The Cities of Centralia and Maple Valley

Stormwater Community Research Report

May, 2010

Prepared by:
Kenneth Klima, Senior Research Director
Bret Buttenob, Research Analyst

Hebert Research, Inc.
13629 NE Bel-Red Road
Bellevue, WA 98005
(425) 643-1337
kklima@hebertresearch.com

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Thank You!

Hebert Research wishes to express its appreciation for the assistance given to us throughout this project by the following individuals:
Kim Ashmore, City of Centralia
David Casey, City of Maple Valley

Hebert Research
Kenneth Klima, *Senior Research Director*
Cynthia Hebert, *Chief Operating Officer*
Bret Buttenob, *Research Analyst*

Goal

Research Goal:
The goal of this research is to measure the public's knowledge and practices regarding stormwater in the cities of Centralia and Maple Valley using a telephone survey.   This research was completed at the request of the participating cities and may be used for stormwater planning and partial compliance with National Pollutant Discharge Elimination System (NPDES) Phase II permit compliance requirements in Washington State.

Content Areas for the Survey:
The "general public" is defined as: adults (18 years of age and older) who speak English and live in the cities of Centralia and Maple Valley. The subjects covered included:

> ❖ General impacts of stormwater flows into surface waters.
> ❖ Knowledge of the benefit of pervious surfaces.
> ❖ Source control BMPs and environmental stewardship actions and opportunities in the areas of pet waste, vehicle maintenance, and landscaping.
> ❖ BMPs for use and storage of automotive parts, hazardous cleaning supplies, carwash soaps and other hazardous materials.
> ❖ Knowledge of what constitutes an illicit discharge and how to report it.
> ❖ Yard care techniques relating to protecting stormwater quality and knowledge of what constitutes pollution in the yard.
> ❖ BMPs for use and storage of pesticides and fertilizers.
> ❖ BMPs for the disposal of carpet cleaning fluids.
> ❖ BMPs for auto maintenance.

Methodology

The survey was created for the general public for administration within each of the participating cities. Survey questions were developed by Hebert Research with input from each city. The survey consisted of 30 questions with 27 of them relating directly to knowledge about stormwater issues and practices respondents had adopted which protect the quality of stormwater. The remaining three questions dealt with an overall assessment of surface water quality, to whom illicit discharges should be reported and the age of the respondent.

Sample

A list containing over 1000 telephone numbers appearing in the telephone directory was purchased from a reputable commercial list company for each city. The list company maintains a record of all telephone numbers appearing in all phone books in the United States cross-referenced by zip code. Using the zip codes covering the study area, the list company drew a random sample of phone numbers. The random draw of these phone numbers assures proper proportionate sampling. High density areas have more phone numbers and, by randomly drawing from the list, the high and low density areas are properly proportioned. The resulting list for each city was loaded into Hebert Research's CATI (Computer-Aided Telephone Interviewing) system which randomly selects phone numbers as required during the interviewing process. Phone numbers were called up to five times at different times during the day and evening. This helped to assure that the survey is administered to both those who are easy to reach and those who are more difficult to contact.

The following table represents the obtained, random sample for each of the participating cities:

Sample Totals	
City	**Sample Size**
Centralia	104
Maple Valley	104
Total Sample	**208**

Research Controls

Hebert Research applied a variety of controls to help ensure that the research and analysis reached the highest quality that can be provided. The primary research controls that were employed in this study included the following:

Interviewer Training

All interviewers participated in a special training session for this study. During this training session, the questionnaire was read and a discussion was held regarding the objectives of the study, screening questions, skip patterns, and techniques for handling potential problems. Interviewers raised questions and provided their professional feedback regarding potential interviewing issues. All issues were resolved.

Pre-test the Survey
After the questionnaire was programmed in our CATI system, it was rigorously tested to assure all questions were asked and that data was accurately recorded. Thirty surveys were conducted during the pretest. The programming was deemed to be valid.

Conduct Interviews
Following a successful pretest of the questionnaire, telephone interviews were conducted using Ci3 CATI software from Sawtooth Software, a recognized leader in computer-aided interviewing. Potential respondents were called on weekdays at various times throughout the afternoon and evening until 9:00 pm. An appointment and callback procedure was used when necessary to minimize refusals and allow respondents to complete the survey at a convenient time. Interviews were conducted in English.

Monitoring
Telephone interviews were regularly monitored by the data collection supervisor and were found to be properly conducted.

Internal Peer Review
Hebert Research uses an internal review process called "CERA" (create, edit, review, approve) which is similar to academic peer review to ensure that each study meets or exceeds rigorous quality control standards. Through this process, several analysts review the statistical findings and offer critical feedback designed to increase the utility of the research and produce a clear and insightful report.

Incidence and Response Rates, Margin of Error
A total of 208 surveys were completed with adults living within the zip codes of Centralia and Maple Valley. At the 95% confidence level, the maximum margin of error for a sample size of 104 respondents is ±9.8% and for the entire sample of the two cities combined (208 respondents), the maximum margin of error is ±6.9%. This margin of error means that if the two-city survey was repeated 100 times, the resulting percents for each response for the two cities combined would be within ±6.9% (the margin of error) in 95 out of 100 cases for each question.

Over 1,000 phone numbers of residences in each city were called. Many of these calls went unanswered or went to voicemail. When a resident answered the phone and contact was made, we asked the respondent to participate in the survey. The *incidence rate* represents the percent of individuals we spoke to who were qualified to take the survey, meaning they spoke English and reported living within the city. The *response rate* represents the percent of qualified individuals we spoke to who agreed to participate and who completed an interview. Response rates above 50.0% are higher compared to other community-wide surveys and serve to increase confidence in the survey's validity and reliability.

Sampling Frame		
City	Incidence Rate	Response Rate
Centralia	68.2%	56.5%
Maple Valley	74.8%	60.7%

Statistical Weighting

Statistical weighting is a technique that is commonly used in survey research to correct for sampling bias. During the process of data collection, demographic data from the U.S. Census was obtained to identify population parameters for the zip codes involved in the survey. Sample demographics—specifically, age and gender—were compared with distributions in the population within each city. To compensate for potential sampling bias (e.g., interviewing a disproportionately high number of females), weights were calculated and applied to the survey sample for each city in order to ensure that gender and age distributions were represented in the proper proportion according to census statistics. After being weighted by age and gender, the samples for each city were then weighted by population to assure a proper proportionate representation among all cities combined. In the final weighting analysis, it was concluded that each sample was representative of the population for each city within the critical parameters of gender and age and for the region (*region* is defined for this report as the two cities combined) according to gender, age and population density.

Use of Findings

Hebert Research has made every effort to produce the highest quality research product within the agreed specifications, budget and schedule. The customer understands that Hebert Research uses those statistical techniques, which, in its opinion, are the most accurate possible. However, inherent in any statistical process is a possibility of error, which must be taken into account in evaluating the results. Statistical research can reveal information regarding community perceptions only as of the time of the sampling, within the parameters of the project, and within the margin of error inherent in the techniques used.

Evaluations and interpretations of statistical research findings and decisions based on them are solely the responsibility of the customer and not Hebert Research. The conclusions, summaries and interpretations provided by Hebert Research are based strictly on the analysis of the data gathered, and are not to be construed as recommendations; therefore, Hebert Research neither warrants their viability nor assumes responsibility for the success or failure of any customer actions subsequently taken.

Geographic Area Surveyed

The map below shows the geographic area covered by the zip codes of the two cities in the study (98531 for Centralia and 98038 for Maple Valley).
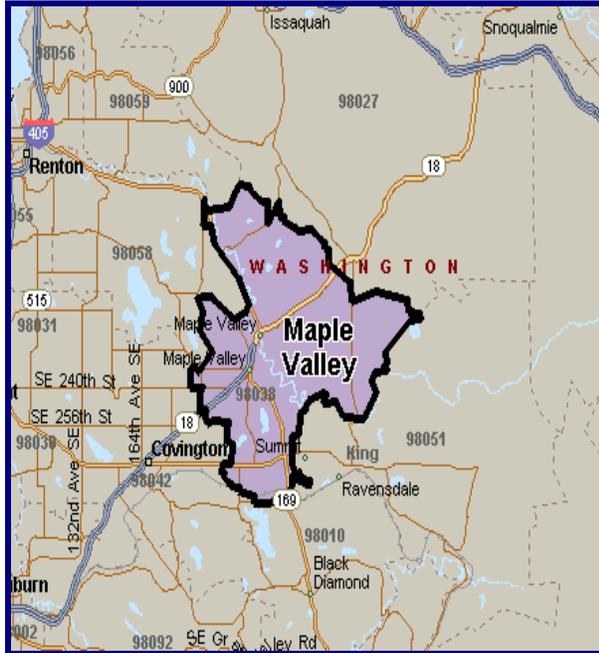
Explanation of Multivariate Analysis

The data for the surveys were analyzed using the chi square statistic to examine differences between respondents on a regional basis according to age and gender. Responses for the knowledge questions were first categorized as being a correct response or an incorrect response. The incorrect response category was made up of wrong answers plus responses classified as "need more information," "don't know/refused," and "not applicable." Following classification, the chi square test was executed. For the questions dealing with the actions of the respondents, those who said the action did not apply to them were first eliminated from the data set. Following their removal, the categories were classified as being "correct" or "incorrect" with the "incorrect" classification consisting of the collapsed categories as described above. The statistical test was run using these two categories.

Hypotheses were tested using the *0.05 level of significance* as the criterion value for the chi square analysis. When differences between groups reached this value, the finding is reported along with its *level of significance* which is stated as a *p value* (e.g., *p = 0.04*). Chi square results that reach the 0.05 level of significance indicate there is at least a 19-out-of-20 likelihood that the finding is true. This is a generally accepted level of reliability for public surveys.

In addition to measures of significance in which differences have been determined at the 0.05 level, a measurement of association is also reported. This measure shows the strength of association or dependency between the variables being tested such as the response to a question and gender. A measurement of 0 indicates there is no association between the two. It represents a null relationship. A measurement of 1 indicates perfect association or, to continue the example, gender is completely predictive of the response to the question. This measure of association is called Cramer's V.

Respondent Profile

The following tables describe the demographic profile of the sample by city and by the two cities combined (termed here as *Overall*, which will also be referred to in this report as the *region*). As indicated in the methodology section, the sample was statistically weighted to match the population by gender and age. The percentages listed below are the weighted frequencies for age and gender based upon the city and the region. Additional time and effort was spent attempting to reach female residents of Centralia who are between the age of 18 and 24. Due to the demographic makeup of Centralia and the limited funds available to conduct this survey, female respondents in this age range were not available to be reached. The result is that the data for Centralia reflects the knowledge of female individuals 25 years of age and older. However, considering the small number of females living in Centralia who are under 25 years of age, it is highly doubtful that the absence of this age group has had any *meaningful* impact on the results (by meaningful we mean there would be no change in the findings and the subsequent recommendations by including interviews with females in this age group). In our assessment, the absence of female respondents in Centralia in the under-25 age group has had no meaningful impact on the findings, conclusions or recommendations.

Age	Overall	Centralia	Maple Valley
18 - 24	7.8%	7.6%	8.1%
25 - 34	21.4%	17.8%	25.4%
35 - 44	25.6%	19.1%	32.7%
45 - 54	17.6%	17.0%	18.2%
55 - 64	9.9%	10.9%	8.7%
65 or Older	17.6%	27.6%	6.8%

Gender	Overall	Centralia	Maple Valley
Male	49.1%	49.9%	48.2%
Female	50.9%	50.1%	51.8%

Highly Variable Assessment of Water Quality in the Environment

Cities Show Similar Overall Perception Regarding Surface Water Quality
Respondents rated the quality of water in our rivers, watersheds and lakes and in Puget Sound (Puget Sound was not included in the questionnaire for Centralia) on a "0" to "10" scale where "0" meant "extremely polluted" and "10" meant "extremely clean. Respondent ratings in Centralia and Maple Valley were similar in their assessment of the quality of surface water in our region with ratings of 6.45 for Centralia and 6.90 for Maple Valley.
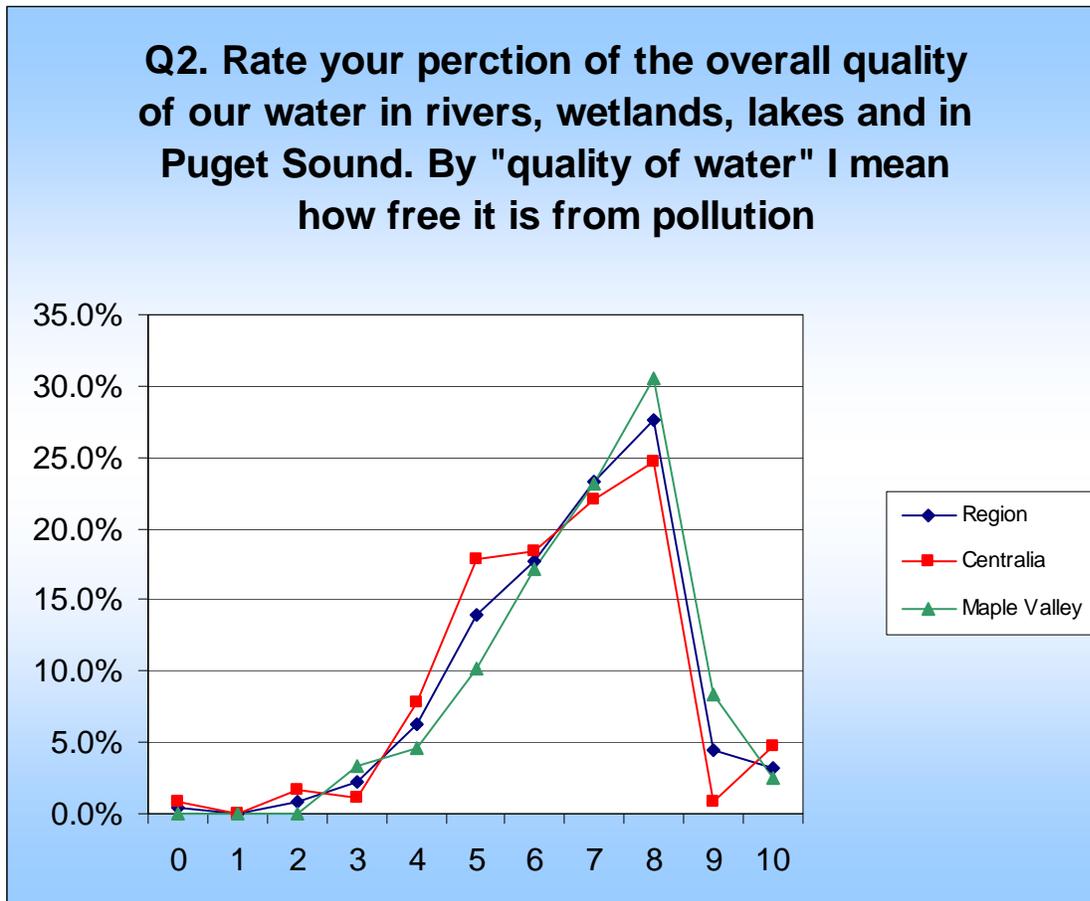
Figure 1. Respondent Rating of Surface Water Quality by Area

Rating of Surface Water Quality

Area	Rating
Region	6.66
Centralia	6.45
Maple Valley	6.90
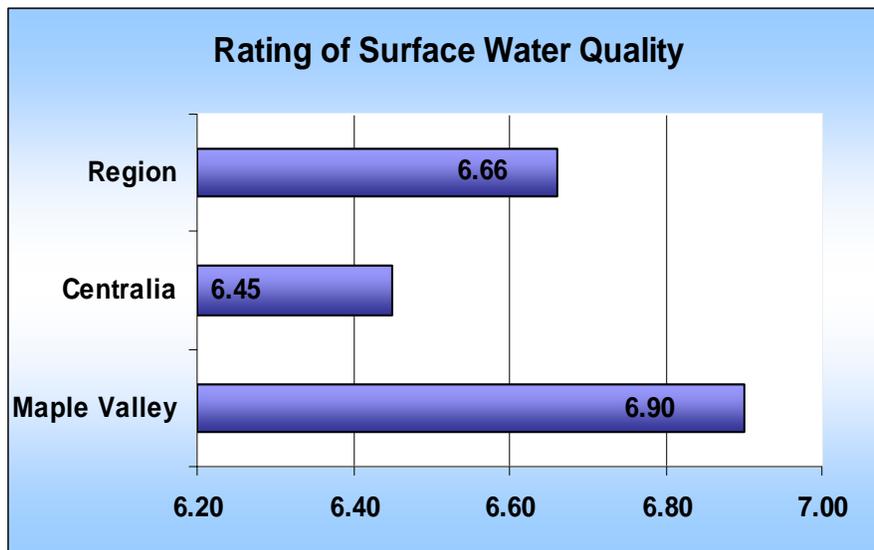
For the region represented by the two cities, the average rating of 6.66 suggests the public sees these waters as being clean, but on a relatively low level. The shape of the curve (see Figure 2 below) suggests a classic normal distribution of scores which is shifted to the right, toward the high end of the scale. A classic normal distribution would result if: 1) the information available to the public provided a confusing picture of surface water as being both high and low in quality, or 2) respondents possessed little knowledge about water quality and guessed at an answer.

The shift in average ratings from the middle toward the high end of the rating scale suggests the public, as a whole, views water quality as being generally clean but with some uncertainty. The similarity of the distribution of ratings to the normal curve suggests that the residents in each city are unclear about how clean the water is and that many respondents may have taken a guess at it.

Figure 2. Rating by General Public of the Quality of Water in the Environment (0 to 10 scale where "0" meant "extremely polluted" and "10" meant "extremely clean.")

Q2. Rate your perction of the overall quality of our water in rivers, wetlands, lakes and in Puget Sound. By "quality of water" I mean how free it is from pollution

Public Needs a Better Awareness of the Problem

The implication of this finding for education purposes is that the public needs to be more deeply informed regarding the current levels of pollution in rivers, wetlands and lakes and in Puget Sound. Using social marketing techniques, educational efforts should communicate: 1) the current nature, severity and negative effects of surface water pollution originating in stormwater, 2) the quality of stormwater that is desired and a vision of clean water in the future, 3) the many positive outcomes that will result from constructive public action to preserve the quality of stormwater, and 4) the helpful practices individuals need to adopt to prevent polluting stormwater. The more real the public perceives the problems and the benefits and the more advertising employs effective social marketing techniques, the greater the impact and response will be. If cities can go beyond simple education and offer programs that help to overcome obstacles to change, the opportunity for success increases. For example, many people resist changing their behavior if it will cost them money. If the city can offer a program where citizens receive money-saving coupons for using a commercial car wash, for example, instead of washing their car on the street, the likelihood of changing behavior in a desirable direction rises.

Areas of Greatest Educational Need

The two main purposes of this survey are to establish a baseline of the public's knowledge and practices regarding stormwater and to provide direction for each city's public education program to meet the requirements in the NPDES Phase II Permit in WA. The survey tested the public's knowledge and practices regarding 27 key issues and the resulting data provides baseline measures against which to assess future improvement as a result of each city's social marketing programming.

The priorities for education resulting from this research are divided into three levels based on the percent of the respondents across the region who provided a correct answer—the lower the percent of correct answers given, the higher the priority for education.
- Priority 1: Less than 50% correct answers (Table 1)
- Priority 2: From 50 to 80% correct answers (Table 2)
- Priority 3: Over 80% correct answers (Table 3)

In administering the questionnaire, respondents were presented with statements that were either true or false and were asked if they agreed or disagreed with the statement. Each of the statements in the tables appearing below include a letter indicating the correct answer for that statement, an **A** for "Agree" and a **D** for "Disagree." When the word "**Adopt**" appears, it means the statement deals with whether respondents have "adopted" the desirable behavior mentioned in the statement. The combination of "**A Adopt**," then, means the question deals with behavior and the desired response is "**A**" for "Agree"—which equates to the respondent saying that he or she engages in the desired behavior mentioned in the statement.

Rank for Education
1
2
3
4-9
10-18
19-23
24
25
26
27

All issues in Tables 1, 2 and 3 are ordered by their regional rank for education. The ranking of issues for each city is also shown with a color code as shown in the "Rank for Education" table on the left. The top rank item for education is colored bright green. Also a "1" appears underneath the percentage in the cell. The least important issue is a magenta color with "27" appearing underneath the percentage in the cell.

Priority 1 Issues: Less than 50% Correct Answers in the Region

Across the region, less than 50% of the public gave the correct answer to seven issues (25.9% of the twenty-seven issues tested, see Table 1). The seven lowest scoring issues for Centralia and Maple Valley were the same, however, the percent of correct responses varied by as much as 25%. Maple Valley residents send soapy water from washing their vehicle into a ditch or onto the street far more frequently than do residents in Centralia (Question 16). Citizens in Centralia are far less aware than Maple Valley residents that stormwater drains are not connected to the sanitary sewer system (Question 3). Among the remaining five issues, even though respondents lived in different locations, their knowledge about stormwater issues showed relatively strong uniformity. Overall, the priority one issues for both cities are the same.

Table 1. Priority 1 Issues for Public Education Ranked by Region

Rank for Education	Question	% Correct Responses by Area		
		Regional	Centralia	Maple Valley
1	15. The runoff from washing a car with biodegradable soap is safe in stormwater drains. **D**	20.3% 1	18.3% 1	22.5% 2
2	16. When I wash a motor vehicle at home, the soapy water ends up in a ditch or on the street. **D Adopt**	31.8% 2	44.8% 7	19.5% 1
3	28. Bricks or pavers offer no advantage for reducing runoff over concrete or asphalt pavement. **D**	35.8% 3	30.9% 3	38.4% 4
4	21. Sediment or dirt in stormwater is natural and not regarded as pollution. **D**	36.0% 4	38.0% 4	32.5% 3
5	3. Drains on city streets for stormwater are connected to the same sanitary sewer system used for treating human waste. **D**	39.4% 5	28.4% 2	49.0% 7
6	5. Pollution in our rivers, wetlands and lakes and in Puget Sound is more the result of industrial dumping practices than individual human activity. **D**	43.4% 6	41.2% 6	44.2% 5
7	19. Grass clippings and leaves are not regarded as harmful in stormwater. **D**	43.6% 7	40.2% 5	45.9% 6

Blue indicates a question dealing with behavior, what the respondent does. Percents apply only to respondents who said the question applied to them.
*** Respondents in Centralia did not have "Puget Sound" included in this particular question.*

Table Note: All "Does not apply" responses were lumped into the "Don't Know" response category for the knowledge questions since all of the knowledge questions apply to everyone. This rule applies to all the tables in the report.

Centralia and Maple Valley Show a Similar Need for Education

As shown in Figure 3, residents in both Maple Valley and Centralia gave a similarly low percent of correct answers for Priority 1 issues suggesting a similar need for educational programming.

Figure 3: Percent Correct Responses to Priority 1 Issues by Area
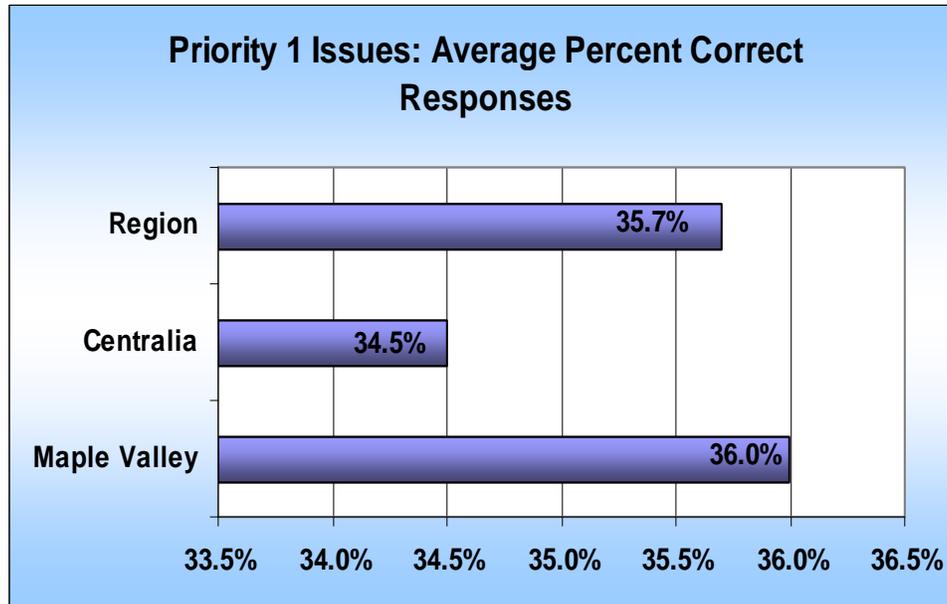
Issues Involving Soap Show High Need for Education

Of all the issues tested, the residents in Centralia and Maple Valley show the least awareness of correct practices involving soap. Issues involving soap have the greatest potential for demonstrating improved community knowledge as a result of educational programming. Educational programming should convey the following messages:

- *Biodegradable soap is not a safe addition to stormwater drains and should be kept from running into the stormwater drainage system.*
- *Wash your car in an area where the soapy runoff will be absorbed by the ground or take your car to a commercial car wash. Soapy water should not be allowed to flow into the street or into a drainage ditch.*

Knowledge of the Stormwater Drainage System and Pollution Sources is Lacking

Other low scoring issues for the cities dealt with how the stormwater drainage system works. Centralia residents appear particularly unaware that stormwater drains are not connected to the sanitary sewer system and 57.9% of the respondents did not know that individual human activity, not industrial dumping, is the primary cause of pollution in rivers, wetlands, and lakes and in Puget Sound.

Knowledge of how rivers, wetlands, and lakes and the marine waters of Puget Sound become polluted by stormwater is an essential precursor to improving understanding, raising the desire to act responsibly, and bringing about behavioral change. Educational programming across the region should convey the following messages:

- *The water in stormwater drains is not connected to the sanitary sewer system nor is all stormwater treated to remove pollutants before being released into the environment. Therefore, the quality of stormwater going into the drainage system is what determines the level of pollution in surface water.*
- *The primary cause of pollution in stormwater runoff is individual human activity, not industrial dumping. Success in reducing environmental pollution depends upon everyone's participation in helping to make a difference.*

Actions to Prevent Polluting Stormwater Need Emphasis

Responses to questions regarding pavers, sediment, and grass clippings also revealed relatively low levels of informed awareness in the community and indicated a need for public education. Nearly two out of three respondents (64.3%) were not aware that bricks and pavers offer an advantage in reducing storm water runoff. Less than half of the respondents across the two cities combined knew that sediment, grass clippings and leaves constituted pollution. The following messages should be conveyed:

- *Bricks or pavers help to reduce the volume of stormwater runoff and, therefore, help to reduce stormwater pollution in the environment.*
- *Sediment is pollution and should be prevented from entering the stormwater drainage system.*
- *Grass clippings and leaves in stormwater are regarded as pollution and should be kept out of the stormwater drainage system.*

Related Multivariate Analysis Findings

Q3. Men show significantly higher awareness than women that the drains on city streets for stormwater are not connected to the same sanitary sewer system used for treating human waste (p = .006, Cramer's V = .260).

Gender	Correct	Incorrect
Male	49.0%	51.0%
Female	31.0%	69.0%

Q21. Women were significantly more aware than men that sediment or dirt in stormwater is pollution (p = .008, Cramer's V = .254).

Gender	Correct	Incorrect
Male	25.7%	74.3%
Female	45.5%	54.5%

Priority 2 Issues: From 50-80% Correct Answers

Priority 2 Issues represent areas of knowledge or behavior where at least half of the public knows what is correct. Ten issues made this list which constitutes 37.0% of the 27 issues tested. While this more desirable level of public knowledge is a step in the right direction, more can and needs to be done to further raise the public's level of knowledge. These areas continue to represent genuine opportunities for reducing surface water pollution in stormwater runoff.

Overall, the Priority 2 list shows a good deal of similarity in the rank of issues indicating that respondents in both cities are similarly informed regarding these stormwater subjects.   However, the degree to which residents in Centralia are informed about some issues did vary a good deal compared to Maple Valley. Differences between cities in the percent of correct responses ranged from a low of 2.3% to a high of 17.0%.

One issue on the Priority 2 list should be included among the Priority 1 items as an issue that is fundamental to generating increased responsible action in the public domain. The issue is the fact that almost half of the respondents in each city hold the erroneous belief that stormwater runoff is not the leading cause of pollution in rivers, wetlands and lakes. Correcting this misunderstanding can be a major step forward to expanded public recognition and alertness to actions that contribute to surface water pollution and to subsequent behavioral improvement. Awareness of the problem is the first necessary step on the road to behavioral change.

A second issue on the Priority 2 list that should be elevated to Priority 1 is knowledge of the definition of an illicit discharge. About four out of ten respondents in each city were not aware that anything in stormwater other than water is pollution. As a beginning point and a key precursor for positive action, knowing the definition of an illicit discharge will help individuals make better decisions regarding how to protect stormwater quality when facing new situations involving a potential for creating pollution.

Table 2. Priority 2 Issues for Public Education

Rank for Education	Question	% Correct Responses by Area		
		Regional	**Centralia**	**Maple Valley**
8	6. All water going into stormwater drains on the street is treated before being discharged into the environment. **D**	53.4% 8	46.8% 8	59.4% 10
9	17. Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle on the street using a biodegradable soap. **A**	54.6% 9	52.3% 9	55.9% 8
10	4. Stormwater runoff is the leading cause of pollution in rivers, wetlands and lakes. **A**	56.3% 10	54.8% 10	57.1% 9
11	29. An *illicit* or *unlawful stormwater discharge* is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. **A**	60.7% 11	59.2% 12	62.6% 11
12	20. Chemical treatments to kill moss on roofs pose little risk for polluting stormwater. **D**	62.7% 12	60.9% 13	63.6% 12
13	7. Hard surfaces such as roads and driveways are not significant sources of pollution in stormwater. **D**	62.9% 13	58.8% 11	67.3% 13
14	18. The best place to dispose of water from cleaning a Latex paint brush is in a sink inside, not outdoors. **A**	65.5% 14	63.2% 15	68.5% 14
15	27. Carpet shampoo wastewater can be safely added to a stormwater drain. **D**	70.1% 15	60.9% 14	77.9% 17
16	10. Scrubbing oil and grease spots on outdoor concrete or asphalt with soap and hosing it off is a good way to prevent polluting stormwater runoff. **D**	72.2% 16	67.1% 16	78.2% 18
17	23. Using a mulching lawnmower reduces the need to fertilize a lawn. **A**	74.8% 17	76.7% 18	73.9% 15

Blue indicates a question dealing with what the respondent does. Percents apply only to respondents who said the question applied to them.

Related Multivariate Analysis Findings

Q6. Women showed significantly less awareness than men that all water going into stormwater drains is not treated before being discharged into the environment ($p \leq .001$, Cramer's V = .306).

| Gender	Correct	Incorrect
Male	68.3%	31.7%
Female	40.7%	59.3%

Q10. Men were significantly more aware than women that scrubbing oil and grease spots on outdoor concrete or asphalt and with soap and hosing it off is not a good way to prevent polluting stormwater runoff (p = .007, Cramer's V = .258).

Gender	Correct	Incorrect
Male	78.4%	21.6%
Female	64.6%	35.4%

Cities Vary in Correct Knowledge about Priority 2 Issues

Figure 4 compares the percent of correct responses given by citizens in each city for all Priority 2 issues. Respondents living in Maple Valley showed a higher percent of correct responses across Priority 2 issues (66.4%) than did respondents living in Centralia (60.1%).

Figure 4: Percent Correct Responses to Priority 2 Issues by Area
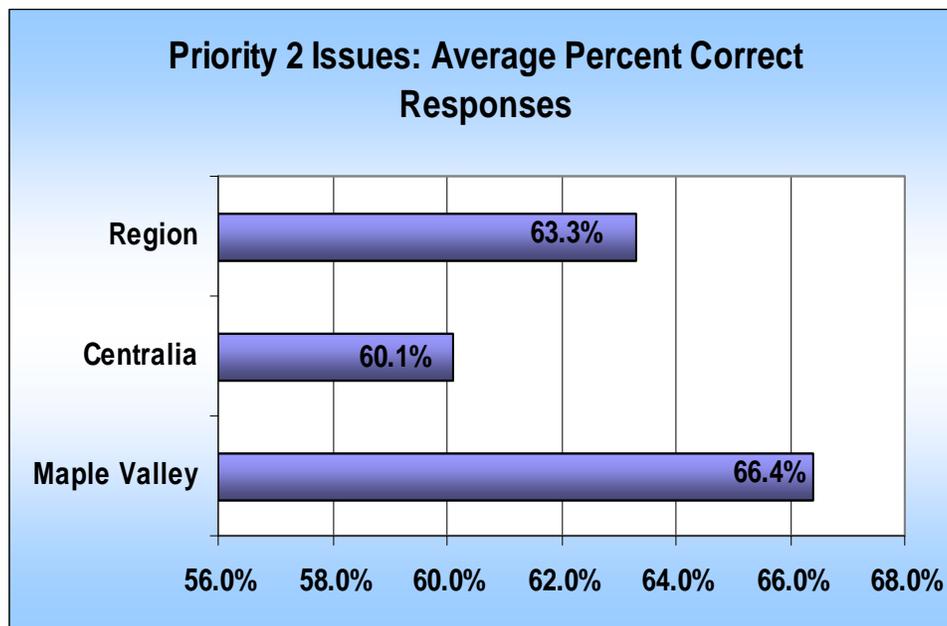
Educational Messages Are Needed for These Issues

In order of importance, the following messages should be included in educational programming on a regional basis:

- *All water going into stormwater drains is **not** treated before being discharged into the environment.*
- *Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle at home with biodegradable soap.*
- *Stormwater runoff is the leading cause of pollution in rivers, wetlands and lakes. Therefore, to reduce environmental pollution, the challenge to the community is to help keep stormwater runoff pollution free.*
- *An illicit or unlawful discharge is anything that enters a storm drain system that is not made up of entirely stormwater.*
- *The residue from chemical treatments that kill moss is a source of pollution.*

- *Hard surfaces are significant contributors to pollution in stormwater runoff. Hence, it is important to keep hard surfaces clean using acceptable cleaning techniques and, where possible, convert impervious surfaces to pervious surfaces.*
- *The best place to clean paint brushes is in a sink that drains into the sanitary sewer system, not outdoors.*
- *Carpet shampoo wastewater causes pollution to the environment and should not be disposed of in a stormwater drain.*
- *Applying soap to oil and grease spots on outdoor concrete or asphalt and rinsing it off with a hose is not a good method for protecting stormwater runoff.*
- *A mulching lawnmower reduces the need for using fertilizer and, hence, represents a valuable method for eliminating fertilizer pollution in stormwater.*

Priority 3 Issues: Higher than 80% Correct Answers

The remaining ten issues (37.0% of the 27 issues tested) deal with specific practices respondents reported engaging in. High uniformity in rank and percent of correct answers given by residents in the two cities was in evidence as can be seen in Table 3 below indicating that residents in the two cities are quite similar in how they deal with these issues in their lives. While respondents indicated in high percentages that they engage in these positive behaviors, a question can be raised whether or not this is actually the case. What this data indicates is that at least respondents are quite aware of the proper actions to take if not actually practicing them in their life. Dollars spent on raising public awareness and promoting behavioral change in these areas will have a much smaller target market than for Priority 1 and 2 issues and the ability to demonstrate change in these areas by raising the percent of correct responses will be much more difficult to accomplish.

Table 3. Priority 3 Issues for Public Education

Rank for Education	Question	% Correct Responses by Area		
		Regional	Centralia	Maple Valley
18	9. The best way to clean up spilled oil on the driveway is to fully absorb it using kitty litter or paper towels and deposit this waste in a garbage can. **A**	80.2% 18	75.8% 17	83.5% 21
19	8. When I am outside with my pet, I always pick up my pet's waste. **A Adopt**	82.0% 19	76.8% 19	89.4% 24
20	12. All of my family's auto or truck parts with oil or grease on them are stored under a roof or cover. **A Adopt**	82.2% 20	81.8% 20	81.6% 19
21	22. The downspouts at my house convey the water to an area where it is absorbed by the ground. **A Adopt**	83.1% 21	88.7% 22	77.6% 16
22	13. My household recycles all used motor oil. **A Adopt**	85.9% 22	87.3% 21	84.89% 22
23	11. If my car or truck is dripping oil, I make sure the leak is fixed within three weeks. **A Adopt**	86.6% 23	90.0% 25	82.8% 20
24	26. In the past 12 months, I may have used more fertilizer or applied it more frequently than the label directions require. **D Adopt**	88.6% 24	89.1% 23	89.0% 23
25	25. In the past 12 months, I may have applied a higher dose of insecticide or weed killer around my house than the directions say to use. **D Adopt**	91.6% 25	93.8% 27	89.9% 25
26	14. My family stores all containers holding oil or antifreeze under a roof or cover. **A Adopt**	92.9% 26	89.8% 24	95.9% 26
27	24. My household stores all yard fertilizers and pesticides inside a building or in a covered area out of the rain. **A Adopt**	96.8% 27	93.0% 26	99.1% 27

Blue indicates a question dealing with what the respondent does. Percents apply only to respondents who said the question applied to them.

Practices

The relatively high percent of respondents across the region who gave the correct responses to the issues in this category (see Figure 5) suggests that high compliance is already taking place. At minimum, it can be said that respondents knew the right thing to do and answered accordingly. One may assume that minimal social marketing needs to be done in these areas, but given the potential for negatively impacting stormwater which these items represent, it remains advisable to continue educating the public on these issues but at a lower level of emphasis:

- *Clean up oil and grease spots on outdoor concrete or asphalt with soap and absorb the residue using kitty litter or paper towels which should then be disposed of in the garbage can.*
- *Pick up pet waste when outside.*
- *Store auto or truck parts with oil or grease on them under a roof or cover.*
- *Direct downspouts to areas on land where the runoff will be absorbed by the ground to avoid the water entering the stormwater system.*
- *Recycle used motor oil.*
- *Fix auto or truck oil leaks within three weeks.*
- *Apply fertilizer at recommended rates.*
- *Apply insecticides or weed killer at recommended rates*
- *Store containers holding oil or antifreeze under a roof or cover.*
- *Store all yard fertilizers and pesticides inside a building or in a covered area out of the rain.*

On average, respondents living in Centralia and Maple Valley showed a similar level of high compliance with Priority 3 behaviors which are friendly to stormwater.

Figure 5: Percent Correct Responses to Priority 3 Issues by Area

Priority 3 Issues: Average Percent Correct Responses

Area	Percent Correct
Region	86.9%
Centralia	86.6%
Maple Valley	87.4%
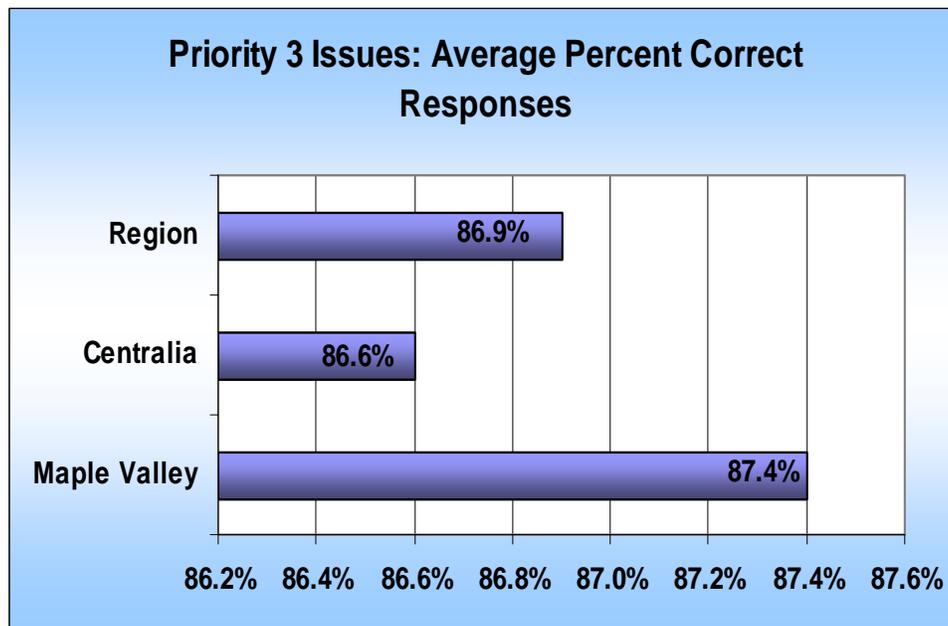
Related Multivariate Analysis Findings

Q13. Men were significantly more likely than women to report that they recycle all used motor oil in their household (p = .003, Cramer's V = .273).

Gender	Correct	Incorrect
Male	94.7%	5.3%
Female	76.6%	24.4%

All Issues: Overall Percent Correct Responses is Very Uniform

Figure 6 shows the average percent of correct responses for all questions for Centralia and Maple Valley. The average number of correct responses for the two cities combined was 64.9%. The difference overall between the two cities in the number of correct responses given was only 3.0%. Overall, residents in the two cities are similarly knowledgeable about a broad spectrum of stormwater issues.

Figure 6: Percent Correct Responses Across All Questions by Area
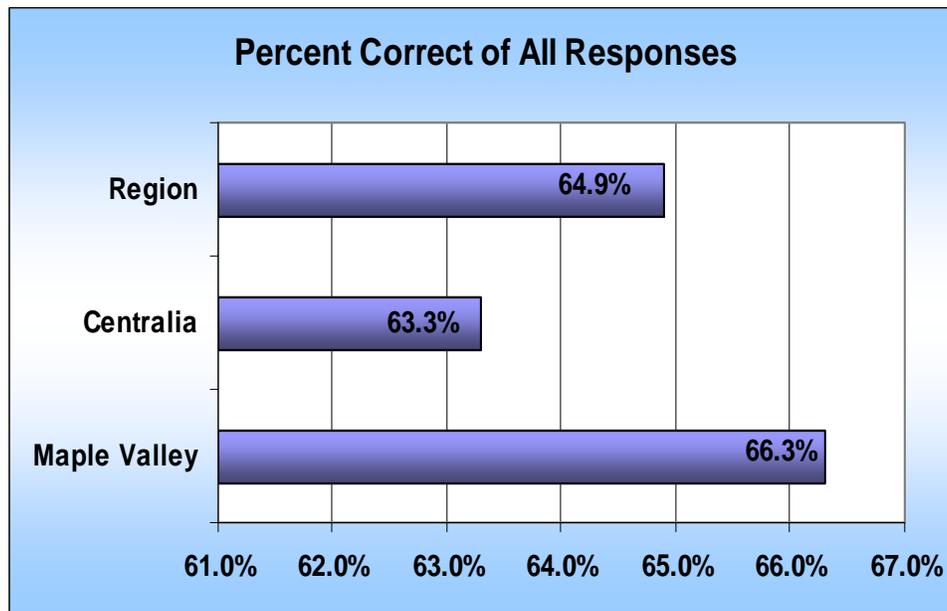
Reporting an Illicit Discharge

To report an illicit discharge, respondents would call a variety of agencies with only 31.0% of Centralia residents and 34.7% of Maple Valley residents calling their City Public Works Department, the correct choice. The fact that nearly seven out of ten respondents said they needed more information or would call an inappropriate agency such as 911 or the Department of Ecology, we reach the conclusion that a good deal of public education is needed if illicit discharges are to be reported to the proper agency in the future. The following graph presents the responses by individual city.

Figure 7: Reporting an Illicit Discharge

Q30. If you witnessed someone pouring a gallon of used paint thinner into a stormwater drain, which agency would you call first to report it?
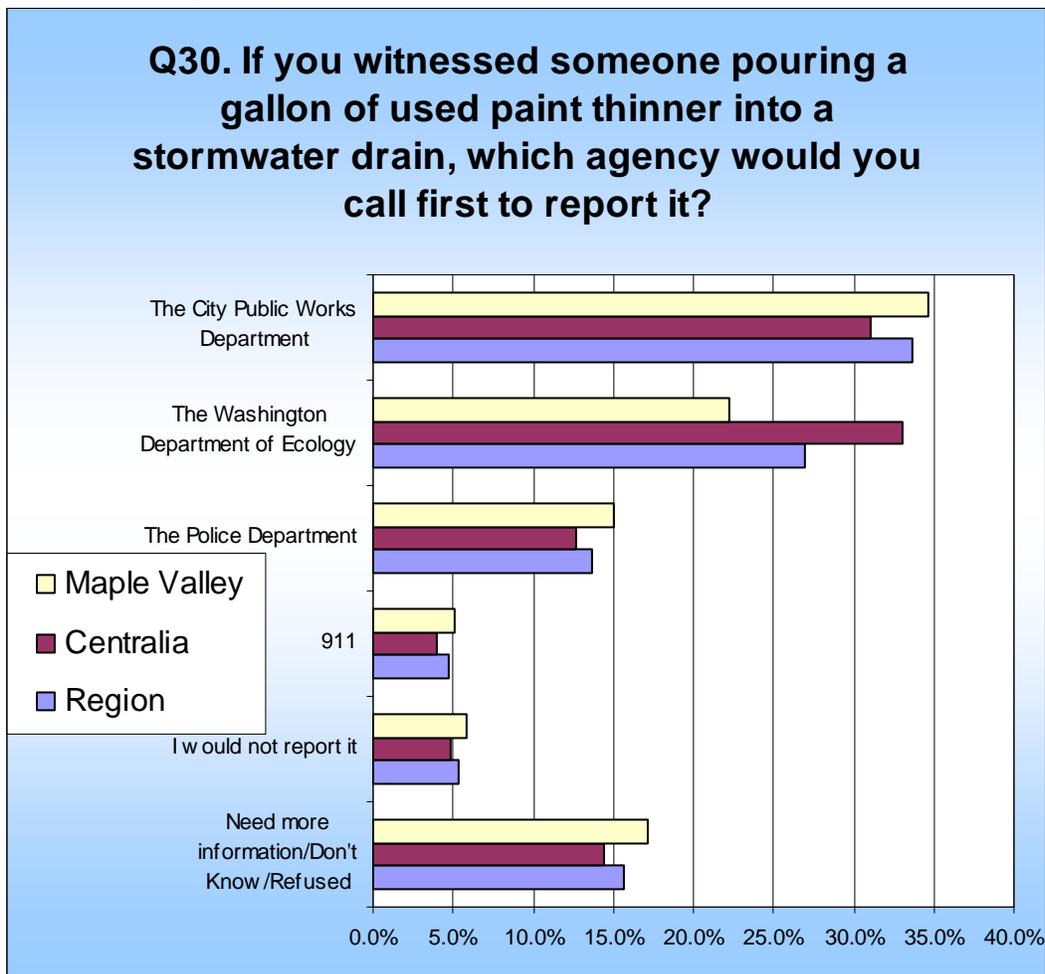
The actual percent of responses given by respondents in each city appears in Table 4 below.

Table 4. Percent Reporting an Illicit Discharge to an Agency by City and Region

Agency	Region	Centralia	Maple Valley
The City Public Works Department	33.7%	31.0%	34.7%
The Washington Department of Ecology	26.9%	33.0%	22.2%
The Police Department	13.7%	12.7%	15.0%
911	4.7%	4.0%	5.1%
I would not Report it	5.3%	4.9%	5.9%
Need more information/Don't Know/Refused	15.7%	14.4%	17.1%

Related Multivariate Analysis Findings

Q30. *While both men and women show a low level of awareness that the City Public Works Department is the correct agency to call if they witnessed someone pouring a gallon of used paint thinner into a stormwater drain, men show significantly less awareness than women ($p = .030$, Cramer's V = .247).*

Gender	Correct	Incorrect
Male	26.0%	74.0%
Female	41.7%	58.3%

City of Centralia
Priority 1 Issues: 50% or Less Correct Answers

Knowledge and Practices

All Priority 1 questions for the City of Centralia are shown in Table 5 below. These issues represent the areas which need the most attention. In order of importance, the following messages should be included in educational programming:

- *Biodegradable soap is not a safe addition to stormwater drains and should be kept from entering the stormwater drainage system.*
- *The water in stormwater drains is not connected to the sanitary sewer system nor is all stormwater treated to remove pollutants before being released into the environment. Therefore, the quality of stormwater going into the drainage system is what determines the level of pollution in surface water.*
- *Bricks or pavers help to reduce the volume of stormwater runoff and, therefore, help to reduce stormwater pollution in the environment.*
- *Sediment is pollution and should be prevented from entering the stormwater drainage system.*
- *Grass clippings and leaves in stormwater are regarded as pollution and should be kept out of the stormwater drainage system.*
- *The primary cause of pollution in stormwater runoffs is individual human activity, not industrial dumping. Success in reducing environmental pollution depends upon everyone's participation in helping to make a difference.*
- *Wash your car in an area where the soapy runoff will be absorbed by the ground or take your car to a commercial car wash. Soapy water should not be allowed to flow into the street or into a drainage ditch.*
- *All water going into stormwater drains is **not** treated before being discharged into the environment.*

Table 5. Priority 1 Issues for Public Education

City of Centralia		
Rank for Education	**Question**	**% Correct**
1	15. The runoff from washing a car with biodegradable soap is safe in stormwater drains. **D**	18.3% 1
2	3. Drains on city streets for stormwater are connected to the same sanitary sewer system used for treating human waste. **D**	28.4% 2
3	28. Bricks or pavers offer no advantage for reducing runoff over concrete or asphalt pavement. **D**	30.9% 3
4	21. Sediment or dirt in stormwater is natural and not regarded as pollution. **D**	38% 4
5	19. Grass clippings and leaves are not regarded as harmful in stormwater. **D**	40.2% 5
6	5. Pollution in our rivers, wetlands and lakes is more the result of industrial dumping practices than individual human activity. **D**	41.2% 6
7	16. When I wash a motor vehicle at home, the soapy water ends up in a ditch or on the street. **D Adopt**	44.8% 7
8	6. All water going into stormwater drains on the street is treated before being discharged into the environment. **D**	46.8% 8

Blue indicates a question dealing with what the respondent does. Percents apply only to respondents who said the question applied to them

Related Multivariate Analysis Findings for Centralia

Q6. Women showed significantly less awareness than men that all water going into stormwater drains is not treated before being discharged into the environment (p = .004, Cramer's V = .349).

Gender	Correct	Incorrect
Male	61.1%	38.9%
Female	31.5%	68.5%

Q21. Women were significantly more aware than men that sediment or dirt in stormwater is pollution (p = .009, Cramer's V = .326).

Gender	Correct	Incorrect
Male	29.6%	70.4%
Female	46.3%	53.7%

Q21. Respondents 65 years and older were significantly more aware than other age groups that sediment or dirt in stormwater is pollution (p = .014, Cramer's V = .326).

Age	Correct	Incorrect
18-24	37.5%	54.2%
25-34	15.8%	83.7%
35-44	15.0%	72.0%
45-54	35.3%	57.1%
55-64	45.5%	60.0%
65 or Older	65.5%	40.0%

City of Centralia
Priority 2 Issues: 50% - 80% Correct Answers

Knowledge and Practices

All Priority 2 questions for the City of Centralia are shown in Table 6 below. Although not as important as Priority 1 messages, Priority 2 areas retain importance in their ability to significantly reduce water pollution. In order of importance, the following messages should be included in educational programming:

- *Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle at home with biodegradable soap.*
- *Stormwater runoff is the leading cause of pollution in rivers, wetlands and lakes. Therefore, to reduce environmental pollution, the challenge to the community is to help keep stormwater runoff pollution free.*
- *Hard surfaces are significant contributors to pollution in stormwater runoff. Hence, it is important to keep hard surfaces clean using acceptable cleaning techniques and, where possible, convert impervious surfaces to pervious surfaces.*
- *An illicit or unlawful discharge is anything that enters a storm drain system that is not made up of entirely stormwater.*
- *The residue from chemical treatments that kill moss is a source of pollution.*
- *Carpet shampoo wastewater causes pollution to the environment and should not be disposed of in a stormwater drain.*
- *The best place to clean paint brushes is in a sink that drains into the sanitary sewer system, not outdoors.*
- *Applying soap to oil and grease spots on outdoor concrete or asphalt and rinsing it off with a hose is not a good method for protecting stormwater runoff.*
- *Clean up oil and grease spots on outdoor concrete or asphalt with soap and absorb the residue using kitty litter or paper towels which should then be disposed of in the garbage can.*
- *A mulching lawn mower reduces the need for using fertilizer and, hence, represents a valuable method for eliminating fertilizer pollution in stormwater.*
- *Pick up pet waste when outside.*

Table 6. Priority 2 Issues for Public Education

Rank for Education	Question	% Correct
9	17. Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle on the street using a biodegradable soap. **A**	52.3% 9
10	4. Stormwater runoff is the leading cause of pollution in rivers, wetlands and lakes. **A**	54.8% 10
11	7. Hard surfaces such as roads and driveways are not significant sources of pollution in stormwater. **D**	58.8% 11
12	29. An *illicit* or *unlawful stormwater discharge* is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. **A**	59.2% 12
13	20. Chemical treatments to kill moss on roofs pose little risk for polluting stormwater. **D**	60.9% 13
14	27. Carpet shampoo wastewater can be safely added to a stormwater drain. **D**	60.9% 14
15	18. The best place to dispose of water from cleaning a Latex paint brush is in a sink inside, not outdoors. **A**	63.2% 15
16	10. Scrubbing oil and grease spots on outdoor concrete or asphalt with soap and hosing it off is a good way to prevent polluting stormwater runoff. **D**	67.1% 16
17	9. The best way to clean up spilled oil on the driveway is to fully absorb it using kitty litter or paper towels and deposit this waste in a garbage can. **A**	75.8% 17
18	23. Using a mulching lawnmower reduces the need to fertilize a lawn. **A**	76.7% 18
19	8. When I am outside with my pet, I always pick up my pet's waste. **A Adopt**	76.8% 19

*Blue indicates a question dealing with what the respondent does. Percents apply only to respondents who said the question applied to them

Related Multivariate Analysis Findings for Centralia

Q10. Men were significantly more aware than women that scrubbing oil and grease spots on outdoor concrete or asphalt with soap and hosing it off is not a good way to prevent polluting stormwater runoff (p = .022, Cramer's V = .325).

Gender	Correct	Incorrect
Male	79.6%	20.4%
Female	53.7%	46.3%

Q29. Men were significantly more aware than women that an illicit or unlawful stormwater discharge is primarily defined as anything that enters a storm water drain system that is not made up entirely of stormwater (p = .044, Cramer's V = .274).

Gender	Correct	Incorrect
Male	68.5%	31.5%
Female	50.0%	50.0%

City of Centralia
Priority 3 Issues: Higher than 80% Correct Answers

Knowledge and Practices

A high percent of respondents in Centralia gave the correct responses to eight questions regarding behaviors that are protective of stormwater. This suggests that high compliance with recommended actions is already taking place. Given the nature of the items tested, however, improvement in these practices is still desirable and should remain a goal. Education should communicate the following actions to the public:

- *Store auto or truck parts with oil or grease on them under a roof or cover.*
- *Recycle used motor oil.*
- *Direct downspouts to areas on land where the runoff will be absorbed by the ground to avoid the water entering the stormwater system.*
- *Apply fertilizer at recommended rates.*
- *Store containers holding oil or antifreeze under a roof or cover.*
- *Fix auto or truck oil leaks within three weeks.*
- *Store all yard fertilizers and pesticides inside a building or in a covered area out of the rain.*
- *Apply insecticides or weed killer at recommended rates.*

Table 7. Priority 3 Issues for Public Education

City of Centralia		
Rank for Education	**Question**	**% Correct**
20	12. All of my family's auto or truck parts with oil or grease on them are stored under a roof or cover. **A Adopt**	81.8% 20
21	13. My household recycles all used motor oil. **A Adopt**	87.3% 21
22	22. The downspouts at my house convey the water to an area where it is absorbed by the ground. **A Adopt**	88.7% 22
23	26. In the past 12 months, I may have used more fertilizer or applied it more frequently than the label directions require. **D Adopt**	89.1% 23
24	14. My family stores all containers holding oil or antifreeze under a roof or cover. **A Adopt**	89.8% 24
25	11. If my car or truck is dripping oil, I make sure the leak is fixed within three weeks. **A Adopt**	90% 25
26	24. My household stores all yard fertilizers and pesticides inside a building or in a covered area out of the rain. **A Adopt**	93% 26
27	25. In the past 12 months, I may have applied a higher dose of insecticide or weed killer around my house than the directions say to use. **D Adopt**	93.8% 27

Blue indicates a question dealing with what the respondent does. Percents apply only to respondents who said the question applied to them

City of Maple Valley
Priority 1 Issues: 50% or Less Correct Answers

Knowledge and Practices

All Priority 1 questions for the City of Maple Valley are shown in Table 8 below. These issues represent the areas which need the most attention. In order of importance, the following messages should be included in educational programming:

- *Wash your car in an area where the soapy runoff will be absorbed by the ground or take your car to a commercial car wash. Soapy water should not be allowed to flow into the street or into a drainage ditch.*
- *Biodegradable soap is not a safe addition to stormwater drains and should be kept from entering the stormwater drainage system.*
- *Sediment is pollution and should be prevented from entering the stormwater drainage system.*
- *Bricks or pavers help to reduce the volume of stormwater runoff and, therefore, help to reduce stormwater pollution in the environment.*
- *The primary cause of pollution in stormwater runoffs is individual human activity, not industrial dumping. Success in reducing environmental pollution depends upon everyone's participation in helping to make a difference.*
- *Grass clippings and leaves in stormwater are regarded as pollution and should be kept out of the stormwater drainage system.*
- *The water in stormwater drains is not connected to the sanitary sewer system nor is all stormwater treated to remove pollutants before being released into the environment. Therefore, the quality of stormwater going into the drainage system is what determines the level of pollution in surface water.*

Table 8. Priority 1 Issues for Public Education

Rank for Education	Question	% Correct
1	16. When I wash a motor vehicle at home, the soapy water ends up in a ditch or on the street. **D Adopt**	19.5% 1
2	15. The runoff from washing a car with biodegradable soap is safe in stormwater drains. **D**	22.5% 2
3	21. Sediment or dirt in stormwater is natural and not regarded as pollution. **D**	32.5% 3
4	28. Bricks or pavers offer no advantage for reducing runoff over concrete or asphalt pavement. **D**	38.4% 4
5	5. Pollution in our rivers, wetlands and lakes and in Puget Sound is more the result of industrial dumping practices than individual human activity. **D**	44.2% 5
6	19. Grass clippings and leaves are not regarded as harmful in stormwater. **D**	45.9% 6
7	3. Drains on city streets for stormwater are connected to the same sanitary sewer system used for treating human waste. **D**	49.0% 7

Blue indicates a question dealing with what the respondent does. Percents apply only to respondents who said the question applied to them

Related Multivariate Analysis Findings for Maple Valley

Q3. Men show significantly higher awareness than women that the drains on city streets for stormwater are not connected to the same sanitary sewer system used for treating human waste (p = .0028, Cramer's V = .321).

Gender	Correct	Incorrect
Male	60.8%	39.2%
Female	38.2%	61.8%

City of Maple Valley
Priority 2 Issues: 50% - 80% Correct Answers

Knowledge and Practices

All Priority 2 questions for the City of Maple Valley are shown in Table 9 below. Although not as important as Priority 1 messages, Priority 2 areas retain importance in their ability to significantly reduce water pollution. In order of importance, the following messages should be included in educational programming:

- *Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle at home with biodegradable soap.*
- *Stormwater runoff is the leading cause of pollution in rivers, wetlands and lakes. Therefore, to reduce environmental pollution, the challenge to the community is to help keep stormwater runoff pollution free.*
- *All water going into stormwater drains is **not** treated before being discharged into the environment.*
- *An illicit or unlawful discharge is anything that enters a storm drain system that is not made up of entirely stormwater.*
- *The residue from chemical treatments that kill moss is a source of pollution.*
- *Hard surfaces are significant contributors to pollution in stormwater runoff. Hence, it is important to keep hard surfaces clean using acceptable cleaning techniques and, where possible, convert impervious surfaces to pervious surfaces.*
- *The best place to clean paint brushes is in a sink that drains into the sanitary sewer system, not outdoors.*
- *A mulching lawnmower reduces the need for using fertilizer and, hence, represents a valuable method for eliminating fertilizer pollution in stormwater.*
- *Direct downspouts to areas on land where the runoff will be absorbed by the ground to avoid the water entering the stormwater system.*
- *Carpet shampoo wastewater causes pollution to the environment and should not be disposed of in a stormwater drain.*
- *Applying soap to oil and grease spots on outdoor concrete or asphalt and rinsing it off with a hose is not a good method for protecting stormwater runoff.*

Table 9. Priority 2 Issues for Public Education

Rank for Education	Question	% Correct
8	17. Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle on the street using a biodegradable soap. **A**	55.9% 8
9	4. Stormwater runoff is the leading cause of pollution in rivers, wetlands and lakes. **A**	57.1% 9
10	6. All water going into stormwater drains on the street is treated before being discharged into the environment. **D**	59.4% 10
11	29. An *illicit* or *unlawful stormwater discharge* is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. **A**	62.6% 11
12	20. Chemical treatments to kill moss on roofs pose little risk for polluting stormwater. **D**	63.6% 12
13	7. Hard surfaces such as roads and driveways are not significant sources of pollution in stormwater. **D**	67.3% 13
14	18. The best place to dispose of water from cleaning a Latex paint brush is in a sink inside, not outdoors. **A**	68.5% 14
15	23. Using a mulching lawnmower reduces the need to fertilize a lawn. **A**	73.9% 15
16	22. The downspouts at my house convey the water to an area where it is absorbed by the ground. **A Adopt**	77.6% 16
17	27. Carpet shampoo wastewater can be safely added to a stormwater drain. **D**	77.9% 17
18	10. Scrubbing oil and grease spots on outdoor concrete or asphalt with soap and hosing it off is a good way to prevent polluting stormwater runoff. **D**	78.2% 18

Blue indicates a question dealing with what the respondent does. Percents apply only to respondents who said the question applied to them

Related Multivariate Analysis Findings for Maple Valley

Q6. Women showed significantly less awareness than men that all water going into stormwater drains is not treated before being discharged into the environment (p = .013, Cramer's V = .321).

Gender	Correct	Incorrect
Male	72.5%	27.5%
Female	48.1%	51.9%

Knowledge and Practices

A high percent of respondents in Maple Valley gave the correct responses to nine questions regarding behaviors that are protective of stormwater. This suggests that high compliance with recommended actions is already taking place. Given the nature of the items tested, however, improvement in these practices is still desirable and should remain a goal. Education should communicate the following actions to the public:

- *Store auto or truck parts with oil or grease on them under a roof or cover.*
- *Fix auto or truck oil leaks within three weeks.*
- *Clean up oil and grease spots on outdoor concrete or asphalt with soap and absorb the residue using kitty litter or paper towels which should then be disposed of in the garbage can.*
- *Recycle used motor oil.*
- *Apply fertilizer at recommended rates.*
- *Pick up all pet waste when outside.*
- *Apply insecticides or weed killer at recommended rates.*
- *Store containers holding oil or antifreeze under a roof or cover.*
- *Store all yard fertilizers and pesticides inside a building or in a covered area out of the rain.*

Table 10. Priority 3 Issues for Public Education

	City of Maple Valley	
Rank for Education	**Question**	**% Correct**
19	12. All of my family's auto or truck parts with oil or grease on them are stored under a roof or cover. **A Adopt**	81.6% 19
20	11. If my car or truck is dripping oil, I make sure the leak is fixed within three weeks. **A Adopt**	82.8% 20
21	9. The best way to clean up spilled oil on the driveway is to fully absorb it using kitty litter or paper towels and deposit this waste in a garbage can. **A**	83.5% 21
22	13. My household recycles all used motor oil. **A Adopt**	84.89% 22
23	26. In the past 12 months, I may have used more fertilizer or applied it more frequently than the label directions require. **D Adopt**	89% 23
24	8. When I am outside with my pet, I always pick up my pet's waste. **A Adopt**	89.4% 24
25	25. In the past 12 months, I may have applied a higher dose of insecticide or weed killer around my house than the directions say to use. **D Adopt**	89.9% 25
26	14. My family stores all containers holding oil or antifreeze under a roof or cover. **A Adopt**	95.9% 26
27	24. My household stores all yard fertilizers and pesticides inside a building or in a covered area out of the rain. **A Adopt**	99.1% 27

Blue indicates a question dealing with what the respondent does. Percents apply only to respondents who said the question applied to them

Related Multivariate Analysis Findings for Maple Valley

Q13. Men were significantly more likely than women to report that they recycle all used motor oil ($p = .009$, Cramer's V = .320).

Gender	Correct	Incorrect
Male	95.7%	4.3%
Female	73.3%	26.7%

Conclusions and Recommendations

It is clear that the residents living in Centralia and Maple Valley do not regard the water in rivers, wetlands, and lakes and in the marine waters of Puget Sound (for Maple Valley residents) as "extremely clean" (meaning free from pollution) nor "extremely polluted." The distribution of opinions across the rating scale suggests the public tends to either think of these waters as being somewhat clean, or to be uncertain regarding the level of pollution due to receiving a mix of both positive and negative information. Effort is needed to more definitively educate the public as to the level of pollution in these waters which can serve as a motivation for change.

The public in these two cities shows varying degrees of knowledge regarding key issues for controlling stormwater pollution. In many cases respondents lacked awareness of basic information which substantiates the need for public education programming. Results for Priority 1 Issues also show a high level of similarity in the two cities in what citizens know and do not know.

The public needs to be better informed regarding the current level of pollution in rivers, wetlands and lakes and in Puget Sound (when Puget Sound is mentioned in this report it refers only to Maple Valley residents since only their stormwater drainage system includes the Sound). Awareness of the problem is the leading to a motivation to act. Educational programming should raise the public consciousness by highlighting the critical nature of pollution in our surface waters and the threats and negative or destructive outcomes that result. Second, programming should help to establish a common vision of pollution-free rivers, wetlands, and lakes and a healthier Puget Sound as the goal to be achieved. Third, the direct and indirect positive outcomes of maintaining pristine conditions in rivers, wetlands, and lakes and the marine waters of Puget Sound should be highlighted—these are all the good things that will result. Fourth, the means of achieving these outcomes—meaning the helpful practices individuals can implement—need to be presented through effective social marketing practices in a way that is interesting, immediately understandable, convincing, and memorable and is able to tap into the beliefs, values and emotional benefits that will motivate behavioral change. Social marketing programs that provide a practical means to help people overcome obstacles to change will likely be most successful in modifying behavior.

The results of this survey are very similar to the results from the same survey which was conducted in eleven other cities in Snohomish, King and Pierce Counties in the summer and fall of 2009 and the winter of 2010. Since Priority 1 Issues show the lowest correct knowledge in the region, these subject areas offer an opportunity where success in improving the public's knowledge and subsequent behavior can be most directly realized and documented. Educational messaging should communicate the following Priority 1 messages:

- *Biodegradable soap is not a safe addition to stormwater drains and should be kept from entering the stormwater drainage system.*
- *Wash your car in an area where the soapy runoff will be absorbed by the ground or take your car to a commercial car wash. Soapy water should not be allowed to flow into the street or into a drainage ditch.*

- *Bricks or pavers help to reduce the volume of stormwater runoff and, therefore, help to reduce stormwater pollution in the environment.*
- *Sediment is pollution and should be prevented from entering the stormwater drainage system.*
- *The water in stormwater drains is not connected to the sanitary sewer system nor is all stormwater treated to remove pollutants before being released into the environment. Therefore, the quality of stormwater going into the drainage system is what determines the level of pollution in surface water.*
- *The primary cause of pollution in rivers, wetlands and lakes is individual human activity, not industrial dumping. Success in reducing environmental pollution depends upon everyone's participation in helping to make a difference.*
- *Grass clippings and leaves in stormwater are regarded as pollution and should be kept out of the stormwater drainage system.*

Priority 1 issues should be communicated in repeated educational messaging. Social marketing seeks to produce behavioral change, and part of behavioral change comes from learning new ways of acting. Learning requires repetition (practice). Hence, important messages need to be repeated through different communication channels and at different times to effectively promote assimilation and bring about change over time. As mentioned previously, practical programs that help citizens to overcome obstacles to change or reduce the "cost" for citizens in changing their behavior (such as reducing the amount it costs citizens to use a commercial car wash) offer the greatest potential for bringing about positive results.

The rank order of Priority 2 issues showed high similarity between the two cities, more so than for Priority 1 issues. Two issues appearing on the Priority 2 list should be included among the Priority 1 items because of their standing as knowledge that is fundamental to improving behavior: stormwater runoff is the leading cause of pollution in rivers, wetlands and lakes; and, second, the definition of an illicit discharge. Knowledge of both is a precursor to increasing positive action. Messaging also needs to focus on establishing the concept that everyone is responsible for reducing pollution in surface waters.

The public shows the highest level of correct knowledge regarding Priority 3 issues which all involved actual behaviors. At minimum, this finding demonstrates a wide public understanding of the right actions. At best, it indicates the public has adopted and is already widely practicing these desirable behaviors. Continued messaging is recommended regarding these issues, with less intensity than for Priority 1 and 2 Issues, to reinforce, maintain and extend positive action.

STORMWATER COMMUNITY SURVEY

QUESTIONNAIRE – FEBRUARY, 2010

V3.1

Hello, my name is _____ and I am calling on behalf of the city of _____ (Centralia)

[IF SPEAKING TO A CHILD] May I speak to someone who is at least 18 years of age? Thank you. **[RE-INTRODUCE YOURSELF]**

Hello, my name is _____ and I am calling on behalf of the city of _____ (Centralia) We are asking citizens about an important environmental issue and we would like to include your opinions. All your answers are strictly confidential and will not be connected to your name.

S1. **[SCREENING QUESTION]** Before we actually begin, I need to verify your city. What city do you live in?

    1. Survey city (Centralia)
    2. Other City   **[THANK AND POLITELY DICONTINUE]**
    3. Don't Know   **[THANK AND POLITELY DICONTINUE]**
    4. Refused   **[THANK AND POLITELY DICONTINUE]**

1. What is your age? **[RECORD NUMBER]**

2. Great, thank you. My first question is about the water in our area. I'd like you to rate your perception of the overall quality of the water in our rivers, wetlands and lakes. By "quality of water" I mean how free it is from pollution. Rate it on a 0 to 10 scale where "0" means the water is "extremely polluted" and 10 means the water is "extremely clean." **[RECORD NUMBER]**

[READ]
Now, I'm going to read a number of statements to you regarding stormwater. Some of these statements may be true, they all may be true or they all may be false. If you believe that a statement is true, please say "Agree." If you believe the statement is false, say "Disagree." If you are not certain about the statement and need more information, you can answer with "need more information." If the question does not apply to you or your family, say "Doesn't Apply." Here is the first one. Do you Agree, Disagree or need more information about the following statement:

Responses for each:
    1. Agree
    2. Disagree
    3. Need more information
    4. Uncertain, Don't Know
    5. Refused
    6. Doesn't Apply

NOTE: A letter follows each statement below indicating the correct answer for that statement, an **A** for "Agree" and a **D** for "Disagree." When the word **Adopt** appears, it means the statement deals with whether respondents have "adopted" the desirable behavior mentioned in the statement. The combination of **A Adopt**, then, means the question deals with behavior and the desired response is **A**gree—which equates to the respondent saying that he or she engages in the desired behavior mentioned in the statement.

3. Drains on city streets for stormwater are connected to the same sanitary sewer system used for treating human waste. **D**

4. Stormwater runoff is the leading cause of pollution in rivers, wetlands and lakes. **A**

5. Pollution in our rivers, wetlands and lakes is more the result of industrial dumping practices than individual human activity. **D**

6. All water going into stormwater drains on the street is treated before being discharged into the environment. **D**

[ROTATE Q7-Q28] [NOTE: These questions will be asked in a random order to prevent sequencing bias.]

[AFTER ASKING THE NEXT NINE QUESTIONS, SAY: You are doing really well. We are halfway through and I'll try to get through this as quickly as I can. Here's the next one, do you Agree, Disagree or Need More Information about this statement.]

7. Hard surfaces such as roads and driveways are not significant sources of pollution in stormwater. **D**

8. When I am outside with my pet, I always pick up my pet's waste. **A Adopt**

9. The best way to clean up spilled oil on the driveway is to fully absorb it using kitty litter or paper towels and deposit this waste in a garbage can. **A**

10. Scrubbing oil and grease spots on outdoor concrete or asphalt with soap and hosing it off is a good way to prevent polluting stormwater runoff. **D**

11. If my car or truck is dripping oil, I make sure the leak is fixed within three weeks. **A Adopt**

12. All of my family's auto or truck parts with oil or grease on them are stored under a roof or cover. **A Adopt**

13. My household recycles all used motor oil. **A Adopt**

14. My family stores all containers holding oil or antifreeze under a roof or cover. **A Adopt**

15. The runoff from washing a car with biodegradable soap is safe in stormwater drains. **D**

16. When I wash a motor vehicle at home, the soapy water ends up in a ditch or on the street. **D Adopt**

17. Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle on the street using a biodegradable soap. **A**

18. The best place to dispose of water from cleaning a Latex paint brush is in a sink inside, not outdoors. **A**

19. Grass clippings and leaves are not regarded as harmful in stormwater. **D**

20. Chemical treatments to kill moss on roofs pose little risk for polluting stormwater. **D**

21. Sediment or dirt in stormwater is natural and not regarded as pollution. **D**

22. The downspouts at my house convey the water to an area where it is absorbed by the ground. **A Adopt**

23. Using a mulching lawnmower reduces the need to fertilize a lawn. **A**

24. My household stores all yard fertilizers and pesticides inside a building or in a covered area out of the rain. **A Adopt**

25. In the past 12 months, I may have applied a higher dose of insecticide or weed killer around my house than the directions say to use. **D Adopt**

26. In the past 12 months, I may have used more fertilizer or applied it more frequently than the label directions require. **D Adopt**

27. Carpet shampoo wastewater can be safely added to a stormwater drain. **D**

28. Bricks or pavers offer no advantage for reducing runoff over concrete or asphalt pavement. **D**

29. An *illicit* or *unlawful stormwater discharge* is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. **A**

30. If you witnessed someone pouring a gallon of used paint thinner into a stormwater drain, which agency would you call first to report it: **[READ 1-5]**
      1. The Washington Department of Ecology
      2. The police department
      3. The city Public Works Department   **A**
      4. 911
      5. Need more information
      6. I would not report it
      7. Don't Know
      8. Refused

That concludes our survey. I want to thank you very much for your time and cooperation. You have been very helpful. Have a good day!

POSTCODE GENDER:
1. MALE
2. FEMALE

DATE: _____INTERVIEWER: _____

Maple Valley
STORMWATER COMMUNITY SURVEY
QUESTIONNAIRE – FEBRUARY, 2010

V3.1

Hello, my name is _____ and I am calling on behalf of the city of
_____ (Maple Valley)

[IF SPEAKING TO A CHILD] May I speak to someone who is at least 18 years of age? Thank you. **[RE-INTRODUCE YOURSELF]**

Hello, my name is _____ and I am calling on behalf of the city of
_____ (Maple Valley) We are asking citizens about an important environmental issue and we would like to include your opinions. All your answers are strictly confidential and will not be connected to your name.

S1. **[SCREENING QUESTION]** Before we actually begin, I need to verify your city. What city do you live in?

    1. Survey city (Maple Valley)
    2. Other City   **[THANK AND POLITELY DICONTINUE]**
    3. Don't Know   **[THANK AND POLITELY DICONTINUE]**
    4. Refused   **[THANK AND POLITELY DICONTINUE]**

1. What is your age? **[RECORD NUMBER]**

2. Great, thank you. My first question is about the water in our area. I'd like you to rate your perception of the overall quality of the water in our rivers, wetlands and lakes and in Puget Sound. By "quality of water" I mean how free it is from pollution. Rate it on a 0 to 10 scale where "0" means the water is "extremely polluted" and 10 means the water is "extremely clean." **[RECORD NUMBER]**

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