

Knowledge, Attitudes and Practice (KAP) Survey Summary Report for the Duluth Lakeside Stormwater Reduction Project (LSRP)

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Introduction

A team of University of Minnesota researchers, educators and local agency partners have been collaborating since 2002 to address stormwater pollution issues in western Lake Superior watersheds. The Website www.lakesuperiorstreams.org provides extensive information on this collaboration and stormwater impacts to area streams. The group also created the Regional Stormwater Protection Team (www.duluthstreams.org/stormwater/rspt/html) to provide science-based information to the public, agencies and businesses. Ron Weber, former Duluth resident, provided seed money to fund an initiative to “fix” problems in Lake Superior trout streams. The Lester River/Amity Creek system was chosen to be a demonstration project because it was designated as “impaired” due to excessive turbidity (muddiness) from sediment (<http://www.duluthstreams.org/weber>). High volumes of water running off residential lots during storms that wash sediment into the streams and increase erosion of stream banks is thought to be a significant contributor to the problem.

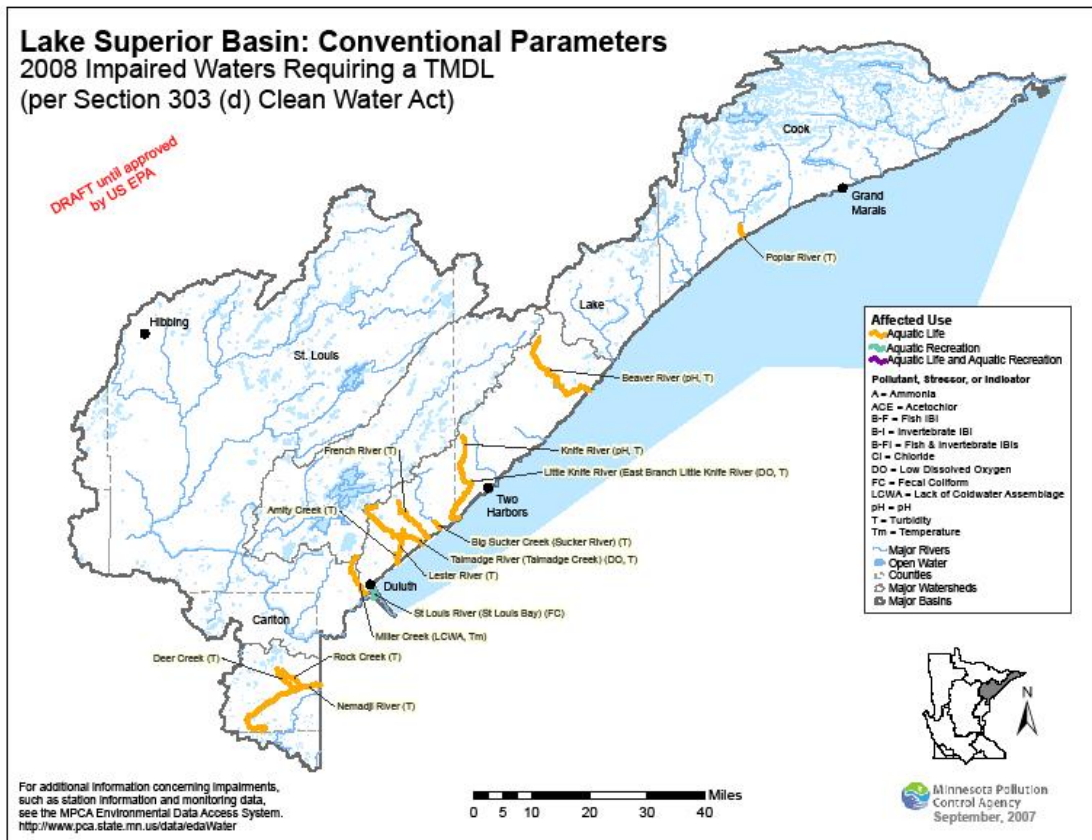




Figure 1: Graves Road tributary to Amity Creek. This tributary receives stormwater flow from the study neighborhoods and experiences high amounts of erosion during storm events.

The City of Duluth and the University of Minnesota Duluth (NRRI and Minnesota Sea Grant) have now partnered with other groups and have received funding from the USEPA 319 program and the Minnesota Pollution Control Agency (MPCA) to determine if working with homeowners to install stormwater retention features has the potential to produce a cost-effective improvement that could be applied throughout the Great Lakes Basin. This project is called the Lakeside Stormwater Reduction Project (LSRP). The study will compare a “retrofitted” neighborhood to one left “as is.” In addition, the study will evaluate the effect of various educational and awareness approaches on changing people’s understanding and actions as related to water quality issues. The paired watershed project area includes a treatment street, a control street, and an intervening street in the Lakeside neighborhood of Duluth. The portions of each street are three blocks long, and include newer homes uphill, and smaller older homes downhill. The storm sewers for all three streets drain toward Amity Creek, which flows into the Lester River and eventually into Lake Superior.



Figure 2: Erosion and sedimentation in the Graves Road tributary to Amity Creek

The Duluth partners collaborated with researchers from the University of Minnesota Water Resources Center (WRC) to conduct a baseline study of the target audience in the project area. The findings of the study, which was carried out with residents on all three streets in May 2008, are summarized in this report.

Methodology

The LSRP team needed to determine existing knowledge, behaviors and practices related to stormwater management in the project area in order to plan and carry out the paired watershed project. Initially the team intended to use the SIDMA (social indicators data management and analysis) tool being developed through the USEPA Region 5 social indicators effort. It was determined, however, that the standardized SIDMA questionnaire for urban residents did not include the specific questions needed to plan the LSRP, or identify residents willing to participate. It was therefore decided to carry out a knowledge, attitudes and practices (KAP) study to help plan the LSRP, and to postpone the SIDMA questionnaire until a later community meeting. KAP studies have been widely used in international water quality and sanitation programs, especially in developing countries, but are relatively unknown in the United States. This is thought to be one of the few times that a KAP study has been tested in a water quality project in Minnesota. The methodology is based upon a literature review done in 2007 by WRC (Eckman forthcoming). In addition, participant observation was used during the survey to triangulate findings of the KAP (Walker forthcoming).

Staff from the LSRP and the WRC first discussed the specific information and questions that would need to be answered before the team could plan project activities and select participating households. Through this exercise a list of draft questions was developed by the team, refined, and incorporated into a draft Survey Monkey questionnaire. The draft was circulated among team members and revised until general agreement was reached on content and wording. The final Survey Monkey questionnaire was then pretested, printed and administered during a house-to-house survey from May 5-10, 2008.

Five volunteers from the Minnesota Conservation Corps were trained in administering social surveys and carried out the household interviews. The WRC team (Karlyn Eckman and Rachel Walker) supervised the field work with the support of Val Brady and other staff from NRRI/Minnesota Sea Grant. Fifty-seven households were interviewed in-person during the week of May 5-10 2008. Six households that could not be reached in person later completed and returned a mailed questionnaire, for a total of 63 households. Three of the returned mailed questionnaires did not include an address, could not be positively identified and were therefore eliminated from the survey. All households on the treatment street were surveyed except one, which could not be contacted. Twelve of nineteen households on the control street were surveyed (six households were unreachable; one homeowner refused). Response rates are summarized in Table 1 below.

Table 1: Response Rate Summary

Total households (hhs)	In-person interviews	Households returning mailed survey	Subtotal	Not surveyed	Response rate
Treatment Street (n=27)	Treatment hhs: 19 Nontreatment hhs: 5 (n=24)	0	24	Treatment: 1 Nontreatment: 2 (n=3)	89%
Intervening Street (n=26)	15	2	17	8	65%
Control street (n=30)	Control hhs: 10 Non-control hhs: 7 (n=19)	2	19	Control: 7 Non-control: 4 (n=11)	63%
Totals: 83 ¹ possible households	40	7 (includes three which could not be identified)	60	22	72% total response rate

Questionnaire data was entered into Survey Monkey by MCC volunteers. The Survey Monkey software automatically calculated descriptive statistics (a summary is attached as Appendix 1). In addition, WRC staff conducted a content analysis on the many open-ended comments provided by respondents. Findings from the content analysis are incorporated into the following sections.

Results from the Lakeside Stormwater Project Survey

Findings are presented first as a summary with averages for all three streets. This section also summarizes findings by block for respondent knowledge, attitudes and practices, where findings are broken down by block for treatment, intervening and control streets. *While the main body of this report may be publically shared, the appendices cannot be made public in the interest of respondent confidentiality.*

Summary

The majority of survey respondents (67%) understand that stormwater from their property enters storm drains that drain into Lake Superior. They understand that heavy rains running downhill results in potential problems for “downhill” home-owners and, ultimately, for Lake Superior. One respondent said, “stormwater comes off the hill and runs from one property to the next.” The majority (55%) know that stormwater and sanitary sewer water are treated separately in Duluth. Just under 50% know that a stream runs near their neighborhood, but only 22% know that stormwater drains into the creek nearest them (Amity Creek). Many incorrectly identified that creek as the Lester River.

¹ 83 households were counted; one is omitted as unreachable.



Figure 3: Confluence of the Graves Road tributary and Amity Creek.

A larger number of respondents believe that stormwater causes greater problems on their neighbors' property (40%) in comparison to their own property (27%). Thirty-two percent said that stormwater is not a problem on their lot. Some respondents said that stormwater affects "their neighbor's retaining wall" or their neighbors' basements. One respondent said s/he believed "Hawk Ridge Estate [an uphill development] should not have been built." Another said, "He who has the lowest house loses." Yet many also contradicted some of their earlier claims that stormwater is not a problem on their property. Many respondents said that their basements had flooded several times in the last decade. Some said that basement flooding is a "big problem in East Duluth," reporting an average accumulation of four inches in their homes. Many discussed problems with failed sump pumps and two property owners acknowledged spending \$10,000 the previous year on excavation around their foundation as a result of basement flooding. One of these homeowners said, "You don't know the importance of [stormwater management] until it happens to you."

Sixty-five percent of respondents say they manage stormwater on their property with a sump pump and 32% say they manage stormwater with landscaping. Some discussed adjusting the gradient on their property, adding trees, installing gutters to channel water to the center of their yard, and putting rocks into a small creek bed ("Penny Creek") or a ditch behind their home. Several respondents said that they manage stormwater with drain tile or French drains, in some cases channeling water from their property onto the street. Some mentioned the value of having or wanting city curbs. Some were aware of a "class about rain barrels," but had no time to attend, and were aware that street leaf litter cleanup might help to improve water quality. The MCC survey crew observed actual landscaping efforts, but they did not find widespread use of rain gardens, rain barrels, or native plants.

While a majority of respondents said they learned about stormwater issues from TV news or weather (62%), 21% said they are not aware of any helpful information to manage stormwater, and 25% said they are not sure how to manage stormwater on their property. Some respondents had heard of "Rex, the watershed dog," or had learned about stormwater issues from print media. One respondent said s/he had visited www.lakesuperiorstreams.org.

While 38% think stormwater might cause problems in Lake Superior, 84% were unaware that Amity Creek is listed by the MPCA as impaired due to erosion from stormwater. One respondent discussed that stormwater "picks up wrong materials that are bad for the environment and

deposits them in adjacent streams/ the lake.” Another said he grew up in the neighborhood and knew that “rivers are worse” than when he was a child.



Figure 4: Amity Creek
Photo credit: Kimberly Nuckles, MPCA

Seventy-nine percent answered positively that they would like to learn more about the results of this study and the LSRP. If the costs and effort were mostly covered, 64% said they would be willing to implement something (such as a rain garden or barrel) to manage stormwater on their property. Several indicated that any installed stormwater management devices ought to be aesthetically pleasing. One respondent said, “We are nature people up here [on Hawk Ridge],” indicating a clear interest to have more information on managing stormwater effectively.

The following sections break down the survey responses by knowledge, attitudes and practices for each of the three streets.

Knowledge

Questions regarding respondent knowledge were posed in survey questions 1-7, 9-10, and 12-13. Tables 2 and 3 show results for more than one survey question.

Questions #1-2: Do you know whether a stream runs near your neighborhood? Do you know the name of the stream? Possible responses were a. Yes; b. No; c. Amity; d. Lester; e. Not sure.

Table 2: Knowledge of Nearby Stream

	Control street: # responses	Control street: %	Intervening street: # responses	Intervening street: %	Treatment street: # responses	Treatment street: %
a. Yes	9	47%	8	47%	10	42%
b. No	10	53%	9	53%	14	58%
Totals	19	100%	17	100%	24	100%
c. Amity	5	26%	4	24%	4	17%
d. Lester	6	32%	5	29%	3	13%
e. Not sure	8	42%	8	47%	17	70%
Totals	19	100%	17	100%	24	100%

Forty-two percent of treatment street respondents said they were aware of a stream in their neighborhood, but only 17% knew the stream's name (Amity). The number of respondents on control and intervening streets who were aware of a stream were somewhat fewer (47% for both), but, as on the treatment street, only approximately half of them knew the stream's name (26 and 24% respectively).



Figure 5: Storm drain entering Amity Creek.

Questions #3-7 and 9 are summarized in Table 3 and include general awareness of stormwater flow and whether respondents perceive stormwater reaching their and/or others' properties and causing problems for them and/or other residents (see original survey for complete list of questions). Possible responses were a. You {your property}; b. Others {others' property}; c. Both; d. Neither.

Table 3: Knowledge of Effects of Stormwater on Residential Properties

	Control street: # responses	Control street: %	Intervening street: # responses	Intervening street: %	Treatment street: # responses	Treatment street: %
a. You	16	84%	11	65%	11	46%
b. Others	16	84%	11	65%	21	86%
c. Both	15	79%	10	59%	13	54%
d. Neither	2	11%	6	35%	3	13%

Eighty-four percent of respondents furthest downhill said that their and their neighbors' properties were affected by stormwater runoff. Forty-six percent of respondents living furthest uphill observed that their properties were affected. Sixty-five percent of respondents from the intervening block said that their properties were affected.

While approximately equal numbers of control and intervening respondents observed that stormwater affected their and their neighbors' properties (84 and 65% respectively), 86% of treatment respondents believed their neighbors' properties were affected (compared to 52% who believed their own properties were affected). In sum, those living uphill perceive their properties to be less affected by stormwater runoff overall, as well as less affected relative to their neighbors' properties.

Question #10: Do you think stormwater and sanitary sewer water go through the SAME treatment process, or are they treated DIFFERENTLY? Possible responses were a. Yes; {different}; b. No {not different}; c. Not sure.

Table 4: Knowledge of Differences Between Stormwater and Sanitary Sewer Water Treatment

	Control street: # responses	Control street: %	Intervening street: # responses	Intervening street: %	Treatment street: # responses	Treatment street: %
a. Yes (different)	14	74%	13	76%	18	75%
b. No (not different)	3	16%	2	12%	2	8%
c. Not sure	2	10%	2	12%	4	17%
Totals	19	100%	17	100%	24	100%

A majority of residents on all three blocks knew that stormwater and sanitary sewer water are treated differently (treatment: 75%; intervening: 76%; control: 74%).

12: Do you know how your stormwater utility fees are used? Possible responses were a. Yes; or b. No.

Table 5: Knowledge of Stormwater Utility Fees

	Control street: # responses	Control street: %	Intervening street: # responses	Intervening street: %	Treatment street: # responses	Treatment street: %
a. Yes	3	16%	3	18%	5	21%
b. No	16	84%	14	82%	19	79%
Totals	19	100%	17	100%	24	100%

A majority of residents on all three blocks were unaware of how their stormwater fees are used (treatment: 79%; intervening: 82%; control: 84%).

#13: Are you aware that Amity Creek is listed on the state list of “impaired” streams? Possible responses were a. Yes; or b. No.

Table 6: Knowledge of Amity Creek Listed as Impaired

	Control street: # responses	Control street: %	Intervening street: # responses	Intervening street: %	Treatment street: # responses	Treatment street: %
a. Yes	2	11%	4	24%	2	8%
b. No	17	89%	13	76%	22	92%
Totals	19	100%	17	100%	24	100%

While a majority of residents on all three blocks perceive affects from stormwater on their or others’ properties, a large majority were unaware that Amity Creek was listed as impaired by the Minnesota Pollution Control Agency (Treatment: 92%; Intervening: 76%; Control: 89%).

Attitudes

Three attitude questions were asked of residents. Results are summarized as follows.

Question #8: Whose job is it to manage stormwater flowing onto and off of your property? (a. The City; b. The property owner; c. Both a. and b.; d. Not sure).

Table 7: Responsibility for Stormwater Management

	Control street: # responses	Control street: %	Intervening street: # responses	Intervening street: %	Treatment street: # responses	Treatment street: %
a. The City	3	16%	10	59%	4	16%
b. Property owner	2	11%	2	12%	11	46%
c. Both a. and b.	13	68%	5	29%	5	21%
d. Not sure/other	1	5%	0	0	4	17%
Totals	19	100%	17	100%	24	100%

Attitudes about whose job is it to manage stormwater varied greatly by block and street. About half (48%) of the respondents on the treatment street felt that it is the responsibility of the property owner; 13% felt it is the responsibility of the City; and 22% felt it was the responsibility of both City and property owner. On the intervening street, 59% felt that it is the City's responsibility; 12% felt it is the property owner; and 29% stated both are responsible. Sixty-five percent of residents on the control street thought responsibility should be shared; 10% felt responsibility rests with the property owner; and 20% with the City. Attitudes about responsibility for stormwater management by property owners are therefore highest on the treatment street, followed by the control and intervening streets.

Question #16: UMD and the City are working together to study stormwater problems in this neighborhood. Are you interested in learning more about this? (a. Yes; b. No; c. Not sure; d. Other).

Table 8: Interest in Learning about LSRP

	Control street: # responses	Control street: %	Intervening street: # responses	Intervening street: %	Treatment street: # responses	Treatment street: %
a. Yes	15	79%	15	83%	17	71%
b. No	3	16%	1	6%	6	25%
c. Not sure	1	5%	2	11%	1	4%
d. Other	0	0	0	0	0	0
Totals	19	100%	18	100%	24	100%

Question #17: If costs and effort were mostly covered, would you be willing to try something to manage stormwater on your property? (a. Yes; b. No; c. Maybe, but I'd like to learn more about it; d. Not sure; e. Other).

Table 9: Interest in Participating in the LSRP

	Control street: # responses	Control street: %	Intervening street: # responses	Intervening street: %	Treatment street: # responses	Treatment street: %
a. Yes	12	63%	12	67%	15	63%
b. No	4	21%	1	5%	4	16.5%
c. Maybe	3	16%	3	17%	4	16.5%
d. Not sure	0	0	0	0	0	0
e. Other	0	0	2	11%	1	4%
Totals	19	100%	18	100%	24	100%

Practices

Two questions relating to existing stormwater management practices were posed to respondents. The results are summarized below.

Question #14. Have you ever done anything to manage stormwater on your property? (a. Sump pump; b. Rain barrel; c. Rain garden; d. Landscaping; e. Native plants; f. Other; g. No).

Table 10: Existing Residential Stormwater Management Practices

	Control street: # respondents	Control street: %	Intervening street: # respondents	Intervening street: %	Treatment street: # respondents	Treatment street: %
a. Sump	12	38%	10	29%	17	59%
b. Rain barrel	2	6%	3	9%	1	3%
c. Rain garden	1	3%	3	9%	0	0%
d. Landscaping	5	16%	8	23%	5	17%
e. Native plants	2	6%	3	9%	2	7%
f. Other	7	22%	2	6%	2	7%
g. No	3	9%	5	15%	2	7%
Totals	32	100%	34	100%	29	100%

Question #15. Is there a reason why you have chosen not to manage stormwater on your property? Check all that apply.

(a. It's not a problem on my lot; b. I'm not aware of any information that would help me; c. I'm not sure what to do; d. There's a cost involved; e. My physical ability limits me; f. I haven't had the time; g. Don't know; h. Other).

Table 11: Constraints to Managing Stormwater

	Control street: # respondents	Control street: %	Intervening street: # respondents	Intervening street: %	Treatment street: # respondents	Treatment street: %
a. It's not a problem on my lot	2	10%	4	25%	11	55%
b. Not aware of information	2	10%	4	25%	4	20%
c. Not sure what to do	4	21%	2	12%	2	10%
d. There's a cost involved	8	42%	1	6%	1	5%
e. My physical ability limits me	0	0	1	6%	0	0
f. I haven't had time	2	11%	1	6%	1	5%
g. Don't know	0	0	3	17%	0	0
h. Other	0	0	3	19%	1	5%

Discussion and Conclusions

Key findings

Many respondents appear to understand that development uphill results in greater stormwater flow downhill. Many appear to be reasonably aware of links between rain events and certain problems, including impaired water quality and property damage associated with too much stormwater flow. Half of the treatment street residents felt that stormwater is not a problem on their properties. Very few of the uphill residents seemed aware that drainage from their properties impacts downhill properties, streams and rivers. The City and LSRP partners could better inform households in Lakeside about how residential stormwater affects Amity Creek and

the Lester River, particularly in terms of water quality and impacts on aquatic habitat. This is especially important for recent residential developments, where newer owners and even some developers may be unfamiliar with local streams and lakeshore issues. This is an area that could be further explored, for example, with the Hawk Ridge development higher uphill and upstream.

The great majority of residents did not make the connection between excess residential stormwater and its effects on Amity Creek; indeed very few could name Amity Creek or the Lester River. Residents do, however, understand the “big picture” about how excess stormwater runoff can harm Lake Superior, which is a very positive finding. Such local knowledge could be a starting point upon which to build a residential information and education outreach effort.



Figure 6: Lake Superior from the beach at Gitchee Gumee Park in Duluth.

Most residents do know that the septic and storm sewer systems are different and that the water in them is treated differently. This represents a “success story” in that the City and its partners have been able to positively inform local residents about previous municipal infrastructure works. The majority (59%) of respondents are unaware of how stormwater fees are used, but a few thought they were used to maintain the WLSSD or sanitary sewer infrastructure. Several respondents discussed that “city pipes are not well maintained,” recalling the failure of water mains near their homes. Most of these comments came from residents on the intervening street.

A significant majority said they were open to cost-share initiatives to mitigate stormwater flow. A striking difference of opinion exists, however, from street to street regarding interest and ability to participate in cost-share strategies. Only one resident on the treatment or intervening streets stated that cost could be a constraint to managing stormwater on their property. However, 42% of residents on the control street stated that cost would be a constraint. Cost was also the mostly highly ranked constraint for intervening street residents.

The majority of homeowners in the study are willing to learn more about the project and to consider residential stormwater and runoff retention practices. In general, there is positive interest and willingness to learn more about the LSRP, as well as to participate in the LSRP. There is very good potential for the LSRP team to work with local residents to better understand and adopt stormwater management BMPs such as rain gardens or landscaping. Many households (especially on control and intervening streets) are interested in measures to mitigate flooded basements, waterlogged yards, and in some cases, eroded landscaping and property damage.

While this is especially relevant for downstream residents who receive stormwater runoff from uphill, many are avid gardeners and interested in rain gardens and landscaping with native plants. Again, this would be a good entry point upon which to build an I & E effort.

There is both a significant need and considerable opportunity for more public education on both stormwater and sanitary sewer issues. There is a very good opportunity to inform residents of the www.lakesuperiorstreams.org website, as it does not appear to be widely known in the neighborhood. There is also very good potential for fostering the adoption of residential best management practices through the LSRP. Providing an opportunity for residents to actually view properly installed and maintained BMPs would help to improve local knowledge and possibly to encourage adoption of such practices.

Finally, there is a consensus by the LSRP team and WRC researchers that the KAP study methodology proved useful, cost-effective, and yielded valuable information for both planning and evaluation purposes. The methodology may have wider application for small to mid-size NPS projects in Minnesota and warrants further testing.

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