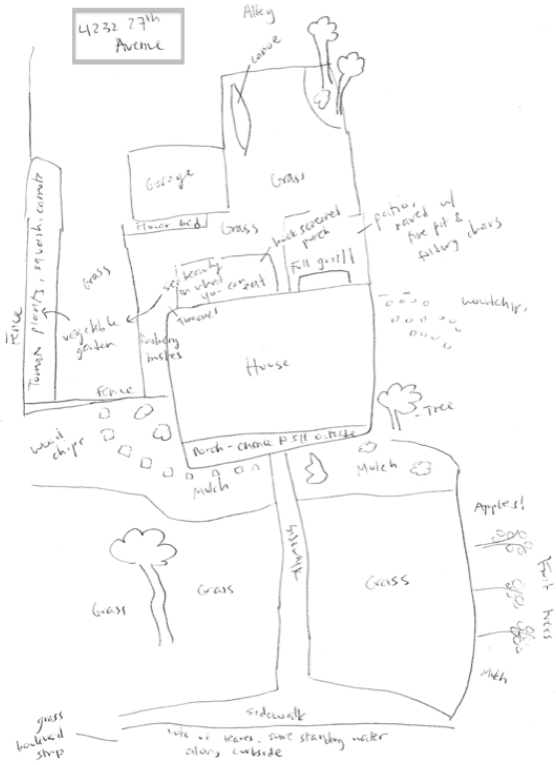
Testing the Waters:

A qualitative study of residents' perceptions of lawn management and water runoff in the Standish neighborhood



A collaborative effort by the Fall 2013 Qualitative Research Methods class
Supervised by Professor Dan Trudeau
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I. Executive Summary

How we care for our yards has an enormous impact on the health of water that flows through the lakes, rivers, and streams that help define our planet. Indeed, when it rains, water falls onto our property and flows off the roof of our houses, over the pavement – as well as over the lawn – taking a host of materials with it. These materials often include the chemicals in the stuff we use to help grass stay green and keep unwanted plants at bay. But the materials in this water runoff can also include fallen leaves and grass clippings among other things. Where do all of these materials go? In cities, these go into the storm sewers, and in the Twin Cities, these empty directly into nearby creeks and lakes, which ultimately flow into the Mississippi River. Why is this a concern? The materials that are swept up by water include a tremendous amount of nutrients – nitrogen and phosphorous – which actually pose an enormous risk to the health of nearby water bodies. As these nutrients enter lakes, for instance, it feeds algae living in lakes, which takes over the lake's aquatic ecosystem turning it into an inhospitable habitat for waterborne plants and animals. This process impacts humans too as algal blooms in the summer turn lakes into sources of unpleasant smells and erode the potential of lakes to serves as places for swimming, boating, and fishing.

One potential solution to this problem is to help water stay where it falls. In order to do this in cities, however, residents will likely need to take different approaches in how they maintain their yards. This document reports research that aims to help us understand how residents in several neighborhoods in southeast Minneapolis that border Minnehaha Creek view and maintain their yards. The report also reflects on this research in order to devise strategies that can encourage residents to help water stays where it falls. This research reflects two distinct and complementary methods of inquiry: 1) a survey of residents' attitudes and practices as it relates to yard management; and 2) follow-up interviews that explore residents' values, how these relate to their yard care practices, and how social networks influence those practices. There are several key takeaway points from this research.

The survey shows both geographic and generational patterns in how people manage their yards. For instance, people who live closer to lakes or streams as less likely to use fertilizer. At the same time, people who have arrived in the neighborhood more recently are less likely to engage in lawn care practices that remove grass clippings or fallen leaves from places where these are transported into storms sewers via water runoff. These recent arrivals tend to be younger and earned a higher level of education than the residents they are joining.

The interviews help put into context the ways in which perception and practice are related and how social networks mediate this relationship. Most significantly, the analysis of interviews describes how many residents experience a disconnect between their environmental values and how they care for their yard. Key reasons for this disconnection is that many people subscribe to a low maintenance approach to yard management and/or many people do not feel competent about adopting practices that may be more aligned with their values. Another dimension of this disconnection is that for many people, their yard management practices are calibrated to affect the environment as it exists on the specific parcel of land they live. Residents' yard management

practices by and large are not informed by a sense that practices affecting their yard impact the health of water in the watershed in which they lived. When it comes to what influences the practices people use to manage their yards, we found that family, friends, and individual research has the greatest impact. At the same time, residents also proved to be influenced by how their neighbors maintain their yards. This latter effect is largely indirect though, as residents report being influenced by what they see their neighbors doing and not necessarily through direct communication. Finally, while we note the aforementioned tendencies and themes, it is important to see that there is a rich diversity in the ways our participants view and relate to their yards. Reflecting on this leads us to the conclusion that any strategy that aims to help residents keep water where it falls will need to be multi-faceted and differentiated so as to be sensitive to this diversity. The report also concludes with recommendations that follow from this conclusion.

The research reported in this document was conducted by students enrolled in the Qualitative Research Methods course offered by Dan Trudeau, in the Geography Department at Macalester College. Geography is a field that is uniquely positioned to examine human-environment interactions. The ways in which people view and care for their yards – and whether they see their yard as part of other environments – is a subject that is thus appropriate for geographical exploration. The questions guiding this research effort were informed by the interests of two organizations concerned with the health of the Minnehaha Creek Watershed: The Freshwater society and the Minnehaha Creek Watershed District. These organizations have initiated a collaborative relationship with the Geography Department at Macalester College to better understand the impact of their Master Water Stewards program, an innovative approach to environmental education that attempts to improve the health of water flowing through the Minnehaha Creek Watershed by encouraging residents to keep water where it falls. The purpose of this specific research effort is to document baseline observations of residents' attitudes and practices before the Master Water Stewards program takes effect. The students in Macalester's Qualitative Research Methods course worked in collaboration with these partner organizations to design research that documents and contributes to our understanding of residents' values, attitudes, and practices as these relate to yard management. It is important to note, though, that the results and their interpretation solely reflect the work of students in the Qualitative Research Methods course.

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II. Introduction

During the fall 2013 semester, Dan Trudeau's Qualitative Research Methods class collaborated with two community partners: the Freshwater Society (FWS) and the Minnehaha Creek Watershed District (MCWD). This is the beginning of a three-year-long partnership between Macalester's Geography Department and these organizations.

The main goal of the FWS is to "keep water where it falls," and they have developed various programmatic approaches, including the Master Water Stewards program, to achieve this goal in neighborhoods in the Minnehaha Creek watershed. Our role as a qualitative research methods class was to gather baseline information about residents that touched upon a few overarching themes: 1) the current relationship to and knowledge of the watershed; 2) the role of social diffusion in the neighborhoods, both in terms of the "look" of an urban yard and how attitudes and decisions about landscaping come to fruition; and 3) behaviors and concerns about water runoff and related environmental issues. We used a combination of questionnaires and follow-up interviews in order to explore these themes.

In order to become acquainted with FWS' work and the types of projects the Water Stewards are implementing, our class went on a field trip with the FWS and MCWD throughout the Minnehaha Watershed District. This field experience also helped us in shaping the questions we would ask residents and develop appropriate language to make residents feel more comfortable with our methods. Based on this experience, we decided that the interview should focus on questions of change and the social dynamics, while the questionnaire would focus more on the relationship to/understanding of the watershed.

This report is organized according to our methods and findings. The report contains three main sections: survey findings, interview findings, and conclusions/recommendations for future research and collaboration. The survey findings are organized into subsections based on the original research questions we used to shape the survey content. Some key themes emerged, including the representativeness of our sample of the larger neighborhood, the difference in individual versus neighbors' responsibility in care for the watershed, and the gap between environmental knowledge/values and perceived responsibility for the watershed. The interview findings are organized into four sections based on the primary takeaways from our interviews: the disconnect between values and practices, the knowledge gap relating to the broader watershed, the influence of social and personal networks on practices, and the importance of values in messaging.

III. Introduction to the survey findings

Starting in September, we surveyed neighborhoods in Minneapolis. Traveling in pairs, we knocked on doors and encouraged residents to fill out surveys regarding their lawn care practices. By late October, 123 residents had completed the surveys. Many of our respondents were from the Standish neighborhood, but we also received surveys from residents in the Bancroft,

Northrup, Ericsson, Keewaydin, Minnehaha, and Wenonah neighborhoods (Fig. 1). We used the survey process as an opportunity to hear from a broad swath of the neighborhood residents. This process allowed for a diversity of community voices to be represented in the research, including people's ideas, preferences, and practices regarding their lawn care practices.

A. Background of survey participants

Meaningful inferences and analysis of a sample population can only be made if the sample can be deemed "representative" of the overall study population. In the survey process, we attempted to get as comprehensive a sample as possible by systematically dividing up the study area among ourselves and approaching each residence on each block. In order to ensure the validity of our study, we strove to have as many respondents as possible complete our survey to bolster our sample size. By the end of the survey period, we had collected 123 surveys, representing 123 unique residences throughout the area. The demographic and background section of the survey allowed us to contextualize our findings within the overall study area and assess the representativeness of our population. We focused on the population variables of age, race, gender, length of tenure in house, family structure, percent owner-occupied, percent renter-occupied, and level of educational attainment.

Our survey respondents were predominantly white (Fig. A1), homeowners (Fig. A2), and typically live in a two-adult family structure (Fig. A3). Children of all ages were uncommon amongst our survey population (Fig. A4 and A5). When asked when they moved into their home, 50 percent of respondents indicated that they had moved in within the past 11 years (Fig. A6). Longer-term residents skewed the distribution of "year(s) moved in," with some residents moving into their current homes as early as the 1950s and 60s (Fig. A6). During our initial rounds of surveying, we did not ask about respondents' gender. The 45 "no answer" respondents can be attributed to the absence of a gender identification question on their survey. We later included a question in the background section of the questionnaire where the respondent could indicate their gender. The gender breakdown after the revision was 43 male and 35 female respondents (Fig. A7). We found that 50 percent of our survey population was under the age of 44, but older residents skewed this distribution of ages we sampled. Overall, our population demonstrated a high level of educational attainment, with 79.4 percent of respondents having received a four-year degree or higher (Fig/ A8). With a wide range of ages and family structures, it is safe to assume that there is a fair amount of turnover. The survey population demonstrates that this is a neighborhood in transition. While we did not encounter many families with children, the fact that 50 percent of our survey population was under the age of 44 indicates that this neighborhood could represent starter homes for many residents (Fig. A9).

Figure A1 compares our sample population with the overall population of the study area. Our survey disproportionately represents the white population, while underrepresenting both Hispanic and Black populations. However, this discrepancy is minimal, thus allowing us to make valid inferences based on our sample population's responses. Our figures for mean

household size and age align quite well with the neighborhood population. Another slight discrepancy arises in percent owner-occupied and percent renter-occupied due to our study design. Our study favored homeowners because we asked to speak with the person who made the decisions regarding lawn care. In the case of renters, the landlord, rather than the residents, is often in charge of lawn care decisions. While acknowledging these limitations, we feel that, for the purposes of this study, this difference between the sample population and the neighborhood population does not in any way compromise our survey.

B. Types of Lawn Care Practices

In order to understand how residents relate to their lawns, it is first important to understand their lawn care practices. Respondents indicated an overwhelming household responsibility for yards—over 93 percent of respondents indicated that the residents of their house performed lawn care practices, rather than relatives or friends, neighbors, or lawn care companies. Nearly all respondents mowed their lawns, in accordance with Minneapolis laws. After mowing, respondents most frequently left these clippings on their lawns.

Yet we saw significant disparities when we delved into the nuances of these practices. About 40 percent of respondents fertilize their lawns and 9 percent use herbicides (Fig. B1). The vast majority of respondents took some action regarding fallen leaves; however, residents had different practices for dealing with leaves and prioritized different areas for leaf removal. Over 80 percent of residents disposed of leaves off of their property, 35 percent mulched them, and about 2 percent burned them.

Overall, we saw less demonstrated ownership of the boulevard strip, and even less of the curbside, than of residents' contiguous properties. Almost three quarters of respondents rake their boulevard strips, and only about a quarter of respondents rake their curbside and gutter or remove leaves from storm drains. Thirteen percent of residents rake leaves into the street. Similar trends arose regarding sweeping lawn clippings off of impermeable surfaces, like sidewalks. As Figure B2 indicates, respondents' practices varied greatly, and contextual information provided in interviews better illuminate these trends.

C. Relationship to the Watershed

In order to understand how residents described their relationship to the watershed, we asked questions about values surrounding the watershed as well as concerns with the health of the watershed itself.

As seen in Figure C1, residents valued the watershed in a variety of ways, including for leisure, wildlife habitat, and aesthetics. To be clear, the question on the survey was asked in the affirmative so the blue bars are solely for reference. The activities described below are ordered from least valued to most valued. Interestingly, there seems to be a correlation between low values and high interaction. In other words, activities such as fishing and boating, which require much more resource input (time, equipment, etc.), were not reflected as high values by our

sample population. One can also see the change in activities along the low-to-high value spectrum as following a change from individualistic to community benefits. For example, aesthetics and wildlife habitat are values that benefit the entire community, while fishing and boating have a much more limited scope of impact.

This point about community benefits is interesting juxtaposed to another survey question about the level of concern with the watershed's health. While the highest value—aesthetics—seemed to be community-oriented, there seems to be an "us versus them" mentality emerging when residents are prompted about responsibility. Residents were asked, "To what extent are you/your neighbors concerned about having clean, healthy water in this watershed?" on a scale from unconcerned to neutral to very concerned (Fig. C2). While responses showed that people were concerned about the watershed, there was a perception that their neighbors were somewhat less concerned, on average. Specifically, the sample indicates that 47.5 percent of respondents are "very concerned" while these respondents indicated that only 12.7 percent of their neighbors are "very concerned." Only 3 percent of respondents report themselves as either "unconcerned," "slightly concerned," or "neutral," compared to 28.8 percent of neighbors in those same categories.

In short, these two questions seen in tandem indicate that while residents overwhelmingly value the watershed for characteristics that benefit the community as a whole, there emerges a locus of control issue when measuring concern for upkeep of the watershed. Rotter defines "locus of control" as, "the extent to which people believe that they have the ability to affect outcomes through their own actions" (McCarty & Shrum 2001). In our analysis, we use locus of control to address the concern, responsibility, and impact of their action individuals feel in relation to their neighbors and the community as a whole. The survey shows that individuals believe they have a higher level of concern on average than their neighbors. At the same time, residents perceive that their contribution only makes a small impact. This paradox is something that the Freshwater Society can try to combat by providing community-level events where residents can talk to one another in order to develop community norms and establish a stronger locus of control.

D. Expectations for urban yards

In the following section we address residents' expectations of their yards and how they articulate them. By understanding respondents' expectations for their lawn, we gain insight about potential barriers and solutions in encouraging residents to "keep water where it falls." These responses were coded directly from what people actively wrote as answers to specific questions in the survey.

In the survey, when we asked respondents which features of their yard were most important to them, the most popular answer was "personal space" (Fig. D1). Other popular responses included "lawn," and "attractiveness." The responses suggest that the principal ways in which residents in the study area derive value from their urban yards is through its role as a site for personal space and an aesthetic amenity. Similarly, when residents were asked which part of

their yard was most important to other members of their household, the top answers were also "personal space," "lawn," and "attractiveness."

When respondents were asked, "What changes to your yard, if any, does your household plan to make in the next two years?", the most common answer was "no change." Other popular answers included "improve lawn," "improve landscaping," or "add a garden". Adding a rain garden, a rain barrel, or improving gutters were responses that were not frequently written.

Though the changes that most respondents suggested were related to aesthetics or food production, most people agreed that they should not fertilize their lawn. As seen in Figure D2, the most common answer to the statement, "I should fertilize my lawn," is "strongly disagree." Simultaneously, "attractiveness" was a popular response to "the parts of my yard that are most important to me." When we asked residents if they thought that fertilizing their lawn resulted in an attractive lawn, 81.5 percent of the respondents said "slightly agree." In response to the statement, "For me, having an attractive lawn is…," 85.7 percent of respondents answered "somewhat desirable." When we asked residents to describe their ideal lawn, the most common answers were "green" and "attractive appearance" (Fig. D3).

Through the answers to these survey questions, we found that while most residents felt that they should not fertilize their lawn, they regard fertilizer as helpful in achieving aesthetic values. In response to this information, we suggest posing the question in the future: "Do residents' values in having an attractive lawn influence whether they use fertilizer even when they think they 'shouldn't'?"

E. Residents' Relationships to Others and Their Sources of Yard Care Information

This section will summarize the results from several questions in our survey that seek to pinpoint where residents get their lawn care information and, more pointedly, address residents' relationships (or lack thereof) with their neighbors and the community.

When asked where residents got their information about yard care, the three top responses in descending importance were family, friends, and the internet (Fig. E1). These are the only three responses that at least 50 percent of respondents marked and ranked as at least "slightly useful". The three least-used resources were lawn care companies, the University, and the Watershed District. For those who marked these resources, at least half described them as not at all useful.

One conclusion we can draw from this is that while people certainly look to the internet for information about their yards, they likely do not use the Watershed District's website, and if they do, they may not find it useful. This may be due to low visibility of the Watershed District (and perhaps also the FWS) as a web resource. Another interesting finding is that lawn care companies ranked the lowest, with less than 10% of all respondents reporting that they were at all useful. The fact that family and friends ranked the highest is also interesting, and leads us to believe that learning about yard care is often done through these close social connections, perhaps even passed down in families.

As for respondents' relationship to the neighborhood, about ⅔ said that they do not discuss lawn care with their neighbors. While this is somewhat in conflict with the fact that more than half indicated that they have used their neighbors as a lawn care resource, it nonetheless indicates a certain reluctance to admit being influenced by the neighbors. In the same vein, 68% of respondents said that they did not have a "community obligation" to fertilize their lawn and nearly 80% feel that it is up to them whether or not they fertilize. We interpret this as a clear pattern of a sense of individualism among those surveyed; residents did not seem receptive about being explicitly influenced by outsiders and preferred to think that they were in control of their lawn care. This is important because it shows that people will react negatively if they think that others are trying to influence them, irrespective of their actual lawn care practices.

F. Responsibility for the health of local waters

When surveyed on the burden of responsibility in caring for the health of the watershed, neighborhood residents displayed a somewhat strong, although by no means ubiquitous, understanding of whom is responsible for tending to leaves on the boulevard strip versus those in the storm drain. Interestingly, survey results indicate a strong value placed on homeownership; most respondents felt that renters should not be tasked with either duty.

In general, most residents indicated that homeowners should be responsible for the collection of leaves on their own boulevard strips. Specifically, 62.6 percent of residents saw homeowners as being accountable to their own boulevard strips, but only about half of that (32.5 percent) conferred the same responsibility among renters. A slightly smaller population, 31.7 percent of respondents, believed the city is responsible for cleaning the boulevard strips of the neighborhood. Thus, although the majority of residents designated homeowners as those accountable to the health of the watershed vis-à-vis the boulevard strip, there is no universal understanding of the burden of responsibility.

When it came to cleaning leaves from the storm drain, most residents believed this to be the city's responsibility: 66.7 percent of residents attributed this task to the city, whereas only 32.5 percent of residents thought it was the duty of the homeowner. Interestingly, here there was an even higher valuation of homeownership: a much smaller percentage, 20.3, thought renters were responsible for the storm drain. There was also a decent degree of uncertainty, where 7.3 percent of residents did not know who was accountable for leaves in the storm drain. Although certainly this is the smallest population, it is nonetheless noteworthy that 9 respondents (raw count) had no idea whether or not they should be clearing leaves from the drain.

Overall, it is safe to conclude that many residents correctly distinguished the homeowner's responsibility for the boulevard strip from the city's responsibility for the storm drain in caring for the watershed. Still, miscommunication among landlords and renters regarding watershed maintenance seems likely, and it is also clear that many residents are uncertain about this basic information.

G. Knowledge of watersheds and perceived influence

We also asked respondents about their perceived impact on the health of the watershed with regard to their fertilizer use. Through our survey findings, we found that respondents understood the negative implications of fertilizer use in an abstract sense, but did not seem to have a concrete grasp of the role of their property within the greater watershed and thus how their lawn management decisions could affect the health of local water bodies.

Respondents clearly understood that fertilizer resulted in some sort of environmental harm. As seen in Figure G1, nearly 71 percent of survey respondents believed that fertilizing a lawn resulted in lawn pollution. Similarly, 56 percent of respondents acknowledged that creating greener grass by fertilizing a lawn is either somewhat or very harmful. The harm of fertilizer was very apparent within the neighborhood consciousness.

Yet, despite this negative connotation with fertilizer use, there was confusion about the process: most respondents did not understand *how* fertilizer and other runoff from their property affected local water bodies and ecosystems. When asked where water went after falling on their property, nearly 40 percent of respondents said they didn't know. Specifically, 15.6 percent of respondents said a nearby lake, 29.5 percent said Minnehaha Creek, and 13.9 percent said the Mississippi River. Even those who stated an answer were often doubtful of their response and seemed taken aback by the question. This was the only question on the survey that solicited a factual answer, whereas the other questions were about opinions and current behaviors. The lack of confidence in answering this question about water may support the idea that they do not feel competent enough to make change in relation to water use. Conceptualizing their property within the greater watershed and how water moved throughout the topography was very challenging for respondents.

People often believed that their own property had a minimal impact on pollution in the watershed. When asked if lawn runoff pollutes, people generally believed the effect was limited. Of all respondents, 47.5 percent thought their personal lawn runoff had very little to no effect on pollution, while 36 percent of respondents thought lawn runoff contributed a moderate amount to pollution, and only 15 percent of people thought that their personal lawn runoff contributed a great amount to pollution.

However, respondents expressed that their neighborhood runoff as a whole contributed more to pollution. In this question, the tables were turned—nearly 85 percent of respondents thought that neighborhood runoff polluted a great or moderate amount, while only about 17 percent of people thought it had little to no effect. These survey results indicated a stark discrepancy between people's perception of runoff on a neighborhood versus property scale. Many respondents expressed an *external* locus of control, meaning they felt powerless over their ability to affect environmental outcomes on the scale of the watershed.

Further reiterating this feeling of powerlessness, when respondents were asked how much influence they individually had on healthy water, only 7 percent thought they had a great amount

of influence, 57.4 percent believed they had a moderate amount of influence, while 35.2 percent of people believed they had very little influence (Fig. G2).

IV. Introduction to the interview findings

Our surveys provided significant insight about respondents' practices and their knowledge about their relationship to water. To dig deeper, though, we conducted a series of follow-up interviews that offered a more nuanced perspective of households' yard care and revealed the context of people's decisions. Where the surveys told us *what* people were doing, the interviews asked *why* they were doing it.

In total, we conducted 18 interviews. The format of the interview was semi-structured, meaning that we used a set of predetermined questions to guide the interview, but that it was more flexible and conversational in nature than a simple Q&A. This allowed us to follow up on interesting leads and engage them less on less relevant questions.

The interviews were generally about 45 minutes to an hour long and took place at the respondent's home. The location proved important because a major feature of the interview was a tour of the respondent's yard. The purpose of this was to focus on specific ways that respondents had personalized their space and to gain a deeper understanding of what people value about their yards. It also helped us understand the process that people go through making decisions, creating their yards, and the different influences that go into those choices. Our other questions supported this line of inquiry and also explored respondents' relationships to their neighborhood, how they perceive the neighborhood, and how they conceptualize water on their property. We also recorded and transcribed the interviews so that we could maintain the integrity of respondents' words and use them in our analysis.

Through these interviews, we gained insight into residents' values and the reasoning behind their lawn care practices. Throughout this section, we illuminate several themes that arise from our conversations with respondents. First, we discuss the disconnect between values and practices, illustrating the importance of a low maintenance ethic for yard management and perceived individual competency. Second, we focus on the influences of scale and understandings of the watershed. Next we explore social and personal networks and their connection to lawn care practices. In the final portion of this section, we explain the spectrum of values that residents hold, and how this malleability might encourage future efforts.

A. The disconnect between values and practices: the importance of competency and the saliency of the low maintenance yard care ethic

In our research, we continually encountered the presence of barriers that kept residents from translating values into practices. In other words, the explanation of some of the more harmful lawn care practices is not necessarily a lack of environmental values or concern for the Minnehaha Watershed. In fact, many residents we interviewed already displayed environmental values. For example, one 60-year old female said that "the creek is very important to me. My

property is small and I don't use any chemicals." Multiple residents told us their environmental concern led them to attend a gardening class, workshop, or consult with a master gardener. Even when residents told us of non-environmentally friendly lawn practices, they often also mentioned how that contrasted with their values. For example, this 35-year-old male said,

> "I'm not really wild about chemicals. I have a dog. I have a child. And quite honestly, it's not the greatest for the environment either … But because the weeds are so bad, I tried it myself, and because I failed miserably, or the weeds were too resistant, I had to call [lawn care consultant] to get help."

Across the board, many people displayed evidence of environmental values, concerns, and/or knowledge. However, even among these respondents, practices did not necessarily align with their stated values. Some respondents framed this disconnect through a lack of resources, such as time and cost. However, other types of barriers came across even more clearly during the interviews: a low maintenance ethic, feelings of competency, and a (real or perceived) knowledge gap as key motivation for how people care for their yards.

We found that people's lawn care practices were largely motivated by this desire to keep things simple. A large number of those surveyed and interviewed expressed an interest in keeping their yard low maintenance, or that they used the yard practices they did because these were the most convenient. For example, one 34-year-old female stated her preference for "stuff we can plant and leave there and it'll grow back year from year and not have to worry about pruning or cutting them back." These kinds of plantings that require minimal long-term upkeep have serious marketing potential for the FWS, because compared to a lawn (or perhaps in conjunction with a *smaller* lawn), their maintenance is, for the most part, less labor- and chemical-intensive. The caveat here is that implementing these sorts of plantings is, for many, a barrier in and of itself. Making yard changes in any case will require a certain level of resources that residents may not possess. In some cases, these are tangible resources like time and money. While one interviewee hired a company to plant a perennial garden, other people expressed that they "don't want to spend money."

Intangible resources—like gardening ability, or social ties to those who have these skills—are also important. Without access to these resources, it is unlikely people will feel competent enough to adopt alternatives to the "quintessential suburban lawn" -- that is, a manicured yard that is predominantly green grass. While we have seen this in participants' responses, Ryan and Deci (2000), a pair of environmental psychologists, support our observations, suggesting that people's intrinsic motivation to act in a given way is mediated by that person's perceived competence. In other words, feeling competent is necessary for us to feel motivated to act, and feeling a lack of competence can be a barrier to motivation. As shown above, a lot of people expressed some degree of environmental values or that they wanted a low maintenance lawn. However, even if people knew that planting a rain garden, or even a mulched bed with shrubs, would help the environment and be lower maintenance, they may not have been motivated to do so because they didn't feel they had the necessary skill set or experience.

It is possible that the Water Stewards program will help solve this problem by integrating people with expertise into the neighborhood social network. On the other hand, around half of people said that they either don't discuss yard care with their neighbors or that they don't use them as a resource for yard care. This may mean that, to make their impact broad, the water stewards will need to do a lot of outreach so that their neighbors are comfortable using them as a resource. Later sections will elaborate on the role of active and passive social networks and how the water stewards can utilize them.

Another strategy to circumvent the barrier of perceived incompetence is to create habits beneficial to water management, since habits are a sign of comfort and competency around a behavior. To do this, the FWS can approach residents about making more responsible water management decisions before destructive yard care practices become a habit and a barrier to change. Returning to environmental psychology, Neal, Wood, and Quinn (2006) identify that when the context surrounding a habitual behavior changes, there is an opportunity to change behaviors intentionally. This could be applied by the water stewards program with an intentional outreach campaign to new residents of the neighborhood: when people move in, it is a different environment than they are used to and may consist of different responsibilities. This means that there will be opportunities for people to act intentionally, rather than habitually. On the other hand, if someone does not experience a significant context change (for example, if they move from one house with a large lawn to another house with a large lawn) this method may not be effective if they continue their habits of the past. Nonetheless, outreach to these newcomers would probably prove more effective at altering yard practices than trying to get people who already have established habits to change.

Another important point is the idea that values are prioritized unevenly. This means that a disconnect between values and practices may exist because values that would most effectively change lawn care practices are not prioritized highly. Having said that, these values do not necessarily have to be environmental. Many participants expressed concern for individual health as well as the health of the environment. One 49-year-old female understood the environmental implications but was more swayed by the ill health effects of pesticides when she said,

> "Environmental, fine, some people just aren't into it. But I'm talking like, it could make you sick, it could make your kids sick. I mean that there are studies that kids that grow up around yards with pesticides have higher rates of childhood cancer. It's proven. That's stark. Pets who have gotten sick and died."

Others valued cost effectiveness or non-resource intensive lawns. One 69-year-old male said, "If I'm out front working or something like that, almost everybody stops by and says, 'Oh your yard looks wonderful, I wish I had the time to do that.' I say, 'The only reason I did it was because I didn't have time to mow.'" He explained how he was able to bring together his values of low maintenance and aesthetics despite the belief of his neighbors that the two are mutually exclusive. Among the residents who showed more environmentally sensitive water management practices, such as using a rain barrel or avoiding pesticides, motivations behind these practices

differed. This demonstrates a need for the FWS to tailor their message for different audiences by identifying individuals' key values. The FWS has an opportunity to do this because of the curiosity so many participants expressed about proper water management practices and the lack of an "expert" established in these communities to speak to water runoff issues. Essentially this would be similar to a community-based marketing approach, which is a strategy focusing on the needs of existing consumers that builds loyalty, authenticity, and innovation.

Prioritization of values also relates to the concept of locus of control, which can be defined as people's perceived ability to effect change. In order to empower people, they must feel that their actions have a broad and measurable impact on the watershed. The FWS can help bring the locus of control closer to residents of the watershed by showing the impact of collective action. This can take multiple forms, whether it is photographs of the watershed's improvement of quality or statistics about runoff reduction. A fitting example was one water steward's project, which diverted all downspouts away from the alley and into yards. This was a simple action, but removed tens of thousands of gallons of water from the storm sewer system. If residents were aware of the magnitude of this collective action, they would perceive it as effective. This may inspire residents to either collaborate more with their neighbors or even convince them to make larger, more significant changes on their property to impact water runoff.

All of these observations and suggestions address the fact that if there is to be widespread change in people's water management practices, there needs to be more than just an educational outreach campaign. There are already a lot of people in the neighborhood who hold values that support water management best practices, but the challenge is providing them with solutions that fit their needs and desires, as well as the tools (figuratively speaking) that will make them comfortable and confident in making such changes. Without these, it is unlikely that people will feel motivated to change their yard care practices.

B. Ecological Consciousness at different scales

i. Understanding the microclimates of the yard

The disconnect in knowledge and perceived responsibility between the property and watershed scale was another barrier that prevented people from translating their values into action. Research participants were both cognizant of and attentive to the ecology of their yards, but had difficulty conceptualizing the situatedness of their property within the larger ecosystem. Many people took conscious steps to understand the ecology of their yards and promote wildlife habitat within the confines of their property. However, few people discussed the implications of their actions on the broader ecological well-being of the ecosystem. This disconnect between scales will be explored in greater depth throughout this section.

A number of interviewees said that, upon first moving into their homes, they took time to acquaint themselves with the ecology of their yard. A 29-year-old male who has lived in his

house only for a year, said this past year was a time of passive observation and learning. “The first year is to see what the yard does. Neither of us have ever really had a yard before. We know very little about gardens or when flowers bloom. We figured we’d come in and the first year would just be to see what the yard does,” he remarked. Many interviewees expressed a similar sentiment—homeowners have to learn to understand the microenvironment of their yard in order to make it their own.

For many, taking ownership of their yard meant creating a habitat for a diverse range of flora and fauna. A 58-year-old female, who has lived in her house for 22 years, said she took a permaculture class that was focused on the microenvironment of the yard. “You know the whole thing about where is the sun, what’s the soil like in this area? So that you’re maximizing your growing potential,” she said. Learning the sun patterns and soil quality of her yard has allowed her to cultivate a diverse plant ecology in her yard.

Other individuals planted native species on their property to provide habitat. A 45-year-old female said she planted native cup plants that hold water in their cups because they are widely used by wildlife. When she noticed that it was spreading its flowers and seeds around the lawn to replicate itself, she was tempted to cut it back. “And then I was reading something about leaving seeds for birds, and then I saw a lot of birds in that plant eating those seeds. And then I thought, I can’t cut it off because those little birds are eating the seeds,” she said. A number of participants said they planted milkweed for butterflies, while others chose other pollinator-friendly species to plant in their yards. A 74-year-old female who was interviewed said she goes so far as to feed the squirrels, birds and rabbits that traipse through her yard: “I call [my yard] my wildlife habitat,” she said.

ii. Disconnect between scales

We found that this ecological consciousness was largely confined to the property scale. Many participants valued the watershed as a wildlife habitat yet did not have a concrete sense of how their property fit into the ecology of the larger watershed. For example, there was little recognition of how the grass clippings, leaves, and eroded soil from their yards could run off and lead to algal blooms in nearby lakes that, in turn, create a hostile lake environment for deep-water fish.

As mentioned before, when individuals were asked in the questionnaire about where the water went that ran off their property, 39 percent said they didn’t know where the water went. Even among people who expressed an abstract understanding that water running off their property ended up in the creek and nearby lakes, their answer lacked confidence. “Yeah, but you have to ask the experts. That's my lay understanding,” one interviewee said. Participants expressed uncertainty and doubt about their watershed knowledge.

There was a common sense that Lake Hiawatha was polluted and perhaps not suitable for swimming. A 37-year-old male who was interviewed remarked on Lake Hiawatha: “For some reason we always go to Nokomis and go right past Hiawatha to go to Nokomis. I think that there is something about Hiawatha not being as clean. And so we go to Nokomis.” Various

interviewees mentioned the pollution of Lake Hiawatha. But this consciousness of the watershed scale rarely extended beyond mere recognition of this pollution.

iii. Starting to make these scalar jumps

Only a few people discussed the implications of individual lawn management practices on the flora and fauna of the watershed. Several of these individuals had specialized and niche knowledge, such as one interviewee who is a hydrogeologist by training: "The water that falls on that ground does one of three things. It either evaporates, or infiltrates through the lawn or it runs off. If it runs off, it runs off into the street and gets into the storm sewers and winds up in the lakes and rivers," he said. This was not knowledge that was widely held by most study participants.

Others said that their knowledge is newfound. A 33-year-old male said: "You know, a few years back, I kind of turned a leaf if you will." Although he had always identified as an environmentalist, he said gaining more knowledge about recycling and consumer habits drove him to translate these values into action. He now has more clarity about the far-reaching environmental implications of yard management, saying, "Then there's the cost to the lakes just down the road from here. We have to pay to clean out all of that fertilizer that doesn't stick in your yard."

One 49-year-old female said a conversation she had with a city forester brought to her attention that using a lot of mulch on the boulevard strip could be harmful because "it actually leaches down into the watershed. And it made me think, well if I'm going to do something, why not a rain garden that's actually beneficial." She has similarly tried to emulate shoreline rehabilitation projects around the big lakes in Minneapolis by planting native species that provide habitat for insects. "We don't think about insects," she said. "If you're riding your bike around the lake, all of a sudden you go by these marshy areas and it's noisy. You can hear all the insects, all the birds. All of that kind of made an impression on me."

iv. The Scalability of Responsibility

While we can only speculate about the causes behind this watershed myopia in our report, the question arises of why people do not have a vested interest in the health and well-being of the watershed. As was touched upon in the previous paragraphs of this section, many of the residents surveyed and interviewed displayed a nuanced understanding of the microclimates of their yards and were cognizant of the ecology of their property. Additionally, residents were highly attuned—at times unwittingly—to the "social ecology" of their neighborhood. Throughout the various stages of the study, a motif emerged of a form of communal responsibility to the overall well-being of the neighborhood or block. People felt as though their personal decisions and the decisions of the neighbors contributed directly to the "health" of the area. Respondents and interviewees cited property values, curb appeal, and the de facto pressures of neighborhood "norms" as the impetus for why they made the decisions they did.

This section will seek to explore why there is a perceived collective consciousness regarding lawn care, but a simultaneous lack of shared responsibility for the watershed.

When asked about the ways in which his family had taken ownership over their lawn, a 43-year-old interviewee said that a motivating factor was a concern for "property values and people" and that they don't "want the perception that our yard is junky and therefore hurting someone else's property." A 46-year-old resident expressed a similar sentiment when asked the same question, saying, "I think my neighbors up-keeping their yard makes me up-keep my yard." Other interviewees articulated similar feelings toward the influence of the neighbors as either inspirations or cautionary examples of lawn care decisions. A 44-year-old female interviewee cited "home value and then also the aesthetics of the neighborhood" as well as having "an attractive place to live" as some of her primary motivations for why she and her neighbors engage in their lawn care practices. These sentiments are fairly ubiquitous throughout the responses collected in various iterations and substantiate the notion of a collective responsibility for the well-being of the neighborhood.

The same cannot be said for the watershed. As was mentioned in the previous section, residents expressed a vested interest in the resources and amenities provided to them by the local lakes and water bodies. Wildlife, trails, and sites for recreational activities were all acknowledged as being valuable resources for the community. With this in mind, it is logical to assume that the neighborhood itself derives some of its value due to its proximity to these amenities, much in the way that it derives value from having nice curb appeal and a neighborhood aesthetic. Why then does this discrepancy in perceived responsibility exist?

A water steward who resides in the area attributed this to two central issues: a lack of education and awareness on the subject of watersheds as well as the perceived "inaccessibility" of changes that could mitigate individual and neighborhood impacts on the health of the lakes, the creek, and the watershed. As was indicated earlier, the majority of those surveyed and interviewed possessed a minimal and abstract conception of the watershed. Only those interviewees who possessed unique, job-related knowledge of the watershed could accurately articulate how water moved from their property and their neighbor's property through the watershed. This can be distilled to the core idea that people perceive themselves and their neighbors to have greater agency over their own property because they have a more "concrete" understanding of their situatedness in the microecology of their yard, and more broadly the natural and social ecologies of their neighborhood. According to the water steward, due to the lack of understanding of the watershed, people can get "overwhelmed" when they consider their potential impact on the lakes because "the implication of caring is that they have to do something," and they don't know what to do. The watershed and the neighborhood are both delineated areas in which the residents we have studied reside, but there is a clear difference in the level of perceived responsibility residents feel toward each, which must be addressed in order to ensure the efficacy of the Water Steward Program. Residents need to buy into the notion that they need to maintain the watershed with the same care and attentiveness that they put toward their block and yard.

C. The Influence of Personal Networks

As an extension of the home, the yard is a private, yet unavoidably public space. Because of their visibility, yards are effectively part of the public domain and thus, how we decide to manage our yards is influenced by our perceptions of what others think and desire. Relationships with neighbors and feelings of safety in a neighborhood affect how long residents stay in their homes, the value of their home, and the reputation and value of their neighborhood. In both surveys and interviews, we asked people about specific relationships with their neighbors, and we took note of anecdotes or opinions that residents shared about their surroundings. Specifically with regard to decisions in lawn and yard care, it became clear that personal relationships (with neighbors or family members) influenced respondents' lawn care practices. During this section we emphasize the connection between residents' personal relationships and lawn care practices. We will discuss the types of resources residents use to learn more about their lawn care practices, perceptions of their neighbor's influence on their lawn care decisions, norms associated with the front yard and back yard, differences in responses that arose in the survey and interview regarding this topic, general relationships with neighbors, and the autonomy to make individual decisions.

i. Lawn-Care Resources

Keeping in mind the goals of Freshwater Society, we wanted to know what resources residents used to learn more about lawn practices. One of our survey questions specifically asked what knowledge resources are used in regards to yard management. A significantly low number of residents reported that they went to their neighbors as a knowledge resource. Instead, the results showed that most go to family or the internet to seek advice. In a telling example, one 35-year-old male participant expressed in his interview that he asks his dad for help. He explained that before moving into the area, he never lived somewhere where he had to maintain a lawn. Now he calls his dad for help, who brings all of his tools and they spend the whole day tending the lawn. He follows his father's practices, saying, "I fertilize because my dad did." Rather than asking neighbors questions about lawn care practices, many people reach out to family from out of the area or go online.

In contrast to the survey, participants had more opportunities to discuss their relationship with their neighbors in the interview. In the surveys, respondents actively communicated information about what resources influenced their lawn care, while in the interview phase we gained insight on passive lawn care influencers. In this context, "active" alludes to what the respondents explicitly write on the survey or state as conscious lawn care resources that they use. "Passive" refers to ideas or norms that are transmitted through neighborhood observations, the media, or "general knowledge." Respondents might not recognize that they are influenced by passive communication because the source doesn't give direct answers about lawn care, but it provides more general ideas at times when residents might not even be looking for suggestions.

Many of the interviewees passively mentioned an anecdote about their neighbors and their yard. Some participants actively mention their concerns of neighbor's practices in regards

to the value of the overall community. A 43-year-old male who has lived in the house for just over a year commented that his wife is concerned about "property values and people, you know. She doesn't want junky yards hurting property values." A few of the interviewees mentioned that they do lawn care-oriented favors for some of their neighbors, such as sweeping their leaves off the curbside.

ii. Respondents' Relationships with Neighbors/Neighborhood

In the interview process, we began to learn more about people's relationships with their neighbors and neighborhood. People identified a wide range of relationships with neighbors. Several interviewees said that their neighborhood organizes block parties or other small get-togethers, or they subscribe to a listserv or engage through E-Democracy. Some sort of neighborhood interaction seemed to be common.

However, some respondents mentioned that they had negative relationships with certain neighbors. This manifested itself in disapproval of neighbors' lawn care practices, upkeep, or otherwise. It also became clear that relationships within the neighborhood influenced respondents' perception of the neighborhood value. One male in his early thirties asserted that when certain neighbors (whom he thought negatively influenced the neighborhood) left, the value and safety of the neighborhood went up. Interviewees mentioned passive aggressive as well as direct tensions in asking neighbors to change their lawn care practices, remove trees, or mow or upkeep their lawn more frequently. Still, neighborhood/official community meeting attendance is low. This research begins to explore how people's personal relationships with their neighbors influences lawn care practices, but future research should explore whether stronger relationships with neighbors result in more attentive lawn care practices.

iii. Neighborhood Relationships' Influence on Lawn Care Practices

Interviewees seemed to believe that their neighbors would react positively to alternative lawn care practices. In the follow-up interview, we asked how respondents believe people would respond to a rain garden. An overwhelming majority believed that the neighborhood would embrace a rain garden (as long as it looked nice). Moreover, many residents believe that their neighbors hold values of environmentalism and sustainability, and installing a rain garden is a way to maintain that image. For the few residents who reported knowing a water steward or contacting a water steward for lawn advice, they reflected positively on the water steward program. This shows that a handful of people in the neighborhood are willing to learn about rain gardens and other sustainable practices that will help their own yard and the neighborhood as a whole.

iv. Neighborhood Norms

Social pressures and neighborhood norms go hand-in-hand. Despite our assumption that most respondents would feel pressure to fit into Quintessential Suburban Lawn Ideal (QSLI), it was clear that respondents felt pressure to comply with more specific norms of individual neighborhoods—even if those norms were "non-traditional," or contrary to QSLI. One male in his early forties noted, "I think for the most part people are, well, in this whole area, are kind of, consider themselves environmentalists. And so if you explain why you're doing something I think they would be happy with it as long as it wasn't, like, a total eyesore." Many participants also made reference to neighborhood cohesion and how neighbors tending to their yard are often noted and sometimes emulated by the rest of the community. The trends and norms in a neighborhood encourage residents to comply to certain, though not universal, lawn care practices. From this information, we infer that a more visible rain garden presence in a neighborhood, the more likely others will be willing to add a rain garden, too.

Many respondents spoke about food production and environmental values as norms in their neighborhood. In the survey, respondents overwhelmingly said that neighbors had little influence on their yard care practices and whether they used fertilizer. Most respondents also considered themselves in the middle of the spectrum in terms of lawn care practices in their neighborhood. They felt like they fit in, but weren't the top of the pack in terms of lawn aesthetics. We noticed that a surprising amount of people we surveyed and interviewed apologized for their lawn, or degraded its aesthetic value. They often opened with statements like, "Oh it's not impressive," or "Don't mind the mess." Furthermore, while the survey suggests that neighbors do not play a large role when making decisions on lawn practices, the follow up interview suggests that residents are observant of their neighbor's lawn choices.

The idea that fellow neighbors are observant of norms and changes is exemplified through the different use of front and back yards. Most of the people's front yards are simple, well-maintained lawns with green grass. Back yards are personalized spaces with various features, such as vegetable gardens, swing sets, porch, patio, grill, etc. While some front yards created strong statements by having a mulch lawn or a large rain garden, most yards had rain barrels or vegetable gardens in the back and kept the front a standard green lawn.

Most of the personalized creativity occurs in the back yard, but neighbors receive ideas by observing front yards. In follow up interviews we noticed that residents noticed new changes to front yards and knew where the rain gardens were on the street. If rain gardens and water barrels reside in back yards, there is less of a chance neighbors will notice them and consider making changes themselves.

v. Perceived Individuality

In the survey stage, respondents felt strongly that all neighbors possess the freedom to do whatever they like with their lawns. However, this individualized freedom did not manifest the same way in the interview stage. Though respondents were reluctant to admit that they comply

with neighborhood norms or pressures, when they talked about the ideas that stimulated their own lawn care decisions, it was clear that neighbors influenced how they cared for their front yards. Even noticing other people's lawn and placing a judgment on whether or not they liked it elicits some sort of thought process. The word "relationship" in the context of the neighborhood does not necessarily mean direct contact with neighbors, but it alludes to the more passive communication within that setting.

While some individuals in the neighborhood are thinking about water impact for the entire community, many still only think about their personal yard and do not think about the issue at the neighborhood scale. One interviewee embodied this thought process, initially framing the impact of rain barrels as minimal on the individual scale: "Besides, a rain barrel only holds 40 or 50 gallons. You know, that's half a week's water for one tree. So it's more or less a cosmetic." Yet, in the next breath, the interviewee then realized the bigger impact that the rain barrel could have if replicated on a broader scale:

> "Well, I suppose if every house in Minneapolis saved 50 gallons from every rainfall then the storm drains, it would show in the storm drains. There would be less flow in the storm drains…"

This shows that respondents often thought of their impact as confined to their personal lawn. Many fail to see the larger impact, and changing this mindset can be instrumental into making water-based sustainability more attractive. In conclusion, surveys and interviews showed that residents had a positive relationship with the neighborhood from block parties to listservs, but that did not translate into collective neighborhood conservation practices. While a handful of residents were accepting of alternative lawns, we noticed in the survey responses that many neglect asking neighbors about lawn care practices, and use family and the internet instead. The survey also shows that residents believe they have a "typical" ideal, and the backyard therefore becomes a private space designated for personal expression, including that which includes rain gardens and rain barrels. Residents indicate that they perceived the neighborhood as environmentalist, but the interviews suggest that they do not view environmental impact on the neighborhood scale. Many discuss their individuality in making lawn-care decisions and fail to see the effective sustainable change that could occur if they altered their lawn practices collectively.

D. The Spectrum of Ideas about Lawn Care Practices

Throughout our surveys and interviews, we noticed a spectrum of lawn care practices and values—we could not classify people into simple "suburban lawn" categories or "alternative lawn" categories. Rather, we encountered many people who demonstrated selective prioritization of specific parts of their yards while remaining content with the status quo in other areas. It was more common to see a conglomeration of practices and values within a single yard than to find a yard that manifested exclusive allegiance to a suburban idyll or to a grass-free, rainwater-

harvesting mecca. Importantly, residents conceptualized their yards in compartments: while they may be committed to the idea of a lawn aesthetic overall, there may also be opportunity to incorporate changes in certain sections. Additionally, we found that practices often are not married to values. Maintenance routines described by residents were often preceded by qualifications or defenses ("I always feel bad when I rake my leaves into the street," said a male in his forties), indicating that, with the appropriate messaging and education, respondents may be open to future modifications. The overall reflexiveness and openness displayed by residents suggests that even those whose values and/or practices seemingly contradict the goals of the Freshwater Society fall within the scope of potential agents of change.

For instance, respondents who prioritized an attractive, well-maintained lawn also expressed interest in alternatives. One respondent in his thirties explained that he strives for a lush, even, and green lawn with few weeds. He uses fertilizers and herbicides, and plans to increase watering his lawn to maintain its attractiveness. If he had more time, he explained, he would devote more effort to upkeep his lawn. At the same time, he is considering building an edible garden in the future because of his desire for organic produce and because he wants to teach his daughter about food production. Moreover, he wanted "to be able to care for something over the course of a year and be able to enjoy the fruits of [his] labor at the end." While this respondent strives for the "quintessential suburban" lawn, he also values the idea of something different in his yard.

On the other hand, people who held alternative values still acknowledged the desire to have a lawn. A respondent in her mid-forties stressed the importance of variety in her yard—she and her partner like to grow a variety of plants, both edible and non-edible. She appreciates the utility and independence her gardens give her with the food they provide; she enjoys creating habitats for native species; and for her, identifying and arranging plants is a fun learning experience. Recently she redid her backyard and decided to keep a large area of lawn. She explained that it wasn't a clear choice: "You know that grass is not environmentally the best thing. But it's also [sighs] convenient in a lot of ways. And it's nice to have open space … so this was the easiest decision to make I guess." While this respondent enjoys variety in her yard, the utility of her lawn is also important for playing lawn games, hanging laundry, and eating outside.

Thus, there were not clear, exhaustive categories of residents whose practices reflected a certain value system; it is not possible to confidently delineate among residents who do or do not fertilize, rake their leaves into the gutter or compost them in their yard, or choose to have a lawn or not have a lawn. Rather, there is a spectrum of values and practices. Additionally, residents' overall set of attitudes and practices can span multiple points along the spectrum. This should be especially promising to the Freshwater Society and the Minnehaha Creek Watershed District because of the flexibility and malleability of the spectrum. Specifically, potential for change among residents' practices (their "place" on the spectrum) lies in expressed values like education, a low-maintenance ethic, family, food production, health, aesthetics, and more; when respondents had a traditional lawn but articulated values that could manifest in changes like rain gardens or rain barrels, flexibility and malleability is evident. In the contrasting example,

residents who have already invested in alternative yard practices may still be willing to make another leap and replace remaining patches of lawn, like the female who admitted she made the "easiest" choice instead of the most responsible one. Even in the consciousness of the most "quintessential suburban lawn" mentality, we see a space for something different.

New messaging and education must be mindful of the intricate dynamics at play, where disparate values may lead to similar practices, practices may not be consistent within a single yard, and ambivalence regarding certain decisions or habits create opportunity for new ideas to be disseminated.

Notably, many values and justifications for harmful practices could easily be connected to rhetoric that aligns with the health of the watershed. Two male respondents, in their thirties and forties respectively, used fertilizer on their lawns but cited the "health" of the lawn as their reasoning. In this case, "health" could be reframed as health of the watershed, creating an opportunity for the Freshwater Society to promote positive changes in yard care by capitalizing on the flexible spectrum (mentioned above) and the disconnect between scales evident among residents' values. Since many respondents refer to "health" on an individual scale, through the microecology of their yards and through the wellness of their children and pets, but do not extend the same notion of "health" to the watershed at large, it is possible to take advantage of the looseness of this term and connect these scales through the language of values. Moreover, something like a native ground cover may fit more than one value articulated by residents (lush, green, healthy) while still promoting infiltration ("health" on the watershed scale). We believe the key is to adopt rhetoric employed by respondents in order to frame yard adjustments championed by the Freshwater Society.

To provide another example, many residents emphasized low maintenance as a value. A male in his thirties said, "We got [grass] seed that was more drought resistant or low maintenance. It required less water and that kind of thing because we knew we weren't going to water it so we wanted it to take." In this case, a lawn is justified by its low maintenance element. The same man, however, also valued his edible garden, indicating that he does not prioritize grass at the exclusion of other alternatives. Moreover, the idea of a rain garden may be framed to such a resident using low-maintenance rhetoric. Despite the initial labor input (of which he is capable, considering he tends to a vegetable garden), a rain garden may ultimately prove lower-maintenance than a lawn that needs to be mowed and watered. The Freshwater Society can take advantage of residents' proven ability to invest time and energy, in tandem with their expressed desire to cut back on routine maintenance, by adopting the same rhetoric used to explain their (often complex) decisions.

As opposed to the current messaging deployed by the Freshwater Society, which often instructs residents to adopt or avoid certain practices in connection to a particular ecological goal, new educational materials that take into account single residents' sometimes-contradictory, often-malleable values and practices would prove more effective in catalyzing change.

Moreover, it is important to recognize that many residents do not conceptualize their individual yards in connection with the watershed at large, as was explored previously in the

report. Although this is a shortcoming that should be ameliorated, and doing so would certainly address a formidable barrier to change, it should also be said that we recognize a possibility to circumvent the knowledge gap by promoting change through the guise of the very ideals residents have expressed. After all, practices that promote watershed health often play into other, more immediate values. One female in her late forties described her distaste for fertilizer and pesticides as a health hazard to all, rather than framing it with the environmental rhetoric. She tapped into a possible alternative messaging strategy that could encourage residents who may otherwise not care about the health of the watershed adopt the same changes for different reasons. In this way, the Freshwater Society can appeal to (and, importantly, respect) the values of residents while promoting a mutually beneficial modification.

Ultimately, the individualistic and inconsistent values and practices held by residents should not be discouraging to the Freshwater Society. Instead, the spectrum of values and practices, as well as the often-inclusive rhetoric used to communicate them, invite new strategies that can appeal to a wide array of residents. We predict that many respondents, based on the heterogeneity of yards and responses, would prove receptive to suggestions proffered by the Freshwater Society given that these suggestions are framed through 1) the variety and flexibility of options, and 2) broadly agreeable rhetoric that has appeared in the research already. A male in his thirties said, "Yeah, I think people are much more open to nontraditional lawns and things like that." Having previously mentioned his commitment to a low-maintenance ethic as well his love of growing food in a garden, this male exemplifies a general willingness (of others, if not his own) to embrace change, provided that the changes fit within the parameters of residents already-held conceptions and values of their yards.

V. Summary and Conclusions

In closing, it is important to reemphasize that seemingly contradictory values and practices indicate a malleable spectrum among residents, where individual yards can typify diverse sets of values and practices simultaneously. People demonstrated an openness to new possibilities, indicating that if they were exposed to the appropriate knowledge and felt competent enough, they might be willing to embark on a change that seemingly contradicts their current practices but actually fits within their expressed values. Thus malleability is evident, although simply glancing at a given front yard may not reveal such to be the case. Also, crucially, values and practices are not necessarily, inextricably linked to each other. We must recognize the immense flexibility and openness among residents, as evidenced by their deceptively multifaceted yards and maintenance habits as well as the values that motivate them.

One of the biggest obstacles that the Water Steward program will encounter is getting their message to resonate with residents in order to catalyze a positive change. We encountered a tremendously varied spectrum of assumptions, values, and levels of understanding regarding lawn care and the implications of lawn care on the health of local water bodies. Thus, a generalized, one-size-fits-all approach would not produce optimal results; the Water Steward Program cannot approach the avid gardener in the same manner that they might approach a

resident who strives to take the path of least resistance with regard to lawn care. Our study results indicate a select set of general values that could provide the building blocks for potential marketing and promotion strategies.

One of the most prominent sentiments reiterated throughout our study was this notion of a "low maintenance ethic." Framing the proposed idea of a rain garden as an investment that will eventually reduce the resident's labor input has the potential win over many of the residents we surveyed based on their expressed values and desires.

Another value expressed by our study participants was the desire for a "healthy" lawn. The idea of "lawn health" took on many different iterations in our study, indicating that the definition of health is somewhat malleable and subjective on a person-to-person basis. The Water Steward Program needs to capitalize on this ambiguous desire for a "healthy" lawn and promote their solutions as the greatest way to ensure a healthy and ecologically conscious yard. Fertilizer companies have been relying on the current paradigm that a green lawn is tantamount to a healthy lawn to create business. The Water Steward Program can adopt a similar strategy by branding their goals as the new definition of a healthy lawn.

As was expressed in previous sections of this report, we found a pervasive knowledge gap with regard to people's understanding of the watershed and their impact on its health. This vagueness about their role in the overall health of the watershed fosters a sense of uncertainty that can lead to apathy. The Water Steward Program needs to be there to facilitate this cognitive leap for residents. For those residents who desire a lawn that it easier to care for, this assistance could come in the form of teams of volunteers who help with the installation of the rain garden. For those residents for whom health is important, increasing awareness that even "natural" fertilizers can cause damage to the watershed and local ecosystem if allowed to run off properties unmitigated could provide the impetus for someone to make a change. By educating about the interconnectedness of individual properties and the overall watershed and by making the incorporation of rain gardens, cisterns, and rain barrels less intimidating, the Water Steward Program could make progress toward actualizing the changes that they would like to see occur.

Furthermore, we recommend that the Freshwater Society pay close attention to the ways residents reach for information. It will be important for the Freshwater Society to bolster its internet presence. Although many resources are currently available on the website, many neighborhood residents may not be aware of the Freshwater Society as a destination for information on these types of topics. Thus we recommend a strategy that takes into account the somewhat low web visibility of the Freshwater Society while reframing its messaging through the aforementioned values expressed by residents.

Additionally, it is important to delineate between the active versus passive transmission of ideas. Although residents mostly attributed their knowledge to active transmitters (family, friends, internet) in the survey, passive transmission of ideas emerged prominently in the interviews, and this cannot be underestimated. Since we know that a rain garden or rain barrel placed prominently in the front of the house strongly promotes the passive transmission of ideas, residents who are enthusiastic about making these changes should be encouraged to implement them in the front yard where they are visible, as neighborhood norms have the potential to be transformed subtly through the power of suggestion.

In a similar vein, just as more visible yard modifications are bound to spur greater change in the neighborhood, people who occupy prominent positions in their social networks will prove effective agents of change. It is important to pay proper attention to the actors, not just the actions, in assessing the potential for transmission of ideas. We found an apt framework in Malcolm Gladwell's (2006) book *The Tipping Point*, which identifies categories of agents who are integral in the "tipping" of trends.

One category is Connectors, who are "a handful of people with a truly extraordinary knack … [for] making friends and acquaintances" across a wide and varying array of social groups and networks (Gladwell 2006, p. 36). In the context of the watershed district, a Connector may hold a lot of social sway in her residential neighborhood as well as her religious congregation and her children's schools. Such a person would be invaluable to the Freshwater Society if she were to install a rain garden in her yard, especially the front yard, because she operates as a conduit of information and ideas for multiple social circles. Another category is Mavens, whom he describes as those who are "almost pathologically helpful" (Gladwell 2006, p. 66). In their instinctual accumulation of knowledge, Mavens are naturally gifted at dispersing information; sharing ideas is an integral piece of their personality, especially in relation to their social connections. Mavens would assist the Freshwater Society in expediting the processes of social networks because they disseminate information intuitively and extensively. We see great value in assessing the social strengths of Water Stewards through the lens of Gladwell's framework. Even if Water Stewards prove motivated and enthusiastic, their impact at the neighborhood and watershed scales will be informed by their efficacy as social agents of change.

Relatedly, too, the positionality of Water Stewards and other residents may contribute to potential for greater change as well as how changes are received. In particular, we suggest that the Freshwater Society focus on newer residents who have not yet established long-standing habits and who are therefore more likely to be amenable to changes. Since the demographics of our study indicate a notable split in the neighborhood between older, longtime residents and recently-arrived, starter-home families, it would be wise to exert a greater amount of energy in attracting newer residents. Whether this is by distributing leaflets on move-in day or by holding community forums for first-time homeowners, the Freshwater Society should capitalize on the demonstrated uncertainty of new residents in order to enact a shift in the neighborhood norms governed by social climates.

In closing, we would like to make clear that residents have been aware of the nascent change in yard norms. Whether it was in the form of being able to cite numerous examples of people who had installed water-saving technologies in their property, an awareness that residents were opting for turf alternatives, or the success stories of changes that they themselves had made, residents throughout our study acknowledged that the standard for yard and lawn aesthetics was changing. More importantly, residents rarely reported incidents of negative feedback or criticism when discussing instances in which someone had "deviated" from the longstanding norm of green, even lawns. Those who had made a change were surprised by how amenable other residents were and often expressed that their peers were curious rather than critical. Our findings from this study cannot be applied directly to other neighborhoods or more broadly to the Twin Cities, but they do indicate an underlying openness to change in our study area, which should inspire confidence in the Water Steward Program and affirm the efforts of the stewards as well as provide guidance for future programming.

VI. References

Gladwell, M. (2006). *The tipping point: How little things can make a big difference*. Hachette Digital, Inc.

McCarty, J. A., & Shrum, L. J. (2001). The influence of individualism, collectivism, and locus of control on environmental beliefs and behavior. *Journal of Public Policy & Marketing*, 93-104.

Neal, David T., Wendy Wood, and Jeffrey M. Quinn. (2006). Habits—A repeat performance. *Current Directions in Psychological Science* 15, no. 4: 198-202.

Ryan, Richard M., and Edward L. Deci. 2000. "Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being." *American Psychologist* 55, no. 1: 68.

APPENDIX A: FIGURES

Fig. 1: Map of survey and interview locations

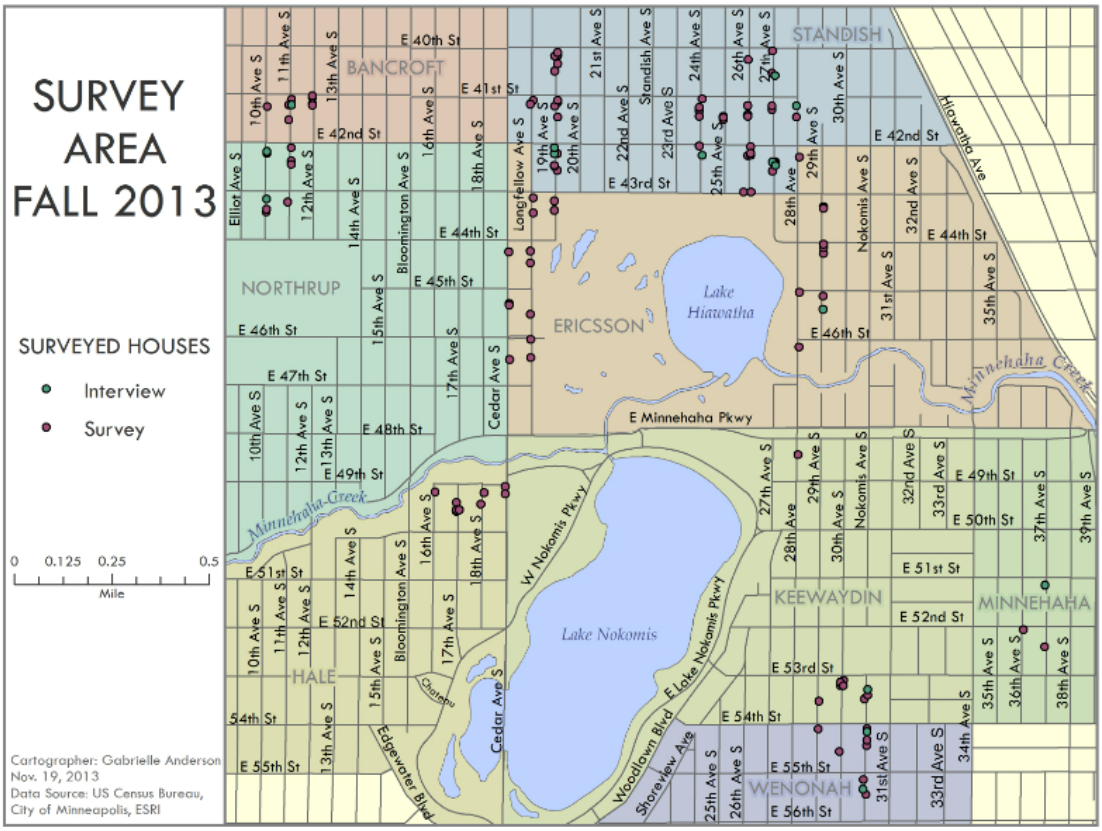


Fig. A1: Summary table of Questionnaire Respondent's Demographics and Neighborhood Demographics (acquired from census)

	Neighborhood population	Survey respondents	Interview participants
Percent white	81.3	91.7	93.8
Percent Hispanic	6.4	0.8	0
Percent black	4.9	2.5	0
Percent 2+ races	2.5	1.7	0
Percent Asian	2.0	2.5	0
Household size (mean)	2.2	2.5	2.6
Age (median)	38	41	43
Percent owner-occupied	84.4	91.1	93.8
Percent renter-occupied	15.6	8.9	6.2

Fig. A2: Homeowner vs. Renter

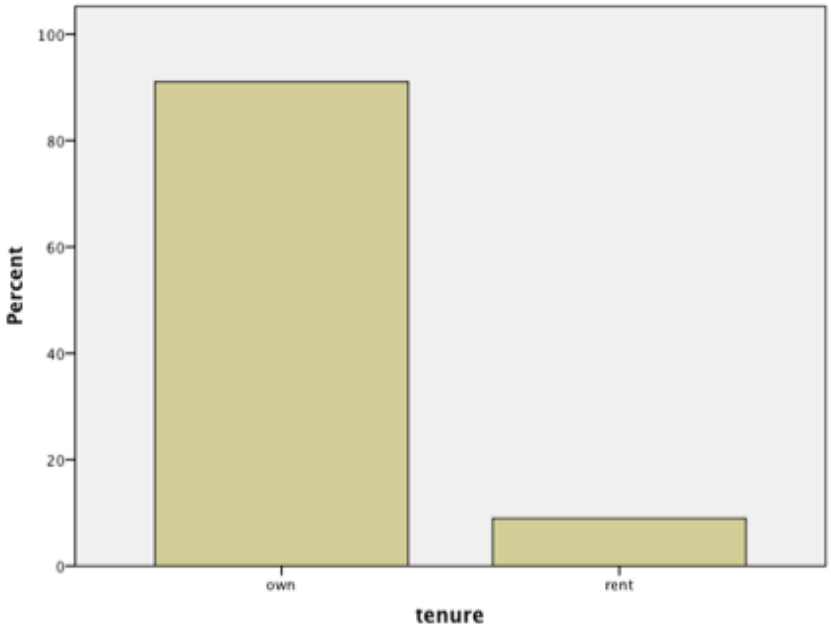


Fig. A3: Number of Adults in Household

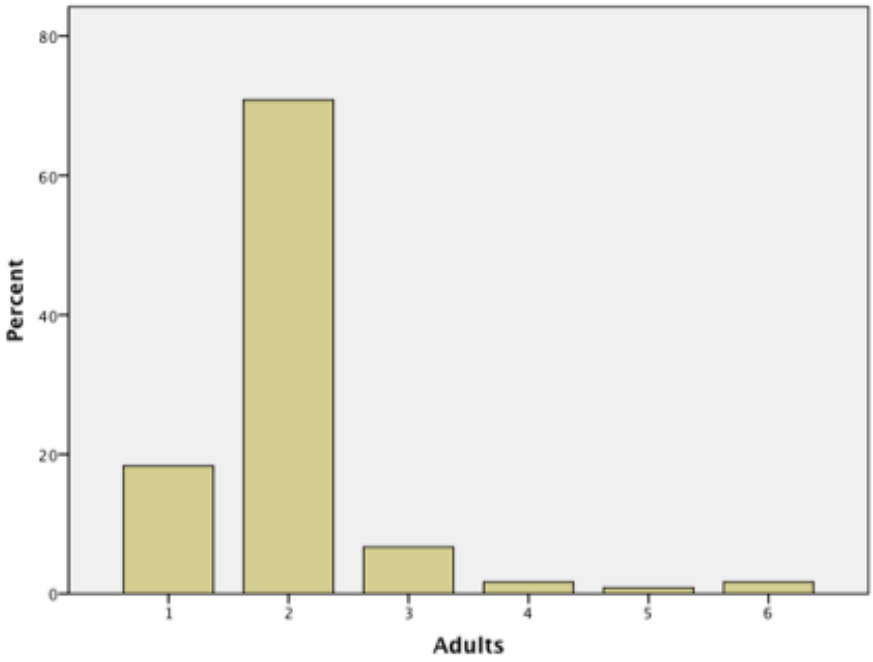


Fig A4: Number of Children in Household Between Ages 5 and 17

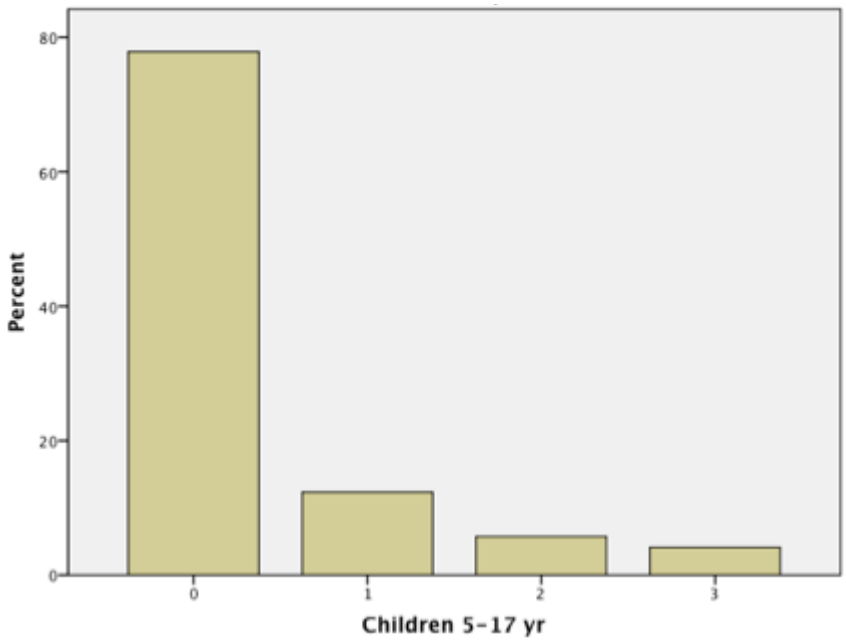


Fig A5: Number of Children in Household Below Age 5

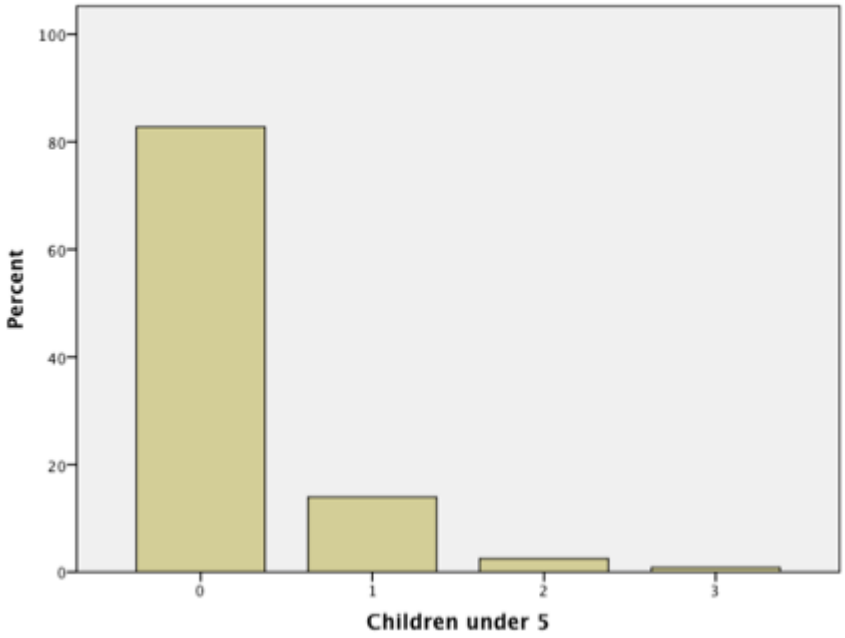


Fig. A6: Distribution of Year Moved in

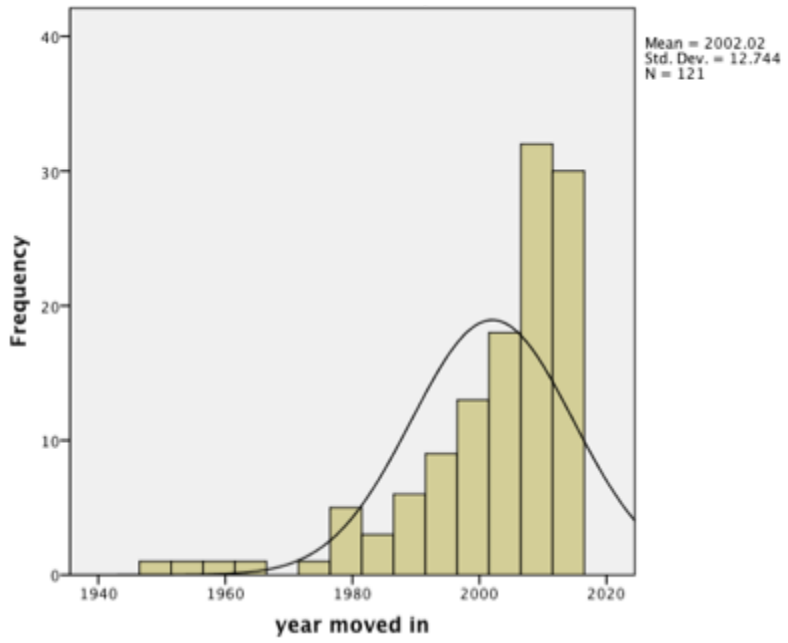


Fig. A7: Summary Table for Respondent Gender Identification

Gender	Number of Participants	Percent of total survey population
No answer	45	36.5
Female	35	28.5
Male	44	35

Fig A8: Summary Table for Residents' Level of Educational Attainment

Education attainment	Number of Participants	Percent of total survey population
No 4-yr degree	28	22.8
4-yr degree or higher	94	76.4

Fig. A9: Age Distribution for Survey Respondents

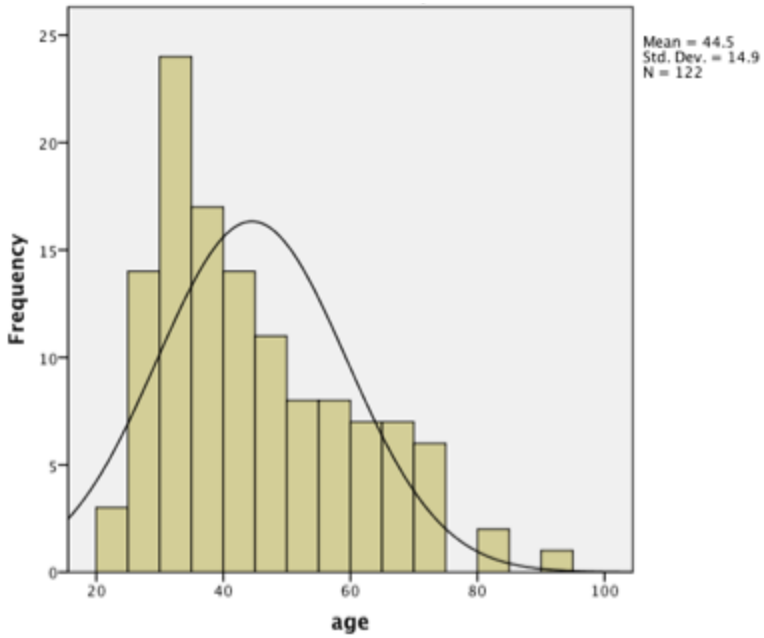


Fig. B1: Map of households that use fertilizer

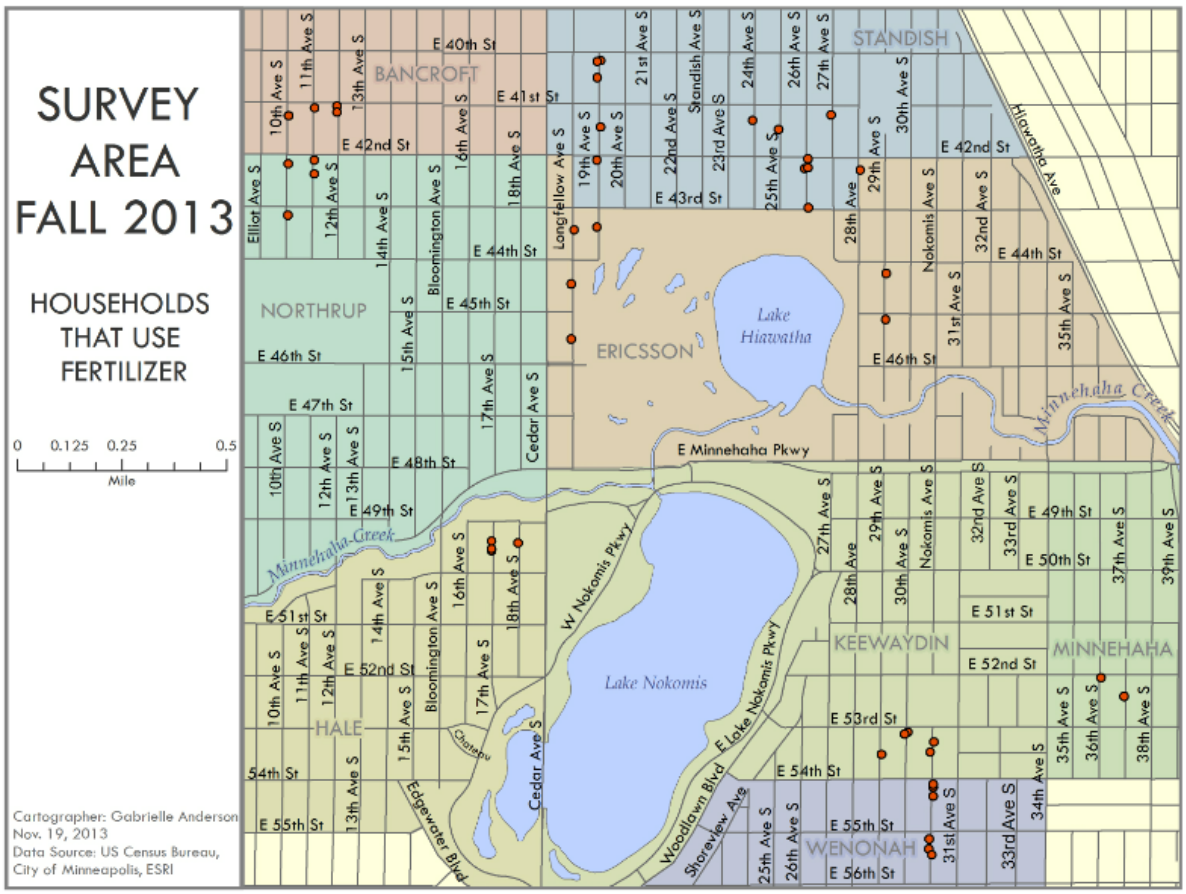


Fig. B2: Sweeping lawn clippings

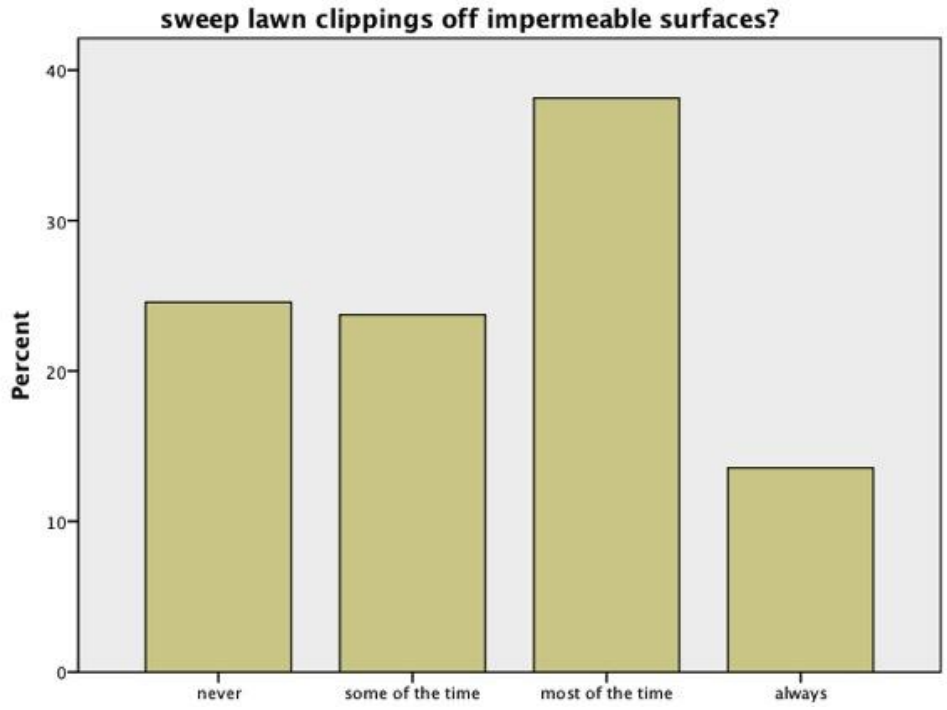


Fig. C1: What residents value about the watershed

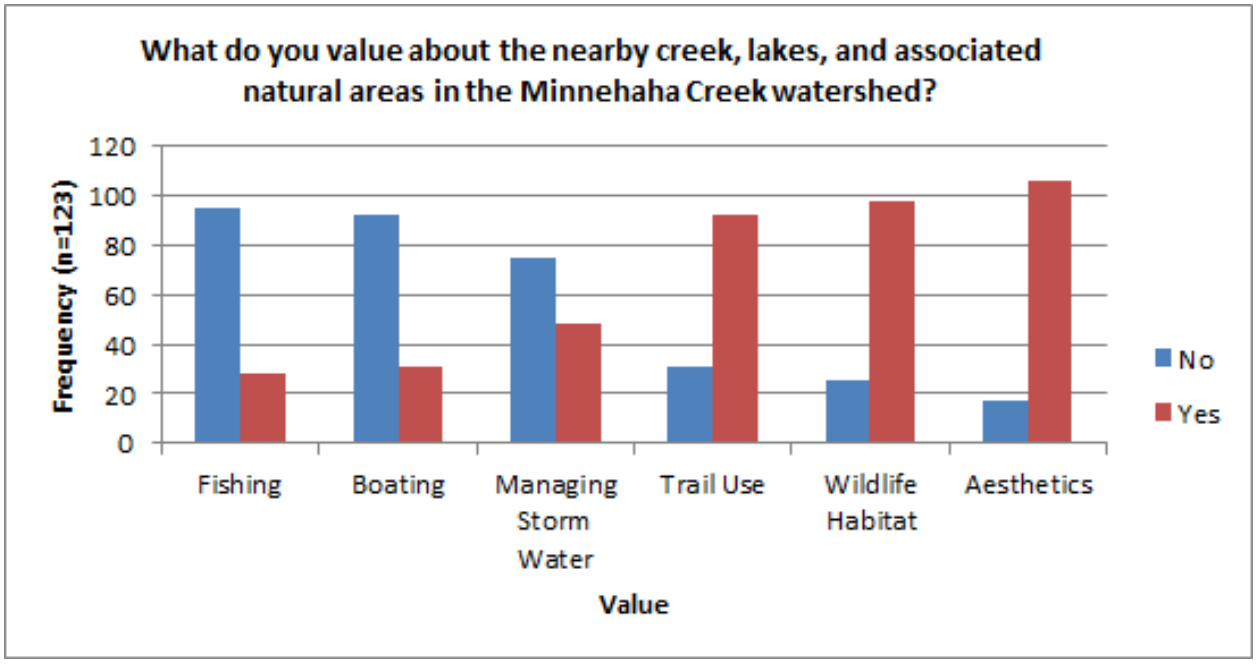


Fig. C2: Concerns about a healthy watershed - comparing respondents and their neighbors

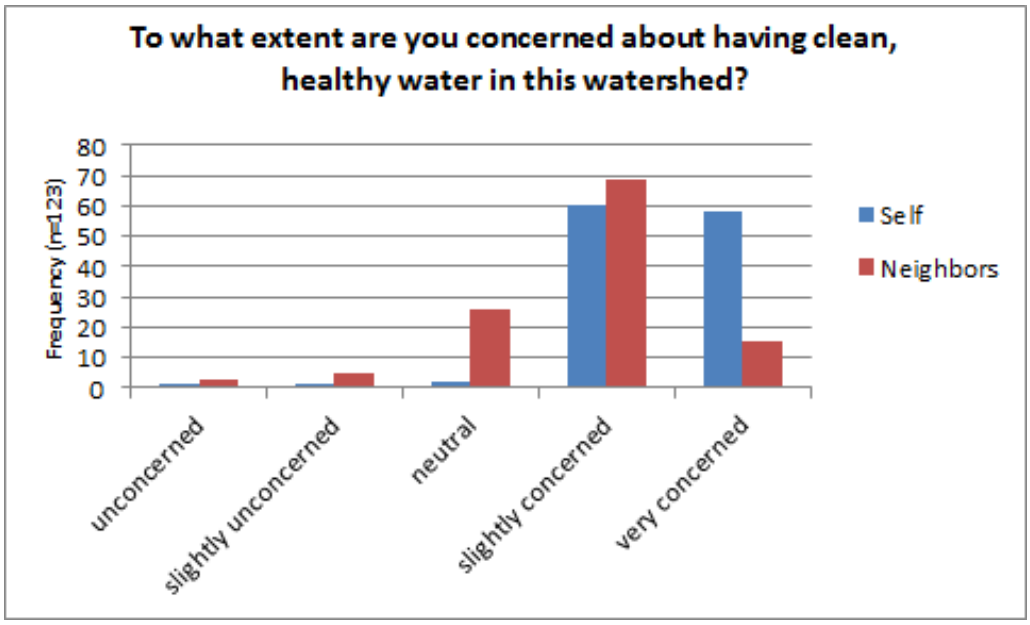


Fig. D1: What features of your yard are most important to you?

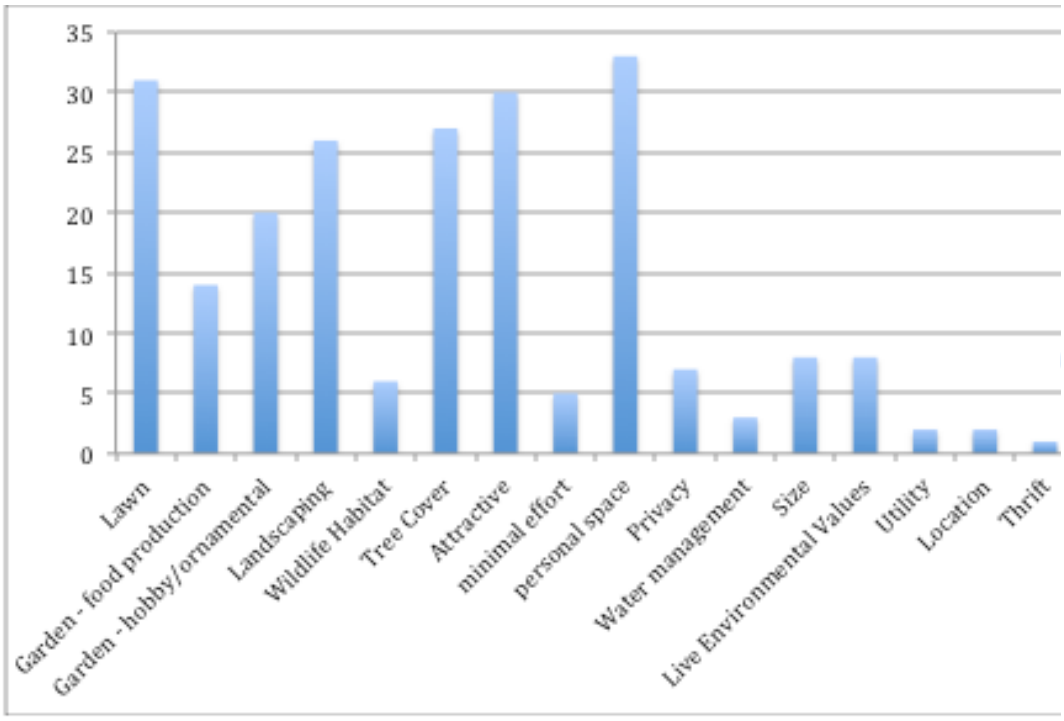


Fig. D2: Residents' perceptions about use of fertilizer

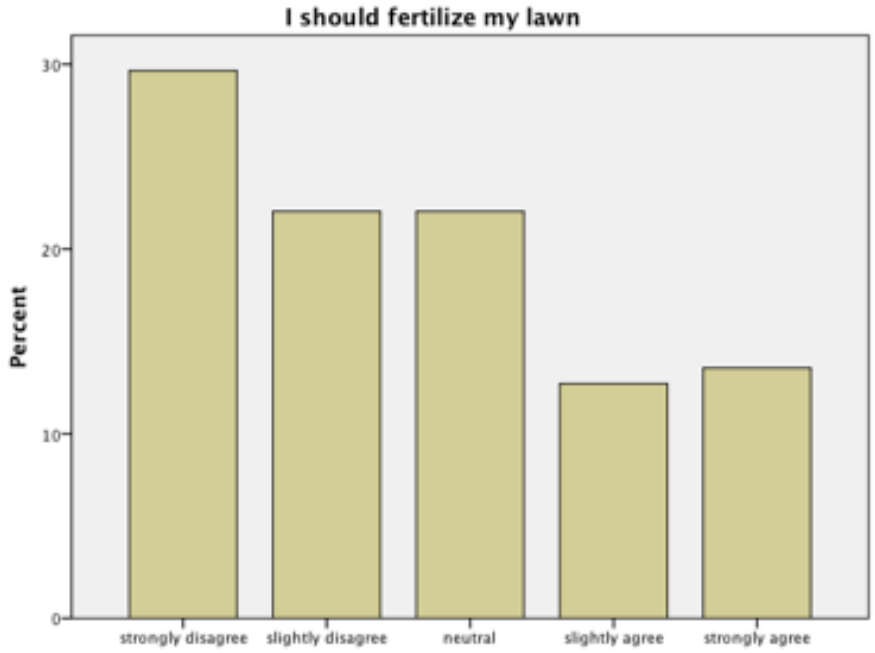


Fig. D3: Key attributes in residents' description of their "ideal lawn"

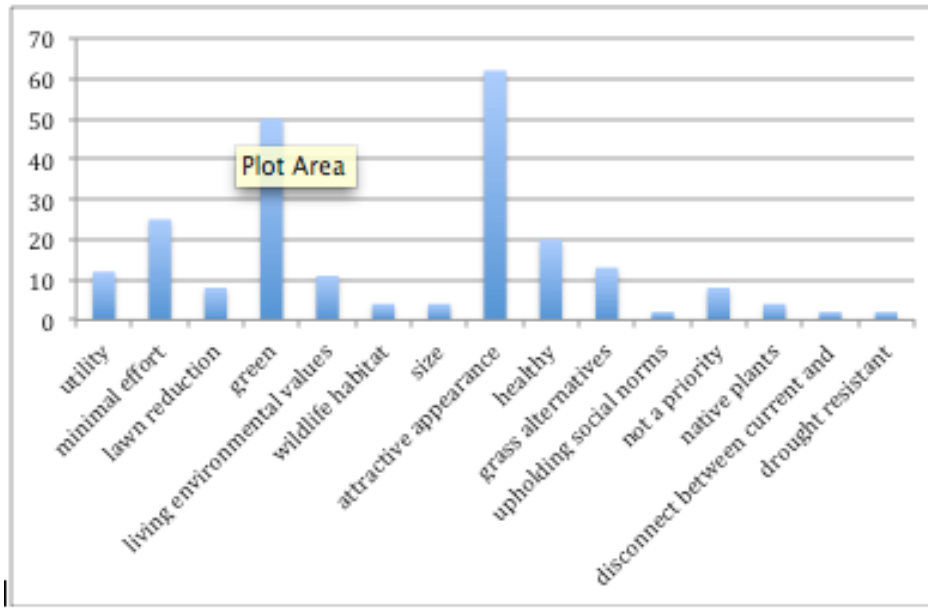


Fig. E1: Where Do Residents Find Yard Care Information?

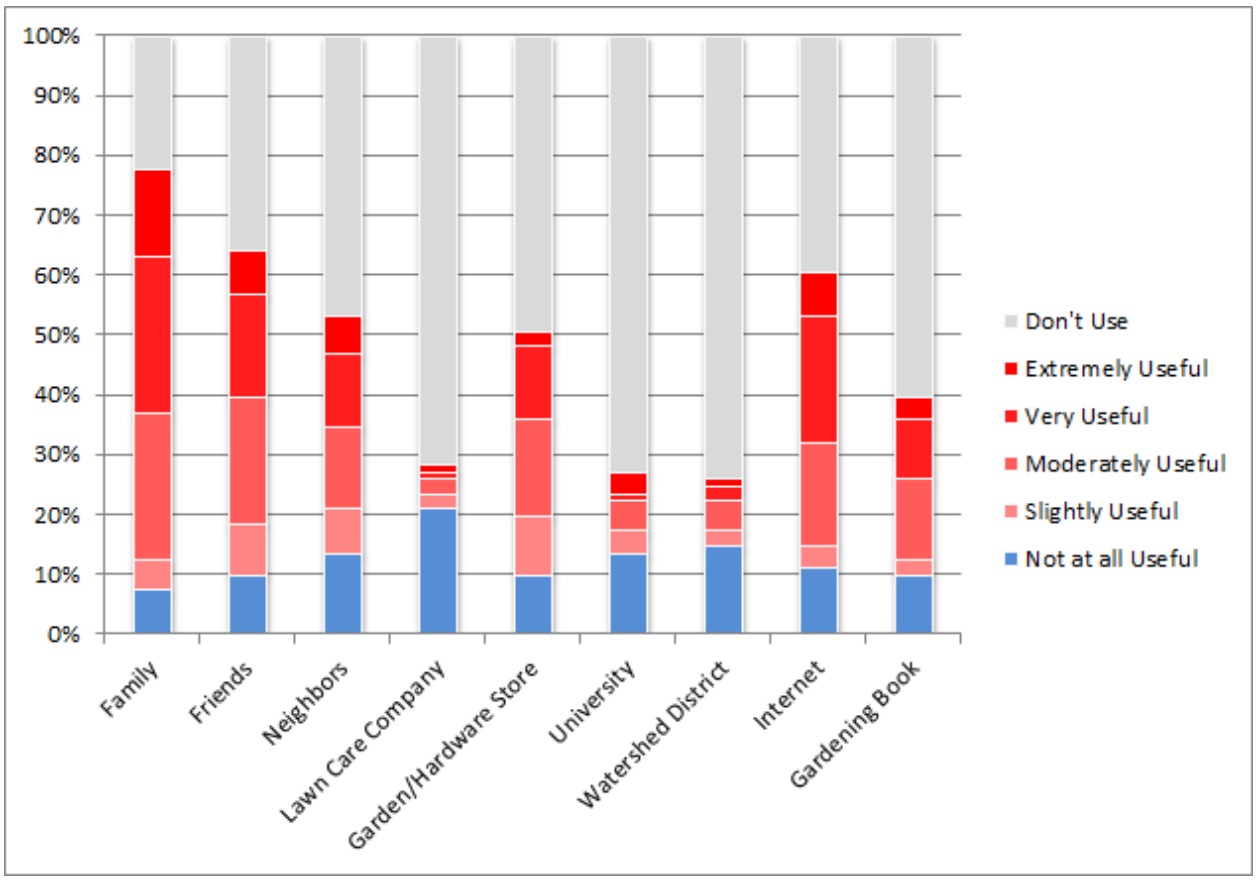


Fig. G1: Fertilizer's impact on lawn pollution

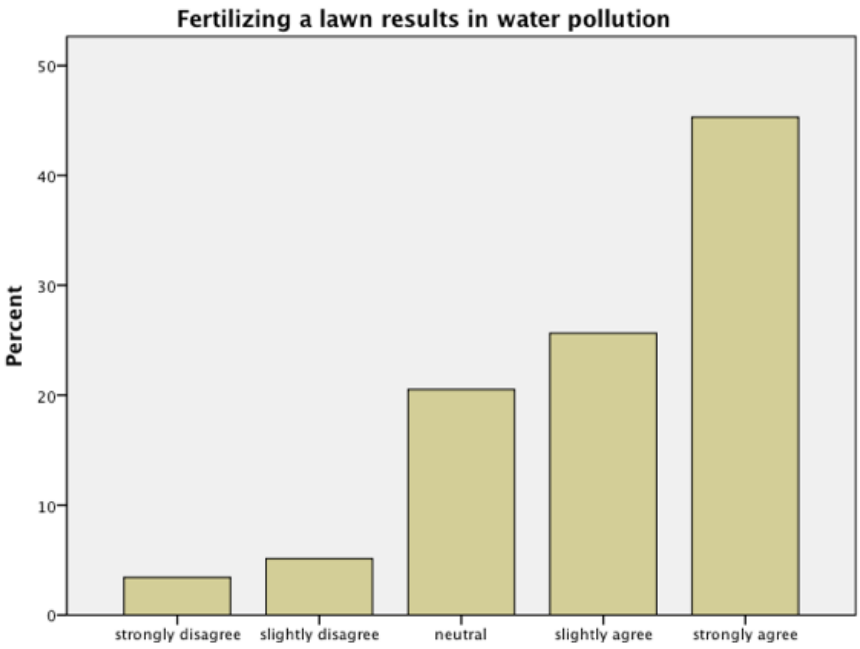
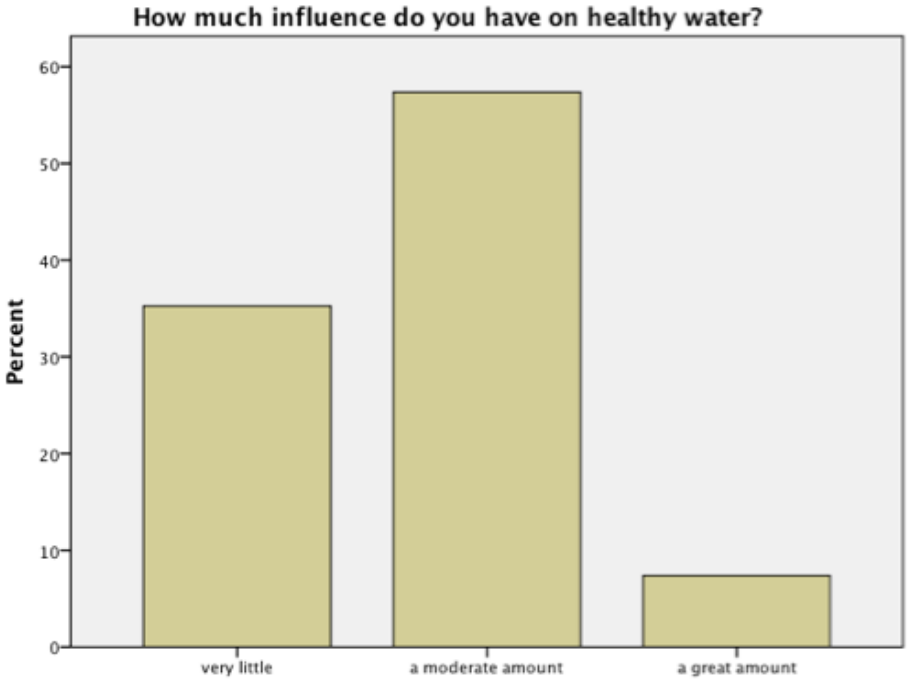


Fig. G2: Influence on healthy water



APPENDIX B: Survey Materials

MACALESTER COLLEGE

GEOGRAPHY DEPARTMENT
1600 GRAND AVENUE
SAINT PAUL, MINNESOTA
55105-1899

TEL: 651-696-6291
FAX: 651-696-6116
www.macalester.edu/geography

Understanding residents' relationships with the Minnehaha Creek Watershed

Thank you for participating in this survey conducted by students in Dan Trudeau's Qualitative Methods course at Macalester College in conjunction with The Freshwater Society and The Minnehaha Creek Watershed District. This survey is being conducted to better understand the attitudes, practices, and concerns in your neighborhood regarding water that runs off of your lawns, streets, and roofs. As a resident, your input is particularly important both to this research effort and the larger mission of supporting the health of the Minnehaha Creek Watershed.

Thank you for your participation!

Privacy
We want to assure you that your responses to the survey will be kept confidential and secure. The results of this survey will be released only as summaries of aggregate responses so that individual responses cannot be identified.

Questions?
If you have any questions about the survey, please contact Dan Trudeau, the faculty supervisor of this survey, at 651-696-6872 or trudeau@macalester.edu. You may also contact Peggy Knapp, program director at the Freshwater Society, at pknapp@freshwater.org or 763-219-1252.

Follow up interview?
We will also conduct follow up interviews to better understand residents' perceptions on how urban yards ought to look and who should bear responsibility for the health of local creeks and lakes. If you would like to participate in an interview, share your contact information with the surveyor or write an email message to mcwsurvey@macalester.edu with "interview" in the subject line.

Results
If you would like copy of the final report, share your contact information with the surveyor or write an email message to mcwsurvey@macalester.edu with "report request" in the subject line.

The person who makes most of the yard care decisions in the household should answer the following questions.

A. Getting to know you and your household

Please list your street address_____

1. In what year did you move to your home at this address? _____

2. Do you own or rent your home? *(check one answer)* ❑ Own ❑ Rent

3. Including you, how many people currently live in your home? *(enter a number on each line)*

_____ Adults (18 and older)
_____ Children 5-17 years old
_____ Children under 5 years old

4. What features of your yard are most important to you? (please explain)

5. What features of your yard are important to other members of your household? (please explain)

6. What changes to your yard, if any, does your household plan to make in the next two years? (please explain)

B. Your household's lawn

In this section, we ask questions specifically about your households' lawn and normal lawn care practices.
If you do not have a lawn, SKIP to #18 (page 3).

7. Do you discuss lawn care with your neighbors? ❑ Yes ❑ No → SKIP to #8

7a. If so, what do you discuss? (please explain)

8. Which of the following sources of information do you use for lawn care? How useful is each source is?

Source	Check if you use this source	Evaluation of usefulness: Extremely	Very	Moderately	Slightly	Not at all
My family	❑	5	4	3	2	1
My friends	❑	5	4	3	2	1
My neighbors	❑	5	4	3	2	1
Lawn care company	❑	5	4	3	2	1
Garden/hardware store	❑	5	4	3	2	1
University outreach	❑	5	4	3	2	1
Watershed district	❑	5	4	3	2	1
Internet resource	❑	5	4	3	2	1
Gardening book	❑	5	4	3	2	1
Other_____	❑	5	4	3	2	1

9. Who does most of your care for the lawn in your yard and boulevard strip (land between sidewalk and street)?

(*check all that apply*)

- ❑ You or another household member
- ❑ A relative or friend
- ❑ Other_____
- ❑ A lawn care service
- ❑ A neighbor

10. Which of the following practices are part of the normal lawn care routine for your yard? (*check all that apply*)

- ❑ Fertilize the lawn
- ❑ Mow the lawn
- ❑ Apply herbicide
- ❑ Remove leaves from the nearest storm drain
- ❑ Rake the boulevard strip
- ❑ Rake the leaves into the street
- ❑ Rake the curbside and gutter
- ❑ Other_____
- ❑ None of the above

11. Is your lawn mowed during the lawn care season? ❑ Yes ❑ No → SKIP to #14

12. When your lawn is mowed, what happens to the grass clippings? (*check all that apply*)

- ❑ Leave clippings on the lawn
- ❑ Compost them on my property
- ❑ Dispose of clippings off-site
- ❑ Other_____

12a. Why do you treat lawn clippings as indicated in question 12? (please explain)

13. Does your household sweep lawn clippings off your sidewalks, curbside of street, and/or driveway?

❑	❑	❑	❑
Never	Some of the time	Most of the Time	Always

14. How does your household dispose of tree leaves? (*check all that apply*)

- ❑ Mulch or compost on property
- ❑ Move them offsite
- ❑ Burn them
- ❑ I don't do anything with leaves

15. Looking at this photo, whose responsibility do you think it is to clean up leaves and other debris from the boulevard strip? (*check all that apply*)

- ❑ The city
- ❑ The homeowner/landlord
- ❑ The residents
- ❑ Other_____

16. On photo, you can see a typical curbside and storm drain. Whose responsibility do you think it is to clean up leaves, lawn clippings, and other debris from the curbsides and storm drain? (*check all that apply*)

- ❑ The city
- ❑ The homeowner/landlord
- ❑ Don't know
- ❑ The residents
- ❑ Other_____

C. Your lawn care choices

We would like to ask you a series of questions about lawn care decisions you make and what influences them. In all of these questions, there is a 5-point scale to evaluate your general opinion. The scales differ among questions.

17. Considering the maintenance of your lawn, please CIRCLE one number in response for each statement.

A. I should fertilize my lawn each year

Strongly disagree 1 2 3 4 5 Strongly agree

B. My immediate family thinks that

I should not 1 2 3 4 5 I should ❑ Don't know

Fertilize my lawn

C. The neighbors on my street think that
I should not 1 2 3 4 5 I should ❑ Don't know
Fertilize my lawn

D. Most people who are important to me think that
I should not 1 2 3 4 5 I should ❑ Don't know
Fertilize my lawn

E. People in my life whose opinions I value
I should not 1 2 3 4 5 I should ❑ Don't know
Fertilize my lawn

F. I think that I have a community obligation to fertilize my lawn
Strongly disagree 1 2 3 4 5 Strongly agree

G. It is mostly up to me whether or not I fertilize my lawn
Strongly disagree 1 2 3 4 5 Strongly agree

H. How much influence does your immediate family have on whether you think you should fertilize your lawn?
No influence 1 2 3 4 5 Very influential

I. How much influence do the neighbors on your street have on whether you think you should fertilize your lawn?
Not influence 1 2 3 4 5 Very influential

J. Fertilizing a lawn takes too much time
Strongly disagree 1 2 3 4 5 Strongly agree

K. Fertilizing a lawn results in an attractive lawn
Strongly disagree 1 2 3 4 5 Strongly agree

L. Fertilizing a lawn results in water pollution
Strongly disagree 1 2 3 4 5 Strongly agree

M. Creating greener grass by fertilizing a lawn is
Extremely harmful 1 2 3 4 5 Extremely beneficial

N. For me, having an attractive lawn is
Not at all desirable 1 2 3 4 5 Extremely desirable

18. Please briefly describe your ideal lawn.

D. Your surroundings

The following questions will help us better understand the area surrounding your home and neighborhood as well as your relationship with your surroundings.

19. Where does the water from your street's storm drain go? (*please check one)*
- ❑ Nearby lake
- ❑ Minnehaha creek
- ❑ Mississippi river
- ❑ Treatment facility
- ❑ Don't know
- ❑ Other_____

20. Your home is in the Minnehaha Creek watershed. A watershed is an area of land drains rainfall and snow to a river or lake, in the same way water in a bathtub or sink runs to a drain pipe. What do you value about the nearby creek, lakes, and associated natural areas in the Minnehaha Creek watershed? (*check all that apply*)
- ❑ Aesthetics
- ❑ Boating
- ❑ Fishing
- ❑ Managing storm water
- ❑ Waterside trail use
- ❑ Wildlife habitat
- ❑ Other_____
- ❑ Other_____
- ❑ Other_____

21. To what extent are you concerned about having clean, healthy water in this watershed? (*check one*)

❑	❑	❑	❑	❑
Unconcerned	Slightly concerned	Neutral	Concerned	Very Concerned

22. To what extent do you think the neighbors on your street are concerned about having clean, healthy water in this watershed? (*check one*)

❑	❑	❑	❑	❑
Unconcerned	Slightly concerned	Neutral	Concerned	Very Concerned

23. To what extent do you think that water runoff from your lawn pollutes the water in nearby creeks and lakes? (check *one)*

❑	❑	❑	❑
None at all	Very little	A moderate amount	A great amount

24. To what extent do you think that water runoff from your neighborhood as a whole pollutes the water in nearby creeks and lakes? (check *one)*

❑	❑	❑	❑
None at all	Very little	A moderate amount	A great amount

25. How much influence do you believe **you** have when it comes to having clean and healthy water in this watershed? (check *one)*

❑	❑	❑	❑
None at all	Very little	A moderate amount	A great amount

26. How much influence do you believe the **neighbors on your street** have when it comes to having clean and healthy water in this watershed? (check *one)*

❑	❑	❑	❑
None at all	Very little	A moderate amount	A great amount

27. How much influence do you believe **city government** has on having clean, healthy water in your watershed? (check *one)*

❑	❑	❑	❑
None at all	Very little	A moderate amount	A great amount

E. Your background

To make sure we have a representative sample, we would like to know a little more about you. Remember, your answers will be kept confidential.

28. What is your age? _____ years

29. What is your gender? ❑ Female ❑ Male ❑ Transgender ❑ Other

30. How would you describe your race/ethnicity? (*check one answer*)

- ❑ White/Caucasian
- ❑ African American
- ❑ Native American
- ❑ Hispanic/Latino
- ❑ Asian American
- ❑ Other: _____

31. How many years of school have you completed? (*circle one answer*)

1 2 3 4 5 6 7 8	9 10 11 12	13 14 15 16	17+
Grade school	High school	College	Advanced Degree

32. In the past year, have you contacted or attended an event organized by a

Neighborhood association	❑ Yes	❑ No
Watershed district	❑ Yes	❑ No
City or district council environmental or natural resource committee	❑ Yes	❑ No
Master Gardener/Naturalist	❑ Yes	❑ No
Master Water Steward	❑ Yes	❑ No
Other neighborhood group	❑ Yes	❑ No

APPENDIX C: SEMI-STRUCTURED INTERVIEW QUESTIONS

1. Personal experiences of the yard/tour of the yard

   A. You moved into your house in ____, what attracted you to this place?
      a. What attracted you to the house? Can you elaborate on why you chose this house?)
      b. Can you elaborate on what attracted you to the neighborhood?)

   B. Tell me about how you've made this yard ***yours***.
      a. How do you use your yard?
      b. Who all uses or experiences your yard?
      c. What parts are important? And to whom?
      d. What changed?
      e. Why did you change it?
      f. If there is a difference between front and back yard, inquire about why those differences exist

   C. Tell me about what practices you use to manage your yard.
      a. What do you do?
      b. Why do you use these practices?
      c. What do you do with the fallen leaves, particularly on the boulevard and curbside?

   D. How do you make decisions about managing your yard?
      a. Who all participates in the decision making?
      b. Can you describe a recent experience where you made a decision about managing your yard?
         i. How did the process unfold?
         ii. What did you decide and why?
         iii. What individuals/sources of information were considered in making the decision?

2. Neighborhood scope

   A. How do you think your yard management compares to your neighbors?
      a. What's similar?
      b. What's different?

   B. How do you think the look of your yard compares to the yards in this neighborhood?
      a. What's similar?
      b. What's different?

   C. What changes, if any, are you considering making in the next couple of years?
      a. Why are you interested in making this change?
      b. What do you think it will take to make the change?

c. How do you think your neighbors would react to a more drastic change, like putting in a rain garden?

D. Have you noticed any changes to yards in your neighborhood? What are your reactions, if so?

3. Water

The last couple of years in the Twin Cities have witnessed long periods of time without rain, which are interrupted by intense rainfall events.

A. Have you responded in your yard management practices to these periods of drought? If yes, How?

B. Have you responded in your yard management practices to the intense rainfall? If yes, How?

C. What happens to the water that falls during these intense storms? Where does the water go, do you think?

Do you have anything more you want to add?