AUTO REPAIR SHOPS’ PERSPECTIVES ON STORM DRAIN PROTECTION

By

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We accept this thesis as conforming to the required standard

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Abstract

Stream health in urban landscapes is affected by non-point sources of pollution from a range of commercial activities that may release pollutants. Significant improvements in water quality will require efforts to control contaminants at their sources from these various activities. Automotive repair businesses are seen as a sector that handles large volumes of products that can be washed into storm drains. The purpose of the study was to learn this sector’s needs in adopting storm drain best management practices. Semi-structured in-person interviews were conducted with business owners to identify barriers, challenges and opportunities to adopting storm drain best management practices. The results show that auto repair businesses were generally receptive to improving practices but indicate that certain barriers need to be addressed in order to have more widespread acceptance and adoption. The participants made design recommendations to improve the effectiveness of an education and outreach program for their industry.
Acknowledgements

I am very grateful to all the participants who so generously gave their time and agreed to share their knowledge and opinions that were the focus of this study.

I’d like to give a very big thank-you to my whole family, especially Kaitlyn, Sophie, Gavin and Janine, for supporting me so much. I promise to make up all the fun adventures that were postponed or missed due to my studies.

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Chapter One
Introduction

Research Problem

One of the biggest pressures facing streams, waterways and near shore coastal areas in the area ofMetro Vancouver, British Columbia (BC) is diffuse sources of pollution from the urban land base. As rainwater falls and travels across pavement and roads, it picks up contaminants and materials that have spilled or leaked onto paved areas. Municipal storm drainage systems are designed to collect this rainwater and release the runoff to local streams and coastal areas. Some industrial/commercial lands may contain and treat stormwater prior to discharge depending upon the nature of their activities, but the majority of commercial/industrial areas, however, do not. A large number of small to medium-sized commercial operations collectively can add up to a big impact to local waterways.

Current knowledge of aquatic health conditions in Puget Sound indicates that non-point sources of pollution from urban and industrial areas are major contributors of contaminants to the environment (Partridge, V., K. Welch, S. Aasen, and M. Dutch., 2005). Quality monitoring of local marine sediments in Burrard Inlet within the area of Metro Vancouver shows petroleum indicators do not meet Provincial Objective levels in some areas (Sutherland, 2004). One of the most effective ways to keep local streams and coastal areas clean and healthy is by preventing contaminants from reaching storm drains in the first place. There is a need to address non-point sources of pollution by targeting higher risk industries that handle large volumes of materials and where there is the potential for contaminants to be released to the environment.

One desired outcome from this research is promoting pollution prevention practices through education and outreach to commercial business sectors. The automotive repair sector is being targeted in this study because there are a large number of businesses in that sector that handle large volumes of substances that, if released to storm drains, can impact aquatic environments. While commercial
properties are not the only causes of elevated pollutant levels, automotive related activities collectively are a main source of petroleum-derived pollutants to the receiving environment. With Canadian passenger cars and light trucks using over 240 million litres of motor oil each year (Canadian Technician, 2012), ensuring all used oil and other automotive fluids are collected, recycled or disposed of properly needs to occur on a widespread basis. A desired outcome of this research was to motivate more widespread adoption of pollution source controls such as storm drain best management practices and automotive fluid containment through outreach programs of environmental education.

Purpose of the Study

This research project goals were to determine the needs of the auto repair sector in the Metro Vancouver area in adopting storm drain best management practices. A premise of the research was that by determining the needs of this sector it would be possible to improve the design and implementation of education and communication resources targeted at storm drain management in auto repair businesses. Through semi-structured interviews automotive mechanical and collision repair shop managers/owners were asked to identify barriers, challenges and opportunities in regard to the adoption of storm drain best management practices. The results were intended to inform the development of communication design criteria and products that might potentially be useful to the auto repair sector. Initiating dialogue with target audiences, although time consuming, is an investment at the ‘front end’ of an environmental outreach program. Formative research is critical to ensuring effective outcomes from any environmental outreach program.

Research Scope and Assumptions

This study focussed on the day-to-day practices in the handling of liquid materials by automotive repair shops – both mechanical and autobody collision - and did not explore issues related to air emissions, solid waste, emergency incidents, purchasing practices or energy consumption. The study
findings are based on a limited number of voluntary participants and is therefore, not intended as a comprehensive summary of the overall industry’s perceptions and practices. One assumption of this study is that when educational outreach programs are designed from the perspectives of the target audience there is a greater chance of success in achieving the program’s desired outcomes.

**Research Questions and Objectives**

The objective of this research was to collect data that might inform the development of education and outreach resources to promote the adoption of best practices in storm drain management from the automotive repair industry. The resources will be designed to inform and help the target audience to control hazardous liquids at the source and avoid their release into storm drains and the environment. The automotive repair and auto body sector is the target audience for this research project.

The research questions were:

- What barriers, challenges and opportunities are faced by automotive repair businesses in adopting storm drain best management practices?

- What communication and education resources do automotive repair businesses need to assist them in recycling used automotive fluids, properly disposing of all hazardous fluids and promoting Best Management Practices (BMPs) in the shop area to minimize hazardous materials entering storm drains that convey them into the environment?

- What design criteria should be considered for communication and education resources, to maximize stormwater awareness and adoption of storm drain BMPs within the automotive repair industry?

**Why This Study is Important to the Researcher**
Finding solutions to one of the major challenges to stream health in the Metro Vancouver area is of great importance to maintaining ecosystem integrity for future generations. Because a large number of wildlife species depend on healthy functioning BC coastal streams and marine waters, it is imperative that coordinated and collaborative efforts are pursued to address non-point sources of pollution. Through the 2010 Metro Vancouver Integrated Liquid Resource and Waste Management Plan (ILRWMP) (Metro Vancouver, May 2010) member municipalities are required by the BC Ministry of Environment (MoE) to develop and implement Integrated Stormwater Management Plans designed to address non-point sources of pollution. Addressing non-point sources of pollution will require a multi-pronged and collaborative approach that focuses on various preventative and/or source control activities on the land base. One approach is to provide education and promotion materials through checklists and accreditation programs that are endorsed by both industry and governments and intended to achieve maximum trust and buy-in from both businesses and the public. Informing a commercial sector on regulatory requirements through outreach assumes that individuals will do the right thing once they have knowledge and awareness. However, literature shows that information alone is not the limiting factor to adoption of pro-environmental behaviours (McKenzie-Mohr and Smith, 2006) and that learning about the target audience and how best to connect to them will greatly enhance the effectiveness of an outreach program. The data gathered through this project is intended to inform development of an effective environmental outreach program for the commercial auto repair sector.

In Chapter Two I will summarize some relevant literature and previous studies on this topic. In Chapter Three I will describe my research methods, and data analysis. I will present the results of my study in Chapter 4 and in Chapter 5, I will discuss and interpret the findings.

Chapter Two

Literature Review

Current Thinking on Environmental Education and Outreach
Traditional environmental outreach efforts such as cards, brochures, posters and websites can be informative but it is difficult to track the utilization of these tools (Hall, 2012). Further, evaluating the level of understanding of the users of these tools is rarely attempted. Although some policy experts and scientists use social media tools like Facebook™ and YouTube™, there is a need to engage audiences in new ways (Hall, 2012).

To achieve long term and structural change that is sustainable, equitable and empowering, more organizations are turning to community-based outreach models. Community-based education campaigns imply that a plan is created as a result of community or target audience involvement and is designed to match their interests (Andrews, Stevens, & Wise, 2002). Matching messages to the interests of the target audience is also consistent with the findings and recommendations of Yeomans (Yeomans & Royal Roads University, 2006) and Petty and Briñol (2008). Individuals are motivated to learn if the information presented is relevant to their lives and they have some sense of control about the learning process (Andrews et al., 2002). Andrews et al (2002) thus propose that community-based education campaigns have four key qualities: 1) they are community based, 2) they are collaborative/participatory, 3) they use information and evidence to inform process and 4) they are action oriented.

Andrews et al. (2002) also affirm the importance of government agency personnel committing to authentic efforts with communities. Due to the collaborative nature of community based social marketing, leadership is not a fixed status where educators/messengers are both working with message recipients as well as being influenced by the recipients’ efforts and feedback. This model is potentially a big shift away from the environmental regulator’s traditional approach of regulatory command and control.

Citing some lessons learned from their experience with the United States Natural Resource Conservation Service Newton (2001) found that local and personal context was an important factor in adopting conservation practices. Newton also noted that direct conversations with trusted leaders or
neighbours were found to be effective outreach tools and that informal social settings and safe places provided the best opportunities for two-way dialogue. Collaborative learning, social learning, and deliberate and inclusionary processes are proposed as other ways of engaging audiences (Monroe, March 2007).

Prior to designing an outreach and education campaign, it is important to determine why a campaign is necessary and what is to be communicated as per the Analysis phase of the ADDIE design process (EECO 508 class notes, 2012). An initial step in this process is to assess the needs and prior experiences of the intended users of an environmental outreach approach. (McKenzie-Mohr & Smith, 2006) claim that this can be done by collecting information about what motivates the target audience to conduct responsible environmental behaviour.

The Kellogg Foundation promotes a logic model approach that diagrams the relationships between the outcomes or results that are intended to be achieved, the activities planned and the resources available to operate a program (W.K.Kellogg Foundation, 2004). In South Carolina, Clemson University established a stormwater education consortium that used a logic model to develop outreach efforts targeted to residential and three commercial sectors including automotive businesses (Joyner & Counts, 2012). Another method of developing an environmental outreach program is through an Action Research Project approach that outlines the symptoms and root causes of an issue and then matches solutions to the causes through a participatory planning framework process (EECO 500 class notes, 2011).

**Persuasion**

“Social influence through persuasion is the most prevalent as well as the most civil means of social control available to governments...” (Petty & Briñol, 2008, p.52). Faced in recent years with smaller budgets, environmental regulatory agencies are realizing the cost effectiveness of relying on persuasion rather than enforcement of regulations. Alder (cited in Leisher Mangubhai, Hess, Widodo,
Soekirman, Tjoe, and Sanjayan, 2012) found the average cost per person of community education about marine protected areas was 1/10th the cost of enforcement. Persuasive communication is being favoured over regulatory measures because it is less controversial, less restrictive and may increase the likelihood of achieving specific mandates and outcomes (Yeomans & Royal Roads University, 2006). Education and awareness outreach approaches used to influence and persuade regulated parties towards increased pro-environmental behaviour are anticipated to become more common tools for the BC Ministry of Environment (MoE). (Braman, J. pers comm, 2010). A major need within the MoE is to integrate social sciences into environmental outreach campaigns (Freyman, E., personal opinion).

Persuasion research has identified key processes and their roles in attitude change (Petty & Briñol, 2008). Understanding the process by which variables can produce persuasion is important because the process by which an attitude is formed or changed affects the strength of the attitude. One approach to persuasive messaging has been the Elaboration Likelihood Model (ELM) that was initially developed to influence attitudes towards particular issues (Petty & Cacioppo, 1986). Attitude is defined as the general evaluation a person holds in regard to themselves, other people, objects and issues. The ELM assumes persuasion takes two routes to change attitudes: a “central” and “peripheral” route (Petty & Cacioppo, 1986). The central route relies on message recipients being cognitively active (high elaboration and level of attention) and having the ability (prior experience, knowledge and understanding) to evaluate the arguments contained in a message. The peripheral route is seen when a recipient has a low degree of capacity for message processing or elaboration and simple cues are more likely to guide decisions. Persuasion can still occur, without effortful evaluation, through the use of simple cues such as message source attractiveness, colors, and associations (Petty & Briñol, 2008). In order to foster successful persuasion, messages must contain elements that motivate the receiver to scrutinize the argument within the message; moreover, the message receiver (target audience) has to have the ability to process the arguments within the message (Petty & Cacioppo, 1986). Variables that contribute to
message elaboration include the recipients’ current attitudes, the message source, the message content, and the overall context. Many studies have been conducted around how these variables can be optimized to achieve persuasion in the intended direction, as described below.

The ELM approach was used to generate four different messages targeting outdoor recreational vehicle users in the Yukon to persuade them to be more conscious of their environmental impacts and to adjust their behaviour (Yeomans & Royal Roads University, 2006). These messages were then tested on the target audience in focus groups. Yeomans (2006) found that outdoor recreational vehicle users tried to dispute the existence of their impacts from riding off trails rather than elaborating on the message. The recipients’ defence in response to the dissonance contained in the message was to ignore the subtle signs of distress in wildlife or trampled vegetation and produce counter arguments. The messages were inconsistent with their beliefs, which suggest that in order to avoid active resistance to persuasion, messages need to take into account biases stemming from self interest, recipients’ broader values, and highly important or involving attitudes. This outcome suggests the importance of determining the target audiences’ beliefs and attitudes prior to outreach campaigns.

Tormala and Petty (2004) investigated message source credibility and target audience resistance to messages. They found that messages from a perceived expert source targeted at someone with “attitude certainty” and with sufficient cognitive resources (high elaboration), resulted in stronger resistance to persuasive messages than if the same message came from an inexpert source. Yeomans (Yeomans & Royal Roads University, 2006) suggests that message content should not be too far from the target audiences’ initial attitudes, otherwise a large gap generates inconsistencies and dissonance that will result in communications with a limited range of influence. Their study also noted however that their target audience - outdoor recreational vehicle enthusiasts - did have a general sense of environmental responsibility and there was the potential to build upon this attitude. Thus, Yeomans (2006) claims that messages should be tailored to strengthen the existence of any pro-environmental beliefs, even if they are
What are Storm Drain Best Management Practices?

The terms Storm drain Best Management Practices or BMPs, can refer to a wide range of efforts that minimize or eliminate pollutants from entering the environment. Storm drain or stormwater best management practices can be classified into structural and operational types (Washington State Department of Ecology, 2012). Structural BMPs are purposefully built physical infrastructures that prevent or minimize contaminant sources from entering storm drains. For example, purpose-built structures that direct contaminated stormwater to appropriate treatment such as an oil-water separator or settling pond. An oil-water separator is usually an underground tank that is designed to allow oils to float to the surface where they can be recovered and where contaminated sediments sink to the bottom (PCA Consultants Ltd, 1995). Operational BMPs are activities and practices that prevent or reduce pollution. Examples include good housekeeping, spill prevention measures, preventative maintenance, worker training and record keeping. Generally, preventative practices are more effective than mitigating and treating contaminated runoff, and more cost effective in the long term. Consequently storm water prevention guidebooks often list BMPs in order of effectiveness and preference.

Best management practices specific to the auto repair industry include installing on-site treatment works such as oil-water separators, establishing protocols that prevent soaps and solvents from entering the oil water separator, the recycling of used oil and coolant and avoiding the purchase and use of polluting products and materials in the first place. There are some shops that have adopted dry shop practices, thus reducing the need for an oil-water separator and storm drains on their property. Dry shop
practices are an optimal way to eliminate the risk of contaminant release to the environment and ideally should become the standard operating practices for all automotive related businesses.

**Examples of Stormwater Outreach Communications for Commercial Auto Repair**

There is a large amount of stormwater pollution prevention education and outreach material designed for the general public (Veda Environmental Consultants, December 2012). Comprehensive targeted outreach programs designed for specific business operations, however, are lacking. The most common education and outreach product is an online brochure or factsheet. For example, the US Environmental Protection Agency has a series of pollution prevention factsheets aimed at auto repair and fleet maintenance businesses (US Environmental Protection Agency, February 19, 2014). Washington State has moved towards mandatory stormwater permits for local governments. One of the conditions of these permits is that counties have to demonstrate that they a) target stormwater outreach efforts to specific audiences, b) work to achieve measurable improvements in target audiences’ understanding of the problem and c) track, measure and record public education and outreach activities.

Kitsap County evaluated their targeted stormwater education campaign by conducting focus groups and surveys of automotive repair and fuel handling businesses (Cunningham Environmental Consulting, June 2011). This project identified the two most common barriers to adopting stormwater BMPs by auto repair shops were not knowing what to do about managing runoff and thinking that small amounts of pollution do not matter. They found that 9 in 10 automotive businesses know stormwater isn’t treated and that most businesses are familiar with stormwater BMPs. Business owners felt they were doing everything in the outreach posters but perhaps were not using optimal BMPs. They also found that more than 50 percent of participants felt that poster delivery by public works staff was extremely useful and that public works staff was a trusted source of information indicating that personal, face-to-face contact may matter more than posters.
The Portland Pollution Prevention Outreach Team developed an ecological business certification program that uses a checklist to evaluate and highlight those businesses that implement pollution prevention efforts that go beyond regulatory requirements (Portland Metropolitan Area Pollution Prevention Outreach Team, ND). Automotive repair businesses can apply to this program and if they meet 80 percent of the checklist criteria, they will receive Eco-Logical Business Certification and advertising to the local community.

Another business certification program exists in Arizona State. Arizona Green Shops are automotive facilities that have found reasonable and cost-effective ways to protect the environment and conserve resources (Arizona Department of Ecology, 2014). The green auto shops program is a public-private partnership with the Arizona Department of Environmental Quality and includes the Automotive Service Association of Arizona (ASA), Automobile Association America-Arizona and City of Mesa. Participating facilities go beyond the government environmental regulations that all automotive repair facilities must meet. This voluntary certification process examines the front-office processes, parts-management programs, housekeeping, parts cleaning and degreasing, fluid recycling, and energy-use policies to reduce or prevent pollution. Sample criteria areas include:

- Cleaning and Degreasing – use of low-hazard, low-pollution solvents or water-based cleaning.
- Waste Fluids - recycle and reuse fluids whenever possible.
- Waste Reduction - reduce paper use, recycle as many other materials as possible, buy and use recycled products when practical.
- Housekeeping - practice spill prevention, seal shop floors, recycle oil.
- Energy Conservation - save energy with efficient lighting, "green" office equipment, energy-efficient air conditioning.
• Water Conservation - properly maintain plumbing, install low-water use fixtures, use desert landscaping and dry-floor clean-up procedures.

Upon registering, an automotive shop works with the Arizona Automobile Association or the Automobile Services Association to develop and implement ideas to help them be green. Participating shops are advertised on the ASA website where customers looking for green shops can find them.

The United States has a national Coordinating Committee for Automotive Repair (CCAR-Greenlink) that aims to provide consistent and compliant safety, pollution prevention, and hazardous materials training, as well as education and environmental best practices for the global motor vehicle industry (Coordinating Committee for Automotive Repair, 2014). CCAR-Greenlink’s vision is one of a workplace with fully trained automotive professionals, focusing on their craft, enhancing their overall business and living ‘safe, clean and green’. They provide online training and resources such as a virtual shop.

In Canada, very little guidance exists nationally on pollution prevention for automotive repair businesses. From a worker health perspective, the Canadian Center for Occupational Health does provide online factsheets for guiding workers through various processes within automotive garages (Canadian Center for Occupational Hygiene, 2009). British Columbia does not have extensive stormwater pollution prevention requirements and therefore very little stormwater education and outreach products exist except for some selected regional and local governments that have incorporated educational materials to help businesses comply with bylaws and protect their storm drainage infrastructure. For example, the City of Richmond has auto repair shop brochures directing businesses to handle and dispose hazardous fluids safely (City of Richmond, October 10, 2012). The Capital Regional District has a website with videos and posters advertising their auto repair shop Code of Practice (Capital Regional District, 2006). Metro Vancouver has an Auto Refinishing Emissions Regulation bylaw that mandates enclosed spray booths for autobody shops operating within the 22 Metro Vancouver member municipalities (Metro Vancouver,
This bylaw is intended to contain air pollutants from volatile solvent-based paints. It is not known, however, whether these bylaw tools and outreach products result in improved environmental outcomes. Appendix D lists additional specific education and outreach products designed for the automotive repair sector.

**Evaluation of the Effectiveness of Outreach Programs Targeting Automotive Repair Businesses**

Only one study was found where outreach strategies to automotive repair industries were evaluated (Cunningham Environmental Consulting, 2011). Effectiveness was evaluated through in-person interviews and focus groups with target audience members. The study’s conclusions recommended for and against certain outreach strategies based on the evaluation of their effectiveness. Outreach strategies recommended were wall posters with bold design, color photos and minimal text and free spill kits (Cunningham Environmental Consulting, 2011). Outreach strategies that were not recommend were brochures, workshops, direct mailers and financial incentives. Some outreach strategies found to be in need of evaluation included point-of-use stickers, off-site training, pledge cards and training videos.

In summary, the literature has shown that community-based environmental education outreach to be most effective when designed to match the interests and motivations of the target audience. If a target audience has potentially weak environmental values, build environmental outreach on any existing environmental values to avoid dissonance by promoting incremental or long term behaviour change rather than large shifts in attitudes & beliefs. There is a current lack of evaluation of effectiveness of outreach to automotive businesses in BC and Canada and only one study was found in the United States (Cunningham Environmental Consulting, 2011).

An important step is to assess the needs of the environmental outreach and determine desired outcomes through tools such as Logic Models, Action Research Project processes or the ADDIE analysis
assessment. Since the most effective automotive repair best management practices are those that prevent and minimize the use of water on site in the first place, a desired outcome is have the entire automotive repair sector adopt optimal storm drain BMPs through maintaining dry shop processes that prevent all liquid materials from escaping collection for proper disposal or recycling as the industry norm.

Addressing non-point source pollution to rivers and streams will need more preventative actions from a large number of land use activities and industries. Regional stream monitoring studies have shown that there is an urgent need to reduce pollutants from entering storm drains from various sources including commercial business activities on the landscape. This can be achieved with well-designed environmental outreach campaigns targeted at commercial businesses that promote comprehensive adoption of more preventative best practices to reduce inputs into storm drains that lead to local waterways.
Chapter Three:
Research Methodology

Study Design

This research study utilized a logic model approach (W.K.Kellogg Foundation, 2004) and information from the literature (Seidman, 2013) & (Creswell, 2007) to inform the study methods. Table 1 summarizes the process used to design the study.

Table 1
Logic Model Process Used to Determine Study Methods and Resources Required

<table>
<thead>
<tr>
<th>Inputs &amp; Resources</th>
<th>Activities</th>
<th>Outputs</th>
<th>Outcomes</th>
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<tbody>
<tr>
<td>• List of potential businesses to target</td>
<td>Stage 1: Initial contact with expert informants</td>
<td>Transcripts from in-person semi-structured interviews</td>
<td>• Barriers automotive businesses face in adopting storm drain Best Management Practices are identified.</td>
</tr>
<tr>
<td>• Project letter</td>
<td>• Telephone interview with expert informants</td>
<td></td>
<td>• Usefulness of existing outreach products are evaluated</td>
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<tr>
<td>• Consent forms</td>
<td>• Transcribe telephone interviews and summarize key themes</td>
<td></td>
<td>• Communication and education resources and design criteria are identified that automotive repair businesses need to maximize awareness and motivate the adoption of Stormwater Best Management Practices</td>
</tr>
<tr>
<td>• Interview questions &amp; example outreach products</td>
<td>• Send interview notes to expert informants for review and additions</td>
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<tr>
<td>• Laptop to show internet-based outreach examples</td>
<td>• Develop and draft in-person interview questions based on expert input.</td>
<td></td>
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<tr>
<td>• Paper &amp; pen</td>
<td>Stage 2: Make initial contact and set up in-person interview appointment</td>
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<tr>
<td>• Recording device – laptop</td>
<td>• At interview, obtain consent signature and request recording</td>
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<tr>
<td>• Thank you gift cards - $25 ea. inducement</td>
<td>• Conduct interview</td>
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<td></td>
<td>• Record interview</td>
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<td></td>
<td>• Transcribe notes from interview</td>
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<tr>
<td></td>
<td>• Send transcript summaries to interview participants for review and additions</td>
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</table>
Study Participants

Data for this project was primarily collected through interviews with shop managers and owners in the autobody and auto repair sector. Data collection occurred in two stages. Stage 1 asked industry expert informants to describe the auto repair materials handling processes, identify critical steps and issues and help develop the appropriate and relevant questions and topics for interviews directed at shop owner/managers. Stage 2 involved direct dialogue with shop owner/managers through semi-structured in-person interviews. The interview topics were based on the results of the consultations in Stage 1 as well as relevant current research (Cunningham Environmental Consulting, 2011) on the topic.

A total of fifteen participants were part of this study. While most of the participants were auto repair shop managers or owners, a few additional participants were sought to help supplement the study. The numbers and types of participants were as shown below.

Stage 1:

- One semi-retired independent autobody shop owner from outside the Metro Vancouver area (Expert #1)
- One auto mechanical repair shop owner from outside the Metro Vancouver area (Expert #2).

Both of these interviewees were recommended as very experienced experts in the autobody and auto repair business sectors. The first participant had long experience with the materials used in autobody/paint shop work and in the processes used to employ these materials. The second auto mechanical repair shop expert had won awards and recognition from environmental organizations for adopting various environmentally sustainable practices in his shop including using dry shop process. Because the number of participants was small, participant numbers identified below are clustered to help maintain anonymity.
Stage 2:

- Three independent mechanical repair shop owner/managers
- Two franchise/dealership mechanical repair shop managers
- Three independent autobody collision shop managers
- Two automotive industry instructors from post secondary institutions
- Two industry association representatives
- One waste disposal/recycling collector

Data Collection Methods Stage 1: Telephone Interviews

In this stage two industry expert informants were sought to describe work-flow processes, describe shop practices, and identify critical topics in the auto repair and auto body sectors in order to help develop interview questions that were likely to be relevant and informative to Stage 2. The expert informants were purposely recruited as having connections to the auto repair and auto body sectors and as not being currently involved directly in the sectors (e.g. retirees or operating outside the study area). The information obtained in Stage 1 was used to inform the interview questions for Stage 2.

The general research question for the Stage 1 interviews was: What topics should be incorporated into interviews with Owners/Managers in the Auto Repair (mechanical and auto body) sector in order to identify criteria for the design and development of effective information and communications materials and resources in regard to the management of liquid materials and products to avoid contamination entering storm drains.

The expert informants were initially contacted via telephone where I explained the purpose of the interviews and set up the telephone interview for a later date and time at their convenience. Subsequent to the initial telephone contact, I sent them an Invitation Letter and the Consent Form via email (Appendix B). The Stage 1 participants consented to participate by replying to my email. The telephone
interviews were digitally recorded, with the consent of the interviewees, and then transcribed. The transcripts were then emailed back to the participants to provide them with an opportunity to provide corrections and add any additional information. The Stage 2 interview questions were developed and finalized based on the information from the Stage 1 expert interviews.

Stages 1 and 2 used a Consent Form that was developed to include the components as described in Seidman (2013): an invitation to participate, risks, participant rights, possible benefits, confidentiality, dissemination, contact info and a copy of the consent form for the participant to keep. Appendix B contains a sample of the Consent Form.

**Data Collection Methods Stage 2: Face to face Interviews**

The interview questions were determined in advance, with the input of the Expert Informants from Stage 1, and were designed to address specific research questions. Appendix C outlines the Interview Questions. The participants in Stage 2 were solicited from the auto repair business sector in the Metro Vancouver area. Google™ maps were used to find participant locations and phone numbers. Eight auto repair businesses participated with supplemental interviews being conducted with automotive industry instructors from post secondary institutions, a representative of the waste recycler/transporter business, and with two automotive business association representatives. Initial contacts were made by telephone and an agreed upon time to meet face-to-face was arranged. If the business owner or manager expressed an interest in participating, I sent them the Project Information form via email along with my contact information. Several contacted businesses declined to participate without providing a reason.

In-person interviews were conducted at the business shops where it was felt participants would be comfortable to share their beliefs, attitudes and trusted information sources. At the interviews, I talked the participant through the Consent Form and had them sign it. If they requested a copy, I later scanned and emailed the participant’s Consent Form along with the a summary of their interview transcript so that the participants had an opportunity to review their input and provide additional information.
The waste recycler/transporter company data collection differed slightly. I initiated contact by telephone with a company representative and subsequently sent my project information letter and consent form to which they assented. I then emailed them the interview questions to which they wrote their responses back via email.

Interviews with the auto shop manager or owner were semi-structured and were approximately one half-hour to forty-five minutes in length. I made gaining a rapport with the participants a priority and tried to be sensitive to their time constraints and presumed lack of interest in the research subject matter. At the same time, I wanted the participants to candidly share their perspectives, demands and the realities of the shop floor. After the interview questions were completed, participants were shown some examples of existing environmental education outreach materials and programs developed in other jurisdictions and asked whether these would be useful in motivating them to improve storm drain best practices and what they liked or didn’t like about them. Using my laptop, I showed examples of a best practices poster, checklist and eco-certification programs. For shops without Internet access, I used my mobile phone hotspot and/or provided printed hard copies for the participants to review.

The samples of existing environmental outreach products reviewed by shop owners are as listed below.

- **4C’s poster**: Cover, Capture, Clean, Contain, from Kitsap County Washington State. This was the highest rated product from an automotive repair focus group study conducted in Washington State (Cunningham Environmental Consulting, June 2011). I also had a printed copy with me to show the participants.

- **Online Stormwater Self-Assessment Tool** pilot project currently in survey format on SurveyGizmo™ (developed by the Burrard Inlet Environmental Action Program, 2012).

- **Portland Metropolitan Area Eco-Logical Business Program** that lists and advertises accredited auto repair businesses by using an online registration and checklist and also site
visits by program staff to assist businesses in meeting certification requirements. The Eco-
Logical Automotive Services Program recognizes vehicle service and repair businesses and
shops that reach the highest standards in minimizing their environmental impact. The goal of
the program is to prevent and minimize pollution generated by small businesses in the state-
wide area.

- Motor oil public service announcement video produced by Seattle Public Utilities
  Commission (shown using my laptop).

With the participant’s permission, interviews were audio recorded with supplementary hand
written notes. If participants declined the audio recording, hand written notes were taken. Three
participants declined the audio recording. Once the data was collected, the recordings were transcribed
and only summaries of these transcripts were sent back to the interviewee for further comment, editing, or
corrections. It was felt that the complete, verbatim interview transcripts would be overwhelmingly long
and difficult to review for participants. Only one participant responded back stating that their interview
transcript summaries looked good.

**Data Management and Analysis**

Following the interviews, I applied qualitative coding to the transcripts and summary notes to
look for patterns, common themes, new information and any relevant data that could inform development
of environmental education resources and outreach materials.

The interview data and responses to the example outreach materials were assessed together. The
analysis approach followed Creswell’s (Creswell, 2007) data analysis spiral that involves organizing data,
establishing preliminary categories, classifying themes into categories and sub-categories and synthesis of
hypotheses that describe the meanings and relationships among the data categories for each research
question. I read, re-read and coded individual passages manually and looked for thematic connections
that informed theories and assertions (Saldana, 2013; Seidman, 2013). I looked for connections among
structures, roles, and social forces that affected participant experiences as auto repair shop workers with respect to awareness and adoption of stormwater BMPs. Since my questions explored participant actions, processes and perceptions, I used first cycle coding such as Descriptive coding which is suitable for novice coders (Seidman, 2013).

Validity and Reliability

The two-stage approach, using industry expert informants to help me gain an appreciation of workflow processes, materials and challenges, and to help identify the appropriate questions, improved the validity of this research. The interview questions were pre-tested using the Expert Informants.

Responses to voluntary interviews will always have some biases because respondents will self-select and those more actively engaged within the industry may be over represented. Since a number of auto repair shop owners and managers declined to participate upon initial contact, the data may represent only a certain segment of the auto repair industry. Participants were provided an opportunity to review summarized versions of their interview transcripts. I used peer debriefing with my research supervisor to enhance validity in the in-person interview data.

Ethical Concerns

I recognize that a researcher’s first responsibility is to the research participant (Seidman, 2013). I used data only from voluntary and informed participants. The Consent Form was explained to the participants in the introduction to the interviews. This provided an opportunity to explain in more detail the value of their responses to the overall study as well as my commitment to their anonymity. The names and locations of participants and their businesses were replaced with participant numbers. Demarcation of participant types with the numbers used to reference them was avoided to maintain confidentiality. Names of contractors and outsourced businesses were included, as this information would not compromise participant anonymity.
Participant tracking forms, electronic recordings and data collected from interviews were stored on password-protected storage drives that were locked in a cabinet at all times (Seidman, 2013). Sound files with interview recordings and transcripts will be deleted after the thesis is accepted. I treated participants with courtesy and respect and made gaining their rapport a prime objective to gain mutual trust and ensure candid and open discussion could occur.
Chapter Four

Results from Interviews with Automobile Repair Businesses

Stage One: Expert Informant Advice for Interviewing Auto Repair Businesses

In the first stage of the research process, as described in Chapter 3, expert informants were sought from the autobody collision and mechanical repair sectors. The intent for Stage 1 was to use experts familiar with the auto repair industry who could assist the researcher to ask the questions that would be useful to maximize the effectiveness of the Stage 2 interviews. The collision repair expert informant was purposely sought through acquaintance contacts, was semi-retired and did not practice within the Greater Vancouver area. He had long experience in the auto body sector and had worked as the manager of the automobile paint department of one of the larger wholesalers of auto paints and paint-related materials. The mechanical repair expert was found through an environmental recognition award that was broadcast on the Internet. He owns and runs an auto repair business that received an environmental award due to their green practices and is also outside the Greater Vancouver area.

The auto body expert indicated that the hazardous materials used in key processes are mainly paints and solvents and that “most auto repair related dangerous chemicals such as volatile organic compounds (VOCs) are in the car body painting department” (Expert #1). Auto body shops have to have two processes – one for handling oil-based primers and topcoats – and one for paints which are now mainly water-based. He indicated that primers and topcoats are solvent based and are captured into waste containers after use and disposed by waste recycling companies. The move to more water-based paints has reduced the health concerns for workers because these new paints contain lower levels of VOCs and have less need for solvents to clean paint guns and other equipment. Another trend in the industry is the use of “…R & I – replace and install damaged parts rather than painting them, thus reducing the need for paint and paint handling over time” (Expert #1).
The auto body expert also informed me that the Insurance Corporation of British Columbia has been driving auto body shops towards a higher level of professionalism. “ICBC accredits shops to meet certain standards for cycle times and systems to ensure they are clean and neat, and provide a certain level of service” (Expert #1).

The auto mechanical repair expert indicated that shop material suppliers and disposal companies were important factors in how auto repair shops handle these materials. “Setting up good local suppliers and recyclers involves extra work” and determining whether they are actually doing what they say they do with used products (Expert #2).

The mechanical repair expert claimed that, “the industry profit margins are low; approx. 5-10% if you’re doing well; the industry is very competitive, has become very price-driven and everyone’s lost sight of any environmental considerations” (Expert #2). “You have to want to do it (be a green shop) and unfortunately most shops ‘just want to make a buck’ and do it the cheapest, most profitable and easiest way” (Expert #2).

I also learned that there are different elements to consider in looking at sustainable practices in a shop: purchasing supplies/products, how housekeeping is conducted (hosing down shop floors versus dry shop practices), handling, recycling and disposal of hazardous materials. Used oil is the biggest challenge because of the volumes handled and “…the worse thing to happen is that fluids get into the storm drains” (Expert #2).

Other key influences on auto mechanical repair shop liquid handling and disposal include lack of consumer demand for greener practices, lack of mandatory requirements, and the design of modern vehicle manufactures. He claimed that currently nobody is pushing for greener business practices and there is almost no benefit to a shop in adopting such approaches. “Changes in this industry will come through customers demanding those changes or enforcement of mandatory oil pick up” (Expert #2).
The Interview questions for Stage 2 of the research process were developed with the input obtained from the expert informants and information from the literature. In summary, the two expert informants provided the following main topics that were incorporated into the interview questions:

- Distinguish between how auto body shops deal with water soluble paints and solvent-based primers and topcoats
- Recognise existing and evolving industry processes and systems that are currently set up such as existing regulations and/or bylaws or the increasing trend to replace damaged parts instead of paint them.
- Acknowledge the role of product suppliers and waste recyclers in influencing auto repair business practices
- Determine various barriers for auto repair businesses to adopting optimal BMPs
- Determine motivating influences for auto repair businesses to adopting optimal BMPs

**Stage Two: Results of Interviews with Automobile Repair Businesses**

Eleven questions covering approximately five themes were asked during the in-person interviews (see Table 2 below and Appendix C).

**Table 2**

<table>
<thead>
<tr>
<th>Theme</th>
<th>Interview Question(s) Developed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sources of information for automotive repair shop owners/managers/ workers</td>
<td>What are your current sources of information regarding materials handling?</td>
</tr>
<tr>
<td></td>
<td>What sources of new information about handling liquid waste are the most respected and useful for you? Why do you find these sources to be most useful?</td>
</tr>
<tr>
<td></td>
<td>What training does your staff get in handling liquids and other hazardous materials?</td>
</tr>
<tr>
<td></td>
<td>Do all suppliers provide training for the use and safe handling of their products?</td>
</tr>
<tr>
<td>Theme</td>
<td>Interview Question(s) Developed</td>
</tr>
<tr>
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</tbody>
</table>
| Barriers to BMP adoption    | Are publications like “Car Care Business Canada” magazine or from the Automotive Industries Association of Canada useful and respected in your shop? \n  
  In your opinion, what current barriers or obstacles exist for your shop in meeting hazardous material BMPs? \n  
  Are there things that “bug” you about the current situation, regulations, and information? \n  
  What could be done better?                                                                                                                                                                                                                                                                                                                             |
| Motivators to BMP adoption  | What motivated you to adopt BMPs? \n  
  What systems do you need in order to adopt Best Management Practices (BMPs) and attain dry shop status? \n  
  What motivates shops to be adopters and or even promoters of BMPS among the auto body/repair industry? \n  
  What approach should we take in developing incentives? \n  
  For Auto body shops: Should we work with accreditation organizations such as ICBC? \n  
  Environmental Regulators and local governments are interested in reaching out to commercial sectors via Internet tools (email, WWW sites, Facebook™, etc.) because it is impractical to have one-on-one personal outreach to every commercial business in Greater Vancouver. What should to be included in an Internet tool to maximize storm drain water awareness and adoption of BMPs by auto repair shops in this region? \n  
  Would local government endorsement or certification recognition be valued?                                                                                                                                                                                                                                                                         |
| Outreach approach considerations and incentives | What approach do you think accreditors, regulators, drainage utilities or environmental agencies should take to encourage widespread adoption of stormwater BMPs? \n  
  Is there a role for industry in establishing and promoting widespread optimal BMPs that protect local storm drains and waterways?                                                                                                                                                                                                                       |
| Outreach design considerations | Are there examples of existing outreach programs that you think could work for you and for the entire automotive repair industry in BC? \n  
  What is your opinion on the design, graphics, look and feel of the example outreach materials in terms of whether it would hold your attention and compel you to adopt optimal storm drain water BMPs?                                                                                                                                                                                                                                           |
Following the interview questions, participants were shown some examples of existing environmental outreach and communication initiatives and asked whether these were useful and what could be improved. A total of thirteen participants contributed to the results in Stage 2. The main themes from the interviews are summarized below. The number in brackets provides reference to individual participants. In order to maintain anonymity and confidentiality, individual participant numbers are not linked to the type of participant.

**Theme 1. Primary sources of information about liquid product handling and disposal.**

During the interviews participants were asked about their main sources of information for liquid product handling, what kind of training occurs for materials handling, and about their trusted sources of information. Most participants claimed that product suppliers and waste contractor/transporters were the main source of information about liquid product handling and disposal for auto repair shops. Both product suppliers and waste contractors were said to supply shops with corresponding Material Safety Data Sheets (MSDS) that specify how to properly handle certain materials, especially if there are accidental spills (Participants #2, 4, 6, 9, & 11). For auto body collision repair shops, paint manufacturers were claimed to provide directions on product use mainly in a written format (Participant #6). Municipal government, Metro Vancouver, the Insurance Corporation of BC (ICBC) and the Automotive Retailers Association (ARA) were also cited as good sources of information (Participants #1, 4, 5, 6, & 7). One participant from an auto mechanical repair shop stated that their shop relies heavily on their contracted waste collector for chemical information because “…there are so many chemicals…it would be a full time job staying on top of every single chemical…and it’s difficult for a shop owner to know every single rule” (Participant #2).
Some participants who were involved in the auto repair/collision shop sector claimed that training generally occurs through apprenticeships and post-secondary courses (Participants #9 & 11), while one (Participant #3) mentioned that apprenticing is becoming less common, “We used to work on a system of mentorship, especially in our trades, but there is no mentorship anymore because of the transient population”. In addition, an industry columnist, Shephard (2012), states that collision repair shops are relying less on apprenticeships as a skills standard and increasingly on ongoing training as a condition of operation. For mechanical repair shops there is no industry standard nor license needed to handle oil and coolants but there is a certificate required to handle air conditioning units in order to ensure Freon™ is not released into the atmosphere because it is an ozone depleting substance. The Workplace Hazardous Materials Information System (WHMIS) was cited as required training by some participants (WHMIS is in fact required for all workplaces that handle hazardous materials). While most of the shops in this research were independently owned, the participants who were involved in franchise/dealerships claimed that their company headquarters provided training to employees. One participant mentioned that, “…we are just inundated with a lot of training…and it gets that there’s so much to do that none gets done…it’s sometimes the last thing I’m gonna do even though it’s the most important thing” (Participant 2). The overall interview results suggest that most material handling training is focused from a human health and safety perspective and that little is available on environmental protection practices.

Trusted publications that were mentioned by some shops included Car Care Business Canada, Service Station and Garage Management and the ARA Collision magazines. Some shop owners/managers read them while others cited a lack of time for reading, did not find them useful, or felt that they were too detailed (Participants #1,2, 8, & 11). Participants 2 and 10 recommended that written materials should avoid information overload and “…use plain language…” (Participant #10).
Theme 2. Structures and processes currently used in the autobody and auto
mechanical repair sectors that have implications for storm water BMPs.

The interviews revealed that there are currently accepted requirements and established processes
that define shop practices and operations. While this theme was not specifically addressed in a direct
question, participants provided relatively consistent information related to the regulatory and standard
practices that currently exist. For example, local municipalities have strict requirements for new building
design including site drainage capture and treatment with oil-water separators prior to storm drain
discharge (Participants #1, 4, & 11). Some participants mentioned that new shops need to conform to
these requirements in order to build or renovate a new business space (Participant #1 & 11). However,
shops in older buildings may not necessarily have the infrastructure, such as oil-water separators, in place
to adequately prevent materials from being released to the environment (Participants #3 & 11).

One requirement is that used oil and coolants (antifreeze) must be recycled. Contracted
recycling/waste collectors who pick up waste fluids from the shops do this regularly. The BC Used Oil
Management Association’s mandate is to manage a program to facilitate the collection, handling and
recycling of used oil and antifreeze materials. Included in the program is the collection and recycling of
used oil and antifreeze containers up to and including the 30 litre container (British Columbia Used Oil
Management Association, 2013, p.4). In British Columbia, used oil and antifreeze producers must have a
product stewardship plan under the Environmental Management Act Recycling Regulation (British
Columbia Ministry of Environment, 2004). The BC UOMA manages this stewardship program. One
franchise shop manager stated that “…headquarters has service operations standards that we follow”
(Participant #1). Most participating shops referred to the waste pick up service as relatively useful:
“…recycling used fluids and bottles…all that gets done with minimal effort…it’s very convenient”
(Participants #11 & 2). Participant #2 stated further, “…that the part that we are paid for used oil makes it
kind of easy”. However, some participants, claimed that, “…there’s no money in (recycled oil);…not
enough buy-back” (Participant #3); “…(the money for used oil) doesn’t cover it…” (Participant #6) and
that “…outside of urban centers the cost of recycled oil transport is higher than the fees collected making
it not worthwhile for recycling/waste collector companies” (Participant #10). The waste
collector/recycler representative (Participant #12) confirmed that they are “…contracted by the (car)
dealerships and other waste generators to manage waste streams including removal of …contaminated
water, oil/fuel and sludge from (storm drain) interceptors”. They also stated that they “…do not initiate
the decision to enact the service, so seldom are we involved in the decision making process and
information flow associated with such activities”, (Participant #12). Another participant recommended
that “mandatory records for purchased fluids in must match purchased fluids out…” (Participant #7)
would stimulate more BMP adoption.

Participants from auto body collision shops stated that water-based paints and cleaners have made
it easier to handle these materials than the solvent-based paints and cleaners of the past. One participant
remarked that, “We use a lot of car cleaning products that have all gone to environmental
soap…everybody’s going environmental…I mean you have to” (Participant #6). Although one auto body
shop (participant #5) also claimed that a new requirement to dry cars inside paint booths makes it more
time consuming and costly. While paint manufacturers do not take back products, left over paint products
are also listed in the BC Recycling Regulation and are picked up by waste/recycling collectors. In
addition, ICBC and Workers Compensation Board (WCB) sets a pretty high standard for service quality
and worker safety respectively for all collision autobody shops (Participant #3).

Some participants mentioned that their shops have underground oil-water separators that collect
all rain and wash water from their premises. The oil-water mixture is stored underground where the oil
separates to the top and is regularly removed by a recycling contractor and the remaining water is
discharged to the municipal storm drain system. One shop questioned whether oil-water separators work
as well as they should and whether they get serviced regularly: “…nobody is inspecting to make sure
that’s getting done” (Participant #4). Only one participant stated they conduct dry shop practices, i.e. no hosing down of shop tarmac. The waste collector/recycler representative (Participant #12) added that washing engines and oily truck beds can lead to heavy oil and grease contamination. “Also detergents and dispersants can visually eliminate a sheen of hydrocarbon but really the hydrocarbon remains present and will continue to enter the environment”, (Participant #12).

In general there appeared to be a general acceptance of increased requirements and attention to improve best practices to limit; as Participant #2 stated: “…it’s gonna happen…it has to happen…it’s part of life. It’s happening in other places and it’s going to come to us eventually”.

Theme 3. Barriers and challenges to adopting storm drain best management practices.

In the interviews conducted for this study all participants cited costs as a barrier to improving best practices. Cost barriers were associated with paying contractors to pick up used products and waste as well as with the cost of installing proper infrastructure such as underground oil-water separators. When asked what barriers existed for their shops in meeting best management practices, some participants stated: “…if you charge people for (recycling) they’re not going to do it…it’s very simple” (Participant #9); “cost is a big thing…it costs money to get rid of stuff safely” (Participant #6); “…costs keep going up…honestly, top of mind for most shops is breaking even…” (Participant #2); “we pay dearly for (recycler/waste collectors) …to handle our wastes…but it’s one of those ‘must do’ things” (Participant #4); “…it’s gotta be relatively cheap for shops…”(Participant #11). “The government wants you to do it but they don’t want to pay for it, right? We’re all ‘environmental this’ and ‘environmental that’, you know… it costs money”, (Participant #6).

Inconvenience was also cited as a barrier especially since handling used containers, waste fluids, and other materials is labour intensive, tedious and time consuming (Participants #1,3 & 5). Keeping shops clean was also cited as a challenge. Participant #4 stated, “…for instance, one of the big challenges
in an automotive shop is trying to keep the place clean ... the floors clean ... the shop clean ... so what we're trying to promote there is a dry shop ... we're not taking a garden hose and washing the floors as many shops do”.

A few participants cited education or lack of awareness as a barrier within the industry as a whole. Not knowing where used materials should go and that there are different ways of keeping a shop clean than washing down floors were seen as issues by some (Participant #4 & #8). Participant #11 speaking about best practices remarked, “…it’s ignored because it’s not something that’s easily fixable or talked about a lot, so it’s not in the forefront”

**Theme 4. What motivates shops to adopt best management practices?**

A few participants cited regulations and fines as motivators but overwhelmingly, most participants cited customer opinion as an influence. For example, Participant #9 stated, “…if it looks good for the public ... we get more customers, right?” The overall impression of the industry by the public is an important factor (Participant #7). Another automotive shop worker noted, “…the whole automotive industry for years, has had the tag that it is a dirty business ... and in the old day, it was ... it doesn’t have to be like that” (Participant #4). Participant #8 added that if the public were better educated, they could know what to look for in a shop. However, other participants claimed that customers are not asking for or about green practices at shops (Participants #11 & 2). “If the consumer is not aware of it, then the shops won’t care about it” (Participant #11), while Participant #9 stated, “You’re not going to get anyone to change unless it profits you in some way”. Alternatively, participants from other shops claimed that they’ve improved practices because of health reasons and to protect employees (Participant #6) and that “…people want to work in a clean environment ... so we keep it clean for them” (Participant #5).

Many participants stated that they were motivated because they recreate in the natural environment. One shop manager said he uses best practices “…because my kids want to go fishing in the Fraser River” (Participant #6). Others stated that they just are environmentally conscious and that “it’s
common sense” (Participants #2 & 4) and that “…it’s the only way to go…(otherwise) everything else gets compromised” (Participant #8). Given these comments there appeared to be a substantial desire among the participants in this study to be seen as progressive, clean and green.

Theme 5. Participants’ reaction to the outreach examples.

Participants were shown several examples of outreach products (see Appendix C). The Portland Eco-Biz accreditation program and the BIEAP Storm Water Self Assessment Tool will be referred to collectively as ‘certification checklists’ in the results and discussion below.

Most participants generally reacted positively to the example certification checklists. Most noted that these approaches are a good idea and would be useful (Participants #5, 7, 9, 4, 2, &11). For example Participant #2 states, “…a lot of this stuff (referring to the BIEAP Self Assessment Tool) seems kind of obvious…but maybe it wouldn’t be obvious to everyone” while Participant #4 said, “…(shop managers) may go ‘geez, yeah, I didn’t know about that’”. This general reaction continued in remarks by Participant #1, who said, “…awareness and education is good; could always use more” and Participant #7 who claimed that there are lots of good pointers that many owners may not be aware of. Participant #2 felt that a successful certification program, “…depends how it’s presented” and while participant #4 noted, “it really surprises me that our government doesn’t have some kind of a body or a program in place for this kind of stuff”. Two participants expressed reservations about whether anyone cares that they have certification while another stated that they thought certification checklists “…will influence guys that already want to change”(Participant #9).

Some participants cited reservations about the amount of time that using certification checklists would take up as well as having to be aware of additional details. For example some shop managers cited a lack to time to go through a checklist or participate in a certification program. Participant #11 “…the only problem I would see…I’m quite a busy guy so I probably wouldn’t take it just because of time…” Participant #2, “…people will not be surprised by it (but) for me…probably it would be fine but for other
(shops)...it would make them angry because there’s just so much stuff...you basically, as a shop owner, have to do it all”. Participant #3 expressed doubts about the Checklist approach, stating, “…you’ll have a hard sell getting (shops) to fill that out…”.

The usefulness of the Capture Contain Clean Cover Poster (4C’s) received a mixed response from participants with most saying it had limited usefulness to affect change in shop practices. Reactions varied between, “posters are good reminders” (Participant #5) to “not useful” (Participant #8) and “…pretty redundant” (Participant #2). Response to how useful the poster would be in encouraging best practices included: “I’ve been to a lot of shops with posters and after awhile it gets covered in dust…these posters would be better as TV ads” (Participant #6); “posters are useful for workers…sometimes a reminder is all that is needed” (Participant #7); “I think a lot of that (4C poster) is common sense and it comes down to training…I would use that as training material….but whether I put a poster like that in my shop…well, maybe not” (Participant #4). Participant #2 was very sceptical, stating, “I don’t think posting something like that …will make someone have ethics…either you care about something or you don’t. I think posting pictures…is just beating around the bush where you’re trying to make a change…(it) will not be a substantial impact”. Participant #11 had a somewhat different opinion: “I would say no…(the 4C poster) wouldn’t have much affect for me personally…but visuals always do get brains turning and a young mind thinking: ‘hey, I have something similar…is that (practice) right?’”

The other examples of the “information reminder” genre were not shown to every participant as it was felt that if they didn’t find the poster useful, the other paper product reminders such as calendars, toolbox stickers, etc. would also not be useful. The public service announcement video was not consistently shown because it was felt that it was slightly out of context, not intended for auto repair businesses, too time consuming, and might interfere with any rapport built during the interviews.
Theme 6. Incentives and approaches to gaining more widespread adoption of best practices

The interview questions and certification program examples generated discussion and feedback from participants who suggested incentives for shops to adopt better practices. Most feedback and misgivings about a certification program cited were about public awareness of certification, whether certification would be worthwhile financially, and about ensuring all businesses took certification seriously.

Public awareness of certification was cited as a necessary component of any outreach program (Participants #2, 3, 4, 7, 8, 9, & 11). “Customers are not asking for green practices…but I think it would be a good thing…” (Participant #2) and “…if (certification) is just talked about to shops and nobody else knows about it, then nobody’s going to care…and the shops won’t care because nobody’s going to come and ask ‘are you endorsed this way?’” (Participant #11). Many participants suggested that certification would require advertising to ensure the public was educated about it (Participants #2, 3, 6, 7, 8, 9, & 11). Educating the public via TV and having certified shops listed on a website were cited as incentives for shop owners to want to participate (Participant #2); “…someone like BCTV or Global doing articles after articles…” (Participant #6). Another participant stated that depending upon what’s involved with meeting certification compliance that, “ok, that’s worth my time to be on someone’s website about an eco-friendly shop” and that “I think they would have to really put some money out on some ads…and just let it be known; spend some money on prime TV…really pound that out there (Participant #11)”.

There was a general sense that currently the public has little interest or knowledge about auto repair shop practices and that this issue is “…not sexy enough (and) nobody’s interested” (Participant #3).

Many participants also claimed that the certification had to have some value in order for most shops to agree to participate. Identifying the worth and benefits of a ‘green logo’ would be needed before shop owners would buy into such a program (Participant #3). Another participant suggested that the best
management practices be presented in a cost hierarchy so that shops can choose from measures that can be addressed with minimal costs all the way to higher cost measures and if “…you can tell people they’ll save money if they (comply with certification), then it makes sense” (Participant #9); “people should be rewarded with some kind of certification (if) they follow certain guidelines…” (Participant #4). Another participant stated, “I don’t mind spending a few thousand dollars to fix the problem…but when I’m getting into the ten thousand dollar range…it’s a lot of money for nothing to come back” (Participant #11) and “…if it’s something that would benefit us (repair shops), I’m sure you’d get us to do it” (Participant #2).

A key consideration cited was ensuring that shop owners are loyal to any certification program and that they provide truthful answers to an online checklist (Participants #3, 4, 6, 7, &11). Concern was raised about the potential for some to participate without taking the requirements seriously; “(a certification program) would be good…but you have some (shop owners) that are very ‘yes, we’re going to be safe for the environment’…some people will fill everything out, get the (eco-certification) sticker on the window, advertise it but won’t follow through” (Participant #6); “…(shops) have to earn (certification) so I guess there would ultimately have to be some kind of inspection process in place” (Participant #4) and “…what’s the buy-in?” (Participant #3) for shop owners and staff. Another participant said, “…I can see a lot of people not doing it or taking it seriously or just clicking through it…” (Participant #11). Suggestions on how to address loyalty and ‘buy in’ varied and the following responses describe some solutions suggested by participants.

Participants were asked whether government endorsement would be valuable with a majority of participants having a positive response. Only one participant stated that government endorsement would not be useful (Participant #8). Some of the participants stated that it would be very valuable and that voluntary accreditation would only move about 10% of the industry indicating that government
endorsement of some kind would be needed to gain widespread adoption of best management practices (Participants #7 & 10).

Asking about government endorsement brought up the theme of mandatory versus voluntary certification even though it was not a specific interview question. Some participants stated that making a certification program mandatory would “…force people to do it; they’ll hate it (and) try to avoid it…” (Participant #9) while another stated that professional development training should be a mandatory component of any accreditation program so that shop workers can stay up to date (Participant #7). One participant had the opinion that “I think the government really needs to spend a little bit more money…train, teach and then monitor it…” (Participant #6). Another suggestion was to make it mandatory to track fluids in and out of businesses to ensure used fluids are accounted for (Participant #7).

Inspection and enforcement was another theme that surfaced when participants were asked about government endorsement. Some interviewees recommended a graduated enforcement approach where shops would be given a grace period before enforcement measures were brought in (Participant #2) and another suggested to “…do change slowly and start with those (measures) that cost nothing” (Participant #9) and “I don’t think it’s fair to just go into someone’s shop and just fine them (without warning)…” (Participant #2); “you can’t flick the switch and go 100% environmental” (Participant #6). Some participants complained that there is not much enforcement and checking unless someone complains (Participant #6 & 8); “…there’s nobody with any teeth…no regulatory agency…we don’t have the enforcement needed” (Participant #3) and “…word can get out there that there isn’t a lot of inspecting going on which can erode good behaviour and that you need inspectors who know the business; that come from industry…” (Participant #7). At the end of the day, some kind of enforcement is needed (Participant #1) because “…there’s still a lot of guys hosing down the shop and ultimately out the bay door and into the laneway…and that’s no good” (Participant #4). Another participant stated “I personally believe that if you want to make a change, there has to be a substantial consequence…and not just $100 fine; it has to be
something that means something to someone…” (Participant #2). However, a slightly different message came from participant #11:

“If you’re being imposed (with a heavy fine)…it doesn’t work for a lot (of businesses) because you can’t really do that if a shop can’t afford that …and it goes under…then I’m not sure you’re doing more harm than good because now you’re protecting the environment but you’re taking away a family’s support…so you’ve got to weigh that out.”

One suggestion was to have more producer responsibility where oil companies fund the programs put in place to ensure safe disposal and recycling of their products (Participant #3) although this process is currently in place through the BC Recycling Regulation and Producer Stewardship (British Columbia Ministry of Environment, 2004; British Columbia Used Oil Management Association, 2013) programs.

Another participant stated that an accreditation program or regulation needs to be Canada-wide “…because everybody’s treated the same…someone can’t complain that it costs less somewhere else” and added, “…a (storm) drain on Fraser Street, Vancouver runs into the Fraser River and a drain on McKay Street, Burnaby runs into the Fraser River” (Participant #6).

Several participants suggested that increased engagement between regulators and industry would be valuable (Participants #2, 3, 4, 6, & 9). Most shops mentioned that the Internet is a good place for environmental outreach information since most businesses need to be Internet savvy (Participants #5, 7, 9, & 11). Some participants mentioned that they already obtain a lot of information and training from the Internet (Participants #2 & 11). One participant suggested that making connections is the “wining formula” through community outreach and social media in order to engage businesses to be responsible (Participant #3).

One participant suggested: “…something like a regular newsletter that would go out to say what’s happening and remind businesses that the environmental side of their business should be huge for them…for example, you could include a story about how this company had a major spill and this is how
they dealt with it…” (Participant #4). This is similar to the newsletters the Workers Compensation Board puts out to various industrial sectors on workplace safety. Having a newsletter would remind businesses about things that could potentially happen and provide updates and “…hammer home the idea that this can be done with out a lot of cost or effort…” (Participant #4).

Several participants recommended having someone, in person, come and show them the proper practices would be valuable (Participants 2, 6, & 9). One participant stated:

It’s called learning; if you teach them…you come and teach everything here properly. I’m a firm believer of ‘put my shoes on and do (my) work’. If you can do this better than I can…then teach me, I’ll learn from you. If you can’t, then you have to think: ‘hey, they’re doing their best – don’t penalize them…let’s help them (Participant #6).

Another participant said it would be best if “…a guy comes in and gives me a new product and says ‘do this’ and ‘don’t do that and if you have any questions, here’s the MSDS sheet’” (Participant #9). “Let’s go and work with (auto repair shops) and then periodically follow up…and if they’re not following the recommendations with the government help, well then …slap them with a fine…” and “…tell them, show them…and then when you’re done with that, periodically send the inspector through…” (Participant #6).

Another participant recommended that having someone come and point stuff out and show you “…is what you will need because it’s very difficult for a shop owner to know every single rule, right?” (Participant #2). Another suggestion was to “…share the cost with (government and auto repair businesses)…putting in a little bit of time and figuring something out…making something cost effective for shops to do it” (Participant #11).

Participants were also generally supportive of including product suppliers and waste recycling collectors in any environmental outreach programs. “It works as a whole so if (waste collectors) understand what is happening, they should adjust as well” (Participant #9) and it’s “…probably in their best interest…if there was something adopted like a new clean practices code, then it would be good for
Another participant felt that best practices encouragement should come from the waste and recycling collector companies going around to all the auto repair shops (Participant #8). Other ways of engagement suggested included tapping into the local Chambers of Commerce and Better Business Bureau (Participants #3 & 9).

Overall the interviews revealed that awareness was not the limiting factor to adoption of optimal best practices by auto repair shop owners and managers. While many participants stated that more education would be beneficial, they provided many other insights into better understanding their situation and perspectives. Main sources of information to auto repair businesses were product suppliers and waste collector/recycling companies. Some participants stated they rely on apprenticeships but others also mentioned that mentoring/apprenticeships are becoming less important to regular continual professional development. The interviews revealed the importance of how the industry is currently structured from municipal building code requirements for storm drain protection, to mandatory oil recycling, to new/improved cars and parts that require less oil changes or part replacement rather than painting. A significant barrier to adopting storm drain BMPs cited was costs. The lack of customer demand for and awareness of more ecologically friendly practices was also cited as a barrier. Main motivating factors for auto repair business participants were regulations, customer perceptions and recreating in the natural environment i.e. fishing. Storm drain BMP checklists were cited as a good way to provide guidance to auto repair shops but that it was also important to make it easy for shop owners/managers to participate. Providing multiple incentives to participate like advertising to the public, recognition/accreditation to reward those who invest in optimal BMPs and ensuring industry-wide equity was advice provided by participants. Introducing accreditation in a progressively more stringent over time was also preferred over suddenly initiating requirements. The design of an outreach program would have to be worthwhile financially and add value to auto repair businesses.
Research Findings and Interpretation of the Results

The purpose of this research was to learn about what components are needed in the design of effective environmental education and outreach approaches for the automotive repair business sector to prevent hazardous liquids from release into storm drains and the environment. The research questions intended to identify what barriers, challenges and opportunities are faced by the automotive repair industry in adopting storm drain BMPs as well as what communication resources and design criteria should be considered to maximize awareness and matching an outreach program to the interests and needs of auto repair businesses. The research findings are summarized below. To provide a deeper understanding of the automotive repair businesses, two constructed narratives were written to give voices to participants in this study.

The results of the interviews suggest that the research participants had a general awareness of their environmental responsibilities. This result is similar with the research findings of Yeomans (2006) on a study of a target audience. Yeomans suggested that messages should be tailored to strengthen any existing pro-environmental beliefs even if those beliefs are weak. Yeomans proposed that this approach is more practical than a general attempt to change attitudes. For example, just about every participant in the study reported here identified costs as a barrier to adopting storm drain best management practices. In order to effectively engage and persuade the auto repair sector to adopt storm drain BMPs, outreach resources should be accompanied by cost effectiveness information and include how adopting BMPs can benefit the business financially. One suggestion was to outline best practices in a cost hierarchy beginning with those measures that can be adopted that are of no or minimal cost. Further, eco-certification programs that reward participating businesses may be used as a tool in marketing their services. In this study reducing the labour time spent and costs of recycling and disposal of automotive
fluids were cited as strong barriers. Many participants claimed that adopting optimal quality BMPs above current practices would add costs in a competitive business environment that has low profit margins. Interestingly, in another study based on focus groups and interviews conducted in Puget Sound (Cunningham Environmental Consulting, 2011) costs were found to be a medium barrier and rather than a strong obstacle.

Another theme emergent from the research for this thesis was that auto repair businesses are sensitive to the perceptions of their customers. However, several interview participants claimed that their customers were making no demands for improved practices. “Changes in industry will come through customers demanding those changes” (Expert #2). “Customers aren’t asking for ecological-friendly practices “…but it would be a good thing” (Participant #2). Public perceptions can motivate shop owners and managers to better practices but there is a “need to educate the public to tell them what proper handling practices look like so they can recognize a good shop” (Participants #7 & #8). Several of the study participants recommended wide-spread advertising to make the public more aware of ‘green shop’ practices as a way to encourage customer demand for these services which in turn would motivate more shops to adopt BMPs. This finding suggests that any outreach strategy should also include a mechanism that involves informing the driving public so that they can start to recognise and distinguish shops with better practices.

Another theme mentioned by some participants was equity, meaning that any outreach strategy will need to offer the same opportunities for all shops. If an eco-certification checklist program is to be pursued, it should be applied consistently otherwise businesses will see that the cost advantages are unevenly distributed and could lose trust in a certification program making it less effective. Some participants (#3 & #4) suggested that a monitoring program to ensure certification loyalty would also be necessary, since buy-in would be higher if everyone participated fairly and consistently across the industry.
While interview participants cited various sources of trusted information, those most commonly cited were provided by product suppliers and contracted waste/recycling collectors. Since auto repair businesses tend to have a large material throughput, it makes sense that they have close connections both with those who provide materials and products as well as with those who remove materials and wastes from the premises. Thus, both material suppliers and waste/recycling collectors should be considered in designing an outreach strategy. Participants provided contradictory information about the role of apprenticeships and mentoring with some saying that it is an important factor while others claimed mentoring is on the decline (Participants #9, #11, & #3; Shephard, 2012).

Available information on storm drain BMPs was cited as a need but was not seen as a priority since many participants stated that they have neither time to develop new expertise nor the capacity to deal with additional information on top of their current workloads. One suggestion for information dissemination was to employ a newsletter format to allow businesses to read about developments and learn from their colleagues (Participant #4). Several participants also indicated the need for straightforward information written or presented in plain language (Participant #10). In addition, information would have to be very relevant and worthwhile if it was to direct their attention away from the busy-ness of shop operations. Some study participants indicated that they would like to find out more about what happens to automotive wastes and how they are recycled. There does appear to be a need to define the comparative benefits of certain practices such as using absorbent pellets to pick up spilled oil that would otherwise have ended up in the storm drain compared to the environmental impact of the oil-soaked pellets when they are taken to landfills (Participant #11). A few participants stated that they would prefer to see industry experts come to their shops and point out where they could make improvements rather than being expected to read educational materials. This is consistent with the preferences found in the Cunningham study (2011) where automotive businesses preferred on-site
training or technical assistance over off-site training because of its convenience and because in an on-site program workers as well as owners/managers can benefit.

Most participants had a positive response to the example certification checklists developed by Portland Eco-Logical and BIEAP (Portland Metropolitan Area Pollution Prevention Outreach Team, ND) to help promote more BMP adoption. Some, however, were concerned about the additional cost, time and effort certification would demand of their businesses. Most participants described additional considerations that would improve business buy-in to a certification checklist program. For example, the value of a voluntary certification program would need to be established so that businesses would take certification seriously and be able to determine whether it was worth their time to invest in improved practices. Greater value was associated with public awareness of business certification programs to generate consumer demand for ‘greener shop’ certification. Another recommendation made by several participants was that eco-certification would have to be meaningful to customers as well as businesses. Potential customers would need to be aware of the requirements to meet certification so that they can identify preferred businesses. This would involve making sure the public knows about green shop practices and certification programs so that they create demand for such services which in turn provides an incentive for businesses to participate in certification/accreditation. ICBC’s Valet Program (Insurance Corporation of British Columbia, 2014) was seen as successfully educating the public. Participants felt that a certification program could adopt and/or build upon the relevant aspects of ICBC’s model. The Better Business Bureau and Chambers of Commerce were also suggested as ways to get public awareness of and trust in accreditation. Given that most participants admitted that customers do not ask for green shop practices, there is likely an untapped consumer demand for repair shops that exceed eco-certification requirements.

Most participants thought favourably of eco-certification in general and one recommended that “making it voluntary at first and then having local government requiring it”, (eco-certification) will get
the majority of industry to move into best practices.” (Participant #10). However, some participants cited a dislike for mandatory certification and preferred a voluntary approach. Others claimed that voluntary certification would only shift those businesses that already wanted to change and that in order to make a meaningful impact, certification should be mandatory for the entire industry. A reasonable approach would be to phase in a certification program over time by initially introducing a checklist with a voluntary short term grace period to allow businesses to adjust without too many initial costs and to allow them to plan for longer-term requirements. As one participant remarked, “…you can’t just flick a switch and go 100 percent environmental” (Participant #6). The interview results overall suggest that the automotive repair industry recognizes that there is a need for industry-wide certification/accreditation.

While not a direct question of this study, enforcement was seen as a mechanism to ‘level the playing field’ among the industry. While participants didn’t necessarily agree on how to effectively enforce best practices, there was a general consensus that providing training/education should be a first step followed by a progression of monitoring, warnings and enforcement where businesses would have some warning and be given a grace period to modify processes and invest in structural changes. Many participants made reference to “other” shops that weren’t following the rules adequately. These comments suggest that any outreach program would need to make sure that the implementation of new requirements would have to be equitable across the industry in order to get buy-in from all businesses. One participant stated the importance of using “…inspectors who know the business…who come from this industry…”, (Participant #7). Overall the participants in this study appeared to feel that throughout the region there was a general lack of checking and enforcement to address poor practices.

Limitations of this Study

This research study targeted a small number of businesses within the auto mechanical repair and autobody service sectors. It may not be representative of all auto repair or autobody businesses across Metro Vancouver or elsewhere. Another limitation of the study resides in the fact that the results are
based on interviews with those participants who agreed to participate. Some businesses that were approached declined to participate upon initial contact, so the results may over-represent participants with favourable beliefs and attitudes towards adoption of storm drain best management practices.

The study is focused on best management practices in regard to run off into storm drains. The study did not attempt to determine the general attitudes of the participants toward a larger scope of environmental behaviours, although comments made by the interviews sometimes revealed their perspectives about human-environment interactions in general.

**Perspectives from the Garage: Tales of Two Repair Shops**

In this chapter I have attempted to provide a composite description of the experiences, views, and perspectives of the fifteen Stage One and Stage Two interview participants. In summary I have developed two narratives: one for an automotive mechanical repair shop and one for an autobody collision shop in the Metro Vancouver area. Each narrative is a composite of a number of relevant participant interview comments regarding liquids handling, recycling and disposal. The shop owners’ names are fictitious and while each story may hold similarities to the experiences of individual participants, the stories are intended to be a blend of the participant experiences obtained in this research. Recommendations are put forward following the two narratives and are intended to inform any future environmental outreach and education initiatives aimed at the automotive repair sector.

**Story 1: Jas, an owner of an automotive mechanical shop business.**

Jas has owned and managed an independent auto transmission repair shop for five years. He received his initial mechanical repair training fifteen years ago from a post secondary school automotive repair program. He gained experience working for a franchise automotive repair shop for ten years prior to buying an existing garage business from a mechanic who retired. He now has two mechanics on his staff.
While Jas still does some mechanical work himself, he is finding that the front counter customer service and general management sides of the business are taking up more and more of his time as his business grows. He would like to improve certain aspects of his business but finds it challenging just keeping up with the day-to-day running of the business, meeting customer requests and breaking even each month. Jas makes sure the mechanical repairs his shop does are up to date with the technology of newer vehicle models. Jas takes extra steps in ensuring his premises are kept tidy and that his staff has a safe work environment. He also ensures that he surpasses customer expectations in service quality so that over time, his business has a large proportion of repeat customers.

Jas’s garage is required to recycle all used oil and coolant. These materials are picked up by a contracted service once every week. While Jas’s business receives a small amount of buy back for the used oil and coolant, he has to pay for the collection of all other waste liquids generated by his business except for car wash water. Any spilled fluids, dirt and car washing liquids end up on the tarmac of Jas’s garage. The tarmac regularly gets power washed and flows into an underground on site oil-water separator. The oil-water separator is a reservoir that captures all spilled liquids and car wash water on the premises and allows the oils to float to the surface where they are collected and eventually sucked out by a vacuum truck. The remaining water in the oil-water separator is released to the municipal storm drain and the storm drain eventually discharges into Burrard Inlet several kilometers away.

Jas suspects that his oil-water separator does not work as well as it should and that it doesn’t deal with the soaps he uses on car engines and exteriors. He has had it serviced only twice since he bought the business and the service contractor indicated that he may need to replace it soon as it’s reached its functional lifespan. The expense of oil-water separator replacement and servicing is a large cost to Jas’s business and so he has decided to investigate alternatives to using oil-water separators. Jas has heard of other shops adopting ‘dry shop’ practices and would like to know more about how that is done but has not had time to investigate this option further due to the daily commitments of running his shop. In addition,
Jas hasn't seen any utility drainage inspectors for several years, so he has decided his research into this can hold off until he finds more time. Jas wishes an experienced dry shop owner/manager would just come to his shop as a colleague and show him how he could do it with minimal costs.

Jas would like to improve several other aspects of his garage including setting up a spill prevention plan and better storage containment of hazardous and waste liquids. He read in the local paper that a service station in another community was fined for inadvertently releasing used oil and petroleum products into a nearby stream and that they did not have adequate controls or spill preparedness systems in place to prevent these products from going down the property’s storm drain and into the environment. The news reported that several dead salmon were observed downstream the storm drain discharge point. This news upset Jas as he takes great pride in keeping his business premises tidy and modern and feels that this report may further entrench the public’s perception that the automotive industry is dirty and a huge source of pollution. What frustrates Jas is that he would like to improve the environmental practices of his garage, but does not know where to find the best and most up to date information and training for him and his staff and on how to proceed in a way that is cost-effective for his business.

**Story 2: Jerry—Manager of an autobody collision repair shop.**

Jerry has been managing an autobody collision repair shop for fifteen years. He began his training as an apprentice in his uncle’s shop and learned the trade over several years. After working for his uncle, he decided to apply to be a shop manager at a larger independent autobody shop. The shop has seven employees including Jerry.

Jerry has seen his shop’s standard business practices change over the last ten years. More and more car parts are now replaceable rather than being fixed and re-painted. This has reduced the need for labour intensive painting. More and more specialized equipment and training are needed as new car materials and repair practices change. In the past, Jerry was able to manage most autobody work based on the knowledge gained from his apprenticeship but not anymore. In addition, autobody shops now have
to use low VOC paints (Volatile Organic Compounds) which makes them easier to handle since they don’t require as many worker safety precautions. In order to use these new paints, Jerry was required to install a vehicle spray booth in 2008 with a ventilation system according to Metro Vancouver’s bylaw 1086 (Metro Vancouver, 2008).

Jerry’s shop also has a waste collection contractor who comes and takes away unused paint and paint gun wash water as well as other waste fluids such as used oil. Jerry wishes that the collection fees weren’t so high for his waste liquids. He also has to find ways to store a variety of waste products at his premises. In addition to waste paint wash water, he has to collect any used oil, used coolant, contaminated gasoline, empty plastic product containers, used light bulbs, cardboard, scrap metal and office paper and pop can recycling. Pick up services exist for some of these materials and are costly. For those that are not picked up, Jerry has to transport them to a recycling transfer station or appropriate depot. He is somewhat annoyed that his business has to store and handle all these materials and that some require special trips for proper disposal. Jerry wonders how many businesses like his just throw recyclables in the garbage on a regular basis because it’s less labour intensive, less time consuming and saves cost.

Jerry would like to see his shop be seen as modern, progressive and green. He has asked the government Inspector about things he’d like to do but their expertise is very specialized as they review only certain aspects of a variety of business sectors and are not familiar with the intricacies of autobody shop business practices. Jerry wishes that someone familiar with the autobody industry could provide him with advice on how to achieve better materials management so that he could save his business money rather than adding costs.

The above two narratives are intended to provide a sense of the deeper understanding of automotive repair business owners and managers acquired from conducting in-person interviews. Providing business owners and managers a voice through their direct quotes and constructed narratives
gives us a better appreciation of their needs and interests and can guide the design of environmental outreach programs.

**Conclusions and Recommendations**

Addressing non-point source pollution to rivers and streams will need more preventative actions from a large number of land use activities. “Just as non-point source pollution comes from a lot of people each doing a little polluting; the solution is for a lot of people each doing a little preventing (Seattle Public Utilities & Washington State Department of Ecology, 2014). For commercial businesses, such as the automotive repair sector, environmental education and outreach in the form of certification or accreditation programs can be effective ways to prevent the discharge of potentially toxic or hazardous wastes into rivers, streams, lakes and the ocean. However, programs of certification and accreditation should be designed in the context of a clear understanding of the target audiences’ needs. Learning about the automotive repair businesses’ perspectives, what is important to them and how best to connect with them will provide critical formative information in the design of environmental outreach programs that effectively match their interests.

The results of this research identified some barriers to the adoption BMPs by automotive repair businesses and also revealed many opportunities to encourage the industry to improve current practices. The participants in this study generally favoured a checklist approach to certification with the caveat that there should be processes and procedures in place to support businesses’ needs such as widespread advertising of an accreditation program to consumers. Participants generally recognized the need for improved industry practices through a certification program although they generally held views that any such program will need to be thought out and designed carefully and reasonably.

Based on the findings of this research, the following considerations and criteria should be included in any outreach and education strategy that is intended to increase motivation and minimize barriers to the adoption of storm drain best management practices.
• Certain barriers such as cost of handling automotive fluids for recycling and disposal should be lowered through expanded producer responsibility programs and stewardship plans.

• Provide estimates of the costs associated with specific best management practices so that businesses can choose from a range of options suitable for their unique situations. Focus should be placed on the positive aspects of adopting BMPs to persuade and motivate more widespread adoption.

• Market research should be conducted to identify any un-tapped consumer demand for the eco-certification of auto repair and body shop businesses. The market research should attempt to determine the importance and value that auto repair customers place on greener business practices and eco-certification.

• Market research should also be conducted to determine how the auto repair industries could create new demand for eco-certified businesses.

• Ensure that transparent monitoring, inspection and enforcement are included with certification programs in order to gain the trust of businesses and the public and to ensure equitable treatment across the industry.

• In-person outreach programs provided directly on-site to businesses were identified as a desired way to get information. Trusted providers of information include product suppliers, waste/recycling collectors, industry associations, municipalities and agencies such as the Insurance Corporation of British Columbia (ICBC).

• Initially Introduce Certification as a voluntary program in order to allow businesses time to adapt, plan, and implement changes in requirements. While some participants recommended keeping Certification programs voluntary, mandatory participation may be needed to gain more widespread and equitable conduct across the entire industry. It is
therefore recommended that industry associations investigate a mandatory certification program with endorsement by government agencies.

- If a Certification program is introduced, it is recommended it deliver outreach in diverse formats such as newsletters, online content, emails and in-person on-site education programs delivered to participating businesses.

- If a Certification program is introduced, it is recommended that it be advertised widely to raise consumer awareness and increase the value of Certification to participating businesses.

- Ensure that supporting businesses to the auto repair industry such as product suppliers and waste/recycling contractors are considered in development of an outreach certification program.

- It is strongly recommended that government regulators conduct formative research to determine target audiences’ needs in achieving compliance and/or adopting best management practices for all environmental education and outreach strategies.

- Government regulators should continue to focus on product manufacturer stewardship programs as a mechanism to encourage systemic change to develop less toxic and longer lasting products, and to foster more accountability for recycled/disposed products, and put pressure on manufacturers to find ways to reduce material throughput at the source.

This research was intended to generate knowledge on designing successful pollution prevention programs through education and outreach to automotive repair businesses. Formative research is critical to ensuring effective outcomes are achieved from any environmental outreach program. Industry eco-certification is one way to get a large number of businesses to each do a little more preventing of contaminants from reaching local waterways. This research learned that the automotive repair sector is receptive to eco-certification and sees the benefits to their businesses provided that such certification was
widely advertised. This research also learned there are specific barriers as well as opportunities that need to be considered in designing an effective outreach program. Successful outreach and eco-certification programs for automotive businesses need to connect with and take the perspectives, motivations and interests of auto repair business owners and managers.
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Victoria, British Columbia.


Appendices

Appendix A Project Information Letters

Stage 1 Project Information Letter for 2 Automotive Repair Shop Expert Advisors

I am currently completing my Master’s thesis in the Environmental Education and Communications program of the School of Environment and Sustainability at Royal Roads University in Victoria, B.C. My thesis project is titled Stormwater Outreach to Business: User Engagement. The purpose of this project is to support automotive repair shops in safe handling of potentially hazardous materials and in meeting any bylaw or regulatory requirements for adopting stormwater Best Management Practices. The project will develop an understanding of what sort of education and communication resources could assist businesses with liquid waste material management.

I would like to invite you to participate in my research project as an expert advisor to describe the work-flow processes, identify critical issues and help me develop the right interview questions for auto body and repair shop managers. Your information will be used towards the second part of my project that is to interview managers and/or staff of existing operational auto body and repair shops. My aim is to interview 2 expert advisors (yourself being one) followed by approximately 10 auto repair shops.

If you are willing, you will be invited to participate in a one-on-one interview of approximately half-hour to an hour in length and at a date and time to be arranged for your convenience. The purpose of my interview with you will be to help identify key topics or questions for inclusion in a series of interviews with Repair Shop/Autobody shop owners or managers concerning the control and handling of potentially toxic or environmentally hazardous liquid wastes. With your permission I will audio record the interview, transcribe the recording, and send the transcript back to you for any changes or additions. The interviews can be conducted by telephone, or by Skype on a computer link, or in person if that is possible and preferred.

At the completion of the interview, in appreciation for your time, you will be offered a token gift card from a selection of popular businesses.

If you are willing to participate in this expert interview phase of my research please review the Consent Letter below and contact me at my email indicating your interest and so that I can arrange your interview. I will ask you to reply to this email and mark off the appropriate box on the form.

If you have any questions prior to deciding if you would like to participate, please don’t hesitate to contact me at my email or my phone #. If you would like to verify the authenticity of the research project, please contact my supervisor: Dr. Milt McLaren or the acting Program Head: Dr. Liza Ireland.

Thank you for considering this request to participate in the research.

Sincerely

Liz Freyman
Stage 2 Project Information Letter to Automotive Repair Businesses

PROJECT INFORMATION
Auto Repair Shops’ Perspectives on Storm Drain Protection

Researcher: Liz Freyman

Date: March 2014

The purpose of this project is to support automotive repair shops in adopting storm drain protection through Best Management Practices (BMPs) and in meeting any bylaw/regulatory requirements. The project is designed to develop an understanding of what sort of education and communication resources and incentives could assist businesses with liquid waste material management. This project is my Master’s thesis in the Environmental Education and Communications program of the School of Environmental Sustainability at Royal Roads University in Victoria, B.C.

If you are willing, you will be asked to participate in a one-on-one interview of approximately a half hour in length and at a date and time at your convenience, preferably at your shop. Topics that will be discussed during the interview will include what storm drain protection practices currently exist for your industry, what compels you to adopt storm drain BMPs, what obstacles and barriers should be changed so more auto repair shops will adopt Best Management Practices, what sources of information are trusted by shop owners/managers/staff, and what resources and outreach materials would benefit you and your shop.

Municipal storm drainage systems are designed to collect rainfall and release the runoff directly to local streams. As rainwater travels across parking areas and roads it picks up contaminants from anything that was spilled or leaked onto those areas. Pollution from these non-point sources is one of the biggest problems facing Greater Vancouver area streams and coastal waters. Preventing spills and leaks to paved areas through BMPs and good housekeeping is the most cost effective way to keep local streams clean and have a safe work environment.

I would like to invite you to participate in my research project and to have input in the development of education and communication resources that may be of assistance to your business in meeting any stormwater bylaws and/or regulations.

Following the interview I will show you some samples of existing stormwater outreach materials being used in the U.S. such as a poster, video, and a checklist tool for businesses. I will ask your opinion on the usefulness of these samples.

At the completion of the interview, in appreciation for your time, you will be offered a token gift card from a selection of popular businesses.

If you are willing to participate in the interview please review the attached Consent Letter and contact me at my email indicating your interest and so that I can arrange your interview. I will ask you to sign a copy of the Consent Letter at the time of the interview.

If you are not interested in participating, please email me at my email to ensure that no follow-up calls are made to you.
If you have any questions prior to deciding if you would like to participate, please don’t hesitate to contact me at my email or my phone #. If you would like to verify the authenticity of the research project, please contact my supervisor: Dr. Milt McClaren or the acting Program Head: Dr. Liza Ireland.

Thank you for considering this request to participate in the research.

Sincerely
Liz Freyman
Appendix B Participant Consent Forms

Stage 1 Consent Form for Industry Experts

This consent form is for participants in Liz Freyman’s Master thesis at Royal Roads University, titled: Stormwater Outreach to Business: User Engagement. The purpose of this project is to support automotive repair commercial businesses in adopting stormwater best management practices to protect water quality in local waterways.

Participant Involvement

Your involvement will include a one-on-one interview of approximately half-hour to an hour in length to be conducted at a time using either telephone or Skype via computer arranged for a time and place of your convenience. The topic to be discussed during this interview is what are the important issues I need to be aware of in developing interview questions at auto body and repair shops managers. I will transcribe your recommendations and use your information to develop an interview protocol for which I would like to obtain your feedback for final comment. The information you provide will be used towards the second part of my project that is to interview managers and/or staff of operating auto body and repair shops. My aim is to interview 2 expert advisors (yourself being one) followed by approximately 10 auto repair shops.

You will be sent a transcribed copy of the interview so that you may make any corrections or additions to the transcript.

Privacy and Confidentiality

As a participant in this research, your privacy, confidentiality and anonymity will be protected. With your permission, the one-on-one interview will be audio recorded and handwritten notes will also be taken. You have the right to decline electronic recording if you wish. Audio recordings will be stored on password protected flash drives that will not be shared with anyone besides my thesis supervisor, Dr. Milt McClaren and possibly myself. Your name and identity will not be used in any final documentation. Names will be altered through the use of pseudonyms. Handwritten notes and computer records will be stored in a locked cabinet. Audio files will be erased after they are transcribed. All data will be destroyed after the thesis is completed and accepted by the university.

All information provided by you will be treated confidentially. No names will appear in the final thesis report. With permission, however, anonymous quotations may be used. All electronic data generated through this study will be kept on external flash drives which will be kept in a locked cabinet in my home office. This data, along with any paper files including the checklist questions will be destroyed following the conclusion of the research and the acceptance of the final thesis report by the university.

You have the choice to participate and the right to withdraw at any time without prejudice. If you choose to withdraw from the study, any information you have provided to that date will be destroyed.

Final Report

The findings of this study will be published as a thesis at Royal Roads University. Identifying information of participants will not be included in the final report. Research findings will be shared with
any participants who express an interest in seeing it. The participants may also be exposed to any environmental education and outreach materials developed with or based on the information collected from this research.

If you have any questions prior to proceeding, or at any time, please don’t hesitate to contact me at: my email or call me at my phone #. If you would like to verify the authenticity of my research project, please contact my supervisor: Dr. Milt McClaren. You may also contact Dr. Liza Ireland, Acting Program Head for the Master of Arts in Environmental Education and Communications program at Royal Roads University.

Your reply to this emailed consent form with an “X” mark by the “YES, I am willing to participate…” section, serves to confirm your participation as a volunteer in this research study and indicates that you have read and understood the Project Information Letter about this study being conducted by Liz Freyman, Masters student at Royal Roads University. By replying and stating, “I agree to participate” and/or placing your “X” by the “Yes” below, you understand that your project involvement, your privacy and confidentiality will be protected and how the data collected will be used.

With full knowledge of all of the foregoing, you agree and understand that taking part in this study is entirely voluntary. You have the right to refuse to participate in this study. Regardless of choosing to participate, you understand that you may chose to leave the study at any time without providing reasons. Your “X” mark below indicates that you have received a copy of this consent form for your records. The mark indicates your consent to participate in this study.

I hereby consent to participate in the study: Stormwater Outreach to Business: User Engagement. Please check below if you are willing to participate and agree to the terms of this Consent, as outlined above and then return this email by Replying to: my email

(_____) YES, I am willing to participate in the Research described above and understand the conditions outlined in the Consent described above in this message.

Your name (please print): Date:
Preferred Contact information: Phone, email, Skype name, etc.
(_____) Check here if you’d like a copy of the final research report.

If you are NOT willing to participate in this research study, please check the box below and return this email by replying to: my email

(_____) NO, I am not able to participate in the Research described above in this message.
If you agree to participate, you should retain one copy of this message for your records. A second copy will be retained by the Researcher and held in secure storage.

By replying to this consent form, you are not waiving legal rights or releasing the Researcher or involved institution from their legal and professional responsibilities.
Stage 2 Consent Form for Auto Repair Businesses

CONSENT FORM – PLEASE SIGN

This consent form is for participants in Liz Freyman’s Masters thesis research at Royal Roads University, titled: Auto Repair Shops’ Perspectives on Storm Drain Protection Outreach. The purpose of the project is to support automotive repair commercial businesses in adopting storm drain Best Management Practices to protect water quality in local waterways.

Participant Involvement

Your involvement will include a one-on-one interview of approximately an hour in length at a time and location of your convenience, preferably at your shop.

You will be sent a transcribed copy of your interview so that you may make any corrections or additions to the transcript.

Privacy and Confidentiality

As a participant in this research, your privacy, confidentiality and anonymity will be protected. With your permission, the one-on-one interview will be audio recorded and hand written notes will also be taken. You have the right to decline electronic recording if you wish. Audio recordings will be stored on password protected flash drives that will not be shared with anyone besides myself and possibly my thesis supervisor, Dr. Milt McClaren. Your name and your shop’s identity will not be used in any final documentation. Names and locations will be altered with the use of pseudonyms. Hand written notes will be stored in a locked cabinet. Audio files will be erased after they are transcribed. All data will be destroyed after the thesis is completed and accepted by the university.

All information provided by you will be treated confidentially. No names will appear in the final report thesis. With permission, however, anonymous quotations may be used. All electronic data generated through this study will be destroyed following the conclusion of the research and the acceptance of the final thesis report by the university.

You have the choice to participate and the right to withdraw at any time without prejudice. If you choose to withdraw from the study, any information you have provided up to your withdrawal can only be used with your permission otherwise it will be destroyed.

Final Report

The findings of this study will be published as a thesis at Royal Roads University. Identifying information of participants will not be included in the final report.

If you have any questions prior to proceeding, or at any time, please don’t hesitate to contact me at: my email address or call me at my phone #. If you would like to verify the authenticity of my research project, please contact my supervisor: Dr. Milt McClaren. You may also contact Dr. Liza Ireland, Acting Program Head for the Master of Arts in Environmental Education and Communications program at Royal Roads University.
Your signature on this consent form serves to confirm your participation as a volunteer in this research study and indicates that you have read and understood the Project Information Letter about this study being conducted by Liz Freyman, Masters student at Royal Roads University. By signing below, you understand that your project involvement, your privacy and confidentiality will be protected and how the data collected will be used.

With full knowledge of all of the foregoing, you agree and understand that taking part in this study is entirely voluntary. You have the right to refuse to participate in this study. Regardless of choosing to participate, you understand that you may chose to leave the study at any time without providing reasons. The signature below indicates that you have received a copy of this consent form for your records. The signature indicates your consent to participate in this study.

**I hereby consent to participate in the study: Auto Repair Shops’ Perspectives on Storm Drain Protection Outreach**

Name of participant (please print)  Signature of Participant

_____ Check here if you’d like a copy of the final report.

Name of Researcher:  Signature of Researcher

Liz Freyman

Date:

As a participant, you will retain one signed copy for your records and the second signed copy will be retained by the Researcher and held in secure storage.

By signing this consent form, you are not waiving legal rights or releasing the Researcher or involved institution from their legal and professional responsibilities.

Please check which $25 gift card you would like to receive as a token of my appreciation for your time and I will mail it to you:

_____ Starbucks Coffee  _____ JJ Bean Coffee  _____ Tim Hortons

_____ Lordco Auto parts  _____ Napa Auto parts  _____ Rona Home Center

_____ The Home Depot
Appendix C Interview Questions

Stage 1 Initial Telephone Contact and Telephone Interview Script

Initial Telephone Contact
Hello, my name is Liz Freyman and I am a student from Royal Roads University. I’m enrolled in the Environmental Education and Communications program and am currently doing a Masters thesis project.

The purpose of my project is to support automotive repair and body shops in safe handling of potentially hazardous materials and in meeting any bylaw or regulatory requirements for adopting stormwater Best Management Practices. The project will develop an understanding of what sort of education and communication resources could assist businesses with liquid waste material management.

I would like to invite you to participate in my research project as an expert advisor to describe the work-flow processes, identify critical issues and help me develop the right interview questions for auto body and repair shop managers. Your information will be used towards the second part of my project that is to interview managers and/or staff of existing operational auto body and repair shops. My aim is to interview 2 expert advisors (yourself being one) followed by approximately 10 auto repair shops. You would be helping me develop the right questions that take into account the perspectives of someone working on the shop floor.

I am inviting you to participate in a one-on-one interview of approximately half-hour to an hour in length and at a date and time to be arranged for your convenience. Your participation is totally voluntary and if at any time you wish to withdraw you may do so without providing me a reason.

The purpose of my interview with you will be to help identify key topics or questions for inclusion in a series of interviews with Repair Shop/Autobody shop owners or managers concerning the control and handling of potentially toxic or environmentally hazardous liquid wastes. With your permission I will audio record the interview, transcribe the recording, and send the transcript back to you for any changes or additions. The interviews can be conducted by telephone or by Skype. If you wish, I can send you my interview questions ahead of time to allow you some time to reflect on your answers before the interview.

The findings of this study will be published as a thesis at Royal Roads University. Research findings will be shared with you if you have an interest in seeing it. You may also be exposed to any environmental education and outreach materials developed with or based on the information collected from this research.

Your name and identity will not be used in any final documentation and any notes and recordings will be destroyed at the completion of this project.

Do you have any questions for me before proceeding further?

I can provide you the name and contact information of my project supervisor and program head.

If you agree to participate, I will forward a project information letter and consent form via email. I request you reply to this emailed consent form stating “I agree to participate” and/or placing your “X”
by the “Yes” below with an “X” mark by the “YES, I am willing to participate…” section which serves to confirm your participation as a volunteer in this research study and indicates that you have read and understood the Project Information Letter.

Your willingness to participate is greatly valued.

Telephone Interview Script
Preamble: I am looking to you to help me better understand and appreciate the processes, stresses, and challenges of auto repair and body shops. The second part of my thesis project will involve interviewing several active shop managers or staff and I want to make sure the questions I ask them are the right ones with the appropriate terminology and approach.
1. In order to better understand auto repair shop managers and staff perspectives, I would like to hear from you about shop work-flow processes especially how they relate to dealing with hazardous liquids, petroleum and oils.
2. Are there any critical issues that I should be aware of?
3. Can you help me develop the right interview questions for auto body and repair shop managers that will answer my research questions:
   b. What communication and education resources do automotive repair shop staffs need to assist them in adopting Stormwater Best Management Practices?
   c. What design criteria need to be considered for communication and education resources to maximize stormwater awareness and adoption of BMPs by the automotive repair industry?
4. If you prefer, I have some preliminary questions drafted that you can review and provide feedback.
   Thank you very much for your assistance.

Stage 2 Interview Questions
Hello, thank you for your time today. I am seeking your expertise and knowledge concerning the management of liquid wastes from within the auto repair & refinishing industry. I will outline the problem and explain why talking to you is important and why I am seeking your help.

The Problem
The municipal storm drainage system is designed to collect rain and release it directly to local streams. As rainwater travels across parking areas and roads it picks up contaminants from anything that was spilled or leaked onto those areas. Washing down work areas with a hose can also cause pollution to local waterways. Preventing spills and leaks to paved areas through BMPs and good housekeeping is the most cost effective way to keep local streams clean and have a safe work environment.

There is a need to address all the various potential sources of pollutants but it is impractical to reach all commercial & industrial sectors face-to-face. Rather than rely on enforcement of regulations, public agencies, such the Ministry of Environment, are turning to education and outreach campaigns to promote awareness of the problem and motivate residential and commercial industry sectors to comply with Storm Drain Best Management Practices.

My goal is to reach out to commercial sectors through outreach and educational materials that
provide relevant information in easy-to-understand formats that will encourage commercial businesses to apply Best Management Practices for hazardous materials that are potential contaminants in run off water to storm drains. The automotive repair sector is one of the fifteen sectors identified for this program so you are not being singled out.

**What the research is not**

We are seeking your cooperation and advice and we want to understand where you are coming from. I am NOT evaluating you and your shop and I am not here to enforce any environmental regulations or bylaws. I want you to feel comfortable and free to be candid. You are also not being evaluated for not knowing an answer to any of the interview questions—this is not a test. Following the interview, you will have an opportunity to provide more comments in writing if you wish.

**How you can help**

You can help me by answering the following questions. Please add anything else that you think is relevant. We want any education and outreach tools to be useful and meaningful to you and your industry….basically if you were to design environmental education and outreach materials for all your shop colleagues, how would YOU do it?

Your participation is completely anonymous and participants’ names will be removed from any information used in this study i.e. any quotes used will be under pseudonyms. Note that shop names will also be changed and any identifying information like the name and location of the shop will not be included.

**Question #1**

a) What are your current sources of information regarding materials handling?

b) What sources of new information about handling liquid waste are the most respected and useful for you? Why do you find these sources to be most useful?

c) What training does your staff get in handling liquids and other hazardous materials? Do all suppliers provide training for the use and safe handling of their products?

d) For example are publications like “Car Care Business Canada” magazine or from the Automotive Industries Association of Canada useful and respected in your shop?

**Question #2**

What motivated you to adopt BMPs or what systems do you need in order to adopt Best Management Practices (BMPs) and/or apply a dry shop status? For example: is there a need for more oil recycling companies, green product suppliers, etc?

**Question #3**

In your opinion, what current barriers or obstacles exist for your shop in meeting hazardous material BMPs? Are there things that “bug” you about the current situation, regulations, and information? What could be done better?

**Question #4**

What do you think is the overall level of knowledge & understanding of storm drain Best Management Practices throughout the auto repair sector in greater Vancouver? Are “dry” shop methods being adopted here? Why or why not?
Question #5
Should your supporting businesses and suppliers be included in any education and outreach? For example: hazardous material transport companies, oil recycling companies, product suppliers, etc.

Question #6
a) Would incentives be useful? What approach should we take in developing incentives? For Auto body shops: Should we work with accreditation organizations such as ICBC?

b) Would local government endorsement or certification recognition be valued?

Question #7
Environmental Regulators and local governments are interested in reaching out to commercial sectors via Internet tools (email, WWW sites, FaceBook, etc.) because it is impractical to have one-on-one personal outreach to every commercial business in Greater Vancouver. What should to be included in an Internet tool to maximize storm drain water awareness and adoption of BMPs by auto repair shops in this region? What motivates shops to be adopters and or even promoters of BMPS among the auto body/repair industry?

Question #8
What approach do you think accreditors, regulators, drainage utilities or environmental agencies should take to encourage widespread adoption of stormwater BMPs? Is there a role for industry?

SAMPLE OUTREACH PRODUCTS

I would highly value your feedback on whether the following sample outreach materials would be useful to you and/or your industry. I’m interested in your opinion not only on the content but also the design, graphics, look and feel of the material in terms of whether it would hold your attention and compel you to adopt optimal storm drain water BMPs. Your views and opinions will be very valuable and greatly appreciated.

**Example #1:**
Please look at this online self-assessment tool and provide your opinion on the usefulness of this tool. We can go through this together, not to rate your shop but as an example of whether the content and format would be useful for you:


(Permission granted February 24, 2014)

<table>
<thead>
<tr>
<th>Question</th>
<th>Comments, suggestions, opinions on the online Stormwater Best Management Practices Self-Assessment Tool for Automotive Repair Businesses</th>
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<tbody>
<tr>
<td>E.g.:</td>
<td>what did you think of the introductory video?</td>
</tr>
<tr>
<td></td>
<td>Was the underground stormwater infrastructure diagram useful to you?</td>
</tr>
<tr>
<td></td>
<td>Is the content informative?</td>
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<tr>
<td></td>
<td>Is the “look and feel” of this tool meaningful to you?</td>
</tr>
</tbody>
</table>

**Example #2:**
Please describe how useful you would feel an ecological certification/accreditation program would be to the auto service industry?

E.g. from Portland, Oregon EcoBiz Program: [http://www.ecobiz.org/automain.htm](http://www.ecobiz.org/automain.htm)
AUTO REPAIR SHOPS’ PERSPECTIVES ON STORM DRAIN PROTECTION

(Permission City of Portland – permission granted February 24, 2014)

<table>
<thead>
<tr>
<th>Usefulness</th>
</tr>
</thead>
</table>

**Example #3:**

Please describe how useful this video would be to you:


(Permission Seattle Public Utilities Commission & Washington Department of Ecology – Copyright permission not required if the material on the Web sites is intended for users’ educational or research purposes)

<table>
<thead>
<tr>
<th>Usefulness</th>
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</table>

**Example #4:**

Please describe whether the following poster could be useful for you and your business.

(Permission Washington Department of Ecology permission not required if the material on the Web sites is intended for users’ educational or research purposes –)

**Comments:**

![Image of a poster]
**Example #5:**

*Please rate the following components of other possible stormwater education and communication resources that could benefit you and your industry:*

- ☑️ = most useful
- ☐️ = somewhat useful
- ☐️ = not useful

<table>
<thead>
<tr>
<th>Component</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Wall Posters Outlining BMPs for hanging in your shop</td>
<td></td>
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<tr>
<td>Calendar format posters outlining BMPs for hanging in your shop</td>
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<td>Laminated instruction sheet to include in a visible area for shop staff</td>
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<td>or on tool boxes</td>
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<tr>
<td>Checklist to do self-assessment audit of your business</td>
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<td>Education and training through the internet</td>
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<td>On site training</td>
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<td>Translated materials, please include which languages</td>
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<tr>
<td>Incentives such as window stickers communicating to your customers</td>
<td></td>
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<tr>
<td>about your BMPs to protect local streams</td>
<td></td>
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<tr>
<td>Automotive training programs to include stormwater BMPs in the curriculum</td>
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<td>DVD with video clips on practices and procedures</td>
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<td>List of hazardous waste haulers</td>
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<td>Spill kit</td>
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<td>Emergency storm drain covers</td>
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<td>Storm drain markers</td>
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<td>ICBC/BCAA accreditation or endorsement</td>
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<td>*Add your own</td>
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<td>*Add your own</td>
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</table>

**Additional comments, suggestions, opinions on any support and/or resources that would be useful to you and automotive repair businesses in general**

Appendix D: Stormwater Best Management Practices and Outreach Materials

Stormwater outreach products designed specifically for automotive repair businesses:

Portland Oregon [http://www.ecobiz.org/](http://www.ecobiz.org/), and Auto Service checklist: [http://www.ecobiz.org/automain.htm](http://www.ecobiz.org/automain.htm). This Accreditation program was used as an example in this research where participants were asked to provide their opinions and comment on the suitability of such a program for their industry in the Metro Vancouver area. (Copyright permission to include this material in this thesis was granted February 24, 2014).

Burrard Inlet Pilot Stormwater BMP Self-Assessment Tool for the auto repair sector; developed by the Burrard Inlet Environmental Action Program (BIEAP): [http://www.surveygizmo.com/s3/970078/BIEAP-Stormwater-Management-Self-Assessment-Tool-Auto-Repair-and-Body-Shops](http://www.surveygizmo.com/s3/970078/BIEAP-Stormwater-Management-Self-Assessment-Tool-Auto-Repair-and-Body-Shops). This draft accreditation program was used as an example in this research where participants were asked to provide their opinions and comment on the suitability of such a program for their industry in the Metro Vancouver area. (Copyright permission to include this material in this thesis was granted February 24, 2014).

Kitsap County auto shop outreach poster and focus group stormwater education pilot campaign evaluation report: [http://www.ecy.wa.gov/programs/wq/stormwater/municipal/resources/PERMITTEEproducts.html](http://www.ecy.wa.gov/programs/wq/stormwater/municipal/resources/PERMITTEEproducts.html). This poster was rated the most popular in focus studies with automotive repair shops in Washington State. It was developed in partial fulfillment of the National Pollutant Discharge program requirements by the Washington State Department of Ecology. Its intended use is for widespread distribution throughout the automotive repair sector. This poster was used as sample outreach material in this study. (Copyright Washington Department of Ecology - permission not required if the Material on the Web sites is intended for users' educational or research purposes)

Arizona Green Business Automotive program: [http://www.azdeq.gov/function/programs/greenauto/index.html](http://www.azdeq.gov/function/programs/greenauto/index.html). ADEQ has partnered with Automotive Service Association of Arizona and the City of Mesa to certify auto repair shops under the Arizona Green Business Program. The scope of this program includes not only Pollution Prevention (P2) activities, but also Resource Conservation (energy, water and recycling) efforts. This voluntary program gives automotive service facilities an opportunity to promote an environmentally friendly approach to car repair. "Green" automotive shops set high standards for pollution prevention and resource conservation. Automotive facilities that receive the Arizona Green Business certification can display a sign with the Green Business logo, showing customers that they are doing their part to protect - and clean up our environment. (Copyright permission granted August 6, 2014.)

Coordinating Committee for Automotive Repair (CCAR - GreenLink©)


Capital Regional District Source Control Program, British Columbia, Automotive Repair Code of practice. Includes all collision and mechanical repair shops, boat motor repair shops, service stations, oil change, auto detailing and engine washing stations, vehicle dealerships and recycling operations: [https://www.crd.bc.ca/service/sewers-wastewater-septic/commercial-wastewater-stormwater/dealing-](https://www.crd.bc.ca/service/sewers-wastewater-septic/commercial-wastewater-stormwater/dealing-)
The Automotive Repair Code of Practice is a regulation for managing the proper disposal and containment of automotive wastes such as petroleum products; also regulated are heavy metals and wastes such as grit and sand. It is a mandatory requirement for automotive and small engine repair businesses in the Region. (Copyright Capital Regional District – permission granted August 13, 2014).

City of Richmond, B.C., auto repair shop poster: http://www.richmond.ca/sustainability/environment/stormwater.htm The city of Richmond created and posted online a series of brochures highlighting best management practices for industries that have been common contributors to stormwater contamination such as auto repair shops, food processing, concrete, stone and tile industries.

(Copyright City of Richmond – permission pending)