

City of Duvall

2012 Assessment of Residential and Business Understanding and Adoption of Targeted Stormwater Behaviors

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Research Goal and Objectives

Research Goal:

The goal of this research was to measure the public's knowledge and practices regarding stormwater in the city of Duvall. In addition, the research assessed Duvall businesses' stormwater practices and behaviors. Ultimately, this research may be used for stormwater planning as well as educational outreach to improve the target audience's understanding of the problem and reduce or eliminate behaviors and practices that cause or contribute to adverse stormwater impacts. This is in partial compliance with Phase II municipal stormwater permit requirements in Washington State. Each permittee (city of Duvall) is required to measure the understanding and adoption of target behaviors of its citizens/property managers/businesses and to use measurement to direct the application of education and outreach resources in the most effective manner.

Furthermore, this research compared the findings in 2010 with the results in 2012 to analyze any statistical differences. This longitudinal analysis was used to identify trends and patterns that are occurring among the public's knowledge and practices of stormwater.

Research Objectives:

The following objectives were completed during the course of this research project:

- 1) Determined the overall public perception of the quality of surface water in Duvall and compared it with the previous year's ratings.
- 2) Identified Priority 1, Priority 2, and Priority 3 issues for Duvall residents. This will help determine what perceptions, behaviors, and practices need the most attention as well as provide direction for an educational outreach program.
- 3) Identified shifts and trends in Priority 1, Priority 2, and Priority 3 issues that occurred from 2010 to 2012.
- 4) Determined the public's knowledge of which agency to report an illicit discharge and compared it with the research conducted in 2010.
- 5) Identified Priority 1, Priority 2, and Priority 3 issues for restaurants, automotive businesses, and property owners/managers.

Research Methodology

Sampling Frame

A Random Digit Dialing (RDD) technique was used to field the research. Subjects were selected from a random sample of phone numbers, cross-referenced by ZIP code. The RDD technique ensures 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 was loaded into Hebert Research's CATI (Computer-Aided Telephone Interviewing) system, which randomly selects phone numbers from this list, as required during the interviewing process. Each phone number was called at least five times at different times during the day and evening before being replaced by a new number. This helped to minimize non-response error, meaning that those who were easy to reach and those who were more difficult to contact were equally represented. Similar to the previous research project, Hebert Research sampled 102 residents of Duvall, which were weighted back to the 2010 U. S. Census data by age and gender.

The following table represents the sample sizes for years 2010 and 2012.

Sample Totals	
Year	Sample Size
2010	100
2012	102

Questionnaire

The survey was created for administration to the general public within the city of Duvall. Survey questions were developed by Hebert Research with input from the city. The survey consisted of 30 questions, 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, where illicit discharges should be reported, and the age of the respondent. Hebert Research completed all interviews using the same interactive voice (telephone) survey methodology that was utilized in the 2010 assessment for Duvall.

In addition, a business survey was developed by Hebert Research in collaboration with the City. Survey questions were comprised of stormwater knowledge and behavior in relation to the type of business. For the city of Duvall, the focus was on three types of businesses, which included:

- Restaurants
- Property Owners/Managers
- Automotive

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 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.

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.

Margin of Error, Incidence and Response Rates

A total of 102 surveys were completed by adults living within the zip codes of Duvall. At the 95% confidence level, the maximum margin of error for a sample size of 102 respondents is $\pm 9.7\%$. This margin of error means that if the survey was repeated 100 times, the resulting percentages for each response for the city would be within $\pm 9.7\%$ (the margin of error) in 95 out of 100 cases for each question.

Over 1,500 phone numbers of residences in the city were included in the sampling frame. 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. The incidence rate was 56.4% in the 2012 survey; the response rate was 63.03%.

Statistical Weighting

Statistical weighting is a technique that is commonly used in research to reduce sampling error. During the process of data collection, demographic data from the U.S. Census was obtained to identify population parameters for the survey. Sample demographics—specifically, age and gender—were compared with distributions in the population within each city. To compensate for potential sampling bias, weights were calculated and applied to the survey sample for the 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 the city were then weighted by population to assure a proper proportionate representation among the city. In the final weighting analysis, it was concluded that the sample was representative of the population for the city within the critical parameters of gender and age according to the U.S. Census.

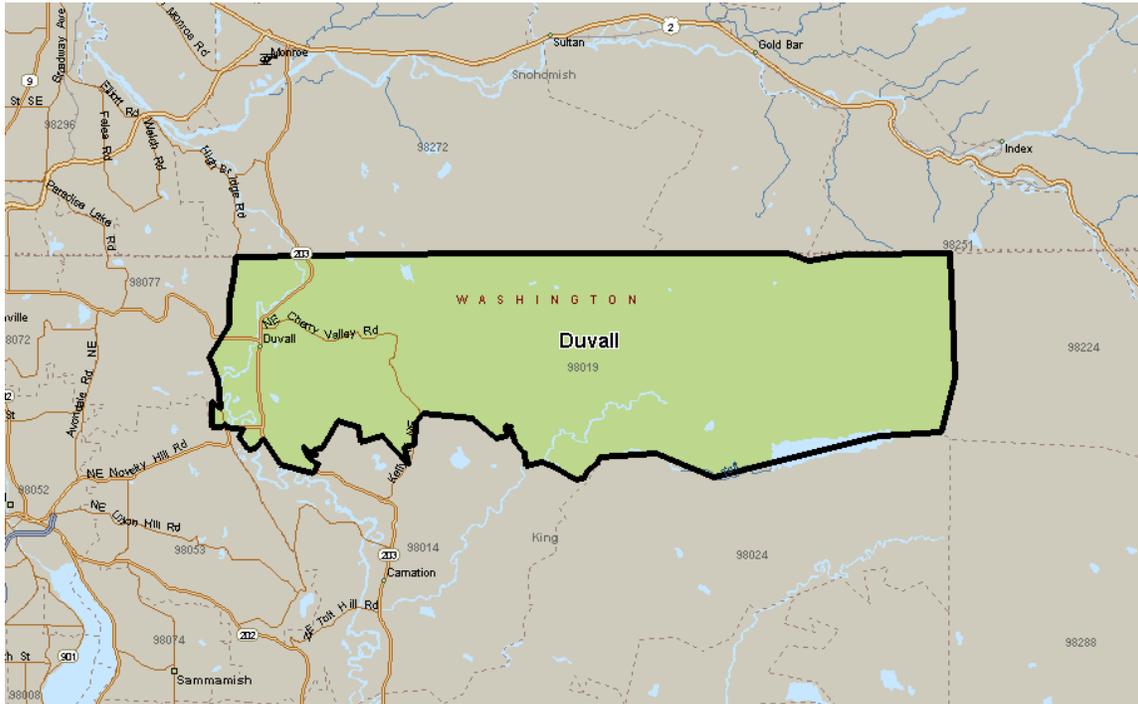
Use of Findings

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.

Geographical Map of Surveyed Area

The map below shows the geographic area covered by ZIP code 98019 for the City of Duvall. Only the respondents living in the city were asked to take the survey.



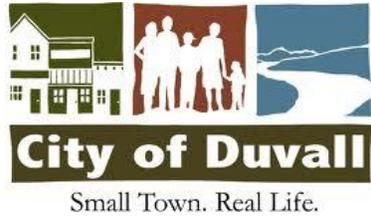
Explanation of Multivariate Analysis

The data for the surveys were analyzed using the chi squared 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 either 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 squared test was executed. For the questions dealing with the actions of the respondents, those who said the action did not apply to them were 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-squared 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-squared test 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. Findings of no significance are also reported to provide the basis for conclusions regarding the uniformity of opinion across the sample.

Cramér’s V is a statistical test that measures the degree of association between two categorical variables. For statistical tests that reach significance using chi-squared, Cramér’s V values are provided to describe the strength of the association between the variables. This measurement ranges between 0.0 and 1.0. The higher the level of association, the greater is the probability that the independent variable is causing an effect on the dependent variable. A measurement of 0 indicates there is no association between the two, meaning it is likely the independent variable has no systematic effect on the dependent variable. A measurement of 1.0 indicates that variations in the independent variable completely match variations in the dependent variable.

Eta^2 is a measure of the effect one variable has on another. The measurement ranges from 0.0 to 1.0. Eta^2 reflects the percentage of the dependent variable variance explained by the independent variables’ variance in the sample data. This statistic is related to the concept of ANOVA, or analysis of variance.



Residential Research

Respondent Profile

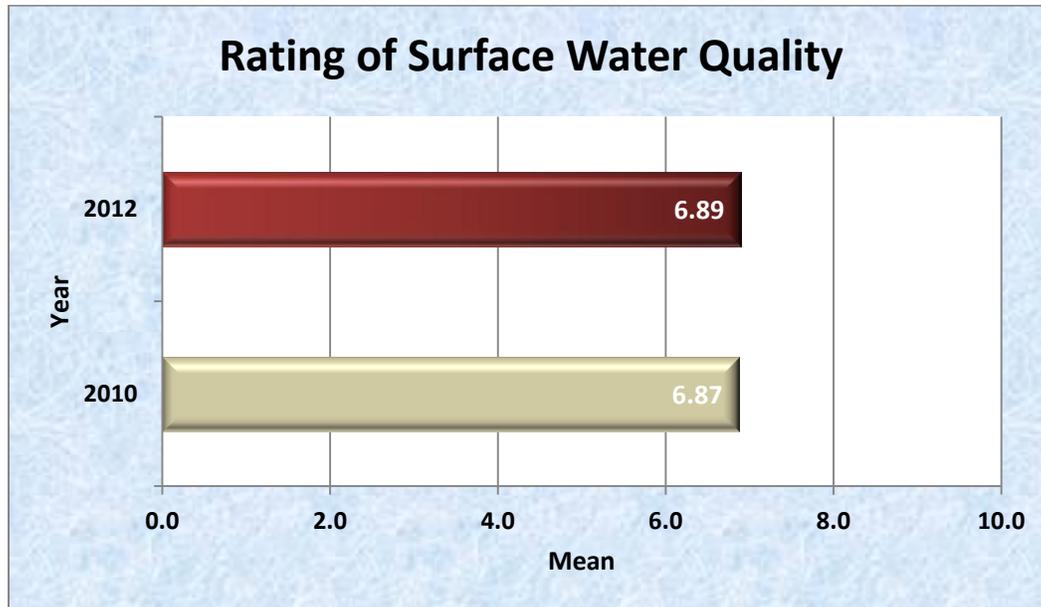
The following tables describe the demographic profile of the sample for Duvall by age and gender. As indicated in the methodology section, the sample was statistically weighted to match the population by gender and age. The percentages listed below are the weighted sample frequencies for age and gender according to 2010 U.S. Census data. Un-weighted percentages have been included for comparison.

2012 Weighted Sample - Gender		
Gender	Sample	Weighted
Male	41.2%	48.3%
Female	58.8%	51.7%

2012 Weighted Sample - Age		
Age Group	Sample	Weighted
18-24	7.8%	5.8%
25-34	9.8%	19.4%
35-44	6.9%	31.6%
45-54	25.5%	24.8%
55-64	29.4%	11.5%
65+	20.6%	6.9%

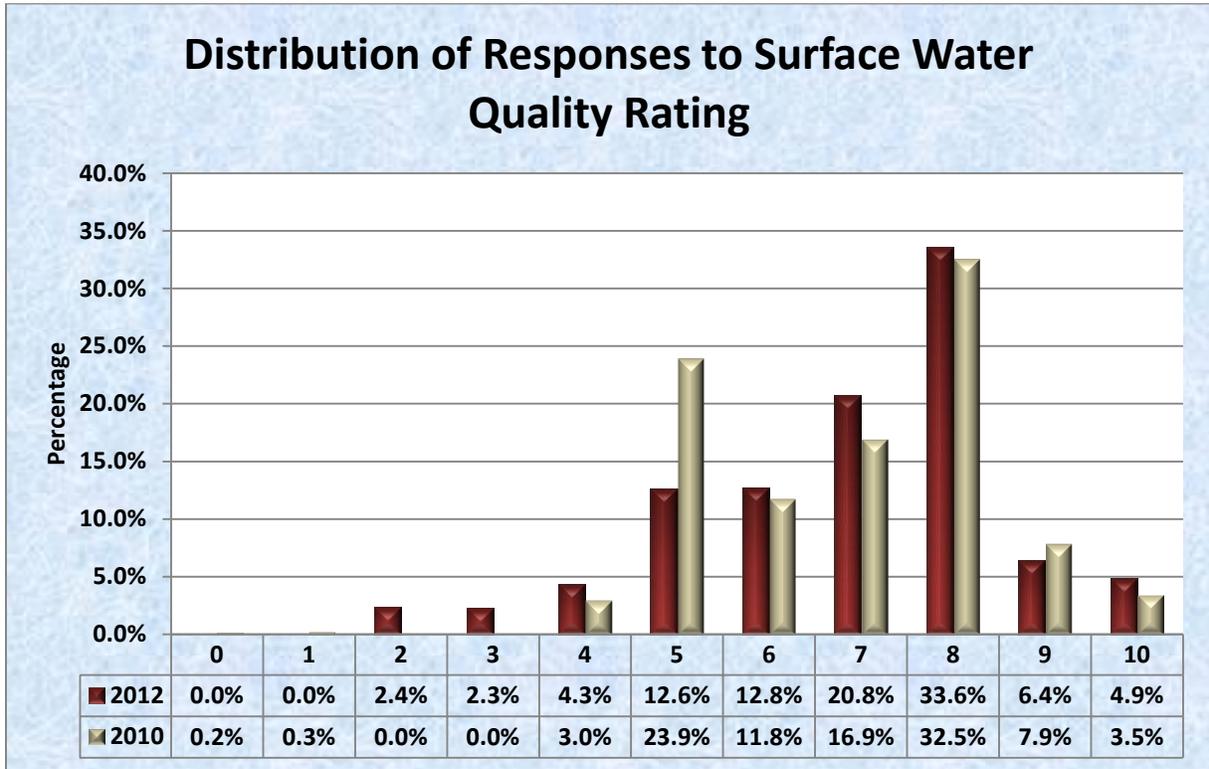
Assessment of Water Quality in the Environment

Respondents rated the quality of water in Duvall's rivers, wetlands, and lakes on a 0-10 numeric scale where 0 meant "extremely polluted" and 10 meant "extremely clean." The average rating for surface water quality was slightly higher in 2012 than in the 2010 survey. The rating increased slightly from 6.87 in 2010 to 6.89 in 2012. This increase was not statistically significant.



$\sigma = 1.586$ in 2010; $\sigma = 1.742$ in 2012

The following chart shows the distribution of respondent ratings for 2010 and the 2012 results at each point along the rating scale



$\sigma = 1.586$ in 2010; $\sigma = 1.742$ in 2012

Opportunities for Expansion and Focus of Educational Programs

The main purpose of this survey was to assess changes in the public's stormwater knowledge and related behavior from 2010 to 2012. These comparisons are needed because of the city's educational program 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 Issues: Less than 50% correct answers
- Priority 2 Issues: From 50 to 80% correct answers
- Priority 3 Issues: Over 80% correct answers

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.

Priority 1 Issues

Priority 1 issues represent areas of knowledge and behavior where less than half of the respondents provided the correct or desired response. The following table shows the percent of correct answers for Priority 1 issues in 2010 and 2012.

Priority 1 Issues (Based on 2010 Results)		
Questions	% Correct	
	2012	2010*
The runoff from washing a car with biodegradable soap is safe in stormwater drains. D	16.7%	29.6%
Drains on city streets for stormwater are connected to the same sanitary sewer system used for treating human waste. D	34.9%	36.7%
When I wash a motor vehicle at home, the soapy water ends up in a ditch or on the street. D Adopt	37.3%	36.8%
Sediment or dirt in stormwater is natural and not regarded as pollution. D	50.6%	38.0%
Pollution in our rivers, wetlands and lakes is more the result of industrial dumping practices than individual human activity. D	38.6%	40.4%
Bricks or pavers offer no advantage for reducing runoff over concrete or asphalt pavement. D	32.2%	48.2%
Grass clippings and leaves are not regarded as harmful in stormwater. D	25.5%	49.2%

**This table of Priority 1 issues is based on 2010 results. Thus, 2012 percentages may exceed 50%.*

Related Multivariate Analysis Findings

Statistically Significant Differences by Survey Year

There were statistically significant differences in responses between survey years to the following priority 1 statements:

- “The runoff from washing a car with biodegradable soap is safe in stormwater drains.” The percent of correct responses *decreased* from 29.6% in 2010 to 16.7% 2012. (p-value = 0.033, Cramer's V = 0.150)
- “Grass clippings and leaves are not regarded as harmful in stormwater.” The percent of correct responses *decreased* from 49.2% in 2010 to 25.5% in 2012. (p-value = 0.001, Cramer's V = 0.243)
- “Bricks or pavers offer no advantage for reducing runoff over concrete or asphalt pavement.” The percent of correct responses *decreased* from 48.2% in 2010 to 32.2% in 2012. (p-value = 0.023, Cramer's V = 0.160)

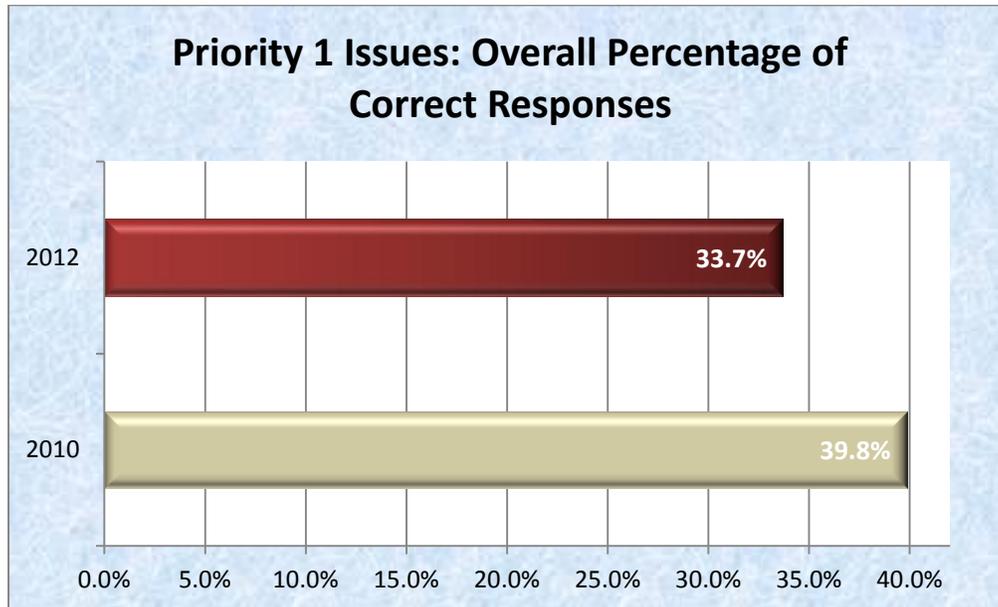
Statistically Significant Differences by Gender

- Males were more likely to give the correct response to the statement, “*Sediment or dirt in stormwater is natural and not regarded as pollution.*” (p-value = 0.017, Cramer's V = 0.236)

Multivariate Analysis - Gender		
Response	Male	Female
Correct	63.3%	39.6%
Incorrect	36.7%	60.4%

Topics for Public Education: Priority 1

The overall percentage of respondents who answered correctly for the 2010 Priority I issues was calculated for the 2010 and 2012 surveys. The overall percent in 2010 of 39.8% decreased down to 33.7% in 2012.



$\sigma = 0.069$ in 2010; $\sigma = 0.107$ in 2012

Knowledge of how rivers, wetlands, 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. Priority 1 educational programming and marketing campaigns 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.*
- *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.*

- *Grass clippings and leaves in stormwater are regarded as pollution and should be kept out of the stormwater drainage system.*
- *Sediment and dirt are 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.*

Priority 2 Issues

Priority 2 issues represent areas of knowledge and behavior where 50% to 80% of the respondents provided the correct response. The table below shows the percent of correct answers for Priority 2 issues in 2010 and 2012.

Priority 2 Issues (Based on 2010 Results)		
Questions	% Correct	
	2012	2010*
Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle on the street using a biodegradable soap. A	66.0%	50.9%
Hard surfaces such as roads and driveways are not significant sources of pollution in stormwater. D	60.4%	59.0%
All water going into stormwater drains on the street is treated before being discharged into the environment. D	51.6%	59.6%
Stormwater runoff is the leading cause of pollution in rivers, wetlands and lakes. A	51.6%	60.2%
Carpet shampoo wastewater can be safely added to a stormwater drain. D	60.7%	61.8%
Chemical treatments to kill moss on roofs pose little risk for polluting stormwater. D	71.9%	62.2%
The best place to dispose of water from cleaning a Latex paint brush is in a sink inside, not outdoors. A	75.3%	62.7%
An <i>illicit or unlawful stormwater discharge</i> is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. A	53.6%	62.9%
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	64.6%	65.3%
The downspouts at my house convey the water to an area where it is absorbed by the ground. A Adopt	71.2%	69.1%
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	84.8%	70.0%
My household recycles all used motor oil. A Adopt	95.5%	76.8%

**This table of Priority 2 issues is based on 2010 results. Thus, 2012 percentages may fall out of the Priority 2 range between 50% and 80%.*

Related Multivariate Analysis Findings

Statistically Significant Differences by Survey Year

There were statistically significant differences in responses between survey years to the following Priority 2 statements:

- “Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle on the street using a biodegradable soap.” The percent of correct responses *increased* from 50.9% in 2010 to 66.0% 2012. (p-value = 0.034, Cramer's V = 0.149)
- “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.” The percent of correct responses *increased* from 70.0% in 2010 to 84.8% 2012. (p-value = 0.015, Cramer's V = 0.171)
- “The best place to dispose of water from cleaning a Latex paint brush is in a sink inside, not outdoors.” The percent of correct responses *increased* from 62.7% in 2010 to 75.3% in 2012. (p-value = 0.048, Cramer's V = 0.139)
- “My household recycles all used motor oil.” The percent of correct responses *increased* from 76.8% in 2010 to 95.5% in 2012. (p-value < 0.001, Cramer's V = 0.272)

Statistically Significant Differences by Gender

- Males were more likely to give the correct response to the statement, “*Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle on the street using a biodegradable soap.*” (p-value = 0.015, Cramer's V = 0.240)

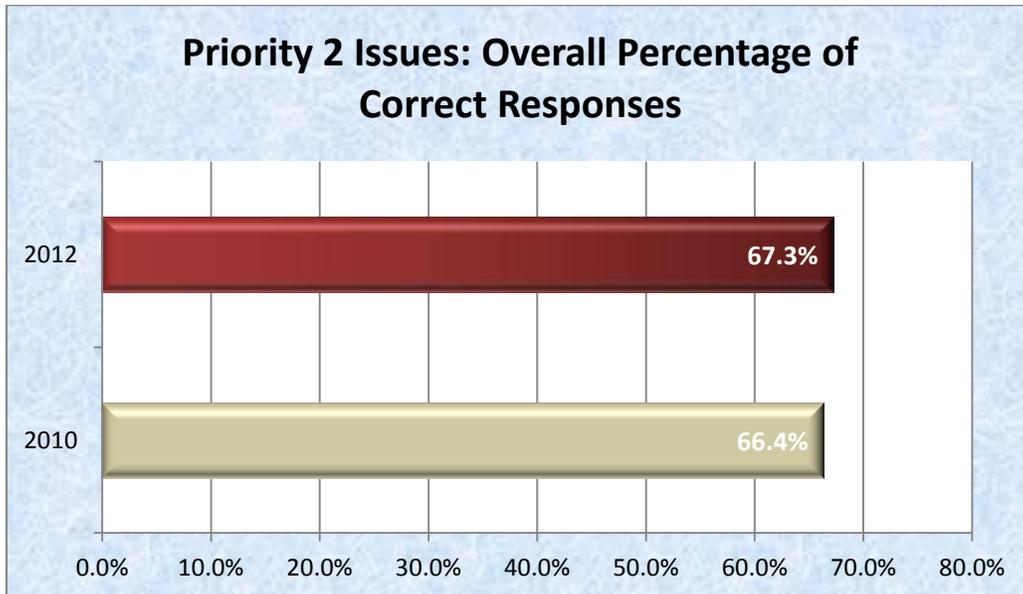
Multivariate Analysis - Gender		
Response	Male	Female
Correct	77.6%	54.7%
Incorrect	22.4%	45.3%

- Males were more likely to give the correct response than female respondents to the statement, “*The best place to dispose of water from cleaning a Latex paint brush is in a sink inside, not outdoors.*” (p-value = 0.001, Cramer's V = 0.320)

Multivariate Analysis - Gender		
Response	Male	Female
Correct	89.8%	62.3%
Incorrect	10.2%	37.7%

Topics for Public Education: Priority 2

The average percentage of respondents who answered correctly for the 2010 Priority 2 issues was calculated for both the 2010 and 2012 surveys. The overall percent in 2010 of 66.4% increased to 67.3% in 2012.



$\sigma = 0.065$ in 2010; $\sigma = 0.139$ in 2012

While more than half of the public responded correctly to these issues represents a desirable level of public knowledge, the goal remains to achieve a fully informed public. Consequently, Priority 2 issues continue to represent real opportunities for further public education and social marketing. Future educational and marketing campaigns addressing Priority 2 issues should contain the following messages:

- *Stormwater runoff is the leading cause of pollution in rivers, wetlands and lakes.*
- *All water going into stormwater drains is not treated before being discharged into the environment.*
- *Hard surfaces, such as roads and driveways, are a significant source of stormwater pollution.*
- *Proper methods for cleaning up oil and grease spills, such as using kitty litter and paper towels.*
- *Vehicles should be washed at commercial facilities, not at homes where runoff is allowed to drain into the streets.*

- *The best place to clean paint brushes is in a sink that drains into the sanitary sewer system, not outdoors.*
- *The residue from chemical treatments that kill moss is a source of pollution.*
- *Proper disposal of used cleaning supplies, including carpet shampoo.*
- *An illicit or illegal discharge is anything that enters a storm drain system that is not made up entirely of stormwater.*

Priority 3 Issues

Priority 3 issues represent areas of knowledge or behavior where more than 80% of the respondents provided the correct response. The following table shows the percentage of correct answers for Priority 3 issues in 2010 and 2012.

Priority 3 Issues (Based on 2010 Results)		
Questions	% Correct	
	2012	2010*
When I am outside with my pet, I always pick up my pet's waste. A Adopt	86.5%	84.9%
If my car or truck is dripping oil, I make sure the leak is fixed within three weeks. A Adopt	94.8%	87.0%
All of my family's auto or truck parts with oil or grease on them are stored under a roof or cover. A Adopt	84.9%	87.9%
Using a mulching lawnmower reduces the need to fertilize a lawn. A	84.1%	89.6%
In the past 12 months, I may have used more fertilizer or applied it more frequently than the label directions require. D Adopt	97.1%	92.8%
My family stores all containers holding oil or antifreeze under a roof or cover. A Adopt	99.1%	94.8%
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	88.2%	96.7%
My household stores all yard fertilizers and pesticides inside a building or in a covered area out of the rain. A Adopt	97.5%	97.1%

**This table of Priority 3 issues is based on 2010 results. Thus, 2012 percentages may fall below 80%.*

Related Multivariate Analysis Findings

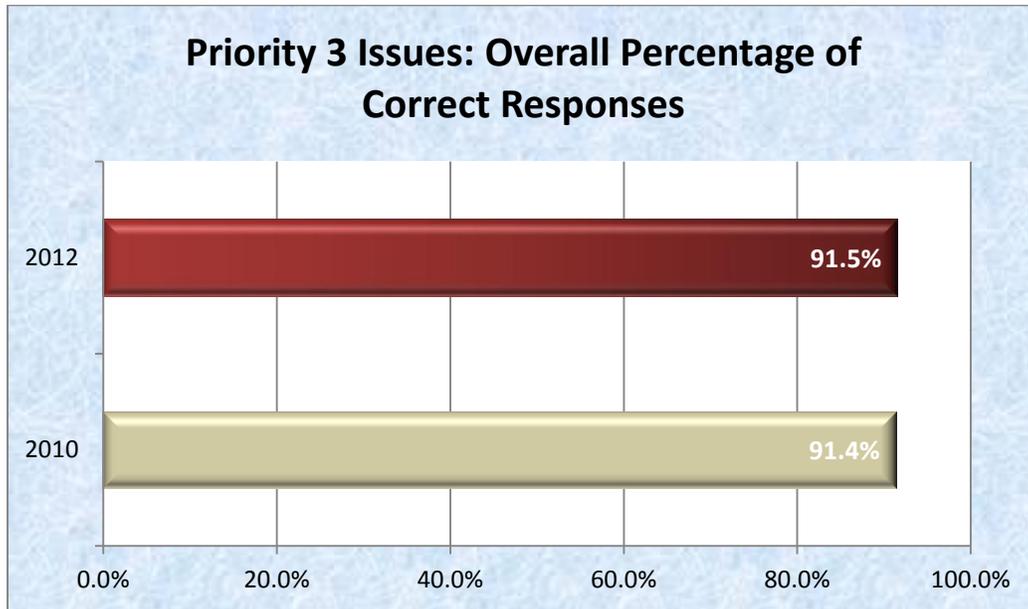
Statistically Significant Differences by Survey Year

There were statistically significant differences in responses between survey years to the following priority 3 statement:

- “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.” The percent of correct responses *decreased* from 96.7% in 2010 to 88.2% 2012. (p-value = 0.028, Cramer's V = 0.180)

Topics for Public Education: Priority 3

The average percentage of respondents who answered correctly for the Priority 3 issues was calculated for both the 2010 and 2012 surveys. The overall percentage in 2010 of 91.4% increased by one-tenth of a percent to 91.5% in 2012.



$\sigma = 0.046$ in 2010; $\sigma = 0.062$ in 2012

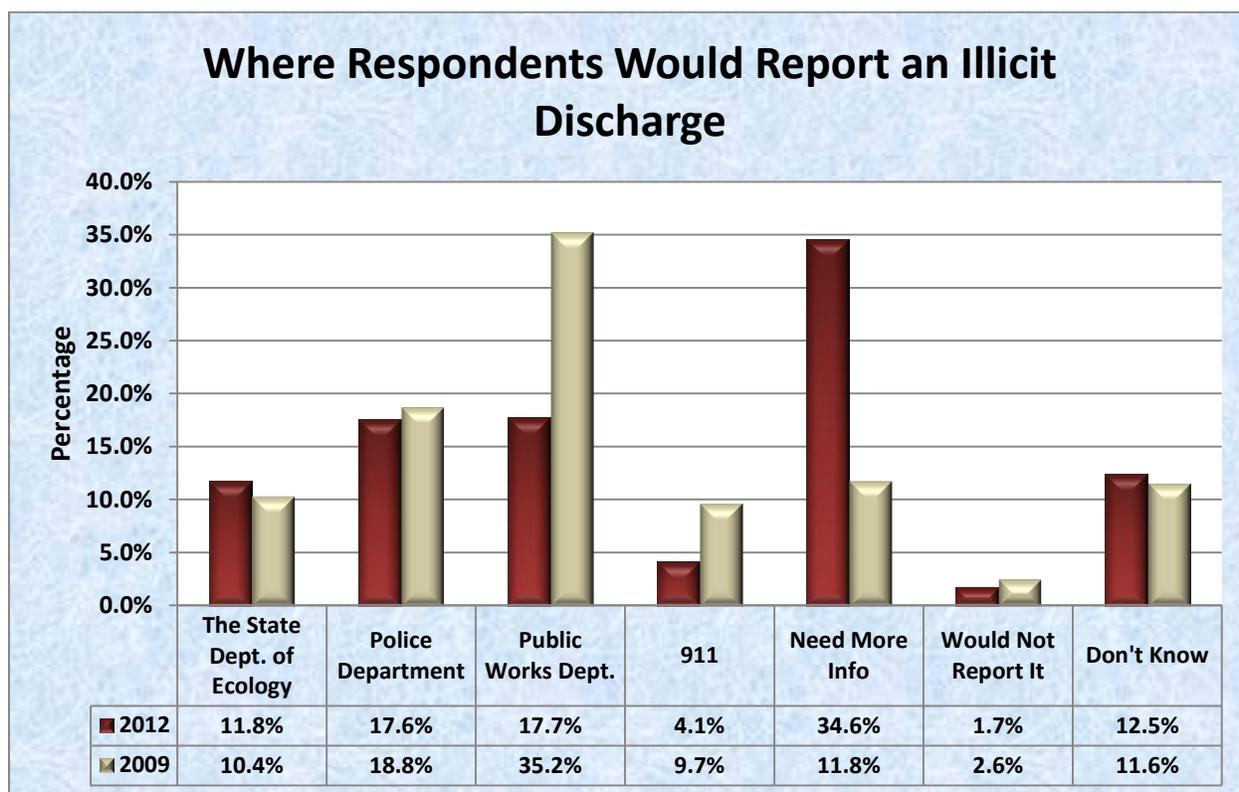
The relatively high percentage of respondents who gave the correct responses in this category suggests that high behavioral compliance continues to take place. At minimum, it can be said that respondents knew the right thing to do and answered accordingly. To maintain and increase positive behaviors, 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. If Priority 3 issues are addressed during educational and marketing campaigns, the following messages should be included:

- *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.*
- *Store auto or truck parts with oil or grease on them under a roof or cover, store containers holding oil or antifreeze under a roof or cover.*
- *Pick up all pet waste when outside.*
- *Apply fertilizer, insecticides or weed killer at recommended rates*
- *Fix auto or truck oil leaks within three weeks.*

- *Recycle all used motor oil.*
- *Store all yard fertilizers and pesticides inside a building or in a covered area out of the rain.*
- *Fix house downspouts to dispense the water to an area where it can be absorbed by the ground.*
- *A mulching lawnmower reduces the need for using fertilizer and, hence, represents a valuable method for eliminating fertilizer pollution in stormwater.*

Reporting an Illicit Discharge

Respondents were asked the following question: “If you witnessed someone pouring a gallon of used paint thinner into a stormwater drain, which agency would you call first to report it?” A variety of options were given as choices. Only 17.7% of residents chose the correct choice, calling their City Public Works Department. This finding represents a 17.5% decrease from the 35.2% correct responses in 2010. Furthermore, the largest modal class in 2012 at 34.6% was those respondents that selected “need more information.” The results indicate that most residents in Duvall remain unaware of the proper agency to call to report an illicit discharge.



Related Multivariate Analysis Findings

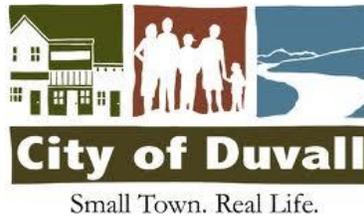
Statistically Significant Differences by Survey Year

There was a statistically significant difference in response between survey years to the question regarding the correct agency to report an illicit discharge. The percent of correct responses *decreased* from 35.2% in 2010 to 17.7% 2012. (p -value = 0.004, Cramer's V = 0.201)

Statistically Significant Differences by Gender

- Female respondents were statistically more likely to give the correct response to the statement, *“If you witnessed someone pouring a gallon of used paint thinner into a stormwater drain, which agency would you call first to report it?”* (p-value = 0.001, Cramer's V = 0.342)

Multivariate Analysis - Gender		
Response	Male	Female
Correct	4.1%	30.2%
Incorrect	95.9%	69.8%



Regional Residential Stormwater Research

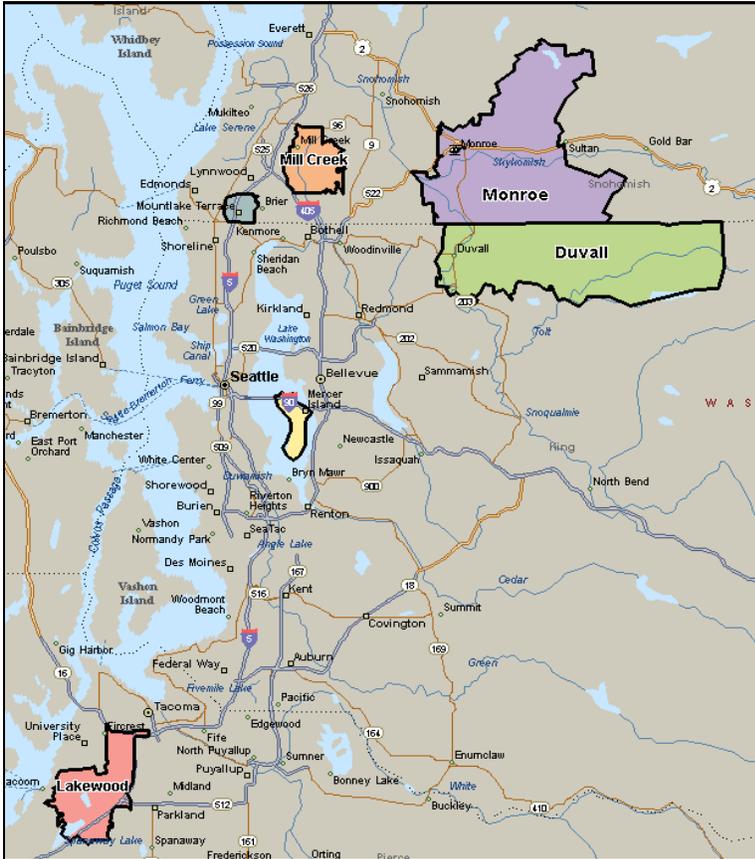
Comparing Stormwater Community Survey Results Across Seven Cities

In August of 2012, Hebert Research surveyed over 800 residents in seven different cities in Western Washington representing a region that includes areas north, east, and south of Seattle. The margin of error for 820 completed surveys is very low at $\pm 3.4\%$, which means the information is highly accurate. The cities that have participated include:

- Bellingham
- Duvall
- Lakewood
- Mercer Island
- Mill Creek
- Monroe
- Mountlake Terrace

What follows is a summary of information that allows each city to see how it compares to the other participating cities within each of the three priority levels of information. Also included is a table summarizing the priorities for each city by question which provides a more detailed view of similarities and differences. Overall, the picture regarding what the public knows and does not know across all participating cities remains very similar. The survey data developed provides a good foundation of understanding, but what is done with the results and the resulting impact on the environment is what matters most.

Geographic Area Surveyed

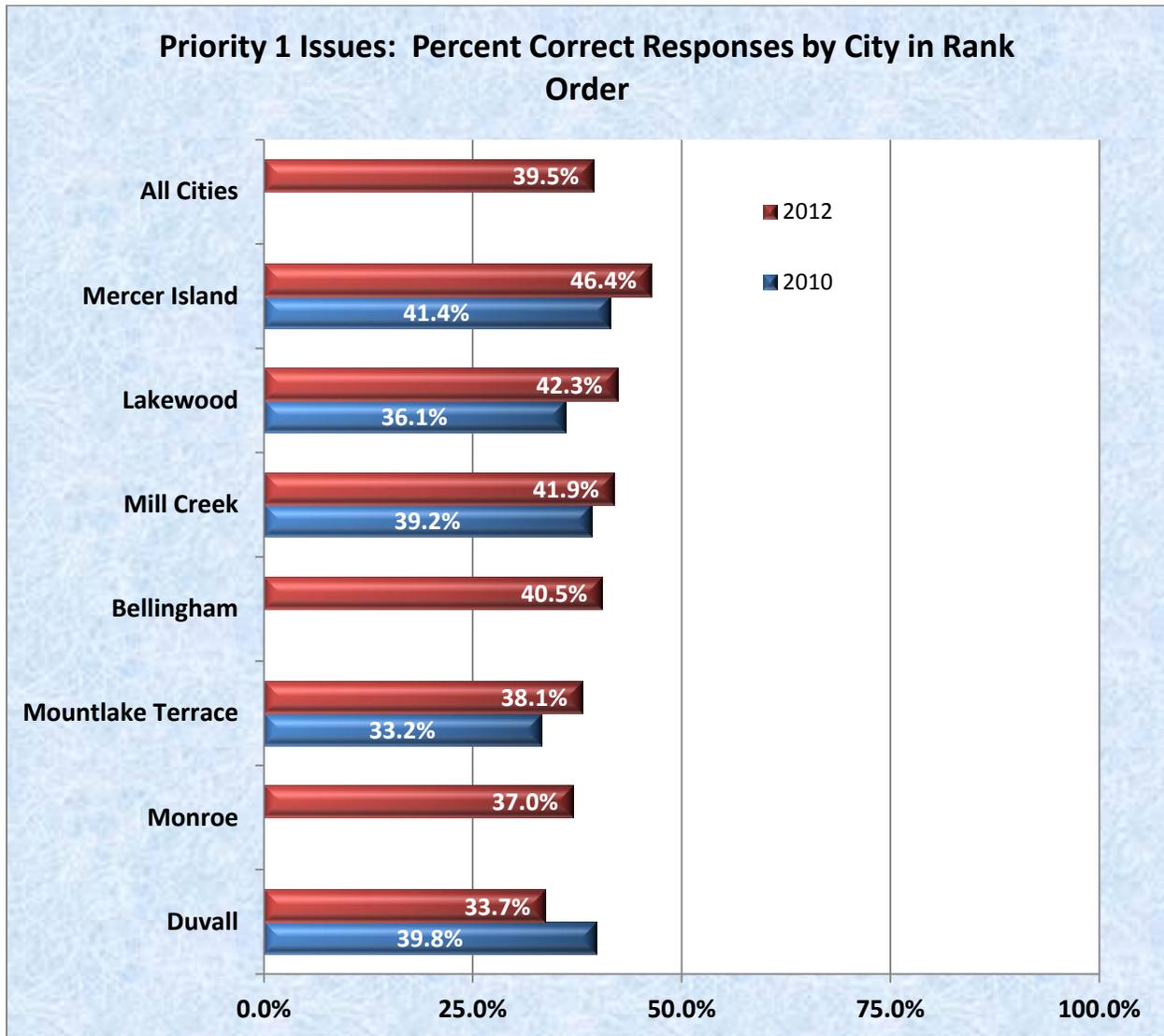


The map to the left shows the geographic area covered by the Zip Codes of each of the seven cities in the study (98019 for Duvall, 98272 for Monroe, 98012 for Mill Creek, 98040 for Mercer Island, 98043 for Mountlake Terrace, 98409, 98439, 98498, and 98499 for Lakewood, and 98225, 98226, and 98229 for the City of Bellingham). Only the respondents living in these cities were asked to take the survey. The blue and yellow highlighted territories represent the city of Mountlake Terrace and Mercer Island, respectively. Also, in order to view the region, a map of Bellingham was included separately.



Priority 1 Issues: Less than 50% Correct Answers

The chart below compares the percentage of correct responses for Priority 1 issues as identified in the individual surveys for each city. Across the region composed of all cities combined, the average number of correct responses for Priority 1 issues is 39.5%.



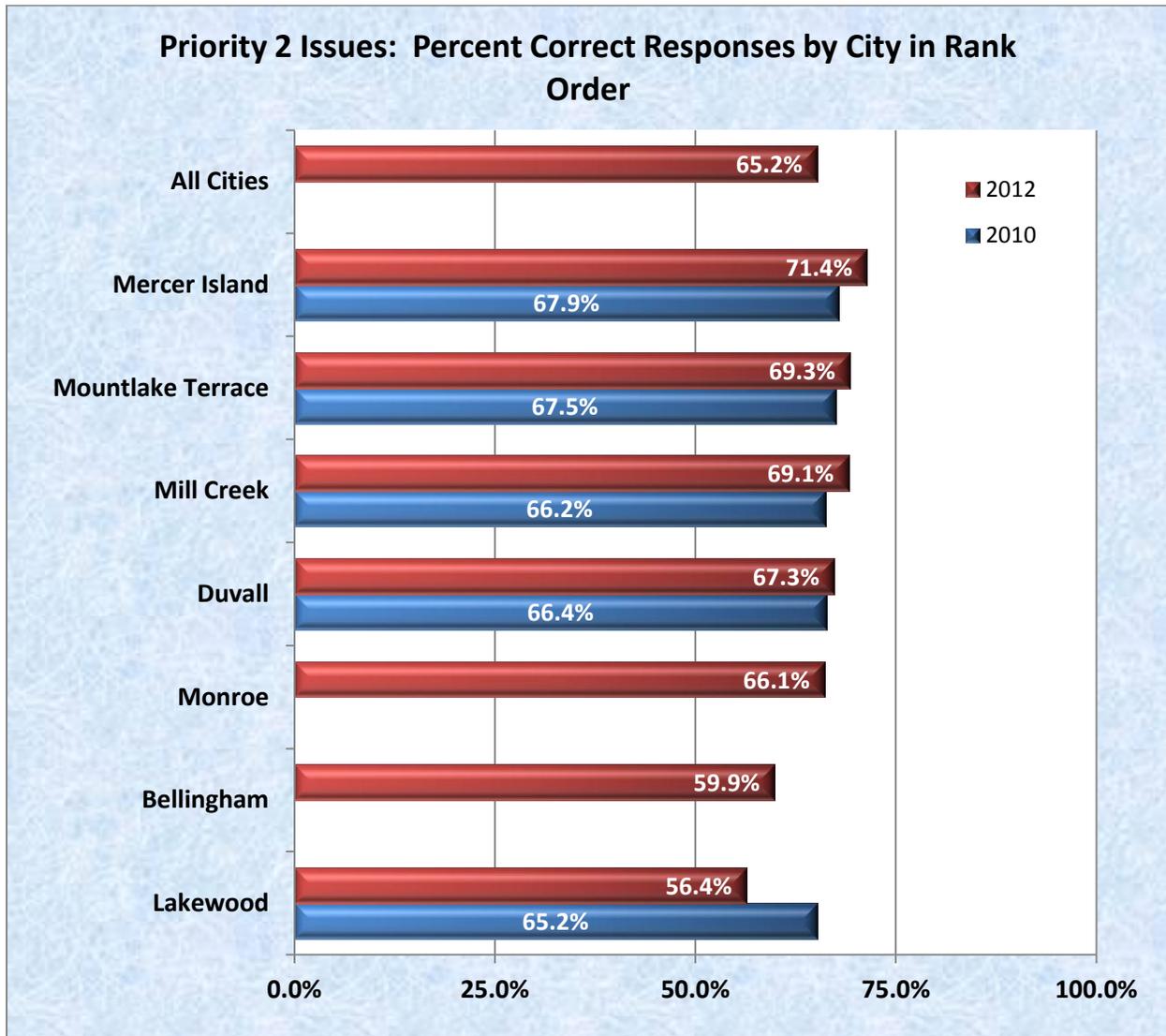
**Note: Mercer Island and Mountlake Terrace have research results for 2011 and are included in their individual reports. The percent correct for Priority 1 Issues was 39.4% and 42.2%, respectively.*

For the region composed of these 6 cities combined, the Priority 1 messages are:

- *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 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.*
- *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.*
- *Grass clippings and leaves in stormwater are regarded as pollution and should be kept out of the stormwater drainage system.*

Priority 2 Issues: From 50-80% Correct Answers

The following chart compares the percentage of correct responses for Priority 2 issues as identified in the individual surveys for each city. The overall combined average number of correct responses to Priority II issues is 65.2%.



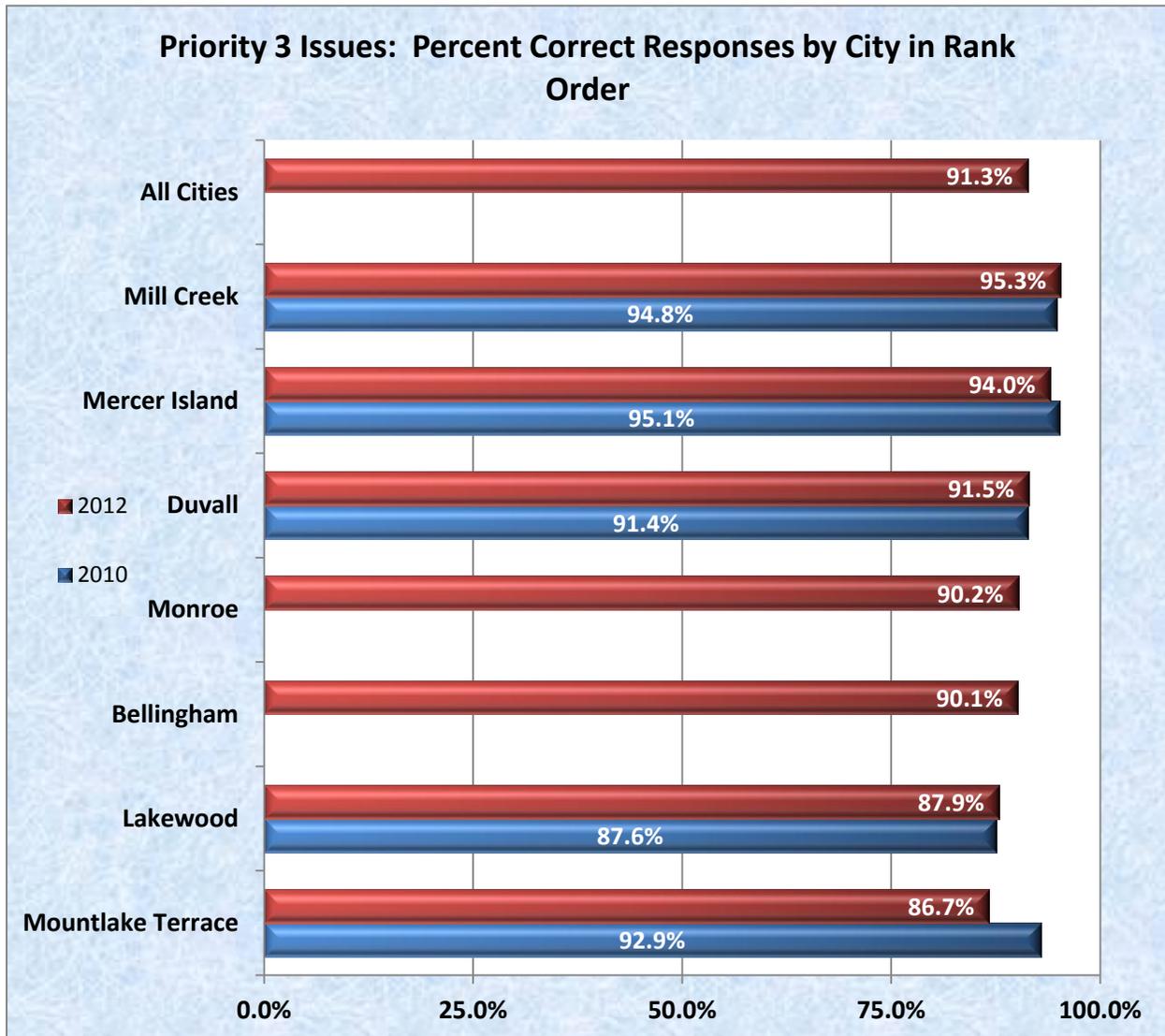
**Note: Mercer Island and Mountlake Terrace have research results for 2011 and are included in their individual reports. The percent correct for Priority 2 Issues was 71.0% and 69.5%, respectively.*

For the region composed of these seven cities combined, the Priority 2 messages are:

- *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 illegal discharge is anything that enters a storm drain system that is not made up of entirely stormwater.*
- *Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle at home with biodegradable soap.*
- *The best place to clean paint brushes is in a sink that drains into the sanitary sewer system, not outdoors.*
- *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, use pervious surfaces.*
- *Carpet shampoo waste water 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.*
- *Downspouts should be directed 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.*
- *A mulching lawnmower reduces the need for using fertilizer and, hence, represents a valuable method for eliminating fertilizer pollution in stormwater.*
- *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.*

Priority 3 Issues: Higher than 80% Correct Answers

The chart below compares the percentage of correct responses for Priority 3 issues as identified in the individual surveys for each city. Across the region composed of all cities combined, the average number of correct responses is 90.2%. Most issues on this list addressed respondent behaviors that were protective of stormwater quality. Whether respondents actually follow through with what they say they do is not known. At minimum, their responses indicate that a high percentage of the residents in each community knows the correct behavior regarding these issues.



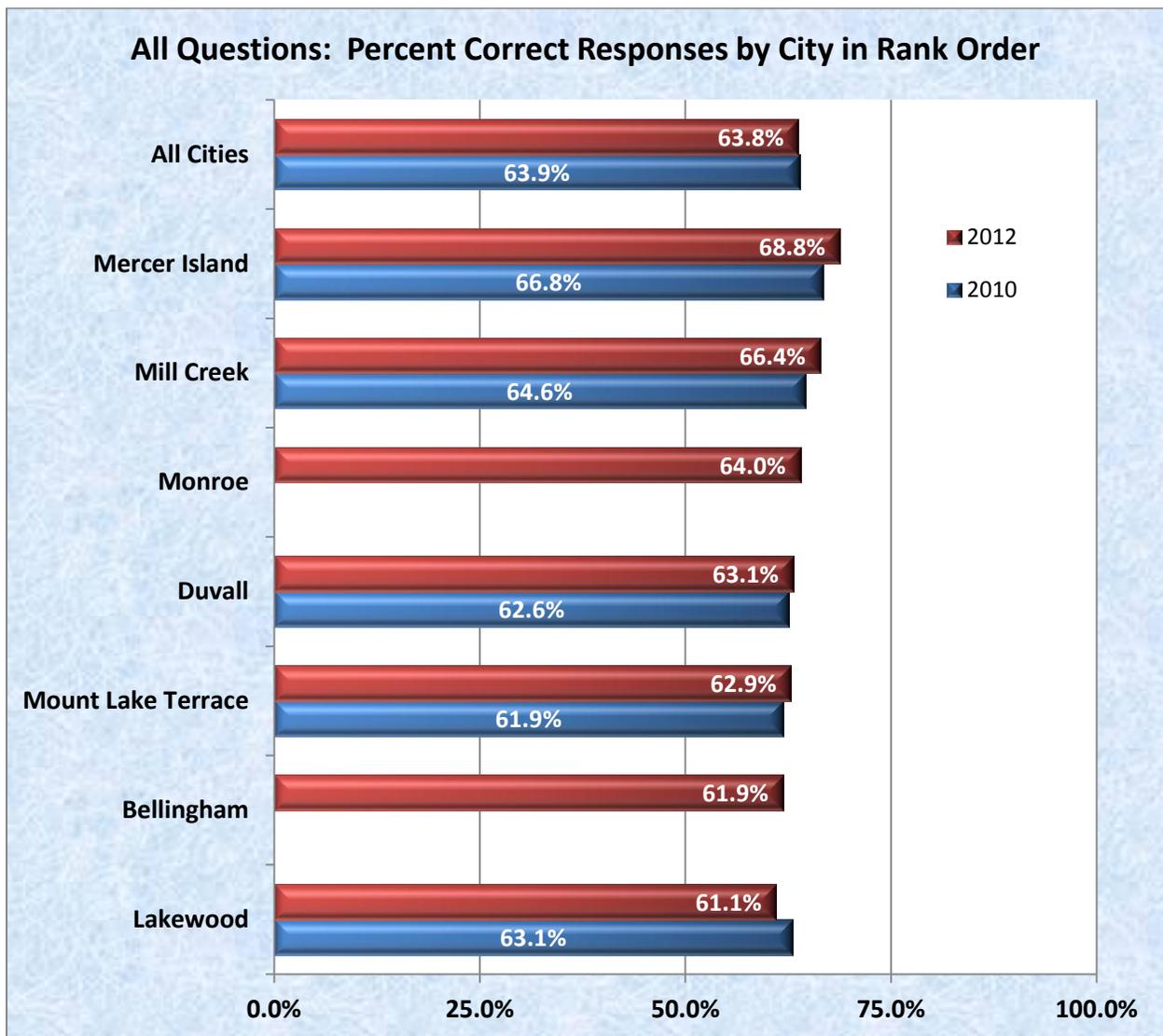
**Note: Mercer Island and Mountlake Terrace have research results for 2011 and are included in their individual reports. The percent correct for Priority 3 Issues was 89.2% and 86.1%, respectively.*

For the region composed of these seven cities combined, the Priority 3 messages are:

- *Recycle used motor oil.*
- *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.*
- *Pick up all pet waste when outside.*
- *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.*

All Questions: Percent Correct Responses

The following chart compares the percentage of correct responses across all questions for each city. Across the region composed of all cities, the average number of correct responses in 2012 is 63.8%.



Stormwater Results Across Seven Cities

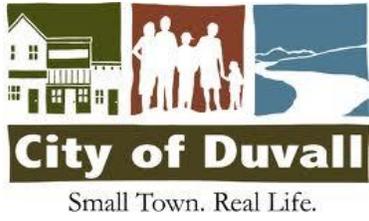
The survey results for the seven cities have been merged together and are presented in the table on the following page. The format is identical to the format in the individual reports provided to each city. All issues are ordered by the regional combined scores consisting of the average percent of correct answers given by respondents in all seven cities combined. The results for each city was weighted by population density for the specific city, based on 2010 US Census data. Each cell in a column contains the percent of correct responses for residents living in the city. Each cell is highlighted a different color depending on its priority level. The table on the left describes the Priority and the associated color.

Priority Level
Priority 1 Issues
Priority 2 Issues
Priority 3 Issues

Results show remarkable uniformity in what people know from one city to another. The color coding reveals at a glance a quite similar ranking of issues at the top and bottom across all municipalities. The message is that people are very much alike regardless of where they live. While some differences between cities crop up, they are minor when compared to the overall picture of sameness across the cities in the prevalence of correct and incorrect understanding in the public's mind. Cities may take advantage of this finding by pooling their resources and enjoying economies of scale in their educational programming.

With this information in hand, the next step is to take action to increase awareness, to expand understanding and to induce the public to engage in behavior that is more protective of stormwater quality.

Priority Level	Stormwater Community Survey Results for Seven Cities (2012)								
Priority 1 Issues	Question	% Correct Responses by Area							
Priority 2 Issues		Regional	Duvall	Lakewood	Mercer Island	Mill Creek	Mountlake Terrace	Monroe	Bellingham
Priority 3 Issues									
	15. The runoff from washing a car with biodegradable soap is safe in stormwater drains. D	25.5%	16.7%	28.5%	39.8%	24.2%	29.4%	30.4%	17.5%
	16. When I wash a motor vehicle at home, the soapy water ends up in a ditch or on the street. D Adopt	33.2%	37.3%	33.4%	37.3%	40.4%	20.4%	26.3%	36.0%
	28. Bricks or pavers offer no advantage for reducing runoff over concrete or asphalt pavement. D	40.3%	32.2%	45.1%	47.3%	32.9%	44.7%	31.0%	44.6%
	19. Grass clippings and leaves are not regarded as harmful in stormwater. D	43.4%	25.5%	47.2%	54.3%	45.0%	37.5%	35.6%	51.2%
	5: Pollution in our rivers, wetlands and lakes is more the result of industrial dumping practices than individual human activity. D	44.0%	38.6%	28.4%	51.8%	50.9%	37.5%	47.9%	48.5%
	21. Sediment or dirt in stormwater is natural and not regarded as pollution. D	44.1%	50.6%	28.1%	48.2%	44.8%	46.6%	44.5%	44.9%
	3. Drains on city streets for stormwater are connected to the same sanitary sewer system used for treating human waste. D	46.0%	34.9%	41.3%	53.5%	54.8%	36.4%	43.4%	51.7%
	6. All water going into stormwater drains on the street is treated before being discharged into the environment. D	53.8%	51.6%	50.7%	63.9%	57.3%	58.2%	54.3%	47.1%
	4. Stormwater runoff is the leading cause of pollution in rivers, wetlands and lakes. A	55.8%	51.6%	52.2%	69.5%	58.1%	55.9%	69.0%	44.9%
	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	57.6%	53.6%	49.3%	63.5%	71.5%	52.5%	64.5%	53.0%
	18. The best place to dispose of water from cleaning a Latex paint brush is in a sink inside, not outdoors. A	62.2%	75.3%	50.1%	67.8%	72.4%	64.1%	61.9%	52.6%
	20. Chemical treatments to kill moss on roofs pose little risk for polluting stormwater. D	63.0%	71.9%	54.3%	76.5%	72.6%	57.8%	66.7%	51.9%
	17. Washing a vehicle at a commercial car wash causes less pollution than washing a vehicle on the street using a biodegradable soap. A	63.2%	66.0%	66.9%	83.7%	62.9%	63.1%	60.2%	51.3%
	27. Carpet shampoo wastewater can be safely added to a stormwater drain. D	65.9%	60.7%	46.1%	72.4%	75.8%	63.9%	68.5%	69.9%
	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	67.7%	64.6%	72.1%	71.5%	71.0%	71.9%	74.5%	57.8%
	7. Hard surfaces such as roads and driveways are not significant sources of pollution in stormwater. D	69.1%	60.4%	70.2%	81.6%	68.5%	66.6%	70.3%	67.5%
	22. The downspouts at my house convey the water to an area where it is absorbed by the ground. A Adopt	69.9%	71.2%	80.5%	54.9%	59.0%	75.7%	61.3%	78.8%
	23. Using a mulching lawnmower reduces the need to fertilize a lawn. A	74.5%	84.1%	80.0%	80.6%	64.5%	71.6%	69.7%	72.9%
	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	79.9%	84.8%	72.7%	78.4%	80.4%	86.5%	72.5%	81.8%
	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	83.9%	84.9%	83.5%	82.3%	83.9%	78.7%	91.1%	83.1%
	13. My household recycles all used motor oil. A Adopt	87.6%	95.5%	88.1%	87.8%	89.4%	83.0%	90.5%	81.9%
	11. If my car or truck is dripping oil, I make sure the leak is fixed within three weeks. A Adopt	90.9%	94.8%	92.3%	94.8%	89.9%	86.2%	89.3%	90.2%
	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%	88.2%	87.8%	97.4%	97.0%	90.3%	88.0%	92.5%
	8. When I am outside with my pet, I always pick up my pet's waste. A Adopt	91.7%	86.5%	89.1%	91.8%	98.8%	97.9%	81.5%	95.8%
	26. In the past 12 months, I may have used more fertilizer or applied it more frequently than the label directions require. D Adopt	93.9%	97.1%	87.8%	93.4%	96.0%	91.4%	96.1%	94.4%
	24. My household stores all yard fertilizers and pesticides inside a building or in a covered area out of the rain. A Adopt	95.3%	97.5%	92.3%	94.3%	99.4%	98.9%	88.1%	96.3%
	14. My family stores all containers holding oil or antifreeze under a roof or cover. A Adopt	95.8%	99.1%	90.0%	98.6%	96.9%	94.6%	96.9%	95.0%



Business Research

Business Profile

As described in the research methodology section, three different types of businesses were involved in the survey. The following table illustrates the types and the number of businesses that were included.

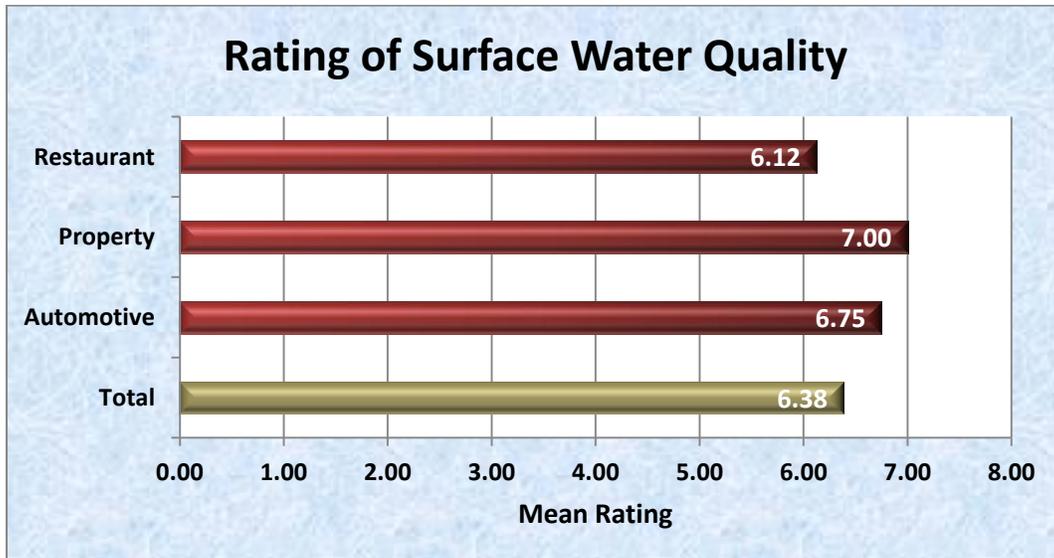
Business Survey Sample		
Business Type	Count	Percentage
Restaurant	8	61.5%
Property	1	7.7%
Automotive	4	30.8%
Total	13	100%

Of the business respondents administered the survey, the majority (61.5%) were males in the qualified position to participate. Below is a table that describes the business sample by gender.

Business Demographic - Gender	
Gender	Percentage
Male	61.5%
Female	38.5%

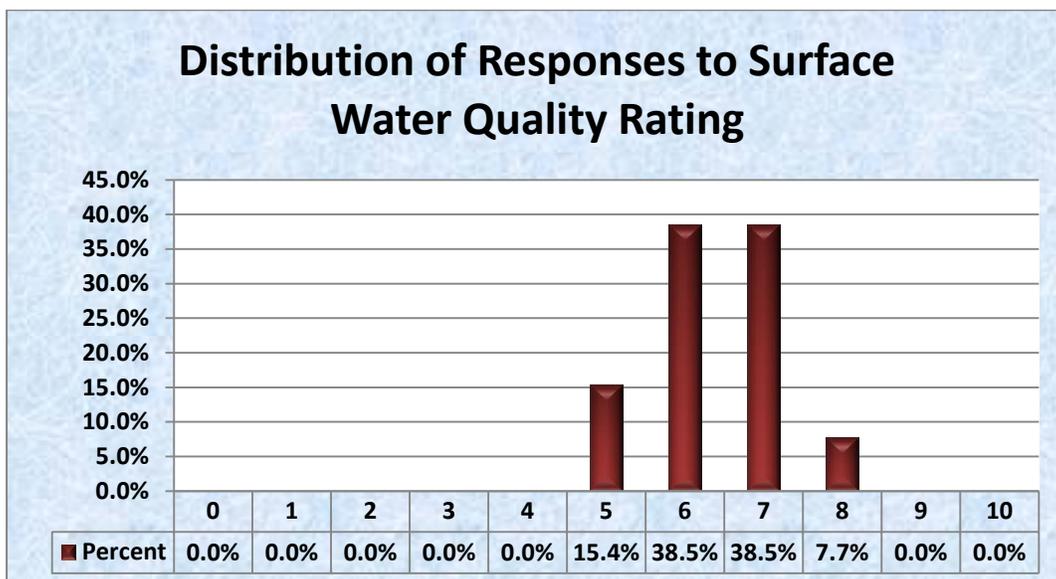
Business Assessment of Water Quality in the Environment

Business respondents were asked to rate the quality of water in Duvall’s rivers, wetlands, and lakes on a 0-10 numeric scale where 0 meant “extremely polluted” and 10 meant “extremely clean.” As a whole, businesses gave a 6.38 average rating for surface water quality. Ratings for each business type can be seen in the chart below. The difference in mean ratings for each business type was not statistically significant.



$\sigma = 0.835$ for Restaurants; $\sigma = N/A$ for Property; $\sigma = 0.957$ Automotive; $\sigma = 0.870$ for total

The following chart shows the distribution of business respondent ratings at each point along the rating scale.



$\sigma = 0.870$ for total

General Stormwater Questions

The survey consisted of ten questions that were considered general stormwater questions applicable to all business types. The following table describes the percent of correct responses by company type. In addition, the combined percentages are included to represent business stormwater knowledge and behavior as a whole.

Correct Responses to General Questions - By Business Type				
General Questions	Restaurant	Property Owner or Manager	Automotive	Combined Average
Sediment in stormwater is natural and not regarded as pollution. D	12.5%	100.0%	0.0%	15.4%
Non-toxic, biodegradable soaps do not pollute stormwater runoff. D	50.0%	100.0%	25.0%	46.2%
An illicit or unlawful discharge is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. A	50.0%	100.0%	100.0%	69.2%
Sometimes wash or wastewater from our business ends up in the parking lot, alley, street, or in a ditch. D Adopt	60.0%	100.0%	75.0%	70.0%
My business has spill kits readily available in case of a hazardous spill. A Adopt	66.7%	0.0%	100.0%	72.7%
A key principle for effective stormwater management is to reduce the amount of stormwater runoff. A	75.0%	100.0%	100.0%	84.6%
My employees have been trained properly on how to clean up hazardous spills. A Adopt	85.7%	100.0%	100.0%	91.7%
Areas outside my business are swept regularly with a broom, vacuum or mechanical sweepers instead of pressure washing and letting the waste water go down a storm drain. A Adopt	87.5%	100.0%	100.0%	92.3%
The trash container area outside is in a contained area and does not leak. A Adopt	100.0%	100.0%	75.0%	92.3%
Vegetation reduces stormwater pollution. A	100.0%	100.0%	75.0%	92.3%

Restaurant Priority Issues

The table below includes correct response results for all restaurant questions. The table has been segmented into Priority 1, Priority 2, and Priority 3 Issues.

Restaurants	
Question	% Correct
Priority 1 Issues	
Sediment in stormwater is natural and not regarded as pollution. D	12.5%
Priority 2 Issues	
An illicit or unlawful discharge is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. A	50.0%
Non-toxic, biodegradable soaps do not pollute stormwater runoff. D	50.0%
Sometimes wash or wastewater from our business ends up in the parking lot, alley, street, or in a ditch. D Adopt	60.0%
External washwater disposal is an illicit discharge. A	62.5%
My business has spill kits readily available in case of a hazardous spill. A Adopt	66.7%
A key principle for effective stormwater management is to reduce the amount of stormwater runoff. A	75.0%
A proper way of disposing cooking oil and grease is through the stormwater system. D	75.0%
Priority 3 Issues	
My employees have been trained properly on how to clean up hazardous spills. A Adopt	85.7%
Areas outside my business are swept regularly with a broom, vacuum or mechanical sweepers instead of pressure washing and letting the waste water go down a storm drain. A Adopt	87.5%
The trash container area outside is in a contained area and does not leak. A Adopt	100.0%
Vegetation reduces stormwater pollution. A	100.0%
Wash water is disposed of into an internal building drain connected to the sanitary sewer system and not into the exterior stormwater system. A Adopt	100.0%
Wet mops are properly cleaned and stored. A	100.0%
The dumpster at my restaurant is always closed after use. A	100.0%

Property Owner/Manager Priority Issues

The table below includes correct response results for all property owner and manager questions. The table has been segmented into Priority 1, Priority 2, and Priority 3 Issues.

Property Owner/Manager	
Questions	% Correct
Priority 1 Issues	
My business has spill kits readily available in case of a hazardous spill. A Adopt	0.0%
Chemical treatments to kill moss on roofs pose little risk for polluting stormwater. D	0.0%
Which one of the following three methods is generally most desirable for controlling stormwater: Infiltration, landscaping, and/or reduction of impervious surfaces. A	0.0%
Priority 3 Issues	
An illicit or unlawful discharge is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. A	100.0%
Non-toxic, biodegradable soaps do not pollute stormwater runoff. D	100.0%
My employees have been trained properly on how to clean up hazardous spills. A Adopt	100.0%
Areas outside my business are swept regularly with a broom, vacuum or mechanical sweepers instead of pressure washing and letting the waste water go down a storm drain. A Adopt	100.0%
The trash container area outside is in a contained area and does not leak. A Adopt	100.0%
Sediment in stormwater is natural and not regarded as pollution. D	100.0%
Vegetation reduces stormwater pollution. A	100.0%
A key principle for effective stormwater management is to reduce the amount of stormwater runoff. A	100.0%
Sometimes wash or wastewater from our business ends up in the parking lot, alley, street, or in a ditch. D Adopt	100.0%
Resident car washings are discouraged on site and suggested alternatives are provided. A Adopt	100.0%
My complex has a designated area for residential car washing. A	100.0%
In the last 12 months, my complex has implemented landscaping techniques to improve the absorption of rainwater. A Adopt	100.0%

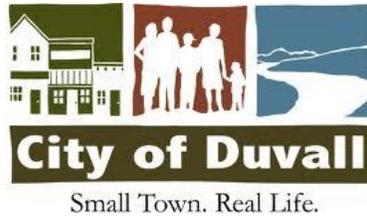
**Note: only one property owner/manager completed the business survey*

Automotive Priority Issues

The table below includes correct response results for all automotive questions. The table has been segmented into Priority 1, Priority 2, and Priority 3 Issues.

Automotive	
Questions	% Correct
Priority 1 Issues	
Sediment in stormwater is natural and not regarded as pollution. D	0.0%
Non-toxic, biodegradable soaps do not pollute stormwater runoff. D	25.0%
All vehicles, mechanical parts and equipment stored outside are checked for leaks at least once a month. A Adopt	25.0%
Priority 2 Issues	
The best way to clean up small quantities of spilled oil is to fully absorb it using kitty litter or absorbent pads and deposit this waste in a garbage can. A	50.0%
In my business, all waste, such as the particle dust from sanding or grinding, and all worn out car parts, such as old transmissions, radiators or brake pads, are all stored in a covered area out of the rain until disposed of. A Adopt	50.0%
When cleaning a vehicle, rinsewater, having little soap and dirt, can be safely added to a stormwater drain. D	66.7%
The trash container area outside is in a contained area and does not leak. A Adopt	75.0%
Vegetation reduces stormwater pollution. A	75.0%
Sometimes wash or wastewater from our business ends up in the parking lot, alley, street, or in a ditch. D Adopt	75.0%
Priority 3 Issues	
An illicit or unlawful discharge is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. A	100.0%
My employees have been trained properly on how to clean up hazardous spills. A Adopt	100.0%
My business has spill kits readily available in case of a hazardous spill. A Adopt	100.0%
Areas outside my business are swept regularly with a broom, vacuum or mechanical sweepers instead of pressure washing and letting the waste water go down a storm drain. A Adopt	100.0%
A key principle for effective stormwater management is to reduce the amount of stormwater runoff. A	100.0%
My Company disposes of all oils, chemicals, and other fluids through an approved disposal facility. A Adopt	100.0%
All mechanic work is done indoors and under cover. A Adopt	100.0%
Scrubbing oil and grease spots on concrete or asphalt with soap and hosing it off is a good way to prevent polluting stormwater runoff. D	100.0%
My business stores all oils, soaps, chemicals, and other materials (like batteries and car parts) under a roof or cover or in a containment area. A Adopt	100.0%
If a car or truck in our business is dripping oil, the leak is always contained immediately and fixed in a timely manner. A Adopt	100.0%

**Question 28: The area where my business washes vehicles allows the rinsewater to flow to the proper sanitary sewer system, was omitted due to all respondents selecting "does not apply." Thus, all responses were considered missing, and no correct or incorrect responses were made.*



Regional Business Stormwater Research

Comparing Stormwater Business Survey Results Across Six Cities

As a supplement to the residential survey conducted in August 2012, Hebert Research surveyed over 100 businesses in the six different cities in western Washington. The margin of error for 116 completed business surveys is at $\pm 9.1\%$. The cities that participated in the business stormwater research included:

- Mill Creek
- Mountlake Terrace
- Monroe
- Duvall
- Lakewood
- Bellingham

Regional Business Survey Sample		
Business Type	Count	Percentage
Restaurant	49	42.2%
Property	34	29.3%
Automotive	33	28.4%
Total	116	100%

The following information displays the collective business results within each of the three priority levels of information for the participating cities.

General Business Questions Survey Results Across Six Cities

The survey consisted of ten questions that were considered general stormwater questions applicable to all business types. The following table describes the percent of correct responses by company type for the region.

% Correct Responses by Business Type				
General Questions	Restaurants	Property Owner or Manager	Automotive	Combined Average
Sediment in stormwater is natural and not regarded as pollution. D	10.2%	20.6%	15.2%	14.7%
Non-toxic, biodegradable soaps do not pollute stormwater runoff. D	44.9%	32.4%	42.4%	40.5%
An illicit or unlawful discharge is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. A	49.0%	47.1%	63.6%	52.6%
A key principle for effective stormwater management is to reduce the amount of stormwater runoff. A	61.2%	67.6%	60.6%	62.9%
Vegetation reduces stormwater pollution. A	67.3%	70.6%	63.6%	67.2%
Sometimes wash or wastewater from our business ends up in the parking lot, alley, street, or in a ditch. D Adopt	77.8%	68.8%	82.1%	76.2%
My business has spill kits readily available in case of a hazardous spill. A Adopt	65.0%	73.3%	97.0%	77.7%
My employees have been trained properly on how to clean up hazardous spills. A Adopt	91.1%	83.9%	97.0%	90.8%
Areas outside my business are swept regularly with a broom, vacuum or mechanical sweepers instead of pressure washing and letting the waste water go down a storm drain. A Adopt	93.9%	81.3%	96.8%	91.1%
The trash container area outside is in a contained area and does not leak. A Adopt	95.9%	100.0%	78.8%	92.2%

Regional Restaurant Survey Results

The table below includes correct response results for all restaurant questions across the region. The table has been segmented into Priority 1, Priority 2, and Priority 3 Issues.

Restaurants	
Questions	% Correct
Priority 1	
Sediment in stormwater is natural and not regarded as pollution. D	10.2%
Non-toxic, biodegradable soaps do not pollute stormwater runoff. D	44.9%
An illicit or unlawful discharge is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. A	49.0%
Priority 2	
External washwater disposal is an illicit discharge. A	53.1%
A key principle for effective stormwater management is to reduce the amount of stormwater runoff. A	61.2%
My business has spill kits readily available in case of a hazardous spill. A Adopt	65.0%
Vegetation reduces stormwater pollution. A	67.3%
Sometimes wash or wastewater from our business ends up in the parking lot, alley, street, or in a ditch. D Adopt	77.8%
Priority 3	
A proper way of disposing cooking oil and grease is through the stormwater system. D	83.7%
Wash water is disposed of into an internal building drain connected to the sanitary sewer system and not into the exterior stormwater system A Adopt	87.8%
My employees have been trained properly on how to clean up hazardous spills. A Adopt	91.1%
Areas outside my business are swept regularly with a broom, vacuum or mechanical sweepers instead of pressure washing and letting the waste water go down a storm drain. A Adopt	93.9%
The trash container area outside is in a contained area and does not leak. A Adopt	95.9%
The dumpster at my restaurant is always closed after use. A	95.9%
Wet mops are properly cleaned and stored. A	100.0%

Regional Property Owner/Manager Survey Results

The table below includes correct response results for all property owner and manager questions across the region. The table has been segmented into Priority 1, Priority 2, and Priority 3 Issues.

Property Owner/Manager	
Questions	% Correct
Sediment in stormwater is natural and not regarded as pollution. D	20.6%
My complex has a designated area for residential car washing. A	20.6%
Which one of the following three methods is generally most desirable for controlling stormwater: 3. Infiltration, landscaping, and/or reduction of impervious surfaces A	23.5%
Non-toxic, biodegradable soaps do not pollute stormwater runoff. D	32.4%
An illicit or unlawful discharge is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. A	47.1%
In the last 12 months, my complex has implemented landscaping techniques to improve the absorption of rainwater. A Adopt	47.1%
Chemical treatments to kill moss on roofs pose little risk for polluting stormwater. D	55.9%
A key principle for effective stormwater management is to reduce the amount of stormwater runoff. A	67.6%
Sometimes wash or wastewater from our business ends up in the parking lot, alley, street, or in a ditch. D Adopt	68.8%
Vegetation reduces stormwater pollution. A	70.6%
Resident car washings are discouraged on site and suggested alternatives are provided. A Adopt	70.6%
My business has spill kits readily available in case of a hazardous spill. A Adopt	73.3%
Areas outside my business are swept regularly with a broom, vacuum or mechanical sweepers instead of pressure washing and letting the waste water go down a storm drain. A Adopt	81.3%
My employees have been trained properly on how to clean up hazardous spills. A Adopt	83.9%
The trash container area outside is in a contained area and does not leak. A Adopt	100.0%

Regional Business Questions Survey Results

The table below includes correct response results for all automotive questions across the region. The table has been segmented into Priority 1, Priority 2, and Priority 3 Issues.

Automotive	
Questions	% Correct
Sediment in stormwater is natural and not regarded as pollution. D	15.2%
Non-toxic, biodegradable soaps do not pollute stormwater runoff. D	42.4%
All vehicles, mechanical parts and equipment stored outside are checked for leaks at least once a month. A Adopt	48.5%
The best way to clean up small quantities of spilled oil is to fully absorb it using kitty litter or absorbent pads and deposit this waste in a garbage can. A	51.5%
A key principle for effective stormwater management is to reduce the amount of stormwater runoff. A	60.6%
An illicit or unlawful discharge is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. A	63.6%
Vegetation reduces stormwater pollution. A	63.6%
When cleaning a vehicle, rinsewater, having little soap and dirt, can be safely added to a stormwater drain. D	68.8%
The trash container area outside is in a contained area and does not leak. A Adopt	78.8%
In my business, all waste, such as the particle dust from sanding or grinding, and all worn out car parts, such as old transmissions, radiators or brake pads, are all stored in a covered area out of the rain until disposed of. A Adopt	78.8%
Scrubbing oil and grease spots on concrete or asphalt with soap and hosing it off is a good way to prevent polluting stormwater runoff. D	81.8%
Sometimes wash or wastewater from our business ends up in the parking lot, alley, street, or in a ditch. D Adopt	82.1%
All mechanic work is done indoors and under cover. A Adopt	87.9%
If a car or truck in our business is dripping oil, the leak is always contained immediately and fixed in a timely manner. A Adopt	93.9%
Areas outside my business are swept regularly with a broom, vacuum or mechanical sweepers instead of pressure washing and letting the waste water go down a storm drain. A Adopt	96.8%
My employees have been trained properly on how to clean up hazardous spills. A Adopt	97.0%
My business has spill kits readily available in case of a hazardous spill. A Adopt	97.0%
My Company disposes of all oils, chemicals, and other fluids through an approved disposal facility. A Adopt	100.0%
The area where my business washes vehicles allows the rinsewater to flow to the proper sanitary sewer system. A Adopt	100.0%
My business stores all oils, soaps, chemicals, and other materials (like batteries and car parts) under a roof or cover or in a containment area. A Adopt	100.0%

Conclusions

- 1) The public perception in Duvall is that the surface water is relatively clean and free of pollutants. Although the lowest rating was given in 2010 at 6.87, the ratings have been generally high. With the highest average rating thus far of 6.89 in 2012, respondents are indicating that they perceive the surface water, at the very least, to be moderately clean.
- 2) As mentioned in the results section, in order to keep the analysis consistent, the questions involved in the priority 1 issues for 2012 were determined by the 2010 results. However, the 2012 data revealed shifts in Priority classifications from the 2010 results.
- 3) In 2012, one statement shifted from a Priority 1 issue to Priority 2 issue. That is, responses to this particular statement in 2010 that were considered Priority 1 issues are now considered Priority 2 issues in 2012. The following is the statement described above:
 - *Sediment or dirt in stormwater is natural and not regarded as pollution.*

Furthermore, the results showed shifts from Priority 2 issues in 2010 up to Priority 3 issues in 2012. The following are the statement shifts:

 - *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.*
 - *My household recycles all used motor oil.*
- 4) The level of awareness of which agency to report an illicit discharge to was low and may need more attention. 2012 results have only 17.7% of respondents giving the correct response. In both years the survey was conducted, less than four out of ten respondents answered correctly. At the very least, this should be a concern seeing as the majority of Duvall residents do not know who to contact in regards to illicit stormwater discharges.
- 5) Priority 1, 2, and 3 business issues are presented in the tables under the business survey results section. The Priority issues are segmented by business type.

Appendix A: Duvall Community Survey

Duvall Storm Water Community Survey Questionnaire - 2012

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

[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 _____ (Duvall) 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 (Duvall)
2. Other City **[THANK AND POLITELY DISCONTINUE]**
3. Don't Know **[THANK AND POLITELY DISCONTINUE]**
4. Refused **[THANK AND POLITELY DISCONTINUE]**

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 **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 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: _____

Appendix B: Duvall Business Survey

BUSINESS STORMWATER MARKET RESEARCH DUVALL

Initial Target Quota Cells

#	Sample Category	Completes	# of Questions
1	Restaurants	7-9	TBD
2	Property Owners/ Managers	7-9	TBD
3	Automotive Companies	7-9	TBD
	TOTAL	21-27	TBD

Hello, may I speak to **[INSERT NAME ON SAMPLE]**?

IF NOT AVAILABLE, ARRANGE A CALLBACK.

Hello, my name is _____ and I am calling on behalf of the city of Duvall. We are asking businesses to provide input on important environmental issues and would like to include your opinion. We would like to speak to the individual in your business who is most knowledgeable about how your business deals with garbage, hazardous waste, and stormwater-related issues.

S1. Would that be you?

1. Yes **[SKIP TO S3]**
2. No
3. We do not deal with stormwater issues at all
4. Don't Know/Refused

S2. May I speak to this individual?

1. Yes
2. No **[SCHEDULE A CALLBACK]**
3. Don't Know/Refused **[SCHEDULE A CALLBACK]**

REPEAT INTRODUCTION WHEN SPEAKING TO CORRECT INDIVIDUAL

Hello, my name is _____ and I am calling on behalf of the city of Duvall. We are asking businesses to provide input on important environmental issues and would like to include your opinion. We would like to speak to the individual in your business who is most knowledgeable about how your business deals with garbage, hazardous waste and stormwater-related issues, so you are the person we need to talk to.

S3. May I ask you some questions?

- 1. Yes
- 2. No **[ASK TO BE REFERRED TO CORRECT INDIVIDUAL OR POLITELY DISCONTINUE]**
- 3. Don't Know/Refused **[ASK TO BE REFERRED TO CORRECT INDIVIDUAL OR POLITELY DISCONTINUE]**

1. Good! Your input is strictly confidential and will not be attached to your name or business.

[SHOW NAME OF BUSINESS CATEGORY ON SCREEN]

[ENTER NUMBER FOR BUSINESS CATEGORY] You will be in our category labeled:

- 1. Restaurant
- 2. Property Owner/Manager
- 3. Automotive Company

2. 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."**[READ]**

What I am going to do is read a number of statements to you. 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 business, 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. Doesn't Apply
 5. Don't Know/Refused
-
3. An illicit or unlawful discharge is primarily defined as anything that enters a storm drain system that is not made up entirely of stormwater. **A**
 4. Non-toxic, biodegradable soaps do not pollute stormwater runoff. **D**
 5. My employees have been trained properly on how to clean up hazardous spills. **A Adopt**
 6. My business has spill kits readily available in case of a hazardous spill. **A Adopt**
 7. Areas outside my business are swept regularly with a broom, vacuum or mechanical sweepers instead of pressure washing and letting the waste water go down a storm drain. **A Adopt**
 8. The trash container area outside is in a contained area and does not leak. **A Adopt**
 9. Sediment in stormwater is natural and not regarded as pollution. **D**
 10. Vegetation reduces stormwater pollution. **A**
 11. A key principle for effective stormwater management is to reduce the amount of stormwater runoff. **A**
 12. Sometimes wash or wastewater from our business ends up in the parking lot, alley, street, or in a ditch. **D Adopt**
[INFO: Examples of 'wash' or 'wastewater' are the soapy runoff from washing a car, the rinse water from mopping a floor, the dirty water from washing the paint out of a paint brush, water used in a manufacturing process--generally, water that has something additional in it beyond plain water that you want to dispose of.]
 13. **[ASK ONLY IF RESTAURANT COMPANY]** Wash water is disposed of into an internal building drain connected to the sanitary sewer system and not into the exterior stormwater system **A Adopt**
 14. **[ASK ONLY IF RESTAURANT COMPANY]** Wet mops are properly cleaned and stored. **A**
 15. **[ASK ONLY IF RESTAURANT COMPANY]** The dumpster at my restaurant is always closed after use. **A**

16. **[ASK ONLY IF RESTAURANT COMPANY]** A proper way of disposing cooking oil and grease is through the stormwater system. **D**
17. **[ASK ONLY IF RESTAURANT COMPANY] [AFTER ANSWERING THIS QUESTION, SKIP TO Q 33]** External washwater disposal is an illicit discharge. **A**
18. **[ASK ONLY IF PROPERTY OWNER/MANAGER]** Resident car washings are discouraged on site and suggested alternatives are provided. **A Adopt**
19. **[ASK ONLY IF PROPERTY OWNER/MANAGER]** My complex has a designated area for residential car washing. **A**
20. **[ASK ONLY IF PROPERTY OWNER/MANAGER]** In the last 12 months, my complex has implemented landscaping techniques to improve the absorption of rainwater. **A Adopt**
21. **[ASK ONLY IF PROPERTY OWNER/MANAGER]** Chemical treatments to kill moss on roofs pose little risk for polluting stormwater. **D**
22. **[ASK ONLY IF PROPERTY OWNER/MANAGER]** Which one of the following three methods is generally most desirable for controlling stormwater: **[READ 1-3] [ACCEPT ONLY ONE] [AFTER ANSWERING THIS QUESTION, SKIP TO Q 33]**
1. A detention pond facility
 2. Offsite management, for example in a ditch or larger storm sewer
 3. Infiltration, landscaping, and/or reduction of impervious surfaces **A**
 4. Need more information
 5. Don't Know
 6. Refused
23. **[ASK ONLY IF AUTOMOTIVE COMPANY]** When cleaning a vehicle, rinsewater, having little soap and dirt, can be safely added to a stormwater drain. **D**
24. **ASK ONLY IF AUTOMOTIVE COMPANY]** My Company disposes of all oils, chemicals, and other fluids through an approved disposal facility. **A Adopt**
25. **[ASK ONLY IF AUTOMOTIVE COMPANY]** The best way to clean up small quantities of spilled oil is to fully absorb it using kitty litter or absorbent pads and deposit this waste in a garbage can. **A**
26. **[ASK ONLY IF AUTOMOTIVE COMPANY]** All mechanic work is done indoors and under cover. **A Adopt**

27. **[ASK ONLY IF AUTOMOTIVE COMPANY]** Scrubbing oil and grease spots on concrete or asphalt with soap and hosing it off is a good way to prevent polluting stormwater runoff. **D**
28. **[ASK ONLY IF AUTOMOTIVE COMPANY]** The area where my business washes vehicles allows the rinsewater to flow to the proper sanitary sewer system. **A Adopt**
29. **[ASK ONLY IF AUTOMOTIVE COMPANY]** My business stores all oils, soaps, chemicals, and other materials (like batteries and car parts) under a roof or cover or in a containment area. **A Adopt** **["Cover" means shielded from rain. A "containment area" is a space surrounded by a wall that is constructed to prevent any spilled fluid from passing beyond it.]**
30. **[ASK ONLY IF AUTOMOTIVE COMPANY]** If a car or truck in our business is dripping oil, the leak is always contained immediately and fixed in a timely manner. **A Adopt**
31. **[ASK ONLY IF AUTOMOTIVE COMPANY]** In my business, all waste, such as the particle dust from sanding or grinding, and all worn out car parts, such as old transmissions, radiators or brake pads, are all stored in a covered area out of the rain until disposed of. **A Adopt**
32. **[ASK ONLY IF AUTOMOTIVE COMPANY]** All vehicles, mechanical parts and equipment stored outside are checked for leaks at least once a month. **A Adopt**

DEMOGRAPHICS

33. What is your title?
34. What is your first name? **[NAME IS CONFIDENTIAL AND NOT REPORTED WITH RESPONSES]**

That concludes our survey. On behalf of the city of Duvall, 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: _____