



Implementing Right of Way Vegetation on South Robert Street, West Saint Paul

ESPM 4041W: Problem Solving for Environmental Change



Report Number 1/9

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December 13, 2021

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Acknowledgments

We want to express our gratitude to the city of West St. Paul and the Parks and Recreation staff for aiding us with our research. A special thanks to Dave Schletty, who aided and advised us throughout the course of our project.

We want to thank our course professors Kristen C Nelson and Eric North as well as our teaching assistant Hannah Ramer, for providing us with invaluable leadership and guidance throughout our work.

We offer special thanks to the citizens of West St. Paul, including the individuals that responded to our survey and the general community for holding so much pride in their city to help us propel this project forward.

In addition, we would like to thank Jack Distel, Elaine Evans, Ross Beckwith, and Emilie Snell-Rood for participating in email interviews to support our project. We thank these individuals for their time and thoughtful responses.

We want to acknowledge the land on which West St. Paul is located, as this land was once home to various tribal communities in Minnesota. This land, along with the culture, was wrongfully taken from Indigenous groups because of white settler colonialism in Minnesota. We would like to take a moment to show our respect and appreciation for the land and honor those tribal communities who are today part of the waters and land in Minnesota.

Executive Summary

The City of West St. Paul collaborated with students at the University of Minnesota to develop a management plan for the right of way (ROW) vegetation along South Robert Street (S Robert Street). This report provides an inventory of possible plant species to implement along S Robert Street in the future.

The City plans to improve the conditions of its ROW vegetation, located along the median and sides of road areas. The site under review, S Robert Street, experiences harsh conditions from the high volume of regular traffic, road salt use, inconsistent irrigation, and limited maintenance availability. Yet, ROW vegetation offers many benefits to the City, such as improved pollinator habitat and aesthetic qualities. Still, vegetation must be carefully determined due to the hard conditions of the road.

This report generated six study methods, including site observations, expert interviews, outreach literature reviews, comparable case studies, plant selection, and pollinator research.

After collecting and analyzing various data, we provide three recommendations for the City of West St. Paul:

1. We identified fifteen native plant species that meet the criteria for ROW vegetation along S Robert Street. These include three species of grass, two shrub species, and ten flowering perennials. These plants can withstand the conditions in the right of way, require minimal maintenance, cater to pollinators, and generate aesthetic value along S Robert Street.
2. We recommend implementing management techniques that are cost and time-effective for West St. Paul. These include mowing the entire ROW area in early spring to simulate a prairie fire and pruning select vegetation once annually to meet height requirements for ROW vegetation. Maintenance personnel should conduct a thorough cleaning of any maintenance equipment to limit the risk of spreading undesired species.
3. We recommend creating educational material, such as signage and flyers, organizing a community outreach event, including community involvement through service learning. These methods allow for community feedback and will spread environmental awareness and expand the implementation of native, pollinator friendly vegetation across the City.

Introduction

Overview

Minnesota is home to various beautiful landscapes, and all are made up of unique combinations of native plant species and land formations. Over the course of urbanization, many of those native plants lost their habitats as cities made way for homes, businesses, and streets. For the sake of convenience, some cities filled their streets with invasive or non-native, yet easy to care for plants to uphold a standard of beauty within the city limits. However, in recent years, many municipalities across the United States have compensated for this loss by adding native vegetation into their right of ways and boulevard areas within their city limits, restoring area for native plants and pollinators, therefore creating green spaces that benefit residents. Such municipalities include Bloomington and Austin, Minnesota, as well as many counties in Iowa. The City of West St. Paul, Minnesota, has expressed the desire to improve the vegetation quality in the city right of ways, specifically on South Robert Street (S Robert Street) in the median areas. The street has several medians filled with grasses, trees, and a small variety of flowering plants. The plants found in these medians are often referred to as “right of way” or ROW vegetation. Six senior Environmental Science, Policy and Management students at the University of Minnesota, with various levels of expertise in native vegetation, pollinators, and restoration, partnered with West St. Paul staff from September to December of 2021 to produce this report. This report aims to provide new ROW vegetation plans based on native plant species that appeal to pollinators, improve biodiversity, provide residents with green space, and create opportunities for environmental education.

Issue Description

The City of West St. Paul's current ROW vegetation has proven difficult to manage along S Robert Street due to the harsh conditions and limited management. High levels of traffic, inconsistent irrigation, and road salt are just some of the challenges working against the City (Beckwith, 2021). Currently, S Robert Street sees as many as 23,000 drivers a day at its busiest sections (City of West St. Paul, 2021) The City's 2040 Comprehensive Plan projects an overall increase of 3,000 drivers a day along S Robert Street within the next 20 years (City of West St. Paul, 2021). This high volume of daily traffic comes with caveats that make survival difficult for plant life. Large quantities of road salt are distributed to maintain safety on the roads during the winter, meaning that each snowmelt results in salt run-off into ROWS (Beckwith, 2021). Furthermore, West St. Paul currently has limited staff attending to the ROWs on S Robert Street. Without an extensive irrigation system in place, the vegetation relies on precipitation and watering by maintenance

workers, factors that can be inconsistent. A more targeted approach to caring for native vegetation in ROWs would improve the quality of plant life.

Despite the challenges associated with the site conditions of S Robert Street in West St. Paul, restoring the ROW vegetation can have many benefits for the community (Harrison, 2014). ROW vegetation made up of native plants can increase biodiversity and pollinator health, and the overall aesthetic qualities of S Robert Street (Penn State College of Agricultural Sciences, n.d.) An increase in native plants can also serve as an environmental education tool, allowing citizens to get more in touch with the natural spaces around them. Furthermore, potential new vegetation can help promote awareness of environmental issues surrounding biodiversity and pollinator decline, ideally inspiring residents to add native plants in gardens of their own, ultimately improving the overall quality of life for plants and people in West St. Paul.

This project can provide the City with a unique opportunity to restore part of the City's landscape to a more natural environment by incorporating native vegetation. The associated benefits of the proposed project could not only help West St. Paul meet their goals, but also unite citizens and the environment. It is essential for the City to develop a management plan that results in a landscape that requires minimal maintenance, is sustainable, hardy, and adds aesthetic value.

Visions

West St. Paul's Vision

Through community investment, West St. Paul aspires to develop their city to meet higher standards of safety, sustainability, and livability, while being economically viable and responsive to community needs.

West St. Paul aspires to enhance their city through encouraging "sustainable development and best management practices to protect the environment for future generations," as stated in their 2040 Comprehensive Plan. To do this, the City will "Advocate and support with municipal investment a safe, high-quality visual environment throughout the City and particularly along major transportation corridors" (City of West St. Paul, 2021).

2021-2022 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 that 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

In the next five years, this report aspires to guide the transformation of South Robert Street into a space that sustains native vegetation, promotes environmental awareness, and adds aesthetic value to the community of West St. Paul, while maintaining economic viability and working within the desires of the community.

Goals

This report will provide a well-rounded plan to the City of West St. Paul that will result in the implementation of low-maintenance native vegetation that adds aesthetic beauty to the community along the right of ways on S Robert Street. Additionally, this plan will foster sustainable development and community environmental awareness. The following objectives will help us meet these goals:

- Conduct site visits to understand the status of existing vegetation
- Conduct a literature review of peer-reviewed scholarship relating to low-maintenance, hardy native vegetation
- Speak with trusted experts about the impact of traffic on pollinators
- Cross-examine successful ROW vegetation plans that have been implemented in other cities
- Interview experienced officials in similarly sized cities to conduct case studies to understand what makes a ROW vegetation plan successful
- Develop a plan for community outreach and education regarding native vegetation and pollinator health.

Methods

Site Description

The City of West St. Paul is a suburban area located just south of the City of St. Paul, in Dakota County, Minnesota (Figure 1) The City is approximately five square miles with a population of 20,547 people. In the past, many of the residents were over 60 years of age. In recent years, many younger families have started moving into the City (US Census Bureau, 2015-2019). This demographic shift has resulted in a steady population increase of 2.1% since 2010, resulting in increased development to keep up with the growing population density (US Census Bureau, 2015-2019). This development is occurring in the construction of large apartment complexes, updated housing infrastructure, and redevelopment of older buildings. Despite a population increase, West St. Paul remains a lower-income city with a median household income of \$56,097, compared to the City of South St. Paul’s median income, \$63,247 (US Census Bureau, 2015-2019).

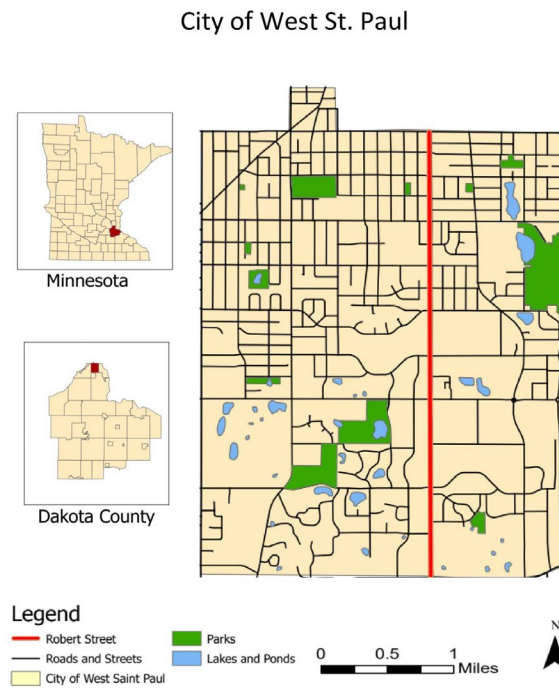


Figure 1 - Map of West Saint Paul, Minnesota (Source: ESPM 4041W Class)

Research Techniques

This report utilized several different research techniques to understand the necessary components for an effective right of way vegetation management plan. The first of these techniques included site observations, which served to develop knowledge of the site in question, being S Robert Street in West St. Paul, MN. These visits were conducted in the pursuit of site-specific information, such as setting and existing vegetation, which will serve the report's research objectives, creating the most effective plan possible for the respective focus.

Secondly, several virtual interviews were conducted with experts in related fields to expand knowledge of right of way management techniques. Interviews with administrators of West St. Paul's Public Works Department provided valuable insight on site-specific information including previous and current management plans, vegetation plans, and demographic information. The gathered information fueled the development of a report management plan that is site-specific and locally appropriate.

Thirdly, in order to determine public opinions of right of way vegetation, a survey was developed and posted to the City's Facebook page. The questions posed in the survey inquired on opinions of the existing vegetation, current management of West St. Paul's right of ways, and public opinion of native vegetation in general, garnering a deeper understanding of how to propel a right of way management plan forward.

In addition, a literature review of recent scholarship was conducted to gather information regarding effective community outreach and public approval. This information was used to develop strategies for meaningful environmental education methods for native vegetation, such as community outreach and service learning. These techniques help to develop a plan for improving aesthetic perceptions of the right of ways and beyond in West St. Paul.

To improve the depth and breadth of information, comparable case studies were conducted of cities that have created effective and sustainable right of way management plans. These cities were of similar size and location to West St. Paul, and information was utilized to translate these effective efforts into practices to ultimately serve West St. Paul's interests.

Similarly, data were collected using several sources of scientific literature to inform plant selection for West St. Paul's right of ways. This information was utilized to create a list of recommended plant species that will withstand the harsh condition of S Robert Street and create a native and sustainable landscape to serve the urban ecosystem.

A final research technique reviewed secondary sources to determine how urban settings may impact pollinators. This research garnered information to determine pollinator-friendly plant species and strategies to mitigate the impacts of heavy traffic conditions on pollinator populations. This research helped to generate recommendations of management strategies that create an environment that maintains ecosystem health and the health of local pollinators.

Site Observations

Site observations were conducted in three visits during the month of September 2021 to gain an understanding of the status. These visits focused on the large strips of median found along S Robert Street, which encompass the right of way vegetation in question. Three medians were visited, each spanning approximately a quarter mile. First, the existing vegetation population — trees, grasses, flowers, and shrubs — were documented and categorized.

Second, photos were taken to document the state of existing vegetation along S Robert Street (Figure 2)



Figure 2 - Site Visit Photographs of Robert Street South, West Saint Paul, MN (Photos by S. Rath)

Third, multiple questions were considered during these site visits:

1. Which existing plants are native to Southern Minnesota?
2. Which existing plants do or do not impede traffic?
3. Which existing plants are pollinator friendly?
4. Which existing plants are aesthetically pleasing? At what time of year do existing plants bloom, and for how long?
5. What are the soil and environmental conditions in the median itself?
6. What are the effects of the existing management strategy of S Robert Street on the existing vegetation?

7. What are the prevailing traffic and climate conditions of S Robert Street?

These questions allowed for a preliminary understanding of the requirements in developing a strategy for managing the ROW vegetation. Questions one through four prompted investigation into which plant species should remain on S Robert Street, while questions five through seven addressed conditions of the site to inform plant selection and the necessary associated management techniques.

Expert Interviews

Interviews were conducted with a variety of experts to gather interdisciplinary qualitative and quantitative information. These interviews were conducted with city officials, management experts, and academics to gain a thorough understanding of the challenges and opportunities related to a right of way vegetation management plan. These interviews were conducted via video chat and email exchanges. Detailed information regarding the individuals interviewed, interviewee affiliations and selection rationale can be found in **Appendix A**.

Additional interviews with West St. Paul officials Dave Schletty and Ross Beckwith were conducted to gather additional data regarding S Robert Street. This data described the site's current management plan, maintenance budget, and regulations. This information was used to determine where and how the current management plan could be improved within the regulatory and budget constraints of the City.

Similarly, interviews were conducted with several University of Minnesota faculty members to gather information relating to the proposed management plan. An interview with University of Minnesota research associate Elaine Evans provided further information to inform plant selection. Evans specializes in pollinator research and has expert knowledge relating to pollinator-friendly land management. Notably, Evans has a number of publications relating to urban pollinator management. Hannah Ramer, a teaching assistant at the University of Minnesota was also able to provide valuable information regarding public approval and served as a connection to the City of Bloomington. Ramer had previously corresponded with Bloomington city officials on local and roadside vegetation. She has also had training related to social science principles determining public approval of natural vegetation. A third virtual interview was conducted with University of Minnesota associate professor Emilie Snell-Rood, which generated information detailing how traffic speeds, road runoff, and pollutants from vehicles can impact pollinator health.

Finally, data was collected from specialist Jack Distel with the Bloomington Parks and Recreation Department. The City of Bloomington has a history of successful and innovative right of way vegetation

management plans. This correspondence with Distel detailed low-maintenance strategies to aid in managing right of way vegetation.

Public Opinion Survey

A public opinion survey was conducted to gather data from some residents of West St. Paul. The responses provided an understanding of the social demand and interests regarding right of way vegetation management. The five survey questions focused on right of way aesthetic value, knowledge of native plants, and concerns relating to right of way vegetation. The questionnaire which was distributed via Facebook can be found in **Appendix B**.

These questions were posed on the City of West St. Paul's official Facebook page as a public poll. In total, the survey generated 47 citizen responses. The survey was open to the public for a total of 6 days, from November 5, to November 11, 2021. This information was analyzed through a collection of citizen opinion statistics and quotes, which were categorized into themes.

Public Approval and Community Outreach Literature Review

A variety of sources were able to provide data detailing scientific and social science strategies of identifying and securing public approval through community outreach initiatives. These sources included Minnesota ecological design expert Joan Nassauer, who detailed strategies to increase public perceptions of right of way attractiveness. An additional literature review found several community outreach research sources that identified multiple methods to best practice community outreach initiatives. These initiatives would garner public support for environmental causes, such as sustainable right of way vegetation management.

Comparable Case Studies

To determine best practices for right of way management, several case studies were conducted, as West St. Paul would not be the first city to establish healthy native vegetation in its right of ways. The experience of others informs potential challenges and opportunities West St. Paul may face. To this end, previous experience with vegetation of right of ways was examined in several Iowa Counties: Story County, Hardin County, and Linn County (Story County Iowa, n.d.) (Iowadot, n.d.). Municipalities in Minnesota were also examined, such as The City of Bloomington (Distel, 2021) and the county of Mille Lacs (Mille Lacs County, 2016). Iowa Counties have developed their own unique management practices, some of which apply to West St. Paul. These counties provide a wide selection of native plants for potential use and demonstrate an experience dealing with weeds and disturbances in the management of right of ways.

The management plan developed by Mille Lacs County, Minnesota is based around avoiding pesticide use and protecting native plants (Mille Lacs County, 2016). This information can be applied to benefit the proposed management plan for West St. Paul. Additionally, The City of Bloomington, Minnesota has had great success in their right of way vegetation plans and management (Distel, 2021). However, Bloomington has access to more resources than West St. Paul, as their population and city size are significantly larger (World Population Review, 2021). That said, West St. Paul and Bloomington are located near each other with a similar climate, meaning Bloomington can remain a model of success.

The case study information was gathered from the public information included in Iowa Counties, Mille Lacs County, and Bloomington online databases, specifically on their city websites and in various reports. The data collected includes information about each city's plans, such as a list of plant species implemented and management methods. This management data includes reflections on how the cities are doing, specifically reflecting on the challenges they have faced and the benefits of using native plants in their right of ways.

Plant Selection

The population of plants selected for implementation in this report must be tolerant of various stressors. These stressors include, but are not limited to, increased salt exposure, air pollution, poor soil conditions, and poor water availability. To meet additional goals set by the City, plants on this list must take West St. Paul's 2016 Pollinator Resolution into account. The resolution highlights the importance of pollinator plants and habitat, meaning that vegetation planted in these medians should support butterfly and bee populations within the City (City of West St. Paul, 2016). The resolution also limits the use of pesticides on plants within the City to ensure pollinator health and safety. In correspondence with the need for tolerant, pollinator-friendly plants, the plants selected in this report have an emphasis on Minnesota native vegetation. Native plants typically require less maintenance and are great at establishing throughout Minnesota due to their nativity.

The proposed plant list for S Robert Street's medians were determined through a variety of sources. The University of Minnesota published two guides that were very helpful in finding the best site-appropriate plants: *Native Plants for Sustainable Landscape* (Krischik, Reed, & Willey, 2000) and *The Best Plants for 30 Tough Sites* (Meyer, Brown, & Zins, 2007). *Native Plants for Sustainable Landscapes* contains information on over 100 native plant species native to Minnesota, also including height, wildlife uses, and sun requirements of each plant species in detail. *The Best Plants for 30 Tough Sites* highlights plants, both native and non-native, that can tolerate harsh conditions. There were several sections that proved applicable for this report, such as: "Dry Soil," "Rain Garden Plants," and "Boulevard Gardens:

Perennials” (Meyer, Brown, & Zins, 2007). Furthermore, this report also noted species that were drought and salt tolerant, two crucial factors for median vegetation. Additional information was gathered for this report through Minnesota-based companies that specialize in native vegetation. Two of the companies that excelled at this were Prairie Moon Nursery and Natural Shore. Their websites contained valuable information on the native plants, including height, spread, tolerances, and bloom time.

In total, this report outlines fifteen plant species to be implemented into the medians along S Robert Street. The plants were ultimately selected to include a variety of grasses, shrubs, and blooming perennials. Plants that have drought and salt tolerances were prioritized, but other factors, such as bloom time, had to be considered to create an aesthetically pleasing landscape. These selected plants were required to withstand full sunlight exposure, be native to Minnesota, and meet West St. Paul’s height requirement for ROW vegetation.

Pollinator Research

In the initial stages of this report, there were aspirations of meeting goals set by West St. Paul’s 2016 Pollinator Resolution. As mentioned above, the resolution was created to help improve spaces and safety for pollinators within the city, by increasing pollinator friendly vegetation and limiting pesticide use. However, there are some concerns regarding the impacts of traffic on pollinator species, specifically insects such as bees and butterflies. Information was gathered from various research publications from the University of Michigan and a combination of Universities in the United Kingdom (Fitch & Vaidya, 2021), (Phillips, et al., 2020) These reports looked at the environmental stressors created by roads and traffic, how they may impact pollinators, and how these right of way spaces can be used safely and effectively. Additional information was supplementally provided by University of Minnesota associate professor, Emilie Snell-Rood. Snell-Rood is currently conducting research on vehicle pollutants that may run off of roadways and enter roadside vegetation, potentially impacting pollinators. This information will help determine the emphasis on pollinator plants in the plant selection portion of this report.

Findings

Site Observations

In our site visits, we found the medians on S Robert Street already had several species of native and pollinator plants, alongside a collection of plants that were not as beneficial to the ecosystem. In particular, we noted the collection of blazing stars, coneflowers, black eyed susans, and daylilies. The first three of these plants are native to Minnesota, while daylilies are native to Asia (Allen, n.d), but all four species have been adding aesthetic value to S Robert Street. However, these four species covered most of the median, limiting space for other plants to grow. Although the aesthetic value of these plants is important, that advantage diminishes when they are not in bloom.

From our visit in October 2021, it appeared the daylilies, coneflowers, and black eyed susans had all completed their bloom time, leaving significant barren space in the ROW. During this visit, it appeared that some of the black eyed susans had been pruned, potentially to stay in compliance with city height ordinances for right of way vegetation. Our visit determined a significant concentration of daylilies along S Robert Street. This particular non-native plant species requires higher levels of maintenance, further contributing to labor concerns for the City, as there is a limited number of employees that care for the plants in the ROW.

In addition to the flowering vegetation on S Robert Street, there were a few trees and several areas made up of mostly dwarf bush honeysuckle, a shrub that typically creeps along forest floors. The dwarf bush honeysuckle is of concern because it can become increasingly overgrown, stretching into roads, potentially impeding traffic on S Robert Street. Our site observations were also able to determine that the median along S Robert Streets contains several species of grasses.

We observed that the existing traffic and climate conditions on S Robert Street are harsh. During our fall visits, we determined that there was a consistent, high volume of traffic running close to the medians. The speed limit on S Robert Street is 35 mph, which contributes to management difficulties and safety concerns for workers in the City. Due to the high volume of traffic, the City regularly employs high amounts of road salt to ensure safety of the residents in the winter months. Snowplows travel this same stretch of road, pushing ice and road salt into the right of way, indicating that the plants must be hearty to withstand these conditions. Additionally, we noted that these right of ways along S Robert Street are primarily located in direct sunlight, with a few trees providing small amounts of shade, marking important considerations for plant selection.

Expert Interviews

A variety of interviews were conducted with a range of experts including city partners, ecologists, researchers, and environmental education experts. This information helped to determine that management of right of way vegetation in West St. Paul must be cost-effective, low-maintenance, and resistant to harsh environmental conditions to meet the expectations for the future of S Robert Street.

Preliminary interviews were conducted with city partner Dave Schletty. He revealed key demographic and characteristic information pertaining to the City of West St. Paul. The City has a large population of elderly individuals, but is currently experiencing an influx of younger families (Schletty, 2021)

Ross Beckwith, the public works director for the City of West St. Paul, was also able to provide some information relating to concerns and levels of maintenance on S Robert Street, along with helpful budget information. Beckwith revealed several concerns relating to the status of S Robert Street management plan, including an inconsistent irrigation system, low soil quality, high alkalinity in the beds from limestone blocks, and most importantly, road salt chemicals (Beckwith, 2021). According to Beckwith, S Robert Street is managed by three employees daily during the height of the summer, which includes street cleanup. To support these employees and management of S Robert Street, the entire City of West St. Paul has an annual budget of \$50,000 for staff and \$30,000 for supplies for right of way vegetation upkeep, meaning that low-cost solutions are of the utmost importance (Beckwith, 2021).

Further expert interviews provided a number of strategies and recommendations to be used throughout this report. We turned to the City of Bloomington for information, as their city has extensive and successful right of way vegetation. Virtual correspondence was made with Jack Distel, Water Resources Specialist for the City of Bloomington. Distel detailed information regarding best practice for right of way management, where he emphasized the importance of resilience in urban right of way vegetation and determining our respective sites' environmental challenges. We determined the main stressors of our site, which are winter road salt application and poor soil quality. To remedy these stressors, Distel explained a strategy that is implemented on Bloomington's West 98th Street and Nesbitt Ave South. The strategy involved “single yearly mowing in late spring. This mowing would be considered a reoccurring disturbance and, as the intermediate disturbance hypothesis tells us, will help the systems resiliency by keeping proper species diversity while mitigating intrusion of weedy species” (Distel, 2021). This yearly disturbance plan simulates the disturbance of a yearly prairie fire, maintaining ecosystem health while simultaneously being low maintenance.

Public Opinion Survey

To gather additional data relating to public opinion, a survey was posed to the respondents of West St. Paul via Facebook. The data gathered from this poll, which can be found within **Appendix C**, determined that the residents of West St. Paul are relatively dissatisfied with the current vegetation along their right of ways. Of the 47 citizens surveyed, 34% stated they did not find the current vegetation along the streets of West Saint Paul aesthetically pleasing. These findings demonstrate the need for changes in West St. Paul's right of ways in order to best comply with the aesthetic values of residents.

According to the public opinion survey, the residents of West St. Paul are highly in favor of native vegetation. 74.5% cited that it is very important to them personally that native and pollinator friendly plants are planted in their community, while 25.5% found it to be somewhat important. Of all residents surveyed, 0% found the planting of native and pollinator friendly plants to be unimportant to them. This shows a clear support for the planting of native vegetation within West St. Paul's right of ways.

When asked to rate their personal knowledge of native plants in their community, there was varied response among residents. 10, or 21.3%, of the respondents stated their knowledge of native plants in their home and community as a one out of five. 12, or 25.5% of the residents rated their knowledge as two out of five. This information details a clear lack of knowledge within the community relating to native and pollinator friendly vegetation, showing a need for environmental outreach resources to educate the public of West St. Paul on the importance and benefits of native plants.

In order to gauge the interest of the public in this initiative, the respondents were questioned on their likelihood to attend a participatory event relating to native and pollinator friendly vegetation. The results reflected a clear interest from the public, with 23.4% of respondents stating they were "very likely" to attend and 29.8% stating they were "somewhat likely." These findings show that outreach initiatives and events relating to native vegetation are likely to be successful.

In consideration of public concern relating to this project, clear themes were identified. The first of these common themes were concerns relating to the use of pesticides within the natural spaces of West St. Paul. The next most common concern related to aesthetics, and if native plants will look unkempt compared to non-native. These findings are important as they can help to inform plant selection in the final recommendations.

Public Approval and Attractiveness

While the public opinion survey generated substantial amounts of valuable data relating to public approval of ROW vegetation, additional research was conducted on the scientific and social significance

of public approval and outreach education relating to right of way vegetation and overall environmental awareness. This research allowed us to conclude that management of right of way vegetation must be intentional, highly designed, and natural in order to maximize public approval and attractiveness ratings.

The findings of this research involved the importance of identifying and including “cues to care,” which are defined as design elements of a sustainable management within urban landscape which effectively identify to the public that the elements are intentional and beneficial (Li & Nassauer, 2020) There can often be challenges in terms of urban sustainable design as social and cultural values may not align with the choices made. These “cues to care” offer the public nonverbal communications which indicate that these landscape changes align with cultural values and provide environmental benefits. These decisions serve to increase public understanding and approval and can serve as an education resource to increase the public's environmental awareness regarding urban ecological management strategies.

Further research was done involving the Aesthetic Initiative Measurement System, also known as AIMS, which investigates the public perceptions of Minnesota residents and travelers regarding right of way vegetation in terms of aesthetic value (Nassauer, 2004) This research determined that viewers perceived attractiveness of a landscape was closely tied to participant cited characteristics including “wildlife, green, environmental, and natural.” However, these natural spaces were deemed less attractive if they were perceived as unmanaged and undesigned, leading to the conclusion that the most attractive sites were those that were both highly natural and highly designed. These findings emphasize the importance of intentional and highly aesthetic maintenance in relation to public approval and attractiveness ratings.

Planning a Successful Community Outreach Event

Environmental education and outreach can serve as catalysts for getting the residents of West St. Paul on board with the implementation of native vegetation into their ROW areas. A brief document analysis provided several findings for creating a successful environmental education and outreach program.

Environmental education can promote awareness, knowledge, attitudes, skills, and participation in environmental issues (Jacobson, McDuff, & Monroe, 2015). In this case, we are hoping to promote these topics through education about the benefits of native vegetation, emphasizing that it is something that is necessary to the community. Specifically, conservation education techniques include citizen science, issue investigation, nature awareness, service learning, and interactive websites. Outreach programs should be designed to increase understanding of the associated problem, which, in this report, is a lack of native vegetation (Jacobson, McDuff, & Monroe, 2015).

To plan a successful community outreach program or event, a systematic framework is necessary, beginning by setting goals and objectives, determining the target audience, and choosing which

educational strategies should be used (Jacobson, McDuff, & Monroe, 2015). As previously stated, the problem that has been identified is that West St. Paul is limited in native vegetation throughout the city. A proposed community outreach event could educate residents of West St. Paul on the benefits of having native plants in their community. The proposed outreach could improve education through events to promote nature awareness and service-learning.

Results of Comparable Case Studies

In the three Iowa Counties examined as case studies, a broadly similar management strategy for right of ways emerged (Story County Iowa, n.d.) (Iowadot, n.d.). The three counties examined, Hardin, Story, and Linn, had similar management strategies that aimed to cut down noxious weeds and non-native plants through the following techniques:

- Herbicide application
- Use of controlled burns to burn small brush and “stimulate desirable vegetation”
- Leaving vegetation that has been cut or sprayed in the right of way to decompose
- Use of pruning to keep desired vegetation outside of traffic and below height limits

This management plan has seen success in keeping Iowa roadways rich with native vegetation and clear of noxious weeds. While Iowa has done well in maintaining aesthetic value in their right of ways by limiting the growth of weeds, not all these same practices can be implemented in West St. Paul due to the City’s ban on pesticides in the 2016 Pollinator Resolution (City of West St. Paul , 2016). However, the other practices detailed in the list above are applicable to the City.

Our case studies also generated data about Mille Lacs County (Mille Lacs County, 2016). The Mille Lacs County management plan works around organic vegetation, meaning they do not use pesticides. As an alternative to using pesticides, Mille Lacs County takes care to only mow at certain times throughout the growing season and ensures soil introduced to the right of ways is free of weeds, to preserve and protect native vegetation. Mille Lacs County also lists several species they define as noxious weeds. Knowledge of noxious weeds is important for the City of West St. Paul because many of these weeds are considered invasive and could harm any native vegetation. This list of noxious weeds can be found in **Appendix D**.

Plant Selection

In total, 15 different plant species were selected to replace the existing ROW vegetation along S Robert Street. These plants consist of three different native grass species, two native shrubs, and ten native blooming perennials (Table 1).

Table 1 - Data for Plant Species Selection List was provided by the following sources (Krischik, Reed, & Willey, 2000), (Meyer, Brown, & Zins, 2007), (Natural Shores Technologies, n.d.), (Natural Shore Technologies, n.d.), (Prairie Moon Nursery, n.d.)

Plant Name (common)	Scientific Name	Maximum Height (in)	Moisture Regime	Sunlight	Bloom Time	Bloom Color
Grasses						
Little Bluestem	<i>Schizachyrium scoparium</i>	36"	Dry, Medium-Dry	Full, Partial	July, August, September, October	Green, Blue
Prairie Dropseed	<i>Sporobolus heterolepis</i>	24"	Dry, Moist	Full, Partial	August, September, October	Green, White
Side-Oats Grama	<i>Bouteloua curtipendula</i>	24"	Dry, Medium-Dry	Full, Partial	August, September, October	Tan, Yellow, Red
Shrubs						
Black Chokeberry	<i>Aronia melanocarpa</i>	60"	Medium-Dry, Moist	Full, Partial	April, May, June	White
Smooth Wild Rose	<i>Rosa blanda</i>	60"	Dry, Medium-Dry	Full, Partial	June, July	Pink
Flowering Perennials						
Wild Bergamot	<i>Monarda fistulosa</i>	48"	Dry, Moist	Full, Partial	July, August, September	Purple
Butterfly Weed	<i>Asclepias tuberosa</i>	24"	Dry, Medium-Dry	Full, Partial	June, July, August	Orange
Foxglove Beardtongue	<i>Penstemon digitalis</i>	48"	Medium-Dry, Moist	Full, Partial	May, June	White
Prairie Tickseed	<i>Coreopsis palmata</i>	24"	Dry, Medium-Dry	Full, Partial	June, July, August	Yellow
Purple Coneflower	<i>Echinacea purpurea</i>	48" (typically less)	Medium-Dry, Moist	Full, Partial	July, August, September	Purple
Purple Prairie Clover	<i>Dalea purpurea</i>	24"	Dry, Medium-Dry	Full, Partial	July, August, September	Purple
Wild Geranium	<i>Geranium maculatum</i>	12"	Medium-Dry, Moist	Partial, shade	April, May, June, July	Purple
Yarrow	<i>Achillea millefolium</i>	18"	Dry, Moist	Full, Partial	June, July, August, September	White
Yellow Coneflower	<i>Ratibida pinnata</i>	60"	Dry, Medium-Dry	Full, Partial	July, August, September	Yellow
Spotted Bee Balm	<i>Monarda punctata</i>	24"	Dry, Medium-Dry	Full, Partial	July, August, September	Purple

Grasses

Schizachyrium scoparium, also known as little bluestem, is a perennial grass native to Minnesota (Meyer, Brown, & Zins, 2007). Little bluestem is a very drought tolerant species, but it also can survive in moist conditions, making it a good option for ROW vegetation where a water regime may be inconsistent (Prairie Moon Nursery, n.d.). This grass also goes from a green or blue color in the summer, to an amber color in the fall, which will add different aesthetic value to the ROW planting (Meyer, Brown, & Zins, 2007). This grass forms clumps, so it is recommended to plant these grasses approximately 2-3 feet apart (Prairie Moon Nursery, n.d.)

Sporobolus heterolepis, more commonly known as prairie dropseed, is another native grass (Meyer, Brown, & Zins, 2007). Prairie dropseed is adaptable to a variety of moisture conditions, which makes it a prime candidate for ROW vegetation (Natural Shores Technologies, n.d.). More specifically, prairie dropseed is a C4 plant, meaning that it can survive harsh drought conditions if necessary and excels in areas where there is constant sun (Prairie Moon Nursery, n.d.). This grass will tend to form in mounds turns a golden color in the fall, adding a fall aesthetic to the ROW vegetation (Prairie Moon Nursery, n.d.).

Bouteloua curtipendula, also known as side-oats grama, is the final recommended native grass for the ROW vegetation throughout S Robert Street. Side-oats grama is a species that can tolerate a variety of moisture conditions and rarely exceeds two feet in height (Natural Shores Technologies, n.d.). This grass produces seeds with a distinct oat-like appearance, and the seeds also contain red-purple anthers below, creating beautiful color during the fall months (Prairie Moon Nursery, n.d.). Elaine Evans, a research associate in the University of Minnesota's Department of Entomology, recommends this grass, as she has seen it do well in other examples of ROW vegetation (Evans, 2021). This grass spreads by rhizomes, so clumps of vegetation will form over time. It is important to not plant this grass too close to other plants, as it has the potential to outcompete other recommended plants (Prairie Moon Nursery, n.d.).

Shrubs

Aronia melanocarpa, black chokeberry, is a native shrub to Minnesota that produces white flowers in the spring, and small black edible fruits in the fall (Meyer, Brown, & Zins, 2007). This shrub can grow in excess of five feet in height, so proper maintenance will include trimming the shrub to the desired height in areas where taller shrub growth is not wanted (Meyer, Brown, & Zins, 2007). This shrub is recommended for ROW vegetation because it can tolerate most soil types. It can also withstand shady conditions, so installing this shrub near preexisting trees is a potential option (Meyer, Brown, & Zins, 2007). Black chokeberry is not as drought tolerant as some of the other listed species, so it is recommended to plant it in shady parts of the median if irrigation is not an option.

Rosa Blanda, commonly known as smooth wild rose, is the other recommended native shrub for the ROW vegetation. This perennial shrub produces fragrant pink roses in the months of June and July, and the flowers do an excellent job of attracting pollinator species of insects (Prairie Moon Nursery, n.d.). This species was recommended by Elaine Evans of the University of Minnesota Department of Entomology as a shrub that does particularly well in median vegetation (Evans, 2021). Smooth wild rose grows more than five feet, which means it will likely shade out smaller plants, indicating this shrub should be planted by itself in an area that can support shrubs. This plant also spreads via root suckers, which means new growth will develop from the existing roots, so the shrubs will get denser over (Prairie Moon Nursery, n.d.). This plant should be trimmed to a height deemed appropriate for median vegetation.

Blooming Perennials

Monarda fistulosa, also referred to as wild bergamot or bee balm, is a native perennial that produces vibrant purple flowers (Meyer, Brown, & Zins, 2007). It is typically a plant that is easy to establish and is a fantastic source of pollen for bumble bees and butterflies (Krischik, Reed, & Willey, 2000). This plant is also great at establishing in areas with full sun exposure, and it can handle a variety of moisture

regimes, so it makes for an excellent ROW vegetation species (Krischik, Reed, & Willey, 2000). As it is very easy to establish, bergamot will likely spread in the areas that it is planted, leading to fuller stands of the plant (Meyer, Brown, & Zins, 2007). Bergamot can also grow to a variety of heights depending on the maintenance regime, being as short as twelve inches and as tall as four feet (Meyer, Brown, & Zins, 2007),

Asclepias tuberosa, also known as butterfly weed or butterfly milkweed, is a blooming perennial that is characterized by its low height and stunning orange blooms (Meyer, Brown, & Zins, 2007). Butterfly weed is a species that thrives in areas that receive full sunlight and have typically dry conditions (Prairie Moon Nursery, n.d.). Because this plant prefers dryer conditions, it can be somewhat late to germinate, so this plant is best suited for areas in the median that receive full sunlight exposure (Prairie Moon Nursery, n.d.). Butterfly weed is unique in its short stature when compared to other perennials, as it seldom grows above two feet in height. This species could be used as a ground cover in areas where there is not as much height, such as near the native grasses (Prairie Moon Nursery, n.d.).

Penstemon digitalis, more commonly referred to as foxglove beardtongue, is an early blooming native perennial with a white flower (Natural Shore Technologies, n.d.). Foxglove beardtongue is an attractive species for a variety of bumble bees, butterflies, and hummingbirds, and it is one of the first perennials that will bloom in the ROW vegetation (Prairie Moon Nursery, n.d.). This plant is also able to adapt to a variety of shade conditions, however, it may not handle dry soils as well as some of the other plants on this report; consider planting in areas with either reliable irrigation or good shade cover (Prairie Moon Nursery, n.d.).

Coreopsis palmata, also known as prairie tickseed, is a native perennial plant that produces a yellow flower (Natural Shores Technologies, n.d.). Prairie tickseed falls within the *Coreopsis* genus, and a genus known for providing great habitat for bees (Prairie Moon Nursery, n.d.). Prairie tickseed is an ideal candidate for ROW vegetation, primarily because it does not grow taller than two feet, making it ideal for areas on the median where vegetation has to be low to the ground (Natural Shores Technologies, n.d.). Prairie tickseed is also able to handle dry to medium-dry soils and is overall tolerant of poor soils and drought conditions (Prairie Moon Nursery, n.d.). For maintenance, it is recommended to deadhead flowers to increase the bloom time of each plant (Prairie Moon Nursery, n.d.).

Echinacea purpurea, commonly referred to as purple coneflower, is a native perennial that produces a large purple flower (Meyer, Brown, & Zins, 2007). This plant can withstand full sunlight conditions and produces nectar that attracts butterflies (Krischik, Reed, & Willey, 2000). This plant is known for its long bloom time, having a bloom that lasts longer than most other flowers listed on this report (Meyer, Brown,

& Zins, 2007). This plant also can handle most soil conditions, and is drought tolerant (Meyer, Brown, & Zins, 2007). Purple coneflower self-seeds, so over time, this plant will likely fill in the areas in which it is planted, resulting in areas with a lot of purple flowers in the ROW vegetation (Meyer, Brown, & Zins, 2007).

Dalea purpurea, or purple prairie clover, is a native perennial that produces a cylindrical purple bloom (Meyer, Brown, & Zins, 2007). This plant is able to withstand very dry conditions and is known to be excellent for both bees and butterflies (Krischik, Reed, & Willey, 2000). Purple prairie clover is considered a superfood for the rusty patched bumble bee, which is an endangered bee species in Minnesota (Prairie Moon Nursery, n.d.). Another benefit to incorporating purple prairie clover in the ROW vegetation is that the genus *Dalea* is a legume, meaning that the plant will fix atmospheric nitrogen into the soil, improving the overall soil health in the (Prairie Moon Nursery, n.d.). Since this plant seldom reaches more than two feet in length, it makes for an excellent ground-cover plant that can be incorporated into areas where plant growth needs to remain low (Meyer, Brown, & Zins, 2007).

Geranium maculatum, also known as wild geranium, is a native perennial that serves as an excellent ground cover and produces a purple/pink bloom (Meyer, Brown, & Zins, 2007). Typically, wild geranium will not grow taller than one foot in height, and this makes it especially useful around trees or shrubs (Meyer, Brown, & Zins, 2007). Wild geranium is not a plant that does well in full sun conditions, so it is important to plant it in shadier parts of the median, preferably near trees where it does very well (Krischik, Reed, & Willey, 2000). While wild geranium is not a full sun species, it does handle dry soils well, so it can be planted in areas where irrigation may not be accessible (Meyer, Brown, & Zins, 2007).

Achillea millefolium, more commonly known as yarrow, is a native perennial that produces a flat, white bloom during the summer months (Meyer, Brown, & Zins, 2007). Yarrow is known for its ability to attract butterflies, while its blooms are small, yet plentiful (Krischik, Reed, & Willey, 2000). It makes for a good median plant, as it can withstand full sun, is very drought tolerant, and grows very fast (Meyer, Brown, & Zins, 2007). The long bloom time of yarrow also adds color for many months out of the year, with blooms as early as June and as late as late September (Meyer, Brown, & Zins, 2007). One downside of yarrow is that it can become weedy when not maintained, so consider planting it in areas where there is either a lot of competition or small areas where it would be allowed to spread (Krischik, Reed, & Willey, 2000).

Ratibida pinnata, also known as grey-headed coneflower or yellow coneflower, is a native perennial that produces a single yellow bloom (Natural Shores Technologies, n.d.). Yellow coneflower is native to dry savannahs and prairie and is a very drought tolerant plant (Prairie Moon Nursery, n.d.) Its ability to reseed

means that it will continue to grow in the medians even after the initial plants die off (Meyer, Brown, & Zins, 2007). Yellow coneflower is a very attractive species to both butterflies and bees and can handle full sunlight conditions, as well as multiple moisture regimes (Prarie Moon Nursery, n.d.). As it can reach heights upwards of five feet, it is recommended to plant this flower in areas where tall growth is acceptable or maintain the flower by trimming it to a more desirable height before it begins to bloom (Meyer, Brown, & Zins, 2007).

Monarda punctata, also known as spotted bee balm or dotted horsemint, is a native perennial that produces a white/purple bloom (Natural Shores Technologies, n.d.). Spotted bee balm is one of the most drought-tolerant species in *Monarda* and is able to withstand dry soils and full sunlight conditions (Prarie Moon Nursery, n.d.). The flowers on spotted bee balm are much different from the other perennials in this report, with the flowers growing off of the stem in bunches of 2-4, and containing shades of white, maroon, pink, purple, and beige (Prarie Moon Nursery, n.d.). The short stature of spotted bee balm, rarely exceeding two feet in height, makes it an excellent fit for median vegetation where the growth of plants needs to be limited (Prarie Moon Nursery, n.d.).

Review on Impacts of Traffic on Pollinators

In the initial stages of this report, several concerns were identified relating to the impacts of traffic on pollinators. Document analysis from a variety of sources led to the conclusion that highly trafficked roads do pose significant obstacles to pollinators, despite their necessity for human travel (Fitch & Vaidya, 2021). A study by Fitch and Vaidya set up an observational study to pay close attention to pollinators and their traveling habits. They set up potted plants, containing both bee balm and coreopsis. Two of the pots were set across the street from each other and the third was the same distance away but on the same side of the street. This third pot, containing bee balm and coreopsis, was the control plant. Following the setup of the plants, researchers observed the number of pollinators that visited each of the pots throughout the duration of their study. They determined that there was a 34% decrease in pollination to the bee balm in the pot across the street when compared to the control plant and a 50% decrease in pollination in the coreopsis when compared to the control plant (Fitch & Vaidya, 2021).

The study concluded that smaller bees were at a very high risk from traffic (Fitch & Vaidya, 2021). These bees may be more vulnerable to collisions with vehicles since they travel at lower heights than other pollinators. Furthermore, traffic-induced air turbulence puts smaller bees at risk, making crossing roads increasingly difficult for these small pollinators (Fitch & Vaidya, 2021).

A second study that was examined during document analysis for this report comes out of the United Kingdom (Phillips, et al., 2020). The study conducted a literature review of the benefits and potential

limitations for pollinators of “road verges,” which are defined as “vegetated strips, generally consisting of grassland, shrubland, woodland or forest, which often form distinctly managed borders that separate roads from adjacent land. They may serve a number of practical purposes, for example, accommodating road infrastructure, improving visibility for road users, and providing refuge for pedestrians, but can simultaneously be managed to benefit wildlife” (Phillips, et al., 2020). There are several similarities between road verges and right of ways, as they are both areas of managed vegetation that separate roads and land.

The literature review conducted in the study determined that road verges, defined as a strip of greenspace located between roadways and sidewalks, may be hotspots for pollinators and flowers, but that there are also negative impacts brought upon pollinators from traffic and road pollution, causing mortality (Phillips, et al., 2020). Similarly, a recent Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) report used in the literature review, determined that road verges could potentially serve as habitats or corridors for pollinators. While the study posits that the benefits of road verges may outweigh the costs, there are still several concerns that must be considered. The researchers highlight that there are several pollinator species that may not even be capable of crossing roads, due to their size, flight height, flight range, and local cues like floral resources or the road itself. Similar to the Fitch and Vaidya study, Phillips et al. determine that smaller pollinators likely have a harder time crossing roads to access the potential benefits such as floral resources on the other side.

In addition to document analysis, further data was collected from communication with University of Minnesota associate professor, Emilie Snell-Rood. Snell-Rood works in the College of Biological Sciences was also able to provide some helpful information for determining how pollinators may be impacted on S Robert Street in West St. Paul. Her research suggests that pollinator habitat restoration is most successful when done on lower-speed and lower-traffic roads, such as roads that see less than 20,000 cars per day. S Robert Street already exceeds that number and is likely to increase into the future. Ultimately, in the sources that Dr. Snell-Rood provided, there is a rather wide gap in knowledge on how ROW vegetation can best be used to benefit pollinators (Du Clos, deMaynadier, Drummond, & Loftin, 2021). There is research that indicates that ROW vegetation can act as corridors for pollinators, but there is also a lot of information that highlights the potential threats pollinators may face attempting to cross highly trafficked roads.

An analysis of this information suggests that while ROW vegetation can have a myriad of benefits for pollinators, those benefits come with high risks. As mentioned in the introduction section of this report, S Robert Street is a highly trafficked area, seeing as many as 23,000 cars per day, indicating that small pollinators like small bees are at high risk of mortality in this area. While native plants naturally serve as

habitat for pollinators, our recommendations detail that our educational event should focus on encouraging the citizens of West St. Paul to plant their own pollinator gardens in their yards to create safer spaces for pollinators within the City limits.

Recommendations

Our recommendations include a list of plant species which have the ability to survive in rough environmental conditions, as well as low-cost management techniques which will serve to support this vegetation. These techniques include annual mowing and pruning. In addition to these ecological considerations, it is recommended that the city take a strong focus on community outreach and education. These initiatives include information education materials and a community outreach event.

Recommendation 1: Native and Pollinator Friendly Plant Species Recommended for Tough Environments Within Right of Ways

While all fifteen plant species have been selected based on ability to survive in medians and create aesthetically pleasing ROW vegetation, not all the species will be able to survive together. Different medians will require different planting regimes based on available space, water regime, sunlight, and existing vegetation.

In areas that were previously planted with shrub-like vegetation, such as dwarf bush honeysuckle (*Diervilla lonicera*), new shrubs such as the early wild rose or black chokeberry can be planted to replace the dwarf bush honeysuckle. These shrubs would be able to fill a similar aesthetic role, while also providing food and pollen for pollinator species. Both species can grow upwards of five feet tall, so pruning will have to take place to maintain the 18 inch and below height requirement. These shrubs could also be planted near taller existing vegetation, such as the prairie blazing star, which already exists in some medians and can be kept. This way, there is more of a uniform height to the plants in an area.

Currently, many areas along S Robert Street contain black eyed susan (*Rudbeckia hirta*). While this species is a native pollinator plant, it would benefit from having other species planted alongside it. It is in the City's best interest to remove stands of black eyed susan where appropriate and plant taller blooming perennials such as yellow and purple coneflower, foxglove beardtongue, and wild bergamot. Not all black eyed susan must be removed, as it fits into the native garden very well, but it is recommended to plant some of these other perennials in the areas that black eyed susan is kept to create a wider display of color and bloom time. It is recommended to remove approximately one half to two thirds of the existing black eyed susan to make way for other plants.

Some of the medians on the southern section of S Robert Street of smaller in size consist of grasses, daylilies, or a mix of both. There are a few ways to incorporate native plants into these smaller medians. One suggestion is to use these areas to plant the suggested native grasses. All suggested grasses can withstand full sunlight and drought conditions, so these medians would be an ideal fit. Another possibility

is to incorporate low-height perennials along with the native grasses, as to add some color and variety to these medians. Suggested perennials that would work well in these small medians include butterfly weed, purple prairie clover, and spotted bee balm. If a monoculture exists within the median, it is recommended to remove daylilies from medians that contain other plants, as daylilies are aggressive and will likely outcompete any new plantings.

One potential problem spot in the medians may be shaded areas. As this report recommends leaving existing trees, there will be areas on the median where sunlight does not reach the ground level. For areas like this, wild geranium is the recommended species, as it will be able to fill in the areas where other plants typically have a hard time establishing. Native grasses can also be planted in these areas but may not be as successful as the wild geranium. All plants in this report have some level of shade tolerance, but wild geranium is the most shade tolerant option.

While many sections of the median will contain single plant species or two to three different species, it is best to plant some parts of the median with a variety of blooming perennial species. By planting multiple species within the same area, the median's aesthetic value will increase due to the wide variety of colors and bloom times. The wildlife value of these medians will also increase, as a greater variety of plant species will attract more pollinators to the area. Potential plants that can be added together into these medians include but are not limited to prairie tickseed, yarrow, yellow and purple coneflower, wild bergamot, and butterfly weed.

Recommendation 2: Cost and Time-effective Management Techniques for Right of Ways to Ensure Development Success

Keeping in mind the limitations in the budget and labor allowances of West St. Paul, it is recommended that in managing the selected plants, West St. Paul adopts the following measures. A first, simple maintenance measure is to mow the entirety of the median or right of way area on S Robert Street once annually, in the late spring. This mowing will simulate a prairie fire, clearing out weeds and cutting back plants in a healthy way that allows for regrowth. Annual late-spring mowing creates the same effect as a controlled burn while being safer for workers and residents, remaining a low-level maintenance technique.

Beyond this annual mowing, it is recommended that West St. Paul focuses on pruning back select vegetation, to meet height requirements outlined by the City. Though that majority of the recommended plants are selected to be low-maintenance and stay within height restrictions, it is likely some pruning will have to be done to prevent overgrowth, as demonstrated by management plans in the case studies. Finally, we recommend that West St. Paul maintenance workers be instructed to clean lawn mowers and other

equipment before use in ROW vegetation on S Robert Street. Following the example of Mille Lacs County, this effort can keep noxious weeds out of right of ways and is a relatively easy precaution to take. This practice takes into account the limited amount of maintenance required to maintain the Robert Street median in the recommendations.

Recommendation 3: Environmental Community Outreach to Educate the Public on Native and Pollinator Friendly Vegetation

We recommend creating several educational materials to supplement the management plan along S Robert Street in West St. Paul. The plan focuses mainly on S Robert Street, while there is much more area within the city that would make great spaces for native vegetation and pollinator plants. We propose using several different techniques of education, including hosting an event for the community, providing signage, and distributing informational flyers.

Dave Schletty and members of the City Council committees mentioned interest in expanding ROW vegetation beyond S Robert Street, which is feasible through environmental education. The sample public opinion survey determined that 74.5% of respondents of West St. Paul believe that having native, pollinator plants in their community is very important, with the remaining 25.5% citing it is somewhat important. However, this same group of citizen respondents also indicated that they don't have a lot of knowledge about planting native vegetation. Educational materials would serve to meet their needs of desired importance, as well as provide resources on how to implement native vegetation in their own yards.

Community Outreach Event

A community outreach event could take place along S Robert Street, involving a variety of organizations who can provide resources for the community on planting pollinator gardens at home, why pollinators are important, why native vegetation is important, and how citizens can get involved with the restoration of S Robert Street. The location of the event is important, as S Robert Street is the location for the proposed implementation of new vegetation. A few organizations that could provide additional educational resources or participate in a community event are the [University of Minnesota Bee Squad](#), [Metro Blooms](#), the [Minnesota Native Plant Society](#), and [Master Gardeners through the University of Minnesota Extension](#).

Including the community in the restoration process of S Robert Street could be on a volunteer basis and help to alleviate the City of some stress related to maintenance. This event could be publicized through the distribution of flyers to the residents of West Saint Paul, detailing the content, impact, and importance

of the event. Residents would be able to assist city staff in the removal of current vegetation and the implementation of replacement vegetation. These ideas are supported by the data collected in the public opinion survey, which showed that 23.4% of the respondents surveyed would be “very likely” to participate in a community service event, while 29.8% responded that they would be “somewhat likely” (**Appendix C**) to participate. This project would need to be overseen by a staff member or community expert to ensure that all vegetation is removed or planted properly. Including the public in the restoration process can be a form of service learning, which is very beneficial in terms of environmental awareness and knowledge. Also, service learning could help to train residents on how to expand native vegetation into their own yards.

Another way to promote environmental awareness and spread knowledge is implementing signage along S Robert Street. The public opinion survey generated several comments about how native vegetation may have a weedy appearance and that the respondents don’t understand what pieces of vegetation are intentionally placed and what pieces are considered “weeds.” To remedy this, we recommend creating signage to include at crosswalks along S Robert Street that explains the benefits of native vegetation, such as creating a habitat for pollinators and restoring the land to the plants that used to exist there before urbanization. This signage would also contain detailed information about exactly what plants were chosen and why. An example of potential signage which could be utilized along Robert Street is included in **Appendix E**.

To extend the reach of the proposed signage even further, we recommend including a list of resources that can be utilized by citizens who wish to get involved with planting native or pollinator gardens in their own yards. The University of Minnesota Bee Lab has a great planting guide that includes a variety of pollinator friendly plants (Evans, beelab.umn.edu, n.d.). The City can use these resources provided on the Bee Lab’s website to inform its citizens about how to help. Furthermore, the proposed signage follows details included in “cues to care,” showing the residents of West St. Paul what specific plants are intentional and educating them on their benefits (Li & Nassauer, 2020).

To support environmental education and promote the spread of native vegetation and pollinator gardens, the City can distribute informational flyers to West St. Paul residents. These flyers would include images of plants that could be used in pollinator gardens and a list of places where native plants can be purchased. The public opinion survey respondents noted that they would like to create pollinator friendly spaces at home, but do not know where to acquire the tools to do so. A draft example of a promotional flyer which could be utilized is included in **Appendix E**.

Furthermore, the report literature review dedicated to information about impacts of traffic and road conditions on pollinators, determined that S Robert Street could prove to be a potentially dangerous habitat for pollinators. It would be unfair to their survival to limit these insects to such a small amount of space, so the proposed community outreach strategies would encourage citizens to create habitats for pollinators in their own yards, where they would be safer from dangerous impacts that high traffic areas may have.

Ultimately, the educational information included in this variety of outreach materials should answer the questions and concerns posed by West St. Paul residents and align with outreach guidelines and programs such as “cues to care.”

Conclusion

Proper management of rights of ways is important to maintain public safety and reflect city aesthetics. As described, right of ways provide opportunities to create a space for native pollinator habitats within urban centers, bolstering urban biodiversity. West St. Paul can provide adequate green spaces for both residents and wildlife, creating an avenue for public environmental education relating to the importance of native vegetation and pollinator health within urban systems. Based on the information collected, a proposal for management has been outlined detailing plant recommendations, management techniques, and community outreach initiatives to increase public awareness and approval of native vegetation along right of ways. With this information, West St. Paul can cultivate an effective management plan for the right of ways within their city, creating a space both beautiful and functional.

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Appendices

Appendix A - Interviewees and selection rationale for information regarding right of way vegetation management plan.

Organization	Professional Title	Interviewee	Selection Rationale
City of Bloomington - Parks and Recreation	Water Resources Specialist	Jack Distel	The city has a successful and well-established right of way vegetation management plan.
University of Minnesota - Department of Entomology	Research Associate	Elaine Evans	Expert on pollinators and pollinator response to traffic.
City of West St. Paul	Public Work Director	Ross Beckwith	Knowledgeable regarding the management and challenges of Robert Street
University of Minnesota	Teaching Assistant	Hannah Ramer	Knowledgeable regarding the social science of public approval
City of West St. Paul	Assistant Parks and Recreation Director	Dave Schletty	Main contact for the target city.
University of Minnesota - College of Biological Sciences	Associate Professor	Emilie Snell-Rood	Knowledgeable about environmental changes and the impacts of traffic and roads on pollinator health.

Appendix B - Public Opinion Survey Posed on West Saint Paul's Facebook Page

<p>1. In general, do you find the current vegetation along the streets of West St. Paul aesthetically pleasing?</p> <ul style="list-style-type: none">• Yes• No• No Opinion
<p>2. How important is it to you that native and pollinator friendly plants are planted in your community?</p> <ul style="list-style-type: none">• Very important• Somewhat important• No Opinion• Not important
<p>3. On a 1-5 scale, how much would you say you know about planting native plants in your home and community?</p> <ul style="list-style-type: none">• 1• 2• 3• 4• 5
<p>4. Would you be likely to participate in a community event in which the citizens of West St. Paul aid in planting native plants along Robert Street?</p> <ul style="list-style-type: none">• Very Likely• Somewhat Likely• No Opinion• Somewhat Unlikely• Very Unlikely
<p>5. Do you have any comments or concerns regarding native and pollinator friendly plants along streets in your community?</p>

Appendix C - Data Analysis of West Saint Paul Citizen Survey

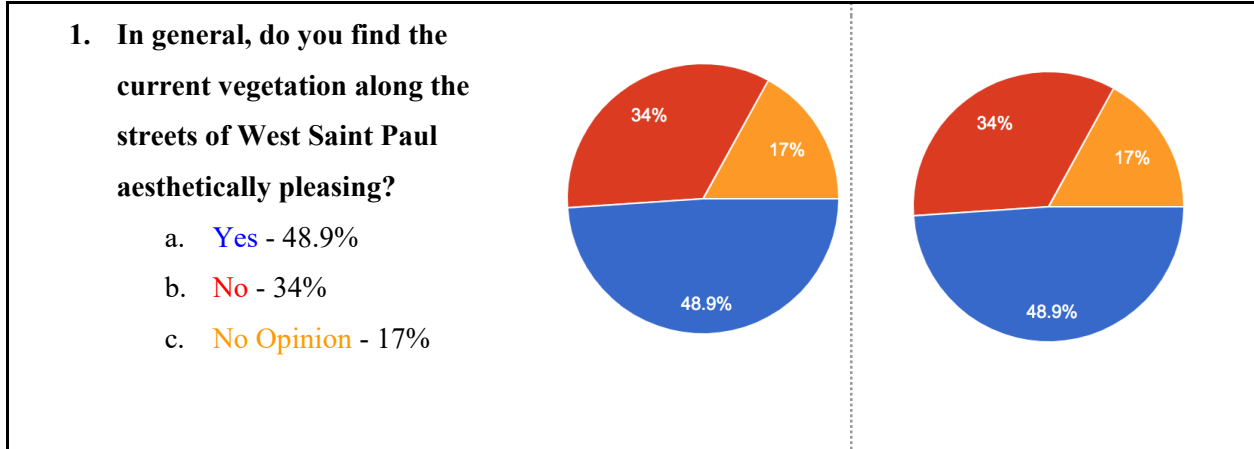


Figure 1 - Public Opinion Survey Question 1 Results: In general, do you find the current vegetation along the streets of West St. Paul aesthetically pleasing?

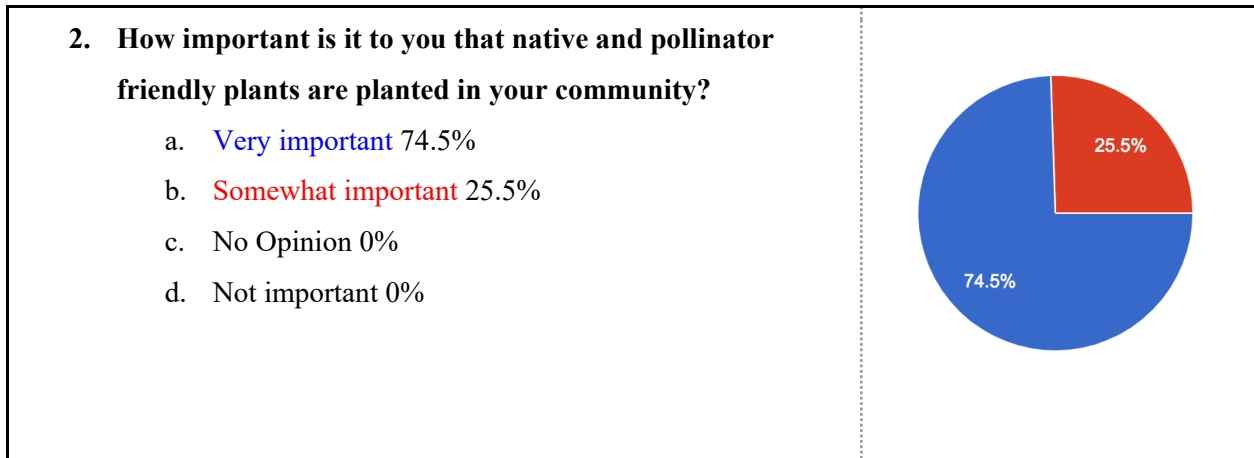


Figure 2 - Public Opinion Survey Question 2 Results: How important is it to you that native and pollinator friendly plants are planted in your community?

3. On a 1-5 scale, how much would you say you know about planting native plants in your home and community?

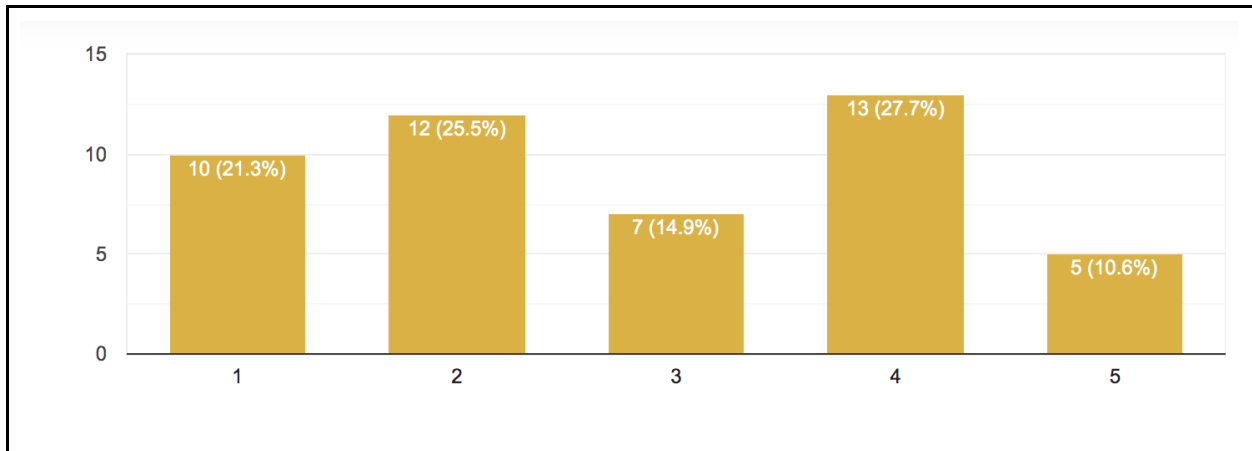


Figure 3 - Public Opinion Survey Question 3 Results: On a 1-5 scale, how much would you say you know about planting native plants in your home and community?

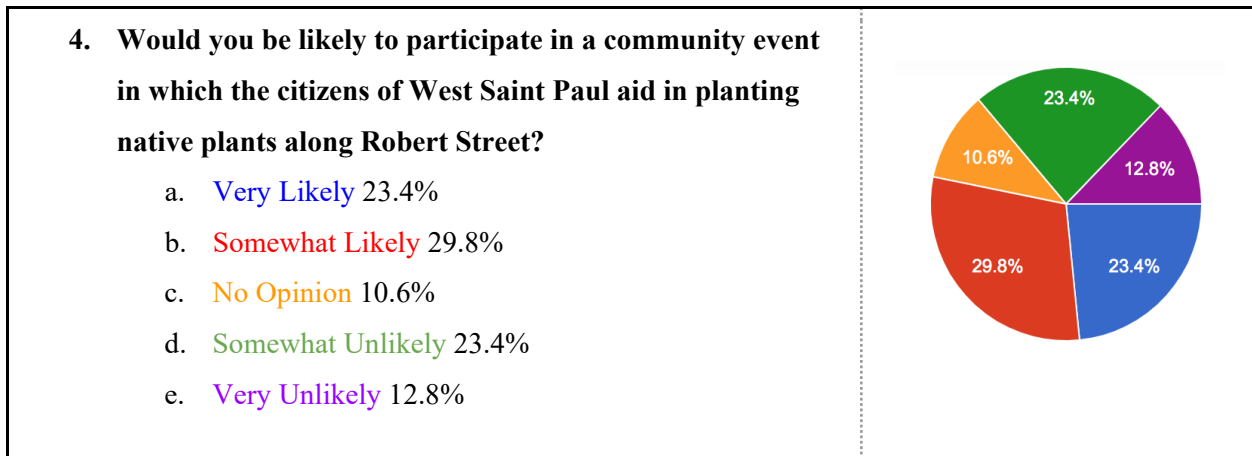


Figure 4 - Public Opinion Survey Question 4 Results: Would you be likely to participate in a community event in which the citizens of West St. Paul aid in planting native plants along Robert Street?

Pesticide Concerns	<ul style="list-style-type: none"> - “How will they be maintained without std suburban overuse of chemicals and employees who don’t understand native plants” - “We need to encourage people to avoid harmful spraying on their lawns too” - “Concerned that lawn care practices will kill native plants.”
Aesthetic Concerns	<ul style="list-style-type: none"> - “I like to have a clean looking yard. Pollinator yards tend to look unkept/run down. Why can’t there be pollinator plants

	that look organized/manicured?”
Support	<ul style="list-style-type: none"> - “I have no personal experience with natural grasses and pollinators but based on current reading regarding the importance to our environment I support that trend.” - “I wish there was support of a legislation that will allow the whole state to have more pollinator friendly yards and now allow cities to fine for it.” - “I would just love to see more pollinator friendly and native plants!” - “I know it is an important topic but I don't know much about it so am glad this is being surveyed and explored. Thanks!

Figure 5 - Public Opinion Survey Question 5: Citizen Comments and Concerns

Appendix D - Mille Lacs County List of Noxious Weeds

Mille Lacs County List of Noxious Weeds

1. Leafy Spurge, *Euphorbia esula* (L.)
2. Canada Thistle, *Cirsium arvense* (L.) Scop.
3. Musk Thistle, *Carduus nutans* (L.)
4. Plumeless Thistle, *Carduus acanthoides* (L.)
5. Purple Loosestrife, *Lythrum salicaria*, *virgatum* (L.),
6. Wild Parsnip, *Pastinaca sativa* L.
7. Common Tansy, *Tanacetum vulgare* (L.)
8. Spotted Knapweed, *Centaurea stoebe* spp. *micranthos*

Appendix E - Community Engagement and Education Outreach Materials

Native Plants In Your Area!

How Native Plants In Your Right-Of-Ways Help Our Pollinators

Why Plant Native?
Native Minnesota plants have evolved over time to serve our pollinators. Key pollinator species such as bumble bees and monarch butterflies are in serious decline. West Saint Paul has taken the initiative to plant native within our right of ways to aid our bees and butterflies!

What is a right-of-way?
Your city's right of ways are the strips of land along roadways. Namely, they are the road medians which can be found along Robert St. South. Listed are some of the native plants which can be found in your own right-of-ways!



Smooth Wild Rose
One of Minnesota most common native roses. It is nearly thornless, with beautiful pink buds



spotted bee balm
A native perennial of the mint family that produces a white/purple bloom. Provides nectar and pollen for pollinators for much of the season.



Yellow Coneflower
A native perennial that produces a single yellow bloom. Yellow coneflower is a very attractive species to butterflies and bees. The flower head is initially green or grey, but becomes dark brown through the flowering season.



Prairie Tickseed
Typically only 2-3 inches tall, with yellow daisy like buds. The "tick" is in reference to the flowers seed, which resembles a small bug or tick.



butterfly weed
While labeled as a weed, it is anything but. Also known as butterfly milkweed, it is characterized by its stunning orange blooms. Known to draw in a number of beneficial pollinators.



Figure 1 - Native Plants in Right-of-ways Example Promotional Signage

Planting Native In West Saint Paul

How Native Plants in Your Gardens Help Our Pollinators

Why Plant Native?
Native Minnesota plants have evolved over time to serve our pollinators. Key pollinator species such as bumble bees and monarch butterflies are in serious decline. West Saint Paul has taken the initiative to plant native within our right of ways to aid our bees and butterflies, and hopes you will aid us in this initiative!

Planting Your Pollinator Garden
Planting a pollinator garden is one of the best things you can do to help our native pollinators. We've collected the best tips and tricks as well as some of the best plants to get you started!

Best Tips!
- Plant in the sun
- Plant in Groups
- Avoid Insecticides



Coneflower
A native perennial that produces a single bloom. Coneflower is a very attractive species to butterflies and bees. The flower head is initially green or grey, but becomes dark brown through the flowering season.



Anise Hyssop
Provides a long nectar season for bumblebees, with a long spike of beautiful small purple blooms. Emits a wonderful smell of anise.



Wild Bergamot
Also known as bee balm, it is a wildflower within the mint family. Historically known to be used in medicine or as a beautiful ornamental.



butterfly weed
While labeled as a weed, it is anything but. Also known as butterfly milkweed, it is characterized by its stunning orange blooms. Known to draw in a number of beneficial pollinators.



Figure 2 - Native Plants in Right-of-ways Example Promotional Flyer