Healthy Soils
for Healthy Streams

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In partial fulfillment of the Marine Resource Management Masters Degree
College of Oceanic and Atmospheric Sciences

For the purpose of the City of Corvallis Public Works Department
Stormwater Program
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Reducing Polluted Runoff Through Improved Business Lawn Care Practices
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Healthy Soils for Healthy Streams: Grasscycling for Lawn Care Businesses

INTRODUCTION

The Marine Resource Management (MRM) Masters Program at Oregon State University is a science-based, interdisciplinary program that incorporates a wide variety of interests. Marine Resource Managers are encouraged not only to understand the science behind ocean health, but the complexities surrounding science in a decision-making arena. The program’s flexibility allows students to study marine and coastal issues that are intricately woven together in policy, stakeholder interests, and marine ecosystem health. One such issue affecting marine and coastal health is marine pollution.

"Human activities often affect the environment in the forms of resource depletion and pollution. Man, like nearly all other living things, moves chemicals around the environment - we remove resources from a natural location (resource depletion) and redeposit them somewhere they don't belong (pollution)." (R.A.Horne, 1978)

Marine pollution has a variety of sources and ranges from toxic chemicals being dumped directly into the ocean to less obvious forms such as washing a car in the street that is upstream from a river. This paper discusses a specific form of marine
pollution: nonpoint source pollution and, more specifically, nutrient runoff from terrestrial sources into estuarine and marine environments.

Nonpoint source pollution in United States waterways is a consequence of land runoff, precipitation, atmospheric deposition, drainage, seepage and/or hydrologic modification. Nonpoint source pollutant in waterways is defined as any unconfined sources of pollution where wastes can either enter into or be conveyed by the movement of water to public waters (Oregon Department of Environmental Quality, 2011). Some examples of nonpoint source pollution are oil or grease from urban transit, sediment from construction sites, bacteria and nutrients from livestock and pet wastes, excess fertilizer, herbicides, and insecticides from agricultural and residential areas. Nonpoint sources contribute more contaminants to waterways than point sources and are vastly more widespread (U.S. Geological Survey, Department of the Interior, 1999).

One example of nonpoint source pollution entering a marine system is stormwater runoff from urban, terrestrial sources. Stormwater runoff is a common mode of introduction for nutrient pollution into a marine ecosystem. Anthropogenic sources of nutrients, such as lawn and landscape fertilizer, washes down storm drains and enters nearby streams. Streams connect to larger rivers that connect eventually to an estuarine environment. While Corvallis’ Rock Creek Watershed does not lead directly to the ocean, it includes many tributaries, streams, and rivers that connect to nearby watershed systems that impact estuarine and marine environments directly.
Furthermore, much marine life, such as salmonids, is connected through this complex pathway of water systems and depends on clean, healthy water.

It wasn’t until 1987 that the Clean Water Act of 1972 (CWA) was amended to include nonpoint source pollution prevention and management. Under the CWA, Section 300, each state is required to manage nonpoint source pollution. The Oregon Department of Environmental Quality (ODEQ) addressed the 1987 CWA amendment by administering National Pollutant Discharge Elimination System (NPDES) permits to two classifications of municipalities, Phase I and Phase II. The NPDES classification requirements are based on municipality population size and location within Census Bureau-defined Urbanized Areas (Oregon Department of Environmental Quality, 2011).

In 2007 the City of Corvallis was issued a Phase II NPDES permit from ODEQ (City of Corvallis, 2008). In Corvallis, the majority of the stormwater conveyance system is separate from the sanitary sewer system. During a rain event, stormwater flows through pipes or over land into the nearest creek or stream, and then into either the Willamette or Marys Rivers. The City of Corvallis Stormwater Management Program Plan (SWMPP) was created to outline the ways that Corvallis would meet the NPDES Phase II permit requirements (City of Corvallis, 2008). Part of meeting these requirements includes working to change behaviors of Corvallis residents and businesses to prevent pollution runoff.
BACKGROUND

Traditional lawn care management practices, such as over application of fertilizer, are a common culprit of nonpoint source pollution. Fertilizers contain nutrients, mainly nitrogen and phosphorus, which are crucial for photosynthesis and cell production in plants. However, when washed into nearby streams and rivers, the nitrogen and phosphorus can lead to eutrophication of rivers and coastlines (Seitzinger, Nitrogen Cycle Out of Reach, 2008). Eutrophication, or the addition of nutrients into a water system, can lead to an accelerated production of organic matter. The pulse of organic matter production may result in harmful algal blooms, depleted dissolved oxygen, and loss of submerged aquatic vegetation (Bricker, Clement, Pirhalla, Orlando, & Farrow, 1999). Eutrophication in freshwater systems has been studied and recognized as a source of pollution for years. However, only recently has eutrophication been associated with estuarine and marine systems (Bricker et al. 1999).

The runoff of fertilizers into rivers or streams can result in increased nitrate or phosphorus levels, or as a decrease in dissolved oxygen levels. The Oregon Department of Environmental Quality (ODEQ), tests water quality parameters, including nitrates and phosphates, at several sites around Corvallis, every other month. These sites include the mouth of the Mary's River in Corvallis, the intersection of Highway 34 in Albany and just downstream of Corvallis, and the Calapooia and the Willamette Rivers in Albany. According to ODEQ, river miles (RM) 119.7 to 148.8 of the Willamette River, which includes the section that runs through Corvallis, exceed
Total Maximum Daily Load (TMDL) requirements established by the EPA in bacteria levels, mercury, iron and manganese, and elevated summer temperatures (City of Corvallis Public Works Department, 2010). While sections of the Willamette River that run through Corvallis do not exceed nutrient TMDL levels, the effects of fertilizers may be seen in depressed levels of dissolved oxygen between RM 54-8 and RM 186.5, another section that runs through Corvallis. According to a report by the Oregon Department of Environmental Quality, the Upper Willamette subbasin, which include Corvallis waterways, scored poorly on the Oregon Water Quality Index in 2009, indicating water quality impairment. Low dissolved oxygen ranked among the leading water quality stressors (Mulvey, Leferink, & Borisenko, 2009). Furthermore, out of the 12 subbasins of the Willamette River Basin, the Upper Willametter subbasin was ranked third most impaired for low dissolved oxygen and phosphorous enrichment (Mulvey, Leferink, & Borisenko, 2009).

There is currently no data that connects depleted dissolved oxygen levels directly to fertilizer inputs into Corvallis waterways. Likewise, there is no definitive data that links fertilizer applied on residential lawns to dissolved oxygen levels in Corvallis waterways. Additional sources, including fertilizer applied on golf courses, agricultural crops, or as manure can contribute to nutrient pollution and depleted dissolved oxygen levels. However, given the definition of nonpoint source pollution, numerous sources may contribute to impaired water quality, including fertilizer applied on lawn and turf. Following the guidelines set forth in the City of Corvallis Stormwater Management Program Plan (SWMPP), it is important for the City
Stormwater Program to encourage sustainable behaviors that may improve water quality in Corvallis waterways.

This paper discusses a new program, Healthy Soils for Healthy Streams, which is intended to be one of multiple business pollution prevention programs in Corvallis. To encourage sustainable behaviors that contribute to improved water quality in Corvallis, there is a need for an outreach and education program for lawn care businesses. For this initial pilot program, fertilizer application by Corvallis lawn care businesses was targeted. According to a recent survey conducted by Riley Research Associates for the City of Corvallis, Corvallis citizens believe lawn and landscaping products are a major source of pollution to local streams (Riley Research Associates, 2011). Furthermore, the Urban Stormwater Quality Management and Discharge Control Ordinance was passed in 2010 to protect streams from stormwater pollution by prohibiting pollutants such as fertilizer from entering storm drains. Healthy Soils for Healthy Streams offers a platform to promote the new ordinance and promote awareness of the ways businesses can help prevent nutrient pollution. In addition, the Corvallis NPDES permit requires that the City engage businesses in preventing stormwater pollution. The Healthy Soils for Healthy Streams Grasscycling pilot program discussed in this paper targets the practice of recycling clippings back into the soil after mowing to reduce fertilizer needs as one initiative to help reduce nonpoint source pollution and improve the health of Corvallis waterways.
The City of Corvallis isn’t alone in striving towards clean, healthy water by reducing fertilizer runoff and promoting other stream-friendly lawn care practices. Other municipalities are also working to prevent pollution by encouraging environmentally friendly lawn care practices. The Soils for Salmon initiative in Seattle, Washington is a cooperative effort with local agencies to improve soil and water quality through improved lawn management practices. ThinkBlueMaine, a media campaign by the Maine Department of Environmental Protection, encourages “yardscaping”, the practice of minimizing lawn area and maximizing garden area in yards, to reduce stormwater pollution. The City of Olympia, Washington released a recent publication titled 5 Easy Steps to a Healthy Yard in which it recommends actions to reduce stormwater pollution. Numerous Universities and Extension Services have also released publications encouraging a change from traditional lawn care practices and promoting stormwater pollution prevention (Cornell University, 2006; Environmental Protection Agency, 2004; Harivandi & Gibeault, 1999; Kussow, Combs, & Sausen, 1997; Maine Department of Environmental Protection, 2005; Stream Team - Olympia, Lacey, Tumwater, Thurston County, 2010; Rosen & Horgan, 2010).

This paper discusses the creation of Healthy Soils for Healthy Streams Grasscycling pilot program, which is designed to change the behaviors of Corvallis lawn care professionals. In particular, this paper focuses on the prevention of nutrient pollution by encouraging grasscycling. Grasscycling refers to the practice of leaving clippings on the lawn after mowing, as opposed to removing them as is traditionally done by
many lawn care professionals. Leaving clippings on the lawn allows the clippings to decompose and release valuable nutrients back into the soil, thus reducing the need for additional fertilizers (Rosen & Horgan, 2010; Kopp & Guillard, 2002). The amount of nitrogen contained in grass clippings in 1000 sq ft nearly equals 1lb of nitrogen on a healthy lawn which is the recommended application rate of fertilizer to achieve healthy turf (Rosen & Horgan, 2010; VanDerZanden & Cook, 2001). On average, grasscycling can reduce fertilization requirements by 25-50% without decreasing turf grass quality. Moreover, a number of studies have found that grass clippings increase the overall quality of the turf (Heckman, Liu, Hill, DeMilia, & Anastasia, 2000; Kopp and Guillard; Rosen & Horgan, 2010; Oregon Department of Environmental Quality, 2000).

Changing traditional lawn care practices to adopt alternatives such as grasscycling requires changing behaviors of lawn care professionals and their clients. Most programs looking to change behavior rely heavily on an information-based campaign that utilizes media, advertising, brochures, and newsletters. This type of outreach campaign assumes the audience would be willing to alter their lifestyle choices and change their behaviors if they simply had more education and information on the topic. In Fostering Sustainable Behavior (1999), McKenzie-Mohr and Smith highlight several examples of unsuccessful outreach campaigns that used information alone to achieve sustainable behavior. For example, results from a study in the Netherlands show that households that had received information about energy use did not reduce their consumption of energy (Midden, Meter, Weenig, & Zievernik, 1983). In another
study, households received a handbook on water efficiency that provided information about the importance of limiting water consumption, as well as ways to go about conserving water in a household. However, despite receiving information, the study found no difference in water consumption in the participating households (Geller, Erickson, & Buttram, 1983). Another study conducted in Switzerland found that environmental awareness did not correlate strongly with environmental behavior (Finger, 1994). In yet another study, a six-day workshop was held with high school students to create awareness of environmental issues. After two months, researchers followed-up with the students and found that they were no more likely to have participated in sustainable behaviors (Jordan, Hungerford, & Tomera, 1986). In order for an outreach campaign to be successful in changing behavior, the barriers and motivators to changing the behaviors of the intended audience must be identified and overcome (McKenzie-Mohr & Smith, 1999).

As a new approach to behavior change, social marketing takes into account the audience’s barriers and motivators. Recently promoted by the EPA in *Getting in Step; A Guide for Conducting Watershed Outreach Campaigns* (2003), social marketing can be used to encourage sustainable behavior in order to reduce nonpoint source pollution. Although the definition of social marketing has evolved over time, it was first defined in 1971 by Kotler and Zaltman as "the design, implementation, and control of programs calculated to influence the acceptability of social ideas and involving considerations of product planning, pricing, communications and marketing research" (p. 5). A more recent article defines social marketing as “the application of
commercial marketing technologies to the analysis, planning, execution, and evaluation of programs designed to influence voluntary behavior of target audiences in order to improve their personal welfare and that of their society” (Andreasen, 1995, p. 7). Social marketing roots derive from basic marketing theory, which includes extensive research on the consumer's perception of the product, its cost, and other factors that may influence consumer behavior such as promotions (Flocks, Leslie, Albrecht, Bryant, Monaghan, & Baker, 2001)

Community-based social marketing (CBSM) applies the same pragmatic approach of social marketing to achieve behavior change in a more targeted audience. (McKenzie-Mohr & Smith, 1999). The creation of the Healthy Soils for Healthy Streams: Grasscycling Program for lawn care professionals follows CBSM methodology. The goal of the program is to help prevent nonpoint source pollution by reducing fertilizer needs through the practice of grasscycling. CBSM consists of five steps (McKenzie-Mohr & Smith, 1999):

1. Uncovering barriers to behaviors
2. Selecting behaviors
3. Designing or redesigning a program to overcome the barriers to the selected behaviors
4. Piloting the program
5. Evaluating the program once it has been implemented

The Healthy Soil for Healthy Streams lawn care business pollution prevention program addresses a growing need to prevent nonpoint source pollution by
encouraging lawn care businesses and their clients to adopt alternative lawn care practices.

**UNCOVERING BARRIERS AND MOTIVATORS**

The first step to changing behaviors, according to the CBSM methodology promoted by Dr. McKenzie-Mohr, is to research the barriers and motivators that may prohibit or encourage lawn care professionals to adopt practices that reduce polluted runoff. This involves several steps: First, a literature search should be conducted to understand past and present studies or programs concerning the sustainable behavior of interest. Second, qualitative research should be conducted. This research can take the form of observation or a focus group. Third, quantitative research should be conducted in the form of a survey (McKenzie-Mohr & Smith, 1999).

**Researching Behaviors**

After deciding to target Corvallis lawn care businesses with the goal of reducing fertilizer runoff, extensive background research was conducted on lawn care practices that can reduce fertilizer from entering local waterways. Both literature and other municipal lawn care pollution prevention programs were researched to create a list of lawn care behaviors that can reduce nutrient runoff. This list can be seen in Table 1.
Table 1. Table of Practices

<table>
<thead>
<tr>
<th><strong>LAWN CARE PRACTICES FROM LITERATURE SEARCH</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaving grass clippings to reduce the need for fertilizer</td>
</tr>
<tr>
<td>Using slow-release fertilizers to reduce nutrient runoff</td>
</tr>
<tr>
<td>Aerating the soil to reduce compaction for better nutrient absorption</td>
</tr>
<tr>
<td>Testing the soil before fertilization to prevent over fertilization and runoff.</td>
</tr>
<tr>
<td>Cleaning up sidewalks and streets after fertilization to reduce runoff into storm drains</td>
</tr>
<tr>
<td>Using a deflector on broadcast spreaders for more accurate application</td>
</tr>
<tr>
<td>Coordinating fertilization with rain events to prevent immediate runoff due to rain</td>
</tr>
<tr>
<td>Using compost instead of synthetic fertilizers</td>
</tr>
<tr>
<td>Leaving grass clippings to reduce the need for fertilizer</td>
</tr>
</tbody>
</table>

(Cornell University, 2006; Harivandi & Gibeault, 1999; Kussow, Combs, & Sausen, 1997; Maine Department of Environmental Protection, 2005; Stream Team - Olympia, Lacey, Tumwater, Thurston County, 2010; Rosen & Horgan, 2010).

**Polling to Identify Behaviors to Target**

The next step in uncovering barriers to behavior change was to narrow down the list of recommended lawn care practice behaviors to those behaviors that both have a significant impact, and are likely to be adopted by lawn care professionals. To do this, a brief poll was created with the goal of identifying three or four effective, yet easy practices to investigate further. Four water quality experts were asked to rank the positive impact of the lawn care practices listed in Table 1 on a scale of 1-5 (Appendix A). Ten lawn care professionals were polled and asked to rank how easy the same list (Table 1) of practices would be to implement on a scale of 1-5 (Appendix B). The practices that were ranked the highest in positive impact and the highest in ease of implementation were: leaving grass clippings in the lawn, using controlled release
fertilizers, cleaning up after fertilization, and testing the soil (See Figure 1) (Appendix C).

Figure 1. Results of polling lawn care experts and water quality experts to target behaviors that are high in positive impact on water quality and high in ease of implementation

Focus Group

Once the list of recommended lawn care practices was narrowed down to four practices, a focus group was held to discuss these practices in further detail, with the goal of elucidating the barriers that might prohibit lawn care professionals from adopting these practices, as well as any motivators that could encourage them to change their practices. A comprehensive list of lawn care businesses that serve Corvallis neighborhood associations, apartment complexes, commercial buildings,
and residential lawns was compiled. The list of lawn care businesses that work in Corvallis was made using the snowball research method: well-known lawn care professionals were contacted and asked for additional names of lawn care businesses. The list of lawn care businesses that served Corvallis was considered sufficient once the names of businesses being recommended became redundant. The final list of lawn care professionals that served the City of Corvallis for the purpose of this project was comprised of 30 businesses (Appendix D).

An invitation to attend the focus group was sent to all listed lawn care businesses (Appendix E). In an effort to increase participation, all lawn care businesses received two follow-up phone calls to remind them about the focus group. A typical focus group should include six to eight participants that are representative of the sample population (McKenzie-Mohr & Smith, 1999; Folch-Lyon & Trost, 1981). Four lawn care professionals attended the focus group, less than the number of participants recommended. The low participation rates were most likely due to schedule conflicts among the lawn care professionals. The focus group was held in the late spring—a busy time for most lawn care businesses. Also, it was held in the evening and while it was intended to move around work schedules of the professionals, the late evening time was difficult for lawn care professionals whose businesses begin early in the morning. These time conflicts highlight the difficulty in working with business professionals. Although the number of participants was limited, they represented a wide range of the sample population of lawn care businesses. Commercial lawn care,
small residential lawn care, landscape design, and organic lawn care businesses were represented in the focus group.

The focus group methodology followed recommendations provided by Community-Based Social Marketing (CBSM) methodology (McKenzie-Mohr & Smith, 1999). In accordance with CBSM methodology, the focus group was facilitated and discussion lasted approximately two hours. Although participants were not paid as suggested by CBSM methodology, they were provided catered food and non-alcoholic beverages. Discussion questions were designed to elucidate the barriers and motivators lawn care professionals have when using controlled release fertilizers, testing the soil in order to add only as much fertilizer as is needed, leaving grass clippings, and cleaning up after fertilization (Appendix F). A volunteer note-taker took notes as participants answered prepared discussion-based questions pertaining to these lawn care practices (McKenzie-Mohr & Smith, 1999).

The discussion notes were then analyzed for themes relating to barriers and motivators to adopting the selected behaviors. As suggested in CBSM methodology, these themes were defined and the discussion data was broken down into ideas that were organized into one or more categories of barriers and motivators (McKenzie-Mohr & Smith, 1999). Four types of barriers arose from the focus group discussion, logistical, knowledge, attitudes, and norms. To see types of barriers and motivators see Table 1. See Appendix G for a complete analysis of focus group data.
Table 2. Examples of barriers and motivators found in each category.

<table>
<thead>
<tr>
<th>Logistical Barriers and Motivators</th>
<th>Knowledge Barriers and Motivators</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Time</td>
<td>• Lack of information about fertilizers or equipment</td>
</tr>
<tr>
<td>• Cost</td>
<td>• Special skills or techniques that are required for a certain behavior</td>
</tr>
<tr>
<td>• Equipment</td>
<td>• Understanding of soil processes that are required to build healthy soils</td>
</tr>
<tr>
<td>• Labor</td>
<td></td>
</tr>
<tr>
<td>• Weather-related (rain or temperature)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Barriers and Motivators based on Attitude</th>
<th>Normative behavior Barriers and Motivators</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Preconceived ideas about practices</td>
<td>• A perspective of a perfect, well-manicured, green lawn</td>
</tr>
<tr>
<td>• Preconceived ideas about what customers or professionals think/feel</td>
<td>• Concerned about what others, such as neighbors, are doing</td>
</tr>
<tr>
<td>• Desires of the lawn care professionals and customers</td>
<td>• Neighborhood association requirements for a perfect, well-manicured, green lawn</td>
</tr>
<tr>
<td>• Relying only on past experience to assess soil requirements instead of testing for pH and nutrient content</td>
<td></td>
</tr>
</tbody>
</table>

The purpose of uncovering barriers and motivators associated with the selected behaviors is to design an effective program that enhances motivation and overcomes barriers in order to increase the probability that lawn care professionals will adopt these sustainable behaviors. Based on previous research, the selected sustainable behaviors discussed in the focus group include: using controlled release fertilizers, testing for soil pH and nutrient content, grasscycling, and cleaning up excess fertilizer. The focus group discussion exposed important information on each of the aforementioned behaviors. For a summary of focus group findings, see Appendix H.
This paper demonstrates how two initiatives, The Healthy Soils for Healthy Streams Grasscycling Program and the Healthy Soils for Healthy Streams Drop Spreader Rebate Program, were created using Community-Based Social Marketing guidelines. From this point on, this paper will be divided into the following sections: First, the Grasscycling Program will be discussed using the Community-Based Social Marketing outline and secondly, the Drop Spreader Rebate Program will be discussed using the same outline.

**THE GRASSCYCLING PROGRAM**

**UNCOVERING BARRIERS AND MOTIVATORS, CONTINUED**

The Healthy Soils for Healthy Streams Grasscycling pilot program is designed to change the behaviors of Corvallis lawn care professionals. In particular, it is designed to prevent nutrient pollution by encouraging grasscycling. Grasscycling refers to the practice of leaving clippings on the lawn after mowing, as opposed to removing them as is traditionally done by many lawn care professionals. Leaving clippings on the lawn allows the clippings to decompose and release valuable nutrients back into the soil, thus reducing the need for additional fertilizers (Rosen & Horgan, 2010; Kopp & Guillard, 2002). The amount of nitrogen contained in grass clippings in 1000 sq ft nearly equals 1lb of nitrogen on a healthy lawn which is the recommended application rate of fertilizer to achieve healthy turf (Rosen & Horgan, 2010; VanDerZanden & Cook, 2001). On average, grasscycling can reduce fertilization requirements by 25-50% without decreasing turf grass quality. Moreover, a number of studies have found that grass clippings increase the overall quality of the turf.
The focus group exposed some barriers associated with the practice of leaving grass clippings in the lawn after mowing, or grasscycling. Weather was mentioned as an important barrier as wet, rainy weather makes grasscycling more difficult and increases time and labor, thus increasing cost. Other barriers pertained to the customers’ perceptions, misconceptions, and desire for a traditional green lawn. Participants suggested that customer's believe that grasscycling is too messy. For instance, customers may complain about clippings sticking to shoes and being tracked in homes. Another barrier is the lawn care professional’s belief that it is too difficult to mulch mow in the winter and customers would not concede to the higher frequency of mowing that is necessary when grasscycling. Focus group participants stated that customers have a misconception that clippings contributing to the layer of living and dead grass, stems, leaves, and roots which accumulate between the layer of grass and the soil underneath, also known as thatch. Too much thatch can prohibit sunlight, oxygen, and water from reaching grass roots. Grasscycling, however, does not create a thatch layer. Grass clippings are mostly water and nitrogen and biodegrade quickly, returning water and nutrients back into the soil (Oregon Department of Environmental Quality, 2011).
Survey

To find out more information about practices that were highlighted in the focus group and to continually narrow down the behaviors to be targeted in the outreach campaign, a survey made up of 16 questions (Appendix I) was mailed out to 30 Corvallis lawn care professionals. The 30 lawn care professionals who received the survey were the same lawn care businesses who received the focus group invitation. Survey methods followed seven steps: clarify the objective, list the items to be included, write the survey, pilot the survey, select the sample, conduct the survey, and analyze the data (McKenzie-Mohr & Smith, 1999). Following CBSM methodology, the questions were based on the literature review and focus group data (McKenzie-Mohr & Smith, 1999). The objective of the survey was to clarify the barriers and motivators of lawn care professionals that may prevent or encourage them to practice sustainable behaviors in order to effectively design a program that creates behavior change in the targeted audience. The survey was also intended to gather data from a broader audience than those who attended the focus group.

Of the 30 recipients, 15 responded to the survey, a response rate of 50%. Mailed survey response rates are typically low, averaging 20% to 40% (McKenzie-Mohr & Smith, 1999). The small population of lawn care businesses that work in Corvallis contributed to the small number of responses to the survey. However, despite the small number of survey responses received, the response rate is still above average (McKenzie-Mohr & Smith, 1999).
The following discussion of survey results illustrate barriers and motivators revealed through the survey analysis and how these findings guided the selection of a grasscycling program to change over-fertilizing behaviors. For an in-depth analysis of the survey, see Appendix (J).

Survey findings suggest that the lawn care professionals fertilize because they believe the soil is nutrient deficient and because clients expect it. When asked how important the following reasons were to fertilize a lawn, nutrient deficiency was reported by 100% of the respondents as an important reason to fertilize a lawn. “Clients expect their lawn to be fertilized” was reported by 93% of respondents as important. Building healthy soils was reported by 92% of respondents as an important reason to fertilize1.

Survey findings also suggest that lawn care professionals surveyed apply more fertilizer than is recommended for lawns in this region. The recommended fertilizer application rate for western Oregon is four times per year for high visual turf quality (Cook & McDonald, 2005). For medium visual turf quality, the recommended application rate for western Oregon is three times per year (Cook & McDonald, 2005). Nearly half of survey respondents apply fertilizer more than is recommended for high visual turf quality. Three-fourths are applying more than recommended for medium visual turf quality.

1 Total exceeds 100% due to the selection of multiple categories as a “Important” by a single respondent
Because research indicates that leaving grass clippings on the lawn can reduce fertilizer needs and build healthy soil, respondents were asked how often they leave grass clippings on a lawn (See Table 3). Given the options of “Always,” “Sometimes,” and “Never.” Respondents reported that they “Sometimes” leave grass clippings in the summer (64%), and “Never” leave grass clippings during the rainy seasons (62% Winter and Spring). These results suggest that rain may be a barrier to grasscycling. When asked why someone would leave grass clippings on a lawn, 86% reported requiring less fertilizer throughout the year as an “Important” reason and 83% reported clippings help build healthy soil as an “Important” reason. This data shows a possible motivator in that grass clippings can reduce fertilizer use and help build healthy soils.

Table 3. How often survey respondents apply fertilizer per season

<table>
<thead>
<tr>
<th></th>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>14%</td>
<td>64%</td>
<td>21%</td>
</tr>
<tr>
<td>Spring</td>
<td>8%</td>
<td>31%</td>
<td>62%</td>
</tr>
<tr>
<td>Fall</td>
<td>15%</td>
<td>54%</td>
<td>31%</td>
</tr>
<tr>
<td>Winter</td>
<td>15%</td>
<td>23%</td>
<td>62%</td>
</tr>
</tbody>
</table>

When asked what would prevent someone from leaving clippings in the lawn, 93% of the respondents reported that customers think grasscycling is “messy” and 83% reported that customers think it leaves clumps and streaks in the lawn. 71% agreed that customers think grasscycling builds thatch in the lawn. The majority of survey respondents disagreed that time and equipment are barriers to leaving grass
clippings in the lawn (31%, 17%, respectively). This survey data supports focus group findings that suggest barriers to grasscycling are primarily based on lawn care providers perceptions of customer preferences.

Survey data suggests that lawn care professionals believe that the cost of removing clippings is not a sufficient motivation for customers to grasscycle. When asked whether the respondent currently charges customers less if grass clippings are left on the lawn, all but one respondent answered “No.” When asked if the respondent thinks customers would be more inclined to grasscycle if they would be charged for removal of grass clippings, six out of fourteen answered “Yes” and eight out of fourteen responded “No.”

SELECTING A BEHAVIOR

Literature review, focus group, and survey finding were all taken into account when deciding what programs to pilot in order to encourage Corvallis lawn care professionals to change their behaviors to help reduce nutrient runoff. Promoting grasscycling to reduce fertilizer needs was chosen as one strategy to reduce nutrient runoff. Survey and focus group results suggest that lawn care professionals are not grasscycling due to customers’ expectations that lawns constantly require fertilizer and due to customer misconceptions that grasscycling is messy and creates thatch. In addition, survey results indicate that lawn care professionals apply fertilizer because they believe soil is deficient in nutrients. However, most lawn care professionals surveyed applied more fertilizer than is recommended for lawns in this region. Nearly
40% of survey respondents apply fertilizer more than is recommended for high visual turf quality and 75% are applying more than recommended for medium visual turf quality. Studies show that over-saturating the soil with nutrients can contribute to fertilizer run off during rain events, which contributes to nutrient pollution (Morton, Gold, & Sullivan, 1988). The survey data indicate that lawn care professionals are aware that grass clippings can provide lawns with needed nutrients, and can even be used as a replacement for fertilizers. Studies show the amount of nitrogen contained in grass clippings nearly equals 1 lb of nitrogen per 1000 sq ft per year (Rosen & Horgan, 2010; VanDerZanden & Cook, 2001). This is nearly equal to the application rate of fertilizer to achieve healthy turf. On average, grasscycling can reduce the fertilization requirements by 25-50% without decreasing turf grass quality (Kopp & Guillard, 2002; State of Oregon Department of Environmental Quality, 2000).

In summation, the barrier to changing over-fertilization behaviors through the practice of grasscycling is based on customer preconceptions and misconceptions. Based on this information, a program was developed to promote grasscycling as a way to reduce the amount of fertilizer applied to lawns unnecessarily, which would reduce nutrient runoff into local waterways. This program was designed to educate customers on the importance of grasscycling and address customer concerns and misconceptions is required in order to promote grasscycling behaviors. The City of Corvallis decided to promote grasscycling behavior because it has the tools and resources to overcome customer-based barriers associated with grasscycling. Furthermore, the City of Corvallis is able to establish a supportive relationship with
lawn care businesses through the promotion of grasscycling by providing their customers with education and awareness of the importance of grasscycling.

**DESIGNING AND IMPLEMENTING**

The first step in program development was to create a program name and brand. Healthy Soils for Healthy Streams was created as an umbrella title for City of Corvallis Stormwater Program initiatives focused on reducing polluted runoff through improved lawn and landscape practices. A graphic was created to serve as the official program brand (Appendix K). This graphic resembled the City of Corvallis Stormwater Program graphic so as to correlate the programs and continue to relate lawn care practices back to stormwater pollution prevention. The graphic was used in all letters, brochures, and official papers in promoting the grasscycling program.

In order for lawn care professionals to reduce their fertilizer applications by leaving clipping in lawns, customer-based barriers including the customer's lack of knowledge about the importance of leaving grass clippings, misconceptions associated with thatch build-up, and customer desires for a clean, tidy lawn needed to be addressed. To achieve this in a way that was supportive of lawn care businesses, an educational brochure was designed for lawn care professionals to give to their customers (Appendix L). The brochures address the misconception that grass clippings build thatch. Techniques to reduce the amount of clippings left on a lawn and to avoid clumps of clippings are also provided in the brochure to address customer concerns of the mess associated with grasscycling. The brochure also
emphasizes the efficacy of replacing fertilizer applications with grass clippings to reduce stormwater pollution prevention and offers information about the new Urban Stormwater Quality Management and Discharge Control Ordinance.

Lawn care professionals were given educational brochures to distribute to home owners in order to assist in the discussion of grasscycling. In this way, the brochure enables the City of Corvallis to serve as a supportive link between lawn care businesses and their customers. A draft of each brochure was sent to lawn care professionals who had participated in the focus group and the survey for editing.

An award program was also created and information about this included in the brochure. The Healthy Soils for Healthy Streams Stewardship Award (Appendix M) is available to any resident or company that worked with their lawn care provider to reduce fertilizer needs by grasscycling. The award is to be displayed in the lawn as to advertise the lawn as stream friendly. The award is designed to promote the social norm that stream friendly lawn care practices are desirable. By visibly advocating grasscycling through signage the award is promoting a tolerance for grass clippings in order to overcome the barrier associated with messy lawns. Recipients of the award are also fostering social diffusion. Social diffusion is the adoption of new behaviors, such as grasscycling, as a result of friends, neighbors, or family members introducing the behavior (McKenzie-Mohr & Smith, 1999). Furthermore, customers receive recognition that their lawn is stream friendly, thereby providing an incentive to continue to grasscycling efforts. The name of the participating lawn care business that
they worked with to reduce their fertilizer needs will be included on the award, as a way to advertise the business, thus providing an incentive for business participation. To receive a Healthy Soils for Healthy Streams Stewardship award, the customer calls the stormwater office and requests an award for their lawn. A packet containing three to ten brochures and a cover letter explaining the objective of the educational brochure (Appendix N) was sent to all 30 lawn care professionals previously targeted. Several weeks after the brochures were mailed out, lawn care professionals received phone calls to evaluate the success of the brochures.

The Healthy Soils for Healthy Streams program was advertised to the community through a variety of ways. Early in the project timeline, an article was written for “The City” newsletter explaining the importance of cleaning up after fertilization as well as other healthy soil practices. The launch of the Healthy Soils for Healthy Streams program was also announced in an article in “The City” newsletter (Appendix O). The Healthy Soils for Healthy Streams program was presented to the Corvallis Commission on Civic Beautification and Urban Forestry and received positive feedback. The idea of building healthy soils for clean, healthy water was transformed into an activity for a booth at the Corvallis Farmer’s Market (Appendix P). The object of the activity was to engage the public by visualizing the difference between over-fertilized soil and healthy soil.
EVALUATION

Evaluation of the grasscycling program was conducted in phone interviews with six participating lawn care professionals. Feedback about the grasscycling program was positive. Lawn care professionals state that the information given on the brochure was “Good” and “Right on.” One lawn care professional stated that is was a good presentation of information about grasscycling.

The program was also deemed successful due to a continuing demand for more brochures. One lawn care business requested and sent out a total of 70 brochures to clients and received a customer phone call inquiring about grasscycling. A neighborhood representative requested 150 brochures from the City of Corvallis to send out to residents. Two more lawn care professionals requested more brochures during the time of the evaluation. While the City of Corvallis has yet to receive any requests for award signs, there has been some interest in award signs for the upcoming season. One lawn care professional stated that a large commercial client was interested in grasscycling and would be interested in receiving an award sign next year.

During the evaluation process, lawn care professionals mentioned barriers to grasscycling that still exist. One lawn care professional noted that they currently grasscycle on a few sites but are limited by equipment demands. There are not enough mulching lawn mowers to service the growing number of interested customers. Another barrier mentioned was that grasscycling requires more frequent
mowing which would increase the cost for customers. This is a misconception on behalf of the lawn care professionals. Grasscycled lawns do not require more frequent mowing when coupled with reducing fertilizer and limiting irrigation (Cook & McDonald, 2005). Another lawn care professional mentioned that dispersing grass clumps that occur when grasscycling during wet weather is too time consuming. For a recommended timeline of grasscycling, see Appendix U. One lawn care professional had recently purchased a mulching lawn mower for grasscycling purposes, but did not have time to learn how to use the equipment properly.

When asked what else might the City do to support lawn care professionals in grasscycling efforts, most respondents suggested greater efforts to educate the public. Writing about the grasscycling program in “The City” newsletter was suggested multiple times, as was sending brochures directly to residents. Another suggestion was to include information on Healthy Soils for Healthy Streams on the City of Corvallis water bill. One lawn care professional summarized that the City of Corvallis should further promote grasscycling.

RECOMMENDATIONS AND FUTURE STEPS

The Healthy Soils for Healthy Streams grasscycling program was successful in reaching businesses and customers. Future recommendations are to continue to promote grasscycling through educational brochures while expanding the efforts to promote grasscycling to the public. Ways to increase exposure to the public may includes: writing more articles in the City Newsletter about the Healthy Soils for
Healthy Streams Grasscycling program, placing brochures in more public venues, as well as on the Stormwater website, and advertising at Farmers Markets or other community events. Another suggestion is to list participating businesses on the City of Corvallis Stormwater Program website as a way to promote lawn care businesses who work to reduce fertilizer pollution. According to the Stormwater Pollution Prevention Behavior of Corvallis Residents Final Report, the most preferred ways of receiving information on stormwater programs is “The City” newsletter, the City website, and direct mailings to residents (Bettencourt, 2010). Posting information about the Healthy Soils for Healthy Streams grasscycling program on the website is a fast, efficient way to provide further information to the public. Mailing the brochure directly to all citizens may not be cost effective. However, a cost-effective option may be targeting neighborhood association members, apartment complexes, and commercial sites as recipients of brochure packets that contain several brochures to hand out to individual residents. Another suggestion is to hold a one-day seminar for lawn care professionals to address the misconception that grasscycled lawns require more frequent mowing as well as emphasize the importance of healthy soils for clean, healthy water. In this one-day seminar, lawn care professionals could acquire one or two credits towards their continuing education credit for the Oregon Contractors Association. The seminar should be held in the off-season for lawn care professionals in the late afternoon so as to avoid schedule conflicts with busy lawn care professionals. The guest speaker could be Dave Alba from Oregon Tilth Organic Lawn Care to talk about the importance of grasscycling when building healthy soil. Offering 1 or 2 credits for the one-day seminar would give incentive to those lawn care
professionals who need to renew their certificate and only need one or two more credits to fulfill their requirements.

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THE DROP SPREADER REBATE PROGRAM

UNCOVERING BARRIERS AND MOTIVATORS, CONTINUED

This portion of the paper discusses the creation of the Healthy Soils for Healthy Streams Drop Spreader Rebate Program, which is designed to change the behaviors of Corvallis lawn care professionals. In particular, this portion of the paper focuses on the prevention of nutrient pollution by avoiding the dispersal of fertilizer onto sidewalks and streets where it can easily run off pavement and enter the stormwater system. Often, excess fertilizer is mistakenly distributed onto sidewalks and streets when businesses use a broadcast spreader to fertilize small areas, such as those between a sidewalk and a street. Cleaning up after fertilization requires time and labor, which in turn costs lawn care professionals money. The Drop Spreader Rebate Program was designed to overcome these barriers to cleaning up excess fertilizer by encouraging the use of drop spreaders to accurately apply fertilizer. Since broadcast spreaders throw fertilizer a long distance, they are best used for open stretches of lawn. A drop spreader helps

Figure 2. Holes located underneath the drop spreader allow fertilizer to be released. The rate of application corresponds to the size of the hole.
prevent stormwater pollution by directing an exact amount of fertilizer straight down into the grass, minimizing the amount of fertilizer that falls on hard surfaces.

Drop spreaders work by opening small holes at the bottom of the spreader and dropping the calibrated amount of fertilizer through the holes (see Figure 1). Using highly accurate equipment such as drop spreaders to apply fertilizer cuts down the misapplication of fertilizer onto streets and sidewalks, thus reducing potential stormwater pollution.

Excess fertilizer left on sidewalks and in streets may wash into storm drains and contribute to stormwater pollution. Focus group questions were intended to uncover barriers and motivators associated with cleaning up excess fertilizer that may fall into streets or sidewalks after application. More motivators than barriers to cleaning up after fertilizing were revealed through the focus group. For instance, lawn care professionals are motivated to clean up excess fertilizer that falls into the streets and sidewalks because fertilizer permanently stains the concrete and pavement. Other motivators include awareness of ordinance violations if fertilizer were to runoff into the storm drain. When barriers such as time of clean up and labor involved in cleaning up fertilizer were mentioned, focus group participants mentioned the use of leaf blowers to blow fertilizer off of streets and sidewalks and back into the lawn as an easy way to clean up after fertilization.

A significant finding of the focus group was revealed when focus group participants suggested the use of drop spreaders as a strategy to overcome possible time and cost
barriers associated with cleaning up after fertilization. In order to avoid getting fertilizer on streets and sidewalks during application, participants suggested that more accurate drop spreaders should be used for narrow spaces instead of broadcast spreaders. One participant stated that drop spreaders save time, because time isn’t spent cleaning up after fertilization. However, participants noted that drop spreaders require special training to avoid streaking and misapplication, a barrier to using drop spreaders.

Survey

To find out more information about practices that were highlighted in the focus group and to continually narrow down the behaviors to be targeted in the outreach campaign, a survey made up of 16 questions (Appendix I) was mailed out to 30 Corvallis lawn care professionals. The 30 lawn care professionals who received the survey were the same lawn care businesses who received the focus group invitation. Survey methods followed seven steps: clarify the objective, list the items to be included, write the survey, pilot the survey, select the sample, conduct the survey, and analyze the data (McKenzie-Mohr & Smith, 1999). Following CBSM methodology, the questions were based on the literature review and focus group data (McKenzie-Mohr & Smith, Fostering Sustainable Behavior, An Introduction to Community-Based Social Marketing, 1999). The objective of the survey was to clarify the barriers and motivators of lawn care professionals that may prevent or encourage them to practice sustainable behaviors in order to effectively design a program that creates behavior
change in the targeted audience. The survey was also intended to gather data from a broader audience than those who attended the focus group.

Of the 30 recipients, 15 responded to the survey, a response rate of 50%. Mailed survey response rates are typically low, averaging 20% to 40% (McKenzie-Mohr & Smith, 1999). The small population of lawn care businesses that work in Corvallis contributed to the small number of responses to the survey. However, despite the small number of survey responses received, the response rate is still above average. For an in-depth analysis of the survey, see Appendix J. The following discussion of survey results illustrate survey data, along with focus group and literature review findings, revealed barriers and motivators that led to the creation of the Healthy Soils for Healthy Streams program.

The survey indicated that that lawn care professionals are motivated to clean up after fertilization, but the additional costs associated with cleaning up may prohibit them from sweeping excess fertilizer off hard surfaces after application. 100% of survey respondents reported always cleaning up excess fertilizer; none of the respondents “Strongly agreed” or “Agreed” to any of the listed reasons that may prevent cleaning up after fertilization. However, the City of Corvallis has received complaints of fertilizer left in streets and sidewalks by lawn care businesses. Therefore lawn care businesses do not always clean up after fertilization, indicating barriers to clean-up must exist. When asked in the survey what may prevent cleaning up excess fertilizer from streets or sidewalks, the difference between disagree and strongly disagree
categories highlighted time and distance of fertilizer dispersal as the most commonly reported barriers (58%, 50% respectively).

Survey data indicated that lawn care professionals were not currently using drop spreaders, which can reduce the cost of cleaning up excess fertilizer. The majority of lawn care professionals who responded to the survey reported that they never use a drop spreader to apply fertilizer (67%), and slightly more than half reported that they always use a broadcast spreader (53%) (Table 3).

Table 4. How often survey respondents use Drop Spreaders and Broadcast Spreaders to apply fertilizer.

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<thead>
<tr>
<th></th>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
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<tbody>
<tr>
<td>Drop Spreader</td>
<td>13%</td>
<td>20%</td>
<td>67%</td>
</tr>
<tr>
<td>Broadcast Spreader</td>
<td>53%</td>
<td>27%</td>
<td>13%</td>
</tr>
</tbody>
</table>

SELECTING A BEHAVIOR

As stated above, literature review, focus group, and survey finding were all taken into account when deciding what programs to pilot in order to encourage Corvallis lawn care professionals to change their behaviors to help reduce nutrient runoff. Promoting the use of drop spreaders to apply fertilizer was chosen as one strategy to reduce nutrient runoff.

Focus group findings and survey results indicate that Corvallis lawn care professionals know that it is important to clean up excess fertilizer from hard
surfaces. Furthermore, survey results indicate that barriers such as time and equipment, rather than knowledge, may prevent cleaning up excess fertilizer. Research indicated that Corvallis lawn care professionals are motivated to save money by reducing the time cleaning up excess fertilizer requires.

According to survey results, most lawn care professionals are currently using broadcast spreaders as their fertilizing equipment. When asked how often they use various spreaders, the majority of lawn care professionals reported that they “never” use a drop spreader to apply fertilizer (67%), and only one out of 14 respondents reported that they “always” use a drop spreader. Broadcast spreaders use a rotary disperser to throw fertilizer pellets a distance into the lawn. These spreaders are known to be inaccurate and can throw pellets onto sidewalks or into streets. Drop spreaders increase accuracy and are appropriate for individual lawns or small areas such as parking strips. Drop spreaders decrease time of clean up because it reduces the distance excess fertilizer travels down the street. And because drop spreaders are more accurate, there would be less wasted fertilizer. Ultimately, promoting drop spreaders through could potentially reduce nutrient runoff into the City storm system.

**DESIGNING AND IMPLEMENTING**

The first step in program development was to create a program name and brand. Healthy Soils for Healthy Streams was created as an umbrella title for City of Corvallis Stormwater Program initiatives focused on reducing polluted runoff through
improved lawn and landscape practices. A graphic was created to serve as the official program brand (Appendix K). This graphic resembled the City of Corvallis Stormwater Program graphic so as to correlate the programs and continue to relate lawn care practices back to stormwater pollution prevention. The Drop Spreader Rebate Program for Lawn Care Businesses was the first program to be piloted under this umbrella title. The graphic was used in all letters, brochures, and official papers promoting the drop spreader program.

A drop spreader rebate program was created to help bypass barriers to cleaning up excess fertilizer from streets and sidewalks. Using a drop spreader would allow for more accurate application of fertilizer which would overcome the main barriers to cleaning up excess fertilizer; time and cost of clean up. A rebate program would offer an incentive for lawn care professionals to use drop spreaders while overcoming any money-associated barriers of purchasing a new drop spreader. The first three applicants accepted by the City of Corvallis Stormwater Program would receive a $300 rebate off of their newly purchased drop spreader. Lawn care professionals who do not currently use a drop spreader would be encouraged to try using a drop spreader to increase their application accuracy without spending a large sum of money to do so. A similar rebate opportunity by the City of Corvallis Water Conservation has been successful in promoting water efficient toilets and washing machines. The Drop Spreader Rebate Program application and rules documents are modeled after these existing City of Corvallis rebate programs. All 30 listed lawn care
businesses received a promotional Drop Spreader Rebate Program packet that included:

- Cover letter (Appendix Q)
- Rules and Qualifications (Appendix R)
- Application form (Appendix S)
- Training Tips (Appendix T)

The Rules and Qualification document addresses details of the rebate program such as the rebate amount, deadlines, and required forms. Eligibility requirements outlined in the rules document state:

- Participants are lawn care professionals.
- A majority of the business’s clientele is located within the Corvallis city limits.
- Each business is permitted only one application per program cycle.
- Preference will be given to those applicants who do not currently own a drop spreader and who have not previously received a drop spreader through this program.

The Rules and Qualification document also includes a section on how to purchase a drop spreader, as well as a list of recommended models, prices of the models, and where to purchase the models. Given that business audiences are very busy, it was important to provide useful, easy to access information on how and where to purchase drop spreaders to overcome any barriers to purchasing a drop spreader. The application form requires the participant to list the date, price, and place of drop
spreader purchase. It also requires the participant to verify eligibility by initialing eligibility statements and providing a signed agreement.

The Training Tips document was created with information gathered in the research process, which included information provided by lawn care professionals during the focus group. Local drop spreader expert, Brian McDonald from the OSU Horticulture Department at the Lewis-Brown Farm, also provided important training information. The Training Tips document provides useful information on where to use a drop spreader, how to calibrate and use a drop spreader, and gives general training tips for new drop spreader users. As suggested during the focus group, the Training Tips document may be translated into Spanish for non-English speaking employees.

The deadline was set two weeks after the applicants received their packets. Shortly after the Drop Spreader Rebate Program packets were sent to the list of 30 local lawn care professionals, a follow-up phone call was made to remind participants of the deadline. The rebate program was open only two weeks due to the high amount of applications that were anticipated. After the rebate program deadline had passed, all lawn care professionals received a phone call to evaluate the success of the rebate program.

The Healthy Soils for Healthy Streams program was advertised to the community through a variety of ways. Early in the project timeline, an article was written for the City Newsletter explaining the importance of cleaning up after fertilization as well as
other healthy soil practices. The launch of the Healthy Soils for Healthy Streams program was also announced in an article in ‘The City’ newsletter (Appendix O). The Healthy Soils for Healthy Streams program was presented to the Corvallis Commission on Civic Beautification and Urban Forestry and received positive feedback. The idea of building healthy soils for clean, healthy water was transformed into an activity for a booth at the Corvallis Farmer’s Market (Appendix P). The object of the activity was to engage the public by visualizing the difference between over-fertilized soil and healthy soil.

EVALUATION

The drop spreader program did not receive any applicants. To investigate this lack of interest, an evaluation was conducted by phone interviews with six participating lawn care professionals.

The first possible contributor to the lack of interest in the program was a disparity between survey results and comments received in the evaluation. During the survey, lawn care professionals were asked how often they use both broadcast spreaders and drop spreaders. Since very few respondents reported “Always” using a drop spreader, an assumption was made that lawn care professionals are not using drop spreaders because they do not own drop spreaders. However, according to comments received in the evaluation, many of the lawn care professionals do indeed own a drop spreader, but still do not use the drop spreader. The Drop Spreader Rebate Program rules state applicants who do not currently own a drop spreader were given priority
over those who own drop spreaders and wish to upgrade. The reason behind this rule was to engage lawn care professionals in new behaviors that reduce polluted runoff. However, the assumption that lawn care professionals do not own drop spreaders may have been inaccurate. Based on evaluation input, the rule that states applicants who do not currently own a drop spreader will be given priority over those who do acted as a deterrent for the program. In fact, two participants stated that because they currently own drop spreaders, they didn’t apply for the rebate because they didn’t think they were eligible. A lawn care professional who owns a drop spreader felt that it was unfair to target only applicants that do not currently own a drop spreader and thought it discouraged those who currently do “the right thing.” Respondents did say that they would be more likely to apply for a rebate if it were open to applicants who already own drop spreaders.

Another possible contributor to the lack of interest in the rebate program was that applicants were given only two weeks to submit their applications. A lawn care professional stated that they didn’t have enough time to apply for the rebate and another suggested that they misunderstood the deadline of the rebate program.

Other comments from the evaluation suggest that drop spreaders are too costly and too hard to train employees to use. Lawn care professionals seemed reluctant to try new equipment that may cause lawn striping. One lawn care professional preferred using a hand-crank spreader to apply fertilizer on the sidewalk strips and suggested that the City of Corvallis promote hand-crank spreader to apply fertilizer in parking
strips. Other barriers to using a drop spreader brought up in the evaluation included inaccuracy, clogging, rusting, as well as the previously stated risk of striping or burning lawns in the summer. Lawn care professionals suggested that blowing or sweeping up fertilizer after fertilization is accurate and works well for clean-up purposes. One lawn care professional stated that the homeowners themselves are most guilty of allowing fertilizer to run into stormdrains.

When asked what else might the City do to support lawn care professionals in efforts to clean up excess fertilizer left in streets and on sidewalks, most respondents suggested eliminating parking strips, educating homeowners about the importance of cleaning up after fertilization, and using liquid fertilizer on the sidewalk strips. Another suggestion was to hold a one-day seminar for lawn care professionals that would teach proper clean up techniques, how to use a drop spreader, and raise awareness about the importance of responsible fertilizer practices for clean, healthy water. The seminar should be held in the off-season for lawn care professionals in the late afternoon so as to avoid schedule conflicts with busy lawn care professionals. The guest speaker could be drop spreader expert, Brian McDonald from OSU’s research farm. Another guest speaker could be Dave Alba from Oregon Tilth to teach about the importance of building healthy soil. Offering 1 or 2 credits for the one-day seminar would give incentive to those lawn care professionals who need to renew their certificate and only need one or two more credits to fulfill their requirements.
RECOMMENDATIONS AND FUTURE STEPS

There are many barriers associated with using drop spreaders to reduce the time required to clean up excess fertilizer that lands on hard surfaces when using a broadcast fertilizer applicator. Lawn care professionals are reluctant to use new, risky equipment and seem firm in their belief that they are effectively cleaning up excess fertilizer. Lawn care professionals also suggest that drop spreaders are too expensive to buy and too difficult to train their employees to use. There is still some interest in the program if it were open to applicants who currently own a drop spreader and would like to expand their practice.

To overcome the cost of purchasing a drop spreader, the Drop Spreader Rebate Program should run once again with alterations to overcome the barriers reported in the evaluation. In order to increase rebate application numbers and to overcome the time restriction barrier, it may help increase participation to extend the application deadline to three or four months. See Appendix V for suggested program deadline. Also, it is recommended to open the program to applicants who currently own a drop spreader and want to expand their practice. This could still promote the use of drop spreaders in order to reduce time and cost of cleaning up excess fertilizer. Increased awareness of the program through increased calling, mailings, or advertising year round could increase the number of applicants as well. The program should also be altered to focus on lawn care professionals who own drop spreaders, but do not use them to apply fertilizer. Advertising the attractiveness of reducing the need for clean
up efforts as well as the saving money by preventing fertilizer waste could help encourage those reluctant to use their drop spreaders.

Furthermore, a seminar that provides information on how to properly use and calibrate a drop spreader, as well as the importance of cleaning up excess fertilizer, would greatly benefit lawn care professionals and their employees. The seminar could possibly overcome barriers to using drop spreaders by training business owners and employees about reducing the risk of striping and patchiness. This discussion could potentially reinforce existing behavioral norm of cleaning up after fertilization and may encourage experienced lawn care professionals. In this one-day seminar, lawn care professionals could acquire one or two credits towards their continuing education credit for the Oregon Contractors Association.

In addition, efforts to reduce the need for fertilizer, such as the adoption of alternative sustainable behaviors such as elimination of parking strips or xeriscaping in parking strips, may also be worthwhile. More outreach aimed at generating increased awareness of the Stormwater Discharge Ordinance may create an important motivator for lawn care professionals and their employees to clean up after fertilization.

**GENERAL RECOMMENDATIONS FOR THE FUTURE OF THE ENTIRE HEALTHY SOILS FOR HEALTHY STREAMS PROGRAM**
It is recommended that the City of Corvallis provide lawn care professionals with greater incentives to participate in the Healthy Soils for Healthy Streams program. This incentive could come in the form of a logo or sticker for their business that states something similar to “This Business is Backed by City of Corvallis Healthy Soils for Healthy Streams Program. We do our part to keep our streams clean.” According to focus group findings, lawn care professionals are eager to be recognized by the City of Corvallis for supporting their stream friendly practices. This recognition may persuade lawn care professionals to participate in current and future Healthy Soils for Healthy Streams programs.

Working with lawn care businesses is a challenging outreach effort. The pilot program showed the importance of timing when working with lawn care professionals. As decision makers of the business, they are busiest in the spring and summer. Future outreach efforts for the Healthy Soils for Healthy Streams program should be conducted in the late fall or winter to avoid schedule conflicts with the businesses.

Although the Healthy Soils for Healthy Streams project served as an outreach initiative and focused on supporting lawn care professionals in adopting sustainable behaviors, some lawn care professionals seemed hesitant to work with the City of Corvallis. As business owners, lawn care professionals struggle to accommodate recommendations by the City of Corvallis and the needs of their customers, all the while competing with several other lawn care professionals for business. Future
outreach efforts to lawn care professionals should be handled delicately and the supportive role of the City of Corvallis should be emphasized in all communications. For that matter, all future pollution prevention programs that include other varieties of businesses, such as car washes or automotive businesses, should emphasize the City of Corvallis’ support in practicing sustainable behavior.

The next steps for the Healthy Soils for Healthy Streams program include supplementary promotion of grasscycling to the public and lawn care professionals and educating and engaging lawn care businesses about the importance of cleaning up after fertilization, while continuing to encourage businesses to reduce fertilizer requirements. Additional areas of interest that could fall within the Healthy Soils for Healthy Streams Program include practices that focus on the replacing of parking strips with other treatments including rain gardens, xeriscapes, or permeable surfaces. These lawn care practices can make a difference for clean, healthy lawns while supporting lawn care businesses in their efforts to reduce fertilizer runoff.

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APPENDIX A

Questions to Poll Water Quality Experts

Impact of a behavior

Rate the following practices on a scale of 1-5:
1 = makes very little positive difference for water quality by reducing nutrient runoff
5 = makes a very significant positive impact on water quality by reducing nutrient runoff

1) Recycling grass clippings (mulch mowing)

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<tr>
<td>Very Little</td>
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2) Using slow-release fertilizers

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<tr>
<td>Very Little</td>
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3) Aerating the soil to help reduce compaction and increase penetration of fertilizer

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4) Regularly test the soil for pH and nutrient content (Phosphorus/Nitrogen)

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<td>Very Little</td>
<td>Very Significant</td>
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5) Sweeping excess fertilizer off hard surfaces (i.e. sidewalks, driveways, streets) and back into the lawn

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<tr>
<td>Very Little</td>
<td>Very Significant</td>
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6) Use a fertilizer/pesticide sprayer with a deflector

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7) Coordinating fertilization with rain events

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8) Applying and tilling high quality (or Grade A) compost as topsoil or topdressing

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APPENDIX B

Questions to Poll Landscape Experts
Probability of adopting a behaviors

1) How much of your business is lawncare as opposed to landscape maintenance?
   10%  25%  50%  75%  100%

2) How easy would it be to recycle grass clippings as mulch and place back into the lawn rather than bagging and disposing?
   1  2  3  4  5
   Very Difficult  Very Easy

3) How easy would it be to use slow-release fertilizers?
   1  2  3  4  5
   Very Difficult  Very Easy

4) How easy would it be to aerate the soil?
   1  2  3  4  5
   Very Difficult  Very Easy

5) How easy would it be to regularly test the soil for pH and nutrient content (Phosphorus/Nitrogen)?
   1  2  3  4  5
   Very Difficult  Very Easy

6) How easy would it be to sweep excess fertilizer off hard surfaces (i.e. sidewalks, driveways, streets) and back into the lawn?
   1  2  3  4  5
   Very Difficult  Very Easy

7) How easy would it be to use a fertilizer/pesticide sprayer with a deflector?
   1  2  3  4  5
   Very Difficult  Very Easy

8) How easy would it be to coordinate fertilization with rain events?
   1  2  3  4  5
   Very Difficult  Very Easy

9) How easy would it be to apply and till compost as topsoil or topdressing?
APPENDIX C

Summary of Poll

Lawn care professional comments

Grass clippings
- Landscapers are willing to do it (most ranked it as 5)
- It’s easy if they already have the mulching-lawnmower
- Customers typically don’t want it done because they think it leaves clumps of grass on the lawn (not aesthetically pleasing)
- Depends on the season- during the winter, the grass is wet and clumps more easily and gets washed down the stormdrain faster in a rain event
- Also depends on how often they mow- customers have to pay for more frequent mowing
- Easier if the customer has a compost site to dump the waste

Slow-release fertilizers
- Most already do it and ranked it as “very easy” and gave it a 5.
- Some said there isn’t much difference in cost in the long run.
- Some said it’s more expensive, but they at least offer the choice to the customer (customer driven)
- Sulfur-coated urea
- In the winter there’s less microbial activity and they don’t use as much fertilizer

Aerating the soil
- Most said it’s easy enough to do if they already have the equipment, it is just an extra cost for the customer.
- Ranked around a 2-3 for difficulty to get the customer to ask for it.
- Time and money factors, customer driven.

Testing for pH and nutrient content
- Since labs have moved out of Corvallis, it is an extra expense to get the soils tested often.
- A fast litmus test can be done by landcapers on-site
- Some said it’s an extra cost to the customer
- Customers really like to see the pH, it’s something they know how to relate to
- You don’t need to do it that often, you can really tell just by looking at the grass.
- There were a few 5’s, but mostly 2-3’s.

Sweeping fertilizer off hard surfaces and back into the lawn
- Everyone said it was very easy and claimed to already do it.
- One person admitted to using a leaf-blower
APPENDIX C CONTINUED

Using a deflector
- Seemed to be a mix of people who already use one and understood what it is, and some that didn’t get what I was talking about. Perhaps another question or picture to clarify what a deflector is or does would be useful to revisit in the future.
- Those that knew what it was gave it a 4-5 because their spreaders already include a deflector.
- mentioned that they use one but it doesn’t work very well.
- Drop-spreaders are more accurate, but usually have operator errors

Coordination with rain events
- Some said it depends on the season. Summer is easier (no rain).
- Scheduled routes make it more difficult. Can’t wait for rain events to come or go- they have times and dates set up.
- Most gave it a 3

Apply compost
- Most said it would be easy to do during initial seeding or when re-seeding a lawn (5).
- After grass/turf has already been established, it’s more difficult to get the customer to agree to it.
- Customer thinks it’s smelly, clumps, doesn’t work, generates more weeds.
- Challenge in getting the right product and matching it to the turf.
- Some mentioned that time and money are factors on both ends.
- Most ranked it low 2-3

Overseeding
- Some said it’s easy to do (5)
- Some said they already do it
- Most said they do it in the beginning (seeding), but after that it’s an extra cost and not very effective
- Works better for already thin areas and as lawns age they do it more often
- Seems to be differing opinions as to when to overseed, but overall agreement that it’s not very effective in reducing the amount of fertilizer or pesticide use.
- Most ranked it a 3.
APPENDIX C CONTINUED

Water Quality comments

Grass clippings
• Most said this would be very effective and ranked it a 5.
• Does not imply that less fertilizer would be used, however.

Slow release fertilizers
• Ranked as 4
• Does not imply that you would apply it at the right time/less frequently.

Aerating the soil
• Some thought this would be effective in allowing the fertilizer, nutrients, and water to penetrate through the soil.
• Eckert thought this was "silly" and a last-ditch attempt to save already compacted and ruined soil.

Testing the soil
• Ranked as 4-5
• Depends on what the landscaper does with the data

Sweeping fertilizer off of hard surfaces and back into the lawn
• 3 from Beth Young because it implies using fertilizer in the first place
• Teresa ranked it as a 4 and David Eckert as a 3
• Mark Taratoot ranked this as his only 5, as it directly aids in improving water quality.
• Seems to be a range of rankings, but overall the agreement is that it would be moderately effective if using fertilizer is unavoidable.

Using a deflector
• Confusion as to what a deflector is or does. A revisit to deflector use may be helpful in the future.
• Beth Young ranked it as a 3 because it again implies using fertilizer in the first place.
• Mark did not answer because he wasn't positive how it worked (if it's only on broadcast spreaders or hand held, liquid sprayers, or both).
• Mentioned drop-spreaders as an alternative
• Most ranked as 3-4

Coordinate with rain events
• Varying ranges of rankings
• Eckert gave it a 4, Beth gave it a 3 (same reasons as before - implies use of fertilizer), Mark gave it a 2 (coming from a water conservation perspective), Teresa gave it a 5.
APPENDIX C CONTINUED

Applying Compost
- Most ranked it as a 5, as long as the compost was high quality.
- Mark ranked it as a 1 because it could still add to runoff and stormwater pollution.

Overseeding
- Mixed rankings due to lack of knowledge. Not sure how effective it would be.
- Teresa and Beth ranked it as a 4-5, Eckert wouldn't answer because he wasn't sure, and Mark ranked as a 1.
APPENDIX D

LIST OF CORVALLIS LAWN CARE BUSINESSES

Gaia Landscapes, Inc.
33735 Peoria Rd Corvallis, OR 97333
541-754-1439

Peterson Landscape Services
1160 SW Stamm Place Corvallis OR, 97333
541-753-0724

Hill’s Top Design
2521 Northwest 9th Street Corvallis, OR 97330
541-738-0690

Shonnard’s Nursery, Florist, & Landscape
6600 SW Philomath Blvd Corvallis, OR, 97333
541-929-3524

Beth Young Garden Design
534 NW 4th St Corvallis, OR, 97330
541-738-2971

David Sandrock
3045 NW Johnson Avenue Corvallis OR 97330
541-207-6399

Cascade Landscape Management, Inc
5287 Portland RD NE Salem, OR
503-393-0673

Kapa Landscape Design, LLC
2340 Southeast Crystal Lake Drive Corvallis, OR 97333
541-753-5281

TruGreen
1040 Old Salem Road Northeast, Albany
541-928-1283

Rainbow Yard Services
6940 Northwest Oak Creek Drive, Corvallis, OR, 97330
541-753-6274

Ham Mock and Associates (Steve Ham)
APPENDIX D CONTINUED

30531 Oakview Dr, Corvallis, OR, 97333
541-929-5563

American Landscape and Irrigation
222 29th Ave SW Albany, OR 97322
541-926-7036

Rainsweet Landscape Svc LLC
247 NW Spring Creek Dr Corvallis, OR 97330-9746
541-752-6110

Stutzman Services- Ryan Jennings
4185 Spicer Dr SE Albany, OR 97322
1800-922-8134

Straub Landscaping- Ashley Straub
PO Box 2129 Corvallis, OR 97339
541-929-4168

Maple Creek Landscaping
28856 Hwy 34, Corvallis, OR 97333-2224
541-757-2810

Willamette Turf Inc
8624 Wabash Drive NE Salem, OR
503-792-3734

B Johnson Turf and Irrigation
1929 SE 3rd St, Corvallis, OR
541-753-6154

Superior Lawn Care
1984 SE Crystal Lake Dr, Corvallis, OR 97333
541-754-2094

MAK Landscape and Irrigation
309 SW 9th St APT #2 Corvallis, OR 97333-4561
541-752-4582

Chorak Mowing
4079 SE 3rd Street Corvallis, OR
541-752-3393

Inavale Lawn and Tree (Bill Traver)
29657 Cronn Drive Corvallis, OR 97330
541-929-6495
APPENDIX D CONTINUED

Green Thumb Landscaping (Scott Friedman)
4400 Dallas Hwy
PO Box 5172 Salem, OR 97304

Lakeside Landscape
29258 Lakeside Dr 97333-9444
541-753-0140

Red Stem Landscape Maintenance Design
PO Box 63 Corvallis, OR 97339
541-207-5614

Lundeen Landscapes
549 PO Box Corvallis, OR 97339
541-929-4243

Greer Brothers Landscaping (Roger Greer)
6290 Lardon Road NE Salem, OR 97305-3758
503-362-3748

Russell’s Landscape Services Inc (Russell)
3901 Timbet Drive SE Salem, OR 97317-9435
503-363-9835

Westside Landscape
590 Greenwood Rd S Independence, OR 97351-9653
503-585-9517

Prograss Landscape Services
4815 Pacific Ave, Eugene, OR 97402-8314
1-800-776-4727
APPENDIX E

Peterson Landscape Services
1160 SW Stamm Place
Corvallis, OR
97333

Mr. Peterson

As a graduate student at Oregon State University in the Marine Resource Management program, I am working with the City of Corvallis Stormwater Program. Together, we are conducting research about how best to engage lawn care professionals in improving water quality through lawn care practices that prevent polluted runoff. The information collected through this project will be used by the City of Corvallis to pilot a Fish Friendly Lawn Care program to support local lawn care professionals interested in implementing pollution prevention practices. This information will also be used as my master’s project.

As someone who specializes in lawn care, I need your help to better understand what you and other lawn care experts think about various practices that may help prevent polluted runoff. I am asking you to consider participating in a one-time, two hour focus group study with other lawn care professionals. The focus group will be held on Thursday, May 6th from 6-8pm at the Corvallis-Benton County Public Library (Room A). Your participation is voluntary. Please RSVP to Jenna Halsey no later than May 4th. RSVP either by email (jhalsey@coas.oregonstate.edu) or phone (260-615-9488). If you would like to participate in this project, please sign the enclosed informed consent form and bring it to the focus group session. If I do not hear from you, I will follow up by phone to request your participation. Your participation is very important to me. I hope you will agree to be a part of this important study.

Please read the enclosed informed consent form carefully. Feel free to contact me with any questions you may have about this research, your rights as a volunteer, and anything else that is not clear. If you choose to participate, the input you provide for this study will be kept confidential to the full extent permitted by law. Any comments you make during this study will be analyzed and presented in such a way that you cannot be identified. There are no foreseeable risks to you as a participant in this project. Your participation in this focus group will help us gather invaluable data to better understand lawn care practices and develop an effective stormwater pollution prevention program.

Thank you for your willingness to participate in this study. If you have any further questions about the study please don’t hesitate to get in touch with the principal investigator for this study, Jenna Halsey, Tel. 260-615-9488, jhalsey@coas.oregonstate.edu or Co-investigator Gwenn Kubeck, Tel. 610-389-5089, Gwenn.Kubeck@ci.corvallis.or.us. If you have any questions about your rights as a focus group participant, please contact the Oregon State University Institutional Review Board (IRB) Human Protections Administrator at 541-737-8008 or IRB@oregonstate.edu.

Respectfully,

Jenna Halsey
Candidate, M.S. Marine Resource Management
APPENDIX F

Focus Group Questions for Discussion

Question: How easy would it be to sweep excess fertilizer off of hard surfaces like sidewalks or driveways, and back into the lawn?
Objective: To assess possible difficulties in sweeping, or to share the possible benefits in sweeping.

• Do any of you do this already?
• What kind of equipment do you use to sweep up the fertilizer?
• Would additional training be helpful to make sure this practice occurs?
• How do you feel you are making a positive impact when you sweep?
• How far would you be willing to sweep- i.e. would you be willing to sweep the street two houses down?

Question: How easy would it be to leave grass clipping in the lawn to recycle the nutrients (as opposed to raking and disposing of grass clippings)?
Objective: To assess possible barriers in recycling grass clippings and discuss the possible benefits in leaving nutrients in the soil.

• Do any of you do this already?
• How do you think customers feel about leaving grass clippings?
• Would this require buying extra equipment?
• Would this cost more for the customers?
• How does the convenience of this practice depend on the rain?
• Would you or your customers be just as willing to leave in grass clippings during the wet season vs. the dry season?
• How do you think this practice could help reduce fertilizer use?

Question: How easy would it be to regularly test the soil for pH and nutrient content?
Objective: To highlight the barriers and discuss possible benefits of regular testing. Discuss possible solutions.

• Do any of you do this already?
• Do you know where to send your soil for testing?
• If you were provided test results for the soil nutrient content, what would you do with them?
• What kind of information about the soil would be most helpful to use?
• Would this practice cost more for your customers?
• Do you feel you can tell how much fertilizer the grass needs just by looking at it?
• Do you think your customers would like to know the test results?
APPENDIX F CONTINUED

Question: How easy would it be to use slow release fertilizers instead of the conventional fertilizers?

- Do any of you use slow release already?
- How do slow release fertilizers differ in price to more water soluble fertilizers?
- How does using slow release fertilizers affect the lawn?
- Would using slow-release increase cost for your customers?
- Do you know what brands or kinds of fertilizers are slow release?
- How would using a slow release fertilizer affect the frequency of application?
APPENDIX G

*FINDINGS ORGANIZED BY PRACTICE AND TYPE OF BARRIER

**Slow Release Fertilizers**

**Structural/Logistical**
- 30-40% more expensive, labor is most expensive part
- Don’t charge customers for higher price
- Controlled release (65% mix) is $18.50/bag compared to ammonia (quick release) is $12/$13
- Labor is more expensive than fertilizer.
- Organic costs more. Chemical fertilizers petroleum based so the cost is increasing.
- Organics lack weed control.
- Don’t use when rainy- too hard to work when rainy
- Don’t want to buy as much fertilizer major expense.

**Knowledge**
- Stays green for longer and helps with mowing
- Different kinds for different seasons
- 12% iron in spring to make grass green-up immediately
- Key is to use CR in fall so grass/root system is healthy in spring.
- Spring is 24-12-15 rations with a bit of P. Summer is 24-14-50. Feb- spray with sulfate to kill moss
- Depends on warmer temp: UF and natural organic work w microorganisms to breakdown. Better in summer. IBDU and SCU depend on water, not as much temp.
- SCU affected by temp only sometimes.
- Organic is problem because of so many definitions
- “Going organic” isn’t just product replacement; it’s building a soil system to support it.
- You are feeding the soil, which in turn will feed the grass.
- Environmental problem is an amount issue. Nitrogen is still going into the biosphere. CR still adds to amount, even if slower.
- Same amount of nit/year, just a matter of how often you have to do it. 70% of fertilizer runs off.
- Osmo-coated might work with microbes.
- Most customers don’t know to request CR

**Attitude**
- Customers demand CR
- Customers don’t care, just want grass to be green
- Whatever has been working will continue to work (from customer’s perspective)
- Have to work with customers to find out what they really want
- Organic is a different mindset than just pouring out of a bag.

**Norms**
- Add iron to make grass look green for spring
- Quick green up
- Moss is not acceptable in lawns
- Just want grass to be green
Organic is the next big thing coming
Going organic means changing the mindset

Testing the Soil

Structural/Logistical
- Time and expense are problems
- $35 a test
- Time, labor, money reasons why not
- Monitor fertilizer
- Penn state $9
- Money is tight this year- no one willing to spend extra
- Liming may lower labor costs
- Liming is not in contract because it’s expensive
- Not going to blend 3 bags of fertilizer just to fix what you have
- Decrease fertilizer could benefit business
- Does liming lower cost over time?
- Soil testing can require a custom plan for each yard.
- No corers or equip necessary
- With penn state it only takes a week
- pH is cheap
- Good grass gets infected with colonial bent grass- grass seeds are in the air

Knowledge
- Most lawns are acidic in Oregon.
- Add lime to acidic soil
- Soil tests don’t test for N since it cycles in the soil change often
- Clients have to understand the process of getting tested.
- May have to specialize a fertility program
- Piece of paper with numbers doesn’t mean anything
- Need recommendations with tests
- Sometimes you can find a real abundance of something, which is causing a real yellowing of the lawn.
- Suggest liming everything
- If you have $5 to test anything. Test pH.
- Always should test pH
- Soil is very buffered system- always have to change the pH because it won’t stay basic for long.
- Select fertilizers that change the system
- Landscape plants that like acidic soil (azalias)
- pH affects nutrient uptake (can’t take up iron in an acidic soil)
- Maybe get turf that likes acidic soil
- New lawn mixes include clover and daises (ecoturf).

Attitude
- I can tell from experience
- I can troubleshoot just by looking at the lawn
- 27 years in business
- If color drops, just apply more fertilizer.
- Based on historic info (what happened last year)
APPENDIX G CONTINUED

- Reading wouldn’t mean much
- Have to manage based on experience
- Easy to do through Penn State
- State agency (customer) doesn’t care
- Most customers aren’t interested in testing unless something really wrong
- Trust experience
- Customers like recommendations called “healthy soil and healthy plants”
- Hard for commercial people
- Home test kits are easy for residents to do on their own
- Easy to test for pH
- Reliable kits out there to test pH
- Putting liming in the contract would take out of competition
- Liming would not zero out costs
- No one is willing to spend extra

Norms

- Customers like when company calls their soil and plants “healthy” by Penn State
- Only about 20% ask for recommendation- most just about moving into a new house
- Moss is unacceptable to customers
- Established garden in a region of the yard- don’t worry about testing
- Turf is an unnatural system and weeds aren’t bad but we have invented a good lawn image that says they are.
- People have to be OK with weeds
- Not a plant problem, human perception problem

Grass clippings

Structural/Logistical

- Try to use mulch mower to make clippings more fine.
- After mow, use blower to spread clumps out
- Spend a lot of money hauling out clippings
- Seasonally- summer is better to mulch
- Use to fertilizer 4-5 times, now leave clippings in and lower to 3 times a year.
- New Honda mulch-mowers have double blade so they cut clippings more than once.
- Open the guard on the mower and wear tall boots. Let clippings fly out at boots so they don’t form a line or clumps as you mulch-mow
- Most professionals have mulch-mowers but don’t use much unless it’s summer and grass is dry/not growing a lot.
- Mulch-mowers are pretty inexpensive
- Mulch mowers don’t work well in the rain- plug up and you have to clean them constantly
- Ideally you would mow more with mulch-mowing
- Spring- grass grows too fast- can’t keep up with mowing
- More cost to customer to mow more often
- Sharp blades are good- cut into smaller pieces.
- Sharpen blades once a day.
- Could give customers a price break if you leave clippings on
- Lower monthly fee to leave clippings
APPENDIX G CONTINUED

- Mow during winter (special to Oregon)
- Probably savings in leaving clippings
- Compost on site is easier
- Fuel spent on composting (?)
- City yard waste bins are being emptied once a week now- easier to toss clippings in bin.

Knowledge

- Have to explain to customers why leaving clippings in is beneficial to lawn
- Winter and Spring is when grass clumps
- People should know what the options are
- Clumps cause grass underneath to yellow and die
- Never cut more than 1/3 of the grass blade
- Education is key
- Leaving in clippings does NOT cause thatch problems

Attitudes

- Trying to leave clippings in
- Complaints about grass clippings being brought into house
- Love it if they could mulch
- Things will change over the next few-20 years (fuel costs)
- Not possible to guess the amount of fertilization that could change by leaving in clippings
- Customers would not be ok with mowing more frequently
- Leaving clippings on the lawn is messy
- Old grass clippings stink
- Winter is too hard to mulch mow
- Summer is easier
- Customers think clippings cause thatch problems

Norms

- Clients don't like the appearance
- Misconception/assumptions about thatch
- Need to tell people that it's okay to leave clippings in
- Clumps are bad

Sweeping

Structural/Logistical

- Broadcast spreaders are most common
- Stains concrete
- Stains are permanent
- Commercial spreaders have guards (deflectors) but they don't work
- Use drop spreaders on narrow spaces
- Fertilizer is expensive- try not to waste it
- Drop spreaders drops straight down
- Drop spreaders require a lot of special training
- Drop spreaders can leave stripes or X-crossed applications
- Blowers are cleaner than brooms- no crushing of fertilizer pills
APPENDIX G CONTINUED

- Blowers can be accurate
- Drop spreaders are better- you don't have to get too close to the sidewalks
- Stains are worse when its wet (winter/spring)
- Drop spreaders save time since you don't have to spend time cleaning
- Train employees to know to sweep
- Biggest savings would be in labor- takes time to blow off streets when it flies 10 ft into the street
- Better to control it
- Drop spreaders are not more expensive
- Takes expertise to use drop spreader
- Drop spreaders are more for independent residents (bought from home depot)

Knowledge
- Use hands for narrow areas to better control where it goes- near the edges use the throwing technique
- Not good for grass to fertilize on wet days.
- Fertilizers are chemically = salt, and create osmotic imbalance when wet.
- Bad if fertilizer dissolves before it works into the soil
- Employees know to sweep
- EPA violation if you let it go into the sewage
- Considered littering if it goes into drain
- New ordinance about state water quality
- Home owners that put down their own fertilizer are less aware than commercial lawn care professionals

Attitudes
- Newer houses create a bigger problem for stains
- Commercial lawn care providers at least make steps towards sweeping up- home owners are main problem

Norm
- Stains are unacceptable, especially in a new house
- Employees know that if they don't blow off fertilizer the customer would not like it
- Professionals are more visible than home owners, perhaps act as leaders
- Effect that will eventually reach the home owner

Other information

Structural/Logistical
- Home owner association has fines if they don't keep their lawns a certain way
- CR fertilizers cost so much but compare against labor and time you save

Knowledge
- Contractors and customers need a third party to come in and explain things without there being a secret agenda
- Give presentations about practices
- Maybe a list of questions to ask the contractor (for the home owner)
- City codes about landscape coverage (cover up dirt quick leads to turf placement)
APPENDIX G CONTINUED

**Attitudes**
- Residential customers have totally different interactions
- Commercial people care more about business than lawn
- People may not care much about the environment but care more about health/safety of children (talk about dogs tracking in fertilizer from lawn to carpet)
- HOA are difficult

**Norms**
- Logo for a card for any professional
- Stamp of approval
- Certification for Corvallis - would be interested in this
- Ecobiz cert for Portland
- Want customers to understand that leaving clippings is ok
- Less lawn campaign?
- Other places have a water campaign for summer: signs say “sleeping not dead..shhh”
- Pressure neighborhoods instead of individual home owners
APPENDIX H

FOCUS GROUP SUMMARY OF EACH BEHAVIOR

Controlled release fertilizers

The most discussed barrier to using controlled release fertilizers was that slow release fertilizers are more expensive than quick release, water-soluble fertilizers. For instance, one lawn care professional stated that controlled release fertilizers are 30% to 40% more expensive than standard, quick-release fertilizers. Controlled-release fertilizers contain nutrients that solubilize at a delayed rate in order for nutrients to remain available for much longer than a traditional, quick release fertilizers such as ammonium nitrate or urea, ammonium phosphate or potassium chloride. (Association of American Plant Food Control Officials, 1997) The delayed rates of controlled release fertilizers minimize the quantities of application of fertilizer the lawn requires throughout the year. Quick-release fertilizers solubilize rapidly, requiring fertilizer to be applied more frequently.

Focus group discussion revealed another barrier to using controlled release fertilizers: the knowledge required to understand the complexity of the controlled release fertilizer’s chemical make-up. For instance, it is important to understand the variable ratio of nitrogen to phosphorous and how these nutrients will solubilize in the soil. The soil’s requirement of these ratios vary depending on the current season as well as the conditions of the soil. According to focus group participants, selected varieties of controlled release fertilizer solubilize in higher temperatures while others are dependent on watering or rain. In order to select the best fertilizer for optimal
nutrient absorption in the soil, lawn care professionals must understand how different fertilizers react in varying weather conditions. In addition, focus group participants agreed that many lawn care professionals, including those who attended the focus group, currently use controlled release fertilizers.

*Soil testing for pH and nutrient content*

Another behavior discussed in the focus group was the importance of testing soil for nutrient content in order to apply only the additives that a particular lawn needs. Testing the soil allows for best treatment instead of assuming nutrient deficiency and therefore applying more fertilizer that will saturate the soil and runoff into the storm drain. For example, a discolored lawn could be a symptom of nutrient deficiency, pH imbalance, disease, or poor irrigation (VanDerZanden & Cook, 2001). Focus group discussion revealed many barriers to soil testing. The barrier foremost mentioned during the discussion was the lack of a soil testing facility in Corvallis. Sending samples away to be tested would increase the cost of caring for lawns, which was created significant resistance to performing this behavior. Another barrier to soil testing was the lack of knowledge required to understand and interpret test results. As one focus group participant stated, “A piece of paper with numbers doesn’t mean anything.” Participants also agreed that soil in Corvallis is acidic. Acidic soils hinder the lawn’s nutrient absorption. A well-buffered soil system would require frequent applications of a base, such as lime, to increase the pH and therefore increase the amount of nutrients the grass is able to absorb (OregonTilth and Clackamas Community College, 2010; Haynes, 1982). However, frequent applications of lime
would also increase the cost. Another prominent barrier revealed by the focus group was the lawn care professional’s preference to relying on experience, rather than using tests, to determine soil requirements. Participants agreed that they are able to troubleshoot soil requirements simply by looking at the lawn.

*Grasscycling*

The focus group exposed some barriers associated with the practice of leaving grass clippings in the lawn after mowing, or grasscycling. Weather was mentioned as an important barrier as wet, rainy weather makes grasscycling more difficult and increases time and labor, thus increasing cost. Focus group participants shared their belief that it is too difficult to mulch mow in the winter and customers would not concede to the higher frequency of mowing that is necessary if grasscycling. Other barriers pertained to the customer’s perceptions, misconceptions, and desire for a traditional green lawn. Participants suggested that customer’s believe that grasscycling is too messy. For instance, customers may complain about clippings sticking to shoes and being tracked in homes. Focus group participants stated that customers have a misconception that clippings contributing to the layer of living and dead grass, stems, leaves, and roots which accumulate between the layer of grass and the soil underneath, also known as thatch. Too much thatch can prohibit sunlight, oxygen, and water from reaching grass roots. Grasscycling, however, does not create a thatch layer. Grass clippings are mostly water and nitrogen and biodegrade quickly, returning water and nutrients back into the soil (Oregon Department of Environmental Quality, 2011).
Cleaning up after fertilization

Excess fertilizer left on sidewalks and in streets may wash into storm drains and contribute to stormwater pollution. Focus group questions were intended to uncover barriers and motivators associated with cleaning up excess fertilizer that may fall into streets or sidewalks after application. More motivators than barriers to cleaning up after fertilizing were revealed through the focus group. For instance, lawn care professionals are motivated to clean up excess fertilizer that falls into the streets and sidewalks because fertilizer permanently stains the concrete and pavement. Other motivators include awareness of ordinance violations if fertilizer were to runoff into the stormdrain. When barriers such as time of clean up and labor involved in cleaning up fertilizer were mentioned, focus group participants noted that the use of leaf blowers to blow fertilizer off of streets and sidewalks and back into the lawn as an easy way to clean up after fertilization.

A significant finding of the focus group was revealed when focus group participants suggested the use of drop spreaders as a strategy to overcome possible time and cost barriers to cleaning up fertilization. In order to avoid getting fertilizer on streets and sidewalks during application, participants suggested that more accurate drop spreaders should be used for narrow spaces instead of broadcast spreaders. One participant stated that drop spreaders save time, because time isn’t spent cleaning up after fertilization. However, drop spreaders require special training to avoid
streaking and misapplication- a barrier to using drop spreaders that was discovered in the focus group discussion.

*Other*

Other barriers and motivators that were unveiled but do not necessarily fit under a certain practice or include new practices were mentioned at the end of the focus group. These include the difficulties of working with homeowner associations to increase tolerance of clumps that may be caused by grasscycling, and the limitations of City codes pertaining to landscaping. Some participants offered suggestions for motivators such as the City of Corvallis should give presentations about recommended practices for the general public to increase demand for practices such as grasscycling and to create awareness of the Healthy Soils for Healthy Streams Program. Participants also mentioned that they would be interested in a City of Corvallis certification or campaign for lawn care businesses that meet recommended practices. Participants agreed that a list of questions provided by the City designed for customers to ask their lawn care providers about recommended practices would be useful.
Dear (name of person) of (name of business),

My name is Jenna Halsey and I’m a graduate student at Oregon State University working on a Masters project with the City of Corvallis. Together, we are conducting research about how best to work with lawn care professionals in improving water quality through lawn care practices that prevent polluted runoff. The information collected through this project will be used to develop a program to support local landscape and lawn care professionals interested in implementing pollution prevention practices.

As someone who specializes in lawn care, I need your help to better understand what you think about various practices that may help prevent polluted runoff. Your participation in the enclosed survey is completely voluntary. All information collected will be anonymous and will not be related back to you.

If you agree to participate in this important survey, please answer the following questions and place the completed survey in the pre-stamped and pre-addressed envelope. It is also important that you read, sign, and return the enclosed Informed Consent Form. Please return the survey and signed Informed Consent no later than Monday, June 21st. Thank you very much for your participation.

Sincerely,

Jenna Halsey
Candidate, M.S. Marine Resource Management
jhalsey@coas.oregonstate.edu
The first question in this survey asks about your customers.

1. What types of clients do you work with? Check all that apply.
   __ Individual homeowners
   __ Homeowner associations
   __ Commercial/Industry
   __ If other, please describe:__________________________________________________________

2. Which of those clients provide the majority of your work? Check one.
   __ Individual homeowners
   __ Homeowner associations
   __ Commercial/Industry
   __ Other

This section of the survey asks about fertilizer use.

3. How much would you agree with the following reasons to fertilize a lawn?
   Check one box for each reason.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Very important</th>
<th>Important</th>
<th>Unimportant</th>
<th>Very unimportant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil is deficient in nutrients</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It quickly ‘greens-up’ a lawn</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clients expect their lawn to be fertilized</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It’s part of our routine maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is important to build healthy soils</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If other, please describe:____________________</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. For your typical client, when do you fertilize and how often? Complete all those that apply.
   Spring  ___ time(s)
   Summer  ___ time(s)
   Fall    ___ time(s)
   Winter  ___ time(s)

5. What type of fertilizer(s) do you use? (i.e. sulfur-coated urea, ammonia, compost, etc.)
   Please be specific______________________________________________________________

6. How often do you use each kind of fertilizer spreader below? Check all that apply.

<table>
<thead>
<tr>
<th>Spreader Type</th>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drop Spread</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broadcast Spread</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If other, please describe____________________</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the next section of the survey I will ask about cleaning up after fertilization.

7. How often do you clean up excess fertilizer that falls onto hard surfaces such as streets, sidewalks, and gutters, and put it back into the lawn? Check one.
8. How important are the following reasons for cleaning up after fertilization? Please check one box for each reason.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Very important</th>
<th>Important</th>
<th>Unimportant</th>
<th>Very unimportant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizer pellets may stain the cement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customers complain about fertilizer pellets on sidewalk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is required by the City of Corvallis to clean up excess fertilizer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilizer may run into storm drains and waterways</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don’t want to waste fertilizer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If other, please describe: ____________________________________________

9. How much do you agree with the following reasons that may prevent you from cleaning up excess fertilizer? Check one box for each reason.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>It takes too much time to clean up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don’t have the right equipment to clean up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It’s too difficult to train my employees how to clean up properly</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The fertilizer pellets go too far down the sidewalk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I didn’t know that I should clean up after fertilization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I always clean up after fertilization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If other, please describe: ____________________________________________

10. How often do you use each of the following tools to clean up any excess fertilizer on streets and sidewalks? Please check one box for each tool.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broom</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leaf blower</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If other, please describe: ____________________________________________

**This section of the survey asks about leaving grass clippings in the lawn.**

11. After mowing the grass, how often do you leave clippings on the lawn? Check all that apply.

<table>
<thead>
<tr>
<th>Season</th>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. How important are the following reasons for leaving grass clippings on the lawn? Please check one box for each reason.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Very important</th>
<th>Important</th>
<th>Unimportant</th>
<th>Very unimportant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
13. How much would you agree with the following statements about leaving grass clippings in the lawn? Check one box for each reason.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would have to mow more often</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It requires more time to use a mulching lawn mower or to spread out clumps of grass</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customers think that grass clippings are messy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grass clippings clump up and leave piles or streaks of grass in the lawn</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customers think that by leaving in grass clippings, you create thatch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I don't have a mulching lawn mower</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I always leave grass clippings in the lawn</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If other, please describe:____________________________________________________

14. Do you charge customers less if you leave grass clippings in the lawn?
   _Yes
   _No

15. Do you think customers would be more inclined to leave clippings on the lawn if you charged more to remove the clippings?
   _Yes
   _No

**Just one more question: This question is about other practices that weren't covered already.**

16. How important are each of the following practices in building healthy soils? Check one box for each practice.

<table>
<thead>
<tr>
<th>Practice</th>
<th>Very important</th>
<th>Important</th>
<th>Un-important</th>
<th>Very unimportant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowing the pH of the soil</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Periodically aerating the lawn</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using controlled release fertilizers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watering the lawn deeply</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using only organic matter, such as compost, leaf litter, or bark mulch, instead of synthetic fertilizers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If other, please describe:________________________________________________________________________

That is the end of the survey. Thank you!

We will be using findings from this survey to develop a program to support you and other lawn care professionals who are interested in partnering with the City of Corvallis to prevent polluted runoff into streams and rivers. Thank you very much for the time you have dedicated to this project.
APPENDIX J

SUMMARY OF SURVEY ANALYSIS

1. What types of clients do you work with? Check all that apply.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homeowners</td>
<td>14</td>
<td>37%</td>
</tr>
<tr>
<td>HOA</td>
<td>11</td>
<td>29%</td>
</tr>
<tr>
<td>Commercial/Industrial</td>
<td>13</td>
<td>34%</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>100%</td>
</tr>
</tbody>
</table>

2. Which of those clients provide the majority of your work? Check one.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual residents</td>
<td>12</td>
<td>67%</td>
</tr>
<tr>
<td>HOA</td>
<td>3</td>
<td>17%</td>
</tr>
<tr>
<td>Commercial/Industrial</td>
<td>3</td>
<td>17%</td>
</tr>
<tr>
<td>Total*</td>
<td>18</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Total exceeds 15 respondents due to the selection of multiple categories as a "majority" by a single respondent

3. How important are the following reasons to fertilize a lawn? Check one box for each reason.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Very Impt</th>
<th>Impt</th>
<th>Unimpt</th>
<th>Very unimpt</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil is deficient in nutrients</td>
<td>9</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>It quickly 'greens-up' a lawn</td>
<td>5</td>
<td>7</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Clients expect their lawn to be fertilized</td>
<td>7</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>It's part of our routine maintenance</td>
<td>5</td>
<td>8</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>It is important to build healthy soils</td>
<td>5</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reason</th>
<th>Important*</th>
<th>Unimportant*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil is deficient in nutrients</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>It quickly 'greens-up' a lawn</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Clients expect their lawn to be fertilized</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>It’s part of our routine maintenance</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>It is important to build healthy soils</td>
<td>12</td>
<td>1</td>
</tr>
</tbody>
</table>

*Categories were lumped together due to low response in some categories
4. For your typical client, when do you fertilize and how often? Complete all those that apply.

<table>
<thead>
<tr>
<th>Season</th>
<th>Time(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>_____</td>
</tr>
<tr>
<td>Summer</td>
<td>_____</td>
</tr>
<tr>
<td>Fall</td>
<td>_____</td>
</tr>
<tr>
<td>Winter</td>
<td>_____</td>
</tr>
</tbody>
</table>

Applications per season for each respondent

<table>
<thead>
<tr>
<th>Season</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Summer</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Fall</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Winter</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Total/Year | 4  | 5  | 3  | 6  | 2  | 7  | 6  | 8  | 4  | 1  | 4  | 2  | 4  |

Recommended application rate for high visual turf quality - 4 times a year for Western Oregon

# of respondents over 4 times/yr: 5 38%

Recommended application rate for medium visual turf quality - 3 times a year for Western Oregon

# of respondents over 3 times/yr: 9 75%

5. What type of fertilizer(s) do you use? (i.e. sulfur-coated urea, ammonia, compost, etc.) Please be specific

*Since the question of open-ended there were a variety of fertilizer types mentioned. Categories were made to lump together similar answers. For the purpose of this study, “Slow Release” includes any mention of coated urea, any ratio of slow release, organic fertilizer, or any fertilizer that is not quick release or readily water soluble such as pure urea. “Coated Urea” was specifically mentioned by 7 respondents, which was included in the total of slow release fertilizer. For the purpose of this study, “Organic or natural” fertilizers include the mention of “organic” in the type of fertilizer mentioned, organic materials such as poultry waste, and the mention of any brand name that advertises itself as organic fertilizer.

<table>
<thead>
<tr>
<th>Fertilizer Type</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Slow release&quot;</td>
<td>13</td>
<td>87%</td>
</tr>
<tr>
<td>Coated Urea</td>
<td>7</td>
<td>47%</td>
</tr>
<tr>
<td>organic or natural *</td>
<td>4</td>
<td>27%</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

Always | Sometimes | Never
---|-----------|----------|
Drop  | 2 | 13% | 3 | 20% | 10 | 67% |
Broadcast | 8 | 53% | 4 | 27% | 2 | 13% |
N/A   | 2 | 13% |
7. How often do you clean up excess fertilizer that falls onto hard surfaces such as streets, sidewalks, and gutters, and put it back into the lawn? Check one.

<table>
<thead>
<tr>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

8. How important are the following reasons for cleaning up after fertilization? Please check one box for each reason.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Important</th>
<th>Unimportant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizer pellets may stain the cement</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Customers complain about fertilizer pellets on sidewalk</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>It is required by the City of Corvallis to clean up excess fertilizer</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Fertilizer may run into storm drains and waterways</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>I don’t want to waste fertilizer</td>
<td>11</td>
<td>3</td>
</tr>
</tbody>
</table>

9. How much do you agree with the following reasons that may prevent you from cleaning up excess fertilizer? Check one box for each reason.

<table>
<thead>
<tr>
<th>Reason</th>
<th>strongly agree</th>
<th>agree</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>It takes too much time to clean up</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>I don’t have the right equipment to clean up</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>It’s too difficult to train my employees how to clean up properly</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>The fertilizer pellets go too far down the sidewalk</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>I didn’t know that I should clean up after fertilization</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>I always clean up after fertilization</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

10. How often do you use each of the following tools to clean up any excess fertilizer on streets and sidewalks? Please check one box for each tool.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broom</td>
<td>2</td>
<td>15%</td>
<td>9</td>
</tr>
<tr>
<td>Leaf Blower</td>
<td>10</td>
<td>67%</td>
<td>5</td>
</tr>
</tbody>
</table>

11. After mowing the grass, how often do you leave clippings on the lawn? Check all that apply.

<table>
<thead>
<tr>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
</table>
12. How important are the following reasons for leaving grass clippings on the lawn? Please check one box for each reason.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Very Imppt</th>
<th>Imppt</th>
<th>Unimpt</th>
<th>Very Unimpt</th>
</tr>
</thead>
<tbody>
<tr>
<td>It requires less transportation to haul away grass clippings</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>It requires less recycling fees to compost clippings</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>It requires less time per typical lawn</td>
<td>4</td>
<td>6</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>It requires less fertilizer throughout the year</td>
<td>4</td>
<td>8</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>I already have a mulching lawn mower</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Clippings help build a healthy soil</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reason</th>
<th>Important</th>
<th>Unimportant</th>
</tr>
</thead>
<tbody>
<tr>
<td>It requires less transportation to haul away grass clippings</td>
<td>9</td>
<td>60%</td>
</tr>
<tr>
<td>It requires less recycling fees to compost clippings</td>
<td>9</td>
<td>60%</td>
</tr>
<tr>
<td>It requires less time per typical lawn</td>
<td>10</td>
<td>67%</td>
</tr>
<tr>
<td>It requires less fertilizer throughout the year</td>
<td>12</td>
<td>80%</td>
</tr>
<tr>
<td>I already have a mulching lawn mower</td>
<td>9</td>
<td>75%</td>
</tr>
<tr>
<td>Clippings help build a healthy soil</td>
<td>10</td>
<td>77%</td>
</tr>
</tbody>
</table>

*Categories were lumped together due to low response in some categories

13. How much would you agree with the following statements about leaving grass clippings in the lawn? Check one box for each reason.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would have to mow more often</td>
<td>0</td>
<td>3</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>It requires more time to use a mulching lawn mower or to spread out clumps of grass</td>
<td>0</td>
<td>4</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Customers think that grass clippings are messy</td>
<td>5</td>
<td>8</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Grass clippings clump up and leave piles or streaks of grass in the lawn</td>
<td>4</td>
<td>6</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Customers think that by leaving in grass clippings, you create thatch</td>
<td>3</td>
<td>7</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>I don’t have a mulching lawn mower</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>
14. Do you charge customers less if you leave grass clippings in the lawn?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13</td>
</tr>
</tbody>
</table>

15. Do you think customers would be more inclined to leave clippings on the lawn if you charged more to remove the clippings?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

16. How important are each of the following practices in building healthy soils? Check one box for each practice.

<table>
<thead>
<tr>
<th>Practice</th>
<th>Very Important</th>
<th>Important</th>
<th>Unimportant</th>
<th>Very unimportant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowing the pH of the soil</td>
<td>9 (64%)</td>
<td>4 (29%)</td>
<td>1 (7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Periodically aerating the lawn</td>
<td>11 (73%)</td>
<td>3 (20%)</td>
<td>1 (7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Using controlled release fertilizers</td>
<td>11 (73%)</td>
<td>3 (20%)</td>
<td>1 (7%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Watering the lawn deeply</td>
<td>9 (60%)</td>
<td>6 (40%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Using only organic matter, such as compost, leaf litter, or bark mulch, instead of synthetic fertilizers</td>
<td>1 (7%)</td>
<td>10 (71%)</td>
<td>1 (7%)</td>
<td>2 (14%)</td>
</tr>
</tbody>
</table>
SURVEY BARRIERS AND MOTIVATORS

Survey data was analyzed and barriers and motivators were identified for various lawn care practices. The majority of survey respondents report the majority of their clientele fall into the individual residents category (67%), as opposed to Home Owners Associations (17%) or Commercial (17%)².

When asked how important the following reasons were to fertilize a lawn, nutrient deficiency was reported by 100% of the respondents as an important reason to fertilize a lawn. “Clients expect their lawn to be fertilized” was reported by 93% of respondents as important. Building healthy soils was reported by 92% of respondents as an important reason to fertilize¹. These findings suggest that lawn care professionals believe that soils are deficient in nutrients and fertilizer is required to build healthy soils.

Survey findings suggest that all lawn care professionals surveyed applied more fertilizer than is recommended for lawns in this region. The recommended fertilizer application rate for western Oregon is four times per year for high visual turf quality. For medium visual turf quality, the recommended application rate for western Oregon is three times per year. Nearly half of survey respondents apply fertilizer more than is recommended for high visual turf quality. Three-fourths are applying more than recommended for medium visual turf quality.

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² Total exceeds 100% due to the selection of multiple categories as a “majority” by a single respondent
The survey asked about the type of fertilizer the respondent uses in an open-ended format. The tremendous variety of answers to this question highlighted a possible knowledge-based barrier\(^3\). These results suggest a misinterpretation of the definition of controlled release fertilizers. The survey asked about the type of fertilizer the respondent uses in an open-ended format. The inconsistency of answers to this question highlight the complexity of defining fertilizers as organic or slow release\(^4\). The majority of lawn care professionals who responded to the survey reported that they never use a drop spreader to apply fertilizer (67%), and slightly more than half reported that they always use a broadcast spreader (53%).

Table 1. How often survey respondents use Drop Spreaders and Broadcast Spreaders to apply fertilizer

<table>
<thead>
<tr>
<th></th>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drop</td>
<td>2</td>
<td>13%</td>
<td>3</td>
</tr>
<tr>
<td>Broadcast</td>
<td>8</td>
<td>53%</td>
<td>4</td>
</tr>
</tbody>
</table>

The survey data support focus group findings indicate Lawn care professional know that it is important to clean up excess fertilizer from hard surfaces. 100% of survey respondents reported always cleaning up excess fertilizer; none of the respondents “Strongly agreed” or “Agreed” to any of the listed reasons that may prevent cleaning up after fertilization. However, the City of Corvallis had received complaints of fertilizer left in streets and sidewalks by lawn care businesses. Therefore lawn care

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\(^3\) Since the question of open-ended there were a variety of fertilizer types mentioned. Categories were made to lump together similar answers. For the purpose of this study, “Slow Release” includes any mention of coated urea, any ratio of slow release, organic fertilizer, or any fertilizer that is not quick release or readily water soluble such as pure urea. “Coated Urea” was specifically mentioned by 7 respondents, which was included in the total of slow release fertilizer. For the purpose of this study, “Organic or natural” fertilizers include the mention of “organic” in the type of fertilizer mentioned, organic materials such as poultry waste, and and the mention of any brand name that advertise itself as organic fertilizer.
businesses do not always clean up after fertilization, proving barriers to clean up must exist. Further investigations between disagree and strongly disagree responses enlightened possible barriers. When asked in the survey what may prevent cleaning up excess fertilizer from streets or sidewalks, the difference between disagree and strongly disagree categories highlighted time and distance of fertilizer dispersal as the most commonly reported barriers (58%, 50% respectively).

Respondents were asked how often they leave grass clippings on a lawn. Given the options of “Always,” “Sometimes,” and “Never,” results indicate that a maximum of 15% of respondents always leave grass clippings, depending on the season. Most respondents “Sometimes” leave grass clippings in the summer, and “Never” leave grass clippings during the rainy seasons (62% Winter and Spring).

Table 2. How often survey respondents apply fertilizer per season

<table>
<thead>
<tr>
<th></th>
<th>Always</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>2</td>
<td>14%</td>
<td>9</td>
</tr>
<tr>
<td>Spring</td>
<td>1</td>
<td>8%</td>
<td>4</td>
</tr>
<tr>
<td>Fall</td>
<td>2</td>
<td>15%</td>
<td>7</td>
</tr>
<tr>
<td>Winter</td>
<td>2</td>
<td>15%</td>
<td>3</td>
</tr>
</tbody>
</table>

When asked why someone would leave grass clippings on a lawn, 86% reported requiring less fertilizer throughout the year as an “Important” reason and 83% reported clippings help build healthy soil as an “Important” reason. This data shows a
possible motivator in that grass clippings can reduce fertilizer use and help build healthy soils. When asked what would prevent someone from leaving clippings in the lawn, the majority of survey respondents disagreed that time and equipment are barriers to leaving grass clippings in the lawn (31%, 17%, respectively). Instead, the majority of the barriers reported by Lawn care professional are customer-driven. 93% of the respondents reported that customers think grasscycling is “messy” and 83% reported that customers think it leaves clumps and streaks in the lawn. 71% agreed that customers think grasscycling builds thatch in the lawn. This survey data supports focus group findings that suggest barriers to grasscycling are primarily customer knowledge-based barriers.

When asked whether the respondent currently charges customers less if grass clippings are left on the lawn, all but one respondent answered “No.” When asked if the respondent thinks customers would be more inclined to grasscycle if they would be charged for removal of grass clippings, six out of fourteen answered “Yes” and eight out of fourteen responded “No.” This suggests that the cost of removing clippings is not a sufficient motivation for customers to grasscycle.

Respondents were asked to rank other practices that were found important to building healthy soils.
Table 3. Importance of various lawn care practices ranked by survey respondents

<table>
<thead>
<tr>
<th>Practice</th>
<th>Very Important</th>
<th>Important</th>
<th>Unimportant</th>
<th>Very unimportant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowing the pH of the soil</td>
<td>9</td>
<td>4</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Periodically aerating the lawn</td>
<td>11</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Using controlled release fertilizers</td>
<td>11</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Watering the lawn deeply</td>
<td>9</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Using only organic matter, such as compost, leaf litter, or bark mulch, instead of synthetic fertilizers</td>
<td>1</td>
<td>10</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Aerating the soil and using controlled release fertilizers received the most “Very Important” responses (73% each), followed by knowing the pH of the soil and watering the lawn deeply (64% and 60%, respectively). Using only organic matter instead of synthetic fertilizers received only one response in the “Very Important” category, but received 71% of the responses in the “Important” category. This data suggests that using organic matter instead of synthetic fertilizers may contain more barriers than the other “Very Important” practices listed in the question.
Grasscycling

Healthy Streams for Healthy Soils

(541) 766-6555
PREVENTION HOTLINE
CITY OF CORVALLIS POLLUTION

It's everyone's responsibility to prevent pollution. If you see stormwater pollution, report it immediately.

www.corvallis.or.us/stormwaterprogram

Stormwater Program Website:

Stormwater programs educate citizens about the importance of preventing pollution and the benefits of healthy green spaces. Let's work together to keep our city clean and healthy!

The Urban Stormwater Ordinance

NEw! CORVALLIS STORMWATER

Lawn care provider tips:

- Mow your lawn when it is damp or dry. If you mow wet, your lawn will need more water, which can affect the quality of your soil.
- Don't let rainfall run off your lawn; it's a great way to reduce pollution.
- Fertilizer and pesticides can pollute our waterways. Always use them responsibly.
- Leave your grass clippings on your lawn; they break down and provide your lawn with natural nutrients.

Clippings are great for your lawn and the environment. It's estimated that 80% of your lawn's nutrients come from your own clippings. This is a great way to reduce pollution and improve your lawn's health. You can also use your clippings to create compost or mulch. Just ask your lawn care provider for more information.
TRUE OR FALSE?

Save water and money.

Not only does this save you from dumps, it’s a great way to

limit irrigation in the summer to prevent excessive growth.

Green, growing lawns can mean too many clippings that may

force you to reduce the mowing.

Keep your mower blades sharp to get a clean cut

and avoid extra trips to the dumps.

A healthier soil.

For more ways to reduce your fertilizer use and build healthy clean and healthy lawns, ask your lawn care provider

and your Cooperative Extension Service. As a reminder to promote practices that keep your streams

clean, your lawn care provider is working with the City of

WORKING WITH YOUR LAWN CARE PROVIDER

CUT IT & LEAVE IT

Green, growing lawns can mean too many clippings that may

force you to reduce the mowing.

Keep your mower blades sharp to get a clean cut

and avoid extra trips to the dumps.

A healthier soil.

For more ways to reduce your fertilizer use and build

healthy clean and healthy lawns, ask your lawn care provider

and your Cooperative Extension Service. As a reminder to promote practices that keep your streams

clean, your lawn care provider is working with the City of

YOUR LAWN CARE PROVIDER
I worked with __________________ to build a healthy lawn and protect our streams.

For more information call the City of Corvallis at 541-766-6916
APPENDIX N

City of Corvallis
Public Works Department
P.O. Box 1083
Corvallis, OR 97339-1083

September 21, 2010

Dear (name of person) of (name of business),

You are invited to participate in an exciting new initiative sponsored by the City of Corvallis, designed especially for lawn care professionals such as yourself.

Healthy Soils for Healthy Streams aims to promote lawn care practices that can make a difference for clean, healthy water. One way to do this is by limiting how much fertilizer is applied on lawns. According to a survey sent to local lawn care professionals, 40% of respondents fertilize more than four times a year, which is the recommended amount for a high visual quality lawn. One way to reduce the amount of fertilizer used while still maintaining its high visual quality is by leaving grass clippings when you mow, also known as grasscycling. Survey findings show that most local lawn care professionals are in favor of grasscycling, but don’t incorporate it into their lawn care practices due to customer preferences and misconceptions.

In order to support lawn care professionals in promoting grasscycling, we have created an educational brochure through the Healthy Soils for Healthy Streams program (see enclosed). This brochure is intended to be distributed to the customer by you, the lawn care professional. In this way, the City of Corvallis serves as an encouraging link between you and your customers. The purpose of this brochure is to address customer misconceptions about grasscycling (thatch build-up, lawn streaks, etc.), while also highlighting the overall environmental benefits of reducing fertilizer use by incorporating grasscycling. The brochure also advertises a Healthy Soils for Healthy Streams Award that your customers can win by asking you to incorporate grasscycling into their lawn care regime. Customers can call the City of Corvallis Stormwater Program and we will send them an award sign to display in their lawn. The name of your company will be posted on this award!

Enclosed are three brochures to get you started. You can present these brochures when meeting new customers, attach the brochure to an invoice, or use the brochure to inform your employees. To request more brochures, simply contact Jenna Halsey (see contact information below), and state how many brochures you need and the best way to deliver them to you. I will be following up in approximately four weeks to evaluate your interest as well as your customer's interest in the grasscycling program.

A pamphlet highlighting useful hints for you, the lawn care professional, is also included in this packet. This pamphlet provides tips for overcoming customer-related issues such as clumps of clippings in the lawn and emphasizes the importance of communicating the positive long-term impacts grass clippings can have on the soil and stream ecosystems. It also offers guidelines for you to work towards as you transition away from using fertilizers to grasscycling. This purpose of this information is to prepare you and your employees for a conversation with your customers about grasscycling.

Thank you very much for your time. If you have any comments or questions please contact Jenna Halsey at Jenna.Halsey@ci.corvallis.or.us, or 260-615-9488.

Sincerely,

Jenna Halsey
Stormwater Intern
City of Corvallis, Public Works Department
Jenna.Halsey@ci.corvallis.or.us /Cell: 260-615-9488
APPENDIX O

Introducing Healthy Soils for Healthy Streams

Healthy Soils for Healthy Streams is a new program developed by the City of Corvallis Stormwater Program to share the message that lawn care practices can make a difference for clean and healthy water. To start, Healthy Soils for Healthy Streams has focused on encouraging and supporting Corvallis lawn care businesses to adopt practices that keep our streams and rivers clean. One practice that can make a big difference for water quality is grasscycling.

Grasscycling is the environmentally friendly act of leaving your grass clippings in your lawn when you mow. Clippings are made up of nutrients such as nitrogen and phosphorus--essential nutrients for plant growth and the same ingredients you find in fertilizer. However, unlike artificial fertilizers, clippings release nutrients slowly over time, while also adding organic matter to the soil. During a rain event unused artificial fertilizers may dissolve quickly and can be washed off lawns and landscapes into nearby stormdrains and streams. When the excess nutrients in fertilizers enter a waterway, they can cause unwanted algae blooms and can even harm fish. Studies show that grasscycling can reduce your fertilizer needs by up to 50%! And, despite common belief, leaving grass clippings on your lawn does NOT contribute to thatch build-up, but does contribute to fewer weeds, higher density grass growth, a robust soil system, and greener grass. If you leave your lawn clippings this winter, you may not need to fertilize this spring!

You can help build healthy soils and protect our streams by asking your lawn care provider to leave your grass clippings on your lawn after mowing. If you are concerned about clumps of grass in your lawn, you or your lawn care provider can contact the Stormwater Program for helpful hints to avoid the mess. If you have worked with your lawn care provider to reduce your fertilizer needs by incorporating grasscycling, or if you have reduced your fertilizer needs by doing it yourself, you are eligible for a Healthy Soils for Healthy Streams Stewardship Award to display in your lawn. To request your award or to find out more about grasscycling, contact Gwenn Kubeck, Stormwater Program Specialist, at Gwenn.Kubeck@ci.corvallis.or.us or 541-766-6916.

Lawn care businesses that have already participated in the Healthy Soils for Healthy Streams program include:

Stutzman Services
Gaia Landscaping
APPENDIX P

Healthy Soil for Healthy Streams
“What’s the difference?” Activity

Supplies:
- “Unhealthy” bucket of soil
- “Healthy” bucket of soil
- Artificial grass, fertilizer pellets, clay, and pipe-cleaner-roots
- Top soil, “soil critters,” pipe-cleaner-roots, and real patches of grass
- Stewardship Award signs (one for do-it-yourself and one for working with a LCP)
- Pot with flowers to place signs in
- Labels and signs for each container and the “What’s the difference” sign
- Prizes (Portable container for dog waste baggies and water bottles go fast)
- Grasscycling brochures (one for do-it-yourself and one for working with a LCP)
- Business cards

Activity (mostly for kids, but some adults may try. You can also use it as a talking point for adults to get a visual of healthy soil).
- “Would you like to win a prize? All you have to do is tell me 3 things that are different between this bucket of soil and this bucket of soil. And when you are done I will ask you which one is healthier.”
- Once participants start explaining the differences, start talking about how bugs can make it healthy, how organic matter like leaves and grass clippings can return nutrients back into the soil, etc.
- Some may say that the bucket with fake grass looks healthier because the grass is greener, but use that opportunity to say that even though the grass is bright green, the soil beneath may be dead. The bucket with real grass has soil that is FULL of life and good bugs that help keep out disease and bad bugs. The more stuff in the soil, the heartier the soil’s “immune system” and the less you have to add chemicals to keep it alive and green.
- “One way to keep your grass healthy is by Grasscycling- or leaving your grass clippings on your lawn after you mow. This way, you feed the critters in the soil and you don’t need to add fertilizer which can run into storm drains and hurt the fish in the streams.”
- Use white pellets on fake grass to show how fertilizer can be swept into the streams and rivers.

Grasscycling brochures and signs (for adults who don’t want to do the activity)
- “Do you live in Corvallis?” *if they say no, remember not to give them a prize, but they can take information that pertains to them.*
- “Do you have a lawn?” If yes, “Do you take care of it yourself or do you have a lawn care professional take care of it and mow it?” Depending on their answer talk to them about the Healthy Soils for Healthy Streams program and hand them a brochure.
- Brochure highlights are tips on how to grasscycle without a mess, information about the new ordinance, a number to call for the award, the Oregon Tilth website, and a number to call to find out about the rainfall.
- If someone says they live in an apartment building and they have no say, tell them to put the brochure in the clubhouse or give it to the management with the next rent check. Remind them that THEY are the customer and something like using less fertilizer is a customer-based decision. Discuss the survey results and try to empower the customer or tenant. Also, the apartment complex can advertise being “green,” which is a hook for Corvallis residents based on another survey that says Corvallis residents have strong environmental values.
APPENDIX Q

November 23rd, 2010

Dear (name of person) of (name of business),

The City of Corvallis Healthy Soils for Healthy Streams program would like to invite you to participate in the new Drop Spreader Rebate Program. The goal of this initiative is to support local lawn care businesses in protecting Corvallis streams from nutrient pollution.

Broadcast fertilizer spreaders are made for open stretches of lawn but don’t work well for small or non-uniform stretches of lawn. Broadcast spreaders often throw fertilizer far beyond the sidewalk strip and into the street. This excess fertilizer can then be washed down storm drains into streams where it pollutes water. A drop spreader helps prevent pollution by directing an exact amount of fertilizer straight down into the grass. By dropping fertilizer straight down, rather than broadcasting it widely, less fertilizer is thrown onto hard surfaces and wasted. This not only helps the environment, but also saves you money by reducing fertilizer waste and the clean up time it takes to remove excess fertilizer from hard surfaces after application.

Cleaning up after fertilization is more important now than ever. The City of Corvallis recently passed the Urban Stormwater Quality Management and Discharge Control Ordinance. This ordinance is designed to protect streams from pollution, which includes fertilizer pellets on streets and sidewalks that may enter the storm system during a rain event or even when irrigating. For more information concerning the Urban Stormwater Quality Management and Discharge Control Ordinance, please visit the Stormwater Program website at [www.ci.corvallis.us/stormwater.program](http://www.ci.corvallis.us/stormwater.program).

The City of Corvallis wants to support your business in protecting water quality by preventing excess fertilizer from entering the City storm system. To do this, we are offering a limited number of rebates, in value up to $300, for lawn care professionals who purchase and use drop spreaders in Corvallis. Because this is a new program, we...
are offering it on a very limited scale. The rebate will be given to the **first three approved applicants.** To apply for a rebate, complete and sign the enclosed application and send all required materials to the address provided on the application form. **Applications must be received no later than February 7, 2011 at 5pm.**

Enclosed are the materials you need to participate in this opportunity, and you use your drop spreader successfully. Enclosed materials include:

- **Application**
  - Please complete and return to participate in the Drop Spreader Rebate Program.

- **Rules and Qualifications**
  - Rebate program details.
  - Eligibility requirements.
  - Guidelines for drop spreader purchase.

- **Training Tips**
  - How to use your drop spreader successfully.
  - English and Spanish training tips.

For more information about the drop spreader rebate program, visit the Healthy Soils for Healthy Streams link located on the left of the Stormwater Program website (**www.ci.corvallis.or.us/stormwater.program**) or contact Jenna Halsey at **Jenna.Halsey@ci.corvallis.or.us.**

Thank you for your time. We look forward to receiving your application.

Sincerely,

Jenna Halsey
City of Corvallis Stormwater Program Intern
APPENDIX R

Healthy Soils for Healthy Streams
Drop Spreader Rebate

Rules and Qualifications

REBATE PROGRAM DETAILS
• This award process has limited funds per funding cycle. Therefore, rebates will be offered on a first come, first serve basis to those who qualify.
• A refund up to, but not exceeding, $300 will be given to the first three approved applicants or until all funds are awarded.
• Those who are awarded a rebate will be notified promptly via email or phone and a check will be sent to the address provided. Please allow up to five weeks to receive your check.
• Those applicants who do not receive an award will be notified by mail within two weeks of application receipt.
• This year’s program cycle will run from December 1, 2010 through February 7, 2011.
• A complete application must be received no later than February 7, 2011 at 5pm in order to be considered. A complete application includes:
  ✓ Completed application form (applications must be received within 30 days of drop spreader purchase)
  ✓ Proof of purchase that clearly shows the purchaser’s name and date of purchase.
• All required forms are attached and can also be accessed through the City of Corvallis Stormwater Program website: www.ci.corvallis.or.us/stormwater_program under the Healthy Soils for Healthy Streams link.

ELIGIBILITY REQUIREMENTS
This program is designed for lawn care professionals who want to reduce fertilizer runoff, save time and money, keep customers happy, and build a reputation within the community for being a steward of Corvallis streams. Eligible participants must meet the following requirements:
• Participants are lawn care professionals.
• A majority of the business’s clientele is located within the Corvallis city limits.
• Each business is permitted only one application per program cycle.
• Preference will be given to those applicants who do not currently own a drop spreader and who have not previously received a drop spreader through this program.

PURCHASING YOUR DROP SPREADER
The Healthy Soils for Healthy Streams rebate program encourages you to purchase a quality drop spreader made by a reliable manufacturer. Lower quality drop spreaders may release fertilizer at highly variable rates that would fertilize some areas of grass more than others, leaving the lawn looking patchy. High quality drop spreaders are calibrated more precisely to steadily release fertilizer as you walk.

What to look for when purchasing a drop spreader:
• The drop spreader container is made out of rustproof material such as hard plastic or stainless steel.
• Check the gate on the bottom of the drop spreader that opens or closes holes. Be sure it is made out of material that cannot warp or bend, otherwise fertilizer pellets can get stuck underneath the gate, making it difficult to open and crushing pellets.
• Look for features that may make your job easier, such as easy-to-maneuver wheels, an easy-to-grip handle, or removable lids that allow for easy cleaning.
• A list of suggested brands is on the reverse of this page.
SUGGESTED BRANDS AND MODELS:

- **Andersons SS-2 Drop Spreader (Under their Golf Products line)**
  Prices vary. Starting at $700
  Sold at:
  Target Specialty Products
  Portland, OR
  Phone: 877-827-4381
  [http://www.target-specialty.com](http://www.target-specialty.com)

- **LESCO Push Drop Spreader**
  Prices vary.
  Visit website for retailers and prices.
  [www.lesco.com](http://www.lesco.com)

- **Gandy Drop Spreader Models 24, 36, or 42**
  Prices vary.
  Sold at:
  General Implement Distributors
  10025 SW Allen Avenue
  Beaverton, OR 97005
  Phone: 503-641-1865
  Northwest Outdoor Equipment
  11951 Southeast Hwy 212
  Clackamas, OR 97015-9039
  Phone: 503-657-3175
  Fax: 503-657-5716

- **Agri-Fab 17-Gallon (dry) Tow Drop Spreader Model45-0288**
  Prices vary. Starting at $200
  Sold at:
  Willamette Saw Service, Inc
  5200 SW Philomath Blvd
  Corvallis, OR 97333
  Phone: 541-754-1343
  Mary's Peak True Value
  1724 Main
  Philomath, OR 97370
  Phone: 541-929-4393
  Wilco Farm Stores
  33685 HWY 99 EAST
  Tangent, OR 97389
  Phone: 541-926-4404

- **Scott's AccuGreen 3000 Deluxe Model Drop Spreader**
  Prices vary. Starting at $50
  Sold at:
  The Home Depot
  1780 NW Four Acre Place
  Phone: 541-758-9303
APPENDIX S

Healthy Soils for Healthy Streams

Drop Spreader Rebate

Application

*Please see Rules and Qualification form for Drop Spreader Rebate Program details and eligibility requirements.

APPLICANT INFORMATION:

<table>
<thead>
<tr>
<th>Applicant name</th>
<th>Today’s Date</th>
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</table>

<table>
<thead>
<tr>
<th>Business name</th>
<th>Business address (street)</th>
</tr>
</thead>
</table>

| City | State | Zip |
|----------------|--------------|

<table>
<thead>
<tr>
<th>Business phone</th>
<th>Business Email Address</th>
</tr>
</thead>
</table>

DROP SPREADER INFORMATION:

<table>
<thead>
<tr>
<th>Manufacturer (brand) name of drop spreader</th>
<th>Model number (not serial number)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Date of purchase</th>
<th>Place of purchase</th>
<th>Purchase Price</th>
</tr>
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</table>

A LEGIBLE COPY OF THE PROOF OF PURCHASE THAT CLEARLY SHOWS THE PURCHASER’S NAME, DATE OF PURCHASE, AND PURCHASE PRICE MUST BE ATTACHED TO THIS APPLICATION. APPLICATIONS MUST BE RECEIVED WITHIN 30 DAYS OF DROP SPREADER PURCHASE.

(see reverse side)
VERIFICATION OF ELIGIBILITY
Please initial all the following statements that apply to you:

_____ My lawn care business currently does not own a drop spreader.
_____ My lawn care business is registered with the State of Oregon.
_____ My business has not previously received a drop spreader through the City of Corvallis Drop Spreader Rebate program.
_____ The majority of my lawn care clients are located within Corvallis city limits.

SIGNED AGREEMENT

I have purchased a drop spreader with the intention of more accurately applying fertilizer. I will continue to sweep any excess fertilizer that may be left on pavement or hard surfaces back into the grass. I acknowledge that I am partnering with the City of Corvallis and I understand the City has the ability to follow up on my participation of the rebate program at any time. I certify that all information on this application is true, correct, and complete to the best of my knowledge. I understand that the City of Corvallis may alter this program at any time.

__________________________________________  ________________
Applicant Signature                           Date signed

PLEASE MAIL COMPLETED FORMS TO:

GWENN KUBECK, STORMWATER PROGRAM SPECIALIST
CITY OF CORVALLIS, PUBLIC WORKS DEPARTMENT
P.O. BOX 1083
CORVALLIS, OR 97339-1083

With questions about the Drop Spreader Rebate Program, please contact Jenna Halsey:
jenna.halsey@ci.corvallis.or.us
Work: 541-766-6916

FOR OFFICE USE ONLY

Date received: ___________                     Date reviewed: ___________

Reviewed by: _______________  Rebate approved?  YES    NO

If no, reason for denial _____________________________________________

Evaluation date: __________
WHERE TO USE YOUR DROP SPREADER
Drop spreaders are great for tight spaces like sidewalk strips, edges of the lawn, or in between flowerbeds. You could use your drop spreader in larger areas of grass as well, just be sure to use an application pattern to avoid missing patches (see Fig.2). Using a drop spreader tends to be easiest on lawns that are mowed often and recycle their grass clippings. If you are already working with a customer to reduce fertilizer use by grasscycling, their lawn may be a great candidate for using your new drop spreader.

HOW TO USE YOUR DROP SPREADER
Drop spreaders work by opening tiny holes at the bottom of the spreader and dropping the calibrated amount of fertilizer through the holes (see Fig.1). The bigger the hole, the more fertilizer is dropped at a time. Rates are fixed and do not depend on how fast you walk.

**Calibration**
Just like most fertilizer application equipment, drop spreaders require calibration. There are different techniques to help you calibrate your spreader successfully. Depending on the type of drop spreader you purchase, it may come with specific instructions for calibration. If it does not include calibration instructions, or if you would like to learn more about calibrating your spreader, visit this site for user-friendly, step-by-step instructions: [http://aggieturf.tamu.edu/aggieturf2/calibration/dropspreader1.html](http://aggieturf.tamu.edu/aggieturf2/calibration/dropspreader1.html).

**General training tips**
Like all new equipment, using drop spreaders successfully may require training to avoid misapplication and to ensure best results. Following are some helpful guidelines gathered from local turf care experts to help you use your spreader successfully.
✓ Use small, particle-sized fertilizer with your drop spreader. Larger pellets tend to
clog the spreader holes, which can affect accuracy.

✓ When filling your drop spreader with fertilizer, be sure to do it on pavement to
avoid any accidental application on grass. When you are done, be sure to sweep
up any fertilizer that may have dropped on the pavement.

✓ To avoid striping the lawn, use a half rate application and apply twice. To avoid
patches, fertilize down a strip of lawn and then double-back before moving onto
another section of the lawn.

✓ The width of the drop spreader application does NOT include the width of the
wheels. Be sure to account for this space when you fertilize.

✓ Some drop spreaders tend to leak fertilizer pellets when being stored or moved.
To avoid any unintentional leaks, make sure your spreader is empty when you
store it and be sure to cover the holes of your spreader when you are moving from
site to site. As always, if some fertilizer accidentally falls on a hard surface, be sure
to sweep it up to prevent it from entering the storm system.

✓ Be sure to clean out your spreader in between uses to keep it from rusting. Be sure that the
spreader is completely dry before storing to avoid rusting. *Plastic and stainless steel
spreaders help avoid corrosion damage.

✓ For larger areas, use an application pattern as
seen in Figure 2 to avoid missing areas or
over-applying in other areas.

✓ You may want to practice walking with the
drop spreader. When practicing, be sure to
walk over a hard surface or plastic that can
easily be swept or cleaned when you are
done.

Fig. 2) Typical application pattern
of a drop spreader fertilization.
**Grasscycling Program**

| Order more brochures to be printed if necessary | Newsletter program for April about grasscycling | Write newsletter article
| Date of event | 0-0.5 in | 0.75 in - 1.5 in | 1 in |
| 0-0.5 in | 0-1 times per month | 0 in |
| 4 times per month | 4-6 times per month | 0 in |
| Apply once, only if needed | (April) | 0 in |
| Summer (June) | 0-1 times per month | 0 in |
| 1 application of fertilizer in early controlled-release fertilizer in late spring | 0 in |
| One Application of fertilizer in early controlled-release fertilizer in late spring | 0 in |

**Important to correlate fertilizing, mowing, and watering frequency in order to reduce amount of clippings moving produced. This will...**

| Fall | Summer | Spring | Winter |

**Recommended Practices**

**Seasons**
<table>
<thead>
<tr>
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<th>Fall</th>
<th>Summer</th>
<th>Spring</th>
<th>Winter</th>
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