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# Urban Residents' Adoption of Stormwater Best Management Practices: Final Report

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*Urban Residents' Adoption of Stormwater Best Management  
Practices: Final Report*

Nicholas Barker, Courtney Foster, and Theodore Levine

Program of Environmental Studies - Bates College

In cooperation with Jocelyn Lahey and the Androscoggin Valley Stormwater Working Group

With assistance from Ethan Miller and Francis Eanes

## **I. Executive Summary**

The practices and decisions of Lewiston and Auburn residents regarding lawn care have a profound impact on stormwater runoff pollution and local water quality. In order to mitigate the substantial effects of these pollutants on waterways, it is critical for local residents to develop an understanding of best management practices (BMPs) which they feel compelled to implement in order to minimize the effects of stormwater pollution on water quality. With a five-year permit cycle for stormwater runoff put forth by the state, the Androscoggin Valley Stormwater Working Group (AVSWG) is contractually tasked with performing educational outreach in the community regarding the importance of stormwater runoff pollution, and with evaluating these educational outreach efforts to ensure that local residents are adequately understanding the BMPs they can adopt to minimize stormwater pollution.

Our research on water pollutants, survey design, and behavioral change theory allowed us to produce a survey aimed at assessing residents' lawn care decisions and at assessing stormwater pollution awareness and outreach efforts in the Lewiston and Auburn area. The survey we created will be sufficient to meet the upcoming permit requirements and to help determine behavioral trends in relation to the adoption of lawn care BMPs, the effectiveness of previous AVSWG educational outreach efforts, and the existing barriers to the adoption of BMPs. Central to our survey design process was the popular and heavily cited behavioral change theory developed by M. Fishbein and I. Ajzen (2010), the Reasoned Action Approach, which locates behavioral intention as the closest predictor of behavior implementation and identifies attitudes, norms, and behavioral control (both perceived and actual) as primary factors to examine which structure a person's behavioral intent. To inform our survey construction, we also conducted interviews with local residents and pretested an initial version of the survey on several Bates College faculty members. After making revisions, we have produced a final version of the survey which will be distributed to residents of Lewiston and Auburn door-to-door in the coming month, as well as generated hypotheses as to the effectiveness of the AVSWG's educational outreach efforts surrounding stormwater pollution. The initial information we have gathered via the framework of the Reasoned Action Approach on residents' attitudes, norms, and perceived and actual control over their lawn care decisions both allow us to begin analyzing the effectiveness of the AVSWG's educational outreach efforts, and to begin identifying leverage points which future education and outreach efforts could target. Our research has allowed us to create a set of conceptual tools which the AVSWG may continue to use in the coming years.

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## IV. Introduction

In the state of Maine, stormwater runoff is regulated by the Department of Environmental Protection (DEP), where the Bureau of Land and Water Quality is specifically tasked with monitoring and regulating the discharge of stormwater from small municipalities (State of Maine Department of Environmental Protection, 2013). In 2003, the Maine DEP and the Bureau of Land and Water Quality established a five-year permit to control stormwater runoff and nonpoint source pollution. Over the course of the last 15 years, three permits have been enacted. In July of 2013, the Maine DEP and Bureau of Land and Water Quality established the current five-year permit, which will ultimately expire in July of 2018. The permit requires municipalities in the state to “develop, implement, and enforce a Stormwater Program Management Plan” (Androscoggin Valley Stormwater Group, 2013). For the cities of Lewiston, Lisbon, Sabattus, and Auburn, the Androscoggin Valley Stormwater Working Group (AVSWG) is the regional entity contractually charged with managing and mitigating nonpoint source pollution impacts. In other words, the AVSWG is tasked with reducing and eliminating polluted stormwater runoff to the maximum extent practicable within the respective municipalities (Ibid). To accomplish this, the AVSWG established six Minimum Control Measures (MCMs) which were designed to satisfy the appropriate water quality requirements, while also providing public education and outreach on stormwater pollution impacts. Additionally, the MCMs suggest regulatory controls and Best Management Practices (BMPs) for mitigating stormwater runoff.

Conducting targeted outreach and education in several neighborhoods in Lewiston and Auburn, the stormwater working group is particularly interested in understanding the effectiveness of their education and outreach campaigns on behavior change in the area of lawn care. Additionally, the working group wants to learn about what additional factors, beyond education, motivate residents and businesses to adopt lawn care practices that mitigate stormwater runoff pollution. With the assistance of Jocelyn Lahey, the District Manager of the Androscoggin Valley Soil and Water Conservation District, this project revolves around the design and testing of a household survey instrument to measure the effects of past education efforts and further explore social and psychological factors motivating the adoption of urban stormwater best management practices.

In establishing this survey such that the AVSWG may fulfill their permit requirements, we also hope to provide the AVSWG with the tools to assess the effectiveness of their educational outreach efforts, and to adjust these efforts over time with the larger goal of contributing to an increase in water quality in the cities of Lewiston and Auburn over the course of the next five-year permitting cycle. The survey itself will be distributed in the month of May by Bates College students and faculty members. Following distribution, the AVSWG and collaborating members of the Bates community may analyze the overall outreach efforts of the AVSWG, as well as the array of attitudes and norms which may motivate or hinder the adoption of lawn care BMPs.

## V. Methodological Approach

Throughout the course of the semester, our group developed a process to synthesize and connect the multiple aims of our project, which included the development of a pretested survey instrument, an assessment of the various pollutants in the Androscoggin River and surrounding brooks, and the development of hypotheses as to what sociopolitical factors motivate behavioral change in the context of lawn care and as to the effectiveness of the AVSWG's educational outreach initiatives. Recognizing that these deliverables were not separate entities, but rather that they served to inform and shape one another, our group developed a framework which conceptualized our work in terms of inputs and outputs through a behavioral change model which both provided a skeleton from which our work took shape and comprised a key finding of our research and exploration.

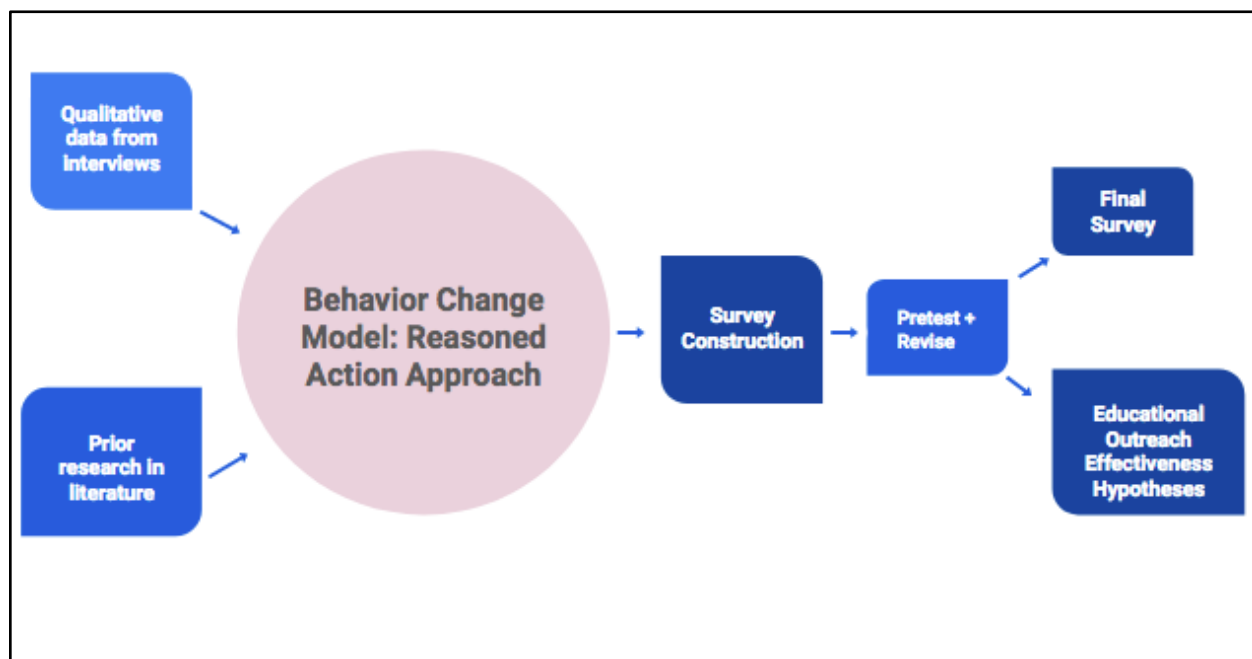


Figure 1. Conceptual diagram of project process and connections between steps. Diagram reads chronologically left to right.

First, we developed a set of questions which we asked in interviews to Lewiston/Auburn residents to give us an initial idea of their perceptions surrounding stormwater pollution and environmental health, as well as of their lawn care practices. Around the same time, we also conducted a literature review to inform the survey construction which would follow, specifically on the topics of stormwater pollution science, survey design, and behavioral change research in the context of lawn care or similar scenarios. Our review of the literature, in conjunction with guidance from our professors, also led us to the selection of the behavior change model, the Reasoned Action Approach, which would guide us to the selection of important themes in our interview and of important findings in the literature. The structure provided by the behavior change model in terms of its emphasis on attitudes, norms, and control then gave us the information we needed to construct our survey around the further investigation of these three

core focus areas, as well as around lawn care practices and perceptions of the AVSWG's educational outreach efforts. After constructing our survey, we then pretested it on members of the Bates community, and revised it based on feedback given to us by these individuals. The pretesting also gave us more information off of which we could base initial hypotheses surrounding behavior change motivations pertaining to lawn care, and surrounding the effectiveness of the AVSWG's educational and outreach efforts. These hypotheses, as well as the final version of the survey which will be distributed to Lewiston/Auburn residents in the next month, are the final deliverables coming out of our project, as well as the conceptual tool provided by the behavior change model, which is both part of the process and is itself a deliverable.

## **VI. Results and Discussion**

To discuss the findings at each step of the project process, we will work through the above model chronologically and unpack the information gleaned from each step, as well as discuss our interpretations of our findings.

### *A. Focus Groups to Discuss Best Management Practices and Stormwater Education*

With the assistance of Jocelyn Lahey, the research group organized a focus group on March 10th, 2018 at the Lewiston Public Library. The focus group discussion was designed to analyze and discuss best management practices and stormwater education in the Lewiston/Auburn area. The focus group event was well advertised and was designed to attract local downtown citizens of all ages. Unfortunately, despite our diligent advertising, people did not show up to the event. While this was a setback for our research team, we quickly adapted and resiliently responded by conducting five interviews with local citizens. Information gained from our research in the literature, and questions inspired by the behavior change model (discussed in section C), largely informed the structure of the interviews and the topics discussed. A major theme which emerged was the notion of “out of sight, out of mind,” which suggested that if one were to pollute a local waterway, they might not experience palpable consequences, or that they might not directly connect their lawn care habits to runoff pollution, and then to the larger ramifications of stormwater pollution on water quality as a whole. However, one of our interview subjects demonstrated the direct impacts that can originate from water pollution. Our interviewee explained that she was a former nurse and recounted an incident where two of her patients had muscular dystrophy, which their mother attributed to water pollution. She continued to portray the costs of water pollution by noting that the Androscoggin River used to be colloquially referred to as “cancer alley.” Another major theme which surfaced was the notion of the Androscoggin River as a symbol for Lewiston/Auburn's vitality and wellbeing. When the Androscoggin River was heavily polluted, it reflected poorly on the cities of Lewiston and Auburn, both harming the area economically and reducing community morale. Conversely, when the Androscoggin River became increasingly cleaner, it symbolized resilience and was a source of pride for Lewiston and Auburn, as well as an economic boon, as the possibility for tourism

and outdoor activities on the water began to flourish. The feedback received from these interviews proved instrumental in the creation and design of the survey as it provided us with an initial window into the mental models held by residents of the connection (or lack thereof) between lawn care and stormwater pollution, as well as into the spectrum of attitudes, norms, and sense of control which they held regarding lawn care practices and water pollution.

### *B. Literature Reviews*

An intensive literature review of scholarly and scientific source material was conducted. The source material discussed stormwater science, behavior change mechanisms regarding lawn care or other similar activities, and survey methods, particularly with regards to mediums and demographics.

The research on stormwater science and pollutant loading provided us with vital sources relating to nonpoint source pollution impacts on overall water quality and best management practices. Understanding that pollutant loading from urban areas to surface waters is of serious interest to water quality managers throughout the United States (Bale et. al, 2017), we discovered that many urban dwellers lack a true sense of how to best prevent nonpoint pollution (Larsen et al, 2013). While the stormwater working group's educational efforts are largely geared towards lawn care practices, we found it important to consider other aspects of nonpoint source pollution and stormwater runoff. Sediment loading, for example, is a major issue affecting urban waterways (Stout et. al, 2004), as additional pollutants, such as bacteria, oils, and nutrients, tend to attach to soil or sediment particles, therefore affecting the chemical, physical, and biological makeup of the waterway (Ibid). Additionally, organic matter, such as animal waste, leaf litter, or food waste, carried by stormwater runoff into surface water, can lead to reduced oxygen levels (Onstad et. al, 2000). Ultimately, we worked to gain a better understanding of pollutant loading and runoff in urban waterways in order to effectively evaluate where educational efforts may be most useful for citizens in Lewiston and Auburn.

The research on behavioral change in the context of lawn care or in other similar contexts provided us with several key insights which proved helpful in the development of our survey. While the field of study directly pertinent to the science of behavior change in this context emerged relatively recently, a burgeoning array of literature and empirical studies has developed in the sustainability and urban planning disciplines which puts forth "a mix of marketing psychology, environmental psychology, behavioral decision theory, and behavioral economics" to establish methods by which those tasked with environmental management may motivate behavioral change for individuals and for businesses (Payne 2012, xi). As a continuation of their research in the social marketing of environmental and sustainability fixes, McKenzie-Mohr and Schultz (2014) present a selection process of community-based social marketing (CBSM) mechanisms, which becomes instrumental in thought concerning behavior change in the context of environmental protection (35). The authors highlight the utility of mechanisms such as commitment-making, "social diffusion" of ideas, goal-setting, highlighting of social norms, giving prompts, providing incentives, providing feedback, and easing convenience of behavior



change, in the context of timing and an analysis of associated barriers to engagement, which are case dependent (Ibid).

While McKenzie-Mohr and Schultz demonstrate the use of their method in the context of three case studies, neither of their reports concern lawn care or fertilizer runoff, an integral component of stormwater pollution which requires its own specific behavioral marketing strategy analysis. However, several recent studies provide some initial insights into the opportunities provided by behavior change mechanisms in the context of comparable scenarios, selected for examination based on their relative similarity to the lawn care and stormwater pollution quandary. In the study put forth by Warner et al. (2018), which focuses on Florida residents, the authors found “an opportunity for landscape professionals to correct disconnects by helping residents understand their personal impact on water quality while providing support for the overall high attitudes, subjective norms, and perceived behavioral control towards good irrigation and fertilization behaviors” (1). Similarly, Ray et al. (2013) overview their behavioral change campaign for homeowners living in the Gulf of Mexico vicinity which focuses on brand and message development. Martini et al. (2014) add that the “diffusion” of yard care best practices amongst residents, such as in focus groups and in individual conversations, may result in a notable proportion of residents sharing information with their neighbors, thus increasing the likelihood of behavior change (1223). Similarly to McKenzie-Mohr and Schultz, Boulet et al. (2017), who discuss pollution in the context of business practices, recommend the use of tools such as leveraging social norms, highlighting business benefits of pollution prevention efforts, and asking businesses to make a commitment, along with practices such as displaying the EPA hotline (278). To further address the distinction of behavior change mechanisms between businesses as well as different types of individuals, Gagnon (2009)’s dissertation examines CBSM principles in both cases, in the context of New England. He recommends attention to the “knowledge rift” in the field of lawn care for “DIYers” and the use of emphasizing social norms (129), “focused outreach” methods for “opinion leaders” in the community (131).

The research on survey design and distribution was centered around a 2014 Purdue University survey titled, “Great Bend of the Wabash River Watershed: Your Views on Local Water Resources” provided to us by Professor Francis Eanes. This previous survey helped us build the foundation for our survey derived from the thorough examination of question type and structure. While our survey contains similar structures and question types to the “Wabash River Watershed” survey, we have uniquely modified our question types and structure to accommodate the demands of the Lewiston and Auburn area.

### *C. Behavior Change Model*

A key finding in our literature review and in discussion with our professors was our identification of a behavior change model, the Reasoned Action Approach (M. Fishbein and I. Ajzen, 2010). The publication of this theory proved a watershed moment in behavioral change research in the way that it challenged prior conceptions of the barriers preventing the modification of behavior, and in the way it set out a framework which could be easily integrated

into survey design or format for scientific study. Before the Reasoned Action Approach was developed, most behavioral change theorists operated under the assumption that simply providing the public with knowledge regarding a certain behavioral practice would result in the adoption of that practice. However, Fishbein and Ajzen did not believe this was the case. Instead, they proposed that the closest predictor and predecessor of behavioral practice is behavioral intent, which is itself influenced by three categories of sociopolitical and psychological factors: attitudes, both towards the behavior and towards the behavioral outcome; norms, both injunctive (regarding what the individual feels they ought do) and descriptive (regarding what the individual notices that the community around them is doing); and control over behavioral practice, both the perceived sense of control that the individual has over the behavior or over the outcome, and the actual control the individual has over that behavior or that outcome.

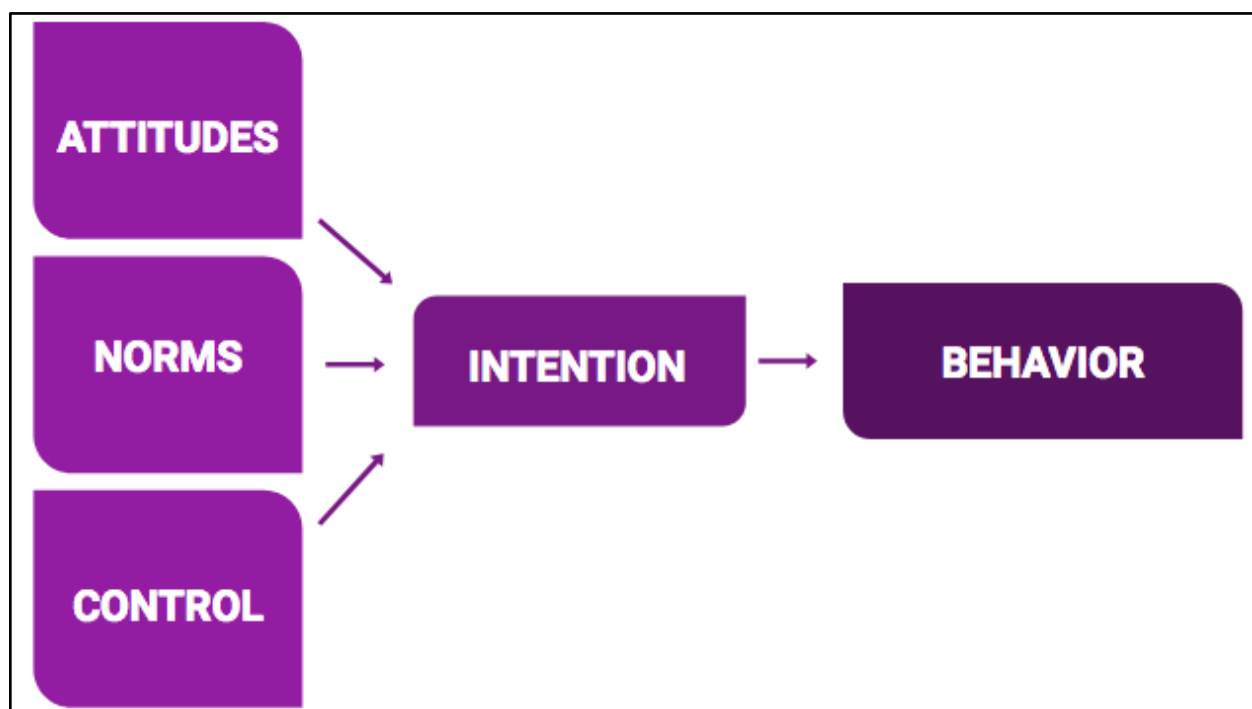


Figure 2. Theory of planned behavior. Adapted from Figure 1, M. Fishbein and I. Ajzen (2010).

After the publication of this theory, its influence became clear as it became dominant in the field of behavior change science and thus heavily cited in studies concerning behavioral change literature which followed, including Warner et al. (2018) as discussed above in the literature review portion of this report. Thus, we recognized that it was essential to include this theory as a constitutive element of our project design, particularly in terms of survey construction. When reflecting on the initial information we had gathered in our interviews and in our literature review, the behavioral change model allowed us to hone in on the results which would have the most bearing on our survey construction, and which would have the most bearing on our understanding of residents' mindsets surrounding the issue of stormwater pollution and

surrounding lawn care decisions. Yet more importantly, the behavioral change model concretized the various categories of questions or focus areas which we would include in our survey and in our preliminary analysis of Lewiston/Auburn residents' behavioral motivations (or lack of motivation) regarding lawn care BMPs. As such, we began to write our survey questions using the behavioral change model as a guide as we aimed to work backwards through the model for each BMP, with the purpose of examining the attitudes, norms, and sense of control which determine a resident's strength of behavioral intention to act in each case.

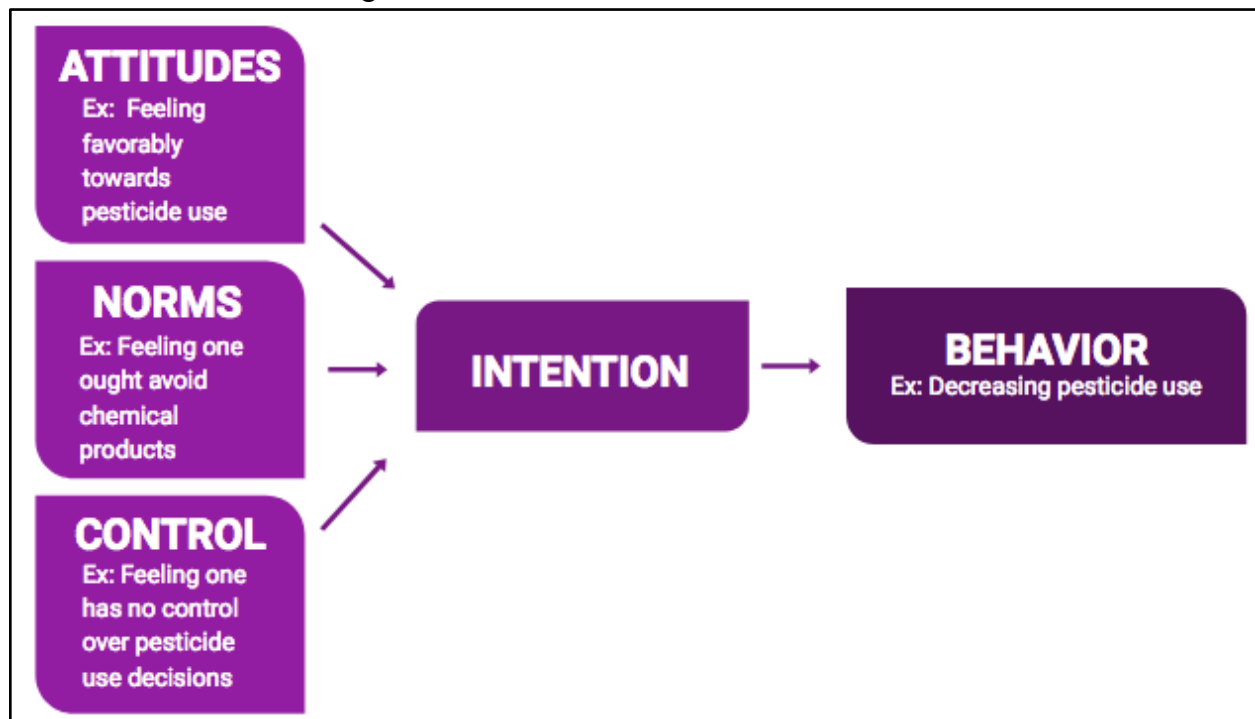


Figure 3. Theory of planned behavior with integrated example of lawn care BMP. Adapted from Figure 1, M. Fishbein and I. Ajzen (2010).

While the findings associated with attitudes, norms, and control for each BMP will not be finished until the survey is distributed and the results analyzed, the information we gathered both in our interviews and in our literature review has allowed us to formulate hypotheses as to the social and psychological motivators which underpin the lawn care decisions of Lewiston/Auburn residents. With regard to attitudes towards the outcome of improved water quality, it seems as though people in the area recognize and want the health benefits and economic boon of cleaner water bodies. However, when it comes to attitudes towards the behaviors themselves which lead to less water pollution and better water quality, whether or not these attitudes are favorable depends highly based on the individual, and what motivates people to care the most is if the ramifications of stormwater pollution have a direct impact on them personally. More generally, it does not seem as though people are apt to organically make the connection between lawn care decisions and stormwater pollution. We also have gathered that the issue of stormwater pollution prevention and the associated lawn care decisions can generate some apathy, as these issues and the importance of lawn care BMP adoption has become deemphasized in comparison

with other social problems, such as personal finances as well as climate change in the environmental sphere. With regard to injunctive norms, it is clear that no one wants the problem of water pollution to worsen, but that people generally don't feel a strong obligation to change their lawn care practices to serve this desire, particularly folks who do not have proclivity to feel favorably towards environmentalism on the topic of clean water. However, strong descriptive norm-setting exists with regards to lawn care practices. Not only does the social aspect of norm-setting, such as perceptions of what others in the neighborhood are doing on their lawns, seem to hold potential for setting positive standards surrounding lawn care, but also these community norms can be particularly detrimental to the cause of lawn care BMP implementation insofar as harmful practices, such as waste dumping or frequent pesticide use, become heavily naturalized when these descriptive norms perpetuate themselves. With regard to perceived versus actual control over lawn care BMP implementation, we see a wide rupture between the two. In the Lewiston/Auburn area, it is common for residents to rent homes, or to have their landscaping taken care of by an outside professional. In these situations, it is often a landlord or a lawn care professional who both decides what will be done with a residents' lawn, and implements these decisions. This may lead people to perceive that they have no control over their own lawn care. However, interaction between lawn caretakers and residents, and conversations surrounding lawn care BMPs between these individuals, hold the potential to bear fruit when it comes to adopting the lawn care BMPs which the AVSWG aims to promote. The actual control of residents over their lawn care is probably much greater than they believe given that people could seek out the opportunity to discuss lawn care with their landlord or landscaper and make their desires known regarding the mitigation of runoff pollution. The possibility also exists that people simply don't feel that they have control over ameliorating water pollution near where they live, and that it is someone else's problem to take care of this. Again, however, this assumption could be challenged with educational outreach.

#### *D. Survey Design and Pretest*

Based on the conclusions derived from the synthesis described above, the research group designed and pretested a survey which will provide the AVSWG with the means to comprehensively understand and evaluate the effectiveness of their educational and outreach programs. After completing the Bates IRB survey, the research team determined that an IRB review was not required for conducting this particular survey. In designing the survey, the research team first considered the most effective survey designs with a focus on finding the best methods of creating the survey. Additionally, the team considered the best mediums, question types, and demographics to target for survey distribution. The survey was pretested by Bates Faculty and Staff in order to improve its performance and validity.

After going through multiple stages of survey revision with our professors Francis Eanes and Ethan Miller we distributed our survey through an online platform (Qualtrics) to a selected group of Bates College Faculty members who are Lewiston/Auburn residents. Their feedback was instrumental in the design and implementation of our final version of the survey.

Our first survey respondent was Pete Schlax, a Bates library research assistant who gave us insightful feedback on our survey format, question selection, and general wording. Pete Schlax advised us to give more background about the AVSWG to inform respondents who might not be aware of the group. Additionally, he advised us to instruct respondents on how long the survey will take to complete and to provide instructions for how the physical survey should be returned to the AVSWG. Pete Schlax also recommended that we be more precise in our distinctions between lawn care practices and lawn care decisions. Perhaps most importantly was the advisement to avoid double-barreled questions that could have varying responses and understandings. For example, we ask “How good an understanding do you feel you have of stormwater pollution, its effects, and/or how to prevent stormwater pollution?” Pete Schlax responded “I think that stormwater pollution, the effects of stormwater pollution and prevention of stormwater pollution are all very different things. I can easily imagine someone having a great understanding of one or two while admitting to a poor understanding of the other(s). Perhaps you would get more information if you split this question up.” Constructive feedback and analysis of our initial survey by informed faculty members such as Pete Schlax was a critical part of how we designed our final product.

Christine Murray, a fellow library services employee at Bates College, also provided helpful preliminary survey feedback. Christine Murray gave us overall bigger scale feedback and dissected small errors in our survey as well. Christine Murray suggested that we eliminate some questions to avoid a loss of interest and fatigue from our survey respondents. Besides this suggestion Christine Murray stated, “I thought your questions were pretty clear, and that’s a big deal.” As for smaller scale errors Christine Murray pointed out some confusion she had with a few of our questions. The first question that created confusion was “The success of the Lewiston/Auburn community relies on healthy water quality in local rivers and streams.” Christine Murray asserted, “This one is hard to answer because I don’t know what kind of success this is. If you’re thinking economic success, you could indicate that, but it might mean well-being, health, etc.” Christine Murray also observed inconsistencies in a few of other questions. In response to “People in my neighborhood generally use environmentally-friendly practices on their lawns” Christine Murray remarked, “For this one, it’s not clear what to mark if you don’t know, and personally I’m not sure what my neighbors do.” Word choice, clarity, and repetition were other areas that were suggested that we revisit. Similarly to Pete Schlax, Christine Murray’s insightful feedback helped us make the necessary revisions for an efficient and effective final survey.

The feedback we received from our pre-testers and the analysis we conducted from their responses on the online platform of Qualtrics helped us formulate the final survey. The final version of our survey was constructed with the use of the desktop publishing software Adobe InDesign and is included in our Appendices section of our report. Once the final survey is distributed starting later this month, Bates students will transfer the data into the Qualtrics program for statistical analysis.

### *E. Interpreting results: Things to Consider*

The behavior change theory which formed the foundation of our survey design process can be looked upon as a concrete finding in assessing the results of our work. However, while we have been able to collect valuable information throughout the course of the project surrounding the behavioral motivations which lead to stormwater pollution BMP adoption, as well as surrounding the outcomes of the AVSWG's educational outreach initiatives, at this point we frame this information as hypotheses which will be further tested upon the distribution and analysis of the final survey product. Developing these hypotheses nonetheless is a crucial step in the process of better understanding how the goals of the AVSWG might be met. Additionally, we emphasize that the investigation of behavior change motivation and of educational outreach effectiveness go hand-in-hand both conceptually and methodologically. While a specific portion of the survey is aimed at receiving direct feedback on the impact of the AVSWG's educational outreach efforts on community consciousness surrounding the problem of stormwater pollution, and while a specific portion of the survey aims to directly reveal the nature of residents' lawn care practices, the portions of the survey dedicated to investigating the components of the behavioral change theory also pertain to the question of educational outreach effectiveness as they allow for the examination of residents' mental models of lawn care and its connection to pollution, which in turn provides guidance on how best the AVSWG might intervene in the mental modeling process with their educational approaches in order to best shape residents' lawn care practices. We elaborate on this larger aim in the following section.

## **VII. Recommendations for Next Steps**

While we recognize that our research and deliverables are intended to be a foundation for the AVSWG to further examine and evaluate their educational and outreach efforts, we would like to provide some informed recommendations for logical next steps for the AVSWG to continue this research once our group has moved on from this project.

We believe that there is a need for increased research regarding BMPs within the Lewiston/Auburn area, especially surrounding behavioral motivation for the adoption of BMPs, or conversely, barriers which prevent BMP adoption. The survey we have produced for distribution at the end of this project only targets Lewiston/Auburn residents and their lawn care decisions, and while these decisions have notable bearing on the stormwater runoff pollution which occurs, we recognize that businesses are required to manage large quantities of stormwater runoff from their properties, and often have sizable contributions to stormwater pollution resulting from their activities. As such, during the next permit cycle, we suggest that the AVSWG, possibly in collaboration with future Bates students and faculty, adapt the survey instrument we have produced specifically for distribution to business owners in order to more thoroughly address and understand stormwater pollution concerns, as well as avenues for the mitigation of stormwater pollution on the part of businesses.

We also suggest that as the AVSWG continues to foster stormwater awareness in Lewiston/Auburn in the coming years, it adapt and tweak its educational outreach strategies in response to the results of the survey such that they may better serve the goal of reducing stormwater pollution in the area. In consideration of the conceptual framework provided by the Reasoned Action Approach, we encourage the working group to continue assessing why some educational outreach efforts are more successful than others, which would open up the opportunity for the identification of new leverage points that future educational outreach efforts could target. We also advise delving further into community-based social marketing (CBSM) techniques, such as those outlined by McKenzie-Mohr and Schultz (2014) in their discussion of barriers to BMP adoption and ways to overcome them, as well as those developed by Ray et al. (2013) for use in their educational outreach mechanisms regarding lawn care runoff pollution into the Gulf of Mexico. Lastly, if it is possible, we advise that the AVSWG expand the breadth of pollution sources they aim to contend with from their current focus primarily on lawn care, to the incorporation of other pollutants which community members are concerned with, such as pet waste. These suggestions will allow the AVSWG not only to continue to fulfill the requirements of the stormwater permit, but also to better pursue the larger goal of ameliorating the problem of stormwater runoff pollution in the community through public education and assistance.

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# I. Appendices

## A. Survey

### Your Views on Local Water Resources - Androscoggin River Watershed

Dear Lewiston or Auburn citizen,

The Bates College Program of Environmental Studies is conducting this survey in coordination with the Androscoggin Valley Stormwater Working Group (AVSWG) to understand water quality issues in the Androscoggin River Watershed. The AVSWG is the regional entity contractually tasked with managing and mitigating non-point source pollution impacts in Lewiston and Auburn. Your insights are particularly important in helping us understand and facilitate technical and financial assistance for local conservation efforts.

This survey is intended to help the Androscoggin Valley Stormwater Working Group advance their efforts to educate local residents on methods to reduce the impacts of stormwater on local water quality.

We ask that this survey be completed by the person in your home who makes most of the lawn care management decisions and is at least 18 years old. Your participation in this survey is voluntary. The information you provide will be kept confidential.

Please follow the individual instructions for each section and choose the answer that best describes your personal situation or opinion. The survey should take approximately 20 minutes to complete.

The researchers will return to pick up the survey at a later date.



LEWISTON • AUBURN • SABATTUS • LISBON



For more information regarding the survey, please contact Francis Eanes at [feanes@bates.edu](mailto:feanes@bates.edu). Thank you in advance for your help!

**Androscoggin River Watershed**  
**Your Views on Local Water Resources**

**SECTION I - About You**

1. Do you live in Lewiston or Auburn?

Lewiston  Neither

Auburn

2. Do you own or rent property?

I own property

I rent property

3. What is the highest degree in school you have received?

High School Diploma  Bachelor's Degree

GED  Graduate Degree

Associate's Degree  I do NOT have a degree

4. What is the approximate size of your residential property (square feet or acres)?

5. What is your age?

**SECTION II - Common Community Lawn Care Practices**

6. Listed below are statements regarding lawn care behavior norms in your neighborhood. Please select your level of agreement with the following statements:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. As a member of the Lewiston/Auburn community I have a responsibility to help protect local rivers, lakes, and streams.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. When I take care of my lawn and my landscaping, I am likely to decide what lawn care practices are acceptable based on what I see my neighbors doing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. People in my neighborhood generally use environmentally-friendly practices on their lawns.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. I feel an obligation to use environmentally-conscious lawn care practices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. I think that I should do what I can to protect the water quality in Lewiston/Auburn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. My community believes that it is important to keep the rivers, lakes, and brooks in Lewiston/Auburn clean.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Androscoggin River Watershed

## Your Views on Local Water Resources

### SECTION III - Attitudes Towards Local Water Quality

7. Listed below are statements regarding opinions on stormwater and water quality. Please select your level of agreement with the following statements:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. I care about ecosystems and wildlife in Lewiston/Auburn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Water pollution in rivers, lakes, and brooks is a problem in Lewiston /Auburn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. I am concerned about the water quality and/or environmental health of Lewiston/Auburn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Surface water pollution, such as in nearby rivers, lakes, and brooks directly affects me and/or the people I care about.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. I would like it if the rivers, lakes, and brooks in the Lewiston/Auburn area were less polluted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Compared to concerns such as the economy, water pollution in Lewiston/ Auburn's lakes, rivers, and streams doesn't seem like a very important problem to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. As a member of the Lewiston/Auburn community I have a responsibility to help protect local rivers and brooks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. The overall success of the Lewiston/Auburn community relies on healthy water quality in local rivers and brooks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. I view local rivers and brooks as an important part of my cultural identity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. I would be willing to change my lawn care practices to improve water quality if I knew what to do.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. I have positive feelings towards lifestyle changes aimed at making the environment cleaner where I live.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l. In general, I support environmentally-friendly lawn care practices such as minimizing pesticide and fertilizer use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m. My personal lawn care practices affect water quality in local rivers and brooks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
n. If the impacts of water pollution are not visible to me, I don't really think about the problem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Androscoggin River Watershed*

**Your Views on Local Water Resources**

**SECTION IV - Influences on Lawn Care Decisions and Practices**

8. People's lawn care practices are often influenced by sources of information. In your opinion, how influential are the following sources of information on your lawn care *practices* (e.g. cutting/mowing your lawn high (>3"), applying fertilizer to your lawn)? Please select how influential the following sources are:

	Not Influential	Slightly Influential	Influential	Extremely Influential	Don't Know this Source
a. Manufacturers of lawn care products (e.g. Scotts, TruGreen)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Product labels on pesticide or fertilizers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Gardening books, magazines, TV shows, or radio programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Websites, blogs, or social media	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Local landscaping professionals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Maine Department of Environmental Protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Auburn Water District	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Lewiston Stormwater Utility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Conservation organizations (e.g. Androscoggin Land Trust, Trout Unlimited)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Other people in my household	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. My neighbors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l. Lawn care professionals at retail stores like Walmart or Home Depot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m. Cooperative Extension (University of Maine)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
n. Androscoggin Valley Stormwater Working Group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o. Other (Please Specify):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Androscoggin River Watershed

**Your Views on Local Water Resources****SECTION V - Decisions About Lawn Care**

9. Who takes care of your lawn?

- I take care of my own lawn                       My landlord  
 Someone else in my household                       Other (Please Specify):  
 My landscaper/a hired individual or company

10. Who makes the lawn care and landscaping decisions on your property?

- I make the decisions                       My landlord  
 Someone else in my household                       Other (Please Specify):  
 My landscaper/a hired individual or company

11. Listed below are statements regarding the degree of control you have over your lawn care and landscaping practices. Please select your level of agreement with the following statements:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. There isn't a lot I can do to change the way I take care of my lawn to protect the water quality in Lewiston/Auburn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. I have control over my own contributions to water pollution in Lewiston/Auburn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. I am doing what I can to prevent water pollution in Lewiston/Auburn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. It is up to other people to control their contributions to pollution to make the problem better.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**\*\*\*Answer Question 12 ONLY IF someone else takes care of your lawn\*\*\***

12. Select your level of agreement with the following statements:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. I have no say in the lawn care and landscaping decisions on my property because I do not discuss lawn care and landscaping decisions with the person/people who are making the decisions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. If I discussed lawn care and landscaping decisions with the person/people who take care of my lawn, they would take my requests into account.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. If I discussed lawn care and landscaping decisions with the person/people who make the lawn care and landscaping decisions on my property, they would take my requests into account.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Androscoggin River Watershed*

**Your Views on Local Water Resources**

**SECTION VI- Effects of Pollution**

13. Pollutants and water conditions impact communities. Please select how much of a problem these consequences of poor water quality are in your area:

	Unsure	Not a Problem	Slight Problem	Moderate Problem	Severe Problem
a. Contaminated drinking water	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Human health concerns (cancer, diseases, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Contaminated fish/loss of desirable fish species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Reduced visual appeal of rivers or streams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Reduced recreational quality in rivers, ponds, lakes or brooks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Excessive aquatic plants or algae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Odor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Reduced property values	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Negatively impacted local economy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Reduced or negatively impacted tourism	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. Reduced sense of community pride	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION VII- Sources of Water Pollution**

14. Listed below are observed sources of stormwater pollution. Please select how present these sources of water pollution are in your area:

	Unsure	Not Present	Present
a. Discharge from paper mills or other industrial sites	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Sewage treatment plant discharge into rivers and streams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Sediment from construction sites eroding into rivers and streams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Excessive use of fertilizers and/or pesticides on lawns	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Improper disposal of lawn waste, oils, and chemicals into storm drains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Improperly maintained septic systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Stormwater runoff from impervious surfaces (roofs, parking lots, and roads)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Street salt and sand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Waste from pets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Littering/illegal dumping of trash	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Androscoggin River Watershed*

**Your Views on Local Water Resources**

**\*\*\*Are you the primary decision maker for your lawn care practices? If NO, please skip to SECTION X: Education and Events. If yes, please continue with SECTION VIII and IX.\*\*\***

**SECTION VIII- My Lawn Care Practices**

*Fertilizers*

15. How often do you use chemical fertilizers on your lawn?

- Never  Twice or more per year  
 Once every two years  
 Once every year

16. How much chemical fertilizer do you use on your lawn?

- I do not use chemical fertilizer  More than the amount recommended  
 Less than the amount recommended  
 The amount recommended

*Pesticides*

17. How often do you use chemical pesticides on your lawn?

- Never  Twice or more per year  
 Once every two years  
 Once every year

18. How much chemical pesticide do you use on your lawn?

- I do not use chemical pesticide  More than the amount recommended  
 Less than the amount recommended  
 The amount recommended

*Mowing*

19. At what length do you typically cut your lawn?

- I do not mow my lawn  1-3 inches  
 1 inch or less  Greater than 3 inches

20. When you mow, how often do you mulch (leave) your clippings on the lawn?

- I do not mow my lawn  Half of the time  
 Never  Every time  
 Once a year  
 Twice a year

*Pets*

21. How often do you pick up your pet's waste?

- I do not have a pet  Most of the time  
 Never  Always  
 Sometimes



*Androscoggin River Watershed*

**Your Views on Local Water Resources**

**SECTION IX- Implementation**

22. Listed below are factors which may prevent you making changes to your household and lawn care practices. How much do each of the following factors prevent you from changing your lawn care practices?

	Not At All	A Little	Some	A Lot	Unsure
a. Financial cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Personal physical limitations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. The need to learn new skills, practices, or techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Lack of knowledge about the benefits of changing my practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. None of my neighbors are implementing the practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Concern about what my neighbors might think	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Legal restrictions on my property	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Concerns about property value	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. Time limitations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l. Having no strong feelings about making changes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION X- Education & Events**

23. How have you heard about the problem of stormwater pollution? (Check all that apply)

- |   |  |
|---|--|
| <input type="checkbox"/> I have not heard of stormwater pollution | <input type="checkbox"/> Word of Mouth           |
| <input type="checkbox"/> Educational Flyers                       | <input type="checkbox"/> Local Businesses        |
| <input type="checkbox"/> Stormwater Drain Stenciling              | <input type="checkbox"/> Professional Contacts   |
| <input type="checkbox"/> City or District Events or Workshops     | <input type="checkbox"/> Other (Please Specify): |

*Androscoggin River Watershed***Your Views on Local Water Resources**

24. Do you support the stormwater fee? Why or why not?

- I am not a resident of Lewiston  
 I am not familiar with the stormwater fee  
 Yes

- No

25. What sort of event, if any, related to local water resources would you be likely to attend?

26. How good an understanding do you feel you have on how to prevent stormwater pollution?

- No understanding  
 Vague understanding  
 Moderate understanding  
 Good understanding  
 High level of understanding

# Androscoggin River Watershed Your Views on Local Water Resources

27. Do you recognize any of the public pamphlets/flyers, related to stormwater, pictured below?

Yes  
 No

## Help us SAVE YOU MONEY

Protect the health and safety of your kids, pets, and water by reducing use of fertilizer and weed and bug killers on your lawn. Instead, **MOW HIGH** and **LET THE CLIPPINGS LIE!**

**Facts**

- Some Cities do not lead to sediment stores. They lead to our ponds and rivers.
- Runoff from your own yards chemicals into the Great Ocean.
- Approximately 50% of pesticides are freely using the Best Management Practices outlined below.

**Best Management Practices (BMPs)**

- Mow High
- Let the Clippings Lie
- Reduce / Avoid Use of Insecticides
- Reduce Herbicide Use (if you have weeds, weeds & power spray)
- Reduce Fertilizer Use (if you have weeds, use a fertilizer granule product that releases slowly)
- Plant native

**TAKE AWAYS**

- Clipping your lawn if you're reducing the need for fertilizers and herbicides.
- There are a lot of pesticides that have been taken up in our water systems.

## Our communities are working for cleaner and safer waters

**WORKING TOGETHER FOR CLEAN WATER**  
LEWISTON • AUBURN • SABATTUS • LISBON

The Androscoggin River, Taylor Pond, Lake Auburn, No Name Pond, Sabattus Pond and other water bodies are important for economy, recreation and environment.

**We need your help! You can make a difference by following these five steps on your property**

For more information: [www.landscape.org](http://www.landscape.org)

## Things to Keep in Mind

Remember... Storm drains are NOT connected to the sanitary sewer, do NOT get clogged, and may discharge directly into the Androscoggin River, Little Androscoggin River, No Name Pond, Lake Auburn, Taylor Pond, and Sabattus Pond.

If you have concerns regarding storm water pollution, please call us at 207-533-3965, x3421.

City will your help on how to keep our water and food safe!

and protect the region from flooding.

**CITY OF LEWISTON**  
Department of Public Works  
80 Allen Ave.  
Lewiston, ME 04203

Phone: 207-533-3965  
Fax: 207-533-3967  
Email: [pubw@lewistonmaine.org](mailto:pubw@lewistonmaine.org)  
[www.lewistonmaine.org](http://www.lewistonmaine.org)

**think blue**  
Help Protect Lewiston's Watershed

Phone: 207-533-3965

## What is the biggest threat to our rivers and ponds?

POLLUTED STORM WATER RUNOFF ON HIGHWAYS, PAVEMENT, AND PARKS.

Checklist of what to look for:

- Household hazardous wastes are common household items.
- Polluted storm water can affect drinking water intakes.
- Animals can become stranded in a parking lot, road, or roof. As a result of a leak or spill, oil, gasoline, antifreeze, oil, paint, and other liquids can flow directly into your local river or lake, or seep into a well.
- Runoff from a car wash, car detailing, or a water leak. Never mop an entire room—take a bucket—less of water to mop.
- Keep your lawn well-maintained. Use fertilizers and pesticides.
- Use the Androscoggin River watershed to improve the quality of the water.

**What is the biggest threat to our rivers and ponds?**

**How Can I Keep Storm Water from becoming Polluted?**

**Don't Dump**  
Don't dump household hazardous wastes and oil into your trash can, down the drain, or into the ground. They can pollute the water supply and harm the environment.

**Don't Use**  
Use less lawn and garden fertilizers, pesticides, herbicides, and other chemicals. Use them only when necessary. Follow the directions on the label.

**Don't Pour**  
Don't pour oil, paint, or other liquids into the ground, down the drain, or into the water supply.

**Don't Scatter**  
Don't scatter fertilizer, pesticides, or other chemicals on the lawn or garden.

**Don't Wash**  
Don't wash your car, truck, or boat in a driveway or on the street.

**Don't Dump**  
Don't dump household hazardous wastes and oil into your trash can, down the drain, or into the ground.

**Don't Use**  
Use less lawn and garden fertilizers, pesticides, herbicides, and other chemicals. Use them only when necessary. Follow the directions on the label.

**Don't Pour**  
Don't pour oil, paint, or other liquids into the ground, down the drain, or into the water supply.

**Don't Scatter**  
Don't scatter fertilizer, pesticides, or other chemicals on the lawn or garden.

**Don't Wash**  
Don't wash your car, truck, or boat in a driveway or on the street.

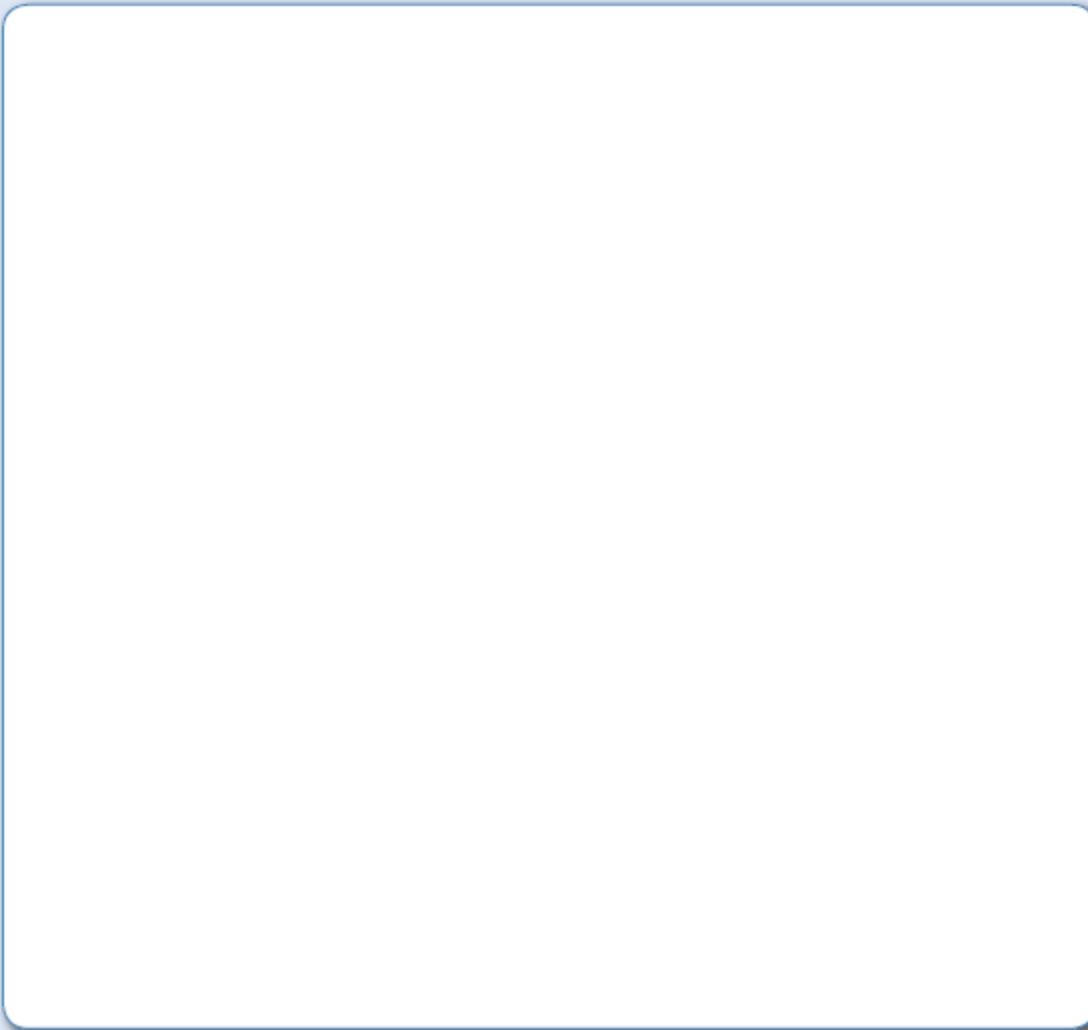
*Androscoggin River Watershed***Your Views on Local Water Resources**

28. Have these pamphlets/flyers altered or influenced your lawn care practices (e.g. cutting/mowing your lawn high (>3"), applying fertilizer to your lawn)?

- I have not seen any of these pamphlets or flyers
- I have not changed my lawn care practices
- I have slightly changed my lawn care practices
- I have significantly changed my lawn care practices

**Thank you**

Please use the space below for any additional comments or questions relating to stormwater pollution or water quality concerns in the Lewiston/Auburn area.



## *B. Additional Survey Questions*

### ***Irrigation and Watering***

1. How often do you irrigate your lawn in an average year? (Never, 2 or fewer times per year, monthly, weekly, more than weekly)
2. When do you water your lawn? (I do not water my lawn, On a schedule regardless of rain, when it looks like it needs to be watered)
3. If you have a watering schedule, how often do you typically water your lawn? (I do not water my lawn, Every day, Every other day, Two or three times a week, Once a week, Less than once a week)
4. If you water your lawn, how do you water your lawn? (Automatic sprinkler; Manual sprinkler; Spraying from the hose)
5. Does the cost of water influence your watering habits (Yes/No; If yes, describe)

### ***Winter Weather Care***

1. In the winter, do you sand or salt your driveway/non-grass surfaces? (I do not have a driveway or a non-grass surface, I do not sand or salt my driveway or non-grass surface, I only *salt* my driveway or non-grass surface when it is icy, I only *sand* my driveway or non-grass surface when it is icy, I use both *salt* and *sand* when it is icy).
2. During inclement weather events, I use salt and/or sand (Never, A little bit, Some, A lot)
3. When I use salt and/or sand, I apply (None, A little, Sometimes, A lot)

### ***Landscaping***

1. I plant native plants in my yard (I don't plant plants, Never, Sometimes, Often, Always)
2. I group plants together that need similar amounts of water in my yard (I don't plant plants, Never, Rarely, Sometimes, Often, Always)

### ***Herbicides***

1. How often do you use herbicides on your lawn? (Never, once every 2 years, every year, twice or more per year)
2. How much herbicide do you use on your lawn? (I do not use any herbicides, less than the recommended amount, the amount recommended by the manufacturer, more than the amount recommended)

## *C. Detailed summary of interviews*

**Interview #1:** White male, estimated age 55, public librarian, lives outside of L/A, but grew up in the area

-Lives in an apartment where the landlord takes care of the lawn/landscaping, but in his childhood home, his family took care of the lawn

- Landlord hasn't made any major changes to the landscaping over the years
- Doesn't know about landlord pesticide or fertilizer use, but knows his family didn't use them growing up
- Doesn't think about stormwater pollution (or water pollution generally) very much; is sympathetic to the environmentalist cause, but wouldn't go out of his way for it (says "I would recycle this water bottle, but I don't recycle every water bottle); thinks that though no one wants to see environmental problems "get any worse," individuals would act in the interests of mitigating stormwater pollution based on how much they personally care about the environment
- Believes that residents care about stormwater pollution (and environmental issues) only if they directly affect a person's life
- Can't recall ever seeing storm drain stencilling or informational door hangings, but generally knows "you're not supposed to be pouring anything into them"

**Interview #2:** White female, estimated age 60, retired nurse and former Bates groundskeeper, currently works at Lewiston Public Library, Auburn resident

- Lives in Auburn/resident of Lewiston-Auburn her whole life
- Father was a business owner who had to get stormwater permitting
- Powerful descriptive images: past environment/attitudes toward the river
  - Paint peeling off the houses
  - River used to smell; raw sewage going into the river
  - Androscoggin area known colloquially as 'cancer alley'; recalls treating two young girls as a nurse whose mother believed the polluted river was the cause of their neural muscular dystrophy
  - How well the river is doing seen as related to city pride and city wellbeing as a whole
- Dog/animal waste is a serious issue as well as chemicals; knows based on experience that all sorts of things get poured down storm drains and that problems arise as dumping accumulates "little by little" without thought to the overall effects of slow pollution buildup
- Thinks people care about environmental health and water quality a lot based on how it affects people in personal and emotional ways
- Owns a home, but doesn't have a lawn (surrounding permeable surface is moss-covered with trees)
- Thinks awareness or concern of stormwater pollution related to a "certain income level"

**Interview #3:** White male, estimated age 60, owner of Rainbow Bicycle, Lewiston resident, homeowner

- Someone else takes care of his lawn; this person does what he is instructed to do by the homeowner
- Uses some pesticides and fertilizers

- Sees that people are more interested in the lakes of this region and the associated consequences in these freshwater systems than they are with the river
  - People are more aware of the effects of runoff in lakes/ponds than the consequences associated to urban runoff into river systems, especially in times when fertilizer use has caused bad algal blooms in the ponds and lakes nearby
  - People are concerned about their property values and especially those with camps are concerned about water quality; people enjoy the ability to participate in recreational activities, recognize economic boom to L/A of clean rivers and lakes
- Believes folks have an ‘out of sight, out of mind’/ “this is someone else’s problem” mentality regarding stormwater pollution and that they don’t “make the connection between the city and their own homes” in considering pollution, outside of lakeside vacation properties or properties on which the water body into which stormwater feeds is directly visible (i.e. a stream)
- Very aware of stormwater tax as a business owner; believes this is the primary topic which comes to residents’ minds in hearing about stormwater
- Believes people are only going to react to laws and regulations surrounding stormwater management
- Can’t recall seeing storm drain stencilling or door hangers, but when prompted seemed to recall seeing the flyer in his water bill
- Feels there has been a decrease in the discussion/educational efforts related to stormwater (as compared to five years ago) as more of the “bandwidth” is taken up by the issue of climate change; believes the public has capacity to consume only a limited amount of information in terms of problems and causes
- Believes lawn care and landscaping practices, especially harmful ones (i.e taking down trees off-season) have contagious element, i.e. practices people engage in and accept are shaped by what others are doing

**Interview #4:** White male, estimated age 65, works at public library

- Not a current homeowner
- Noted the changing attitudes and realities of the Androscoggin River. The attitude shift from not caring about stormwater/water pollution to more awareness and recognition of the problem. Additionally noted the physical changes of the river, it went from “seeing pieces of toilet paper in the river”/ “being able to smell the river from main street” to being a place where this man now frequently goes fishing.
- Has complained to the state of Maine about pesticide regulations particularly in his experience working as a groundskeeper for a golf course that practiced questionable pesticide application, which in his mind jeopardized the wellbeing of the lower Androscoggin River. He preferred to keep the particular golf course anonymous.
- He didn’t cite any particular educational effort as the reason why stormwater/water pollution has become more aware in the L/A area but believes it is a symptom of larger environmental

awareness and a recognition that the Androscoggin had become so badly polluted that it was starting to reflect poorly on the cities of Lewiston/Auburn.

- Believes that lack of education is a big factor for water pollutants, for example he suggested that many private homeowners with large lawns take shortcuts and are misinformed and therefore buy products like Roundup which creates dangerous chemical runoff. He also suggested that other products such as motor oil, and large amounts of cigarettes and general trash littering as part of the problem.

- Suggested that Lewiston/Auburn residents have a lot of pride in their city and that the turn around of the Androscoggin is proof of that.

- Believes that the Androscoggin river pollution problem was not properly advertised/educated because it reflected poorly on the city and most people wanted to keep it discreet

- Expressed satisfaction with the ecological state of the river, noting the return of birds of prey and admiring the vibrancy and health of the river ecosystems.

**Interview #5:** White female, estimated age 30, Lewiston home renter, Employee Poland Springs water and The Vault liquor store

- Did not express much awareness of her pesticide usage/lawn care because she is a renter and says her landlord makes lawn care decisions

- Has been featured alongside the Androscoggin river for photoshoots, and claims that this would not have been possible due to the state of the river, when she was growing up

- Expressed awareness that while many have helped to improve the river there are still people who illegally dump in the river, citing parties alongside the river where people throw their trash into the river, and even noted that people still throw tires and larger waste into the river as well.

- Has not seen any educational materials regarding stormwater but believes people are more aware of environmental issues now than in the past. But also believes many people are still uninformed and uneducated.

- She also suggested that her work with Poland Springs has made her more aware of environmental problems, that she might otherwise be unaware of. And that her work at Poland Springs might make her more aware of environmental problems than other Lewiston residents.

- Believes that in general Lewiston/Auburn residents care about their community and their environment and that often times visitors are more likely to be disrespectful to the environment and the community.