



# Residential Yard Nutrient Management and Water Use

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ESPM 4041W: Problem Solving for Environmental Change



Report Number 6/9

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First, we would like to thank the City of West St. Paul for this opportunity. We would also like to thank the people of West St. Paul for participating in our online Facebook survey as well as Dave Schletty, Eric North, and Kristen Nelson for their guidance. We are also very appreciative of the West St. Paul Environmental Committee for supplying the topics used by our Problem Solving for Environmental Change course. Lastly, we would like to thank our fellow classmates for the key research and information they shared with us.

# Executive Summary

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West St. Paul is a city that is passionate about improving the sustainability and equity of their city. It has many parks, water bodies, and recreational areas to enjoy. However, the current management practices for residential lawn care are affecting the health of the nearby waterbody, Thompson Lake. This report focuses on informing West St. Paul residents about the best management practices for lawn management, such that lawns across the City can provide both ecological and cultural benefits.

To determine the best recommendations for the problems of lawn nutrient management and water use in West St. Paul, several steps needed to be taken. First, a pilot survey was created to determine West St. Paul residents' knowledge. Next, we identified similar cities within the metropolitan area to West St. Paul and reviewed their website information for accessibility and education programs, as compared to West St. Paul's. To develop an action plan for the City, University of Minnesota websites were reviewed to determine best management practices for lawn nutrient management and water use. Finally, the health of the watershed district region that includes West St. Paul was assessed via the Watershed Health Assessment Framework.

We found that about 60% of respondents infrequently water their lawn and those that do water at night or in the morning. By comparing city websites, we found that the information on West St. Paul's website about lawn care could be made clearer with a modified layout, where the lawn care information is found, and adding more information. From the University of Minnesota lawn management websites, we gained valuable information on recommendations for best management practices. Finally, with the Watershed Health Assessment Framework information, we determined that there is some room for improvement in West St. Paul in terms of watershed management and health.

Based on these findings, we can make the following recommendations to address lawn nutrient management and water use concerns:

- Provide more lawn care resources on the city website
- Host educational events on nutrient lawn care management and water use
- Implement an irrigation controller program
- Develop policies for alternative lawn

# Introduction

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## Overview

In the United States, there are 40 million acres of lawn (Milesi et al., 2005). With such a large amount of land, the potential negative effects of improper lawn care are numerous. Some of the most common practices that lead to harmful environmental effects are nutrient loading and excess water use (Krimsky et al, 2021). This environmental degradation conflicts with residential lawn practices to keep an aesthetically pleasing lawn. Therefore, it is extremely important that residents have resources on the best way to care for their lawn while not harming the surrounding watersheds.

West St. Paul is a city located directly south of St. Paul, Minnesota. Its location on the West banks of the Mississippi River prompted its name. West St. Paul has a current population of 19,779 people. Although the City had a large older population a few years ago, it is starting to see an increase in young families. West St. Paul has 12 parks as well as a large nature center. Their main commercial area follows Robert's Street, which runs north to south through the center of the City.

The management of nutrients used on lawns is important because chemicals from lawns and businesses will most likely end up in waterways. This can be seen in the main body of water in the Thompson Lake area, which is on the impaired waters list.

## Issue Description

Improper lawn care management has ramifications on scales that range from local neighborhoods to the entire country. Fertilizers that contain nitrogen and phosphorus can be leached into groundwater or carried in runoff through attachment to soil particles. Once these nutrients make their way into waterways, they can spur toxic algal blooms leading to subsequent kill-offs of aquatic life (Toor et al., 2017). Due to its location in the Mississippi River watershed, nutrient-borne pollution in West St. Paul can create hypoxic zones in the Gulf of Mexico when combined with pollutants from other cities in the watershed. In the state of Minnesota alone, 3,416 bodies of water are classified as impaired by the Minnesota Pollution Control Agency, all of which compound this major problem (MPCA, 2019). One of West St. Paul's lakes, Thompson Lake, is a part of this impaired list and may indicate pollution issues occurring in the City (MPCA, 2020).

However, when looking specifically at the scope of West St. Paul, the scale of the issue of lawn management is narrowed down to a resident-by-resident basis. Here, the lawn holds a great cultural significance to those that maintain them. They are a source of status, a place to relax and gather for summer enjoyment (Bormann et al., 2001). Because residents attain all these benefits from lawns, they will take steps to ensure that their lawns are maintained to a high standard. Residents meet these standards by using nitrogen, phosphorus, and potassium fertilizers that increase the health of their turfgrass. Statistics have shown that 60% of the 90 million households with a lawn in the U.S utilize lawn fertilizer in some capacity (Campbell et al., 2020). However, this sentiment is in direct conflict with the value to preserve green spaces and healthy environment, which citizens of West St. Paul hold.

Although residential lawns are manicured to be aesthetically pleasing, improper lawn care can result in damage not only to the surrounding environment, but to the lawn itself. Common improper practices include mowing too often and with dull blades. Moreover, watering at ill-advised intervals, over-watering and over application of fertilizers can result in residents having higher lawn care costs while not seeing further benefits.

Even though fertilizers and irrigation can lead to nutrient loading in waterways, both are not inherently bad. The use of fertilizer is necessary to maintain a healthy lawn, as the University of Minnesota's Turfgrass Science department recommends fertilizing at least once a year (UMN Turfgrass, 2020). Also, when a lawn is irrigated and fertilized properly, it can provide ecological benefits, such as the capture of runoff, improving soil health, and the reduction of soil erosion (Campbell et al., 2020).

This report focuses on informing West St. Paul residents about the best management practices for lawn management, such that lawns across the City can provide both ecological and cultural benefits. When enough residents adopt these practices, the City will receive fewer complaints, as lawn uniformity and connectivity will be possible across the City. This is because those who partake in harmful lawn care practices will be encouraged toward common beneficial practices. Also, if the residents adopt these practices, it will increase the community feel that is so important to West St. Paul citizens and help clear up city lakes and ponds.

## **Visions**

### *City Vision*

The City of West St. Paul is a proud, tight-knit community with a devotion to the people that live there. The 2040 Comprehensive Plan (2020), states that the City “... strives to insure a safe, pleasant, and affordable environment...” (p. 3). Over the course of the next 20 years, the City hopes to “... preserve green spaces, high quality infrastructure, and the community feeling...” (City of West St Paul, p. 3), with a particular emphasis on green spaces. Their vision also states that the City “... will be a friendly, safe, walkable and well-connected City for its residents and visitors” (City of West St Paul, p. 3). Overall, West St. Paul values its residents' input and hopes to help the area grow while keeping the same “community feel”.

### *Class Vision*

Through collaboration with the City of West St. Paul and our independent research, the values of conservation, equity, and community engagement were integrated to develop solutions which are effective and innovative. With these integrated values as a guide, West St. Paul can promote safe and sustainable public growth to serve the community and its future generations.

### *Report Vision*

The Lawn Nutrient Management and Water Use report aims to inform the West St. Paul city council and citizens about the issue of lawn nutrient management. Through this report, we outline potential solutions that will educate the public about how to have a sustainable lawn, which overall will result in healthier lawns, decreased fertilizer runoff into water bodies, and uniform lawn care recommendations. Additionally, our recommendation to reformat the City’s website will increase the accessibility and the amount of helpful information regarding specific lawn management topics, which will further increase the public’s awareness.

## **Goals and Objectives**

This report aims to address the issues of residential yard nutrient management and water use by informing West St. Paul residents of best management practices for lawn care to benefit the community and the surrounding environment. The following objectives were identified to achieve this goal:

- Release a pilot survey on social media to gain information about the lawn care practices of West St. Paul residents,



- Make connections with experts to inform residents on the most environmentally friendly ways to manage their lawns,
- Study West St. Paul's 2040 Comprehensive Plan from their website on land use, water supply, and sustainability to help further compile information for residents,
- Gather information on what education and outreach programs on the previously mentioned topics, and how those programs can be built upon,
- Review online materials to gather information on how metro citizen's care for their lawns, and how this information can be applied to West St. Paul, and
- Finally, help increase the public's awareness of issues surrounding lawn practices' issues and environmentally friendly solutions to these problems.

# Methods

## Site Description

The City of West St. Paul occupies an area of 4.91 square miles and has a current population of 19,779. Most of the City is residential, with 56% of residents being homeowners themselves. There is an industrial corridor surrounding Roberts Street, which cuts down the heart of West Saint Paul. The rest of the land in the City is dedicated to their parks system, which contains 12 city parks along with a nature center in the southwest area and one county park (Figure 1). One area of interest is Thompson County Park which contains Thompson Lake, the largest lake in West Saint Paul. This lake covers 7 acres with a maximum depth of 8 feet (MN DNR, 2021). Thompson is surrounded by neighborhoods, making it a prime target for runoff from yard waste. This has led Thompson Lake to being placed on Minnesota’s impaired waters list. Other sites evaluated for this report include: the Dodge Nature Center, smaller city parks within neighborhoods, and the golf courses in West Saint Paul.

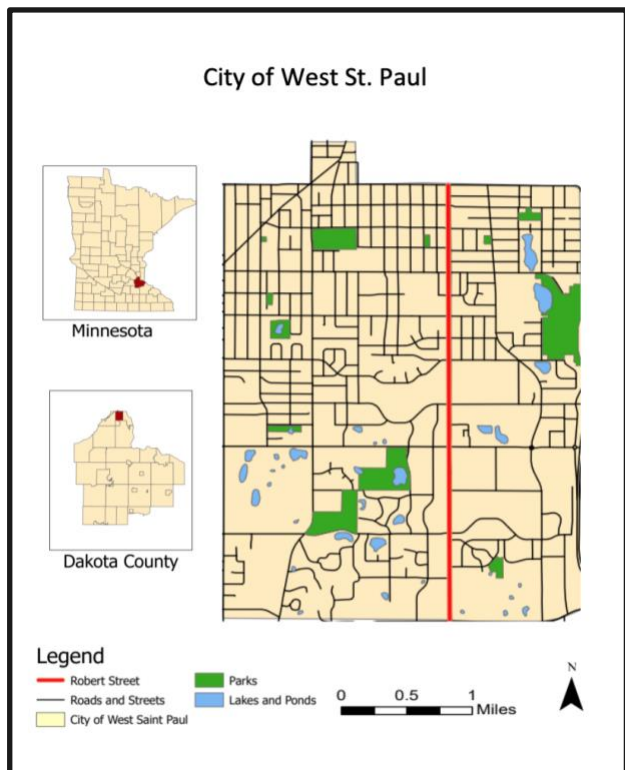


Figure 1: Map of the City of West Paul  
(Source: ESPM 4041W class).

## Online Survey

One method we used to gather information was an online pilot survey. This method was pursued to gather information on current residential knowledge and practices in West St. Paul. Assistant Parks and Recreation Director Dave Schletty recommended using West St. Paul’s Facebook page as our population. While answering questions, Dave mentioned that West St. Paul has active community members who are very involved on the City Facebook page. With just over 6,000 members, the City Facebook page was seen as an avenue for gathering information from many residents of West St. Paul about their current

practices for lawn care and water conservation as well as the impacts of improper practices. Twelve closed-ended questions were tailored to receive as much information possible from participants while maintaining a relatively small number of questions. Furthermore, a link provided at the end of the survey supplied participants with information about lawn care, water use and nutrient loading if they desired to investigate further (see Appendix A for all survey materials). We grouped responses into three categories: water use, lawn care, fertilizer, and miscellaneous responses. These categories lump similar questions and responses together to gain insight about each issue and the scale at which each needs to be addressed. This survey could also be used after West St. Paul's initiatives to gauge change over time.

## **Comparative Study of City Websites**

We used a comparative study of city websites to understand the ways residents can get their lawn care information about management, regulations and other topics about their city. Since each city website is designed with input from city officials, it was deemed plausible that some websites have easier access to varying information. Our study population was city websites of the 114 municipalities in Minneapolis-St. Paul metropolitan areas. West St. Paul was the baseline and cities chosen to compare to the baseline were Eagan, Golden Valley, and White Bear Lake. These cities were chosen due to multiple factors. While both White Bear Lake and Golden Valley have similar populations to West St. Paul, Eagan has a much larger population, but it is a neighboring city to West St. Paul it may have a similar geography. Also, White Bear Lake recently had a University of Minnesota project like ours, where nutrient loading and lawn care management were the focus.

Our goal in comparing these city websites was to assess ease of access, logical organization, and presence of lawn care information. Ease of access was evaluated by comparing the number of clicks and drop-down menus it took to reach pertinent information about lawn care or water conservation. It was initially determined that fewer clicks and fewer drop-down menus to reach a destination would be better. However, as analysis progressed this was deemed less important than other comparisons we included. The number of clicks and drop-down boxes did not impede a user from reaching the destination. Ease of accessibility was evaluated by the location of the information on the website and noting lawn care keywords. It was determined if these keywords led the user to pertinent lawn care information. Furthermore, organization was also evaluated by the number of dead ends. It was important to note a simple "yes" or "no" to the presence of dead-ends and evaluate terms leading to these dead ends. For example, if a user was searching for lawn care information only to find it elsewhere then this would be a dead end. Dead ends play a role in the analysis because they impede a user from finding the necessary

information. Finally, availability was evaluated by noting the presence and absence of information. The City's calendar was also reviewed during the search of city websites. A comparison was done to recognize how far in advance the city planned events, and if calendars were user-friendly.

## **Comparative Study of Twin Cities Metro Area**

Aside from reviewing the websites of Twin Cities metro cities, a review of case studies and irrigation programs within these metro cities was also conducted. Our goal in this comparative study method was to analyze current programs in use, such that a program recommendation could be made for West St. Paul regarding conserving water through solving irrigation issues. Any city website that included information on a water conservation irrigation program was considered for review. Cities specifically chosen for this report were the 59 metro communities participating in the Metropolitan Council Water Efficiency Grant Program, as well as the cities of Eagan, Stillwater, Chanhassen, and Woodbury. This group of cities allowed for a diverse review of different programs currently being implemented. Information analyzed within each individual program was the program cost, funding method, and successes or failures. We found many cities not participating in the Metropolitan Council Water Efficiency Grant Program. Yet West St. Paul's use of water from St. Paul Regional Water Services means that it is important to search for alternative water saving programs.

## **Secondary Analysis**

### *University Site Recommendations*

In addition to the online survey, a review of university lawn care recommendations and Twin Cities area case studies was conducted to develop recommendations. In these reviews, we sought answers to what the recommendations for lawn care in the area are, as well as water use. The Google search was "University of Minnesota lawn" and "Mowing Practices for Healthy Lawns".

### *Alternative Lawn Investigation*

To conduct an investigation of alternative lawn use in Minnesota, an analysis of Minnesota state agency websites was used to gain insight into the possibilities of alternative lawns. The Google search "Alternative lawns in Minnesota" was used and sources were selected for those of state agencies, such as the Minnesota Board of Water and Soil Resources and the Minnesota Pollution Control Agency used for this investigation.

### *Watershed Health Assessment Framework*

Another method to gather information on West St. Paul was the use of the Minnesota Department of Natural Resources' Watershed Health Assessment Framework (WHAF). Through information gathered on the WHAF website, we sought to further determine risks associated with surface cover types in the City. With data associated with the current health of the Lower Mississippi River Watershed, we could compare its health to other watersheds. The major keywords searched were impervious cover, water quality assessment, and nonpoint source pollution. It is important to acknowledge impervious cover because it is prominent in cities and increases water quality risks. Furthermore, the need to evaluate water quality was necessary to assess the health of waterbodies in the area. Nonpoint source pollution was evaluated due to prior knowledge about the yard nutrient management resulting in water quality issues.

# Findings

## Online Survey

The piloted online survey we managed to obtain 23 responses during a 3 week period. Although this number is small, we were able to gain example information that elucidated practices of the West St. Paul respondents.

In this example group, we found 60.87% of respondents stated that they only infrequently watered their lawn, and 21.74% never did (Figure 2). Of the 18 people who water their lawn almost 89% water their lawns during morning and evening hours which is desired (Figure 3). Finally on water use, only 8.7% of respondents use below-ground sprinkler systems while 34.78% water their lawn using an above ground sprinkler system (Appendix B).

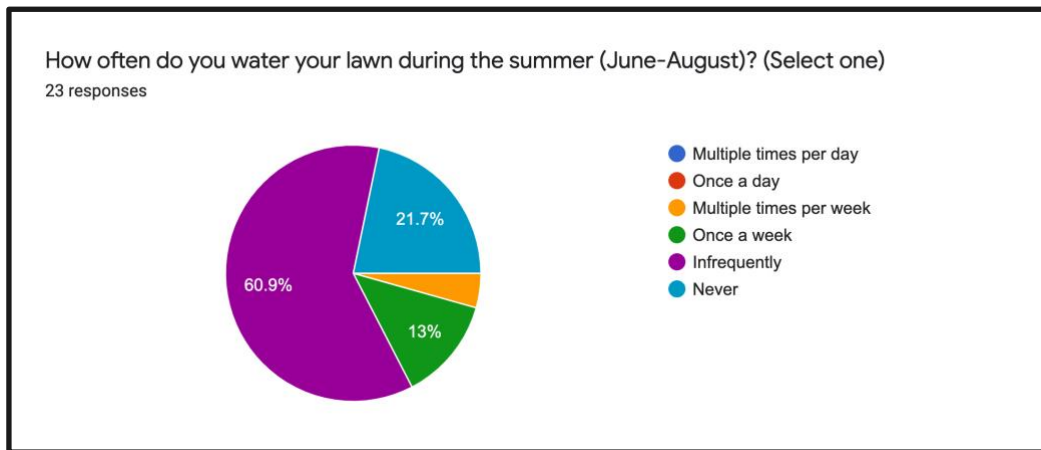


Figure 2: Watering Frequency Among Pilot Survey Responses (n=23)

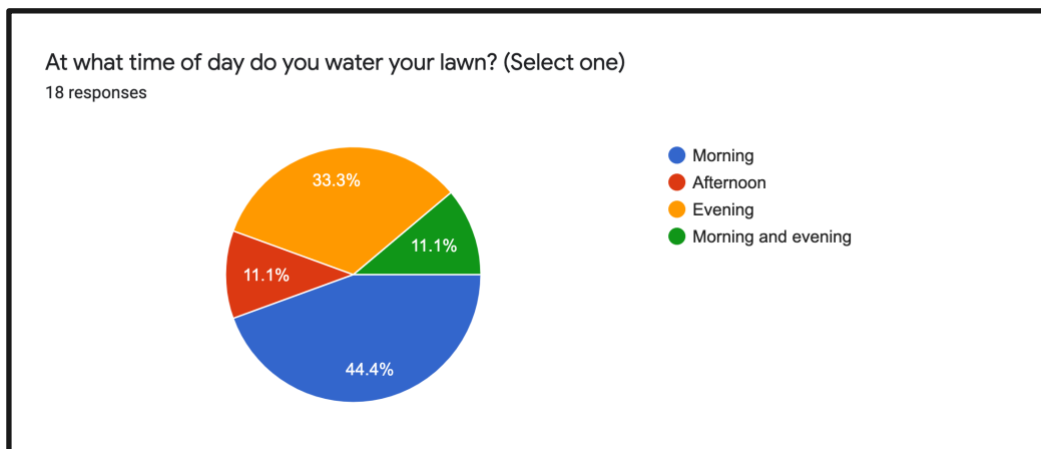


Figure 3: Time of Watering Among Pilot Survey Responses (n=23)

Our second focus was on lawn care. A combined 43.48% of respondents mow their lawn on a 5-day to weekly basis (Figure 4). Although the majority could be considered to mow their lawn at a sustainable frequency, the number of households whose lawn mowing techniques are not sustainable based on current research is problematic. However, 60.87% of respondents cut their lawn to a 3 inch height or more, with only 30.43% knowingly mowing it below 3 inches (Figure 5). Three inch and above mowing height is one of the sustainability practices recommended. This is a better ratio than that of mowing frequency and indicates fewer behaviors to change. Finally, a vast majority of respondents (82.61%) leave their clippings on their lawn after they mow, with every other option garnering similar 4% proportions (Appendix B). This also shows that respondents are participating in sustainable practices with the disposal of their lawn clippings.

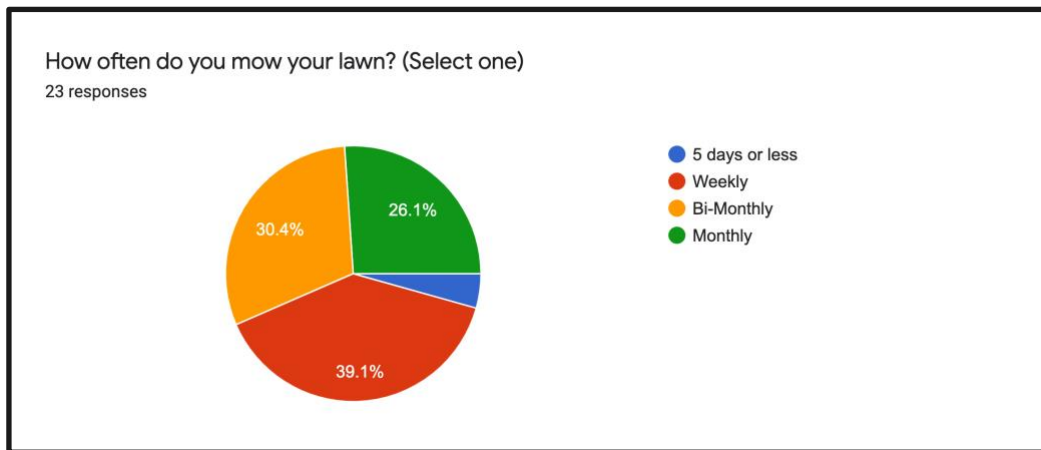


Figure 4: Mowing Frequency Among Pilot Survey Responses (n=23)

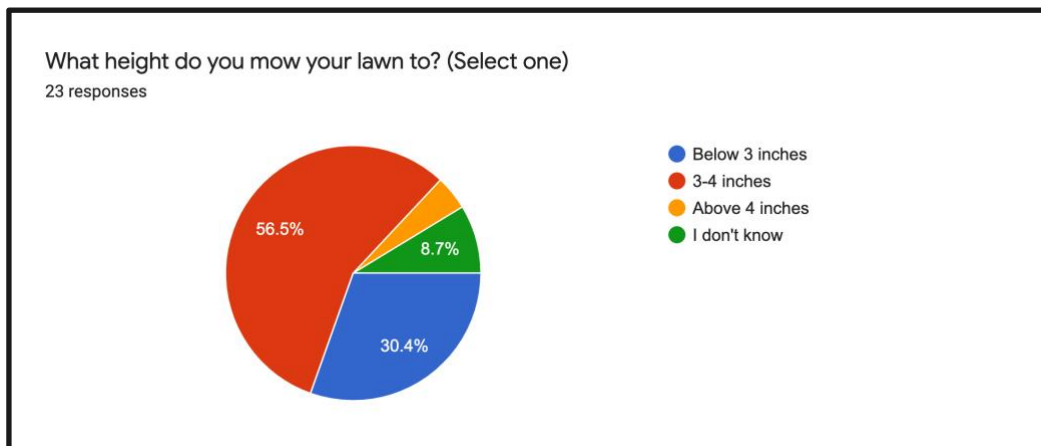


Figure 5: Lawn Height Among Pilot Survey Responses (n=23)

Regarding fertilization, 50% of respondents simply don't fertilize their lawn, while only 4.55% fertilize their lawn once a month (Figure 6). This does not include leaving grass clippings on lawns which

comprise a single fertilizer application throughout the year (UMN Extension). This also suggests that most respondents are fertilizing their lawn at a sustainable frequency. Finally, we found that only 26.09% of respondents use inorganic fertilizer (Figure 7). This suggests that inorganic fertilizer is not as prevalent, and the majority of respondents are not of concern for changing practices.

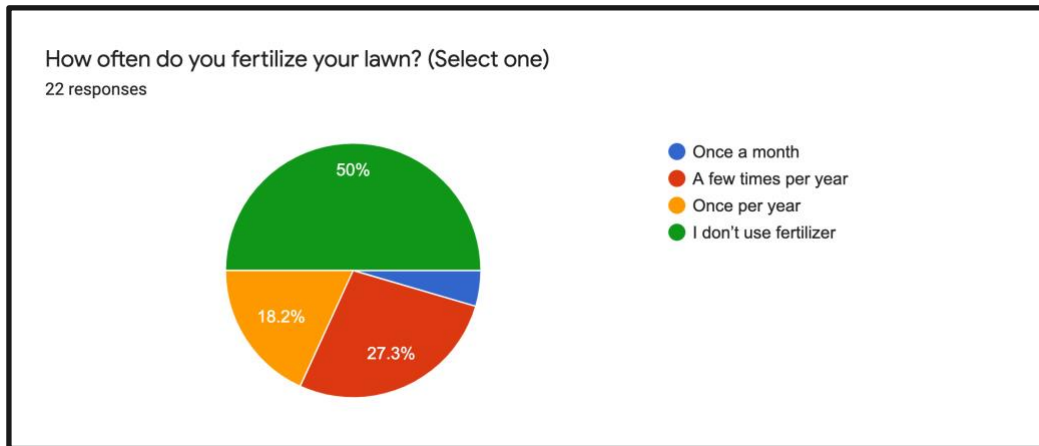


Figure 6: Fertilizer Frequency Among Pilot Survey Responses (n=23)

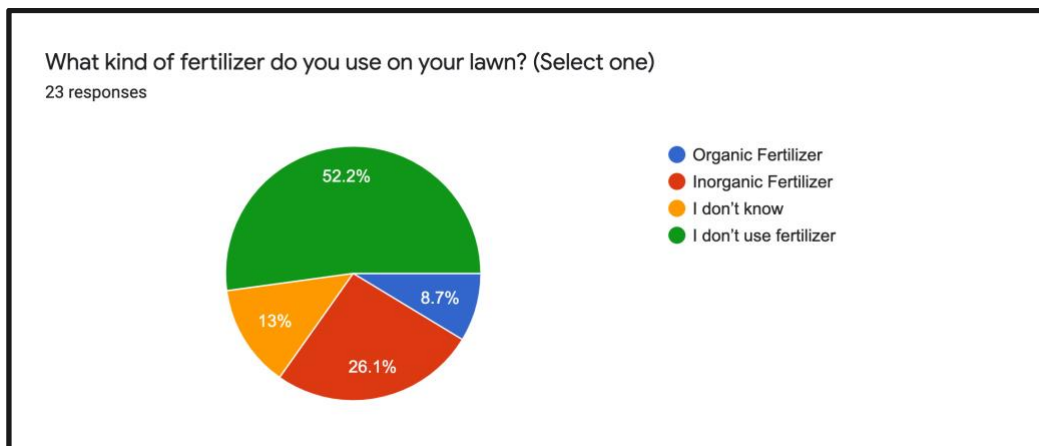


Figure 7: Fertilizer Type Among Pilot Survey Responses (n=23)

Finally, a few miscellaneous insights, 82.61% of respondents stated that they manage their lawns themselves (Appendix B). This is important as it indicates outreach programs will need to reach a larger number of people instead of a focus on lawn care companies. We also confirmed our assumption that very few (0% of respondents) have tested the soil of their lawn (Appendix B). This indicates they may not know how much fertilizer or water their lawn needs to stay healthy. We also noted how roughly 50% of respondents stated their lawn practices were like their neighbors (Appendix B). So while it may be plausible that some respondents may change their lawn care practices if their neighbor did, this may not be the case.



## Comparative Study of City Websites

### City Website Information

While making comparisons of Minnesota city websites, several things were noted. The first was how comprehensive the City sites are and how easy it was to find information. For example, when looking at West St. Paul's city website, at the top of the page can be seen "City Services", "Your Government", "Our Community", "Doing Business" and "How Do I..." (*City of West St. Paul*). From these tabs many more links can be found, however it is not immediately clear where information could be found about lawn care within the confines of West St. Paul. When the available tabs are considered, "Our Community" seems to fit best, however there is nothing available for lawn care. Finally, when a search is done on the City site for "lawn care" the first result is pollution prevention. Some useful information can be found here such as a general recommendation for composting yard refuse such as grass clippings or leaves, but this information is relatively minimal. When compared to White Bear Lake, Golden Valley, or Eagan's city websites, other sites have more easily accessible information (Appendix C).

White Bear Lake's city homepage has 3 tabs at the top of the page "Community", "Services" and "Your Government". When the "Services" drop down tab is observed, a category of "Environment" is seen including "Lawn and Garden". The information given is not as extensive as is preferred, but this is an example of ease of access and comprehension that is not as present with West St. Paul's site (*City of White Bear Lake*) (Appendix C).

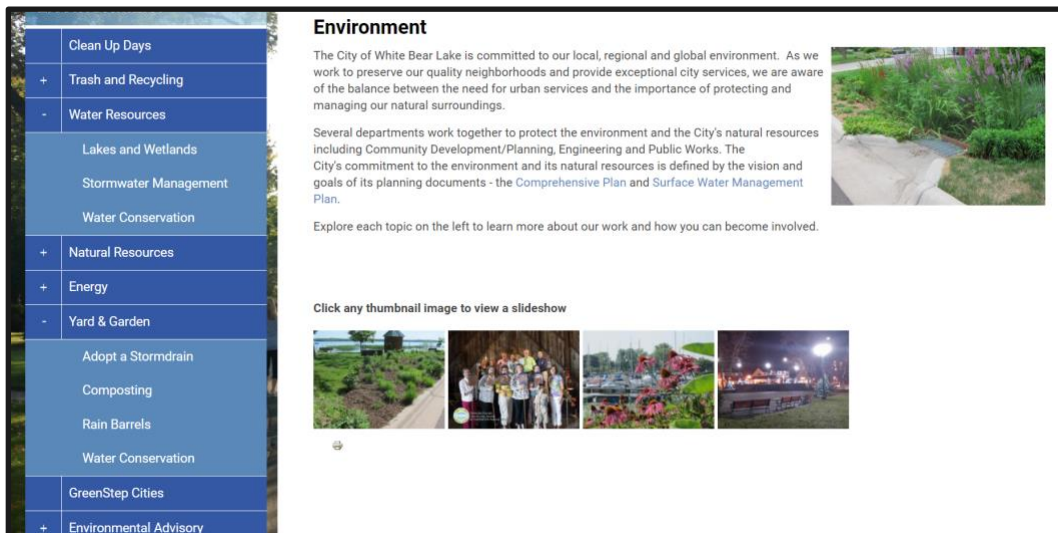


Figure 8: White Bear Lake Resources

Golden Valley’s website has a dropdown tab at the top of the page that is simply titled “Your Home and Yard” with a link to “Yards and Gardens” (Figure 9). But again, information is lacking with only mention that yards must be well kept to city ordinance and other information about practices such as rain gardens (*City of Golden Valley*) (Appendix C).



Figure 9: Golden Valley Drop-Down Menu

Finally, Eagan’s city site has a tab at the top of the page for “My Home & Environment” (Figure 10). When this is clicked, three more links are available for “My Neighborhood and Environment”, “In My House” and “In My Yard” (Figure 11). Instead of “In My Yard”, confusingly, information about lawn management is found under the “My Home & Environment” link. However, this provides a page with a category of “Going Green” with information about several key environmental issues or practices such as energy conservation, Adopt-A-Drain, rain gardens and even information about irrigation and healthy lawn tips (Figure 13). Each of these provides pertinent information about their respective topics including information we have found about proper lawn care and water use such as not watering during the hottest parts of the day due to higher evaporation rates or raising the mower blade height (*City of Eagan*) (Appendix C).

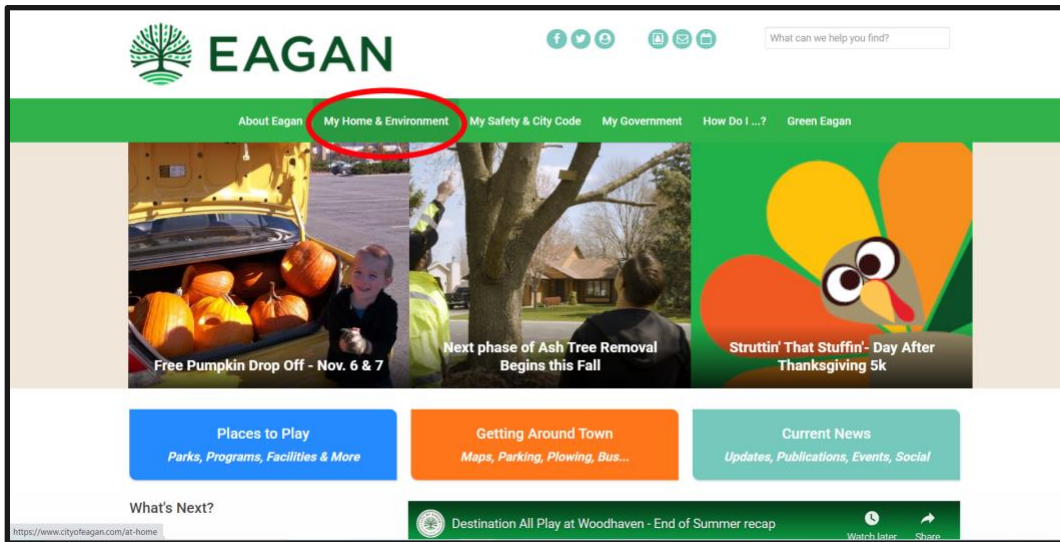


Figure 10: Eagan Front Page

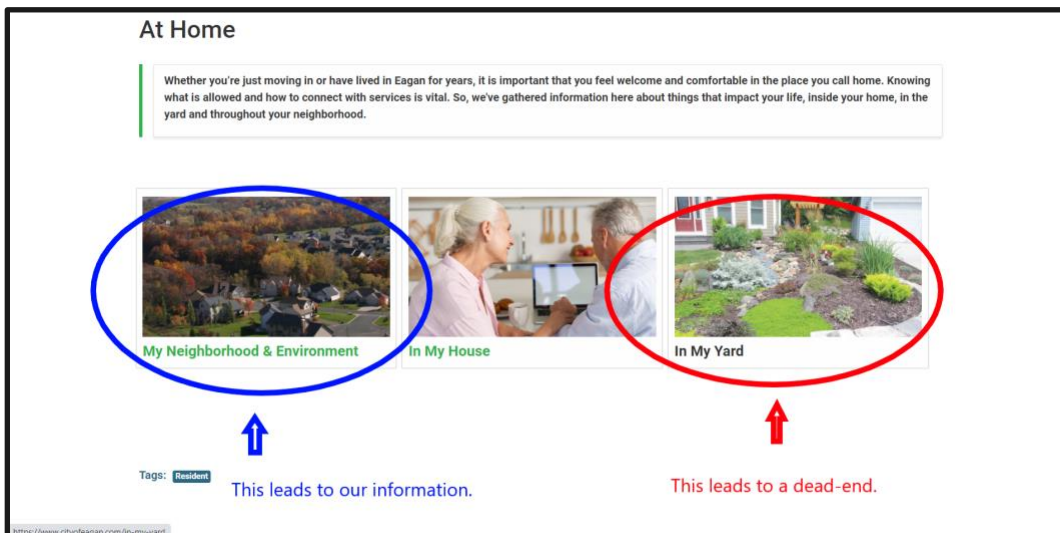


Figure 11: Eagan Dead-End Path

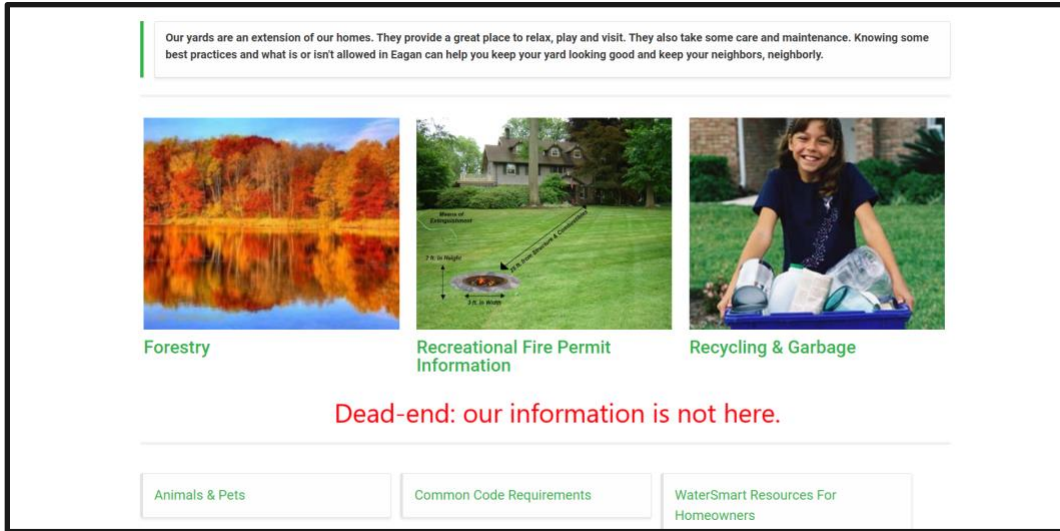


Figure 12: Eagan Dead-End



Figure 13: Eagan Going Green

### Calendar

All city sites were also examined for ease of access to community events. Each website had easy access to a calendar for events for the city council and community events. Although the list of events in West St. Paul has been omitted by other city sites in favor of a more extensive calendar; the main differences are simply that of aesthetics. A list is simply not as easy to look at for a resident as a simple calendar even if it functions the same. However, the biggest difference is that at other sites there are simple lists of community events that residents engage in on a yearly basis. These events are more clearly defined earlier than on West St. Paul's website, such as White Bear Lake already planning its Marketfest event for the summer of 2022 or an Environmental Resources Expo the last Thursday of every July. These events

planned so far in advance and available to the public to see helps residents plan further in advance, but it also helps the City plan the allocation of resources or outreach attempts.

#### *West St. Paul's 2040 Comprehensive Plan*

While searching the West St. Paul City website, our group found the City's 2040 Comprehensive Plan. In this plan, the City details how their desired outcomes for 2040 include stewardship, prosperity, equity, livability and sustainability. The topics of stewardship, livability and sustainability directly pertain to the issue we are addressing, and these goals have been tailored to meet the values of their community they surveyed to construct this plan. In providing evidence for their goals and in order to accurately represent their community, the City included graphs showing the results of survey questions asked of their residents. One of the results that stood out the most was the emphasis by the community about the desire to preserve green/open spaces which indicated to us that the community values the environment.

#### *Facebook*

There is active community engagement on the City's Facebook page. The Facebook page has 6,784 followers and 6,289 likes. The community is relatively active on this page and each post from the City has engagement. Most of the posts from the City are in the form of updates about upcoming events, with a few announcements made such as for the watering restrictions implemented by the City in August 2021. Given their large following and degree of engagement, this was seen as an avenue for the City to make public service announcements and reach a large segment of the City's almost 20,000 population. Furthermore, this was also seen as a way for the City to get information and feedback from their residents about their practices.

## **Comparative Study of Twin Cities Metro Area Programs**

Through analysis of Twin Cities metropolitan area case studies, looking into cities spearheading irrigation conservation programs, it is evident that water conservation is an issue addressed throughout the area. There are currently three methods in use: grant funds from the Metropolitan Council, partnership with third party organizations, and use of city-based programs funded independently. Many of these programs have been established recently, but data and participation suggest that they help conserve water and solve irrigation system problems.

### *Metropolitan Council Water Efficiency Grant Program*

The Water Efficiency Grant Program is organized by the Metropolitan Council who awards grants to cities using funds from the Minnesota Clean Water, Land and Legacy Amendment. The program started in 2015 through an initial \$500,000 award and a further \$750,000 to continue in 2019. The first program that ran through 2015 to 2017 included 19 metropolitan communities, and the 2019 to 2022 program will have 40 participating communities. This program focuses on entire home water conservation efforts, with yard irrigation conservation measures in both replacements of old irrigation controllers with WaterSense-labeled controllers and WaterSense Partner-certified irrigation audits (MetCouncil 2021). Eligibility for the program includes that applying municipalities must be water suppliers, a portion of the cost for irrigation technology or audit must be paid for by property owners. The municipality must fund 25% of the program (MetCouncil 2019). Upon completing the 2015-2017 program, approximately 52,000,000 gallons of water were saved per year, with 18,000,000 coming from new irrigation controllers and 59,000 coming from audits. Also, a single irrigation controller saved an average of 15,000 gallons per year and an audit saved an average of 14,800 gallons (MetCouncil 2021). For an example of a city working within this grant program, Apple Valley partnered with Dakota County and received \$29,000 from MetCouncil. The city then offered rebates on both WaterSense irrigation controllers and audits, where 50% of the cost of a controller was covered up to a maximum of \$150 and a flat amount of \$150 for an audit (City of Apple Valley 2020).

### *Partnership with Third-Party Organizations*

Aside from using the MetCouncil program, the Cities of Stillwater and Eagan partnered with the Safe Water Commission in their Smart Irrigation Program. This program offers residents who apply \$500 worth of services for around \$170. This includes an audit of the resident's irrigation system, and replacement and installation of smart irrigation controllers. The program has simple eligibility, including a currently functioning irrigation system, access to a smart-phone and Wi-Fi, and a system no less than two years old. According to the Safe Water Commission, the Stillwater program that began in 2020 saved approximately 5,000,000 gallons of water in its first year. The Eagan program began in 2021 and data has not yet become available for this year (SWC 2021).

### *Independently Funded Programs*

Several metropolitan area cities have taken an independent approach to irrigation issues by introducing their programs. For example, the City of Woodbury partnered with Washington County, the South Washington Watershed District, and the Minnesota Technical Assistance Program (MnTAP) to conduct a 2-year pilot program which led to the creation of the Smart Irrigation Controller Program in 2016. In this

program, the city bought smart irrigation controllers in bulk and then distributed them to residents at a reduced cost of \$35. Since the program began, 2,600 controllers have been distributed, with each home saving an average of 30,000 gallons of water per year (City of Woodbury 2021).

Another city that has taken independent initiative is the City of Chanhassen. This program, called the WaterWise program, began in 2007 after a drought forced the city to implement a full watering ban. The program's goal was to create awareness around water conservation and assist residents in conserving water. In 2008, the City started by offering irrigation audits, landscape rebates, technology rebates, a conservation contest, and classes at the Minnesota Landscape Arboretum. From 2009 to 2013 the City began an information packet and weekly e-newsletter, a Water Festival Weekend at the Arboretum, and the use of the City website and social media to spread awareness. The City saw a drop in water use and a great public response while noting one issue with irrigation audits. They stated that the audits took up far more time and staff than originally anticipated, so in response, the City certified one staff member in the WaterSense Professional Certification Program for Irrigation Audits such that one person can now conduct all of the audits the city provides (MetCouncil Water Conservation).

## **Secondary Analysis**

### *University Site Recommendations*

The first resource reviewed was the University of Minnesota Turfgrass Extension website. Under the lawn resources section, a six-part webinar series highlights topics such as “Lawn Care Best Management Practices” and “Outdoor Water Use in the Twin Cities: Am I using too much?” In these videos, developed in partnership with the Metropolitan Council, there is a complete overview of how residents in the metro area should care for their lawn in ways that benefit their lawn and the environment. An analysis of the videos was conducted to complete the development of questions used for the survey, as well as developing an educational plan such that residents are using the recommendations from the University of Minnesota and Metropolitan Council (UMN Extension). Furthermore, the website provided information about what lawn care constitutes as “healthy”. Analysis indicates that a turfgrass height of 3 inches is ideal for most lawns and homeowners should never cut off more than  $\frac{1}{3}$  of the grass blade with each mow. This, paired with having sharp mower blades is to prevent the grass from being damaged. Residents should also do soil tests on their lawn and leave grass clippings on them after mowing. The clippings can act as fertilizer and tests help indicate how much fertilizer and water are needed for a particular lawn. For water use, the site indicated that residents should water in the morning and evening hours to reduce water loss due to evaporation. Residents should also water less frequently and with more

water to effectively irrigate roots and to keep an eye on the weather, so lawns are not watered unnecessarily close to a weather event. Finally, the use of Smart irrigation technology can reduce the amount of water wasted through various techniques.

### *Alternative Lawn Investigation*

Across the U.S homeowners are beginning to view the lawn through as part of nature and that it should work to become one with the surrounding ecosystem (Bormann, 2001). This change in mindset is evident in West St. Paul, as two respondents to the pilot survey conducted, left comments about alternative lawn plans. Those comments were:

- “I just started a clover lawn in most of my yard. It’s drought resistant/self fertilizing and dog urine resistant.”
- “I am planning to convert as much of our lawn to native plantings and low-mow grass options but it is costly and time consuming. I expect it to take many years, but am committed to making our little plot of land as beneficial to the ecosystem as possible. Most of our neighbors have lawns that they water, fertilize and spray weed killer on. We do not and I’m not sure how they feel about it.”

Coming from the Minnesota Pollution Control Agency (MPCA) and the Minnesota Board of Soil and Water Resources (BWSR, 2020), there are many options a city or homeowner can take when planning for alternative lawns. The first option is the easiest to develop and maintain as it is part of the lawn and can be mowed to a height of 3 inches. This is called a “flowering lawn” and the MPCA recommends the use of four flowers, with those being Dutch White Clover (*Trifolium repens*), Creeping Thyme (*Thymus serpyllum*), Self Heal (*Prunella vulgaris*), and Ground Plum (*Astragalus crassicaarpus*). All four of these species are low lying and are attractive to bees for pollination, and Dutch White Clover itself is a nitrogen fixer. These may be seen as “weeds” by some but are far less aggressive than common weeds such as Creeping Charlie and Dandelions (MPCA “keep off”). The other option is from BWSR and entails the creation of separate gardens as a part of the yard or as a raised bed. BWSR provides three templates, included in appendix E, with those being a shade, sunny, or rain garden. Each garden utilizes different flowering plants and trees; however all are equally beneficial to pollinators. The rain garden is a particularly beneficial option to addressing the issue of nutrient management as water is funnelled to the gardens where infiltration is promoted. The garden templates provided by BWSR have 15-20 feet by 6-8 feet dimensions but can be reduced for smaller yards. Pollinator bed signage is also recommended to show the intent of the garden (BWSR, 2020).



### *Watershed Health Assessment Framework*

The Watershed Health Assessment Framework indicated West St. Paul had a score of 0 out of 100 for impervious cover. This is not out of the ordinary since the entirety of Minneapolis-St. Paul has a similar score. This simply means there are many impervious surfaces such as streets and buildings that can exacerbate runoff and lead to pollution. Although an exact number was not found, the water quality assessment was around 40-50/100 and nonpoint source pollution was around 50-60/100. This indicates that both of these factors have room for improvement (MN DNR WHAF). This information is backed up by the knowledge that Thompson Lake in West St. Paul is considered an impaired waterbody.

# Recommendations

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## Overview

To address yard management issues in the City of West St. Paul, four recommendations have been provided. These recommendations are to provide lawn care resources on the City website, to host education events on lawn management, implement an irrigation controller and audit program, and to develop policies for alternative lawns. Resources provided on the City website and educational events will work to assist residents in improving and engaging in best practices. While the controller and audit program as well as the development of policies for alternative lawns will allow the City to achieve progress in water conservation efforts and addressing future challenges to changes in yard design. All four will provide the City and the community with the tools to further its overall sustainability.

## Provide Lawn Care Resources on the City Website

Modifying the city website to include lawn care resources will provide a platform for training and engagement in the future. The website comparison identified a few areas where West St. Paul could improve to provide information for its residents. First, add specific lawn care and water conservation information. Yard care pages can include details about lawn mowing frequency, mower maintenance, fertilizer use, yard waste composting and grass height recommendations. Water use pages can include tips about how often to water lawns and at what times to maintain a healthy lawn while using as little water as possible. Furthermore, consider restructuring the City calendar. Also, when possible, help residents plan events further ahead by posting dates earlier. This will help groups plan more outreach programming during the events. Finally, consider adding a “Going Green” section on the websites. West St. Paul could review the city websites analyzed in this report as examples. A Going Green section could not only be used to spread awareness about lawn care, but also to summarize the issues and ideas addressed in the other eight reports in the ESPM 4041 class projects. A tab on the front page for this section could also help West St. Paul stand out as focused on a green and innovative future.

Finally, with over 6,500 followers, the City’s Facebook page could be used to spread awareness about local environmental issues. Posts could include posts in the summer months regarding healthy lawn care information or watering guides. Furthermore, the piloted survey provided in this report could be sent to all homeowners, and if modified slightly, rental properties, with a water bill. This could help the City get

a better understanding of what West St. Paul residents are doing with yard care. Or the survey could be sent to the public on a yearly/semi-yearly basis to track the changes in resident knowledge and practices due to the City outreach efforts.

## **Host Educational Events on Lawn Nutrient Management and Water Use**

West St. Paul has many events held periodically throughout the year. West St. Paul Days would be a great opportunity to inform citizens of best management practices for their lawns. This would include having a booth where a few professionals are available to give insights and answer questions residents have about their lawns. A booth could also contain flyers and posters with information on general best management practices for lawns. Smart Irrigation devices could also be purchased directly at the booth.

Furthermore, West St. Paul could host a yearly event in the spring to remind residents of best management practices for their lawns, about the time people are contemplating yard work. This event could start with a short presentation with general information. After the presentation, there could be tables set up with different businesses and professionals to answer more specific questions and perhaps offer some samples or information of best fertilizers or equipment that people can then purchase in the future. To advertise this event, see an example design with the report information. Outlines for both the booth and the standalone event are also provided.

## **Implement an Irrigation Controller and Audit Program**

Based on the findings from the review of irrigation controller case studies and programs within the Twin Cities metro area, the City of West St. Paul is limited by two factors, the absence of a staff member to apply for grants and that it does not provide its own municipal water. These issues lead to the difficulty of the city to attempt to participate in the Metropolitan Council Water Efficiency Grant Program that is used by 59 metro communities (MetCouncil 2021). However, following the independently funded programs used by the Cities of Chanhassen and Woodbury would be beneficial. For West St. Paul this would mean purchasing smart irrigation controllers in bulk and then distributing them to citizens at a discounted price. This incentive may sound costly but based on the pilot survey results and age of the homes in West St. Paul; there are a relatively small number of homes that currently use a below ground sprinkler system. For irrigation audits, residents would hire an irrigation auditor and the City would offer a rebate up to \$150. Implementation of this program would mean all homes with underground irrigation systems would have

the opportunity to have updated and properly functioning systems. This would not only benefit the appearances of lawns in the City, but also help to conserve water.

## **Develop Policies for Alternative Lawns**

From the ever-changing view on the American lawn, the City should look to get out in front of the issue through the development of alternative lawn policies. Due to the relative youth of this topic and its cause for discourse, the City can look to utilize motivated conservations to promote and test the introduction of alternative lawns. Outlined in the potential 3-to-4-year plan in appendix F that the City could utilize, the Green Thumbs and the highly motivated Mud Lake area residents could run an alternative lawn pilot program where the flowering lawn and garden templates are allowed to be planted. This pilot program would allow for an initial small view into how alternative yards would change the overall aesthetic of the community. The biggest aspect of this is to understand the reaction of citywide residents to these changes. Gathering this data through surveys and City Council meetings would allow the City to then determine the benefits and drawbacks of a community-wide alternative policy. If the City were to choose to move forward, community feedback could then be utilized to develop the final policy. The final policy would include items such as acceptable low-lying plants in lawns, dimensions and flowers for gardens, as well as maintenance and signage requirements.

# Conclusion

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This report aims to aid the City of West St. Paul with the issue of lawn nutrient management and water use issues. The focus is to improve nutrient management and water use is to inform citizens about best management practices for their lawns. A major waterbody in West St. Paul, Thompson Lake, is on the impaired waters list, which highlights the importance of nutrient management. Also, while the visual appeal of lawns is important to residents, so is the protection of greenery and lakes around the City.

The report covers the importance of lawn nutrient management and how proper practices can improve the community. Since the recommendations focus on what citizens wanted to do in West St. Paul, it seems appropriate that a majority of the recommendations involve the public. From the pilot survey, information on the resident's lawn care behavior and opinions can be incorporated into recommendations to prevent negative residential yard side-effects like eutrophication, poor water quality, and aquatic kill offs.

However, to further education, more accessible resources on lawn management topics through the use of the City's website should be utilized. The website can contain lawn care and water conservation sections, a restructured City's calendar, and create a "Going Green" front page summary tab. Residential lawn care and water use recommendations could also be posted through the City of West St. Paul's Facebook page to reach a more engaging audience. Lastly, public outreach programs could be hosted more frequently throughout the year for environmental representatives to talk to residents and provide informational flyers or presentations on common environmental issues and solutions, as well as providing irrigation controllers and audit programs for the citizens.

The report's goal is to advise West St. Paul towards its future with the help of our group, our class, and the City. Through research, outreach to West St. Paul residents, and meetings with land care nutrient management professionals, the report is designed to guide the city toward a more sustainable, safe, and healthy city that benefits everyone in the community while considering what the public values most.

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# Appendices

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## Appendix A: Online Survey Questions

Hi! We are a group of seniors at the University of Minnesota working with the City of West St. Paul, through our Environmental Sciences and Policy Management capstone class, in order to understand lawn nutrient management and water use in the City. We are collecting information on residential lawn maintenance to supplement our project. Please fill out this short form to the best of your ability and choose the answer that best reflects what you do in a typical year. All personal information will be removed. This survey will allow West St. Paul to better inform its residents on the best lawn management practices. Please feel free to reach out (walk0955@umn.edu) if you have any questions. Thank you very much for your contribution to our project.

Picture from City of West St. Paul website

Who manages your lawn? (Select one)

- a. Lawn care company
- b. Landlord/Rental Agency
- c. You/someone in your household

How often do you water your lawn in a month during the summer (June-August)? (Select one)

- a. Multiple times per day
- b. Once a day
- c. Multiple times per week
- d. Once a week
- e. Infrequently
- f. Never

At what time of day do you water your lawn? (Select one)

- a. Morning
- b. Afternoon
- c. Evening
- d. Morning and evening

What method do you use to water your lawn? (Select one)

- a. Above-ground sprinkler
- b. Below-ground sprinkler system
- c. Hose
- d. I don't water my lawn

What is the size of your lot? (Select one)

- a. < 1/4 acre
- b. 1/4-1 acre
- c. >1 acre

When was the last time you did a soil sample of your lawn? (Select one)

- a. Within the last year
- b. Within the last 5 years
- c. More than 5 years ago
- d. Never

How often do you fertilize your lawn (June-August)? (Select one)

- a. Once a month
- b. A few times per year
- c. Once per year
- d. I don't use fertilizer

What kind of fertilizer do you use? (Select one)

- a. Organic Fertilizer
- b. Inorganic Fertilizer
- c. I don't know
- d. I don't use fertilizer

What do you do with lawn clippings after mowing? (Select one)

- a. Throw them away
- b. Leave them on the lawn
- c. Compost them on site
- d. Compost them off site

How often do you mow your lawn? (Select one)

- a. 5 days or less
- b. Weekly

- c. Bi-Monthly
- d. Monthly

What height do you mow your lawn to? (Select one)

- a. Below 3 inches
- b. 3-4 inches
- c. Above 4 inches
- d. I don't know

Is your lawn management similar to your neighbor?

- a. Yes
- b. No

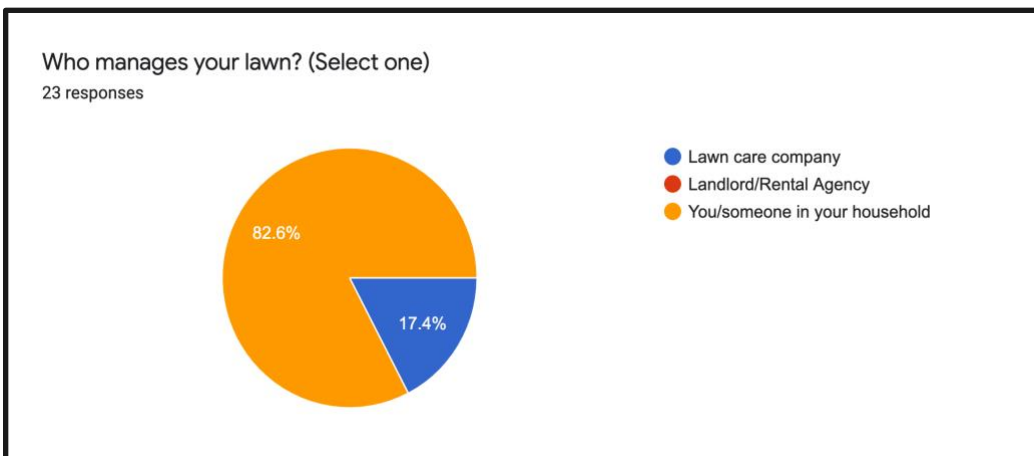
Any additional comments or questions?

If you are interested in learning about best management practices for caring for your lawn, please check out these links:

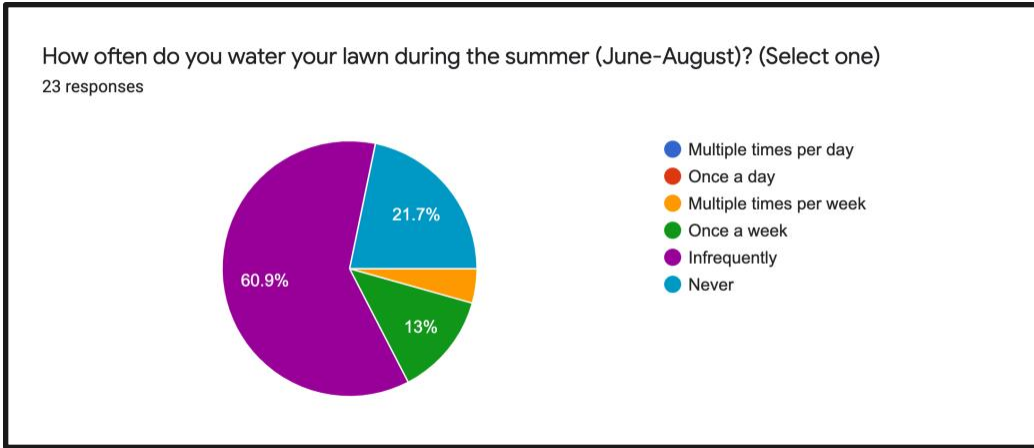
<https://www.pca.state.mn.us/living-green/grow-healthy-no-waste-lawn-and-garden>

## Appendix B: Pilot Survey Results

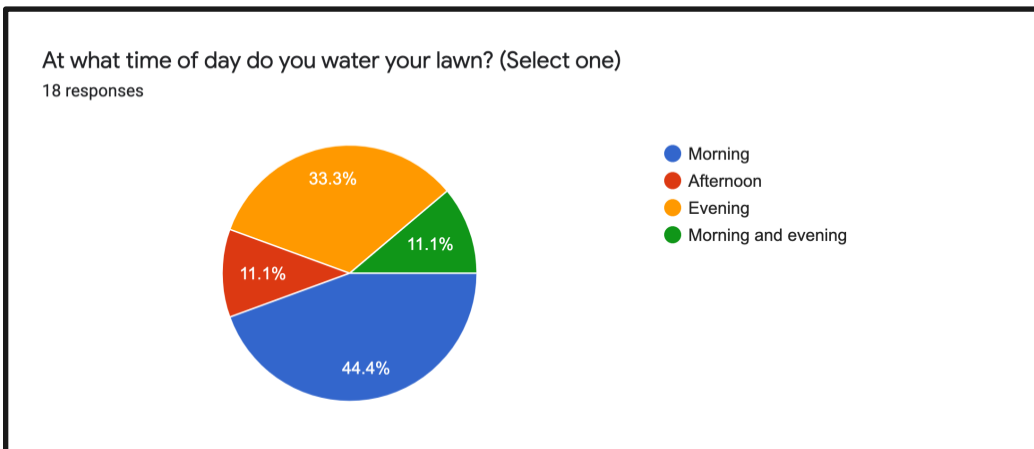
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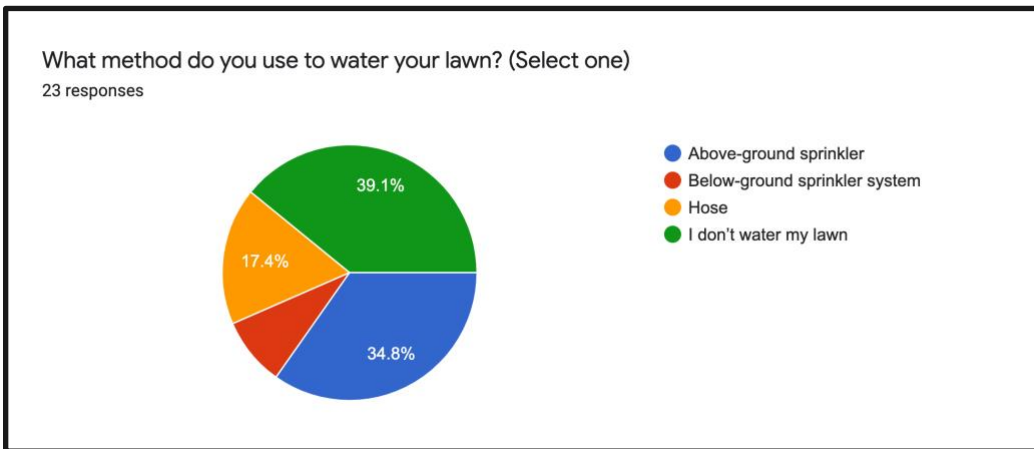
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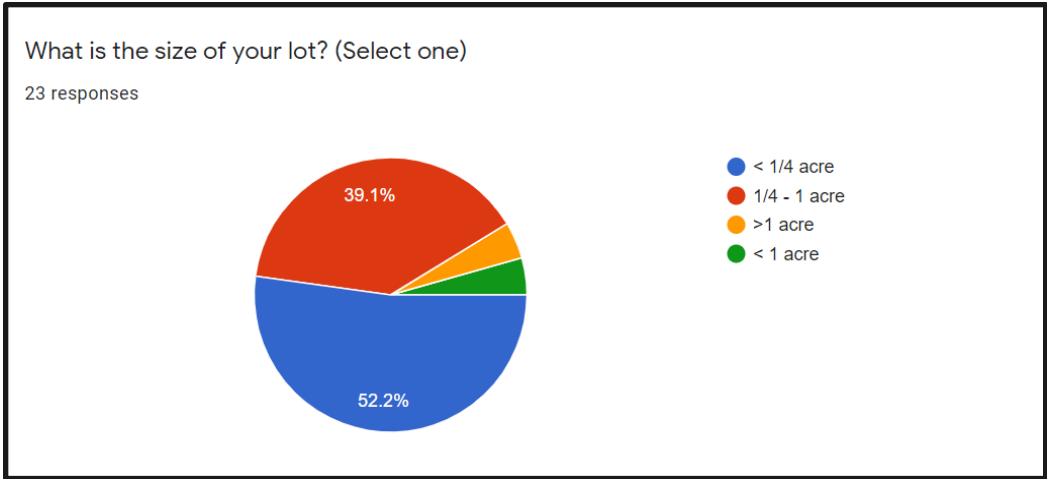
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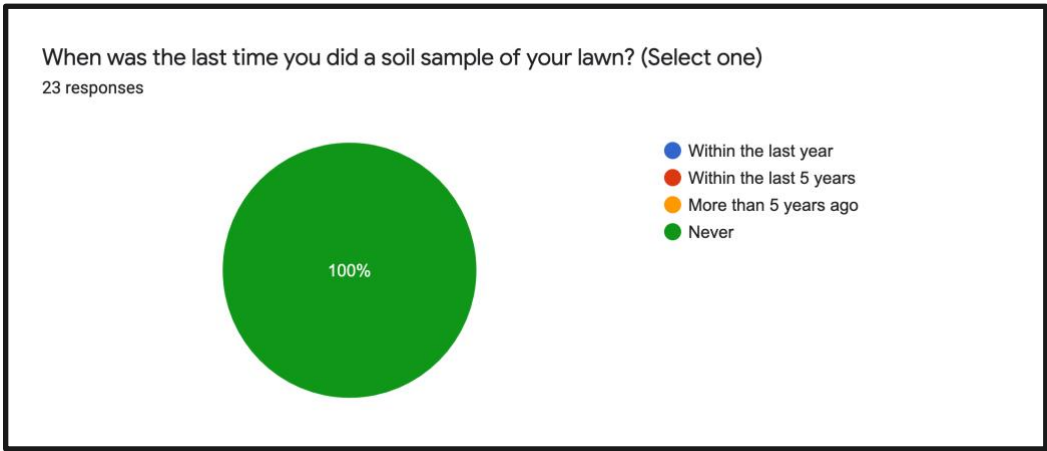
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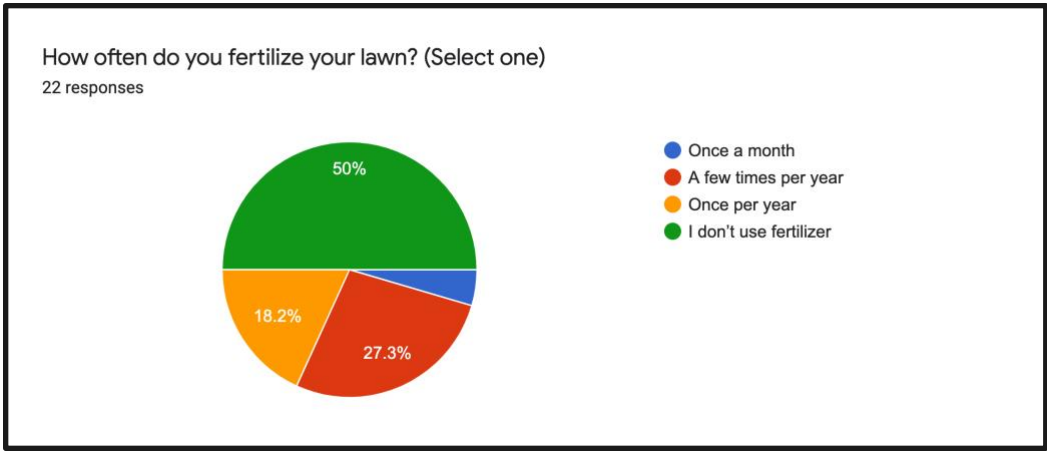
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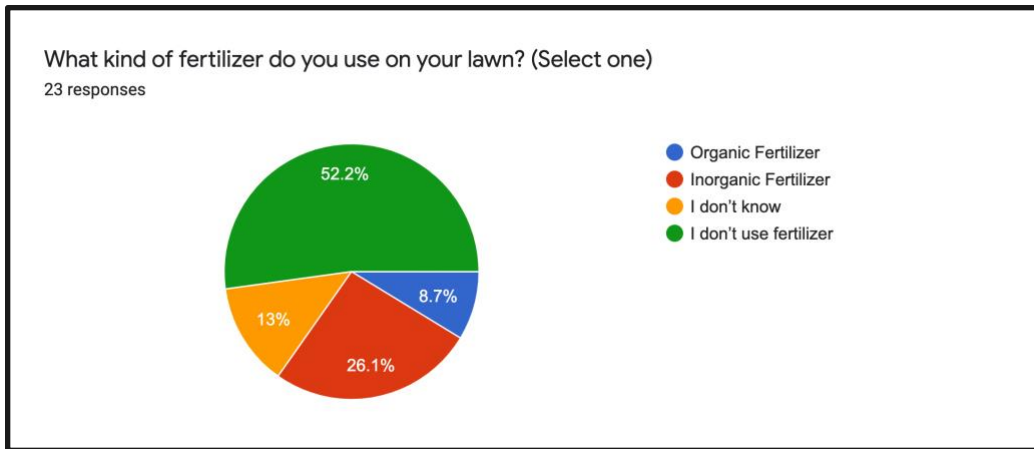
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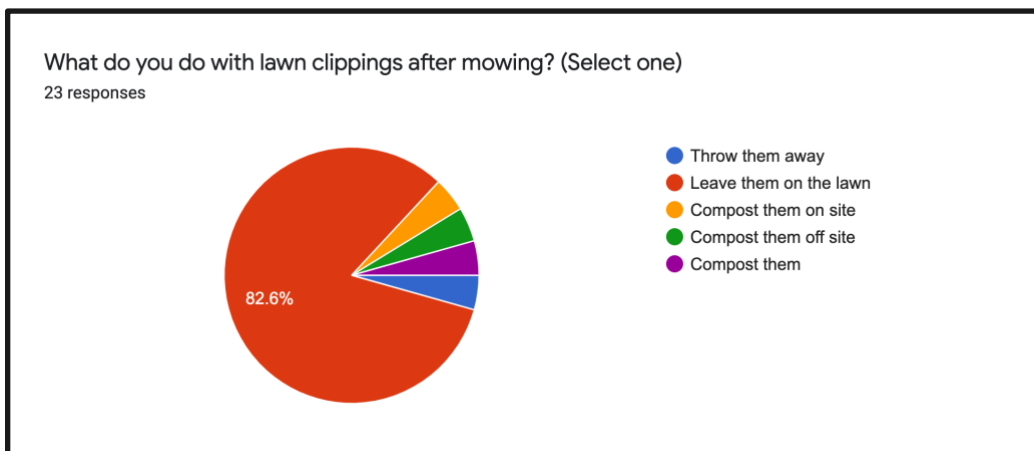
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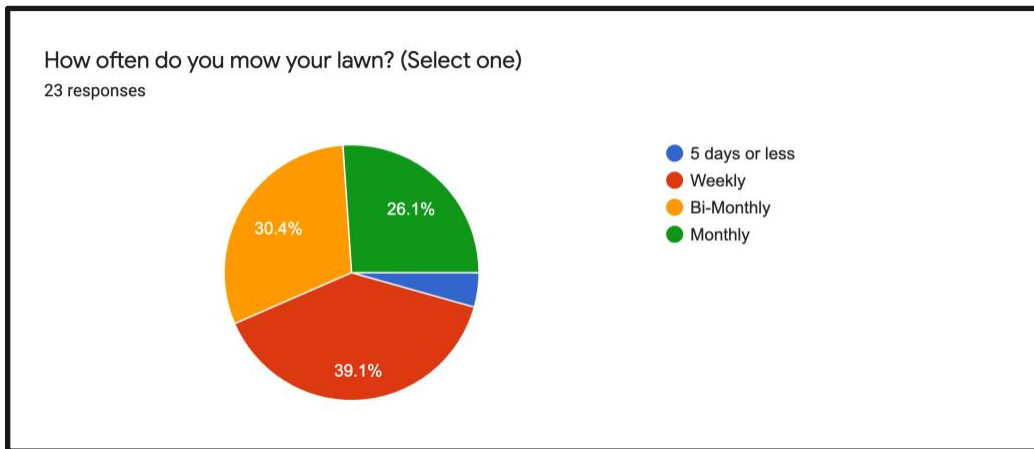
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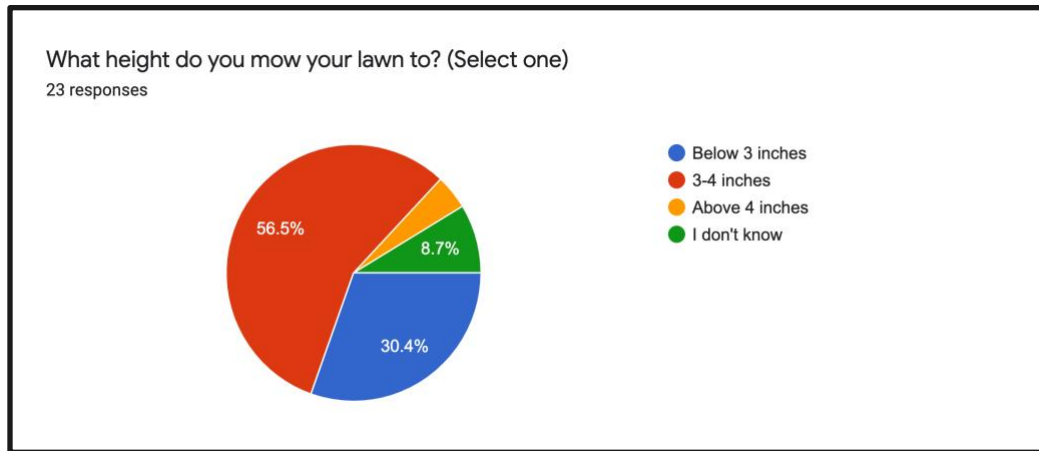
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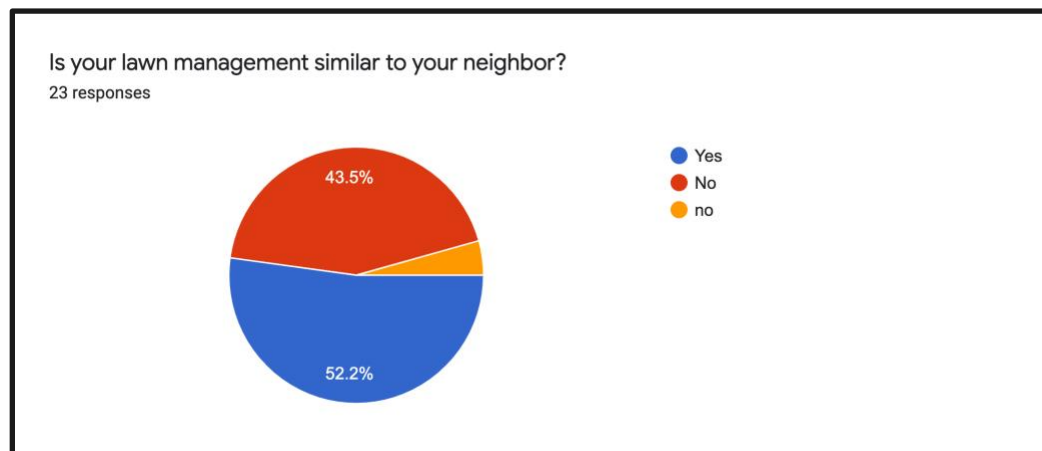
10.



11.



12.



**Survey Comments & Additional Questions:**

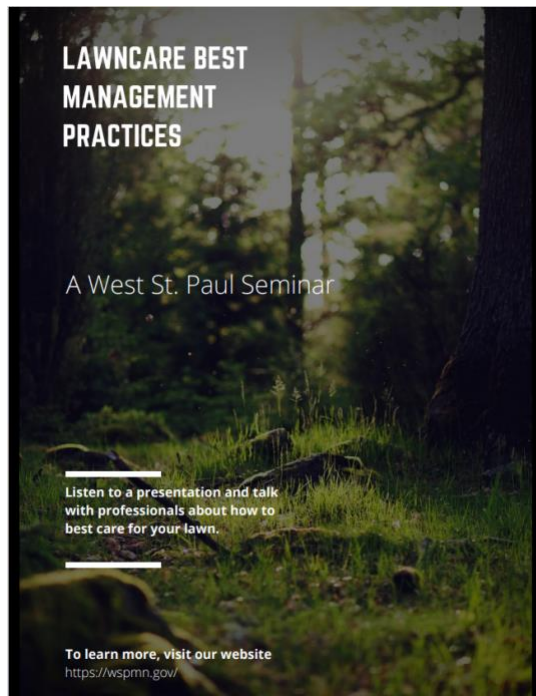
1. “A thousand years from now, teachers explaining our civilization will use "there were even detailed and well-enforced laws on how tall your grass was, and everyone had to use large devices to destroy healthy grass at least monthly or be fined!" to make bored tenth-graders pay attention as they try to imagine such crazy micromanagement. We will still be the only civilization in the history of the world to have done this.”
2. “No mow May left our community looking unkept. Let’s skip this year!”
3. “I just started a clover lawn in most of my yard. It’s drought resistant/self-fertilizing and dog urine resistant.”
4. “I am planning to convert as much of our lawn to native plantings and low-mow grass options but it is costly and time consuming. I expect it to take many years, but am committed to making our little plot of land as beneficial to the ecosystem as possible. Most of our neighbors have lawns that they water, fertilize and spray weed killer on. We do not and I’m not sure how they feel about it.”
5. “We mow/rake, but a company does weed control/fertilizer/aerating/etc. They do not use organic and have reported it being very ineffective, otherwise we would have done so.”

## Appendix C: Table 1 - Website Comprehension Table

City Website	Was the information there? How limited was it?	Were there dead ends?	Was a search necessary?	Number of clicks/Number of drop-down menus	Terms encountered to find information.
West St. Paul	Very limited information about lawn care. No information on water use.	Yes. "Lawn Irrigation Requirements"	A search was necessary to find any information about lawn care.	Yard: One click after a search. Water: N/A.	N/A - a search was necessary.
Golden Valley	Some limited information on yard waste. No information about water use.	Yes. "Environmental Resources", "Utilities".	No.	Yard: 2 clicks. One drop-down menu. Water: N/A.	"Your Home & Yard", "Yards and Gardens", "Yard Maintenance & Yard Waste Disposal", "Native Landscaping & Rain Gardens"
White Bear Lake	Some information on yard waste disposal. No information about yard maintenance. Extensive information about water use. Links provided to governmental bodies.	No.	No.	Yard: 2 clicks. 1 drop-down menu Water: 2 clicks 1 drop down menu	"Services", "Yard and Garden", "Water Conservation", "Yard Waste".
Eagan	Extensive information is found for both lawn care and water use.	Yes. "In My Yard"	No.	Yard: 3 clicks. No drop-down menu. Water: 3 clicks. No drop-down menu.	"My Home & Environment", "My Neighborhood & Environment", "Healthy Lawn Tips"



## Appendix D: Event Outline



### Stand Alone Event Outline

1. What you need
  - a. Conference room
  - b. Presentation accessibility
  - c. soil/water/plant specialists
2. Important details
  - a. Hour long event
  - b. Presentation and interactive
  - c. Citizens are able to meet with professionals
3. Timeline
  - a. 20 minutes: 15-minute presentation, 5 minutes questions with full group
  - b. 40 minutes: booths set up for each professional and maybe bring in some companies to advertise their products for best management
4. Vision for the event
  - a. This event is much larger than having a booth at the annual festival. We envision this event to be a more educational event where citizens can learn a lot about how to take care of their lawns. This may involve less people, but it would make a big difference in those individuals' lawn care. This event would start off with a presentation (provided in report) where the citizens can learn more general best practices. Then there would be time for questions. Finally, attendees could walk around the room to different tables to talk with professionals and businesses about specific questions they have.

## Booth at festival

1. What you need
  - a. Booth at festival
  - b. Some products for best management practices
  - c. Some professionals from the U
2. Vision for event
  - a. This would be a much simpler and potentially cheaper option to inform the community of best management practices for nutrient lawn care and water use. This would just involve setting up a booth at the annual festival. You could make a poster and have a QR code that leads to recommendations for best practices. You could also include some UMN professionals that could be there to answer citizen questions. Finally, you could invite some local businesses to share their products that will help improve the lawns around the city. This would reach a lot more people, but they would probably make fewer substantial changes.

## Appendix E: Alternative lawn templates

### Sunny and Low Garden for Pollinators

These plants were selected for their drought tolerance and height. Most are 24" or under, ranging to 36" in the center. Plants in this design are tough enough for a dry boulevard.

<p><b>Prairie Dropseed</b> Fine leaves create 2' high mounds of texture that will offset the height and color of the blooms around it. Prairie Dropseed is most beautiful in groups.</p> <p><b>PB</b> 14 plants height 24"</p> <p>height 24"</p>	<p><b>Wild Strawberry</b> This low ground-cover will spread throughout this planting, helping to stabilize soil and conserve moisture and providing tiny but delicious early summer fruit.</p> <p><b>WS</b> 24 plants height 8"</p> <p>height 8"</p>	<p>A low-growing native coral bell, <b>Alumroot</b> provides early blooms and its crisp leaves will look great against the textures of Butterfly Milkweed and Prairie Dropseed grass.</p> <p><b>AR</b> 6 plants height 24"</p> <p>height 24"</p>	<p><b>Purple Prairie Clover</b> is a graceful legume that forms a vase-shape of blooming stems beloved by pollinators. It is not a favored food of deer or rabbits and is extremely drought resistant.</p> <p><b>PP</b> plants height 24"</p> <p>height 24"</p>	<p>A Minnesota's only native coneflower, it is shorter than its relative Purple Coneflower, but with similar flowers. Host plant of the Ottoe Skipper butterfly.</p> <p><b>NL</b> 8 plants height 24"</p> <p>height 24"</p>	<p><b>Butterfly Milkweed's</b> bright mid-summer fireworks attract butterflies and bees alike. Vibrant color and tough, this plant can handle boulevard conditions. Butterfly Milkweed is amazing!</p> <p><b>BM</b> 12 plants height 24"</p> <p>height 24"</p>	<p>One of the best plants for attracting native pollinators, some people call it 'Sweet Leaf' because the edible foliage can be made into a minty tea.</p> <p><b>WB</b> 7 plants height 36"</p> <p>height 36"</p>	<p><b>Peary Everlasting</b> attracts bees and butterflies and blooms in the hottest time of the summer when pollinator foods are sometimes scarce. Beautiful fuzzy silver foliage.</p> <p><b>PE</b> 8 plants height 24"</p> <p>height 24"</p>	<p>This aster has a sprawling habit and is best supported by other plants. It is a host plant for Silvery Checkerspot larva. Blooms last from summer into late fall.</p> <p><b>SA</b> 5 plants height 24"</p> <p>height 24"</p>
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**May**

**June**

**July**

**August**

**September-Oct.**

20 feet

Featured Pollinator:  
**Minnesota's State Bee**  
**Rusky-Patched Bumble Bee**  
*Bombus affinis*

Key nectar and pollen plants include **Purple Prairie Clover, Narrow Leaved Coneflower, Butterfly Milkweed, Wild Bergamot and Silky Aster**

Note: To make this planting smaller, eliminate the center portion of the design, shown in the dotted black line.

Keep plants in groups to create more visual impact and make it easier for pollinators to forage efficiently.

Low growing plants are on the edges, taller plants in the center.

**m**  
**BWSR** [bwsr.state.mn.us/creating-residential-pollinator-habitat](http://bwsr.state.mn.us/creating-residential-pollinator-habitat)

## Rain Garden for Pollinators

Your pollinator planting can do double duty and improve water quality if it is also a rain garden! These plants will also work well in moist garden conditions. The selected species in this garden and bloom times make it a great butterfly garden.

**Fox Sedge**  
Adds texture and beautiful seed heads to a rain garden. It is a tough plant that can easily handle the saturated conditions of a rain garden basin.



FS 5 plants

**Pussy Toes**  
These low-growing fuzzy plants slowly form carpets of foliage. In the spring their flowers rise up gracefully 6"-8" above their leaves.



PT 12 plants

**Blue Eyed Grass**  
is a bunch forming early summer bloomer. Not a true grass, its dainty sky blue flowers brighten the early summer garden, and is a great edging plant.



BE 10 plants

**Hoary Vervain**  
Bright spires of color to the summer garden that look great against the bright green of Fox Sedge. It is a host to Common Buckeye butterfly larva.



HV 4 plants

**Swamp Milkweed**  
The bright flowers of Swamp Milkweed are unforgettable, and much loved by pollinators. It tends to spread, plan to divide this plant when it outgrows your garden space.



SM 4 plants

**Prairie Onion**  
Lavender colored stary blooms in mid-summer rise from bright green clump forming flat-leaved foliage. Will slowly create colonies as the plants become more established.



PO 5 plants

**Joe Pye Weed**  
Covered with mid to late summer blooms. Joe Pye is a butterfly magnet. It will spread, be prepared to divide this plant by the third year to share with others!



JP 2 plants

**Blue Lobelia**  
howy spires attract bees and butterflies and blooms well into the fall. Can take part shade conditions, but needs moist soil.



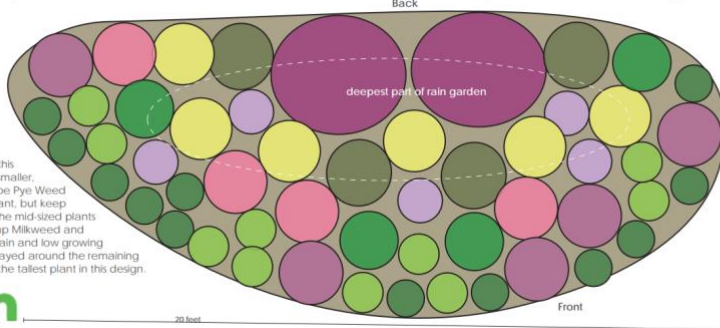
BL 5 plants

**Flat-Topped Aster**  
Enjoyed by diverse pollinators as well as rabbits and deer. If you have trouble with browsing wildlife, consider substituting with Rattlesnake Master.



FT 3 plants

Bloom Time



Note: To make this planting smaller, reduce Joe Pye Weed to one plant, but keep some of the mid-sized plants like Swamp Milkweed and Blue Vervain and low growing plants arrayed around the remaining Joe Pye, the tallest plant in this design.



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Featured Pollinator:  
**American Lady**  
*Vanessa virginiensis*

Caterpillar hosts include  
**Pussy Toes**

Nectar plants include  
**Swamp Milkweed, Joe Pye Weed, Blue Lobelia, and Flat-Topped Aster**

## Shade Garden for Pollinators

There are great native plant options for a shady spot. The plants featured here also selected for their beautiful foliage as well as continuous bloom from spring to fall.

A grass-like woodland ground-cover, **Pennsylvania sedge** provides habitat for nesting pollinators and larva. Low growing and fine textured.



PS 9 plants

Spring ephemerals **Yellow Violets** emerge and bloom before the other plants in the garden, providing valuable early food for pollinators.



YV 7 plants

A low-growing native coral bell, **Alumroot** provides early blooms and nectar and season-long foliage interest in a shady garden.



AR 5 plants

**Solomon's Seal** gracefully adds texture to a shady garden. It is pollinated by bumblebees and other native bees. Blue berries in late summer provide food for other wildlife.



SS 3 plants

**Pagoda Dogwood** a sculptural small tree, producing copious flowers in late spring. Violets planted beneath it will flower before Pagoda Dogwood leafs out. Prune lower branches to allow space for other plants.



PG 1 plant

**Wild Geranium** is a beautiful scented, spreading powerhouse. It is easy to transplant and share its shallow rhizomes with your neighbors or your other gardens when it outgrows its space.



WG 4 plants

**Ohio Spiderwort** flowers in the morning and closes its buds during the heat of day. It looks great planted in front of textured foliage plants like Solomon's seal and Spikenard. "won't survive in deep shade."



OS 3 plants

**Common Yarrow** attracts bees and butterflies and blooms in the hottest time of the summer when pollinator foods are sometimes scarce. Beautiful lacy foliage.



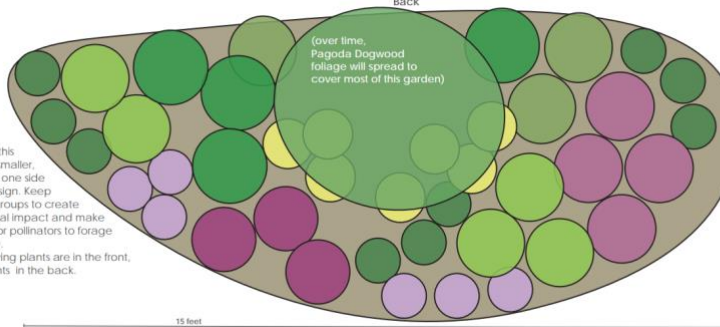
CY 5 plants

**Callico Aster's** lacy flowers look best supported by other plants. It is a host plant for Silvery Checkerspot larva. Blooms last from summer into late fall. Fluffy seed heads add winter interest.



CA 3 plants

Bloom Time



Note: To make this planting smaller, eliminate one side of the design. Keep plants in groups to create more visual impact and make it easier for pollinators to forage efficiently. Low growing plants are in the front, taller plants in the back.



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Featured Pollinator:  
**Silvery Checkerspot**  
*Chlosyne nycteis*

Caterpillar hosts include  
**callico aster**

Nectar plants include  
**Alumroot, Wild geranium, Pagoda Dogwood, and Common Yarrow**

## Appendix F: Alternative lawn sample plan

Year Number	Goal(s)	Objective(s)
1 (Summer)	City Council and City Environmental Committee conduct internal discussions	Conclude the feasibility and scope of how alternative/pollinator lawns will look in the City.
1 (Fall)	Begin community outreach and plans for testing	Hold discussions with motivated residents such as the Green Thumbs and other City groups that greatly value conservation. Develop guidelines for initial testing based on group feedback.
1-2 (Spring)	Introduce pilot programs	Plant pollinator beds in parks and conduct a pilot program with the Mud Lake community such that alternative yards are slowly introduced to the community.
2 (Fall)	Gauge community response to pilot program through several mediums	Better understand community reaction to the alternative yards, such that changes can be made to future citywide plans. Promote feedback through City Council meetings and introduce a survey that includes questions about reactions to the pilot program and what residents would like to see in an alternative yard program.
2-3 (Winter)	Use feedback to develop alternative lawn policy	Hold internal discussions where policies on acceptable lawns are established (dimensions, acceptable plants, maintenance regulations).
2-3 (Spring)	Introduction to public	Finalize policy and allow the public to begin implementing alternative yards. Continue to gather feedback from the public and make necessary changes.