dhm RESEARCH
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February 4, 2014

TO: Oregon Association of Clean Water Agencies (ACWA)
FROM: DHM Research
SUBJ: Research summary about stormwater behavior

1 | INTRODUCTION

This summary and observations document is a high-level analysis of public attitudes and priorities about stormwater in Oregon. The focus is on residential customers and the general population. A few national studies are included to add perspective on the issue. The objective of this summary is to provide added context and inform and/or validate existing information, especially as the Oregon Association of Clean Water Agencies (ACWA) interacts with the public.

Much of the information is developed from recent research conducted by ACWA members, related work by DHM Research, and select national studies conducted on relevant topics. Attempts were made to include a geographically diverse set of research to review. Where data exists at the state level and at a city level, the report provides these for comparisons. Much of the existing research in Oregon has been conducted in the state's population centers and specifically the Portland Metro area. Thus, the results in this report have an urban bias, which should be taken into account. However, although water resources and quality are highly localized, much of the general public's knowledge and values about water are independent of geography.

The summary is grouped into five main areas:

1) **Values** – what do Oregonians value in general, and how does it relate to stormwater
2) **Behaviors** – what are the key behaviors of the public that impact stormwater; what are the emerging issues
3) **Barriers, motivations, messaging** – what are the barriers and motivations to behavior change
4) **Media review** – how is stormwater covered in the media
5) **Gaps in research** – where are the gaps, if any, in existing research

Any observations and recommendations are general guidelines and specific to Oregon; while much of the advice may apply outside of the state, it would be wise to conduct independent research to test their effectiveness in other areas.

Research sources reviewed include the list below. A more detailed listing of research provided to DHM by ACWA members and a discussion of methodology is found at the end of this summary.

1. Bend Community Survey (2007)
2. Bend Environmental Issues Survey (1999)
3. Clackamas County Water Environment Services Survey (2006)
4. Clark County Stormwater Research (2012)
5. Clean Water Services Customer Service Surveys (2002, 2006, 2008, 2010, 2012)
6. Clean Water Services Stream Habits Survey (2002)
7. Clean Water Services Stormwater Survey (2012)
8. Clean Water Services Customer Values Survey (2013)
9. Earthfix Survey (2012)
10. Eugene Stormwater Management Survey (2013)
11. Gresham Lawn Care Pre and Post Surveys (2007, 2009)
12. Gresham Stormwater Survey (2008)
13. Hillsboro Water Supply Residential Customer Focus Groups (2010, 2011)
14. Keizer Community Survey (2011)
15. Lake Oswego-Tigard Water Partnership Focus Groups (2010)
16. Lake Oswego Community Survey (2013)
17. Metro Household Hazardous Products Survey (2007)
18. Metro Toxic Reduction Focus Group (2009)
19. Metro Sustainable Living Survey (2012)
20. Oak Lodge Satisfaction Survey (2012)
21. Oregon Department of Environmental Quality Household Hazardous Waste Survey (2008)
22. Oregon Forests Research Institute/Oregon Department of Forestry Forest Values and Beliefs Survey (2010)
23. Oregon Values and Beliefs Study (2013)
24. Portland Bureau of Environmental Services Surveys (1999, 2005)
25. Portland City Community Surveys (2011, 2012)
26. Puget Sound Partnership Survey (2011)
27. Regional Coalition for Clean Rivers and Streams (2011)
28. Rogue Valley Sewer Services Public Education Survey (2012, 2013)

National Sources used for Reference:

1. Environmental Protection Agency National Menu of Best Management Practices and website (http://cfpub.epa.gov/npdes/home.cfm?program_id=6)
2. American Veterinary Medical Association pet ownership statistics (https://www.avma.org/KB/Resources/Statistics/Pages/Market-research-statistics-US-Pet-Ownership-Demographics-Sourcebook.aspx)
3. Killmuss, Anja and Angyeman, Julian. 2002. Mind The Gap: Why Do People Act Environmentally And What Are The Barriers To Pro-Environmental Behavior? *Environmental Education Research.* 8(3): 240-260
4. 2012 Value of Water Index: Americans on the U.S. Water Crisis, Xylem Inc. (http://www.xyleminc.com/valueofwater/)
5. Stormwater Pollution Prevention Behavior of Corvallis Residents, Oregon State University, 2010 (http://www.corvallisoregon.gov/modules/showdocument.aspx?documentid=4617)
6. Stormwater Knowledge, Attitude and Behaviors: A 2005 Survey of North Carolina Residents, Chrystal Barlett (http://www.ncstormwater.org/pdfs/stormwater_survey_12506.pdf)
7. Universities Council on Water Resources Journal survey on public perception of stormwater, 2010 (http://ucowr.org/issue-146/survey-says-implications-of-a-public-perception-survey-on-stormwater-education-programming)
8. *Stormwater Monitoring and Resident Behavior in a Semi-Arid Region*, 2011. (http://www.joe.org/joe/2011april/a8.php)
9. Understanding Watershed Behavior, *Watershed Protection Techniques*, 3(3): 671-679. (http://www.northinlet.sc.edu/training/media/resources/Understanding%20Watershed%20Behavior.pdf)
10. Stormwater Runoff: Pierce County Public Attitudes, Awareness and Behavior, 2009. (http://www.ci.sumner.wa.us/Documents/Public%20Works/Stormwater/09_B.pdf)
11. Water Pollution in Puget Sound: A compilation of Public Opinion. 2004-2009. (http://www.mypugetsound.net/index.php?option=com_mtree&task=att_download&link_id=126&cf_id=24)
12. Residential Car Washwater Monitoring Study, 2009. (http://www.ecy.wa.gov/programs/wq/stormwater/municipal/MUNIdocs/2009FWCarWashwaterMonitoringStudyRev1.pdf)
13. Oregon Department of Environmental Quality Household Hazardous Waste Survey, 2008. Portland State University Survey Research Lab. http://www.deq.state.or.us/lq/pubs/docs/sw/hhw/HHWSurveyResultsCompleteReport.pdf

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City of Portland
City of Salem
City of Springfield
City of West Linn
City of Wilsonville
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Clean Water Services
Multnomah County
Oak Lodge Sanitary District
Oregon Association of Clean Water Services
Port of Portland
Rouge Valley Sanitary Services
Surface Water Management Agency of Clackamas County

3 | SUMMARY AND OBSERVATIONS

Oregonians place a high value on the environment and natural beauty of the state, especially as it relates to water.

- DHM Research's 2013 Values and Beliefs study found the features that Oregonians most value about the state are its beauty and scenery, weather and climate, outdoor recreation, and its forest and trees.
- Other statewide surveys have consistently shown that Oregonians are concerned about, and prioritize, protecting water.

Protecting *drinking water* is the most paramount water issue for Oregonians.

- Other issues are important, but secondary. They include, water as a source of fish and wildlife habitat, irrigation for agricultural, and recreational opportunities.

Oregonians have limited knowledge and awareness of stormwater.

- Their low level of awareness means that the average person does not have a well-developed understanding of the relationship between drinking, sewer and stormwater.
- Nationally, more than three-fourths do not believe that stormwater runoff is the largest source of water pollution. Rather, a majority believe that industry is the largest source of water pollution.

Individual perceptions and behaviors related to stormwater are specific to the source, and need to be addressed as such. For example:

- Pet waste: while most pet owners pick up their pet waste when out in the community, just one-quarter pick it up on a daily basis at home and one-third pick it up once a week or less. Many simply don't believe it is impactful on water.
- Car washing: evidence suggests that most car owners wash their car at home rather than at a commercial carwash because they perceive it as cheaper, less likely to damage the car, and more effective.
- Lawn and garden care: decisions about lawn and garden care are strongly influenced by cultural values and community standards. There is also a common assumption that if a product sold at a local home and garden store, than it must be safe to use.

Motivations to change stormwater behavior should be connected to other important values. For example:

- Drinking water: draw a connection between stormwater runoff and the quality and safety of drinking water.
- Children and pets: survey and focus group research has consistently shown that the safety of children and pets ranks in the top tier of concern for the use of chemical products in lawns, gardens, and in the home. This is particularly true with women.
- Saving money and discounts: for a segment of consumers, saving money is strong motivator. To change behavior, however, consumers must feel that that they are not sacrificing effectiveness or convenience.
- Natural areas, wildlife habitats, green spaces and outdoor recreation: Oregonians place a high value on the environment and enjoying outdoor recreational opportunities. When possible, link stormwater projects to these key values.

Other considerations for messaging

- Consider mothers as messengers to target the strongest base of supporters – females, Democrats, and people with higher education/income. Other research also shows that women are strong messengers, often the most effective messengers, around improving the health of families.
- Partner with community organizations, small businesses, retailers, and university experts as spokespeople around preferred stormwater behaviors. They are often better messengers than government, environmental groups, and utilities that may be viewed by the public with skepticism.
- Use a positive tone and focus on outcomes. This is more easily understood and resonates with the public. It also communicates a message that there is a plan for the future.
- Suggest simple steps to behavior change and be specific.

4 | VALUES

4.1 | General values in Oregon

Oregonians place high value on the natural beauty of our state, outdoor recreation opportunities, and clean air and water. Residents across the state, whether living in Bend or Portland, place similar importance to the natural beauty of Oregon. DHM's recent study on Oregonian's Values & Beliefs (2013) found people value most about living in Oregon (in this order):

1. **Beauty and scenery**
2. **Weather and climate**
3. **Sense of community**
4. **Outdoors and outdoor activities**
5. **Forests and trees**
6. **Ocean and easy access**
7. **Nature**
8. **Mountains and easy access**

These values are consistent across all areas of the state. The order may vary slightly from one region to another – for instance, people in Central Oregon may place greater emphasis on outdoor activities – but the general list is the same across the Metro area, Valley, Central, Eastern, or Southern Oregon.

Water can be linked to almost all of these key values. ACWA has the rare opportunity to connect to what Oregonians value most about their state. Public outreach should include references to how water, particularly stormwater, connects people to these key values about Oregon.

During economic downturns, values around water and the environment in general can easily get lost with pressing issues facing the state and national concerns.

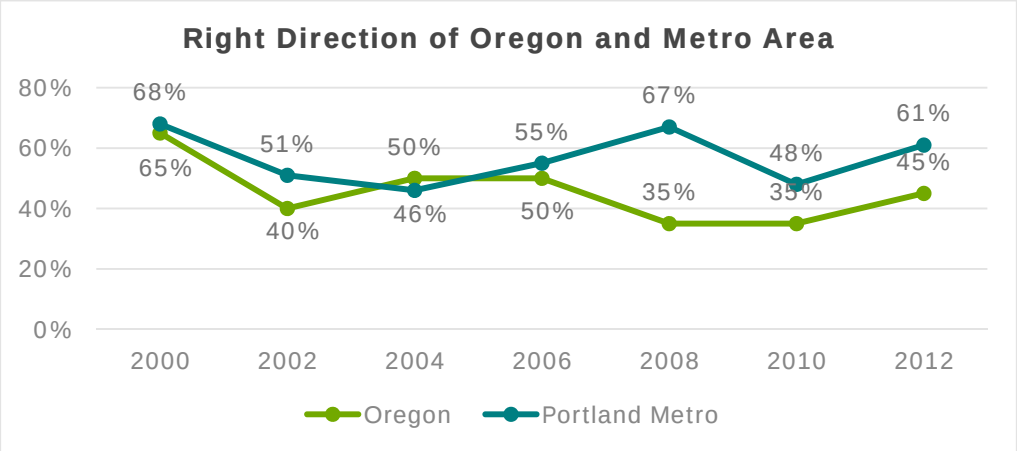
Most Important Issues in Oregon

Before recession (2007 and earlier)	During recession (2008 to today)
Public education	Jobs / economy
Healthcare	Public education
Taxes / government spending	Healthcare
Environment	Government waste

Environmental issues, including water quality, have taken a back seat to what residents consider higher priorities – the economy, unemployment, public education, healthcare, and government waste. However, Oregonians clearly value a healthy environment. In the Oregon Values and Beliefs Survey, Oregonians mention **environmental awareness** as the number one reason Oregon will be a better

place to live in 10 years (24%), even ahead of a stronger economy and economic growth (18%).

The public mood, as framed by whether people believe we are heading in the "right direction," shows that Oregonians continue to be pessimistic about the direction of the state, although recent numbers show some improvement.



Source: DHM Research

When right direction numbers are higher (60%+), the public expresses heightened awareness and concern for environmental issues, including water. In other words, when the public mood is more optimistic Oregonians care more about issues that affect the environment. Current right direction numbers hover around 45% across Oregon. As we would expect, then, residents express greater concern about the economy and less concern about the environment, and much less concern about stormwater issues. In the Portland Metro area, right direction numbers are closer to 60%. Residents in the Portland area are more likely to have a heightened awareness and sensitivity to environmental issues, including issues about stormwater. Portland residents are frequently more optimistic than other areas of the state, with lower unemployment, more job opportunities, and a larger population of younger residents who are generally more upbeat.

Public pessimism creates sensitivities for communications and public outreach. This applies particularly to the government or messengers that are linked to government. Many national and state surveys show that trust in government is declining and is at an all-time low. Thus, any outreach may be viewed with skepticism. Public outreach about stormwater would benefit from making the connection to what Oregonians value about their state – beauty, nature, outdoors – in order to resonate more strongly with the public.

4.2 | Top water values in Oregon

Water is highly valued by Oregonians. The quality of water is of high concern, especially in the context of drinking water.

90%+ are very and somewhat concerned about water quality (ODF, 2013)
75%+ believe it is very and somewhat important to fund protection of water and air quality (Oregon Values and Beliefs, 2013)
70% worry most about quality of drinking water and the health of rivers and streams, compared to 10% for industrial pollution and 5% for agricultural pollution (Earthfix, 2012)
47% value their local rivers most for a source for drinking water, followed by 19% who value rivers as a habitat for fish and wildlife (CWS, 2013)

Drinking water. People place a higher value on water issues that impact directly household activities, such as access to clean and good tasting tap water or sufficient supply of water for home and lawn use, than on overarching concerns for the water system or infrastructure. Water is most highly valued as a source for drinking water, as seen in a recent Clean Water Services study and across other local and national studies.

Water Values

Values about rivers and streams	Most important
Source for drinking water (current and future supply)	47%
Habitat for fish and wildlife	19%
Indicator of a healthy environment	14%
Natural beauty and open space	7%
Source of water for farming and agriculture	5%
Natural areas for recreation activities (fishing, hiking, swimming, paddling, bird watching, etc.)	5%
Drain away rain water	3%
Other	0%
Don't know	1%

Source: CWS, 2013

Women in particular have a tendency to rate water quality as a higher priority, which ultimately connects them to issues that impact drinking water. In general, women are consistently more concerned with environmental issues than men. People living near a river or stream also evidence greater connection and

awareness about water issues than those who are “non-streamside” residents (CWS, 2013).

Habitat for fish and wildlife. Another top-tier water value is the protection of habitat for fish and wildlife. Focus groups have shown that residents in the region link the well-being of fish and wildlife in rivers and streams to the quality of water – if fish and wildlife are thriving then rivers and streams must be clean and healthy. Not surprisingly, streamside residents rank the importance of habitat for fish and wildlife higher than non-streamside residents (CWS, 2013).

> **93% +** support improving flow of water to support fish, wildlife and water quality (CWS, 2013)
> **90% +** agree that native fish are an asset to Portland (Portland BES, 1999)
> **70% +** consider the Tualatin River important as a habitat for fish and wildlife (CWS, 2013)
> **7.9 mean** out of 10-point scale on importance of restoring healthy salmon runs (Clark County Environmental Issues, 1999)

Many residents have at least a basic understanding of the potential impact they have on water quality which impact habitat for fish and wildlife. In a recent survey of residents in Clackamas, Clark, Multnomah, and Washington counties, 54% feel “somewhat informed” about what they can do to maintain the health and water quality of local rivers and streams and 20% feel “very informed” (Regional Coalition of Clean Rivers and Streams, 2011). However, over 25% are not informed or report that they didn’t know.

Little research examines public awareness about declines in number of fish and health of habitats. Residents seem to make a connection to less personal behaviors; when asked specifically about reasons for declines in salmon runs, 38% said it’s due to overfishing and 36% said from water pollution generally, without being able to identify a primary source. This is compared to 6% who specifically identify of runoff from homes and other human activities.

Other water values. Second tier water values that are important to residents include public health, recreation, and natural areas. Because this summary is focused on stormwater, our analysis will not explore these second tier values as related to water in general. Instead, these same values are linked to stormwater issues and are addressed later in this report under motivations for stormwater behavior change.

5 | STORMWATER

5.1 | Stormwater awareness

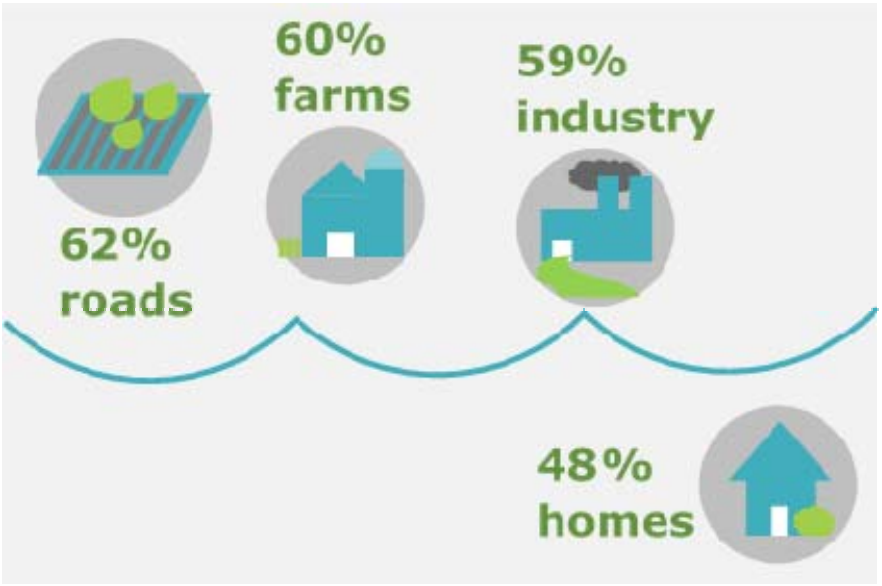
Residents in Oregon believe the greatest source of pollution in rivers and streams is:

a. Stormwater runoff from roads and hard surfaces
b. Factories and industry dumping waste
c. Farming and agricultural products from fields
d. Untreated sewage dumped into waterways
e. Discharge from sewage treatment plants

An EPA report shows 78% of the American public does not understand that stormwater runoff is now the most common source of water pollution and nearly half of Americans believe industry is the problem (EPA, 2009).

From a study conducted with residents in Oregon, Idaho, and Washington, at least 60% believe the most likely causes of water pollution are runoff from roads, pollution from industry, and chemicals from farms and agriculture (Earthfix, 2012). The perception of pollution from sewage is much higher in Oregon (60%) than in Washington (50%) or Idaho (30%). A majority of residents are uncertain or believe only a little pollution comes from households through the use of chemicals on lawns and gardens or from personal products like laundry detergent or prescription drugs.

Perceived Causes of Water Pollution in Pacific NW

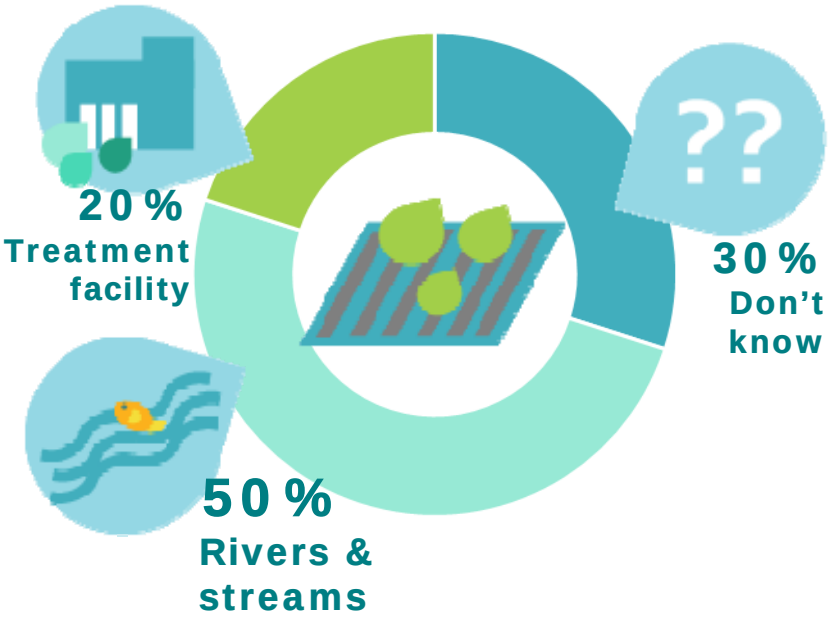


Source: Earthfix, 2012

In the Pacific Northwest, a recent Puget Sound study found 67% don't believe *fertilizers, oil, and other contaminants running off yards and streets* is the greatest source of water pollution in the sound. Instead, most cite industrial discharge, development, sewage treatment plants or other reasons, and about 25% report they don't know (Puget Sound Partnership, 2011).

People show uncertainty or general lack of knowledge regarding what happens to stormwater when it enters storm drains. For example, in Portland metro survey about one-third of residents said they aren't sure of the destination of their stormwater runoff. Inconsistent methodology across research studies makes it difficult to determine more detailed trends in awareness about stormwater, however, in focus group research that DHM has conducted, it has often been the case that people make assumptions about their water but when pressed they are not confident in their assertions.

Perceived Destination of Stormwater Runoff



Source: EPA, 2009, various studies

5.2 | Stormwater behaviors

We reviewed multiple regional, statewide, and national studies carried out from 1999 to 2013 in order to identify personal behavior related to stormwater runoff in Oregon. The specific stormwater behaviors can be grouped into four key areas:

1. Pet care
2. Car care
3. Lawn and garden care
4. Home care

Pet care

An EPA report in 2009 reported that residents do not recognize the extent to which pet waste is a threat to water quality. According to the U.S. Pet Ownership & Demographics Sourcebook (2012), Oregon has one of the highest pet ownership rates in the country at 64%. While it is difficult to accurately report the local percentage, a 2011 Regional Coalition for Clean Rivers and Streams study found that 40%+ of respondents in Clackamas, Clark, Multnomah, and Washington counties own a dog. In Gresham, dog ownership ranges from 21% of streamside renters (Gresham Stormwater Survey, 2008) to 59% of lawn-owning individuals (Gresham Lawn Care Behavior Surveys, 2007, 2009).

People are more likely to immediately pick up their pet waste when walking their dogs compared to when dogs are let out in a yard. When walking their dog, upwards of 90% pick up pet waste immediately. Only 2% of dog owners in Gresham who take their dog to the park report not picking up after them (Gresham Stormwater Survey, 2008).

The rate of pick up drops when compared to what happens at home: only one quarter (26%) pick up pet waste in their yards regularly (daily), another quarter pick up every 2-3 days, and a third pick up once a week or a couple times each month (Regional Coalition of Clean Rivers and Streams, 2011). Overall, 21% of Gresham dog owners report never taking their dog on walks or to the park (Gresham Stormwater Survey, 2008).

A study in nearby Pierce County, Washington (2009) showed “proper behavior” (picking up droppings, bagging, and placing in the trash) was more common in cities than in unincorporated areas (44% vs. 26%).

Picking up Pet Waste in Oregon

Source: Regional Coalition of Clean Rivers and Streams, 2011

Top reasons for not picking up after pets include inconvenience and unpleasantness. Incentives for picking up more often were:

1) free collection device (scoopers or bags)
2) monetary fine
3) health of family and pets

In Gresham, 35% of dog owners going to the park use the available dog bag dispensers, suggesting that the convenience of city-provided dispensers plays an important role in whether pet owners pick up after pets. Usage varies widely across demographic groups, however, from over six in ten renters to four in ten non-streamside homeowners and two in ten streamside homeowners (Gresham Stormwater Survey, 2008).

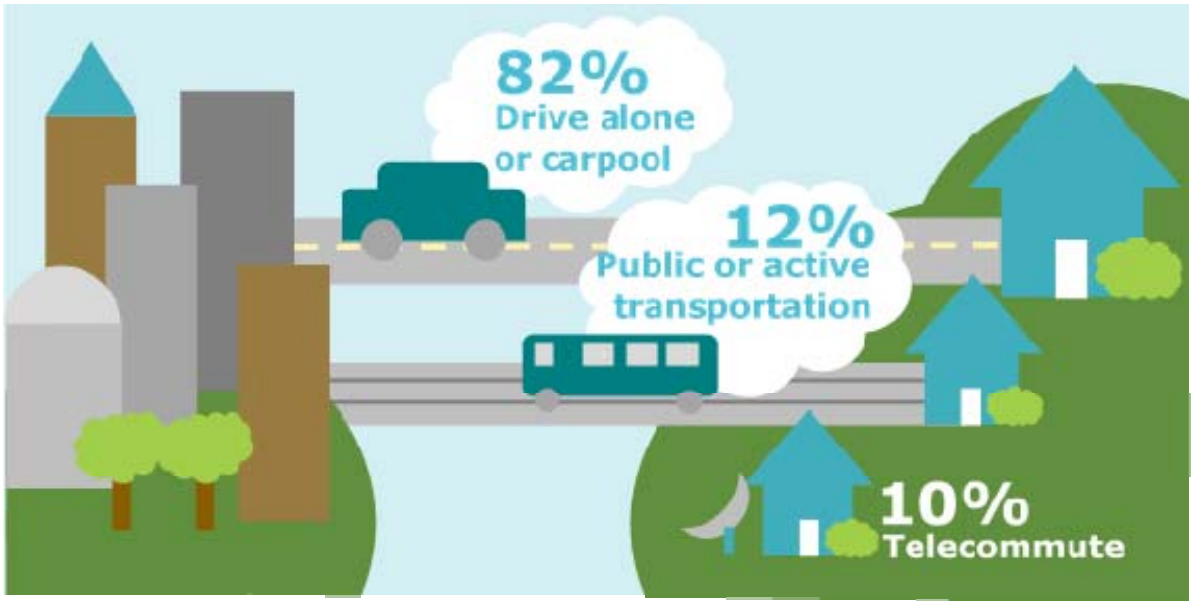
Residents do not automatically make the connection between improved water quality or household health and picking up pet waste. General values around water are not top of mind for this specific behavior (Regional Coalition of Clean Rivers and Streams, 2011). Any public outreach and communications to change behavior will require connecting the dots to water values, providing a clear message about picking up pet waste and the connection to improved water quality.

Car care

Most of the research on car care involves hazardous materials on impervious surfaces or materials washed directly into storm drains. Common activities that contribute to stormwater runoff include vehicle washing and maintenance. We discuss how these individual behaviors and general trends in car usage affect stormwater issues.

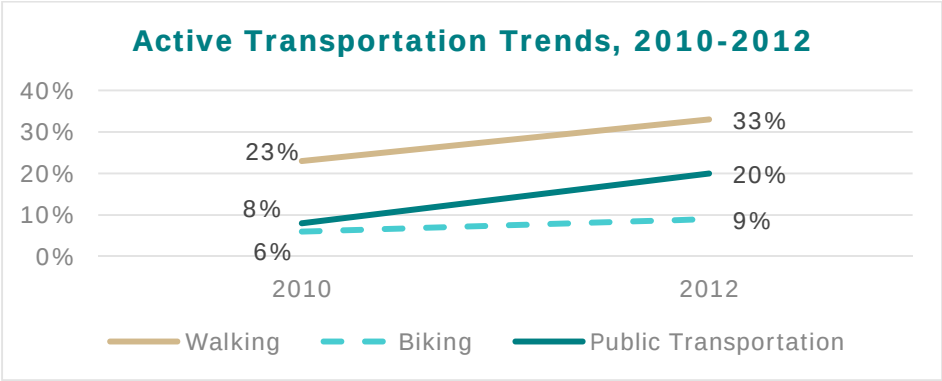
Cars are still the most frequent mode of transportation in Oregon with 82% driving alone or choosing carpool to get to work or school, and about 12% using alternative modes like public transportation.

Modes of Transportation in Oregon



Source: US Census, 2012

Transportation patterns are similar across the country and there is evidence that use of alternative modes of transportation is increasing. A recent telephone survey of Metro area residents conducted for Metro Regional Transportation Options showed an increase from 2010 figures in the number of people walking, using transit, and biking at least weekly as a form of transportation.



Source: Metro RTO, 2012

Vehicle washing. According to the EPA, "outdoor car washing has the potential to result in high loads of nutrients, metals, and hydrocarbons during dry weather

conditions in many watersheds, as the detergent-rich water used to wash the grime off our cars flows down the street and into the storm drain" (EPA, 2009). Commercial car washes are the preferred alternative, as most capture waste water which is subsequently treated before it goes into the sewer system. Another alternative option is washing vehicles on pervious surfaces such as a lawn or dirt in order to filter residue.

Across Oregon, upwards of three quarters of residents wash their vehicles at home, though this number varies depending on geography and demographics. In the Portland Metro area, 45% never wash at home while 32% wash their vehicle 1-3 times per year at home (Regional Coalition for Clean Rivers and Streams, 2011). In Eugene, 61% wash their vehicle at a commercial car wash, and 36% at home on a paved driveway or street (Eugene Stormwater Management Report, 2013). The Gresham Stormwater Survey (2008) found that about one third of home owners never wash their car at home, while the rate was about 50% for renters. However, one third of those washing their car at home reported a willingness to use a car wash.

Further afield, 31% of Puget Sound residents always use a commercial carwash facility and 69% wash their vehicles at home (Puget Sound Partnership, 2011). This high variability in behavior may be due to a combination of lifestyle factors including time of year, urban or rural locations, access to facilities, cost, and general knowledge of alternatives.

Those washing vehicles at home are most likely to be homeowners, those with children and/or dogs, and those who do not have a college degree (Gresham Stormwater Report, 2008; Eugene Stormwater Management Report, 2013). In Gresham, these same groups are also less willing to change their behavior and begin using a car wash facility (Gresham Stormwater Report, 2008).

The top reasons for washing their vehicle at home rather than a carwash facility typically include:

1) perceived expense or higher cost
2) perception that hand washing is better for vehicle care
3) perception that hand washing gets the car cleaner

A primary incentive for washing vehicles at a carwash and motivation for changing behavior is discounts or coupons (reducing the perception of higher cost). Messages about the environmental benefits of commercial car washing, such as *facility uses recycled water* or that it *protects water quality or wildlife*, can help to supplement

motivations but tend not to be primary drivers of behavior change (Regional Coalition for Clean Rivers and Streams, 2011).

Vehicle maintenance. Relevant behaviors related to home vehicle maintenance include changing oil and antifreeze, addressing leaks in a timely manner, and proper disposal of vehicle related chemicals such as oil, solvent, grease, and fuel.

In the Gresham Stormwater Survey (2008), about 25% of residents change their own oil or antifreeze. Of those, 86% report using an acceptable disposal[1] method. Although 7% reporting placing it in the trash, an undesired behavior, none reported pouring it on the ground or into a storm drain. In the Puget Sound area, roughly one half of residents perform maintenance on their cars at home and most say they properly dispose of hazardous materials (Puget Sound Partnership, 2011).

In the Metro Household Hazardous Products Survey (2007), very few people dump chemicals in storm drains (<1%) and the vast majority take leftover motor oil to a facility or recycle at curbside with their regular pick-up (31%-96% depending on product type). The survey also found that even if residents use a less preferred method to dispose of other household hazardous materials (throwing in trash, pouring down sink, or pouring into a storm drain), they seem to take extra care with vehicle materials like motor oil.

Addressing unintentional spills of hazardous materials on driveways or fixing vehicle leaks in order to prevent further spills or damage is another car maintenance issue. In the Puget Sound (2011), 74% of respondents report fixing oil and fluid leaks promptly either always or most of the time, 12% report doing so sometimes or rarely/never, and 14% weren't sure. Existing research does not speak clearly as to whether residents link prevention of vehicle leaks and spills to protection of water quality. More research may be needed to explore motivations around this behavior change.

Vehicle trends. National and local studies highlight changes in travel behavior that may ultimately impact the number of vehicles. A 2013 study by the Public Interest Research Group showed that "for eight years in a row, Americans have been driving less on a per person basis than the year before." Younger generations are driving less and are also less likely to have a driver's license than any generation before them. A study done this year by the Centers for Disease Control and Prevention found that the percentage of high school seniors who had a driver's license fell from 85% in 1996 to 73% in 2012. Furthermore, it appears that this generation is not

[1] Curbside recycling, take back center, or collection event.

merely postponing acquisition of a driver's license; rather, many of those without a license do not ever intend to get one.

Other studies also indicate that Millennials (people born between 1983 and 2000) are more multi-modal than previous generations. This group is quickly embracing newer alternatives such as car-sharing, bike-sharing and ride-sharing, modes of transportation that require less or better vehicle-related care. Another trend is foregoing a vehicle altogether, mostly in urban regions. Currently, about 15% of Portlanders and 8% of Oregonians do not own a vehicle (U.S. Census), and that trend will likely increase as more Millennials choose a no-car lifestyle.

High School Seniors without a Driver's License Nationally

Source: US Census, 2012

Lawn and garden care

Roughly 80% of residents have a lawn or garden in the Portland Metro area (Metro Sustainable Living, 2012). Lawn ownership increases with incomes greater than $75,000 (95%+).

Nationally, upwards of 75% of homeowners use at least some lawn and garden chemicals some of the time with roughly 25% classified as "heavy users." The exact rate of usage for each varies by geography and time of year. People in colder climates tend to use herbicide application to kill the weeds that arrive with the onset of spring whereas people in warmer climates use more pesticides where insect-control is a year-round problem (EPA Best Management Practices, 2009).

Lawn and Garden Behavior Nationwide

Source: Various Surveys Nationwide, EPA 2009

Similarly, in a statewide DEQ study (DEQ Household Hazardous Waste Survey, 2008), 70% of residents managing their lawns purchase lawn and garden chemicals. Half (52%) report using a spot spray or weed and feed product, another quarter (24%) report using both a chemical and a natural type product, and 18% report not knowing which type of product they apply (chemical or natural).

Specifically, when asked what products they apply to their entire lawn, the responses were as follows:

- Weed and feed: 43%
- Weed killer: 31%
- Fertilizer: 48%
- Insecticide: 18%
- Moss controller[2]: 20%

The DEQ survey (2008) also found that about 40% of Oregonians practice low-intensity turf management practices (less watering, setting the mowing blades higher, and grasscycling), whereas 64% report watering twice or more per week. Results also showed that use of lawn care products was lowest among households with less than $25,000 and highest among those earning $75,000 or more. The majority (51%) of those earning more than $50,000 reported using weed and feed and were significantly more likely than those earning less than $50,000 (only 33% use) to do so.

Many residents seem to have an awareness of the harmful effects of lawn and garden care products. Any resistance toward alternative products or methods stems primarily from the perceived inconvenience and cost (common barriers to behavior

[2] More information on Moss controllers included in the home care and maintenance section.

change). One of the largest barriers to reducing or eliminating the use of lawn care products is the perception that a “lush” green lawn is necessary (EPA Best Management Practices). Research shows that this cultural ideal may be more difficult to overcome than other barriers.

There is some difference in lawn care between rural and urban areas, with those in rural areas using more lawn and garden chemicals that those in urban areas. The statewide DEQ Household Hazardous Waste Survey (2008) found that those living in rural areas are more likely than urban residents to use high intensity turf management (lots of watering, mowing and fertilizing) as well as lawn chemicals. Roughly 15-20% more residents in Clackamas and Washington Counties report using chemical products in their lawn or garden compared to those in Multnomah County (Metro Sustainable Living Survey, 2012). In the Tri-County region, one third use chemical products, another third use organic products, and the remaining third use a combination or forego products altogether. When asked, close to 80% believe it’s important to have a chemical-free lawn or garden.

Focus group research has shown residents are most concerned about the health of children and pets when considering the use of lawn and garden products, rather than about the impact on our waterways (Coalition for Clean Rivers and Streams, 2011). Messages around safety of children and pets were highly effective in focus group testing. Additionally, the Gresham Lawn Care Behavior Surveys (2007, 2009) found that 82% of women (and 74% of men) feel that weed and feed products are potentially harmful to children and pets.

Other findings from the statewide DEQ survey (2008) show that 7% of those using products on their lawn report using organic products, while 69% of those using products on their own lawn report not trying natural products because they do not know enough about them. More than 50% believe that chemicals are easier and more effective to use than natural products.

Research often shows demographic differences in lawn and garden care behaviors. Women, more than men, tend to have a greater awareness of harmful effects of lawn chemicals on water systems. Women also have significant influence over changing behavior in the household. Of the 80% of respondents who believe having a chemical-free lawn is at least somewhat important, the majority were women, living in Multnomah and Washington Counties, and under the age of 55. Those who use organic or less toxic products were primarily women, residents of Multnomah County, and those in the higher income brackets (Metro Sustainable Living Survey, 2012). In Gresham, a 2009 Lawn Care Survey found that younger residents, women, and those with children were more likely to let their lawn go brown during

the summer, while those preferring to keep a green lawn were male, older, and in households without children.

Demographics for Lawn and Garden Behavior

Chemical-free Lawn	Organic/Less Toxic Products	Let their Lawn "Go Brown"
Women	Women	Women
Multnomah County	Multnomah & Washington Counties	Households with children at home
Younger Ages	Higher incomes	Younger ages

Source: DHM Research, 2012

A smaller segment of the population uses outside companies to manage their lawn or have Home Owner Associations (HOA) that dictate the standards for the outward appearance of lawns and gardens. In the Gresham Stormwater Survey (2008), 15% report hiring a landscape service for all lawn care or just for fertilization. Statewide, the rate of landscape service use was 7% (DEQ Household Hazardous Waste Survey, 2008). The Gresham survey also found that 20% use organic options, but most (78%) do not use an organic option and do not know if their company offers that service.

Survey respondents in Gresham who use a landscape service report that they would select natural or organic products for their lawns if offered the choice (93%) (Gresham Stormwater Report, 2008). While landscape service users comprise a small portion of the population, the Gresham findings suggest that education of landscape firms or landscape service customers to use and/or request organic products could lead to fewer chemicals being used for lawn care.

In the Pacific Northwest, another consideration for lawn and garden care is proper application of product during our long rainy season. A recent survey in Clark County found that residents are split on whether it is best to water their lawn after applying fertilizer: 46% believe it is best to fertilize when rain is forecasted and 33% when no rain is forecasted (11% say it doesn't make a difference, and 10% don't know; Clark County Stormwater Report, 2011). This is an opportunity to further educate the public on smart application of lawn products.

Little research has examined the extent to which residents dump extra grass clippings in natural areas. The Gresham Stormwater Survey (2008) found that 25% of streamside homeowners and 16% of non-streamside homeowners put extra grass clippings and pruning in a nearby natural area. Only 5% of streamside renters dump extra clippings, but this rises to 20% for non-streamside renters. Groups most likely to perform this behavior include women and those with dogs.

Home care and maintenance

Existing research on home care behaviors that impact stormwater is minimal. The most relevant studies are from Metro (Sustainable Living 2012 and Household Hazardous Products 2007). For this report, home care includes:

1. Household chemicals and paint
2. Illegal burning/burying of trash
3. Septic systems and Recreational Vehicles
4. Home exterior care

Most research studies have focused on household chemical use, typically in the context of impacting treated water supplies. Dumping chemicals into storm drains is an extremely uncommon practice across the board; most residents opt to completely use the product. At least 20% of residents take products to recycle centers, while less than 10% place it in the garbage (Metro Household Hazardous Products, 2007). In Metro's Sustainable Living Survey (2012), when asked how they dispose of chemical products from their home such as solvents, cleaning supplies, old paint or pesticides, 37% either bring it to Metro or a recycling center. While "dumping" was not listed as an option, only 3% or less chose all other responses. There may be an opportunity to persuade residents to consider alternatives, as close to 80% express apprehension about the chemical products they use in their homes (Metro Household Hazardous Products, 2007).

Very few people bury or burn their trash. Nonetheless, like dumping chemicals, this is an area of research that could be expanded. In the Gresham Stormwater Survey (2008), one of the few surveys which mentions this practice, respondents clearly understand that burning garbage is illegal and very few use this method of waste management (5-10% depending on streamside location). Even fewer bury their garbage; fewer than one in twenty report this behavior.

Use and maintenance of septic tanks is another area under home care that impacts water issues. Among those who have septic tanks, regular maintenance appears to be uncommon. Most respondents in the Puget Sound (Water Pollution in Puget Sound, 2009) report that they would wait for a smell, wet ground, or a back-up to "know that they had a problem." Only half schedule maintenance checks every 2-3 years. In Gresham, septic tanks are most common among streamside residents, although relatively uncommon in the region as a whole (Gresham Stormwater Report, 2008). More research needs to be done on this correlation.

Proper disposal of septic waste by Recreational Vehicle (RV) owners also impacts water quality. RV ownership in the region is relatively uncommon and the few residents who do own RVs are very likely to be disposing of septic waste at a pump

station. The Gresham Stormwater Survey (2008) found that about 10% of homeowners own an RV and no renters report owning one. When asked about disposal practices for RV septic waste, 88% report disposing of the waste using an acceptable method, 5% do not know how it was disposed, and 5% report dumping waste onto the street or storm drain.

Few research studies address the application of fungicides on roofs to prevent moss. Use of fungicides may be more pertinent to regions west of the Cascades. Nonetheless, only a small portion of the population reports using fungicides. In a Clean Water Services Stream Habits Survey (2002), a majority of respondents indicate that they never treat their roofs (62%) and those who do, typically do so once a year or less. A similar number in Clark County (Stormwater Report, 2012) also report never applying a fungicide to their roof, walkway, or hard surface. A statewide DEQ survey (DEQ Household Hazardous Waste Survey, 2008) found that 20% of respondents apply moss controller on or around their home.

Future research should also consider issues related to downspouts, especially in conjunction with roof application of fungicides. Most houses have some sort of downspout. Downspouts can release runoff onto hard surfaces such as driveways rather than collection containers or pervious surfaces. More research needs to be done on local awareness of this issue and alternative approaches.

6 | MOTIVATIONS FOR BEHAVIOR CHANGE

People's motivations to change behavior around stormwater issues tend to be consistent across the nation. Although most of the research evaluated for this summary is in urban areas (specifically Portland Metro), there is little indication that primary motivations would differ between urban and nonurban residents. One area for further research is to examine motivations among communities of color – there is little to no research currently available in Oregon on ethnic differences in motivations for change.

Top motivations for stormwater behavior change include:

1) Safety of children and pets
2) Saving money or discounts
3) Protection of drinking water and public health
4) Fish and wildlife
5) Natural resource and recreation

Safety of children and pets. In both survey and focus group research, the safety of children and pets ranks in the top tier of concern for the use of chemical products in lawns, gardens, and in the home. Message testing in focus groups often shows that the presence of children and pets drives changes in behavior – households with these vulnerable groups are also more likely to use organic products or forego chemical use altogether in their home. Research also shows women are more likely to be concerned about chemical products (and water quality); they are often the best drivers of change in households.

> **Recommendation:** Link stormwater behaviors to the safety of children and pets, as appropriate. Consider mothers as messengers to target other females. Provide alternatives to chemical products in messaging – direct residents to safer and other effective alternatives.

Saving money or discounts. For some, saving money is the biggest motivation to change. With regards to car washing, this would be in the form of coupons to commercial car washes. For proper pet waste disposal, it could simply be free bags or scoopers. Saving money is a nuanced motivator when it comes to stormwater behaviors; it can be a key driver for some and not as effective for others. The perceived benefit of saving money will reach a cap if individuals feel any particular behavior is inconvenient or does not make much of a difference.

> **Recommendation:** Partner with organizations and businesses in the community to offer discounts for preferred behaviors. Communicate that saving money is an added benefit and not the first benefit.

Protection of drinking water and public health. Studies show that the public is more likely to change their behaviors if water conservation and preservation outreach includes a reference to the protection of drinking water. The impact is greater if residents know the source of their drinking water. Protection of drinking water is closely associated with Oregonians' values. Both focus groups and surveys show residents closely associate quality drinking water to good public health.

> **Recommendation:** Strengthen the connection between stormwater and drinking water. Inform the public about how clean rivers and streams equate to clean drinking water. Messages that make explicit the connection to drinking water will be more effective motivators than ones about general water pollution. Water pollution does not necessarily resonate with the public because a large portion of the population is unaware of the source of their drinking water.

Fish and wildlife. The value and importance of fish and wildlife habitat in Oregon remains high. Natural habitat is consistently in the top tier when ranking protection of water quality and natural areas across urban, rural, and suburban areas. Oregonians connect the health of fish and wildlife to the quality of water.

> **Recommendation:** Messages about stormwater should connect more directly to fish and wildlife habitat – stronger habitat means healthier rivers and streams, which are better for all of us.

Natural areas and recreation. Oregonians value the bounty and variety of natural areas and open spaces the state has to offer and they actively enjoy the outdoors. Natural beauty, scenery, and easy access to recreation and the outdoors are some of the strongest values for residents about Oregon. Though these values are generally high across the state, some communities may place greater importance on natural areas and access to recreation. Residents of Central Oregon and Bend, as an example, may emphasize access to recreation more highly than other motivators.

> **Recommendation:** Link stormwater projects to not only improving water quality but also creating natural areas and green spaces. As appropriate, make the connection to recreation and access to recreation, and how stormwater projects help to maintain a key value for Oregonians.

Note: People may mention **disincentives** as a motivation for behavior change. However, people are more likely to suggest disincentives as a way to change other peoples' behavior rather than as an effective method to modify their own behavior. As an example, dog owners would like to see fines for other dog owners who do not pick up after their pet. Disincentives or additional charges can be effective in some contexts but traditionally are not a major motivating factor and should be considered a last option.

7 | BARRIERS TO BEHAVIOR CHANGE

Barriers to behavior change related to stormwater can also be grouped into broader categories. Top barriers to behavior change include:

1) Inconvenience
2) Lack of knowledge
3) Higher cost
4) Perceived lack of impact
5) Perception that product is less effective
6) Mixed messages

Inconvenience. Behavioral changes that are perceived to be inconvenient or to take more time are difficult to effect. Cost savings alone provide insufficient motivation; residents report that saving money is not enough to change their behavior if the change is less convenient for them. It is worth noting that a portion of the population perceives any change in their current behavior to be inconvenient; this group is not a good target for behavior change.

> **Recommendation:** Provide easy resources, such as information on websites and through retailers, instruction stickers on recycle bins, and clear and simple instructions on products. Inform residents about alternative products or services; make it available and easy to find. Message around how simple steps can make a difference.

Lack of knowledge and awareness. A general lack of knowledge is a common barrier to behavior change, in particular as it relates to stormwater. A majority of residents are unaware of the source of their water, where runoff goes once it enters storm drains, the toxicity of household products, how pet waste is contributing to water pollution, or that carwash facilities are better for our waterways than washing vehicles at home. Many residents are simply unaware of the issues stormwater runoff poses to local rivers and streams.

> **Recommendation:** Connect common activities to their direct impact on local rivers and streams (and less on general waterways). Mention specific rivers and streams as much as possible; highlight rivers and streams as a source for drinking water.

Higher cost. A common perception is that alternative products or services cost more. Although cost is a key motivation for some, for most people it is not the primary driver of behavior change. However, because the perception of higher cost can easily prevent people from even considering alternatives, cost should be addressed in public outreach. Information and knowledge of resources and alternatives can overcome concerns over cost.

Recommendation: Do not lead behavior change messages with mentions of cost or arguments that some alternatives cost less. Other benefits in tandem with saving money are more effective to change behaviors; link to those benefits first before addressing perceptions around cost.

Perceived lack of impact. One of the easier barriers to overcome is the perception that individuals have little impact on improving water quality. Research consistently shows that the public perceives industry and farms to be the biggest contributors to water pollution and that they as individuals have less impact or are unable to make changes that count. Messages often link stormwater runoff to large bodies of water (global issue), and less on specific rivers and streams (local issue). In more recent years, a growing segment of the public is connecting runoff from roads and household behaviors as significant contributors to water quality.

Recommendation: Messaging should continue to connect how individual behaviors impact local rivers and streams (rather than general bodies of water). Name specific rivers or streams as much as possible to connect closer to "home." Be specific about the activity or preferred behavior, like picking up pet waste in the yard or reducing soapy water. Sometimes, simple suggestions that are easy enough to tackle are usually enough to persuade changes in behavior.

Perception that product is less effective. Some people believe that less toxic products will not be as effective as chemical products. This is especially the case for household products. Similar to perceptions of higher cost, outreach around the perception of a less effective product is better addressed with other benefits and more emotional motivations.

Recommendation: Do not lead behavior change messages by persuading residents of how alternative products and services are just as effective as products or services that use chemicals. Link to other benefits first, in particular ones that spark more emotion like the safety of children and pets.

Mixed or too many messages. We commonly hear in focus groups that messages around stormwater have too many instructions, aren't simple, sometimes conflict with product labels, or seem too big to tackle by one individual. Another barrier is mistrust in the messenger; government messengers are more effective around public health and less as a source for preferred behaviors, products, or services.

Recommendation: Give simple and easy suggestions around behavior change. Partner with local community organizations, small businesses, and university 'experts' as messengers. Save government messengers to message around improving the health of the community, or public health.

8 | MESSAGING FRAMEWORK

This framework for messaging is a general guideline for communications about stormwater in Oregon. Many of the recommendations are supported by focus group and survey research conducted for ACWA members, and the decades of past work by DHM Research on stormwater and related issues.

The framework is meant to present broad rules for communications, and may not apply uniformly to specific demographic groups such as communities of color or younger residents. Additional research is needed to determine if messages resonate differently among particular groups.

Messaging recommendations for stormwater communications:

- Connect to **Oregonians' values**, specifically to preserving the natural beauty of our state, the outdoors, water, trees, and nature. Water evokes strong emotions in people; this is an opportunity to engage Oregonians on something they care about.
- Use a **positive tone** and **focus on outcomes**. What are the benefits to individuals? How does it connect to their core values? Why change behaviors? Keep a focus on maintaining our quality of life, and specifically to improve our rivers and streams for future generations. This is more easily understood and resonates with the public. It also communicates a message that there is a plan for the future. Failed policies or consequences of bad behaviors are weak reasons for behavior change. Stick with a positive tone.
- Link stormwater more to **drinking water**. Protection of drinking water is one of the best motivations for changing behaviors. Mention and include **specific rivers and streams** to make a stronger "local" connection to a drinking water source. Relate how individuals' behaviors impact their community to more effectively address how individuals can make a difference in their own "backyard."
- Another top motivator is protecting the **health of children and pets**. Link stormwater behaviors to the safety of children and pets. This is highly effective in both focus groups and surveys, especially among women.
- Consider **mothers as messengers** to target the strongest base of supporters – females, Democrats, and people with higher education/income. Other research also shows that women are strong messengers, often the most effective messengers, around improving the health of families.
- Mention how stormwater projects create **natural areas and green spaces** and, when appropriate, improved recreation and access to recreation. This is another key reason why residents value living in Oregon – connect to values that resonate with the public.

- Suggest **simple steps** to behavior change. A large number of residents are uncertain or confused about what actions they can take. They are also unsure of where to find additional resources on alternatives. Provide simple changes and link those to outcomes. Be specific. “Use organic lawn and garden products to keep children and pets safe from chemicals.” “Pick up pet waste to minimize bacteria in yards and parks, which may drain into our source for drinking water.” “Consider carwash facilities to reduce soapy water in our rivers and streams.”
- **Partner** with community organizations, small businesses, retailers, and university experts as spokespeople around preferred stormwater behaviors. They are often better messengers than government, environmental groups, and utilities that may be viewed by the public with skepticism. A better angle for government and utilities is around public health. Protecting water quality, clean drinking water, and maintaining water and sewer systems are seen as good public services.

Other considerations for stormwater communications:

DO NOT lead with saving money as the key motivation for behavior change. Instead, lead with other values and include saving money as an added benefit.
DO NOT get bogged down in too many details and instructions. Keep it simple and easy.
DO NOT start with government messengers. They evoke a high sense of skepticism due to increasing distrust in government generally.
DO NOT talk about water pollution in general terms. It’s too broad and global, and leaves people with a sense that their behavior won’t make a difference. Link to local rivers and streams. Name them.
DO NOT persuade residents that alternative products are just as effective as chemical ones. Let them come to that conclusion. Instead, move people with other values like the safety of children and pets.
DO NOT use words like infrastructure, sustainable, herbicides, pesticides, etc. Use words that express benefits for the individual.

Words to use	Words to avoid
Water	Waste water, stormwater
Quality of life, communities	Sustainability, livability
Nature, maintain our water source	Infrastructure
Natural, organic, compost, native plants	Sustainable, green
Kills weeds	Herbicides
Kills insects	Pesticides

9 | MEDIA REVIEW

In order to gain a more comprehensive overview of stormwater issues, a simple media search was conducted to analyze how media approached stormwater, individual contributing behaviors, and related news in Oregon during the past year (January 2013 – November 2013). Newspapers with archives available online and with an adequate amount of content were searched for stories relating to stormwater runoff; this included The Oregonian, Oregon Public Broadcasting, The Portland Tribune, and The Bulletin (The Salem Statesman Journal was not included due to subscription requirements when viewing archives). A national search for stormwater issues during the same time was also conducted to provide additional context. This summary is intended to offer a broad overview of how the media is approaching stormwater related issues.

National coverage. Nationally, stormwater issues are covered infrequently by major news networks. Stories are often a 'side effect' of other issues, such as a court case or policy change. Two recent national stories exemplify this kind of reporting. One involves Senator Tom Udall (D-NM) proposing a bill to reduce pollution caused by stormwater runoff. The second story involves a successful appeal by a West Virginia chicken farmer who was threatened with fees by the EPA if the farm did not comply with stormwater permits. These stories were covered by several news agencies. News coverage on stormwater is more often linked to conflict versus education or general public knowledge.

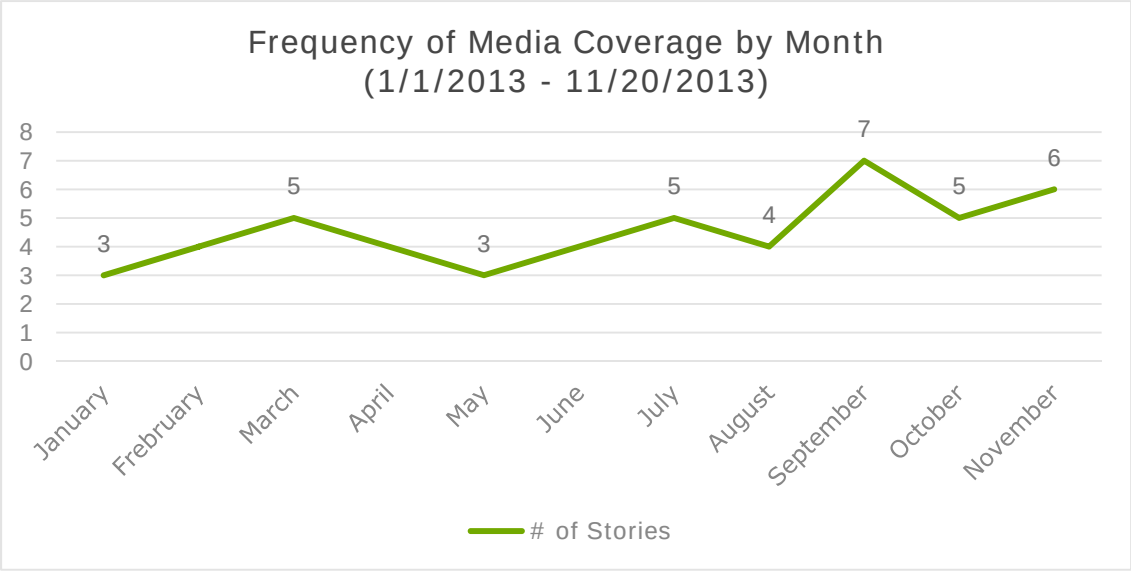
Local coverage. Statewide, individual news agencies were searched online for the terms "stormwater", "runoff", and "stormwater pollution". Relevant news stories were grouped into categories based on their major topic area:

- Environmental concerns: Pollution
- Infrastructure construction: Completed or planned projects regarding stormwater construction, bioswales, riparian growth, technology
- Court case: Court rulings, lawsuits, fines, etc.
- Development details: Master plans, open houses, updates
- Policy: Proposals, bills, city government decisions
- Stormwater advocacy: Information on stormwater as primary topic

Topic of Media Coverage	No. Stories
Infrastructure construction	**27**
Court case	8
Development details	7
Environmental concerns	3
Stormwater advocacy	3
Policy	2
Total	**50**

Type of Media Coverage	No. Stories
News	**40**
Public announcement	5
Photo/video feature	3
Editorial	2
Total	**50**

More often, local news highlights a local stormwater infrastructure related project, lawsuit, or development plan that also involves stormwater systems. Individuals relevant to the individual story are cited either as the source of a city project to help prevent stormwater runoff (city official) or as a specialist who can provide background information on why stormwater runoff is important to address (environmental advocacy group, for instance). Infrastructure is a common topic but often emphasizes threats of flooding or complying with regulations rather than pollution. Generally, detailed descriptions of stormwater pollution are brief unless highlighted in a feature article.



The Oregonian is by far the leading source of stormwater news, followed by OPB. Story frequency did not seem to be affected by any significant events. Significant stormwater related events occurring in recent months, including a conference on the topic, received no news coverage.

The tone of the news stories also varies. Most stories depict straight news in a neutral tone, closely followed by stories with a positive tone. Negative stories tend to have stormwater as a side issue, and not necessarily as the main story.

Source of Media Coverage	No. Stories
The Oregonian	**24**
OPB	17
Portland Tribune	8
The Bulletin	1
Total	**50**

Tone of Media Coverage	No. Stories
Neutral	**24**
Positive	21
Negative	5
Total	**50**

Messengers named in stormwater stories are most frequently city officials. This reflects the nature of the stories found: most relate to infrastructure plans and projects where stormwater is not the primary issue. A city official related to the project or topic is often cited in these cases. At times, larger environmental or water related advocacy groups are also cited.

Messengers in Media Coverage	Frequency
City officials (water, BES, environment)	**18**
City officials (planner, engineer, council, etc.)	**11**
Environment/water advocacy group	8
Tualatin Riverkeepers	5
State/regional officials	5
Attorney	3
Citizens	3
Project/construction member	2
Professor/expert	2
Water utility management	1
Other advocacy group	1
Author	1
Private stormwater management company	1
Private investment firm	1
Company CEO	1
HOA board member	1

10 | FUTURE RESEARCH

Oregon is fortunate to have a great number of nationally recognized leaders in stormwater services. We have also benefited from the depth and breadth of research that has been conducted across the state, as demonstrated in this review. Yet many opportunities exist to expand on this research to help guide our leaders and policy makers. The following are some suggestions for future research, and approximate costs to keep in mind for budgeting purposes.

Community research in rural communities
Unfortunately, much of the existing research has been conducted in Portland Metro Area. While there is reason to believe that Oregonians broadly share many values – particularly about the state's natural environment – it should not be assumed that knowledge and behaviors about stormwater are the same in every community. Not only may values differ across the state, but water issues are also varied. Concerns about the impact and causes of stormwater pollution are likely to be different in communities in the high desert, Willamette Valley, and along the coast. To learn how, and to what degree, it will be necessary to conduct research in those communities.

Methods: surveys, focus groups, and in-depth interview

Message testing
At a high level, this review has provided good guidance on the motivations and barriers to stormwater behavior. We know less about what specific messages are most effective, with which audiences, and using which communication mediums. More refined research that could demonstrate how to target key audiences could be an important line of research.

Methods: surveys and focus groups

Benchmark studies
While values are slow to change, awareness of issues and prioritization of those issues can change relatively quickly. The organizations most effective at maintaining public opinion in their favor regularly conduct benchmark studies. These are studies that are repeated over time, often once every one to three years, to measure changes in attitudes, behaviors, and responses to key messages.

Methods: surveys

Stakeholder and opinion leader studies

Key stakeholders and opinion leaders often shape the perspectives of the general public and are instrumental in driving public policy. It is advisable to conduct research with these individuals to better understand their specific concerns.

Method: in-depth interviews

Costs

The following are cost estimates for telephone surveys, focus groups, and in-depth interviews. The high dollar range is assuming a full service project including reporting and analysis. The low dollar range would provide less support in the research design, implementation and level of analysis.

Telephone surveys

N-size	Margin of Error	Length	*Cost*
300	±5.7%	5 minutes (~15 questions)	*~$9,000 - $11,000*
400	±4.9%	10 minutes (~30 questions)	*~$15,000 - $18,000*
500	±4.4%	15 minutes (~45 questions)	*~$23,000 - $28,000*

Focus groups

Focus groups are structured conversations with 8-10 people who are recruited from the population of interest. Often the participants are recruited at random from customer and voter registration lists. Quotas are established by key demographics (e.g., age, gender, household size) to ensure a representative sample. Multiple groups are recommended for group-to-group validation. Full service would include topic guide development, participant recruitment and honorariums, facility and hosting, moderation, professional videography, transcribed written exercises, and full reporting and analysis.

Cost: $6,000 - $8,000 per group

In-depth stakeholder interviews

In-depth stakeholder interviews are one-on-one structured conversations with key decision-makers and opinion leaders. They are typically 30-45 minutes in length. Full service would include interview guide development, participant recruitment and honorariums, interviews, and full reporting and analysis.

Cost: $200 - $400 per interview

11 | RESEARCH PROVIDED BY ACWA MEMBERS

The table below lists research studies provided by ACWA members and referenced in this report. DHM reviewed these and other studies to draw conclusions and make recommendations. These studies were selected for inclusion based on confidence in the methodology (e.g., survey sample size and design), the variety of populations reached (e.g., homeowners, community size), and whether they addressed the key topics of interest.

Year	Study	Sample Size	Method	Stormwater Awareness	Water Values	Household Hazardous Materials	Lawn and Garden Care	Car Care	Pet Care	Illegal Dumping	RV Waste
2013	Clean Water Services Customer Values Survey	944	Online		x						
2013	Eugene Stormwater Management Survey	400	Phone	x			x	x			
2012 2011	Portland Community Surveys	3,400 3,731	Mail	x	x						
2012 2010 2008 2006 2002	Clean Water Services Customer Service Surveys	400-1500	Phone Online	x	x	x					
2012	Clean Water Services Stormwater Survey	1696	Online	x	x	x	x				
2012	Metro/DHM Sustainable Living Survey	300	Phone			x	x				
2012	Oak Lodge Sanitary District Satisfaction Survey	907	Phone	x							
2011	Keizer Community Survey	838	Mail	x							
2011	Regional Coalition for Clean Rivers and Streams, Community Survey	1,090	Online	x	x	x		x	x		
2010	Lake Oswego-Tigard Water	20	Focus Groups		x						

Year	Study	Sample Size	Method	Stormwater Awareness	Water Values	Household Hazardous Materials	Lawn and Garden Care	Car Care	Pet Care	Illegal Dumping	RV Waste
	Partnership Focus Groups										
2009	Metro Toxic Reduction Focus Group	31	Focus Group	x			x		x		
2009 2007	Gresham Lawn Care Pre and Post Surveys	400	Phone				x				
2008	Gresham Stormwater Report	400	Phone		x	x	x	x	x	x	x
2007	Metro Household Hazardous Products Survey	412	Phone			x	x	x		x	
2006	Clackamas County Water Environment Services Survey	505	Phone	x	x						
2005 1999	Portland Bureau of Environmental Services Surveys	500	Phone	x	x		x	x	x		
2002	Clean Water Services Stream Habits Survey	430	Phone		x	x	x	x	x		
1999	Bend Environmental Issues Survey	415	Phone	x	x	x	x			x	