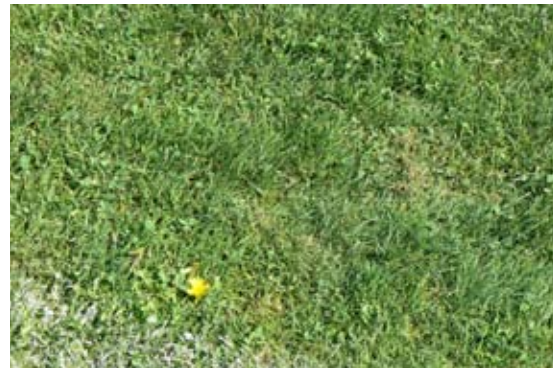
visibility of the park, which is designated by “mode” levels. For turf in Mode 2 parks, weeds are classified as follows, in order of increasing tolerance:

Class I weeds: Canada and Bull thistle, for example, can cause harm to barefoot patrons.

Class II weeds: including dandelions, clover, and English daisies, are aesthetically undesirable and in sports fields considered a tripping hazard issue, although heavy use helps to keep these weeds in check.

Class III weeds: including sorrels, black medic, and chickweed are aesthetically undesirable but less noticeable.

Class IV weeds: include weedy grasses, which might be noticeable but are not as aesthetically undesirable as broadleaf weeds and may help to out-compete broadleaf weeds.¹



A dandelion, which is a Class II weed for Mode 2 turf areas, in Maurie Jacobs Park in Eugene.

pH and Fertilizers

Preparing the soil for turf in new parks is important for ensuring healthy turf from the start.¹ Soil pH testing is performed in all new parks and adjusted prior to construction. If needed, calcium carbonate (Calprill) is applied to bring the soil to the optimal pH level for turfgrass (6.5 to 7). If the soil has low magnesium content, then dolomite lime (magnesium carbonate) is used instead of the calcium carbonate. Testing for pH levels is performed in established parks if unhealthy-

looking turf does not respond to normal fertilization. If potassium-loving weeds, such as red sorrel and plantain emerge, fertilizer with lower potassium content is used. By adjusting fertilizer and focusing on good cultural practices, these weeds can generally be eliminated or kept under desired threshold levels in two seasons.¹

Hallett has tried two different non-synthetic fertilizers with unsatisfactory results.¹ One was made from biosolids from the municipal waste treatment plant. Despite “phenomenal results” because of its long-lasting qualities, the biosolids were logistically difficult to get onsite and apply; also, the public disliked the odor of biosolids applied to turf and were concerned about health risks. The other organic fertilizer Hallett tried cost four times as much as synthetic fertilizer and had only 5 percent nitrogen content, as compared to the 20 percent nitrogen content of the synthetic fertilizer. Hallett notes the 20 percent nitrogen synthetic fertilizer, with 30 percent of the nitrogen released upfront, will produce “vigorous turf growth quickly to fill voids in thin turf” and provide more nutrients faster than organic fertilizer.^{1,2} “From a performance and cost standpoint, for sports field turf, the synthetic is the choice for us,” Hallett says.²

Monitoring and Record-keeping

Monitoring and record-keeping, elements of most integrated pest management plans, are important for maintaining healthy turf with minimal weeds.¹ Hallett remarks that, although monitoring records do not exist for all parks in Eugene’s system, record-keeping is improving. Records will become part of an enduring file rather than merely stored in the memory of maintenance personnel who leave or retire. The department keeps a calendar to remind parks personnel about when to monitor for which weeds. For example, monitoring for perennial weeds occurs in late April or early May, for summer annuals in mid-June, and for winter annuals in late August to September. In

addition to monitoring for weed populations, parks personnel also visually inspect and monitor irrigation, looking for over-watering symptoms or drought stress, all of which can greatly impact both turf health and infrastructure, says Hallett.²

Cultivars

Another challenge that parks personnel face in achieving the healthiest turf possible is the ongoing growth of Eugene’s park system.¹ Successful bond measures have expanded the city’s park system by an additional 16 parks recently.² Though the expansion of the system is great for the community, capital improvements do not come with additional resources for maintenance.^{1,2} “Continual growth of our park system is a manifestation of the public’s focus on the paint job, not the engine,” Hallett says,² echoing a common sentiment across city parks departments. By researching and testing different grass species, different turf applications and new turf cultivars that require less water to maintain a healthy appearance and better out-compete weeds, Hallett works to overcome the turf expansion challenge as much as possible.^{1,2}

Planning is key. After Eugene’s Candlelight Park was constructed, for example, a budgetary limitation resulted in the decision to irrigate some parts of the park and not others. Even so, the same grasses were planted in all areas of the park. Knowing in advance of construction which areas will be irrigated can be helpful in determining which grasses to plant.



Candlelight Park is irrigated in some parts of the park and not others because of budgetary constraints.

As a general rule of thumb, Hallett explains, fine fescues perform better in the shade and perennial rye grass performs better in the sun.¹ A very lush green grass that is well adapted to the climate and soil of Eugene, perennial rye grass is, unfortunately, “one of the most needy of the typical turf grasses.” However, new cultivars of turfgrass species, not commonly used in the Willamette Valley, are now on the market and may out-perform the popular perennial ryegrass in some park situations. Hallett first grows these new cultivars in small test plots and then selects the most appropriate for the situation.

New cultivars of turf-type tall fescue, the grass one might see in a cow pasture, with rough, light-green clumps, have been developed to demonstrate lower-growing and darker-green color characteristics. These new cultivars



Mode 2 turf in Candlelight Park, a new neighborhood park in Eugene, contains a new cultivar of turf-type tall fescue.

will have the same drought tolerance and low fertilizer requirements as their sister varieties, but also have some new characteristics more suitable for park use and aesthetic value. Therefore, turf-type tall fescue may be appropriate for parks that will not receive much irrigation or fertilizer. Hallett says new cultivars of Kentucky blue, “an awesome grass” with better survivability than the old cultivars, could be well-suited for sports fields. Kentucky blue grass is rhizomatous, unlike the bunch type perennial ryegrass, demonstrating “great recuperative power” to close voids in the turf

that emerge from heavy activity, says Hallett. Although other grasses, like annual blue grass, can spread via a massive seed bank, greater susceptibility to drought stress makes them less attractive options. A native grass that Hallett would like to experiment with in dog parks, with their heavy traffic, is *Deschampsia caespitosa*, which is very tough, like beach grass (non-native), as well as drought-tolerant.¹



Annual bluegrass, an invasive plant, creates a mottled, or splotchy, appearance.

In summary, focusing on the basic cultural practices of turf management will enable parks personnel to grow healthy turf with minimal weeds. Hallett advises, “Focus on optimum mowing heights and frequencies, proper nutrient input and watering, aeration, and overseeding practices. Use soil tests to guide fertilization, and correct soil pH if needed. Don’t apply product that is not needed; it’s a waste of time and money. Work with park planners in the designing of new parks to make sure that the right grass type is planted in the right situation. Be involved in the construction phases of parks development, and eliminate weeds around the periphery before construction. Make sure soil compaction is dealt with before seeding occurs; make sure the contractors are seeding at the right seed rates and using the specified seed. Review current construction specifications; if possible, write your own.”²



Dandelion seed heads along the periphery in foreground (above) and background (below) (outside of the area designated for management) of the Mode 1 sports field in Ida Patterson Park in Eugene, which can spread to the sports field and make weed control more challenging.



Portland Parks and Recreation tolerates clover (except in stadiums), residents are content with the vibrant, healthy park turf that does not require herbicide treatment to control broadleaf weeds. “It’s important to know what you want to accomplish,” acknowledges Mike Carr, Turf and Irrigation Supervisor with Portland Parks and Recreation. Because maintenance goals vary, he says, “There is not just one right way to do things.”⁴



Portland Parks and Recreation tolerates some clover in turf in Arbor Lodge Park, a pesticide-free park in Portland.

Irrigation

Of the six departments highlighted in this report, Portland Parks and Recreation Department seems to focus the most attention on the optimization of its Maxicom centrally controlled irrigation system, in conjunction with its turf cultural practices. Maxicom software combines site characteristics, such as soil and vegetation type, with weather information to calculate the site-specific evapotranspiration rate of turf grass, or the rate at which the turf loses moisture.⁴ Based on the calculation of moisture lost, the system directs the precise daily amount of water needed by a particular landscape to be delivered by automated irrigation equipment. The irrigation department hired Horticulturist Linda Corbett to monitor daily water use and annual cost, which totaled about \$1.3 million last year. The department

PORTLAND

“The consistency of our cultural practices and turf management techniques has enabled Portland Parks and Recreation to manage, with the exception of a few acres in high-profile ball fields, most of its general turf areas without any broadleaf herbicide use in the past 15 to 20 years,” asserts John Reed, Integrated Pest Management Program Coordinator and Botanic Specialist with Portland Parks and Recreation.³ Half of the 1,400 mowed acres that the department manages are groomed (279 sites, including 273 sports fields). While

irrigates more than 750 acres at 135 sites with automatic irrigation systems, and 400 acres at 50 sites that are managed by central control.

Carr explains, “Portland City Council realized the benefits of managing our system with central control irrigation and funded the parks department for an additional 30 sites.”⁵ Before the Maxicom system was implemented, water usage varied according to the individual doing the watering.⁴ Maxicom has resulted in nearly uniform water usage.

Corbett has compared the cost of irrigation before the Maxicom system was adopted with costs after the system was adopted for each park. The department saved 20 percent by using the software and weather station to measure plant evapotranspiration rates. Another 10 percent is saved if parks personnel routinely inspect their irrigation systems.

According to Carr, however, Maxicom has its limitations. “It is only as good as the systems in the ground,” so ongoing maintenance of irrigation systems is still needed.⁵ Maxicom software indicates if a leak exists but does not indicate if the distribution of the water being applied is not uniform or the sprinkler head has stopped turning.⁴ Carr asserts that maintaining healthy turf that is adequately fertilized requires less water, which in turn leads to leaching of fewer nutrients.^{4,5}

Mowing

Regular mowing encourages healthy turf and prevents weeds from going to seed. For most of Portland Parks and Recreation Department’s 1,350 acres of mowed turf, a 2.5-inch mowing height is standard, according to Reed.³ The mowing season, with weekly mowing, lasts from late March through September, with two mowings in October and one in November. Leaf vacuuming occurs in November for leaves that are not mulched and left on the turf to provide natural fertilizer.

Aeration

Aeration, using a deep tine aerator to punch holes several inches deep in the soil, is another important cultural method used in Portland’s parks. Although Carr would like to aerate all of Portland’s park turf, due to budget constraints, sometimes only the areas impacted the most by foot traffic, primarily athletic fields, receive aeration (two to three times per year).⁴



Deep tine aerator used to reduce compaction.

Overseeding

Parks maintenance personnel also focus on over-seeding in these most-worn areas to re-establish turf, adding 20-25 tons per year of grass seed. The department generally uses a perennial rye blend in sunny areas (1/3 each of: Quick Start II, Brightstar SLT, Manhattan 4), and a 50/50 rye/fescue blend in shaded areas.⁵



Seedavator used to overseed bare spots in turf.

Fertilizer

Athletic fields receive fertilizer at least once per year in late September, before the daily rains come, whereas other turf areas receive fertilizer as needed.^{3,4} The department uses 35-40 tons per year of a 57 percent slow-release, 22-5-10 N-P-K, 0.9 percent iron blend.⁴ Carr notes this fertilizer may be a little more expensive than others but lasts longer. All grass clippings are mulched by the mower and left on all turf to provide some fertilization. Some lime might be added to help maintain the optimal pH.

Top dressing with sand improves the drainage and the soil structure of playing fields. This is an important strategy for modifying the soil profile under turfgrass. The success of a topdressing program is determined by Portland's ability to make frequent light applications of the topdressing material. A typical soccer field in one of Portland's parks or school sites may require two to three topdressing applications per year. A normal application would call for approximately 30 to 50 yards of sand per playing field.

"This is a very labor intensive and costly maintenance activity but one that is essential if Portland Parks is going to improve the safety and playability of our sportsfields," says Carr.



Top dresser used to apply sand or similar material.

Following is a breakdown of all costs to maintain a typical soccer field in the Portland

Parks system.⁵ Carr says not all of the fields that the department manages receive the same level of maintenance, nor do they experience the same level of intense use:

Total Turf Maintenance Costs in 2002 for Ed Benedict Park:

Field Size 200 ft X 310 ft = 62,000 ft²

Fertilizing as required (approximately 3 applications)	3 hours
Mowing (weekly for 36 weeks)	36 hours
Aeration (3 times at 3 hours each)	9 hours
Overseeding (2 times at 2 hours each)	4 hours
Total hours	52 hours
Turf management	
52 hours @ \$40.32 per hour	\$2,096.70
Seed (350 pounds @ \$.89/pounds)	\$311.50
Fertilizer (3,000 pounds @ \$.40/pounds)	\$1,200.00
<u>Water costs (estimated)</u>	<u>\$1,680.00</u>
Total maintenance cost	\$5,288.20

SEATTLE

Seattle, which also aims for healthy but not weed-free turf, manages the turf in all of its neighborhood parks, including sports athletic fields, without any herbicide applications, according to Barb DeCaro, Resource Conservation Coordinator with Seattle Parks and Recreation.⁶ A comprehensive turf program for the city's 185 athletic fields includes annual fertilization, aeration, and top dressing. The results are a resilient, healthy stand of turf that crowds out weeds; the weeds that remain do not interfere with usability.



Healthy, weed-minimal turf, despite intense activity in the soccer field in Alki Park, a pesticide-free park in West Seattle



Bare spots created by very intense activity in front of the soccer goal in Alki Park

Fertilization

Irrigated, high-use, high-visibility turf areas are prioritized for fertilization over unirrigated parks. How frequently parks are fertilized depends on play intensity, according to Phil Renfrow, Senior Gardener with Seattle Parks and Recreation.⁷ The highest-use areas are fertilized at least three times per year and the most heavily impacted spots more often. All athletic fields and other high-use parks are fertilized at least once per year, sometimes more often. Lower-use parks, especially those without irrigation, receive at least a one-time application of fertilizer in November.

DeCaro prefers slow-release conventional to organic fertilizer.⁶ Both slow-release and organic fertilizers provide

nitrogen and other essential nutrients, but the conventional fertilizer, which is less costly and more active during cooler months, releases nitrogen at a steady rate, especially during the warmer months. The intent, she explains, is to maintain consistent nutrient levels by releasing nitrogen only as fast as it is used by the grass. If nitrogen is released too quickly, fertilizer, which may be over-applied, can burn grass, and the excess can run off and pollute waterways. Seattle's recently updated Environmental Critical Areas Ordinance restricts fertilizer application within 50 feet of wetlands, shorelines, and creeks. Like the other departments highlighted in this report, Seattle's uses the weather-based central control Maxicom 2 software to manage irrigation in 63 parks and athletic fields.⁸

BEND

Geography and climate make Bend unique when compared to other cities covered in this report.⁹ High elevation and soil with high volcanic ash content are distinguishing characteristics. With a dry climate, the pathogenic fungi that predominate in wet areas are not a problem. However, the precipitation varies from the east side of Bend, which receives 5-7 inches of rain per year, to the west side, which receives about 15 inches of rain per year, according to Paul Stell, Natural Resource Manager of Bend Parks and Recreation District. Therefore, Bend has two weather stations, one on either side of the city, that measure evapotranspiration rates to inform the Maxicom centrally controlled irrigation system.

Bend's parks patrons have high expectations for the appearance of their turf, which must be a resilient recreation surface yet not demand too much water. Because of this, Bend both investigates turf grasses that are more drought-tolerant and installs less turf in

newer parks, leaving the rest of the park in a more natural condition with drought-tolerant plant species, like bunchgrasses, juniper, and pine. Because these varieties are not able to withstand heavy foot traffic, a turf area is still needed if park patrons are going to play ball or participate in similar high-impact activities. Watering is performed at night to minimize evaporation except following festivals or other special events that require intense mitigation afterward because of foot traffic. The day after an event, a crew clears dead turf and then aerates, overseeds, fertilizes, and irrigates heavily.⁹



Soil plugs after aeration, following a festival in Bend's Drake Park

Fertilization

According to Mike Duarte, Landscape Manager with Bend Parks and Recreation District, the Fall fertilization, which happens in September, is most important. The Fall fertilization involves the addition of potassium and phosphorus, which are crucial for root growth and will ensure overall turf health in the Spring.¹¹ Fertilization occurs until mid-October and does not occur again until the middle of April. Fertilizer is applied again in May and July. Polymer-coated synthetic fertilizer is applied at 4.5-6.66 lb (1.5 pounds nitrogen) per 1,000 square feet.⁹ Bend staffers perform soil tests to

ensure the proper level of nutrients. Each test costs about \$35, although they have been able to arrange for free testing in the past.⁹

Rather than having a fertilizer-free buffer zone as Seattle and Boise do, Bend applies only 8-4-5 N-P-K organic fertilizer to parks areas that are near waterways three times per year.⁹ Made from poultry byproducts processed for application as fertilizer, the organic fertilizer has a strong odor, but it spreads evenly and is manufactured to have consistent composition. More expensive than synthetic fertilizer, organic fertilizer is \$15-25 per 50 pounds bag. Bend applies organic fertilizer at a rate of 12.5 pounds (equivalent to 1 pounds of nitrogen) per 1,000 square feet of turf. Unfortunately, there is no organic fertilizer on the market higher in potassium content for fall fertilization.

Aeration

A solid tine aerator, which penetrates to 2.5 to 3 inches is used in all parks turf in spring and fall. A deep tine aerator, penetrating 8 to 10 inches, is used only in compacted areas. Although the solid tine aerator can be used to seed, Duarte prefers to use a slit seeder that puts the seeds deeper into the soil. Gypsum can be added following aeration to loosen heavy soils in some areas. Also deficient in organic matter, the soil benefits from the addition of a compost/soil mixture with a top dressing machine (a quarter-inch at a time) following aeration. The addition also increases soil depth. Although it is a slow process, this soil-building is necessary in park soils that are deficient in organic matter. Additional calcium is usually not needed, but iron and sulfur (1.5-3 percent iron, sulfur-coated) are applied to produce a better aesthetic because the soil, which is high in volcanic ash content, is deficient in these minerals.⁹

Mowing

The turf in most of Bend's parks is maintained at 2.5 to 3 inches during the summer.¹⁰ Mowing height is set at 3 inches before large events in the parks to help prevent compaction. Grass crowns are not as easily damaged by weight, so turf with the crowns remaining is more resilient. Grass is simply healthier and out-competes weeds better when less of the grass plant is cut. The exception is sports fields, where tripping on the taller grass is a concern.¹⁰ Sports turf is maintained at 2.5 inches in summer and 2 inches in spring and fall. Grass clippings are mulched using mulching mowers and left on the turf.⁹

Cultivars

The department previously used a 3-part Kentucky blue/Chewings fescue/red fescue mix.¹⁰ Now, in new parks, a blue rye/creeping red fescue mix is used on the periphery, with a 90/10 turf-type tall fescue/blue grass mix in the sports field. The turf-type tall fescue has a deeper root system and a wide blade that can handle more abuse. The blue grass is important because it is rhizomatous and, therefore, fills in voids. Blue rye and chewing fescue are more suitable for neighborhood parks.¹⁰

Bend parks personnel tolerate some chickweed and clover as long as it is not gaining ground.¹⁰ Parents have filed claims about bee stings, but Stell thinks the problem is probably insects that are attracted to trash, not bees that like clover. Stell says, "What turf is supposed to look like is aesthetic and cultural. It varies. The mentality used to be to conquer nature. Now you find ways to live with it and set priorities for what you will and won't tolerate."¹⁰

Right: Compacted, stressed turf following a festival in Julia Davis Park in Boise will receive intensive cultural treatment to restore health and minimize weeds.



Healthy turf with minimal weeds in Bend's Columbia Park

BOISE

Being farther inland, Boise is the driest city among those visited for this project, with a 2,200 to 2,500-foot elevation and fine, sandy soil.¹² Eden Belanger and Mike Woodward, Horticulture Managers with Boise Parks and Recreation, note that cultural practices have been their top priority for growing healthy, weed-resistant turf for the past 10 years. Turf cultural practices are site-specific. As is common in order to maximize the utility of limited money and staff time, the parks with the most visitors receive the highest maintenance. After multi-day festivals, trash is removed and then parks maintenance personnel immediately irrigate the site for two solid days, aerate, fertilize lightly, and finally overseed.



Athletic fields receive regular fertilizer applications and neighborhood parks receive a slow-release fertilizer in October or not at all. Like DeCaro (Seattle), Woodward and Belanger prefer slow-release commercial to organic fertilizer. Woodward notes that the polymer coating around the slow-release commercial fertilizer makes the release rate fairly predictable, depending only on temperature and moisture level.



A low percentage of clover is tolerated in turf in most of Boise's parks.

With a limited budget, purchasing organic fertilizer is too expensive, but the department deposits its own organic fertilizer — mulched grass-clippings and leaves — on its turf, as well. Clippings are removed sometimes if over-abundant.

As in other departments, a critical practice for improving turf health has been to raise the mowing height in non-sports parks to 2.5 inches. While weekly is the ideal mowing frequency, limited labor often results in slightly less frequent mowing.

Aside from Ann Morrison Park, a very high-maintenance park planted with many annuals, irrigation does not occur during the heat of the day in order to conserve water. Manual

irrigation quick couplers are used for daytime watering in Ann Morrison Park. Some turf areas that do not receive much foot traffic, such as rights-of-way, receive drip irrigation. Across most of the park system, Boise uses Maxicom software to determine how much irrigation the turf needs. However, the department is beginning to replace turf in low-traffic areas with drought-tolerant plants, an effort to save water and money.

Boise's flagship parks are collectively known as the Boise River Greenbelt. By city ordinance, no mowing, fertilizing, or herbicide application can occur within 20 feet of the river. Along the river, hand-weeding is the predominant method for weed removal. In other areas, the labor costs are too high to make hand removal feasible.

Weed tolerance is dictated by budget and public response. Dandelions and clover are considered tolerable in less-used locations, but not high-use and/or high-aesthetic locations, like sports facilities and rose gardens. As is common in many cities, the public blames insect stings on bees that pollinate clover. However, stings alone do not result in stricter clover control, as Belanger and Woodward recognize that insects attracted to trash are usually the culprits. Boise has a brochure to educate the public about how not to attract stinging insects to parks in the first place.

Like all parks departments, Boise's has been experimenting with different turf grasses, especially drought-tolerant varieties. As in Eugene and Bend, rhizomatous tall fescue (RTF) is a current focus of testing in Boise because of the several advantages this new variety of grass exhibits over other varieties — more durability, less water required, and the ability to crowd-out weeds by spreading to fill in gaps in the turf. Fescues generally do not withstand foot traffic as well as rye grass, but some claim that RTF is comparably durable. While RTF can prevent weeds on one hand, it has the potential to become a weed itself, encroaching on bare

areas in tree wells and shrub beds, just as it does on bare spots in turf, says Woodward. The department has also experimented with sheep fescue on rights-of-way, but the public does not find this variety green enough, and weeds were able to out-compete turf with a four--week mowing cycle. However, more frequent mowing in low-use areas would not be the best use of labor resources. When tested, creeping red fescue tolerated long mowing cycles, but again, the weeds became too obvious.

SUMMARY

While each of these cities uses specific, unique strategies, they all work to improve soil health, plant cultivars that are well adapted to their climate and soil and to keep turf grass at optimum health with proper irrigation and mowing.

CONTACT INFORMATION

The following parks departments were referenced in this report:

Eugene Parks and Open Space	541-682-4800
Portland Parks and Recreation	503-823-1636
Seattle Parks and Recreation	206-684-7250
Bend Parks and Recreation	541-388-5435
Boise Parks and Recreation	208-384-4190

REFERENCES

1. Hallett, Rob. (Eugene Parks and Open Space. Turf and Grounds Supervisor). On-site interview. September 2007.
2. Hallett, Rob. (Eugene Parks and Open Space. Turf and Grounds Supervisor). E-mail communication. February 2008.
3. Reed, John. (Portland Parks and Recreation, Pest Management Program Coordinator & Botanical Specialist). On-site interview. October 2007.
4. Carr, Mike. (Portland Parks and Recreation, Irrigation and Turf Supervisor). On-site interview. October 2007.
5. Carr, Mike (Portland Parks and Recreation, Irrigation and Turf Supervisor) & Reed, John. (Portland Parks and Recreation, Pest Management Program Coordinator & Botanical Specialist). E-mail communication. February 2008.
6. DeCaro, Barb (Seattle Parks and Recreation. Horticulture Program. Resource Conservation Coordinator). On-site interview. October 2007.
7. Renfrow, Phil (Seattle Parks and Recreation. Senior Gardener) & Barb DeCaro (Seattle Parks and Recreation. Horticulture Program. Resource Conservation Coordinator). On-site interview. October 2007.
8. DeCaro, Barb (Seattle Parks and Recreation. Horticulture Program. Resource Conservation Coordinator). E-mail communication. January 2008.
9. Stell, Paul (Bend Parks and Recreation District. Natural Resource Manager), Moore, Ed (Bend Parks and Recreation District. Director of Park Services), & Duarte, Mike (Bend Parks and Recreation District. Landscape Manager). On-site interview. September 2007.
10. Stell, Paul (Bend Parks and Recreation District. Natural Resource Manager) On-site interview. September 2007.
11. Duarte, Mike (Bend Parks and Recreation District. Landscape Manager). On-site interview. Phone communication. February 2008.
12. Belanger, Eden (Boise Parks and Recreation. Horticulture Manager) & Mike Woodward (Boise Parks and Recreation. Horticulture Manager). On-site interview. September 2007.