

*The City of Maple Valley*

# **Stormwater Education Evaluation Report**

June 2011

*Prepared by:*

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The City of Maple Valley  
***STORMWATER COMMUNITY EDUCATION  
EVALUATION REPORT***

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# ***Thank You!***

Hebert Research wishes to express its appreciation to David Casey, City of Maple Valley, for his assistance given to us throughout this project.

## **Hebert Research**

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# Goal

## Research Goal

The goal of this research is to determine the extent of improvements in the public's stormwater-related knowledge and practices in 2011 compared to baseline data collected in 2010. This evaluation is intended to satisfy the program evaluation requirements set forth in the permittees' Western Washington Phase II Municipal Stormwater Permit.

## Content Areas for the Survey of the General Public

The "general public" is defined as adults (18 years of age and older) who speak English and live in the city of Maple Valley. The questions asked in the 2011 survey are identical to the questions asked in 2010. 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 consisted of 30 questions, of which 27 related directly to the public's knowledge about stormwater issues and the practices they engage in which protect stormwater quality. 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 1,300 telephone numbers appearing in the telephone directory for Maple Valley was purchased from a reputable commercial list company. 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 code covering the city, a random sample of phone numbers was drawn. 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 the 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 assure that the survey was administered to both those who were easy to reach and those who were more difficult to contact.

### ***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. During this training, interviewers can raise questions and provide their professional feedback regarding potential interviewing issues. No issues were raised since the questionnaire was fully validated in its first administration.

#### ***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. Ten 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 research staff 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 100 surveys were completed with adults living in the city of Maple Valley. At the 95% confidence level, the maximum margin of error for a sample size of 100 respondents is  $\pm 9.8\%$ . This margin of error means that if the survey was repeated 100 times, the resulting percents for each response would be within  $\pm 9.8\%$  (the margin of error) in 95 out of 100 cases for each question.

Over 1,200 phone numbers of residences in the city were called. Many of these calls went unanswered or went to voicemail. When a resident answered the phone, the individual was screened for being an adult who lives in the city and asked 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 were adults who spoke English. 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. The incidence rate for the 2011 administration of the survey was 76.6% and the response rate was 54.6%.

### ***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 the 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 data for the city in order to ensure that gender and age distributions were represented in the proper proportion according to census statistics. After weighting, it was concluded that the sample was representative of the population living in the city within the critical parameters of gender and age.

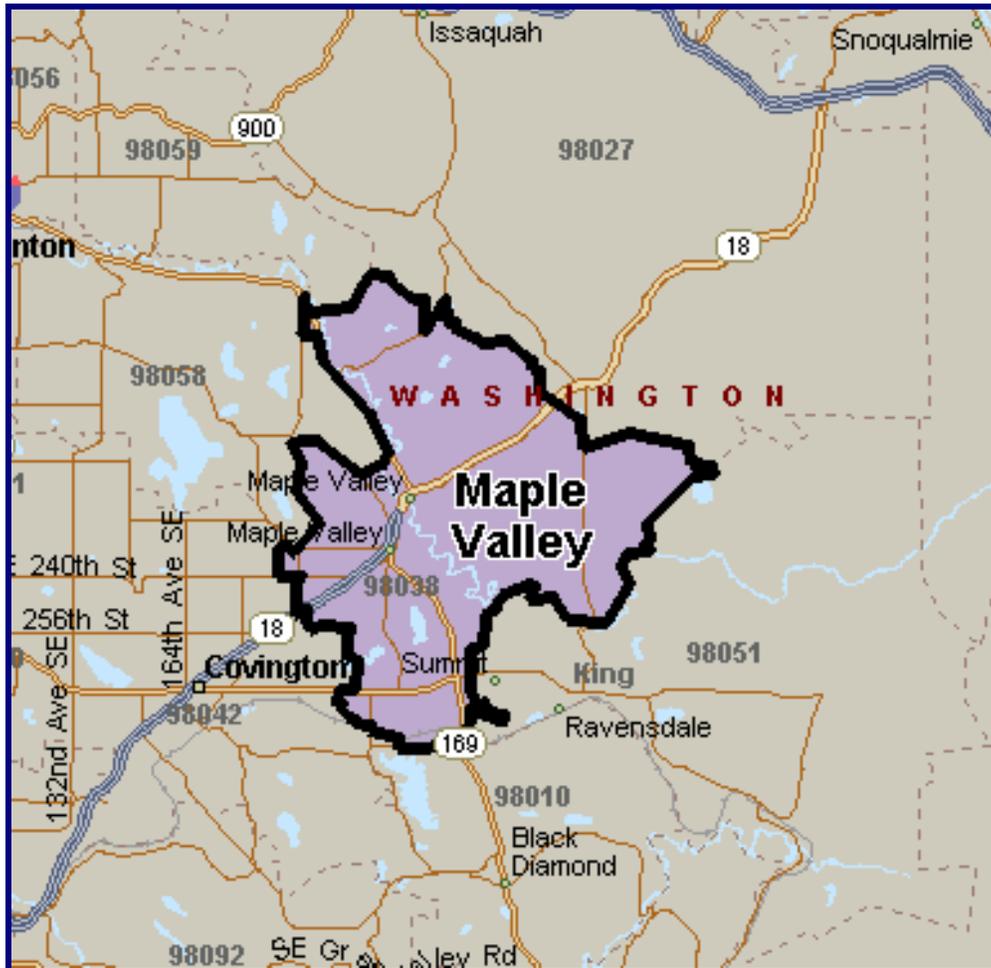
### ***Use of Findings***

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 ZIP code 98038 for the City of Maple Valley. Respondents were screened for living in the city.



## Explanation of Multivariate Analysis

The data for the survey was analyzed using the chi-square statistic ( $\chi^2$ ) to examine differences between responses in 2010 and 2011. 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 to statistically compare the 2010 and 2011 data to identify statistically significant changes. 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 results for the two administrations of the questionnaire reached 0.05, the finding is reported along with the actual 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 significance for public surveys. For this analysis, results are also reported for significance levels greater than 0.05 and less than or equal to 0.15 which we consider to be sufficiently low to indicate real change for this research.

## Respondent Profile

The following tables describe the demographic profile of the sample for Maple Valley by age and gender. 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 sample frequencies for age and gender.

Age	2010	2011
18–24	8.1%	8.1%
25–34	25.4%	25.4%
35–44	32.7%	32.7%
45–54	18.2%	18.2%
55–64	8.7%	8.7%
65+	6.8%	6.8%

Gender	2010	2011
Male	48.2%	41.1%
Female	51.8%	50.9%

## Assessment of Water Quality in the Environment

Respondents rated the quality of water in our rivers, wetlands and lakes and in Puget Sound on a 0-10 numeric scale where 0 meant “extremely polluted” and 10 meant “extremely clean.” Figure 1 shows that the average rating of surface water quality for 2011 is very close to the average rating for 2010, decreasing by 0.22 points. The difference between 2010 and 2011 is not statistically significant. The overall perception among Maple Valley residents of the quality of surface waters is the same in 2011 as in 2010.

*Figure 1. Average Rating of Surface Water Quality*

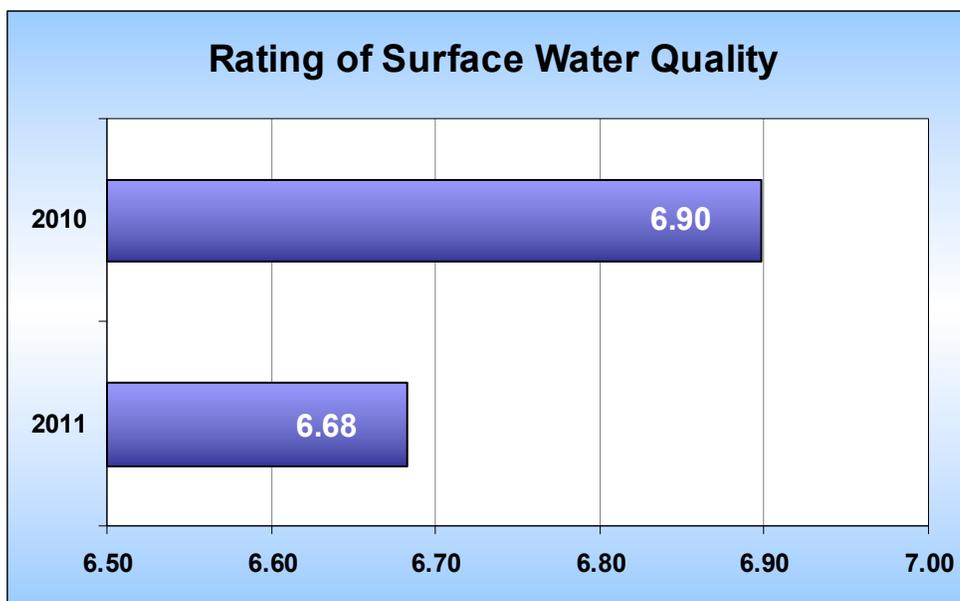
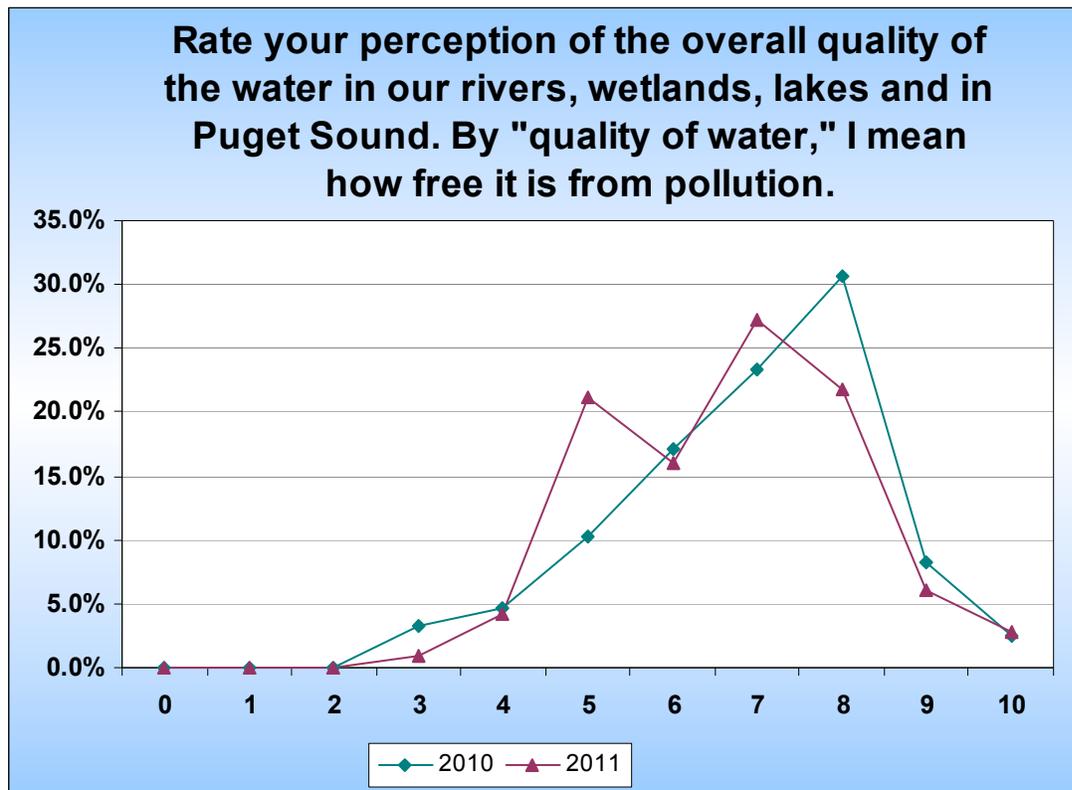


Figure 2 on the next page shows the distribution of respondent ratings for Maple Valley for 2011 and for the 2010 baseline at each point along the rating scale. The shape of the curve for each of the two datasets is very similar and suggests a normal curve that is shifted to the right or high end of the scale. The shift in average ratings toward the high end of the scale indicates that the public, on average, views water quality as being moderately clean. However, the range of ratings across the scale shows that a substantial difference of opinion exists. This finding implies that the information residents receive about the quality of surface waters is a confusion of positives and negatives. While very few respondents believe surface waters are “extremely clean,” the weight of opinion toward the “extremely clean” end of the scale implies that, on the whole, surface waters are not that much of an issue for the public. If the weight of the ratings were concentrated on the low end of the scale (the “extremely polluted” end), surface water quality would be perceived as being more of a problem to be addressed. As a result of the public seeing surface water quality as less of a problem, the city’s task of making the case for changing behavior to improve surface water quality is more difficult.

**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.”)**



### **Public Continues to Need a Better Awareness of the Problem**

The results point to the same need as in 2010: the public needs to be more deeply informed regarding the current levels of pollution in rivers, wetlands and lakes and in Puget Sound. Using educational and social marketing techniques, educational efforts should

- 1) communicate the current nature, severity and negative outcomes of surface water pollution (e.g., the contamination in Puget Sound is concentrated in resident salmon which are the food base for the most contaminated wild animals on the planet, Puget Sound Orcas [see *Scientific American*, Jan. 20, 2010]),
- 2) create a vision of the quality of surface waters that we should be aspiring toward and the positive outcomes that would derive from its realization, and
- 3) motivate the public to engage in the helpful practices that will serve to reduce new surface water pollution.

The first step in behavioral change is awareness of the problem. The more realistically the public perceives the problems and consequences of polluted surface water and the better it understands the benefits of clean water, the greater the impact and response will be. If the city can go beyond simple education and offer social marketing programs that help the public 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 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 assess changes in the public’s stormwater knowledge and related behavior from 2010 to 2011 resulting from the city’s educational programming and to develop priorities for future stormwater public education and outreach.

As in the baseline study, the results are organized by the percent of the respondents who provided a correct answer for the current survey—the lower the percent of correct answers given by the sample, 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”—this response equates to the respondent saying that he or she engages in the desired behavior mentioned in the statement.

The tables on the following pages show the percent correct answers for each question for the 2010 baseline study and the 2011 follow-up survey. A statistical test (chi-square) was carried

Level of Significance
Increase, $p \leq 0.05$
Increase, $0.05 < p \leq 0.15$
Decline, $p \leq 0.15$
Non-significant difference

out to compare the baseline data with current data to determine if the percent change is statistically significant. When significant differences were found and these differences showed improvement, the table cell showing the level of significance is highlighted. When the significance level is less than or equal to 0.05, the cell is highlighted in green. When significance level is

greater than 0.05 and less than or equal to 0.15, it is highlighted in tan. Significance levels at the 0.05 level indicate that there is at least a 95-out-of-100 chance that the observed change is real. Significance levels at the 0.15 level indicate there is at least an 85-out-of-100 chance that the observed change is real. In cases where there is a statistically significant decline in the percent of correct responses at the 0.15 significance level, the cell showing the level of significance will be highlighted in red. (See table Level of Significance above on left for examples.) Cells remaining white indicate a non-significant difference in the percent of correct answers between baseline data and the current 2011 evaluation data—statistically, the data from the two administrations is regarded as being equivalent. A significance level of 1.0 means the results from the two surveys are identical. Also, below the percentage of correct answers in each cell for each administration, the rank of the issue for education within that administration is also presented. The ranking helps in examining differences between the baseline and the follow-up research.

## Priority 1 Issues: Less than 50% Correct Answers

Priority 1 issues represent areas of knowledge and behavior where less than half of the respondents provided the correct or desired response. As shown in Table 1 below, the percent of correct answers for Priority 1 issues compared to 2010 values varied from an increase of 2.1% to 15.5%. Statistical differences were found for percent change for questions 16 and 21. Whereas there were seven Priority 1 issues found in 2010, now Maple Valley has only four. They are the top four issues from the 2010 research, but in a slightly different order.

The issue where the public showed a significant increase in behavior was:

- *When washing a motor vehicle at home, significantly fewer respondents reported allowing the soapy water to end up in a ditch or on the street.*

The issue where the public showed a significant increase in knowledge was:

- *Sediment or dirt in stormwater is pollution.*

**Table 1. Priority 1 Issues for Public Education and Social Marketing**

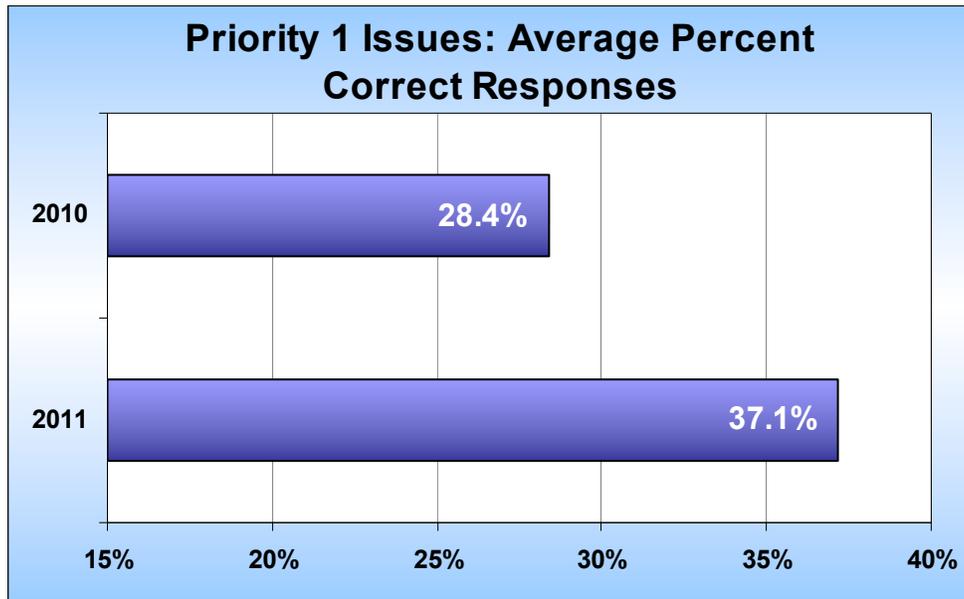
Rank for Education	Question	n		% Correct		% Change from 2010	Level of Significance
		2010	2011	2010	2011		
1	15. The runoff from washing a car with biodegradable soap is safe in stormwater drains. <b>D</b>	106	100	22.5% 2	28.3% 1	5.8%	0.376
2	16. When I wash a motor vehicle at home, the soapy water ends up in a ditch or on the street. <b>D Adopt</b>	98	83	19.5% 1	35.0% 2	15.5%	0.018
3	28. Bricks or pavers offer no advantage for reducing runoff over concrete or asphalt pavement. <b>D</b>	106	100	38.4% 4	40.5% 3	2.1%	0.846
4	21. Sediment or dirt in stormwater is natural and not regarded as pollution. <b>D</b>	106	100	32.5% 3	44.4% 4	11.9%	0.078

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

**Table Note:** All “Does not apply” responses to knowledge questions were added to the “Incorrect” response category since all knowledge questions apply to all respondents. This rule applies to all the tables in the report.

Figure 3 shows the average percent of correct responses in 2011 compared to correct responses for the same questions in 2010. The 8.7% increase in correct responses is statistically significant ( $p = 0.009$ ; Cramér's  $V = 0.093$ ). Respondents gave significantly more correct responses for 2011 Priority 1 issues than for the same issues in 2010.

**Figure 3: Overall Percent Correct Responses to Priority 1 Issues**



Future stormwater education should focus on the following educational messages:

- *Biodegradable soap is not a safe addition to stormwater drains and should be kept from entering the stormwater drainage system.*
- *To best protect the environment, soapy water from washing a motor vehicle is best handled by allowing it to be absorbed by a lawn or the ground. It 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 and dirt are pollution and should be prevented from entering the stormwater drainage system.*

## Priority 2 Issues: From 50–80% Correct Answers

Priority 2 issues represent areas of knowledge and behavior where 50% to 80% of the respondents provided the correct response. Twelve issues made this list in 2011, which constitutes 44.4% of the 27 issues tested, compared to 10 issues in 2010. The increase in the number of issues on the Priority 2 list is due the increase in correct responses to three issues that moved down to Priority 2 that were Priority 1 in 2010.

Table 2 below shows the percent of correct answers for Priority 2 issues in 2011 compared to 2010. Results show the public's response to two of the twelve issues underwent a significant change in 2011 from 2010. One issue showed a statistically significant increase in correct responses and one showed a significant decrease in correct responses. The results for the remaining issues showed no significant change.

The issue where the public showed a significant increase in knowledge was:

- *Chemical treatments used to kill moss on roofs poses a risk for polluting stormwater.*

The issue where the public showed a significant decrease in knowledge was:

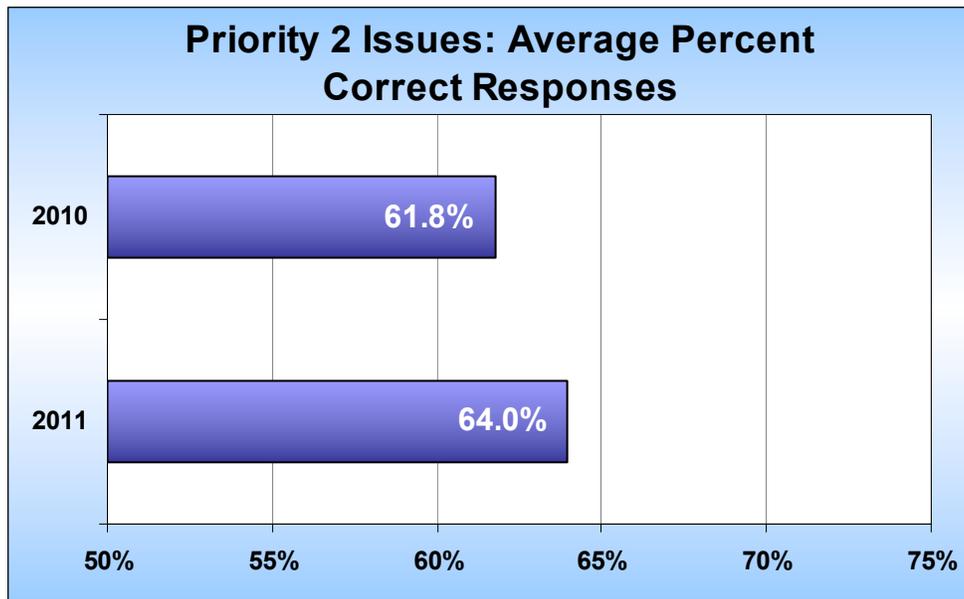
- *Applying soap to oil and grease spots on outdoor concrete or asphalt and rinsing it off with a hose is not a good method for protecting stormwater runoff.*

**Table 2. Priority 2 Issues for Public Education and Social Marketing**

Rank for Education	Question	n		% Correct		% Change from 2010	Level of Significance
		2010	2011	2010	2011		
5	19. Grass clippings and leaves are not regarded as harmful in stormwater. <b>D</b>	106	100	45.9% 6	50.1% 5	4.2%	0.588
6	3. Drains on city streets for stormwater are connected to the same sanitary sewer system used for treating human waste. <b>D</b>	104	100	49.0% 7	51.4% 6	2.4%	0.679
7	5. Pollution in our rivers, wetlands and lakes and in Puget Sound is more the result of industrial dumping practices than individual human activity. <b>D</b>	106	100	44.2% 5	52.7% 7	8.5%	0.214
8	17. Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle on the street using a biodegradable soap. <b>A</b>	104	100	55.9% 8	59.9% 8	4.0%	0.444
9	6. All water going into stormwater drains on the street is treated before being discharged into the environment. <b>D</b>	106	100	59.4% 10	64.1% 9	4.7%	0.501
10	18. The best place to dispose of water from cleaning a Latex paint brush is in a sink inside, not outdoors. <b>A</b>	106	100	68.5% 14	64.5% 10	-4.0%	0.555
11	4. Stormwater runoff is the leading cause of pollution in rivers, wetlands and lakes. <b>A</b>	106	100	57.1% 9	66.0% 11	8.9%	0.167
12	27. Carpet shampoo wastewater can be safely added to a stormwater drain. <b>D</b>	104	100	77.9% 17	68.3% 12	-9.6%	0.177
13	29. An <i>illicit</i> or <i>unlawful stormwater discharge</i> is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. <b>A</b>	105	100	62.6% 11	68.3% 13	5.7%	0.388
14	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. <b>D</b>	106	100	78.2% 18	69.2% 14	-9.0%	0.129
15	20. Chemical treatments to kill moss on roofs pose little risk for polluting stormwater. <b>D</b>	106	100	63.6% 12	74.2% 15	10.6%	0.096
16	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. <b>A</b>	105	100	83.5% 21	78.8% 16	-4.7%	0.462

Figure 4 shows that the average percent of correct responses for Priority 2 issues in 2011 is slightly higher than for these same issues in 2010, a difference of 2.2%. This difference is not statistically significant. The average percent of correct responses in 2011 is not significantly different from the average percent for the same issues in 2010.

*Figure 4: Percent Correct Responses to Priority 2 Issues*



While more than half the public knowing a correct answer to these issues represents a desirable level of public knowledge, the goal remains to achieve a fully informed public. Consequently, Priority 2 areas continue to represent genuine opportunities for further public education and social marketing.

The following issues should be addressed in future programming:

- *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 all pollutants before it is released into the environment. Therefore, the quality of stormwater going into the stormwater drainage system can have a significant effect on 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.*
- *Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle at home with biodegradable soap.*
- *All water going into stormwater drains is **not** treated before being discharged into the environment.*
- *The best place to clean paint brushes is in a sink that drains into the sanitary sewer system, not outdoors.*

- *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.*
- *Carpet shampoo waste water causes pollution to the environment and should not be disposed of in a stormwater drain.*
- *An illicit or illegal discharge is anything that enters a storm drain system that is not made up entirely of stormwater.*
- *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.*
- *The residue from chemical treatments that kill moss is a source of pollution.*
- *Oil and grease spots on outdoor concrete or asphalt should be cleaned up with soap and the residue absorbed using kitty litter or paper towels which should then be disposed of in the garbage can.*

Two issues on the Priority 2 list should be included among the Priority 1 items as issues that are fundamental to increasing responsible action in the public domain. About one out of three respondents were not aware that all water going into stormwater drains on the street is not treated before being discharged into the environment. Correcting this lack of understanding 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.

The second issue on the Priority 2 list that should be elevated to Priority 1 is knowledge of the definition of an illicit discharge. About a third of the respondents 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 with a potential for creating pollution.

## Priority 3 Issues: More than 80% Correct Answers

Priority 3 issues represent areas of knowledge or behavior where more than 80% of the respondents provided the correct response. Eleven issues made this list in 2011, which constitutes 40.7% of the 27 issues tested. In 2010, ten issues made the Priority 3 list.

Table 3 below shows the percent of correct answers for Priority 3 issues in 2011 compared to 2010. Results show the public's response to three of the eleven issues underwent a statistically significant increase in correct responses. The results for the remaining issues showed no significant change.

The issue where the public showed a significant increase in knowledge was:

- *Understanding that hard surfaces such as roads and driveways are significant contributors to pollution in stormwater runoff.*

The issues where the public showed a significant increase in engaging in desirable behavior were:

- *Directing downspouts to areas where rainwater can be absorbed by the ground.*
- *Fixing auto or truck oil leaks within three weeks.*

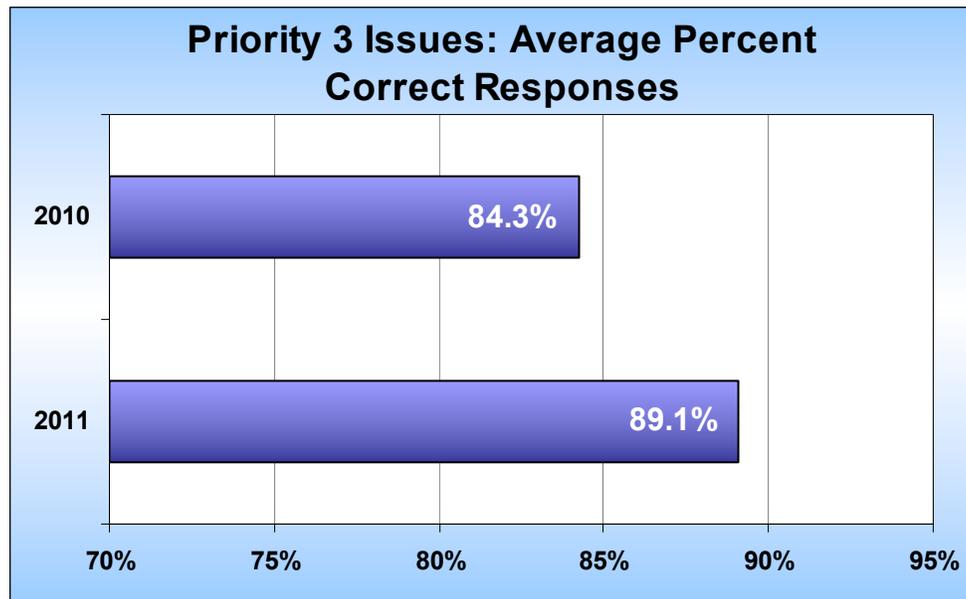
**Table 3. Priority 3 Issues for Public Education and Social Marketing**

Rank for Education	Question	n		% Correct		% Change from 2010	Level of Significance
		2010	2011	2010	2011		
17	23. Using a mulching lawnmower reduces the need to fertilize a lawn. <b>A</b>	106	100	73.9% 15	80.8% 17	6.9%	0.205
18	7. Hard surfaces such as roads and driveways are not significant sources of pollution in stormwater. <b>D</b>	106	100	67.3% 13	81.5% 18	14.2%	0.022
19	22. The downspouts at my house convey the water to an area where it is absorbed by the ground. <b>A Adopt</b>	105	99	77.6% 16	85.5% 19	10.9%	0.126
20	12. All of my family's auto or truck parts with oil or grease on them are stored under a roof or cover. <b>A Adopt</b>	82	91	81.6% 19	87.7% 20	6.1%	0.254
21	8. When I am outside with my pet, I always pick up my pet's waste. <b>A Adopt</b>	67	70	89.4% 24	88.0% 21	-1.4%	0.831
22	26. In the past 12 months, I may have used more fertilizer or applied it more frequently than the label directions require. <b>D Adopt</b>	92	89	89.0% 23	88.5% 22	-0.5%	0.916
23	11. If my car or truck is dripping oil, I make sure the leak is fixed within three weeks. <b>A Adopt</b>	101	97	82.8% 20	91.0% 23	8.2%	0.080
24	13. My household recycles all used motor oil. <b>A Adopt</b>	92	88	84.89% 22	91.0% 24	6.2%	0.210
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. <b>D Adopt</b>	94	91	89.9% 25	93.0% 25	3.1%	0.445
26	14. My family stores all containers holding oil or antifreeze under a roof or cover. <b>A Adopt</b>	89	93	95.9% 26	93.9% 26	-2.0%	0.562
27	24. My household stores all yard fertilizers and pesticides inside a building or in a covered area out of the rain. <b>A Adopt</b>	106	97	99.1% 27	99.5% 27	0.4%	0.328

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

Figure 5 shows that the average percent of correct responses for Priority 3 Issues in 2011 is higher than for the same issues in 2010 by 4.8%. This is a statistically significant difference ( $p < 0.001$ ; Cramér's  $V = 0.073$ ). Significantly more correct answers were provided by respondents in 2011 for Priority 3 issues compared to the results for the same questions in 2010.

**Figure 5: Percent Correct Responses to Priority 3 Issues**



The relatively high percent of respondents giving the correct responses in this category suggests that high behavioral compliance continues to take place. At minimum, it can be said that respondents knew the right thing to do and answered accordingly. To maintain and increase positive behaviors, it remains advisable to continue educating the public on these issues. Because of the already high level of knowledge/compliance for Priority 3 issues, the degree of emphasis on these issues may be lower compared to Priority 1 and Priority 2 issues.

The following messages should be included in public education and social marketing programs:

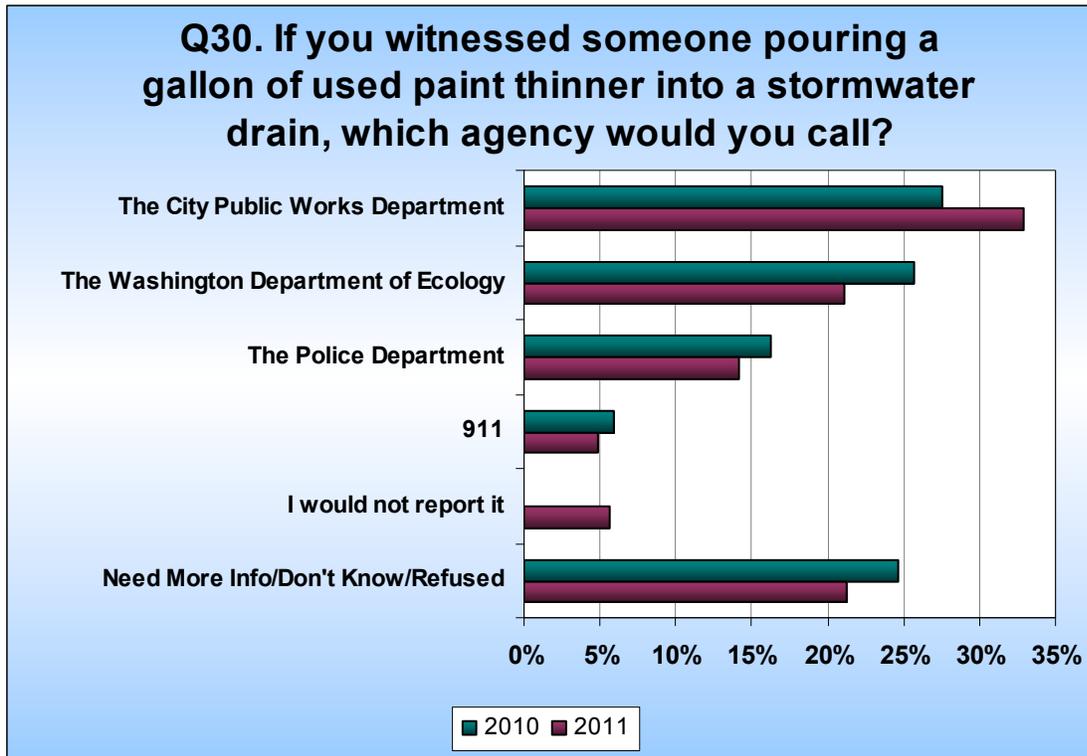
- *A mulching lawn mower reduces the need for using fertilizer and, hence, represents a valuable method for eliminating fertilizer pollution in stormwater.*
- *Hard surfaces are significant contributors to pollution in stormwater runoff. Hence, it is important to keep hard surfaces clean using acceptable cleaning techniques and, where possible, use pervious surfaces.*
- *Direct downspouts to areas where rainwater can be absorbed by the soil.*
- *Store auto or truck parts with oil or grease on them under a roof or cover.*
- *Pick up all pet waste when outside.*
- *Apply fertilizer at recommended rates.*
- *Fix auto or truck oil leaks within three weeks.*
- *Recycle all used motor oil.*
- *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.*

## Reporting an Illicit Discharge

To report an illicit discharge, respondents would call a variety of agencies with only 33.0% of residents calling their City Public Works Department, the correct choice. This finding represents a 5.5% increase from the 27.5% of respondents who said they would contact the Public Works Department in 2010. Most of the public remains unaware of the proper agency to call to report an illicit discharge.

**Figure 6: Reporting an Illicit Discharge**



The percent of responses given for each response category (agency) appears in Table 4 below.

**Table 4. Percent Reporting an Illicit Discharge to an Agency**

Agency	2010	2011
The City Public Works Department	27.5%	33.0%
The Washington Department of Ecology	25.7%	21.1%
The Police Department	16.3%	14.2%
911	5.9%	4.9%
I would not report it	0.0%	5.6%
Need More Info/Don't Know/Refused	24.7%	21.3%

## Baseline Stormwater Survey Results for 16 Cities

The following three tables present the percent correct answers for each of sixteen cities that have administered a baseline survey beginning in the summer of 2010 through April of 2011. The priority ranking for education across all sixteen cities was determined by calculating the average percent of correct responses across cities for each question (column labeled All Cities).

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

The ranking of issues for each city is also presented with a color code as illustrated in the “Rank for Education” table on the left. The top rank item for education for a designated city 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. Color-coding provides a quick understanding of how municipalities compare.

## Baseline Stormwater Survey Results for 16 Cities: Priority 1 Issues

**Table 11. Priority 1 Issues (Under 50% Correct Responses) for Sixteen Northwest Washington Cities**

Rank for Education	Question	% Correct Responses by Area																
		All Cities	Aberdeen	Centralia	Duvall	Edmonds	Enumclaw	Kenmore	Kent	Lakewood	Maple Valley	Mercer Island	Mill Creek	Mountlake Terrace	Mukilteo	Newcastle	Tukwila	Woodinville
1	15. The runoff from washing a car with biodegradable soap is safe in stormwater drains. <b>D</b>	29.8% 1	23.8% 1	18.3% 1	30.4% 1	31.8% 1	32.4% 1	36.6% 2	24.5% 1	31.7% 3	22.5% 2	26.5% 1	31.8% 2	23.3% 2	22.8% 1	31.4% 3	31.0% 1	30.7% 1
2	16. When I wash a motor vehicle at home, the soapy water ends up in a ditch or on the street. <b>D Adopt</b>	35.1% 2	47.4% 6	44.8% 7	36.8% 3	37.1% 2	42.4% 4	36.2% 1	32.3% 4	33.0% 4	19.5% 1	35.2% 2	24.9% 1	21.4% 1	38.9% 4	19.2% 1	45.8% 4	33.3% 2
3	28. Bricks or pavers offer no advantage for reducing runoff over concrete or asphalt pavement. <b>D</b>	38.2% 3	36.8% 3	30.9% 3	48.9% 7	40.8% 3	48.3% 8	46.3% 6	31.2% 2	30.0% 2	38.4% 4	49.1% 5	39.6% 3	30.3% 4	33.1% 2	29.9% 2	42.1% 2	34.4% 3
4	5. Pollution in our rivers, wetlands and lakes and in Puget Sound is more the result of industrial dumping practices than individual human activity. <b>D</b>	40.0% 4	34.4% 2	41.2% 6	40.4% 6	43.8% 5	39.4% 3	44.2% 4	31.6% 3	35.5% 5	44.2% 5	47.7% 4	44.1% 6	41.3% 6	39.2% 5	46.9% 7	43.6% 3	37.6% 5
5	21. Sediment or dirt in stormwater is natural and not regarded as pollution. <b>D</b>	42.7% 5	50.5% 8	38.0% 4	38.0% 4	52.6% 6	46.3% 6	43.8% 3	41.6% 6	50.7% 8	32.5% 3	49.2% 6	44.1% 5	29.0% 3	36.8% 3	33.6% 4	53.3% 7	36.0% 4
6	19. Grass clippings and leaves are not regarded as harmful in stormwater. <b>D</b>	46.6% 6	47.0% 5	40.2% 5	49.2% 8	43.3% 4	43.8% 5	50.7% 7	46.5% 8	53.4% 9	45.9% 6	40.7% 3	49.2% 7	47.0% 8	53.5% 6	46.7% 6	50.0% 6	41.5% 6
7	3. Drains on city streets for stormwater are connected to the same sanitary sewer system used for treating human waste. <b>D</b>	46.7% 7	56.4% 10	28.4% 2	36.7% 2	55.1% 7	36.6% 2	45.3% 5	40.6% 5	27.5% 1	49.0% 7	57.5% 9	40.5% 4	41.6% 7	53.9% 7	45.9% 5	46.5% 5	50.9% 7

## Baseline Stormwater Survey Results for 16 Cities: Priority 2 Issues

**Table 12. Priority 2 Issues (50% to 80% Correct Responses) for Sixteen Northwest Washington Cities**

Rank for Education	Question	% Correct Responses by Area																
		All Cities	Aberdeen	Centralia	Duvall	Edmonds	Enumclaw	Kenmore	Kent	Lakewood	Maple Valley	Mercer Island	Mill Creek	Mountlake Terrace	Mukilteo	Newcastle	Tukwila	Woodinville
8	4. Stormwater runoff is the leading cause of pollution in rivers, wetlands and lakes. <b>A</b>	53.2% 8	49.2% 7	54.8% 10	39.8% 5	59.6% 9	52.3% 10	62.1% 10	56.1% 9	46.5% 6	57.1% 9	56.6% 8	50.6% 9	53.9% 9	59.5% 8	56.2% 8	60.7% 10	58.6% 9
9	17. Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle on the street using a biodegradable soap. <b>A</b>	57.8% 9	44.4% 4	52.3% 9	52.3% 9	72.8% 14	51.7% 9	62.2% 11	58.9% 10	48.7% 7	55.9% 8	78.7% 20	57.1% 10	64.2% 11	64.6% 10	67.8% 12	62.5% 12	53.9% 8
10	6. All water going into stormwater drains on the street is treated before being discharged into the environment. <b>D</b>	58.2% 10	56.1% 9	46.8% 8	59.6% 11	61.0% 11	56.2% 11	58.3% 9	44.1% 7	58.1% 11	59.4% 10	67.7% 14	50.0% 8	56.3% 10	67.2% 12	57.7% 9	59.1% 9	59.6% 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. <b>A</b>	58.3% 11	66.9% 13	59.2% 12	66.4% 16	60.8% 10	48.2% 7	57.0% 8	67.2% 13	66.8% 12	62.6% 11	60.1% 11	67.6% 13	37.6% 5	63.5% 9	58.4% 10	58.5% 8	59.7% 11
12	18. The best place to dispose of water from cleaning a Latex paint brush is in a sink inside, not outdoors. <b>A</b>	63.2% 12	58.6% 11	63.2% 15	64.5% 14	59.0% 8	60.4% 12	63.8% 12	59.5% 11	57.1% 10	68.5% 14	66.3% 12	62.8% 11	67.8% 14	68.7% 15	70.6% 15	64.0% 13	64.9% 13
13	20. Chemical treatments to kill moss on roofs pose little risk for polluting stormwater. <b>D</b>	65.0% 13	66.5% 12	60.9% 13	62.4% 12	74.1% 15	60.5% 13	64.5% 13	66.6% 12	69.9% 14	63.6% 12	59.5% 10	70.4% 15	66.8% 13	68.2% 13	62.7% 11	61.5% 11	60.5% 12
14	27. Carpet shampoo wastewater can be safely added to a stormwater drain. <b>D</b>	70.5% 14	72.6% 15	60.9% 14	63.9% 13	76.2% 17	76.9% 18	66.0% 14	69.2% 14	73.1% 17	77.9% 17	56.2% 7	75.7% 19	70.6% 15	85.2% 21	70.0% 13	77.4% 16	69.8% 14
15	7. Hard surfaces such as roads and driveways are not significant sources of pollution in stormwater. <b>D</b>	70.7% 15	74.6% 17	58.8% 11	59.0% 10	80.3% 21	75.8% 16	69.5% 15	69.9% 15	70.4% 15	67.3% 13	76.4% 17	72.7% 17	83.7% 20	68.6% 14	70.4% 14	71.9% 15	71.9% 16
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. <b>D</b>	72.6% 16	74.9% 18	67.1% 16	65.4% 15	79.2% 19	77.2% 19	71.9% 16	73.3% 18	71.1% 16	78.2% 18	76.7% 18	70.8% 16	73.5% 16	74.2% 16	74.9% 18	67.2% 14	71.8% 15
17	22. The downspouts at my house convey the water to an area where it is absorbed by the ground. <b>A Adopt</b>	73.5% 17	75.3% 19	88.7% 22	69.2% 17	72.3% 13	71.1% 14	79.4% 18	71.1% 16	88.4% 24	77.6% 16	66.5% 13	65.4% 12	84.9% 21	66.1% 11	72.9% 16	85.6% 23	82.3% 20
18	23. Using a mulching lawnmower reduces the need to fertilize a lawn. <b>A</b>	75.1% 18	72.4% 14	76.7% 18	89.6% 23	79.3% 20	81.4% 20	75.7% 17	74.9% 19	69.8% 13	73.9% 15	73.9% 15	69.3% 14	81.9% 19	75.2% 17	73.6% 17	78% 17	75.9% 17
19	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. <b>A</b>	77.2% 19	78.5% 21	75.8% 17	70.1% 18	69.7% 12	83.7% 22	82.4% 19	75.4% 20	75.7% 18	83.5% 21	75.0% 16	75.6% 18	81.0% 18	77.1% 18	79.5% 19	81.8% 19	78.8% 18

## Baseline Stormwater Survey Results for 16 Cities: Priority 3 Issues

**Table 13. Priority 3 Issues (Over 80% Correct Responses) for Sixteen Northwest Washington Cities**

Rank for Education	Question	% Correct Responses by Area																
		All Cities	Aberdeen	Centralia	Duvall	Edmonds	Enumclaw	Kenmore	Kent	Lakewood	Maple Valley	Mercer Island	Mill Creek	Mountlake Terrace	Mukilteo	Newcastle	Tukwila	Woodinville
20	13. My household recycles all used motor oil. <b>A Adopt</b>	81.1% 20	87.1% 23	87.3% 21	77.0% 19	76.1% 16	75.0% 15	91.2% 25	82.4% 21	83.7% 20	84.9% 22	86.5% 21	87.4% 20	66.7% 12	79.9% 19	83.9% 20	80.3% 18	82.0% 19
21	12. All of my family's auto or truck parts with oil or grease on them are stored under a roof or cover. <b>A Adopt</b>	82.0% 21	73.9% 16	81.8% 20	88.0% 21	77.0% 18	76.5% 17	85.6% 23	72.2% 17	86.9% 22	81.6% 19	78.6% 19	88.6% 21	93.3% 23	83.8% 20	85.8% 21	82.0% 20	84.2% 21
22	11. If my car or truck is dripping oil, I make sure the leak is fixed within three weeks. <b>A Adopt</b>	87.5% 22	86.2% 22	90.0% 25	89.5% 22	89.4% 22	84.1% 23	86.0% 24	87.4% 22	86.7% 21	82.8% 20	96.3% 24	90.5% 22	78.7% 17	91.8% 25	88.7% 23	85.5% 22	94.1% 25
23	8. When I am outside with my pet, I always pick up my pet's waste. <b>A Adopt</b>	87.7% 23	75.4% 20	76.8% 19	84.9% 20	89.6% 23	82.2% 21	84.9% 21	93.8% 26	88.3% 23	89.4% 24	95.3% 22	94.2% 23	93.1% 22	85.9% 22	95.8% 26	85.4% 21	86.5% 22
24	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. <b>D Adopt</b>	91.1% 24	89.5% 24	93.8% 27	97.0% 25	91.1% 24	92.1% 24	83.3% 20	92.0% 25	89.7% 25	89.9% 25	95.8% 23	96.9% 25	98.7% 27	88.8% 23	88.4% 22	91.1% 24	89.4% 24
25	26. In the past 12 months, I may have used more fertilizer or applied it more frequently than the label directions require. <b>D Adopt</b>	91.6% 25	90.9% 25	89.1% 23	92.8% 24	91.8% 25	94.2% 26	85.2% 22	89.9% 23	83.5% 19	89.0% 23	96.3% 25	98.4% 26	98.1% 25	89.0% 24	91.3% 24	93.2% 25	89.0% 23
26	14. My family stores all containers holding oil or antifreeze under a roof or cover. <b>A Adopt</b>	94.1% 26	96.3% 27	89.8% 24	97.7% 27	93.1% 26	92.7% 25	93.7% 26	91.0% 24	90.0% 26	95.9% 26	97.2% 26	96.8% 24	98.5% 26	95.8% 26	93.1% 25	93.2% 26	98.6% 27
27	24. My household stores all yard fertilizers and pesticides inside a building or in a covered area out of the rain. <b>A Adopt</b>	95.0% 27	95.9% 26	93.0% 26	97.3% 26	93.8% 27	94.3% 27	95.0% 27	94.5% 27	91.1% 27	99.1% 27	98.3% 27	99.7% 27	97.2% 24	98.1% 27	96.5% 27	98.2% 27	97.7% 26

## Key Findings and Recommendations

### Key Findings

- The public's perception of the overall quality of water in our rivers, wetlands and lakes and in Puget Sound remains the same in 2011 as in 2010.
- The public's knowledge and behavior regarding four Priority 1 issues showed significant positive change overall and a significant increase in correct responses for two issues. The number of Priority 1 issues decreased from seven to four.
- The public's knowledge regarding Priority 2 issues showed significant positive change for one issue, and a significant decline for one issue.
- The public's knowledge and behavior regarding Priority 3 issues showed significant positive change overall and a significant increase in correct knowledge or behavior for three issues.
- Respondents showed an increased awareness of whom to call when witnessing an illicit discharge. The proportion of respondents who would correctly call the City Public Works Department increased from about one in four to about one in three. However, the vast majority of the citizens in Maple Valley remain uninformed about the correct agency to call to report an illicit discharge.

### Recommendations

The reduction of the number of issues on the Priority 1 list, the significant increases in the average percent of correct responses for Priority 1 and Priority 3 issues, and the significant improvement in the public's knowledge and practices in six of the twenty-seven issues tested are positive outcomes demonstrating genuine movement in the desired direction toward a fully informed public. The fact that four issues remain on the Priority 1 list in 2011 and that 12 issues are on the Priority 2 list demonstrates that educational efforts and social marketing must continue. If the goal is a fully informed public that universally engages in practices that highly protect the quality of water entering the stormwater drainage system, additional and more powerful methods of raising the public's knowledge and motivating desired behavior must be implemented. The recommendations for action mentioned in this report and in the baseline 2010 report must remain operational for the foreseeable future.

The survey results provide a valid assessment comparing the results from 2011 to 2010 in the public's knowledge about stormwater issues and the degree to which the public is engaging in desirable practices. The results serve well as a guide to prioritizing continuing educational programming and social marketing. These results also provide a continuing measure of progress in the effort by the City of Maple Valley to achieve high quality surface waters within its own community and throughout the Puget Sound region.

**City of Maple Valley**  
**STORMWATER COMMUNITY SURVEY**

*Questionnaire – May 2011*

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. Maple Valley |                                       |
| 2. Other City   | <b>[THANK AND POLITELY DICONINUE]</b> |
| 3. Don't Know   | <b>[THANK AND POLITELY DICONINUE]</b> |
| 4. Refused      | <b>[THANK AND POLITELY DICONINUE]</b> |

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]**

**[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 **Agree**—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 and in Puget Sound 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: \_\_\_\_\_