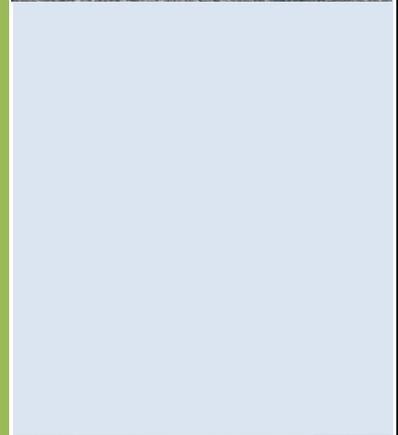


City of Marysville Stormwater Management Program



Plan Year
2016



Permit Term – August
1, 2013 to July 31, 2018



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PURPOSE

The National Pollutant Discharge Elimination System (NPDES) Permit (Permit) is a federal permit that regulates stormwater and wastewater discharges to waters of the State. While it is a federal permit, the regulatory authority has been passed to the Washington State Department of Ecology (Ecology) for program implementation. The first term of the modern Western Washington Phase II Municipal Stormwater Permit began in January of 2007 and ended in 2012. The current permit term is five years, and began on August 1, 2013 and ends on July 31, 2018.

The Permit requires that all regulated municipalities create and implement a Stormwater Management Program (SWMP) which addresses five required program elements:

- 1) Public Education and Outreach,
- 2) Public Involvement and Participation,
- 3) Illicit Discharge Detection and Elimination,
- 4) Controlling Runoff from New Development, Redevelopment and Construction Sites and,
- 5) Municipal Operations and Maintenance

Select cities, such as the City of Marysville, are required to provide additional actions applicable to Total Maximum Daily Load (TMDL) requirements. This SWMP Plan describes the current TMDL monitoring program, and how this program will be implemented in the upcoming calendar year.

The SWMP shall be designed to reduce the discharge of pollutants from the regulated small municipal separate storm sewer system (MS4) to the maximum extent practicable (MEP) and meet state AKART (all known and reasonable technologies) requirements and protect water quality.

INTRODUCTION

The City of Marysville is located in Snohomish County approximately five miles north of Everett, and adjacent to the southern border of the City of Arlington. Major highways within the City include Interstate 5, State Route 531, State Route 528 and State Route 529. The Burlington Northern Santa Fe Railroad also runs north to south through the City.

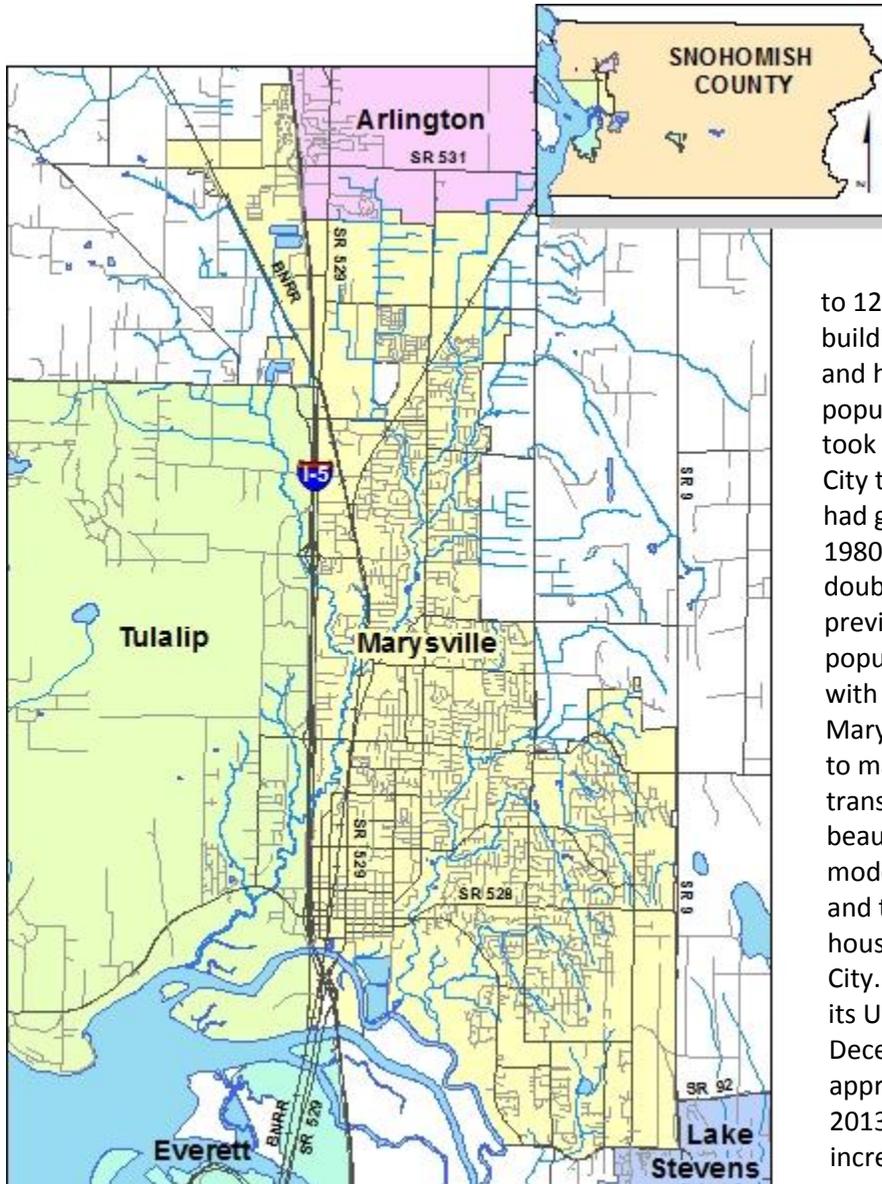


Figure 1 - Regional Map of Marysville

Population and Growth

The City of Marysville was incorporated in 1891 with 350 inhabitants. Timber related industries

increased the population to 1250 residents by 1905. As new buildings, schools, streets, bridges and highways were built the town's population continued to grow. It took approximately 50 years for the City to double in size and in 1954; it had grown to 2,500 people. By 1980, the population had again doubled, but in half the time it had previously taken. Since 1980, the population has almost doubled with each decade through 2000. Marysville's location with proximity to major employment centers and transportation corridors, the beauty of the natural setting, the moderate size of the community, and the relatively reasonable housing costs make it an attractive City. Upon annexing the majority of its Urban Growth Area (UGA) in December 2009, the City grew to approximately 58,040 residents. In 2013, the population further increased to over 63,000 people.

Land Use Distribution

Marysville is largely comprised of residential neighborhoods. A large majority of the commercial and industrial property is located on the east and west sides of State Avenue, which is the main north south thoroughfare through the City. New commercial and industrial development is occurring in the Downtown, Lakewood and Smokey Point areas of Marysville.

Hydrologic Conditions

The City is part of the lower Snohomish River Basin, in Water Resource Inventory Area (WRIA) 7. Quilceda and Allen watersheds are the two sub basins draining a majority of the City. The Quilceda/Allen watershed contains approximately 70 minor streams and tributaries and encompasses an area of approximately 49 square miles. Approximately 11 square miles drains to Allen Creek and the other 38 square miles drains to Quilceda Creek. Both of these creeks empty into Ebey Slough near the mouth of the Snohomish River.

The Quilceda Basin consists of till, outwash, Custer Norma and saturated soils with the central plain of the basin being comprised primarily of a combination of Custer Norma and outwash soils. The eastern and western hillsides primarily consist of till soils. Till soils are dense and have limited infiltration capabilities, whereas Custer Norma and outwash soils drain well. However, due to high winter groundwater tables in the basin, surface water runoff is common. The Allen basin consists of till, outwash, Custer Norma and saturated soils. Again, due to high

groundwater tables in the winter, surface water runoff is common in the Allen Basin. Marysville receives approximately 37.5 inches of precipitation annually with the majority of it falling in the winter and spring months.

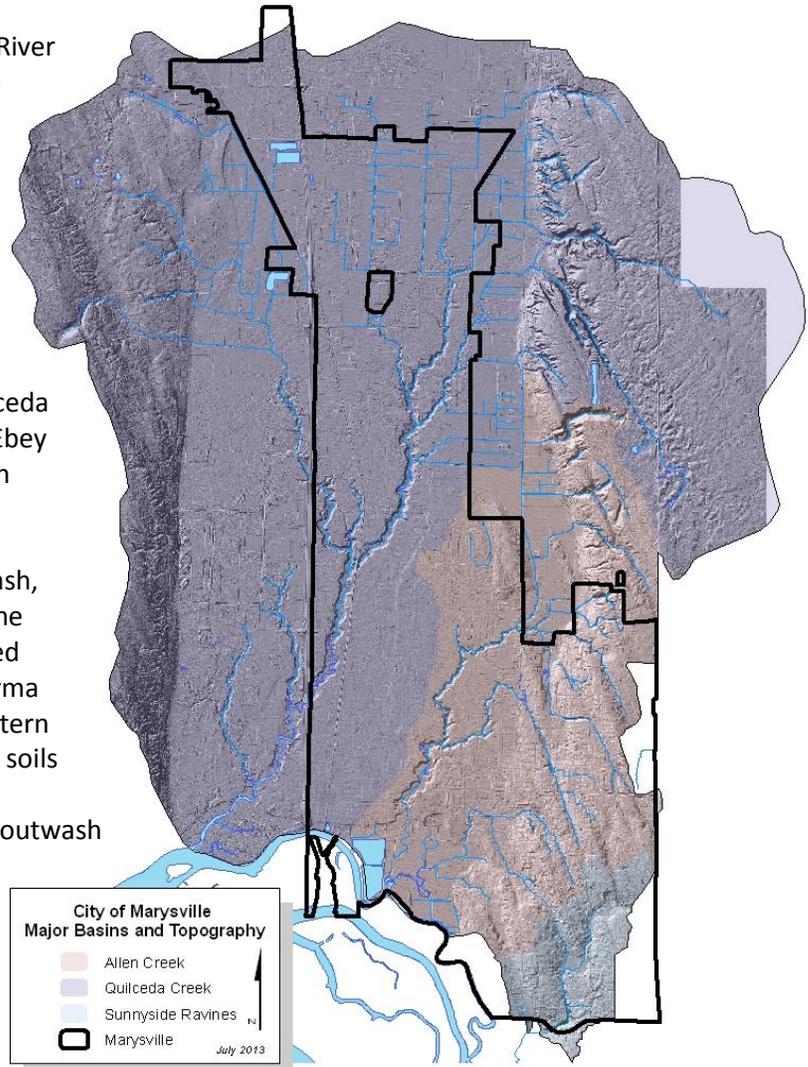


Figure 2 - Marysville Topographic/Watershed Map

Topography

The Marysville Trough is the most prominent topographic feature characterizing the City. The Marysville Trough is an expansive, nearly flat, alluvial plain and runs north-south through much of the City. Elevations along the trough range from approximately 130 ft in the north to sea level in the south along Ebey Slough. The Trough is bordered to the west by the Tulalip Plateau and to the east by the Getchel Hill Plateau.

The headwaters to Quilceda and Allen Creeks are located in the northeast, on the Getchel Hill Plateau. The maximum elevation is 430 feet located at the intersection of 74th place and 83rd avenue and slopes in this area are generally northwesterly. The headwaters of Jones, Munson and King Creeks are located

in the southeast on the top of the Getchel Hill Plateau. The maximum elevation in this area is 465 feet, between 60th and 64th streets on Highway 9 at the eastern edge of the City limits.

Receiving Water Quality and Pollutants of Concern

Both Allen and Quilceda creeks have been placed on Washington State's 303(d) list for fecal coliform, requiring Total Maximum Daily Load (TMDL) cleanup plans. Other pollutants of concern within the Allen/Quilceda Watersheds include total suspended solids (TSS), fertilizers, petroleum, detergents, heavy metals and organic wastes. In the summer months, low dissolved oxygen levels are also a concern. Primary sources of pollution in the watershed may include high sediment loads, runoff from agricultural and pasture lands, failing septic systems in older neighborhoods and increased impervious runoff causing high pollutant loading from urbanization. All these activities have potentially detrimental effects on water quality within the watershed.

Storm Water Drainage System

Within Marysville, stormwater runoff from buildings, driveways, parking lots and other impervious surfaces is collected, then conveyed through public and private drainage systems. Most of the public tributary drainage lines are within existing road rights-of-way. Much of the run-off is conveyed to area-wide detention/water quality facilities prior to release or detained and treated on-site and released into the public system. City-owned surface water facilities are complemented by the numerous on-site detention and water quality facilities constructed by private landowners and businesses. The storm drainage system ultimately discharges stormwater to one of the local tributaries or directly to Ebey Slough.

COORDINATION

The Surface Water Division works both internally and externally to coordinate permit activities. General coordination activities that don't fall under a specific permit section are described below. The groups responsible for specific items required in the Permit are called out in the applicable section of this SWMP Plan.

S5.A.5.a: The City of Marysville borders the Cities of Arlington and Lake Stevens, Unincorporated Snohomish County and the Tulalip Tribe Reservation. The Cities of Arlington and Lake Stevens are Phase II Permittees and Snohomish County is a Phase I Permittee, while Tulalip Tribal Land is federally regulated and not covered by the Washington State NPDES Permit program. The primary mechanism for external coordination is the North Sound Permit Coordinators meetings. These quarterly meetings create a forum to coordinate stormwater management activities for shared water bodies among Permittees, and avoid conflicting plans, policies and regulations. External coordination is also accomplished through the Status and Trends Monitoring Option #1 of section S8 in the Phase II Municipal Permit.

The City coordinates with Fire District 12 for Illicit Discharge spill response. The Fire District has a Hazardous Materials Team and works as a part of the county wide response team.

The City hosts the Allen Quilceda Watershed Action (AQWA) Team. This group includes Adopt-A-Stream, City of Arlington, Department of Ecology, Marysville School District, Snohomish Conservation District, Snohomish County, Sound Salmon Solutions, and Tulalip Tribe. The meetings are open to the public and provide a forum to discuss activities happening throughout the watershed, coordinating efforts when possible.

The City also coordinates with Snohomish County, Department of Ecology and STORM (a regional educational outreach group) to provide education and outreach programs. See a full description of those programs in the Education and Outreach section of this SWMP Plan.

S5.A.5.b: Within the City, the Surface Water division is the main work group responsible for Permit implementation. The primary mechanism for internal coordination is engagement with other City working groups through meetings and direct involvement in activities, thereby providing direct support or clarification when needed and reducing barriers to Permit compliance. Table 1 is a general overview of the Permit requirements and the City departments, or partners, which are responsible for each requirement. See Appendix 1 for City organizational charts.

Table 1- Overview of Responsibilities

Permit Section	Title	Division(s) Responsible
S5.C.1	Public Education and Outreach	Surface Water Division Parks Department Marysville School District Ecology (Local Source Control Program) Snohomish County (Natural Yard Care) Snohomish County Health Department AQWA Team Organizations
S5.C.2	Public Involvement and Participation	Surface Water Division
S5.C.3	Illicit Discharge Detection and Elimination	Surface Water Division, Sewer/Storm Maintenance Division, Engineering Division, Parks Department All City Staff (reporting incidents) Fire District 12
S5.C.4	Controlling Runoff from New Development, Redevelopment and Construction Sites	Surface Water Division, Community Development Department
S5.C.5	Municipal Operations and Maintenance	Public Works

Public Works (PW)

The Surface Water Division is part of the Public Works Department, and the primary work group responsible for Permit implementation. This group creates permit related submittals, plans, reports and records. There are five staff members within the division, the Water Resources Manager, a Permit Coordinator, two Surface Water Specialists, and a Surface Water Inspector. While there are only five staff members directly within this division, the surface water utility funds are used to support a variety of positions throughout the City because the staff members perform permit related job duties. These positions include, but are not limited to, the Sewer/Storm Maintenance Division, and Community Development Department staff.

The Surface Water Division implements in house training efforts and assists other departments to receive external training when needed/appropriate. Two in house trainings for all PW Crews on Best Management Practices (BMP) and Illicit Discharge Detection and Elimination (IDDE) are held annually. While these trainings are utilized to convey the primary subject matter, they are also used to relay overall Permit concepts, changes in requirements and supporting documents like the Stormwater Pollution Prevention Plan (SWPPP) or BMP Documents.

Quarterly, the Public Works Department meets to discuss topics of City wide importance. Each division manager has a chance to update the group, and surface water topics may be discussed at that time. The Surface Water Division and the Sewer/Storm Maintenance Division also conduct an annual planning meeting.

Community Development Department (CD)

A monthly meeting with all Community Development Divisions, Engineering and the Fire Department is attended by a Surface Water staff member. This meeting creates an open dialogue regarding current issues throughout the development process and provides a forum for coordination.

Parks Department

The Surface Water Division regularly orders refill bags for mutt mitt stations located throughout City parks. The Parks department notifies a Surface Water staff member when bags are close to running out and need to be reordered. The Parks department is involved with many City wide events and coordinates facility reservations for meetings/events. The Parks department also works to update and comply with the citywide SWPPP.

Other Departments

All staff members are responsible for reporting illicit discharges to the City's Spill Hotline.

The City maintains an internal web site, which opens as the home page each time internet explorer is opened. On the internal web site there is a link to a Surface Water Division departmental page. This page has information and training videos posted. The City also has an internal newsletter that is distributed city wide. This newsletter can be used to post surface water related reminders.

STORMWATER MANAGEMENT PROGRAM COMPONENTS

1) Public Education and Outreach

Summary Permit Requirements

- Implement an education and outreach program designed to reduce or eliminate behaviors and practices that cause or contribute to adverse stormwater impacts and encourage the public to participate in stewardship activities.
- Create stewardship opportunities and/or partner with existing organizations to encourage residents to participate in activities such as stream teams, storm drain marking, volunteer monitoring, riparian plantings and education activities.
- Measure the understanding and adoption of the targeted behaviors for at least one target audience in at least one subject area and use the resulting measurements to direct education and outreach resources most effectively.

Planned Activities

S5.C.1.a: Surface Water staff members have developed an education and outreach program that will be implemented throughout the entire City. The program was designed to educate target audiences about stormwater problems and provide specific actions they can follow to minimize these problems.

S5.C.1.a.i: To build awareness with the general public, including school-aged children and businesses, the City has several activities planned to occur in 2016:

Adopt-A-Street: The City of Marysville Adopt-A-Street Litter Control Program is a stewardship program designed to clean up litter along the right of way, preventing it from being washed into the MS4. This program is organized within the Streets Division. Participating groups volunteer to remove litter from an assigned section of street at least four times a year over a two-year period. Groups are usually asked to remove litter from at least six street blocks. In return the Public Works Department posts permanent signs identifying the adopting group, provides safety vests, hard hats and trash bags. When the bags are filled, groups leave them at the clean-up site, and City of Marysville solid waste collectors pick them up.

AQWA Team: The City participates in the Allen Quilceda Watershed Action (AQWA) Team. This group serves as a coordination forum for local nonprofit groups, Cities, the Snohomish Conservation District and the Tulalip Tribe. In the past this group has collaboratively organized an Earth Day Event. In 2016 an Earth Day Event will be planned by the City of Marysville. Other members of AQWA Team will be invited to participate but the event may not take the same form as past years. The City plans to continue facilitating the meetings as a coordination forum for the watershed.

Carwash Kit: The City owns two clean water car wash kits. Clean car washing procedures and the kit are advertized on the City web-site, general information board and a flyer located in a kiosk at the front counter of the Public Works Department building. Letters are sent to businesses that are known to allow charity car washing in their parking lots. The letter includes a description of the pollution

problem posed by charity car washes and a brochure about the kit. Each business is asked to distribute information about the car wash kit to any group that wants to host a car wash in their parking lot.

Catch Basin Painting/Stenciling: In 2016 a pilot catch basin painting program will begin. One catch basin located near Comeford Park in downtown Marysville will be decoratively painted. The graphic will depict fish swimming into the catch basin. If there is positive public comment on the graphic, the program may be extended to other locations around the City or as a festival activity.

The City also has a storm drain stenciling program. The stencil says “only rain in this drain” and “Report Dumping Call 363-8100” the City’s spill reporting number. Citizens can request their storm drain to be stenciled. The City of Marysville completes the storm drain stenciling.

City Code: The Marysville Municipal Code contains standards relating to Stormwater treatment and flow control BMPs/facilities, technical standards for stormwater and site and erosion control plans, and low impact development (LID) principals and LID BMPs. City adopted the 2005 Stormwater Management Manual for Western Washington with Ordinance 2816 in January 2010. All review staff and planners have this manual available to them. A link to the Manual is provided on the City website. During the plan review process Engineering Services staff members check for adherence to Manual standards, ensuring that engineers, contractors and developers are aware of the standards. The Surface Water Division, CD, and Engineering Services Division are in the process of reviewing and updating these code sections by December 31, 2016.

EDDS: The Engineering Services Division develops the Engineering Design and Development Standards (EDDS). These standards must be used by engineers, developers and contractors submitting building plans to the City. The EDDS are publicized on the City website and made available at the front counter of the Public Works Department building. The Surface Water Division, CD, and Engineering Services Division are completing a review and update EDDS by December 31, 2016.

Events: Several general information boards have been made to display at citywide events and present to groups. The boards explain permit requirements, stormwater pollution problems and what the target audiences can do to solve them.

2016 City events include:

- Clean Sweep – April 11th-15, 2016
- Earth Day-April
- Poochpalooza- July 9th
- Marysville Street Festival- August 12th-14th
- Touch a Truck- September 10th

The City will also continue to purchase and distribute dog waste bag dispensers for these events. Poochpalooza is the highest priority event for pet waste education. Along with dispenser distribution, the City also provides informational brochures. To track the number of dispensers distributed an Excel spreadsheet with the number of dispensers purchased and distributed is kept. A magnet advertising Marysville’s spill reporting number was created in April 2008. The City may choose to redesign the magnet in 2016 or change the distribution method but keep the message consistent with the prior design. These magnets are also passed out during citywide events.

Handbooks: The “Rain Garden Handbook for Western Washington” was created by Washington State University Extension, Department of Ecology and other project partners and serves as a guide for

design, installation and maintenance of rain gardens. These handbooks are available to City residents at the front counter of the Public Works building and are frequently distributed to homeowners who have drainage problems on their property. The manuals are an excellent source of information about Low Impact Development techniques for the general public, homeowners, landscapers and property managers.

Mutt Mitt Stations: Numerous Pet Waste Stations have been installed in City Parks. The Stations and the information associated with them educate the general public on the health and environmental risks associated with pet waste. The Parks Department will continue to maintain the existing pet waste stations and has purchased additional stations that will be set up as parks expand.

School District Education: The City gives the Marysville School District a reduction in their surface water fees based on the development and implementation of an environmental education program. The program uses the Next Generation Science Standards (NGSS) that were formally adopted by Washington State in 2013. Programs are being taught in the 5th, 7th and High School grade levels and will continue into the 2016/2017 school year.

TV21: A Microsoft Power Point presentation with information about each of the targeted behaviors was created and is displayed on the City's public access channel, TV21. The Power Point presentation is directed to all target audiences. The content of the presentation is periodically updated to target all of the required education elements in different ways. The information rotates with the other general announcements daily on the public access channel.

Private Facility Inspections: The Surface Water Inspector contacts the owners of private commercial and residential stormwater systems. In most residential situations, everyone in the neighborhood is contacted after an inspection has occurred. This program informs owners about the stormwater system and how illicit discharges may affect the system they are responsible for maintaining. The Stormwater Inspector will continue to provide some private facility inspections for facilities that are not required to be inspected by the permit in 2016 as time allows. All private facilities permitted by the City after February 16, 2010 will be inspected per section S5.C.4.c.iii.

General Outreach: The City participates in the regional Puget Sound Starts Here (PSSH) campaign and the Stormwater Outreach for Regional Municipalities (STORM) group. The Puget Sound Starts Here campaign was created by a partnership of regional governments dedicated to improving water quality in our local lakes, rivers, streams and ultimately Puget Sound. The campaign is run by the STORM group, which includes 57 cities and counties in conjunction with the Washington State Puget Sound Partnership and Washington State Department of Ecology. The City plans on continuing to attend the local Snohomish County STORM meetings. Numerous outreach materials including informational ads on Marysville TV, and brochures have been produced including the PSSH logo. These educational materials will continue to be distributed at City events and at the Public Works Department building.

A flyer addressing issues relating to residential car washing was included with the June/July 2013 utility bills. The flyer included a car wash coupon for one local car wash, information about the Puget Sound Car Wash Association charity car washing program, and the Puget Sound Starts Here logo and web site link. The car washing business was asked to keep track of the number of coupons received. Since a large number of coupons were used this program has been planned to continue. In 2015 additional car wash companies were contacted in order to expand the program, but the coupons were not sent because of drought concerns. Further research is needed to determine if the car wash locations

in the City recycle their used water. Depending on the outcome of this research the coupon program may be repeated in the summer of 2016.

Table 2: S5.C.1.a.i - Build General Awareness

Subject Area	Audience					
	General Public	Businesses	Engineers	Contractors	Developers	Land use planners
General impacts of stormwater on surface waters	School Dist Ed, CB Painting/ Stenciling	LSC				
Impacts from impervious surfaces	TV21					
Impacts of illicit discharges and how to report them	TV21, Events, Carwash Kit	LSC, Carwash Kit				
Low impact development (LID) principals and LID BMPs	TV21, Handbooks		EDDS, Code			
Opportunities to become involved in stewardship activities	AQWA Team, Carwash Kit, Adopt-A-Street	Carwash Kit				
Technical standards for stormwater and site and erosion control plans			EDDS, Code			
Stormwater treatment and flow control BMPs/facilities	Private Facility Inspections	Private Facility Inspections	EDDS, Code			
TMDL: bacterial pollution problems and promote proper pet waste management behavior	TV21, Mutt Mitt Stations, Events					

S5.C.1.a.ii To effect behavior change the Surface Water staff have several activities planned to occur in 2016:

Local Source Control (LSC): In 2015 the Local Source Control (LSC) program and a program developed and implemented by the Environmental Coalition of South Seattle (ECOSS) were used to conduct business outreach in the City. The LSC program focuses exclusively on small quantity generators of waste. These businesses have little oversight and are often in need of technical assistance in order to implement Best Management Practices (BMPs) at their sites. The City had been receiving grant funding from the Department of Ecology to conduct the LSC program and the Surface Water Inspector was completing all tasks associated with implementation. Such as inspecting various business sectors, providing appropriate educational materials, assisting to create a spill plan, and providing spill kits and other spill prevention materials where appropriate. The ECOSS business outreach program focused primarily on businesses that had not yet received a visit during the LSC program and other businesses that were added based on the level of risk observed in the field. The program provided informational materials, spill kits and trainings in various different languages.

Assessments of these two programs were conducted in 2015. Both programs have successfully created behavior change in the target audience. Having two business outreach programs at the same time allowed more businesses to be reached during the calendar year. However it created an overlap and some businesses may have been visited multiple times. It is impossible to determine if one program is more effective than the other because of the data recorded by each program and the evaluation tools available for assessment.

In 2016 the Local Source Control Program will be modified based on the assessment of the program. In the future the City will be partnering with the Snohomish County Health Department to conduct the Local Source Control program. Due to the high number of inspections during 2015 and reductions in funding inspections are not planned for 2016. City staff will be working with the Health Department to determine appropriate business sectors to inspect. The next round of inspections will be conducted by Health Department Staff. City staff members will continue to offer other supporting activities such as coordinating stormwater maintenance, coordinating waste removal activities and assisting with possible permitting questions when needed.

Natural Yard Care (NYC): The City is collaborating with Snohomish County and the other Cities within the County to provide a regional Natural Yard Care Program. The program is partially funded by a Grant of Regional or Statewide Significance (GROSS grant) from the Department of Ecology. Snohomish County conducted a multi-session lecture series in the partner communities. The target audience was single-family homeowners residing in urban and suburban areas and having lot sizes 2-acres or less.

The county also completed an extensive program evaluation. The lecture series was a successful means for creating behavior change on the topics covered. The County submitted a Near Term Action for the Snohomish-Stillaguamish Local Integration Organization to continue this program. The City supports the general concept that was submitted and will continue to participate in the planning process for future outreach associated with this program. Future funding for the program will determine the level of participation from the City.

Table 3: S5.C.1.a.ii - To Effect Behavior Change

Subject Area	Audience				
	General Public	Businesses	Residents	Landscapers	Property Managers /owners
Use and storage of automotive chemicals, hazardous cleaning supplies, carwash soaps and other hazardous materials		LSC			
Equipment maintenance		LSC			
Prevention of illicit discharges		LSC			
Yard care techniques protective of water quality			NYC		
Use and storage of pesticides and fertilizers and other household chemicals					
Carpet cleaning and auto repair maintenance					
vehicle, equipment and home/building maintenance					
pet waste management and disposal					
LID principles and LID BMP's					
Stormwater facility maintenance					
Dumpster and trash compactor maintenance		LSC			LSC

S5.C.1.b The City has an Adopt-A-Street program, Catch Basin Painting/Stenciling program (described above) and is active with the Allen Quilceda Watershed Action (AQWA) Team to provide stewardship opportunities to residents. The AQWA Team is comprised of representatives from local city, county and state agencies, the Tulalip Tribe, Marysville School District, non-profit organizations, local businesses and residents. The meetings allow each group to share what they are doing in the watershed and coordinate efforts when possible. This group collaboratively organizes an Earth Day event each year. The meetings are open to the public. The City also offers support to the AQWA team organizations when they are conducting activities within the City.

S5.C.1.c The City (or City partners) has measured the understanding and adoption of the targeted behaviors for the Local Source Control and Natural Yard Care Programs. The evaluation information was used to direct education and outreach resources most effectively in 2016 and for the remainder of this permit term, as described above for each program. The evaluations have been attached to this SWMP as Appendix 3.

2) Public Involvement and Participation

Summary Permit Requirements

- Provide ongoing opportunities for public involvement and participation through advisory councils, public hearings, watershed committees, participation in developing rate-structures or other similar activities.
- Post the SWMP Plan and the annual report on the City web site no later than May 31 each year, and make other submittals available to the public upon request.

Planned Activities

In 2016 Surface Water staff will be revising the surface water comprehensive plan. The public is given opportunities to view this plan during the SEPA review process and when the plan goes to City Council for review and adoption. This update is not expected to include an analysis of surface water rates.

S5.C.2.a. To create opportunities for the public to participate in decision-making processes involving the development, implementation and update of the SWMP Plan Surface Water staff will post requests for public comments annually. A request for comments will be added onto the City utility bills, posted on the front page of the City web site, added to the surface water web page and posted to the City's social media sites. The SWMP will be available for review and comment in January and February of 2016.

S5.C.2.b. The SWMP Plan and the annual report required under S9.A are posted on the Surface Water web page titled "NPDES Phase II Permit" no later than May 31 each year. (<http://marysvillewa.gov/index.aspx?NID=294>). All other submittals are available to the public upon request.

3) Illicit Discharge Detection and Elimination

Summary Permit Requirements

- Mapping the Municipal Separate Storm Sewer System (MS4) on an ongoing basis, with periodical updates as needed.
- Implement an ordinance or other regulatory mechanism to prohibit non-stormwater, illicit discharges into the MS4 to the maximum extent allowable under state and federal law.
- Implement an ongoing program designed to detect and identify non-stormwater discharges and illicit connections into the MS4.
- Implement an ongoing program to address any illicit discharges, including spills and illicit connections, into the MS4.
- Train staff members that are responsible for identification, investigation, termination, cleanup, and reporting of illicit discharges to conduct these activities.

Planned Activities

S5.C.3.a Mapping of the MS4 is done using Geographic Information System (GIS) software called ArcGIS. Mapping information is updated on an ongoing basis. The City of Marysville employs two full time GIS staff members, within the Engineering Division, to handle the mapping requirements for all City utilities. They digitize the MS4 system into ArcGIS utilizing paper and digital record drawings. A Global Positioning System (GPS) is also used in the field to verify the accuracy of the digitization and to map areas that do not have a record drawing. In 2007 GIS staff began mapping all public and private systems that are authorized and/or connected to the MS4.

The City's GIS system includes but is not limited to the following information:

- Known MS4 outfalls and known discharge points
- Receiving waters, other than ground water
- Stormwater pipe (type, material, and size where known)
- Stormwater treatment and flow control BMPs/facilities owned or operated by the City
- Associated drainage areas
- Land use
- Areas served by the MS4 that do not discharge stormwater to surface waters

Discharge points and connections between the City MS4 and other municipalities will be mapped by Grey & Osborne, the consultant completing the surface water comprehensive plan update. The consultant will use existing GIS storm water data to determine the locations that meet the definition of a discharge point. Grey & Osborne will also gather GIS data from the surrounding municipalities to map the known connections. Surface Water and GIS staff members will check the data for consistency with our existing data and completeness. The first phase, completed by Grey & Osborne is planned to be completed by July 2016. The field verification and data quality control phase will be completed by February 2, 2018.

The City's GIS information is available upon request to Ecology, federally-recognized Indian Tribes, municipalities, and the Public.

S5.C.3.b In 2016 the City will continue to apply Chapter 14.21- Illicit Discharge Detection and Elimination (IDDE), and other related sections in Marysville Municipal Code (MMC) to effectively prohibit non-stormwater illicit discharges into the MS4. This Chapter is enforced by the Surface Water Division and the Code Enforcement Officer. The IDDE chapter includes a list of acceptable discharges, conditionally acceptable discharges and prohibited discharges. Surface Water staff plan to evaluate this chapter to ensure it meets all current permit requirements and update the chapter by February 2, 2018 if changes are needed.

S5.C.3.c The City will continue to implement an ongoing program designed to detect and identify non-stormwater discharges and illicit connections into the City’s MS4 using the methods described below:

S5.C.3.c.i To detect and identify non-stormwater discharges and illicit connections to the MS4, the City will continue using the methods described in the *Illicit Connection and Illicit Discharge Filed Screening and Source Tracing Guidance Manual* prepared by Herrera Environmental Consultants in May 2013. Methods implemented include the expansion of IDDE screening practices into existing inspections and daily work activities and the Local Source Control Program.

The City must conduct field screening of at least 40% of the MS4 by December 31, 2017 and 12% of the system thereafter. In order to meet this requirement Surface Water staff had to determine a reasonable method for quantifying the percentage of MS4 screened. After reviewing the definition of a MS4 in the Permit, public street miles were chosen as a proxy measure to represent the MS4.

The City catch basin inspections will serve as the primary IDDE screening method, so the catch basin inspection grids are the basis for analysis. Surface Water staff used GIS information to verify which streets do, and do not, have catch basins. Then the total lane miles of street was determined for each catch basin inspection grid. The total number of lane miles with catch basins was also determined. For each grid, the lane miles with catch basins divided by the total lane miles in the City. This yields a percentage of MS4 field screened per catch basin inspection grid.

Table 4: S5.C.3.c.i- 40% Field Screening Quantification

Grid #	Lineal Ft of St w/ cb's by Grid	Lineal Ft of St w/cb's / Total Lineal Ft in City	Total Lineal Ft of St by Grid	Planned Grid Inspection Yr
1	254,600	23%	350,417	2015
2	254,178	23%	325,507	2016
3	186,345	17%	190,084	2017
4	188,294	17%	240,050	2014*
Totals:	883,417	80%	1,106,058	

* This table represents estimated inspection targets and does not reflect what actually occurs each year. See the annual report for actual inspection totals.

Using this method to quantify the percent of MS4 screened, it is not possible to inspect 100% of the City, because not all streets in the City have catch basins. In order to ensure all areas of the City are screened for illicit discharges, stormwater treatment and flow control BMP's/facilities will also be screened during the normally scheduled annual inspections. Surface Water staff members will emphasize awareness of

IDDE during daily activities as part of IDDE training so that the remaining areas of the City are informally screened. In the past, staff members have reported more incidents of illicit discharges than any other method of identifying discharges.

55.C.3.c.ii The City will maintain the spill reporting hotline in 2016. The hotline number connects to the main Public Works Receptionist during business hours. The receptionist directs the hotline calls to a Surface Water staff member available at the time of the call. After hours, on-call Public Works staff is responsible for response. The hotline is listed in the blue pages under “spill reporting”. The number has also been advertized on magnets distributed at events and advertised on TV21, the City’s local access channel. The City keeps records of all calls received and follow-up actions taken.

55.C.3.c.iii In 2016 Surface Water staff plan to conduct training for municipal field staff, which as part of their normal job responsibilities might come into contact with or otherwise observe an illicit discharge and/or illicit connection to the MS4. Follow-up training will be provided as needed to address changes in procedures, techniques, requirements, or staffing. A record of the content of the training and the staff members trained will be kept for each training event.

55.C.3.c.iv Surface Water staff will inform public employees, businesses, and the general public of hazards associated with illicit discharges and improper disposal of waste through staff trainings, the Local Source Control program, as well as other education and outreach materials (described in the Education and Outreach section).

55.C.3.d Public Works will implement an ongoing program designed to address illicit discharges, including spills and illicit connections, into the City’s MS4.

55.C.3.d.i A written procedure for characterizing the nature of and potential public or environmental threat posed by an illicit discharge was completed in 2011. Procedures follow the guidance of the *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and technical Assessment*, from Center for Watershed Protection, October 2004. All illicit discharges, including spills, which may constitute a threat to human health, welfare, or the environment, are investigated immediately. All other investigations, or referring of investigations, will occur within 7 days of receiving a complaint, report or monitoring information indicating an illicit discharge. Documentation of this procedure will be updated in 2016 and will follow .

55.C.3.d.ii A written procedure for tracing the source of an illicit discharge was completed in 2011. Tracing the source of illicit connections will be conducted using the methodologies suggested in the *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and technical Assessment*, from Center for Watershed Protection, October 2004, including visual inspections, opening manholes, using mobile cameras, and collecting and analyzing water samples. All field investigations will occur within 21 days of any report or discovery of a suspected illicit connection to determine the source of the connection, the nature and volume of discharge through the connection, and the party responsible for the connection.

55.C.3.d.iii Written procedures for eliminating the illicit discharge were completed in 2011. Procedures include notifying appropriate authorities and the property owner, providing technical assistance for eliminating the discharge, follow-up inspections, escalating enforcement and legal actions if the discharge is not eliminated. If an illicit connection is found the enforcement actions specified in Marysville Municipal Code will be used to eliminate the illicit connection within 6 months.

S5.C.3.d.iv In order to ensure compliance with the provisions in (i), (ii), and (iii) above, a review of the procedures will be done in 2016. The review will update those documents to ensure consistency with *Illicit Connection and Illicit Discharge Field Screening and Source Tracing Guidance Manual*, by Herrera Environmental Consultants, May 2013. IDDE records are reviewed annual to ensure all timelines outlined in the Permit have been met.

S5.C.3.e. All staff responsible for identification, investigation, termination, cleanup and reporting illicit discharges, including spills, and illicit connections have received trainings based on the *Illicit Connection and Illicit Discharge Field Screening and Source Tracing Guidance Manual*, by Herrera Environmental Consultants, May 2013 for initial training on these activities. These trainings have been expanded to the field crew conducting stormwater BMP inspections so they can also indentify potential illicit discharges. Training will continue to be implemented by the Surface Water staff members. Trainings developed by others will also be attended, as available, including training opportunities sponsored by the Department of Ecology, HAZWOPER refresher classes, and the Washington State Stormwater Conference.

S5.C.3.f The Surface Water staff will track and maintain records of the activities conducted to meet the requirements of this section in 2016.

4) Controlling Runoff from New Development, Redevelopment and Construction Sites

Summary Permit Requirements

- Implement an ordinance or other enforceable mechanism that addresses runoff from new development, redevelopment, and construction site projects.
- Implement a program that includes a permitting process with site plan review, inspection and enforcement capability.
- Implement a program that includes provisions to verify adequate long-term operation and maintenance (O&M) of stormwater treatment and flow control BMPs/facilities.
- Train staff members that are responsible for are implementing the program to control stormwater runoff from new development, redevelopment, and construction sites, including permitting, plan review, construction site inspections, and enforcement.
- By December 31, 2016 review and revise City development-related codes, rules, standards, or other enforceable documents to incorporate and require LID principles and LID BMPs. The intent of the revisions shall be to make LID the preferred and commonly used approach to site development.

Planned Activities

S5.C.4.a The Surface Water Division and Community Development Department implement the ordinance that was adopted under the 2007 permit to addresses runoff from new development, redevelopment, and construction site projects. By December 31, 2016, the City will adopt a new ordinance or other enforceable mechanism to implement the provisions in Appendix 1 of the current permit and adopt the 2012 Stormwater Management Manual for Western Washington. Marysville Municipal Code sections 14.15.160 and 14.17.040 provide the legal authority to inspect and enforce maintenance standards for private stormwater facilities.

S5.C.4.b The Surface Water Division and Community Development Department are implementing the permitting process that was adopted under the 2007 permit that includes site plan review, inspection and enforcement capability. All development plans received are first reviewed by Planning for general requirements. Then plans are sent to Engineering Services to be reviewed for technical requirements, specified in Appendix 1 and the 2005 Stormwater Management Manual for Western Washington. Concurrent with each of these review cycles the Surface Water Division is routed the plans. Information regarding development plans is entered into a database called TRAKiT. TRAKiT is available to Surface Water staff to view and add information about projects.

The inspection program is implemented for both private and public projects, and is completed by the Surface Water Inspector and Construction Inspectors. The Surface Water Inspector meets with the Engineering Services Manager and Construction Inspectors on a weekly basis to discuss ongoing construction projects. The Surface Water Inspector conducts inspections based on Appendix 7, inspects active construction projects weekly and plats with active home building sites every six months. The Surface Water and Construction Inspectors verify sediment controls are installed and functioning properly throughout the construction project. Inspectors enforce as necessary based on the inspection. Construction and Building Inspectors, within Community Development, complete project check lists

when a development is completed. They verify proper installation of permanent stormwater facilities and verify maintenance requirements are in place. The Inspectors also record their inspection information in TRAKiT.

S5.C.4.c The Surface Water Division and Community Development Department will implement the provisions to verify adequate long-term operation and maintenance (O&M) of stormwater treatment and flow control BMPs/facilities that were adopted under the 2007 permit. These provisions will be reviewed to ensure compliance with the current permit term. If any changes are needed then they will be in place no later than December 31, 2016.

S5.C.4.d Copies of the Notice of Intent for Construction Activity and Notice of Intent for Industrial Activity are made available to representatives of proposed new development and redevelopment sites. They are available at the City of Marysville Community Development/Public Works Department front counter as well as the City web page.

S5.C.4.e All staff whose primary job duties are implementing the program to control stormwater runoff from new development, redevelopment, and construction sites, including permitting, plan review, construction site inspections, and enforcement, are trained to conduct these activities. Follow-up training will be provided as needed to address changes in procedures, techniques or staffing.

S5.C.4.f In 2016 the Surface Water Division and Community Development Department will continue the process of review, revision and implementation of local development-related codes, rules, standards, or other enforceable documents. This review and revision is being completed by City staff members. The Surface Water Division, Community Development, Engineering and Fire Departments will work closely through the process. The intent of the review and revision is to make LID the preferred and commonly used approach to site development. The revisions will be focused on minimizing impervious surfaces, native vegetation loss, and stormwater runoff in all types of development situations. The final review, revision and implementation process will be completed no later than December 31, 2016.

S5.C.4.g The City is not included as part of a watershed selected by a Phase I county for watershed-scale stormwater planning under condition S5.C.4.c of the *Phase I Municipal Stormwater General Permit*. Therefore, the City does not plan to participate in watershed-scale stormwater planning during this permit term.

5) Municipal Operations and Maintenance

Summary Permit Requirements

- Implement maintenance standards that are as protective, or more protective, of facility function than those specified in Chapter 4 of Volume V of the *2012 Stormwater Management Manual for Western Washington*.
- Annual inspection of all municipally owned or operated permanent stormwater treatment and flow control BMPs/facilities, and taking appropriate maintenance actions in accordance with the adopted maintenance standards.
- Spot checks of potentially damaged permanent stormwater treatment and flow control BMPs/facilities after major storm events.
- Complete inspections of all catch basins and inlets owned or operated by the City at least once by August 1, 2017 and every two years thereafter.
- Implement practices, policies and procedures to reduce stormwater impacts associated with road maintenance activities and runoff from all lands owned or maintained by the City.
- Train staff members who have construction, operations or maintenance job functions that may impact stormwater quality.
- Implement a Stormwater Pollution Prevention Plan (SWPPP) for all heavy equipment maintenance or storage yards, and material storage facilities owned or operated by the City.

Planned Activities

55.C.5.a In 2016 the City will continue to implement the maintenance standards adopted under the 2007 Permit. By December 31, 2016, the City will adopt and implement the maintenance standards of Chapter 4 of Volume V of the *2012 Stormwater Management Manual for Western Washington*. If the Stormwater Manual does not have a maintenance standard that applies to a stormwater facility, then the City will use the manual developed by the manufacturer of the facility. In all cases, the applicant shall provide the proposed maintenance program to the City for approval before construction of the facility occurs.

55.C.5.b Annual inspection of all municipally owned or operated permanent stormwater treatment and flow control BMPs/facilities is completed by the Sewer/Storm Maintenance Division or Surface Water staff and maintenance needs are noted. The inspections are tracked using a laptop in the field, with a customized GIS/ Access database program. This ensures that all new facilities will be inspected each year and inspection records are maintained. The records will be compiled annually and kept in a central location.

55.C.5.c The Surface Water staff and the Sewer/Storm Maintenance Division created a list of high priority facilities to check after major storm events. An online precipitation gauge is used to determine if a storm is greater than a 24-hour 10-year recurrence interval. If the storm event is large enough to require spot checks Surface Water staff complete inspections of the high priority facilities and complete an inspection check list using the same GIS/ Access database program that is used for the annual facility inspections. If damage is found all stormwater facilities that may be affected will be inspected. Repairs will be conducted based on the results of inspections. Records of the inspections are downloaded to a central location for tracking purposes.

S5.C.5.d For the 2013 to 2018 permit term all catch basins and inlets owned or operated by the City must be inspected at least once by August 1, 2017 and every two years thereafter. Therefore, the City has been broken into four grids (see Figure 3). One grid will be completed each year until August 1, 2017, and then two grids will be completed for the following year. Inspection and maintenance activity will be recorded in the field using GIS/GPS equipment and a Microsoft Access database. The City has a laptop computer installed in the vector truck. The inspection and maintenance records are stored in an Access database on the laptop. The records are digitally compiled and kept in a central location.

S5.C.5.e The inspection and maintenance program is designed to inspect all sites and to achieve at least a 95% inspection rate. A method for recording each maintenance activity described above has been established. The systems rely heavily on the City GIS data and the City’s Work Order Database. These two systems allow staff to compile maintenance data and track maintenance progress in the office.

S5.C.5.f The City will continue to implement practices put in place under the 2007 permit term to reduce stormwater impacts associated with runoff from all lands owned or maintained by the City. In 2016 these policies and practices will be evaluated for consistency with Chapter 2 of Volume IV of the 2012 *Stormwater Management Manual for Western Washington*

Table 5: S5.C.5.f - Required activities to be addressed by City practices, policies and procedures

Activity	Practice/Policy/Procedure
Pipe cleaning	BMP Document 2012
Cleaning of culverts that convey stormwater in ditch systems	BMP Document 2012
Ditch maintenance	BMP Document 2012
Street cleaning	A grid system has been created for street sweeping and other road maintenance activities. A map of the cleaning grids can be found at the end of this section, Figure 4.
Road repair and resurfacing, including pavement grinding	BMP Document 2012
Snow and ice control	BMP Document 2012
Utility installation	BMP Document 2012
Pavement striping maintenance	BMP Document 2012
Maintaining roadside areas, including vegetation management	BMP Document 2012
Dust control	BMP Document 2012
Application of fertilizers, pesticides, and herbicides according to the instructions for their use, including reducing nutrients and pesticides using alternatives that minimize environmental impacts	The Parks Department developed an Integrated Pest Management Plan (IMP) in 2000. This plan was updated and expanded upon in 2010 to meet the permit requirements.
Sediment and erosion control	BMP Document 2012
Landscape maintenance and vegetation disposal	BMP Document 2012
Trash and pet waste management	BMP Document 2012
Building exterior cleaning and maintenance	BMP Document 2012

S5.C.5.g Surface Water staff developed an on-going training program for employees whose construction, operations or maintenance job functions may impact stormwater quality under the 2007 permit.

Various training methods are used. Surface Water Staff annually present information to the field crews about BMP's. All Public Works crews have been given the City BMP manual from 2012 as a guide in the field. In 2016 the BMP manual from 2012 will be evaluated for consistency with Chapter 2 of Volume IV of the 2012 *Stormwater Management Manual for Western Washington*. In the past the Public Works field crew Leads and the Surface Water Inspector attended the ESA Track 3F: Road Maintenance Crew Training in the Field Environment. The Lead workers and the Surface Water Inspector are responsible for ensuring that City field crews implement the practices they learned at the Track 3F training. Other trainings include pesticide recertification, excavation and trenching safety, and confined spaces training. These various trainings are conducted as needed to enhance the knowledge of field staff members, keep certifications current, and ensure safe practices are followed when inspecting and cleaning the MS4. The Public Works Administrative Services Division maintains records of the trainings provided and the staff trained.

The City also maintains an internal web site. Applicable training materials are posted on a Surface Water page. This ensures that all employees have access to the materials, even if they were not present on the training day. Follow up training is provided as needed to address changes in procedures, techniques or requirements.

S5.C.5.h Surface Water staff has developed a Storm Water Pollution Prevention Plan (SWPPP) for all City owned heavy equipment, maintenance and storage yards and materials storage facilities. This document was created collaboratively between many departments in the City. Department heads are responsible for the implementation of BMP's applicable to their work groups. The SWPPP is updated periodically to ensure it is accurate.

S5.C.5.i The City will maintain records of inspections and maintenance activities conducted as a requirement of the permit. The type and format of record kept varies by activity.

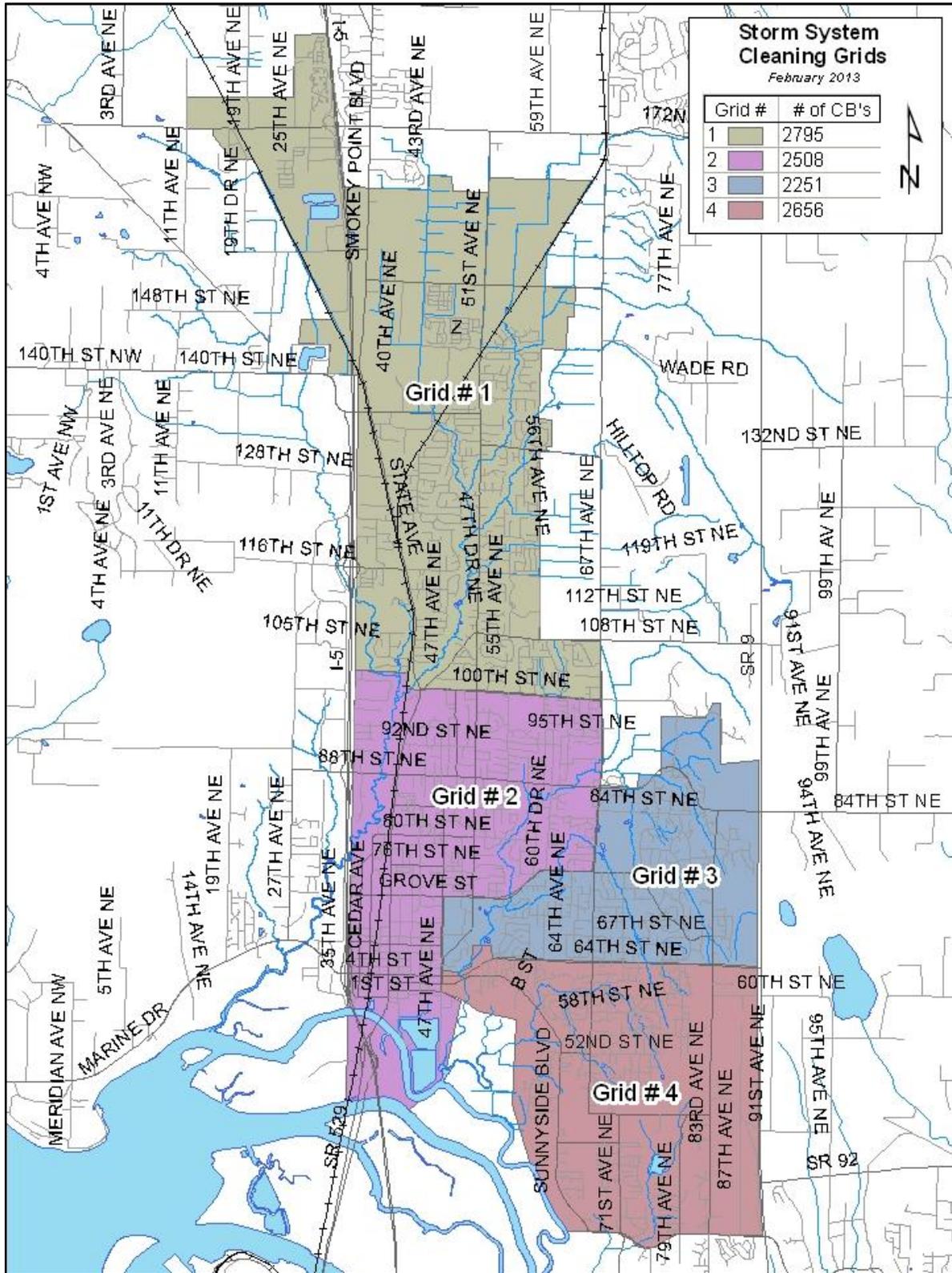


Figure 3- Catch Basin Cleaning Grids

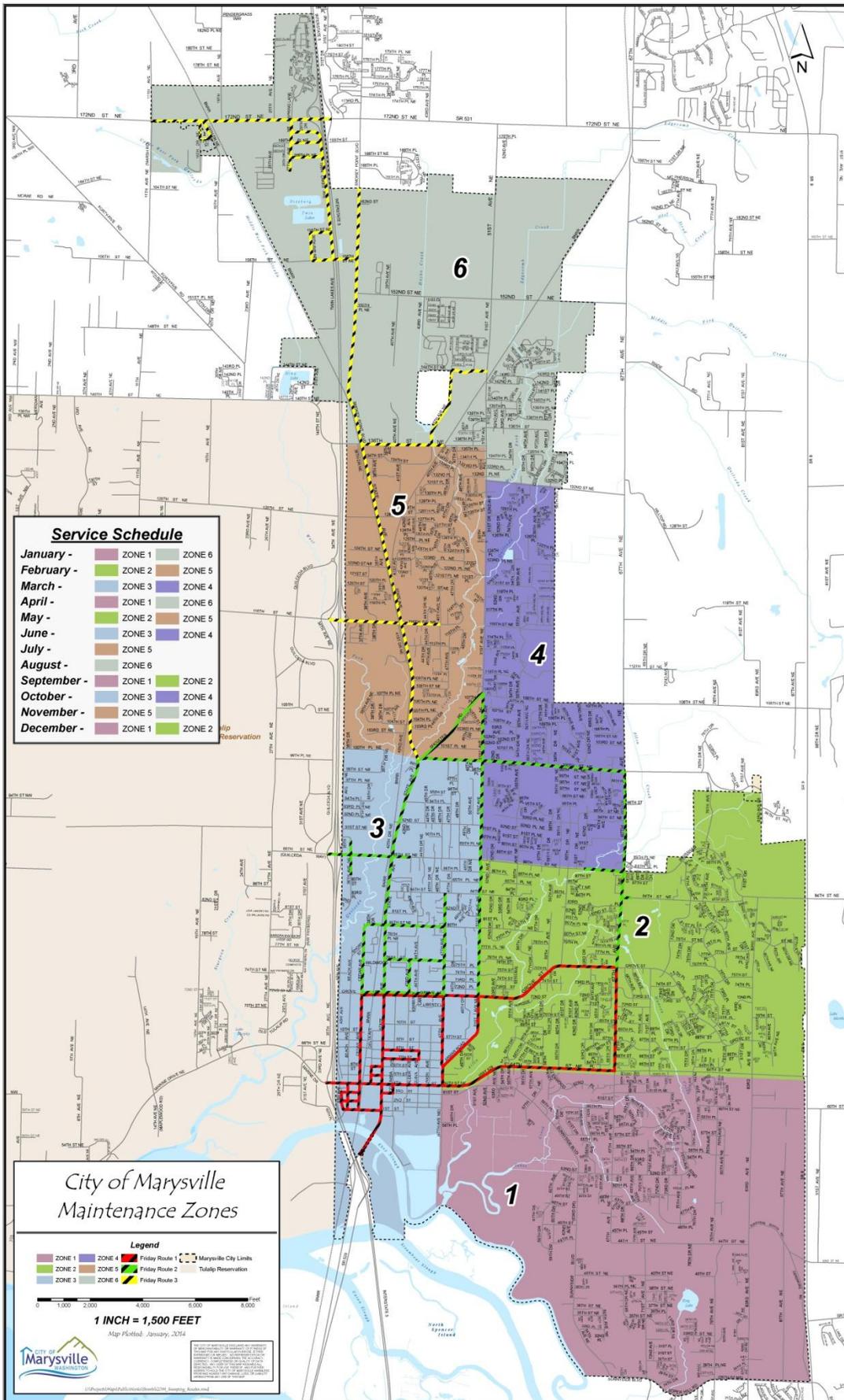


Figure 4 - Street Sweeping Grids

6) Total Maximum Daily Load (TMDL) Requirements

Summary Permit Requirements

- Inspect commercial animal handling areas and commercial composting facilities to ensure implementation of source control BMPs for bacteria and implement an ongoing inspection program to re-inspect facilities with bacteria source control problems a minimum of every three years.
- Conduct public education and outreach activities to increase awareness of bacterial pollution problems and promote proper pet waste management behavior.
- Install and maintain animal waste collection and/or education stations at City parks and other City owned and operated lands reasonably expected to have substantial domestic animal use.
- When conducting IDDE-related field screening under section S5.C.3 of the Permit include screening for bacteria sources.
- Review fecal coliform data collected under the 2007 Permit and identify one high priority area that will be the focus of source identification and elimination efforts. The source identification and elimination program shall be implemented no later than August 1, 2014. The City shall prepare written documentation of this review and the identified high priority area; documentation will be submitted with the Annual Report for 2014.
- Each Permittee shall review the fecal coliform data collected under the 2007 Permit and select surface water monitoring location(s) as appropriate for continued characterization and long-term trends evaluation of fecal coliform.

Planned Activities

Business Inspections: Inspections at commercial animal handling areas and composting facilities within the City were completed in 2015. None of the facilities had bacteria source control problems. At this time there are no inspections scheduled for 2016.

Public Education and Outreach: The City has developed an education and outreach program per section S5.C.1. of the Permit. To build awareness about bacterial pollution several actions will target behaviors that could contribute to this type of pollution, including general information boards, participation in citywide events, and TV21.

General information boards have been made that explain permit requirements, stormwater pollution problems, pet waste management and what the target audiences can do to solve these issues. The boards are displayed at festivals and events Citywide. Events include the Homegrown Festival; Touch a Truck, Earth Day and Poochpalooza. The City will continue to purchase and distribute dog waste bag dispensers for these events. Poochpalooza is the highest priority event for pet waste education. Along with dispenser distribution, the City also provides informational brochures. To track the number of dispensers distributed an Excel spreadsheet with the number of dispensers purchased and distributed is kept. Another avenue for general awareness and outreach is TV21, the City's local access channel, educational information rotates with the general announcements daily.

Operations & Maintenance: Numerous Pet Waste Stations have been installed in City Parks. The Stations and the information associated with them educate the general public on the health and

environmental risks associated with pet waste. The Parks Department will continue to maintain the existing pet waste stations and has purchased additional stations that will be set up as parks expand.

Illicit Discharge Detection and Elimination (IDDE): During any IDDE field activities, screening for bacteria sources will be included as applicable.

Targeted Source Identification & Elimination: Surface Water staff has conducted a review of the fecal coliform data collected per the approved QAPP under the 2007 Permit. From this review, Munson Creek was identified as a high priority area and will be the focus of source identification and elimination efforts during this permit cycle. Surface Water staff members believe that targeted efforts within this watershed can be effective in improving stream health because this tributary is entirely within City limits.

Sampling in the Munson Creek Basin will continue in 2016, see Figure 5 for a map of sampling locations. Samples are taken to the Everett Environmental Lab for analysis. Sampling events may also include testing for E. coli, pH, conductivity, turbidity, dissolved oxygen, flow rate and temperature as needed or desired on a case-by-case basis. These variables may not be recorded each sampling event because the equipment may not be available for use and/or the cost of sampling may be too high.

Based on sampling results the Surface Water staff will prioritize potential bacteria pollution sources to be addressed or investigated further. Probable sources for investigation are sewer alignments close to the creek, septic systems, and waterfowl or other wildlife. The sample results should narrow the location to begin further investigation and therefore rule out, or include, some of the potential sources. The Surface Water staff coordinates with the Sewer/Storm Maintenance Division to employ a mobile sewer camera, vactor truck, and/or dye testing to investigate the potential for contamination from existing sewer lines near the creek. Investigation into potential septic contamination may include field investigation with the Snohomish Health District, dye testing, sampling for optical brighteners, a stream walk and/or microbial source tracking. If sewer and septic systems have been ruled out as sources of pollution then microbial source tracking may be employed to determine if contamination is coming from waterfowl or other wildlife.

In each annual report, the Surface Water staff will provide a TMDL summary including qualitative and quantitative information about the source identification and elimination activities, procedures followed and sampling results.

MONITORING AND ASSESSMENT

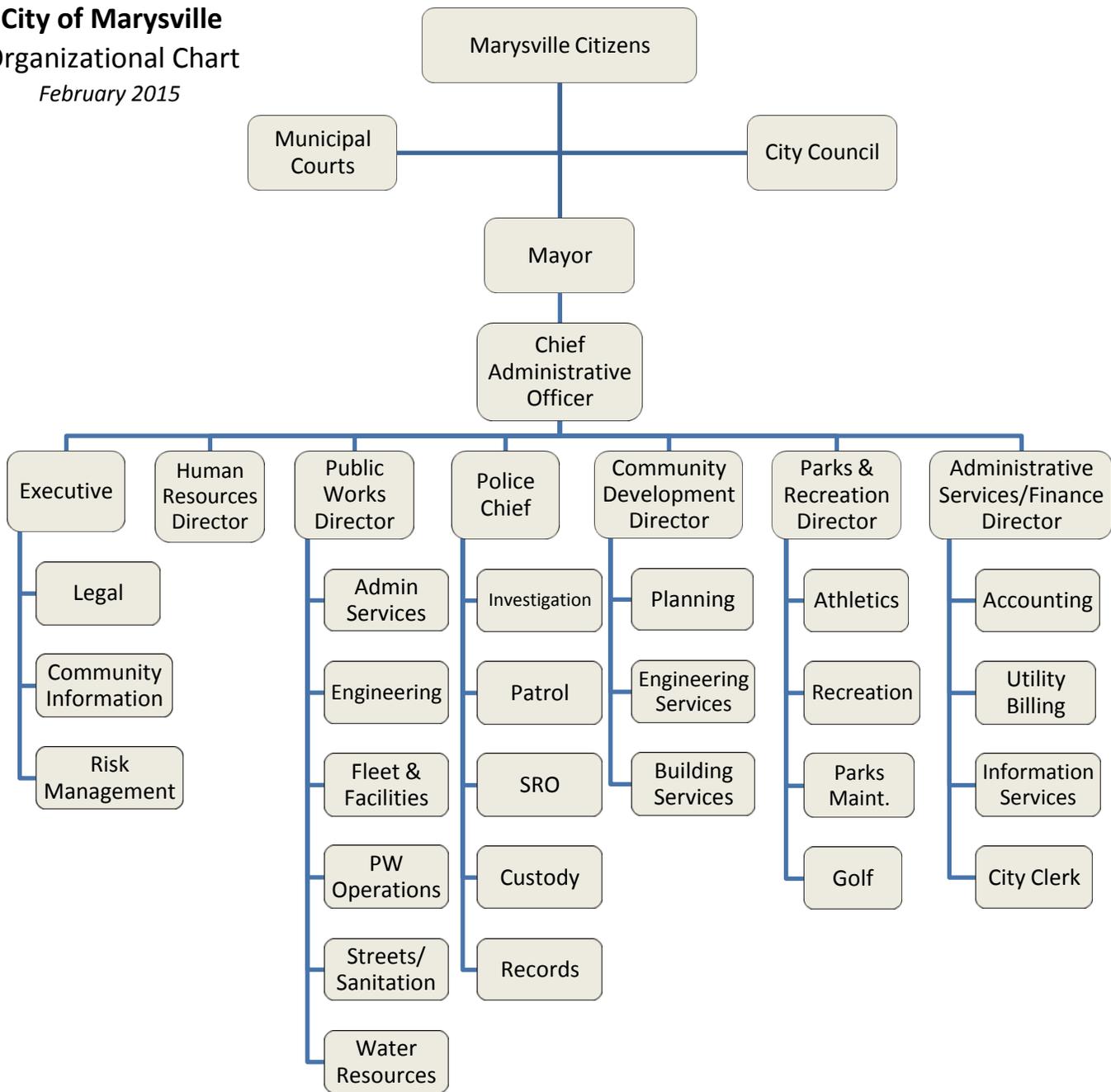
S8.B The City has chosen Status and Trends Monitoring Option #1 to meet this requirement. Option #1 requires that the City pay annually into a collective fund to implement RSMP small streams and marine nearshore status and trends monitoring in Puget Sound.

S8.C The City has chosen Effectiveness Studies Option #1 to meet this requirement. The City will pay annually into a collective fund to implement RSMP effectiveness studies.

S8.D Source identification and diagnostic monitoring requirements will be met by the City by paying annually into a collective fund to implement the RSMP Source Identification Information Repository (SIDIR).

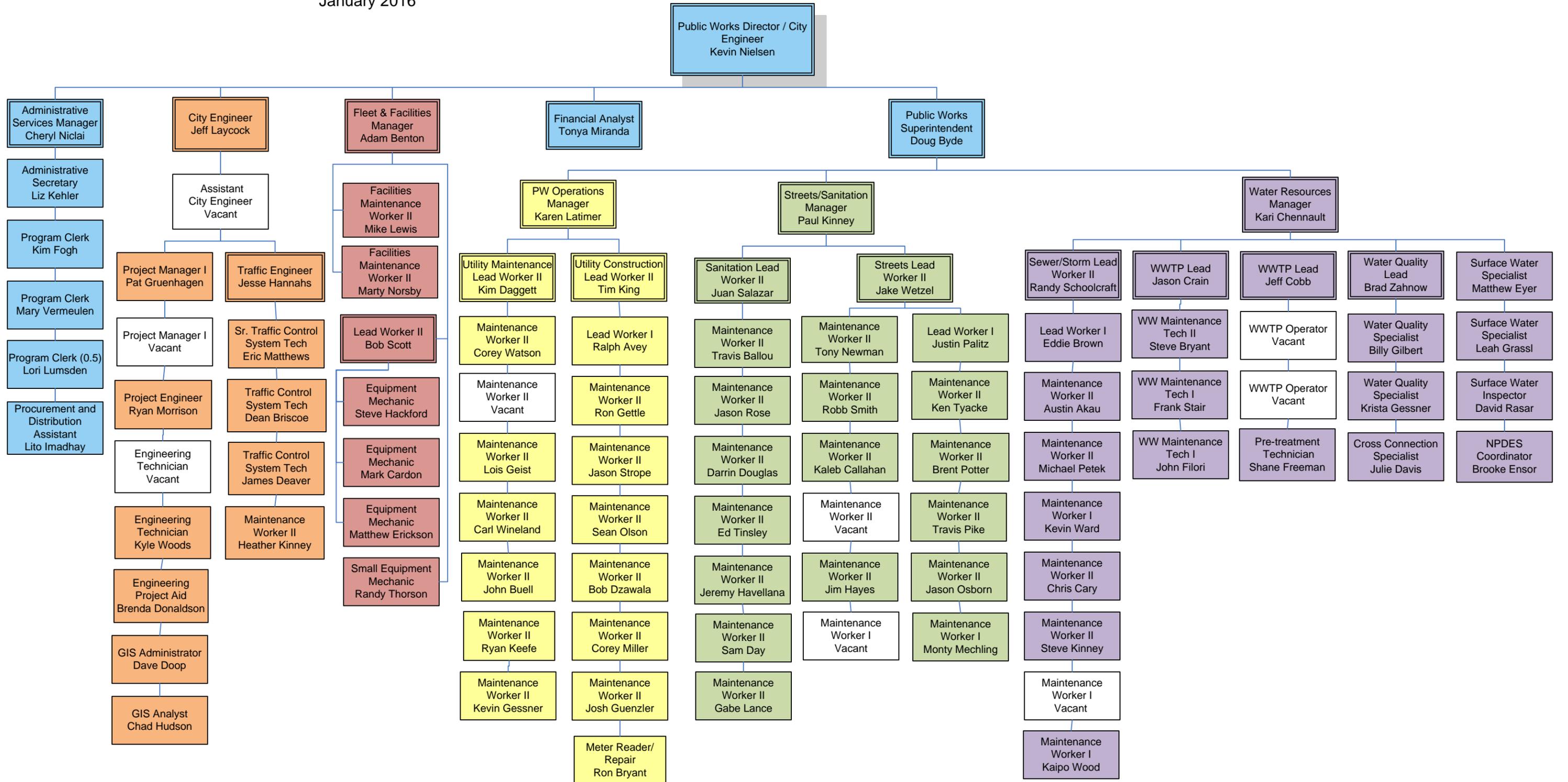
APPENDIX 1- City Organizational Charts

City of Marysville
Organizational Chart
February 2015

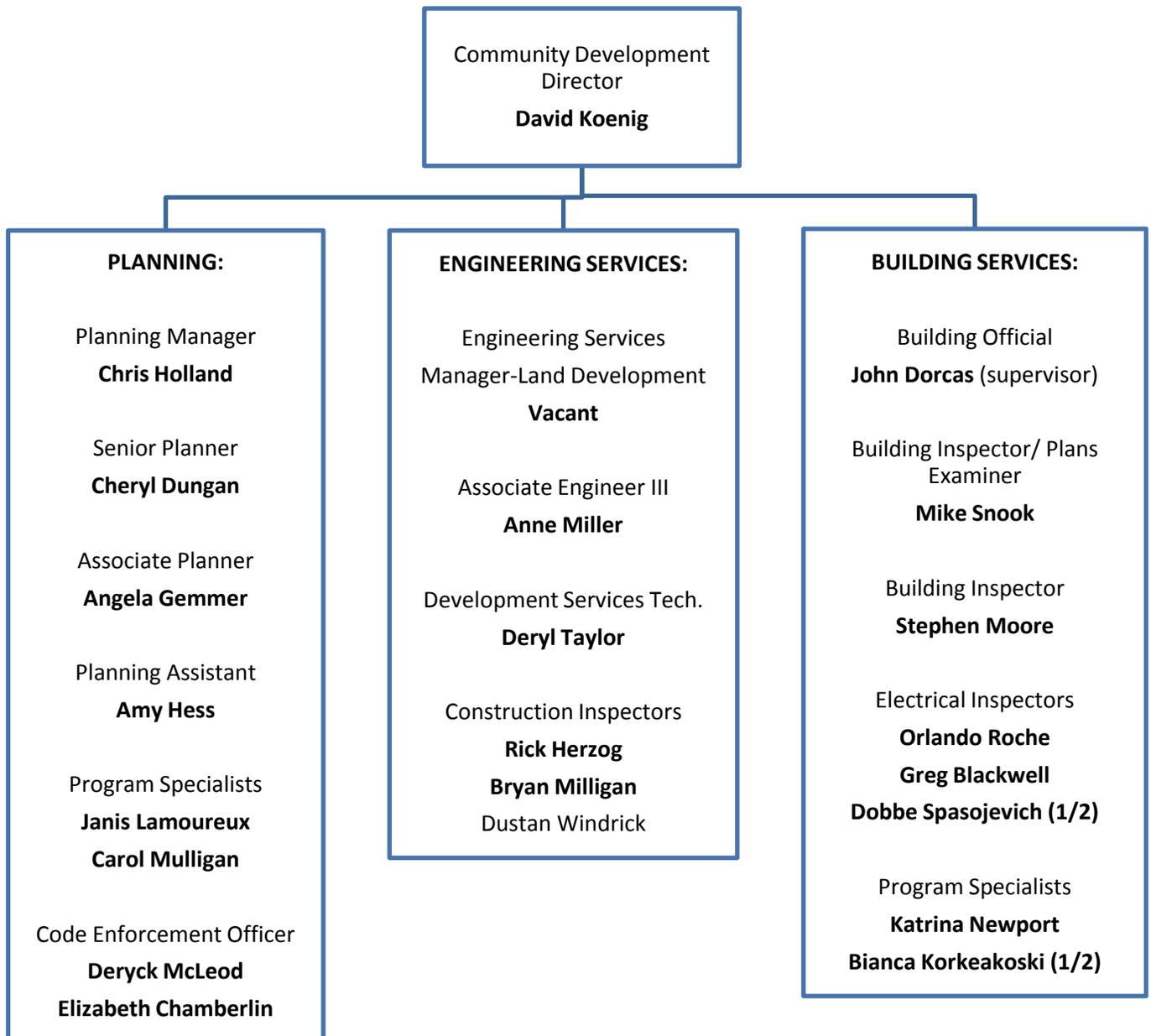


Public Works

January 2016



**Community Development
January 2016**



APPENDIX 2- 2016 Schedule

Condition	Section	Sub-Section	Western Washington Phase II Municipal Stormwater																											
			2016												2017						2018									
			January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April
S5	A1		SWMP Develop & Implement																											
	A2		SWMP Plan Annually Updated																											
	A3	a.	Track Costs or Estimated Costs																											
		b.	Track Inspections, Enforcements & Public Educ. Activities																											
	A4		Continue Implementation of Existing Programs																											
	A5	a.	Include Coord. Mech. w/ Other Entities (If Applicable)																											
		b.	SWMP Includes Internal Coordination Mechanisms																											
	C1			Public Education & Outreach																										
		a.	Provide and ed & outreach program																											
		b.	Create Stewardship Opportunities																											
		c.	Measure Understanding & Adoption of Behaviors																											
	C2			Public Involvement & Participation																										
		a.	Public involvement in SWMP update																											
		b.	SWMP & Annual Report Website Posting																											
	C3			Illicit Discharge Detection and Elimination																										
		a.	Ongoing Stormwater Mapping																											
		b.	IDDE Ordinance Update																											
		c.	Illicit Discharge Detection & Elimination Program																											
		c.i	Field Screen 40% of MS4 12/31/17- 12% yrs thereafter																											
		c.ii	Publically List Phone #'s for Reporting Spills																											
		c.iii	Ongoing Training all Muni. Field Staff																											
		c.iv	IDDE Education																											
		d.	Implement Program to Address Illicit Discharges																											
		e.	Ongoing Training IDDE Staff																											
		f.	Recordkeeping																											
	C4			Construction Site Runoff Program																										
		a.	Update Construction Site Runoff Ordinance																											
		b.	Permit Process / Plan Review & Inspect. w/ new thresholds																											
		c.	O&M for Private Stormwater Facilities & BMPs																											
		d.	Make NOI for Const. & Industrial Site Avail. & Enforce Local Regs on NPDES Const. Sites																											
	e.	Train All Applicable Staff on Above Activities																												
	f.i.	Incorporate LID into Codes, Rules Stnds & Enf. Docs Making LID Preferred/Commonly Used Approach																												
	f.ii	Submit Summary of Results of LID Update Process																												
	g.	Watershed Scale Stormwater Planning w/ Phase I																												

APPENDIX 3- Understanding and Adoption of Targeted Behaviors



Understanding and Adoption Review of the Local Source Control Program

April 2015

From 2012 to 2015 the City of Marysville has been involved with the Department of Ecology Local Source Control Program (LSC). This program involves visiting local businesses that qualify as Small Quantity Generators (SQGs) of hazardous or dangerous wastes, and educating the business operators on waste regulations and responsible waste handling practices. Education topics vary depending on the type of business, but overall topics include: Department of Ecology Best Management Practices (BMPs), waste storage, waste tracking, spill response and preparedness, stormwater system functionality and protection, and waste reduction. The main point expressed during the visits is protecting the stormwater system and surface water bodies from pollutants generated by the business.

During each visit “issues” are identified. An issue is generally defined as a practice, process or situation that is inadequate for protecting the stormwater system, or the improper handling and disposal of wastes. The issues are divided into four categories:

1. **Spills**- related to spill response, spill preparedness and housekeeping
2. **Hazardous waste**- include storage, disposal and tracking of wastes
3. **Stormwater**-related to the maintenance, protection and discharges to the stormwater system
4. **Industrial wastewater**- related to inadequacies with pretreatment of sewer or stormwater discharges

From August 1, 2013 to April 7, 2015, 149 businesses were visited. If needed, follow up visits were conducted approximately 30 days after initial visits, and as needed thereafter to track the progress of the businesses in addressing the identified issues. Follow up visits consisted of a return visit to a business with unresolved issues, either to confirm that issues were resolved, or to provide the business with technical assistance and encouragement to resolve the issues. On average, approximately 2 out of 3 businesses required a follow up visit. If a business was unable to, or chose not to resolve an issue, follow up phone calls and/or visits were continued for approximately 60 days after the initial site visit. If no progress was made to rectify the issues, follow up efforts ceased. If there was a serious issue that violated state law or city ordinance, the case would be referred to the Department of Ecology or City of Marysville Code Enforcement for further follow up.

During the initial site visits, 108 issues were identified (some businesses had multiple issues). In total, 101 follow up visits were conducted as a result. Spills related deficiencies accounted for 69% of the issues, hazardous waste 26%, stormwater 6% and industrial wastewater 0%. Of the 108 total number of issues identified, 74% were corrected. Issues with spills were most commonly resolved (51%) followed by hazardous waste (37%), and stormwater (12%).

These results show a measurable rate of understanding and adoption of targeted behaviors amongst small business owners. Visiting local businesses and discussing the needs and benefits of protecting stormwater has shown to be a worthwhile effort, with 74% of issue resolution. After contact was made through the LSC program, business operators understood the importance of protecting surface water, and took actions to resolve the issues. In cases where the issues were not resolved, outreach was conducted in a way that shed light on problems and helped the business to understand possible solutions and their liability if the situation was not rectified.

The rate of issue resolution may not encompass all the behavior changes that are occurring because of the LSC program. Many businesses did not have issues at the initial visit. In cases where a business does not have any issues identified, having the discussion about protecting stormwater with owners, managers and staff is still worthwhile outreach that could result in behavior change.

Businesses have staff turnover and/or complacency, change in facility infrastructure or functions, and cost management measures that threaten to undermine the ongoing implementation of best management practices, so recurring visits and educational outreach are necessary for continued success. Overall, the LSC program has been an effective way to implement education and outreach. However the program has been time consuming for the staff members involved. On average, involvement in the LSC program occupied the time of approximately 0.2 to 0.4 full time employees (FTE) (8 to 16 hours per week). This time includes the initial site visits, business research, database entry and subsequent re-visits and follow up efforts. The Surface Water Inspector is the primary person responsible for program implementation. It has been difficult to maintain the level of effort necessary to conduct this program because of the other job duties required of this job position.

This analysis of the Local Source Control program was completed to direct the City's education and outreach resources most effectively (S5.C.1.c). The City of Marysville will apply for funding from the Department of Ecology to continue the LSC program. To minimize the time required for program implementation, the LSC responsibilities will be subcontracted to the Snohomish County Health District (SCHD) for the 2015 to 2017 LSC contract period. LSC specialists from the SCHD will conduct LSC visits within Marysville city limits at a rate of 0.5 FTE. Metrics of understanding and adoption will continue to be tracked throughout program implementation.



2015 ECOSS Pollution Prevention Outreach Report For the City of Marysville

Introduction

The number one source of pollution in Washington State's waters is stormwater (also known as polluted runoff). Small spills, unintentional deposits, and leaks from equipment/machinery that occur in businesses travel across impervious surfaces until finally being deposited in local waterbodies, particularly during rainy days. The polluted runoff has environmental impacts that effect both wildlife and human health. According to the U.S. E.P.A.'s "Urban Storm Water Preliminary Data Summary", the impacts range from the proliferation of bacteria and disease causing organisms, possible contamination of water supplies, beach closures, and higher rates of pre-spawn mortality amongst fish populations.

Controlling polluted runoff and non-point source pollution is key to protecting and restoring the Puget Sound ecosystem and the amenities the waterway provides to local communities. The greatest opportunity for systemic change is for businesses, residents and agencies to do their part and prevent pollution before it gets to the Puget Sound, today and in the future.

The Environmental Coalition of South Seattle (ECOSS) began an expansion of the Puget Sound Spill Kit Program with funding from a wide spectrum of partnerships. The goal of the program is to help increase awareness of stormwater pollution, and spill preparedness in small to medium sized businesses with connectivity to Puget Sound. ECOSS has developed partnerships with over 25 local municipalities, including the City of Marysville to help meet local water quality goals and assist in educating local businesses through this program.

By providing free spill cleanup materials as an incentive, ECOSS seeks to engage businesses on the subject of stormwater pollution prevention, help them save money, and contribute to a cleaner Puget Sound.

Implementation

Business Prioritization

The City of Marysville provided an initial list of preferred businesses from which ECOSS launched the program. ECOSS' outreach staff added additional businesses to the list through field research based on the level of risk observed in the field. The following facility activities were used as the standard to assess risk:

- Fueling and fuel transfer
- Outdoor manufacturing
- Outdoor equipment/vehicle maintenance
- Outside drum or container storage
- Vehicle, equipment, or building washing
- Loading/unloading of products
- Landscape construction/maintenance
- Outside storage of uncovered materials

In the City of Marysville, **58** businesses were identified and served through these approaches in 2015 (see Appendix A for a list of businesses served).

Outreach and Materials

ECOSS' outreach staff made contact with each business through a site visit and introduced themselves as a partner of City of Marysville. When available, the outreach staff also used referrals through property management companies, business associations, networks, and in some cases, other agencies, as a means of introduction. The ECOSS team has provided outreach in multiple languages in addition to English which includes: Spanish, Vietnamese, Korean, Somali, Mandarin/Cantonese, and Amharic.

A suite of outreach materials was developed with the help of a social marketing consultant. As part of this program, businesses were interviewed to gather information about the perceived barriers and benefits of their participation in the program. A list of the materials is provided below:

- **Program brochure** (Appendix B) – This was the primary tool used to introduce the program and to substantiate the city's participation. The brochure covers the issue of polluted runoff, the benefits to participation in the program, and historical background on ECOSS to increase the level of trust.
- **Instructional Poster** (Appendix C) – A tool that illustrates the steps to clean up a spill. In early 2014, ECOSS translated the Instructional Posters into five languages: Chinese, Korean, Somali, Spanish, and Vietnamese. The translated documents are available to businesses with employees who speak English as a Second Language (ESL). These documents were made to further assist

multicultural businesses owners and employees to better understand stormwater management.

- **Spill plan** (Appendix D) – This plan was developed with the information collected from each business and it details the site-specific risks and contact information for emergency response. Depending on the languages needs of the businesses, the plans were provided in English exclusively or bilingual English and another language: Chinese, Korean, Somali, Spanish, or Vietnamese. Samples of English-only plan and a bilingual plan are shown in Appendix D.
- **Site map** (Appendix E) - Geographic Information System (GIS) data provided by the cities was used to create maps of each business site that showed its stormwater infrastructure and connectivity to Puget Sound. A sample is shown in Appendix E.

Initial and Follow-up Visits

During the initial visit, participating businesses were given a brief primer on the subject of stormwater and its effect on water quality. As an incentive to responsibly address onsite spills, the business received a free spill kit (Figure 1) containing either universal or oil-only sorbent materials capable of cleaning seven gallons of liquid. The kit contents are:

- 1 - 6.5 Gal UN Rated Pail w/lid
- 2 - Disposal Bag (4 mil)
- 2 - Disposal Bag (6 mil)
- 4 - Poly Zip Ties
- 20 - Heavy Wt. Sorbent Pads
- 2 - 3" x 48" Sorbent Socks
- 1 - Pair Nitrile Gloves
- 2 - Splash Resistant Goggles
- 1 - Instruction/Contents Page
- 2 - Spill Response Labels
- 1 - Grate Hook



Figure 1. Spill kit provided to participating businesses.

Outreach staff provided training on the proper use and disposal of kit materials, as well as an instructional poster on how to clean spills. Staff collected information on existing liquids and potentially high-risk activities, and made a follow-up visit to each business to provide the individualized spill plan and site map. During this follow-up visit, the outreach staff assessed the chosen location of the spill kit on-site and offered

suggestions when applicable. The businesses were reminded of ECOSS' role as a resource for future trainings (also available in a variety of languages) for their employees.

Baseline and Follow-up Survey

During the initial visit, a baseline survey was conducted to develop an understanding of the level of awareness on the part of businesses owners or staff. This survey helped paint a picture of what businesses' beliefs were regarding liability and responsibility before the interaction as well as awareness level. Later, a representative sample of the businesses served were re-contacted for a follow-up survey. The purpose was to assess the level of understanding of the issue that was retained since the first interaction.

2nd Training

In 2014, ECOSS developed a thorough evaluation report on the effectiveness of the program. We found significant numbers of businesses had not been providing spill prevention trainings to their employees on a regular basis. As a solution to further improve the effectiveness of the program, ECOSS started revisiting previously served businesses to offer them free training opportunities. As part of the 2nd training, the outreach staff reminds business managers and employees about the latest required BMPs, spill kit replenishments, spill prevention plan update and emergency spill contact update (if applicable). ECOSS generally does not provide a 2nd free spill kit to businesses, but outreach staff provides detailed spill kit purchasing information to business managers on each visit. If language barrier is an issue for business manager to train their employees, ECOSS also offers trainings in 17 different languages.

Business Served and Their Stormwater Awareness

Characteristics

In 2015, a total of 58 businesses were served through this program in the City of Marysville (Appendix A). A breakdown of the types of businesses served in this city is shown in Figure 2.

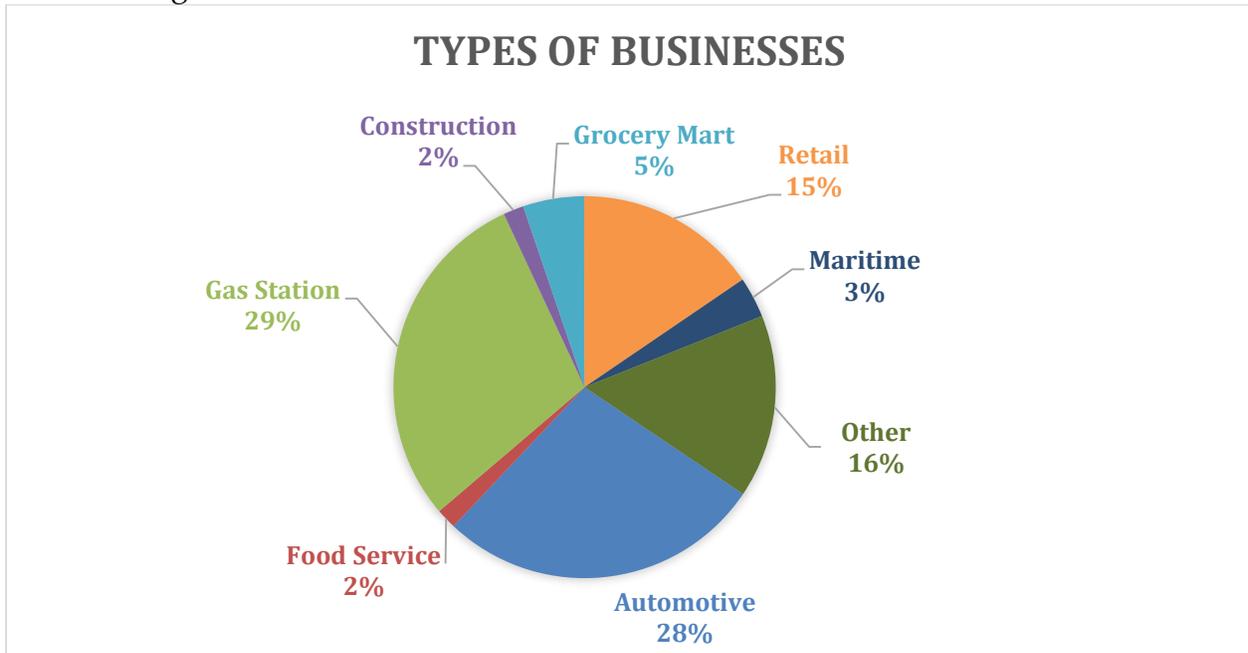


Figure 2: Business Sector Breakdown

Languages

Through this program, ECOSS' Multicultural Outreach Team utilized their language capacities to connect with hard-to-reach businesses. As seen in Figure 3, 19% of the businesses served in the City of Marysville spoke English as a Second Language (ESL).

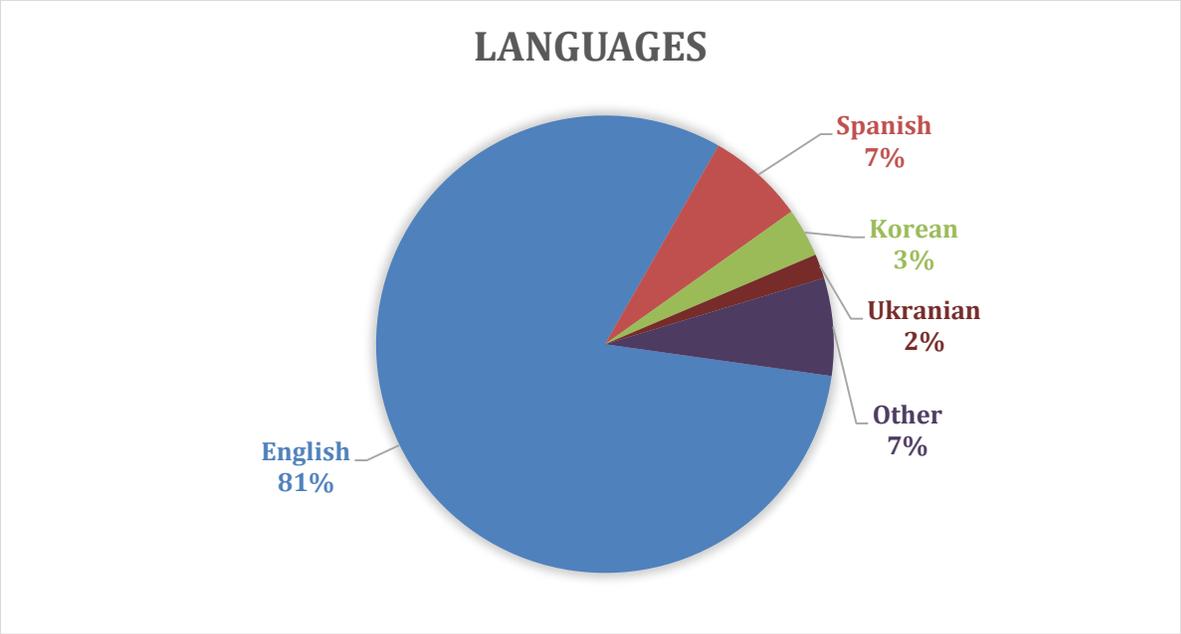


Figure 3: Primary Language Spoken Breakdown

The rest of this section includes results from all the participating cities.

Out of the total businesses served in this program throughout all the cities in 2015, 34% spoke ESL. A breakdown of the languages spoken by the businesses program-wide is shown in Table 1.

Demographic Data of Businesses Served	
Language	Percentage
English	66%
Korean	7%
Spanish	6%
Somali	2%
Vietnamese	4%
Chinese	6%
Other	9%

Table 1: Primary languages spoken by businesses

Survey Results

During the initial visit, a baseline survey was conducted to develop an understanding of the level of awareness on the part of business owners or staff. This survey helped paint a picture of what businesses’ beliefs were regarding liability and responsibility before the interaction as well as awareness level. Later, a representative sample of the businesses served were re-contacted for a follow-up survey. The purpose of which was

to assess the level of understanding of the issue that was retained since the first interaction.

Participating businesses were asked to answer all of the questions in the Baseline Survey, and about 36% of participating businesses responded to the follow-up survey. Additionally, we developed a series of more involved questions for those willing to take part in a longer and more in-depth interview to discuss details of on-site spills and their impressions of the program. The following figures highlight some of the success and barriers we had from the project.

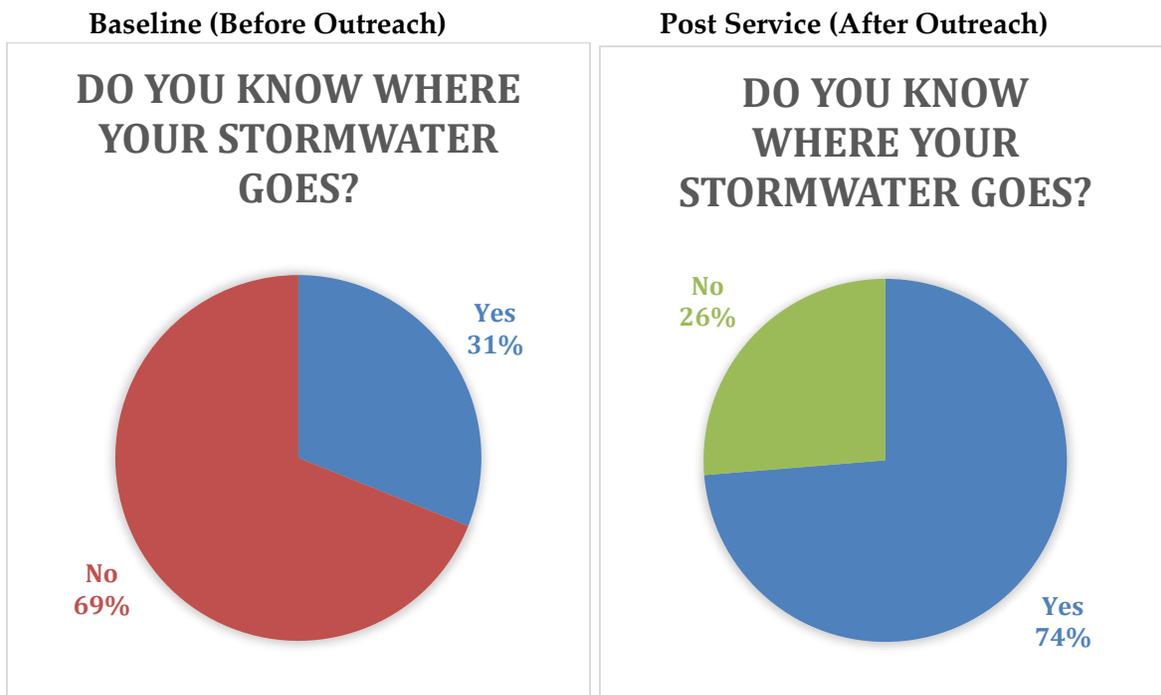


Figure 4. Baseline and Post-Service Question1a Result Comparison

Business managers and owners showed significant improvement on understanding where the stormwater runoff goes from their sites after the outreach, as 74% reported to know where their stormwater goes after the outreach, compared to 31% before the outreach (Figure 4). This can be attributed to onsite training and site-specified GIS maps provided by the outreach staff.

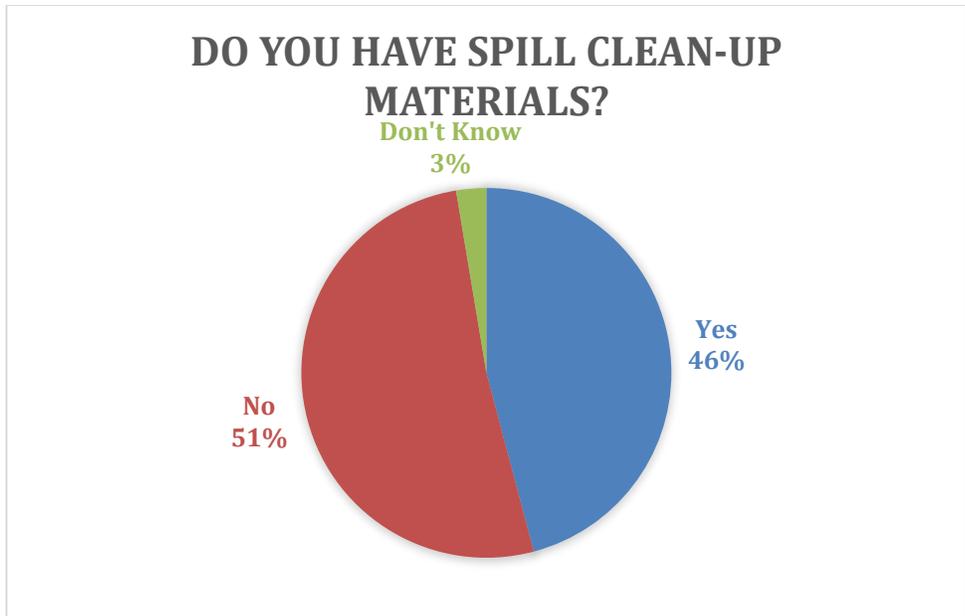


Figure 5. Baseline Question 3a survey result.

During the initial outreach, ECOSS' staff identified if the businesses had any spill clean-up materials (e.g. shop rags, sorbent pads/booms, sorbent powder, etc.) onsite. The team found that about **46%** of the businesses had some materials to address spill incidents (Figure 5). In these circumstances, our staff would educate and assist the businesses to utilize all tools available to address outdoor spills.



Figure 6. Is it business responsibility for outdoor spill cleanup?

We also found that **73%** of the business recognized outdoor spill was their responsibility to clean up (Figure 6). However as seen above, only 46% of the business had any materials to address spill incident. Although it was not documented in our

survey, many businesses managers were not aware of any regulatory liabilities associated with outdoor spills.

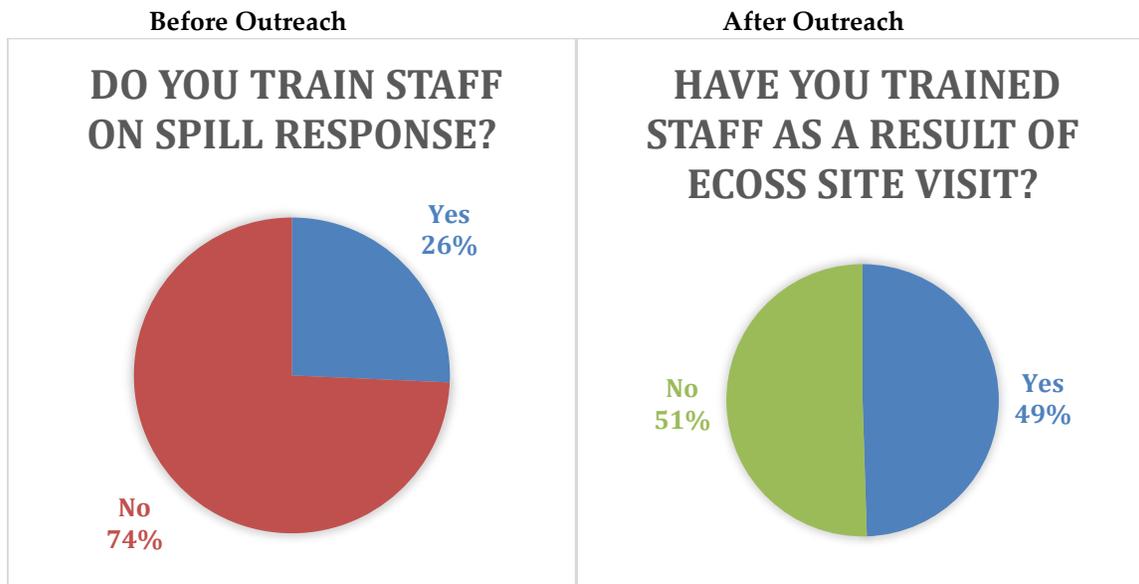


Figure 7. Baseline Question 4a and Post-service Question 4a result comparison.

Only 26% of the businesses trained their staff on spill response prior to the outreach, whereas 49% of the businesses conducted trainings for their staff as a result of the visit (Figure 7). While apparently automotive businesses were more likely to train their staff after the visit, food service businesses were least likely to do it. When ECOSS identified the issue of low training rate among business sectors in 2014, we started revisiting some of the served businesses to remind them the importance of spill response training to their employees.



Figure 8. Post-service survey Question 2a result.

After conducting the post-service survey, the team found that about **11%** of the businesses surveyed had already utilized the spill kits since receiving the training (Figure 8). Most of these businesses used the spill kits for cleaning up common vehicle fluids (**73%**), while others used the kits for miscellaneous chemicals (**10%**) and waste such as paints, solvents (**4%**) and cleaning products (**4%**) and fat, oil and grease (**4%**) (Figure 9). All but six of these spills were less than five gallons.

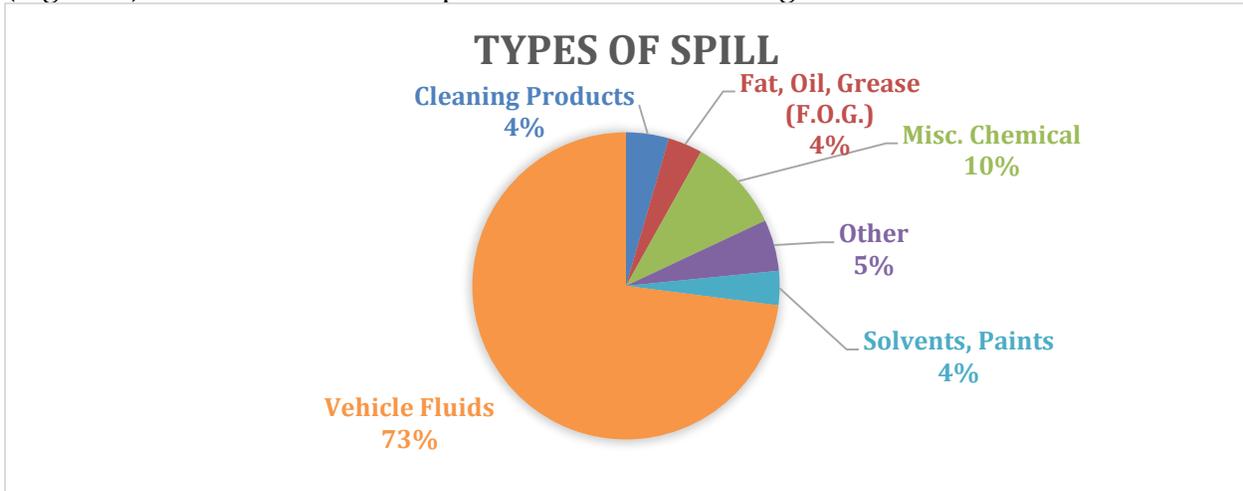


Figure 9. Types of spills record in post-service survey

Since our visits, 79% of the businesses have adopted new spill prevention practices for their businesses. (Figure 10) As part of the initial training, ECOSS staff encouraged businesses to utilize the Spill Prevention Plan as a training tool and guideline to educate their employees on the importance of cleaning up spill.

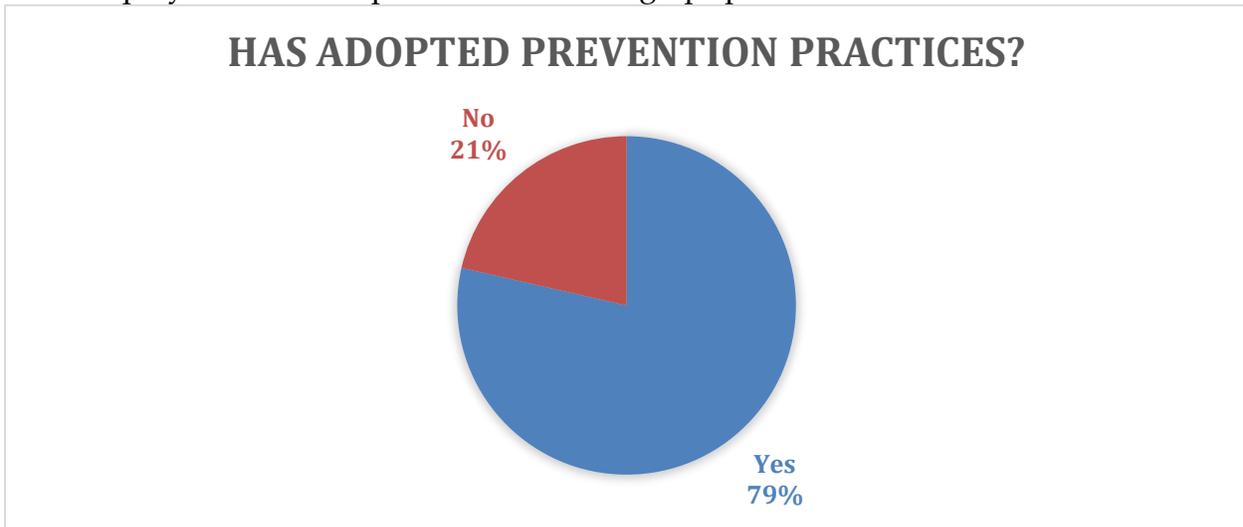


Figure 10. Have the businesses adopted spill prevention practices?

ECOSS found about 50% of the businesses served were ‘Very Confident’ in cleaning up spill whereas 45% were “Somewhat Confident” and only 5% were “Not Very Confident” and “Not Confident at all” (Figure 11). The survey result showed most

businesses managers are confident to response to a spill after ECOSS' spill prevention training.

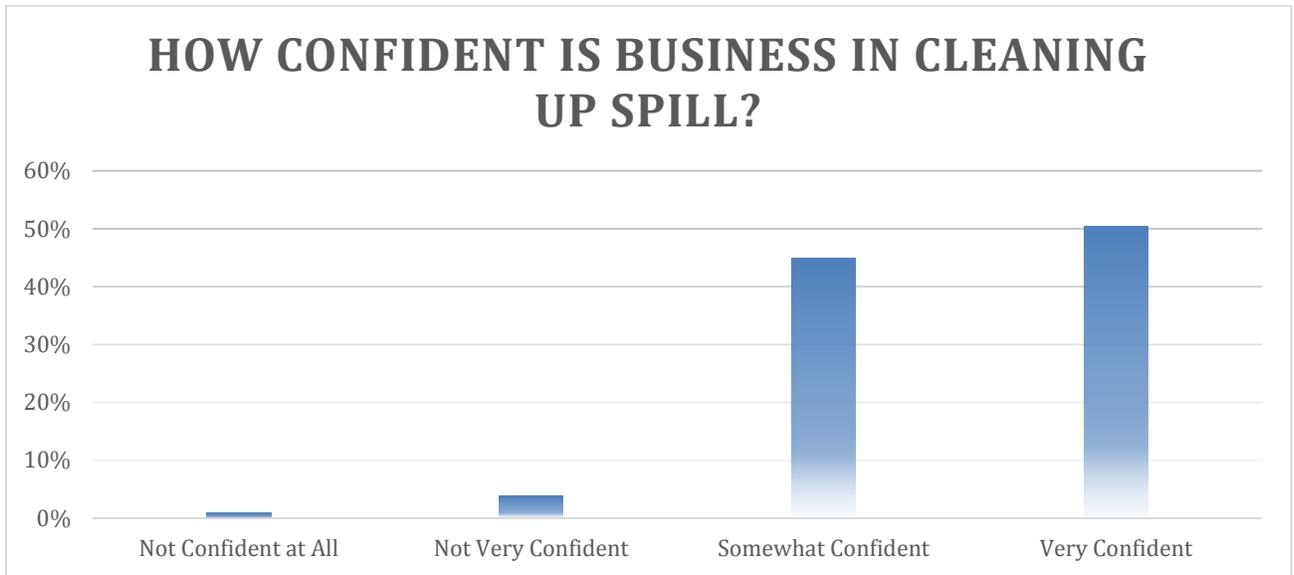


Figure 11. How confident is businesses in cleaning up spill

Conclusions

In summary, the main 2015 outcomes for the City of Marysville from this project are:

- A total of **58** businesses in City of Marysville received educational training and a spill kit (Appendix A).
- **19%** of the businesses served in the City of Marysville spoke ESL. The most common language spoken other than English is Spanish within the served businesses.
- About **11%** of the businesses (of all participating cities) served reported an outdoor spill since receiving the service and utilized the spill kit they received to clean up the spill. Assuming that those businesses were in jurisdictions that had spill response programs, those agencies would have collectively saved approximately \$32,000. Assuming that a spill was not cleaned, and therefore did reach a storm drain, a contractor would need to be used to address the spill by jurisdictions without spill response equipment. In this case the cumulative costs would have been close to \$300,000.
- Prior to the service, **31%** of the businesses that took part in the program were unaware of where polluted runoff went; while this number increased significantly to **72%** with the sample of businesses that completed a Post-Service Survey.
- Expressed support on the part of the municipality was crucial to gaining the trust of the business' representatives
- Most of the trainings were very well-received and the outreach team received very positive feedback from the attendees about how much they learned.

Recommendations and Next Steps

- Based on the use of the kits amongst the business community, ECOSS recommends continuing to provide the program for 2016. By both engaging new businesses and revisiting some earlier-served businesses, ECOSS can further solidify the principles of spill prevention and clean-up within City's business community.
- ECOSS recommends revisiting previously served businesses to provide a refresher training. While conducting the Post-Service survey, we found that though many businesses did provide trainings their employees, due to high staff turnover, inconvenience, and other reasons, a majority of the businesses that we worked with did not provide trainings on these issues to their staff. Not only would a refresher training encourage businesses to recognize instances in which the spill kit would be of use, but it would also help the city to develop

meaningful relationships with the businesses by indirectly providing this free resource.

- As this program continues in the future, it would be best to allocate resources to allow more time for staff to be an ongoing resource to the businesses served. By providing regularly recurring training, not only would we increase the value of the program to businesses that don't have the resources and experience to train their staff, but also increase the likelihood that pollution prevention practices become institutionally embedded at those businesses.
- ECOSS has received some direct support for this program from a number of historic partners in 2015. ECOSS continues to underwrite a portion of the costs for this program through grants, however, we are exploring funding options and arrangements that may pool direct financial support. We will be engaging with all of our partners in the near future to find feedback, ideas, and recommendations of the most efficient way in which funding for this highly effective program can be managed.

Appendix A: Table of Businesses Served.

Business Name	Address	City	Primary Language Spoken	Accepted Service
Type of Business: Automotive (17 records)				
Formula Tire & Car Care Center	9229 State Ave	Marysville	English	Yes
Excell Commercial Tire Service	16319 Smokey Point Blvd	Marysville	English	Yes
Sound Harley Davidson	16212 Smokey Point Blvd	Marysville	English	Yes
Tulalip Motor Sports	100 State Street	Marysville	English	No
O'Reilly's Auto Parts - State Ave	1273 State Ave	Marysville	English	Yes
Autozone - Marysville	1090 State Ave	Marysville	Spanish	Yes
Marysville Auto Parts - NAPA	8213 B State Street	Marysville	English	Yes
Pep Boys	70 C State Ave	Marysville	English	Yes
Western Peterbilt	15330 Smokey Point Blvd	Marysville	English	Yes
O'Reilly Auto Parts	6618 - 64th Street NE, #G	Marysville	English	Yes
A&V Auto Sales	606 Cedar Ave	Marysville	Ukrainian	Yes
J&R Auto Sports	9028 A State Ave	Marysville	English	Yes
Honda of Marysville	15714 Smokey Point Blvd	Marysville	English	Yes
Quick Lane @ Marysville Ford	15900 Smokey Point Blvd	Marysville	English	Yes
PCD Auto Detail	417 Cedar Ave	Marysville	Spanish	Yes
Bone's Automotive	1215 - 3rd Street	Marysville	English	Yes
Northend Truck Equipment Inc.	14919 - 40th Ave NE	Marysville	English	Yes
Type of Business: Construction (1 record)				
E & E Lumber	1364 State Ave	Marysville	English	Yes
Type of Business: Food Service (1 record)				
Fanny's Restaurant	505 Cedar Ave, Suite A-1	Marysville	English	Yes
Type of Business: Gas Station (17 records)				

State Street Food Mart	1034 State Ave	Marysville	Other (See Notes)	Yes
Quick Stop	9515 State Ave	Marysville	English	Yes
Grove Street Food Mart	5830 Grove Street	Marysville	Other (See Notes)	Yes
Marysville Shell & Food Court	11601 State Ave NE	Marysville	English	Yes
Marysville Chevron	1206 - 4th Street	Marysville	English	Yes
Jackpot Foodmart	6031 47th Ave NE, Suite A	Marysville	English	Yes
Jacksons #601	1209 - 4th Street	Marysville	Spanish	Yes
Circle K	8007 State Ave	Marysville	English	Yes
AM/PM Mini Mart	1124 - 4th Street	Marysville	English	Yes
First Stop Food Mart	70 B State Street	Marysville	Korean	Yes
Marysville Bigfoot Java & Shell	3608 - 88th St NE	Marysville	English	Yes
Petrocard	706 Cedar Ave	Marysville	English	Yes
7-Eleven - 88th	3609 - 88th St NE	Marysville	Other (See Notes)	Yes
88th Shell Station	3506 - 88th St	Marysville	Korean	Yes
7-Eleven - Shoultes Rd	10013A Shoultes Rd	Marysville	English	Yes
Donna's Travel Plaza (Petrocard)	3104 - 116th St SE	Marysville	English	Yes
Lakewood Station General Store	1401 - 172nd St NE	Marysville	English	Yes
Type of Business: Grocery Mart (3 records)				
Albertsons - Msvl	301 Marysville Mall #60	Marysville	English	Yes
Safeway - Msvl	1258 State St	Marysville	English	Yes
Grove Street Market	5931 Grove Street	Marysville	Other (See Notes)	Yes
Type of Business: Manufacturing (1 record)				
Kylemont Industries	1042 Ash Street	Marysville	Spanish	Yes
Type of Business: Maritime (2 records)				
RV Marine Supply by Cascade LLC	1108 State Ave	Marysville	English	Yes
CJ's Marine Supplies Inc.	1326 - 1st Street	Marysville	English	Yes
Type of Business: Other (7 records)				

Superhawk Canopies	8016 State Ave	Marysville	English	Yes
Bud Barton's Glas-co Inc.	805 Cedar Ave	Marysville	English	Yes
Carr's Hardware	1514 - 3rd St	Marysville	English	Yes
Whitewall Brewing	14524 Smokey Point Blvd	Marysville	English	Yes
Co-Op Supply	8323 State Ave	Marysville	English	Yes
Dry County Distillery	521 Delta Ave	Marysville	English	Yes
American Distributing	13618 - 45th Ave NE	Marysville	English	Yes
Type of Business: Retail (10 records)				
Bartell Drugs #51 - Msvl	6602 - 64th St NE	Marysville	English	Yes
Pacific Plumbing Supply Co - Msvl	3704 - 124th St NE	Marysville	English	Yes
Radio Shack	1335 State Ave	Marysville	English	Yes
Parr Lumber	7610 47th Ave NE	Marysville	English	Yes
Frank Lumber	1046 Cedar Ave	Marysville	English	Yes
Marysville Paint Store	1717 Grove Street	Marysville	English	Yes
Big Lots	205 Marysville Mall	Marysville	English	Yes
Judd & Black	1315 State Ave	Marysville	English	No
HD Supply Waterworks	4106 - 134th St NE	Marysville	English	Yes
Trailer Plus	3603 - 136th St NE	Marysville	English	Yes
Type of Business: Warehouse (1 record)				
King Marine	3820 - 124th St NE	Marysville	English	Yes
Grand Totals (60 records)				

Appendix B: Program Brochure



Why is Stormwater Important?

Stormwater is polluted runoff, and the leading source of pollution into Puget Sound. Small amounts of contaminants carried by runoff add up, combining to become a serious threat to local lakes, rivers, and Puget Sound.

Do You Know Where Your Storm Drains and Runoff Go?

ECOSS can determine where your stormwater flows, and will provide a drainage map for your site.



"We have ideas of things we can do to make our workplace better, but most of the time we are simply focused on our bottom line. For ECOSS to come to our door and take the time to show us how we can improve our impact, it makes all the difference."

— Son Vo, Warehouse Manager

To Get a Spill Kit or for assistance, contact:
John Loyd, Program Manager
spillkit@ecoss.org
206-767-0432 ext.1011
www.ecoss.org

Why Should My Business Participate?

- 💧 Avoid clean up costs and fines
- 💧 Help keep pollution out of Puget Sound
- 💧 It's easy; training is simple and takes 10-15 minutes

The Puget Sound Spill Kit Program has been funded by the US Environmental Protection Agency (EPA) under assistance from agreement 00117601 to the Puget Sound Partnership (PSP), Washington State Department of Ecology, public and private funders identified below, and others. The contents of this document do not necessarily reflect the views and policies of the EPA, Ecology, PSP, or others, nor does mention of trade names or commercial products constitute endorsements or recommendations for use.



Remember: Only Rain Down the Drain!

Photo on front courtesy of the Duwamish River Cleanup Coalition

FREE SPILL KIT

Stormwater Resources for Businesses

A pollution prevention partnership between ECOSS, businesses, and local agencies of Puget Sound.

Prevent Pollution & Save Money

You can **save money** and **reduce liability** by preventing pollution problems before they start.

Avoid clean up costs and fines:

- 💧 50% of businesses surveyed had spills
- 💧 Catch basin cleanup costs average \$2,700
- 💧 Regulatory fines can be over \$10,000

In case of an outdoor spill:

- 💧 Use the Spill Kit to clean it up
- 💧 Dispose of the used materials properly
- 💧 Replenish your kit (cost of replacing materials typically ranges from \$20-60)

By using best practices, you will also be helping improve water quality in our lakes, streams, rivers, and Puget Sound.



Services are available in multiple languages, including Amharic, Arabic, Chinese, Korean, Somali, Spanish, Tigrigna, and Vietnamese.



ECOSS Provides Free Environmental Services to Eligible Businesses

- 💧 Spill kit
- 💧 Spill plan and drainage map for your site
- 💧 Training for your employees
- 💧 Best Management Practices for your activities
- 💧 Assistance with permits and regulations
- 💧 Water, energy, and resource conservation recommendations



Free and Confidential Services

As a non-profit organization, our services are always free and confidential, and that's why businesses trust us. ECOSS has helped thousands of businesses improve their environmental performance since 1994.

If you appreciate the work we do, please let others know about our services. Businesses and individuals also support our work by becoming ECOSS members, visit www.ecoss.org or call 206-767-0432.



The Spill Kit program was created by ECOSS and Seattle Public Utilities in 2004. ECOSS is currently partnering with over 25 cities and counties around Puget Sound to provide spill kits to businesses.

"Our staff are now prepared to respond to a spill and understand the importance of protecting our local waterways."

— Michael Nguyen, Business Owner

HOW TO CLEAN A SPILL





Stormwater is the leading source of pollution in the Puget Sound area. Small amounts of contamination can add up. By cleaning up spills before they reach our local lakes, rivers, and Puget Sound you can:

- Avoid fines
- Avoid expensive clean up costs
- Protect local waterways



1. Evaluate the situation. Put on protective equipment. Follow your spill plan.



2. Stop the source of the spill.



3. Protect the storm drain. If material has entered a storm drain, notify agencies listed on your spill plan.



4. Use kit materials to stop spill.



5. Clean up and dispose of used spill kit materials appropriately. For help call ECOS: 206-767-0432



6. Restock the spill kit.

Remember: Only Rain Down the Drain!

For more information visit: www.ecoss.org or contact ECOS at 206-767-0432

Adapted from Seattle Public Utilities.



The Puget Sound Spill Kit Program has been funded by the US Environmental Protection Agency (EPA) under assistance from Agreement O331002 (the Puget Sound Partnership/PSW). Washington State Department of Ecology, public and private funds identified below and others. The contents of this document do not necessarily reflect the views and policies of the EPA, Ecology PSW or others. Your state may have its own commercial products containing materials of different concentrations for use.

Appendix D: Spill Plan



SPILL PREVENTION AND CLEANUP PLAN

Business Name		Phone	
Site Address			
Run-off from this site drains to:		Date	

SPILL PLANNING AND PREVENTION:

<input type="checkbox"/>	Take inventory of chemicals and materials on site – use less toxic materials where available.
<input type="checkbox"/>	Obtain appropriate spill response materials and personal protective equipment (PPE)
<input type="checkbox"/>	Designate and train spill cleanup coordinator
<input type="checkbox"/>	Train staff, at least once annually. Document your training

IN CASE OF A SPILL, CONTACT THE FOLLOWING:

	CONTACT NAMES	CONTACT PHONE NUMBERS
Business Owner, or Site Manager		
Onsite Spill Cleanup Coordinator		
REQUIRED PHONE CALLS to make if a spill that is too large to control reaches a catch basin, water-body, or exceeds kit capacity.	National Response Center	1 (800) 424-8802
	City of Marysville spill hotline	(360)363-8100 24 hours
	WA State Dept of Ecology	(425) 649-7000 24 hours

SPILL CLEAN-UP:

<input type="checkbox"/>	Evaluate situation, including safety considerations; notify owner/manager of spill
<input type="checkbox"/>	Put On Personal Protective Equipment (PPE)
<input type="checkbox"/>	Stop the source of the spill
<input type="checkbox"/>	Protect the drain(s)
<input type="checkbox"/>	Clean up spill by applying spill kit materials
<input type="checkbox"/>	Dispose of clean up materials properly and restock the kit

FACILITY ACTIVITIES WITH POTENTIAL TO CONTAMINATE RUN-OFF

Activities	check all that apply	Activities	check all that apply
Fueling and fuel transfer	<input type="checkbox"/>	Loading/unloading of products	<input type="checkbox"/>
Outdoor manufacturing	<input type="checkbox"/>	Landscape construction/maintenance	<input type="checkbox"/>
Outdoor equipment/vehicle maintenance and repair	<input type="checkbox"/>	Outside storage of uncovered materials	<input type="checkbox"/>
Outside drum or container storage	<input type="checkbox"/>	Customer and employee vehicles	<input type="checkbox"/>
Vehicle, equipment, and building washing	<input type="checkbox"/>	Others:	<input type="checkbox"/>

EQUIPMENT AND MATERIALS STORED ON SITE (>1 GALLON) WITH POTENTIAL TO CONTAMINATE RUN-OFF

Equipment	check all that apply	Vehicle Fluids	check all that apply	Misc. Chemicals	check all that apply
Forklifts	<input type="checkbox"/>	Antifreeze	<input type="checkbox"/>	Acid	<input type="checkbox"/>
Trucks	<input type="checkbox"/>	Brake fluid, transmission fluid	<input type="checkbox"/>	Ammonia	<input type="checkbox"/>
Cranes	<input type="checkbox"/>	Gasoline	<input type="checkbox"/>	Caustic, bases, lye	<input type="checkbox"/>
Other:	<input type="checkbox"/>	Motor oil	<input type="checkbox"/>	Photographic chemicals	<input type="checkbox"/>
Cleaning Products	<input type="checkbox"/>	Other fluids:	<input type="checkbox"/>	Pesticides, herbicides	<input type="checkbox"/>
Liquids	<input type="checkbox"/>	Solvents, Paints, Lubricants	<input type="checkbox"/>	Other	<input type="checkbox"/>
Solids	<input type="checkbox"/>	Parts washer	<input type="checkbox"/>	Fertilizers	<input type="checkbox"/>
Food Preparation/Waste	<input type="checkbox"/>	Dry cleaning fluids	<input type="checkbox"/>	Inks, dyes	<input type="checkbox"/>
Cooking oil	<input type="checkbox"/>	Paint thinner, turpentine	<input type="checkbox"/>	Others:	<input type="checkbox"/>
Grease (new or used)	<input type="checkbox"/>	Paint, coatings; oil based	<input type="checkbox"/>		
Dumpster	<input type="checkbox"/>	Paint, latex	<input type="checkbox"/>		
Trash compactor	<input type="checkbox"/>	Machine oil/coolant	<input type="checkbox"/>		
Other liquids:	<input type="checkbox"/>	Hydraulic fluid	<input type="checkbox"/>		
		Others:	<input type="checkbox"/>		



Need help developing your spill plan? Contact Us! (206) 767-0432 or SpillKit@ecoss.org

Appendix E: Site Map

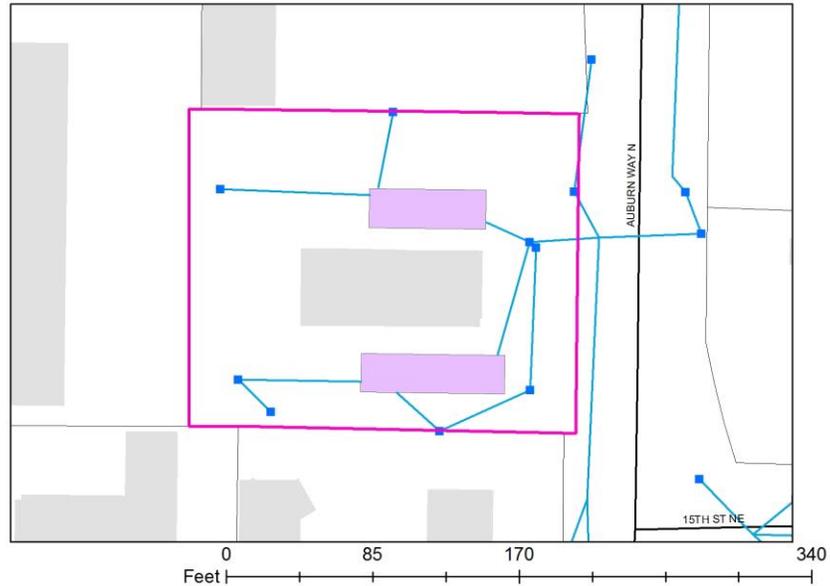
(BIZ NAME)
(ADDRESS)
(City), WA (ZIPCODE)

Runoff from this
business drains to
(BASIN)



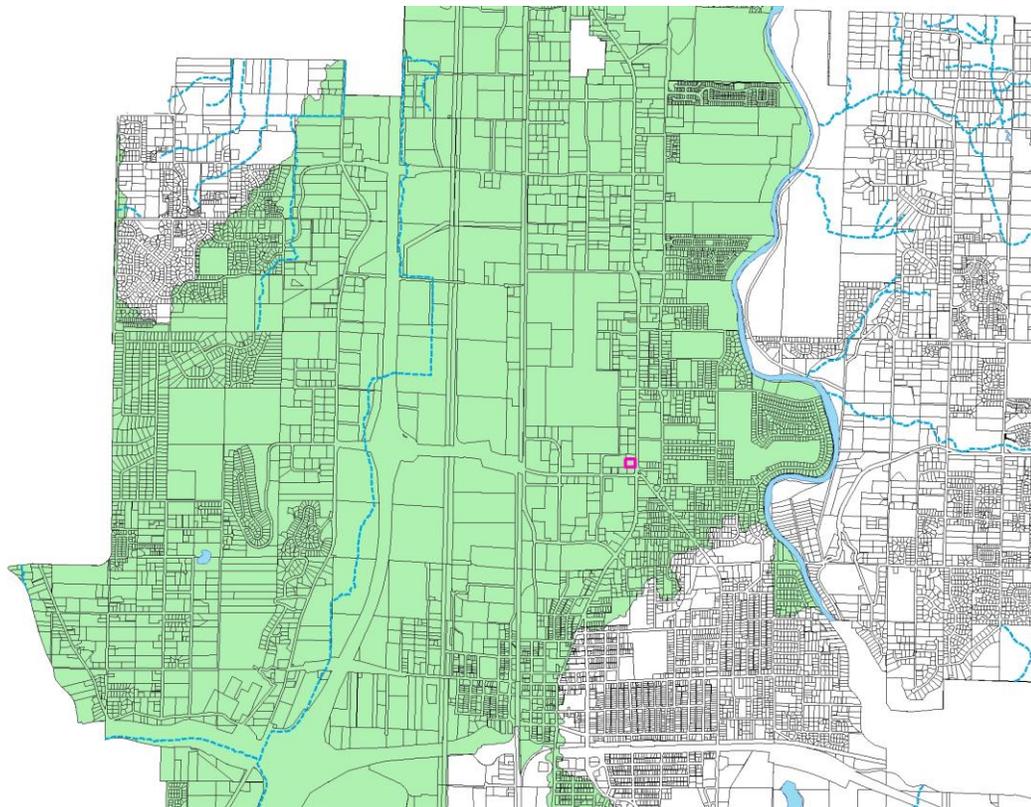
Legend

- Storm Drains (Catch Basins)
- Stormwater Lines
- Detention & Infiltration Sites
- Streets
- Buildings
- Parcels



Date created: 1/16/2014

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North and South Sound Natural Yard Care Education Evaluation Report

Prepared for:
Snohomish County
City of Olympia
December 31, 2015



Acknowledgments

We dedicate this work to Patricia Pyle. Her passion and energy led to the success of Olympia’s Go Green natural lawn care program. Patricia was dedicated to teaching people every-day, science-based ways to protect water quality and aquatic habitats. She was a green champion and remains an inspiration to us all.

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Executive Summary

Project and Evaluation Overview

In 2014, Snohomish County and the City of Olympia, in partnership with 15 other local jurisdictions in the Puget Sound region, implemented two natural yard care education programs in two geographic regions using distinctly different delivery strategies. Both programs were designed to improve local water quality and protect Puget Sound by reducing pollutants associated with conventional residential yard care practices.

Both programs were implemented with a rigorous evaluation component designed to meet National Pollutant Discharge Elimination System (NPDES) permit for municipal separate storm sewer system (MS4) reporting requirements for measuring the understanding and adoption of targeted behaviors related to water quality. The evaluation, described in this report, assessed the results of each program and made comparisons where possible.

Program Models

Snohomish County, in partnership with thirteen cities, the Snohomish Conservation District, and the WSU Extension Master Gardener Program, implemented the North Sound program. This program consisted of a three-part evening lecture series with presentations covering a wide variety of natural yard care topics by landscape professionals. The City of Olympia, in partnership with the City of Tumwater and Thurston County, implemented the South Sound program. This program consisted of two lawn coach home visits, a demonstration workshop, and incentives to promote natural lawn care (covering only turf and grass areas of a yard). Incentives consisted of a free soil test and lawn measurement, free slow-release fertilizer, free lime, and a discount on renting an aerator.

Program Evaluation

The program evaluation was designed to assess each individual program in a statistically valid manner. The evaluation was also designed to compare the programs' effectiveness qualitatively but not statistically. Participants completed surveys before and after participating in the programs. Surveys were also administered to randomly selected non-participating households to measure whether they made changes during the same time period without participating in one of the programs. To obtain feedback on program implementation, the evaluation also included participant interviews and surveys of program staff, speakers, and coaches.

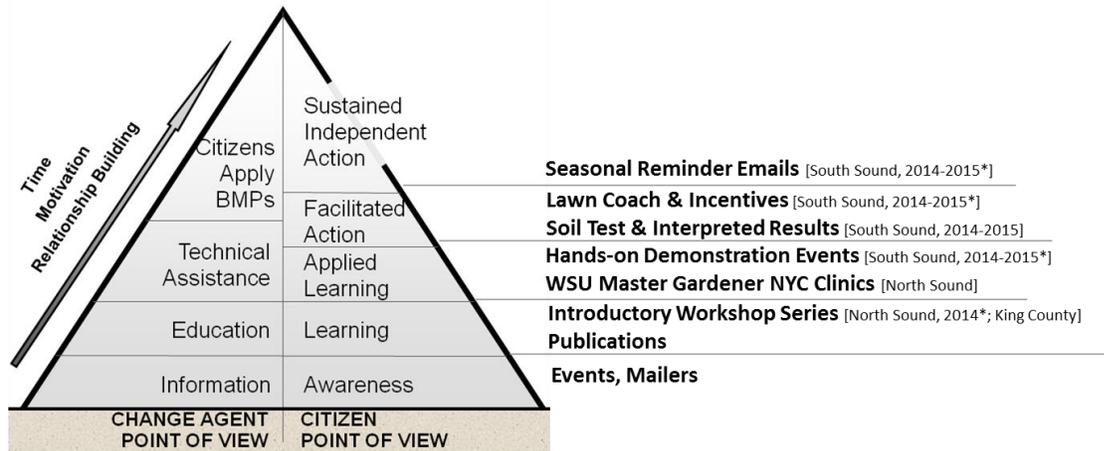
Program Comparisons

While the two programs addressed some of the same behaviors, they cannot be compared statistically, due to differences in the outreach models. When compared qualitatively, the results should be considered within each program's particular context. The two programs differed substantially in their target audiences, breadth of topics covered, goals, and level of outreach intensity.

Lawn care was the primary cross-over topic between the two programs. In the North Sound, participants received 50 minutes of lecture specific to natural lawn care in a large workshop format (up to 75 participants per lecture). In the South Sound, participants received six hours of hands-on education on natural lawn care, including two hours of personalized at-home education from lawn care professionals and four hours in small demonstration workshops (no more than 20 participants per workshop). The South Sound program also provided incentives that directly support the desired behavior change (free soil test, free lime and fertilizer, and discount aerator rental).

Figure 1 shows the elements of each program in the context of a continuum of public involvement. Programs that provide more intensive outreach with technical assistance (such as the South Sound program’s site visits and demonstration workshops) are typically expected to result in more action and behavior change *per participant*, although they often reach a smaller number of *total participants*. In addition, incentives that directly support behavior change (such as the free lime and fertilizer provided by the South Sound program) are typically expected to increase behavior change, at least during the period in which the incentives are provided. Additional research is needed to determine whether specific incentives create lasting behavior change.

Figure 1. Natural Yard Care (NYC) programs, 2014 public involvement continuum



Prochaska & DiClemente, Stages of Change Model

***Grant funded NYC programs implemented 2014-2015**
North Sound – Snohomish County, 13 partner NPDES city jurisdictions, Snohomish Conservation District, WSU Master Gardeners
South Sound – City of Olympia, Thurston County, City of Tumwater

Source: Snohomish County Surface Water Management, 2015

Executive Summary Organization

This executive summary presents an overview of key evaluation results in the following sections:

- North Sound Program
- South Sound Program
- North Sound and South Sound Comparisons
- Summary Recommendations

Notes on Data Presentation

Figures in this report are been rounded to the nearest percentage point. As a result, the sum of “baseline” and “change” figures may not appear to equal the “post-outreach” figure, but each figure is independently the most accurate rounded amount.

In the narrative findings, two icons indicate the **level of behavior change** (**H**, **M**, or **L**) from baseline to medium-term post-outreach surveys and the **post-outreach use** (✓, ▲, ●) as follows:

Behavior Change	Post-Outreach Use
<p>H High behavior change</p> <ul style="list-style-type: none"> ■ 20 or more percentage points 	<p>✓ High post-outreach use</p> <ul style="list-style-type: none"> ■ 70% or more for preferred practices ■ 25% or less for harmful practices
<p>M Moderate behavior change</p> <ul style="list-style-type: none"> ■ 10 to 19 percentage points 	<p>▲ Moderate post-outreach use</p> <ul style="list-style-type: none"> ■ 40% to 69% for preferred practices ■ 26% to 60% for harmful practices
<p>L Low behavior change</p> <ul style="list-style-type: none"> ■ Less than 10 percentage points 	<p>● Low post-outreach use</p> <ul style="list-style-type: none"> ■ Less than 40% for preferred practices ■ More than 60% for harmful practices

Unless otherwise noted, charts and tables use the following notations regarding the statistical analysis:

- (P) Indicates that only participants showed a statistically significant difference between baseline and medium-term post-outreach adoption levels.
- (NP) Indicates that only nonparticipants showed a statistically significant difference between baseline and medium-term post-outreach adoption levels.
- (P)(NP) Indicates that both participants and nonparticipants showed a statistically significant difference between baseline and medium-term post-outreach adoption levels.
- (W) Indicates that question wording was different between the baseline and medium-term post-outreach survey, requiring responses to be combined for statistical comparison. This notation can be combined with (P), (NP), and (P)(NP).

North Sound

The North Sound program’s goal was to reduce pollutant runoff and improve yard health and resiliency by promoting natural yard care practices associated with lawns and other areas of yards. The North Sound program offered a three-part lecture series in seven locations across Snohomish County. Participants learned about six natural yard care topics during the series: *Natural Lawn Care*; *Smart Watering*; *Building Healthy Soil*; *Sustainable Landscape Design*; *Right Plant, Right Place*; and *Natural Pest, Weed & Disease Control*. In total, the North Sound program held 21 lecture workshops reaching a total of 451 households. Figure 2 presents participant understanding and use of natural yard care practices before and after the workshops.

Figure 2. North Sound yard care practices summary

Type	Yard Care Practice or Understanding	Baseline Use	Change in Behavior/Understanding	Post-Outreach Use
Using Weed-and-Feed	HARMFUL PRACTICE: Use weed-and-feed (any amount) (P)(W)	66%	H -53%	14%
Fertilizing	HARMFUL PRACTICE: Use fast-release or weed-and-feed fertilizer (P)	50%	H -27%	23%
	Use slow release, organic or natural fertilizer (P)	30%	H 24%	54%
Managing Pests	HARMFUL PRACTICE: Pests/diseases: broadly apply product (P)(NP)	11%	L -8%	4%
	Pests/diseases: remove, prune, use netting or collars, or tolerate	74%	L -2%	73%
Applying Lime	Apply lime at least every 2 to 3 years (W)	22%	L	4% 26%
Aerating	Aerate at least every 2 years (W)	19%	L	8% 27%
	Top-dress with compost, if aerated (P)	23%	H	25% 48%
Applying Mulch	HARMFUL PRACTICE: Bed cover: landscape fabric, plastic, or bare soil (W)	38%	M -12%	26%
	Bed cover: mulch, grass clippings, or plants (W)	82%	L	5% 87%
Mulch Mowing	Sometimes or always mulch mow in dry months (P)	48%	M	18% 67%
	Sometimes or always mulch mow in wet months (P)	46%	M	18% 64%
Mowing Height	Mow 2-3" or higher (P)	87%	L	9% 95%
Choosing Plants	Always match plant to where it thrives (P)	23%	H	42% 65%
	Always look for a plant's soil drainage needs (P)	27%	H	30% 57%
	Always look for whether a plant is native to Pacific Northwest (P)	18%	H	28% 47%
	Always look for a plant's pest and disease resistance (P)	15%	H	28% 43%
	Always look for a plant's full-grown size (P)	50%	H	23% 73%
	Always look for a plant's cold temperature tolerance (P)	35%	H	20% 54%
	Always look for a plant's watering needs (P)	45%	M	18% 63%
	Always look for a plant's sun/shade needs (P)	67%	M	17% 84%
	Has sketched a map of the yard	NA	NA	NA 25%
Preparing Soil	Know to prepare soil with compost (P)	65%	H	26% 91%
	Know to mix materials into soil 6-8 inches deep	26%	M	11% 37%
Watering	Measure sprinkler watering rate (tuna can test), if waters	23%	M	12% 35%
	Water lawn once a week or less (P)	68%	L -8%	61%
	ACCEPTABLE PRACTICE: Water lawn two to three times per week	26%	L	5% 31%
	HARMFUL PRACTICE: Water lawn daily or every other day	6%	L	2% 9%

Note: The unusually dry weather in 2015, when participants took the medium-term post-outreach survey, may have affected watering practices.

As shown in Figure 2, North Sound participants reported varying levels of behavior change, with some practices showing large improvements and resulting in high levels of use after the program while other practices show mixed results—either moderate behavior change or moderate use after the program.

Practices that Protect Water Quality

After the program, at least 70% of participants were using several key practices that directly protect water quality, as shown in Figure 3. Notably, the program achieved a high level of behavior change in reducing weed-and-feed use—the share of participants who used this harmful product decreased from 66% to 14%. As described below, the program also achieved varying levels of behavior change in practices that support a healthy yard and reduce the weed, pest, and disease reasons people use toxic yard care products.

Figure 3. North Sound adoption of practices that protect water quality

H ✓	Avoiding weed-and-feed use
H ✓	Avoiding fast-release fertilizer use
L ✓	Avoiding broad application of pesticides
M ▲	Not leaving beds bare or covered in landscape fabric or plastics
H ▲	Top-dressing lawns with compost after aerating
L ●	Aerating every two to three years

Where the Program is Working Effectively

H ✓ **Substantial change resulting in high post-outreach use**

- Knowing to prepare the soil with compost.
- Not using fast-release fertilizer.
- Not using weed-and-feed.

M ✓ **Moderate change resulting in high post-outreach use**

- Always looking for a plant’s sunlight and shade needs and full-grown size when planting.

L ✓ **Little change because of high adoption levels before the workshops**

- Mowing two to three inches or higher.
- Using at least one least-toxic weed management technique.

H ▲ **Substantial change with room for additional improvement**

- Always matching a plant to where it thrives.
- Always looking for a plant’s soil drainage needs, pest and disease resistance, watering needs, cold temperature tolerance, and status as native to the Pacific Northwest.
- Using slow-release, organic, or natural fertilizer.

Where the Program Achieved Moderate Change but Room for Improvement Remains

M ▲ Moderate changes with moderate post-outreach use

- Mulch mowing, in both wet and dry months.
- Not leaving beds bare or covered in landscape fabric or plastics.

M ● Moderate changes with low post-outreach use or understanding levels

- Measuring their sprinkler watering rate.
- Knowing to mix materials six to eight inches deep in soil when planting.

Where the Program Achieved Little Change

L ▲ Little change with moderate post-outreach use

- Lawn watering frequency (recommended frequency is once a week; the dry weather in 2015 may have affected watering practices).
- Top-dressing with compost after aerating.

L ● Little change with low post-outreach use

- Aerating.
- Applying lime.

South Sound

The South Sound program's goal was to reduce nutrient and pesticide runoff resulting from traditional lawn care practices used on residential lawns and to improve yard health and resiliency by promoting natural lawn care practices. The South Sound program model featured two educational home visits by a lawn care professional, demonstration workshops, and incentives. The incentives included a free soil test, free lime and slow-release fertilizer, and a discount on renting an aerator. Participants were screened during registration to ensure they met program criteria, which included having applied fast-release fertilizer or weed-and-feed in the past year. A total of 190 households participated in the South Sound program in 2014.

Figure 4 presents participant understanding and use of natural lawn care practices before and after the workshops.

Figure 4. South Sound yard care practices summary

Type	Yard Care Practice or Understanding	Baseline Use	Change in Behavior/Understanding	Post-Outreach Use
Using Weed-and-Feed	HARMFUL PRACTICE: Using weed-and-feed (any amount) (P)(NP)	63%	H -47%	16%
Choosing Fertilizer	Use slow release, natural, or organic fertilizer (P)	38%	H	55%
	HARMFUL PRACTICE: Use fast-release fertilizer or weed-and-feed (P)	60%	H -51%	9%
	Calculate lawn area and application rate to determine fertilizer use (P)	18%	H	47%
	Calibrate spreader when using new fertilizer (P)(NP)	35%	H	36%
	Know how much nitrogen was applied (any amount) (P)	3%	H	25%
Applying Fertilizer	Always sweep fertilizer back onto lawn	36%	M	11%
	Fertilize in May, September, or October	64%	L	7%
	HARMFUL PRACTICE: Fertilize in January or February	5%	L	6%
Managing Weeds	HARMFUL PRACTICE: Weed: broadly apply weed-and-feed or weed killer (P)	46%	H -35%	11%
	Weeds: pull, dig, tolerate, or spot-treat	89%	L	6%
Soil Testing	Plan to test soil every 3 years or more often (P)	3%	H	59%
Applying Lime	Apply lime every 2-3 years (P)	31%	H	60%
Aerating	Aerate lawn every 2 years (P)(NP)	34%	H	49%
Mowing	Sharpen mower blade every year (P)	27%	H	37%
	Sometimes or always mulch mow in dry months (P)	51%	H	21%
	Sometimes or always mulch mow in wet months (P)	48%	M	17%
	Mow 2-3" or higher (P)	91%	L	6%
Watering	Measure sprinkler watering rate (tuna can test), if waters (P)	17%	H	43%
	Water once a week or less	36%	M	11%
	ACCEPTABLE PRACTICE: Water two to three times per week	46%	L -9%	36%
	HARMFUL PRACTICE: Waters daily or every other day	19%	L -2%	17%

Notes: For measures of soil testing, baseline use describes actual past behavior, while the change in behavior reflects the intention of participants to conduct a soil test in the future. The unusually dry weather in 2015, when participants took the medium-term post-outreach survey, may have affected watering practices.

As shown in Figure 4, South Sound participants reported varying levels of behavior change, with some practices showing large improvements and resulting in high levels of use after the program, while other practices show mixed results—either moderate behavior change or moderate use after the program.

Practices that Protect Water Quality

After the program, at least 40% of participants were using all the key practices that directly protect water quality, as shown in Figure 5. At least 70% were avoiding products that harm water quality: weed-and-feed, fast-release fertilizer, and broadly applied weed killer.

Notably, the program achieved a high level of behavior change in reducing weed-and-feed use: the share of participants who used this product decreased from 63% to 16%. As described below, the program also achieved varying levels of behavior change in practices that support a healthy lawn and reduce the weed, pest, and disease reasons people use these toxic lawn care chemicals.

Figure 5. South Sound adoption of practices that protect water quality

H ✓	Avoiding weed-and-feed use
H ✓	Avoiding fast-release fertilizer use
H ✓	Aerating every two to three years
H ✓	Calibrating the fertilizer spreader when using a new fertilizer
H ✓	Avoiding broad application of weed killer
H ▲	Calculating the lawn area and fertilizer application rate
M ▲	Sweeping fertilizer back onto the lawn

Where the Program is Working Effectively

H ✓ Substantial change resulting in high post-outreach use

- Applying lime.
- Using slow-release or organic fertilizer.
- Aerating.
- Avoiding weed-and-feed use.
- Avoiding fast-release fertilizer use.
- Always calibrating spreaders when using a new fertilizer.
- Avoiding broad application of weed killers.
- Mulch mowing in dry months.

L ✓ Little change because of high adoption levels before the workshops

- Mowing two to three inches or higher.
- Using at least one least-toxic weed management technique.
- Lawn watering frequency (recommended frequency is once or twice a week; the dry weather in 2015 may have affected watering practices).
- Fertilizing in the proper months.

H ▲ Substantial change with room for additional improvement

- Intending to test soil within three years.
- Calculating lawn area to determine fertilizer use.
- Measuring sprinkler watering rates.
- Sharpening mower blades.

Where the Program Achieved Some Change but Room for Improvement Remains

H ● High change with low post-outreach use

- Knowing how much nitrogen they apply per year.

M ▲ Moderate changes with moderate post-outreach use

- Mulch mowing in wet months
- Always checking for and sweeping fertilizer back onto the lawn.

Overall Summary and Recommendations

Key Findings on Program Comparisons

As noted above, results comparing the two programs were not analyzed statistically; this analysis considers a difference of 10 percentage points in survey responses to be meaningful. This section compares changes in mowing, fertilizing, using lime, aerating, and watering. While both programs addressed weed management, making direct comparison is impractical because the South Sound survey instrument asked only about practices to manage weeds in lawns while the North Sound survey instrument also addressed practices to manage weeds in planting beds (such as covering bare soils with mulch to prevent weeds).

Figure 6: Comparison of lawn-focused North Sound and South Sound program behavior changes levels

Practice	North Sound Behavior Change	South Sound Behavior Change	South Sound Extra Strategies
Apply lime at least every 2-3 years	L 4%	H 60%	Incentive Demonstration
Aerate at least every 2 years	L 8%	H 49%	Incentive Demonstration
Used slow-release or organic fertilizer	H 24%	H 55%	Incentive Demonstration
HARMFUL PRACTICE: Used fast-release fertilizer or weed-and-feed	H -27%	H -51%	Incentive Demonstration
Measure sprinkler watering rate (tuna can test), if waters	M 12%	H 43%	Demonstration
ACCEPTABLE PRACTICE: Water two to three times per week	L 5%	L -9%	
HARMFUL PRACTICE: May use weed-and-feed in future	H -48%	H -36%	
Water once a week or less	L -8%	M 11%	
Always mulch mow in wet months	M 19%	L 5%	Demonstration
Sometimes or always mulch mow in dry months	M 18%	H 21%	Demonstration
HARMFUL PRACTICE: Used weed-and-feed (since outreach)	H -53%	H -47%	
Sometimes or always mulch mow in wet months	M 18%	M 17%	Demonstration
Mow 2-3" or higher	L 9%	L 6%	Demonstration
Always mulch mow in dry months	M 14%	M 12%	Demonstration
HARMFUL PRACTICE: Water daily or every other day	L 2%	L -2%	

Note: this table shows changes as a percentage of total surveyed participants, not scaled to the baseline level of behavior. For example, 22% of North Sound participants applied lime in the baseline and 26% applied lime post-outreach, for a change of 4% of participants (26% minus 22%).

Both programs resulted in significant and substantial behavior change in many of the practices they addressed.

This substantial behavior change indicates that both programs used effective program models and were well implemented. Both participants and program staff praised the programs and recommended continuing them in the future, with some modifications.

Both programs had varied results in behavior change and participant use of key practices after the programs.

While a few practices in each program showed little to no behavior change, most showed moderate to high levels of behavior change with remaining room for improvement.

South Sound incentives, supported by outdoor demonstrations, appear to have been a major factor in short-term behavior change.

After the programs, a much higher share of South Sound participants reported using practices that were supported by incentives (free fertilizer, free lime, and \$30 discount on aerator rental) compared to North Sound participants. These practices were also supported by outdoor demonstrations. As a result, the incentives coupled with demonstrations appear to have contributed substantially to behavior change in the associated practices. However, additional research is needed to assess whether South Sound participants continue using slow-release fertilizer, applying lime, and aerating without the incentives and, if so, what is the optimal level and format of incentives to maximize behavior change while minimizing program costs.

South Sound outdoor demonstrations also appear to be a strong factor, although behavior change results varied by practice.

The South Sound program provided outdoor demonstrations without incentives for watering and mowing practices. South Sound participants had a higher level of behavior change for measuring sprinkler watering rates but similar or lower levels of behavior change for mulch mowing.

The South Sound program cost more than twice as much per participating household as the North Sound program while addressing fewer practices.

While the South Sound program achieved greater behavior change in specific lawn care practices, it also cost more than twice as much per household compared to the North Sound program (\$550 South Sound and \$250 North Sound) and did not address as many other yard care practices that can protect water quality. In addition, the South Sound program may not be scalable to larger audiences as staff reported that they had difficulty finding enough lawn care professionals who used natural lawn care practices, wanted to teach in a resident education program, and were effective instructors.

Jurisdictions would benefit from testing a hybrid program that combines large lectures and small outdoor demonstration workshops, with and without incentives.

Given the differences in program cost and results, jurisdictions would benefit from testing whether a program with lectures and outdoor demonstrations—but without the lawn coach home visits and incentives—results in a similarly high level of behavior change. In addition, the South Sound program should evaluate whether the incentives given to 2014 participants resulted in lasting behavior change in 2016 or 2017.

Recommendations

This section summarizes the top recommendations for future natural yard care programs. Recommendations are based on a survey of program staff; surveys and interviews of program participants; and the analysis of behavior change results from the program evaluation surveys.

Each natural yard care topic area (such as *Natural Lawn Care*, *Building Healthy Soil*, or *Smart Watering*) involves a separate set of specific natural yard care practices, and each practice may have a distinct set of barriers that participants must overcome to adopt the practice. As a result, education programs that engage participants more intensively than publications and lectures should be tailored to overcome the

specific barriers associated with the practices and topic areas covered. Lecture-based workshops can provide foundational knowledge, but more intensive programs should use market research and a social marketing process to determine the most effective way to change the relevant behaviors.¹

Program Model Recommendations

Both program models were effective, but they had different cost levels and breadth of coverage. Accordingly, the evaluation team recommends that jurisdictions use a core program model consisting of lectures and outdoor demonstrations. These methods were found to be effective at a lower cost than lawn coach home visits, while covering a broader range of topics.

Core Program Delivery Model: Lecture and Demonstration Workshops

Combine lecture workshops with outdoor demonstration workshops. Workshops should be taught by yard care professionals who have proven expertise in both using natural yard care practices and in presenting these practices in lectures and demonstrations. This program model should include the following elements:

- Lectures presented by dynamic, engaging, and informed speakers using visuals and displays including photographs, visual aids, and display stations.
- Outdoor demonstration workshops focused on hands-on learning.
- Opportunities for personalized assistance at workshops from presenters, other natural yard care experts, or WSU Master Gardener volunteers.
- Take-home materials that support the core practices covered and list other local natural yard care resources.
- Seasonal emails with timely reminders that serve as prompts for key practices, keep past participants engaged, and enable participants to share information with others easily.

Optional Add-ons Elements to Core Program Model

As programs have additional budget, they should consider adding the following program elements:

- Online videos (the City of Olympia, in partnership with STORM, is currently developing natural lawn care videos).
- Periodic curriculum updates.
- Personalized assistance through home visits.
- Incentives (if shown to create lasting behavior change).

¹ Two excellent books on social marketing are *Fostering Sustainable Behavior: Community Based Social Marketing* by Doug McKenzie-Mohr (available for free online at www.cbsm.com/pages/guide/preface) and *Social Marketing: Changing Behaviors for Good* by Nancy Lee and Philip Kotler.

Yard and Lawn Care Topics

Jurisdictions should choose which topics to cover based on the goals of their program and the interests of their target audience. The North Sound program selected its goals and target audience based on successes and lessons learned from pilot implementation in Snohomish County of workshops initially developed by King County. The South Sound program conducted an ethnographic study to identify program goals and select its target audience. More information is available in the logistics guide for each program.

This section identifies strategies to increase the adoption of specific yard and lawn care practices included in the North Sound and South Sound programs.

To meet NPDES permit requirements, programs should ensure they address the following topic areas that directly reduce polluted runoff:

- Avoiding weed-and-feed use.
- Choosing and properly applying slow-release fertilizer.
- Controlling weeds, pests, and diseases using least-toxic methods.
- Applying mulch to planting beds.
- Aerating lawns and top-dressing with compost.
- Properly storing and using garden products.

Programs should then address relevant topic areas that reduce the need to use fertilizers and pesticides:

- Building healthy soil through soil testing, applying lime, and preparing soil with compost.
- Using “Right Plant, Right Place” principles and proper planting techniques.
- Mulch mowing to feed the soil.
- Using proper watering techniques for plant health and water conservation.

The recommendations section in the body of the report offers suggestions for increasing the adoption of these behaviors using the following types of strategies:



Outdoor demonstration—stations and hands-on activities to include in outdoor demonstration workshops.



Indoor display—displays to include in lecture workshops, for information conveyed visually on a poster, three-dimensional display, or hands-on activity that can be conducted indoors.



Tools and assistance—strategies that directly help participants use a practice by reducing barriers, such as difficulty recognizing recommended products in stores.



Information resource—such as fact sheets, guides, and webpages. Programs should avoid overwhelming participants with too much information by listing key resources in the core take-home materials and by providing supplemental resources online or by request. Programs should identify and use existing guides to avoid duplication before creating new materials.



Messaging—key points to convey when teaching a practice.



Videos—visual lessons, often on practices presented in outdoor demonstrations, to allow participants to review techniques at home.



Incentives—strategies that provide rewards or reduce costs to participants to encourage the use of practices.

Strategies are also labeled according to their recommended priority level:

- **High**—strategies that are expected to have high impact while being feasible and cost-effective to implement.
- **Moderate**—strategies that are expected to have moderate to high impact but may be more costly or otherwise difficult to implement.
- **Low**—strategies expected to have lower impact and be more difficult and costly to implement.

Other Recommendations

The recommendations section in the body of the report also includes recommendations on the following topics:

- Participant Recruitment
- Participant Communication
- Partner Coordination
- Program Logistics
- Take-Home Materials
- Program Evaluation

1. Introduction and Overview

In 2014, Snohomish County and the City of Olympia, in partnership with 15 other local jurisdictions in the Puget Sound region, implemented two natural yard care education programs in two geographic regions using distinctly different delivery strategies. Both programs were designed to improve local water quality and protect Puget Sound by reducing pollutants associated with conventional residential yard care practices.

Both programs were implemented with a rigorous evaluation component specifically designed to meet National Pollutant Discharge Elimination System (NPDES) permit for municipal separate storm sewer system (MS4) reporting requirements for measuring the understanding and adoption of targeted behaviors related to water quality (Phase I NPDES Permit- S5.C.10.c; Phase II NPDES Permit- S5.C.1.c). The evaluation, described in this report, assessed the results of each program and made comparisons where possible.

North Sound Program

Snohomish County, in partnership with thirteen cities, the Snohomish Conservation District, and the Washington State University (WSU) Master Gardener Program, implemented the North Sound program. This program consisted of a three-part evening lecture series with presentations covering a wide variety of natural yard care topics by landscape professionals. Each evening lecture lasted two hours, and participants received relevant handouts and had an opportunity to consult with WSU Master Gardener volunteers. A total of seven three-part lecture series were implemented in 2014: three sets in the spring and four in the fall.

South Sound Program

The City of Olympia, in partnership with the City of Tumwater and Thurston County, implemented the South Sound program. This program consisted of home visits, demonstration workshops, and incentives to promote natural lawn care (covering only grassy lawn areas of a yard). Participants received two home visits from a lawn care professional (referred to as a lawn coach); one or two demonstration workshops; and incentives including a free soil test and lawn measurement, free slow-release fertilizer, free lime, and a discount on renting an aerator.

Program Development Approach

Each natural yard care topic area (such as *Natural Lawn Care*, *Building Healthy Soil*, or *Smart Watering*) involves a separate set of specific natural yard care practices, and each practice may have a distinct set of barriers that participants must overcome to use the practice. As a result, education programs that engage participants more intensively than publications and lectures should be tailored to overcome the specific barriers associated with the practices and topic areas covered. Lecture-based workshops can

provide foundational knowledge, but more intensive programs should use market research and a social marketing process to determine the most effective way to change the relevant behaviors.²

The South Sound program applied a tailored approach specific to natural lawn care. Before developing its strategy, the program conducted an ethnographic blind study to identify its target audience and barriers related to natural lawn care practices. Following this initial research, the program was developed using a social marketing approach consisting of lawn coach home visits, demonstration workshops, and incentives.

Program Comparison

While the two programs addressed some of the same behaviors—such as proper mowing, fertilizer choices, using lime, and aerating—they cannot be compared statistically because the two programs differed substantially in their target audiences, breadth of topics covered, goals, and level of outreach intensity, as shown in Figure 7. When compared qualitatively, the results should be considered within each program’s particular context.

Lawn care was the primary cross-over topic between the two programs. In the North Sound, participants received 50 minutes of lecture specific to natural lawn care in a large workshop format (up to 75 participants per lecture). In the South Sound, participants received six hours of hands-on education on natural lawn care, including two hours of personalized at-home education from lawn care professionals and four hours in small demonstration workshops (no more than 20 participants per workshop). The South Sound program also provided incentives that directly support the desired behavior change (free soil test, free lime and fertilizer, and discount aerator rental).

² Two excellent books on social marketing are *Fostering Sustainable Behavior: Community Based Social Marketing* by Doug McKenzie-Mohr (available for free online at www.cbsm.com/pages/guide/preface) and *Social Marketing: Changing Behaviors for Good* by Nancy Lee and Philip Kotler.

Figure 7. Summary of key differences between North and South Sound programs

	North Sound Program	South Sound Program
Target Audience	Residents of detached single-family homes on properties sized less than one acre within urban growth areas. The program reached 451 households in 2014.	Residents who (1) live in detached single-family homes on properties sized less than one acre, (2) own their home, (3) maintain the lawn themselves, and (4) currently use fast-release chemical fertilizers. The program reached 190 households in 2014.
Topics covered	Natural lawn and yard care practices including planting; “Right Plant, Right Place” principles; healthy soils; composting; sustainable landscape design; and natural pest, weed and disease control.	Natural lawn care practices, addressing grass lawns and not planting beds.
Goals	Reduce all pollutant runoff from lawns and planting beds.	Reduce nutrient and pesticide pollutant runoff from lawns.
Outreach intensity	<p>Education and technical assistance, reaching more households at a lower level of engagement.</p> <ul style="list-style-type: none"> ▪ Three 2-hour lecture workshops with up to 75 participants per workshop ▪ Diagnostic and identification technical assistance from WSU Master Gardeners at lecture workshops <p>Participants received 6 hours total of education that included just under one hour on each of the following 6 topics: <i>Natural Lawn Care; Smart Watering; Right Plant, Right Place; Natural Pest, Weed & Disease Control; Growing Healthy Soil; and Sustainable Landscape Design.</i></p>	<p>Education and technical assistance, reaching fewer participants at a higher level of engagement.</p> <ul style="list-style-type: none"> ▪ 2 hours of personalized, at-home education from lawn care professionals, spread over two home visits ▪ 4 hours of hands-on demonstrations with no more than 20 participants per demonstration ▪ Ongoing lawn care email updates throughout the year-long program <p>Participants received 6 hours of education on <i>Natural Lawn Care.</i></p>
Incentives	Small incentives used to reward participants for attending lectures and completing surveys.	<p>Large incentives used to directly support behavior change:</p> <ul style="list-style-type: none"> ▪ Free soil test ▪ Free lime and slow-release fertilizer ▪ Discount on aerator rental <p>Small incentives also used to reward attending workshops and completing surveys.</p>
Program History	<p>Well-established program:</p> <ul style="list-style-type: none"> ▪ Piloted in 2010 ▪ Full implementation in 2012 ▪ Refinements in 2013 	<p>New program:</p> <ul style="list-style-type: none"> ▪ Piloted in 2012 ▪ Full implementation in 2014

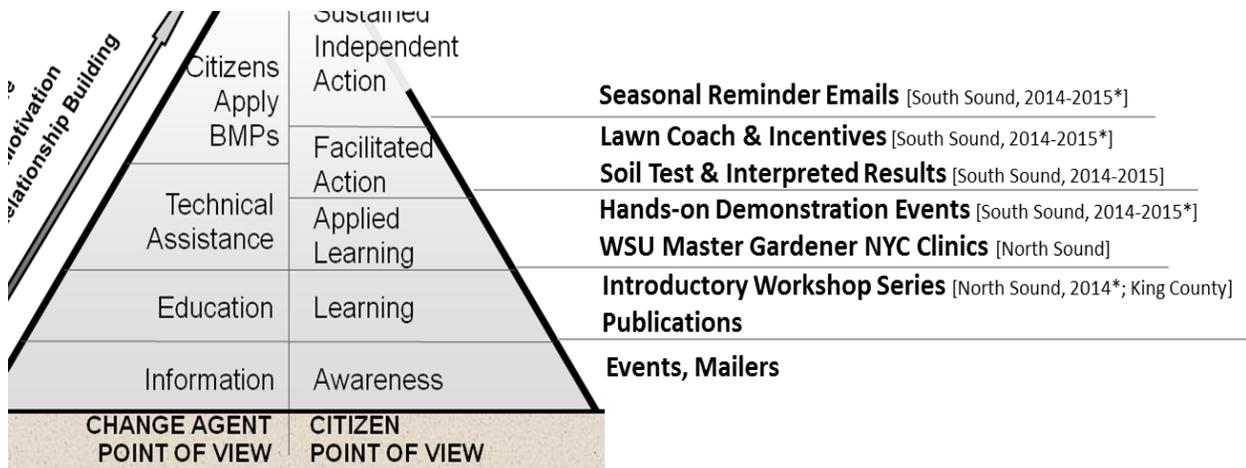
More information on the elements, activities, logistics, and details of each program can be found in:

- Appendix H-01—Final Project Report for G1400481
- Appendix H-02—North Sound Logistics Guide
- Appendix H-03—South Sound Logistics Guide

Public Involvement Continuum

Figure 8 shows the elements of each program in the context of a continuum of public involvement. Programs that provide more intensive outreach with technical assistance (such as the South Sound program’s site visits) typically result in more action and behavior change *per participant*, although they often reach a smaller number of *total participants*. In addition, incentives that directly support behavior change (such as the free lime and fertilizer provided by the South Sound program) are typically expected to increase behavior change, at least during the period in which the incentives are provided. Additional research is needed to determine whether specific incentives create lasting behavior change.

Figure 8. Natural yard care (NYC) programs, 2014 public involvement continuum



aska & DiClemente, Stages of Change Model

***Grant funded NYC programs implemented 2014-2015**

North Sound – Snohomish County, 13 partner NPDES city jurisdictions, Snohomish Conservation District, WSU Master Gardeners
South Sound – City of Olympia, Thurston County, City of Tumwater

Source: Snohomish County Surface Water Management, 2015

Core Project Team

The core project team included staff members from Snohomish County, Snohomish Conservation District, and the City of Olympia. The project team hired Cascadia Consulting Group in partnership with TerraStat Consulting Group (the evaluation team) to design and implement an evaluation to assess each individual program in a statistically valid manner. The evaluation was also designed to compare the programs’ effectiveness qualitatively but not statistically.

Evaluation Goals

The project team and evaluation team conducted this evaluation for the following purposes and audiences:

1. To assess the effectiveness of the programs so program partners can decide how to continue each program in the future.
 - a. To identify whether the programs yield a significant difference in knowledge and understanding of the selected practices.
 - b. To identify whether the programs yield a significant difference in participants' adoption of the selected practices.
 - c. To measure understanding of the potential impact of conventional yard care practices on water quality (South Sound program only).
2. To gather feedback and develop recommendations on program elements so agency partners can improve the programs in the future.
 - a. To identify the demographic factors that influence the target audience's participation in the programs, motivators for behavior change, and barriers to behavior change.
 - b. To identify whether participants are sharing natural yard and lawn care information with neighbors, including promoting the education programs.
 - c. To develop recommendations on how to improve and/or streamline natural yard and lawn programs.
 - To receive input on the participants' perceptions of the technical level of the information, practicality of the information, and quality of presenters, coaches, presentations, and overall workshops.
 - To receive input from program implementers (such as presenters, coaches, and coordinators) on how to improve or streamline natural yard and lawn care programs.
 - To develop recommendations that will maximize effectiveness of future natural yard and lawn care programs by using evaluation findings and applying the principles of community-based social marketing and behavioral economics.
3. To obtain support for future funding from state and municipal officials to offer and refine the program, including demonstration of participant behavior change and (if possible) estimating the return on investment.
4. To compile information that will motivate and help nonparticipating organizations to replicate the program in their jurisdictions.
5. To enable participating jurisdictions to meet NPDES MS4 permit reporting requirements for measuring the understanding and adoption of targeted behaviors related to water quality.
6. To fulfill grant requirements by delivering a report to the state Department of Ecology and federal National Estuary Program that measures outputs and outcomes.

Evaluation Activities

To accomplish the evaluation goals described above, the evaluation team administered a total of 15 separate surveys to the more than 600 program participants; 4,000 randomly selected nonparticipating households assumed to be comparable to participants; and numerous program staff members. The evaluation team also conducted post-education interviews with program participants.

Participant and Nonparticipant Surveys

Participant Surveys

Participants completed surveys at three points during their participation:

- **Baseline** surveys, before receiving education.
- **Immediate post-outreach** surveys, directly after receiving education:
 - North Sound participants completed three immediate post-outreach surveys—one after each lecture workshop.
 - South Sound participants completed one immediate post-outreach survey in mid-summer (after the spring lawn coach visit and the demonstration workshops but before the fall lawn coach visit).
- **Medium-term post-outreach** surveys, conducted three to twelve months after receiving education; these surveys were not conducted long enough after the education to be considered long-term surveys. Surveys were conducted within this time frame to ensure that the partnering NPDES permittee jurisdictions could meet required NPDES permit education and outreach deadlines.

Nonparticipant Surveys

The evaluation team surveyed nonparticipating households (called nonparticipants) before the education programs and three to twelve months after the education programs, around the same time that participants took the baseline and medium-term post-outreach surveys. Nonparticipants were randomly selected from households expected to be similar to participants. Due to the voluntary nature of the survey, some nonparticipants responded to both surveys while others responded to only the baseline survey or only the medium-term post-outreach survey.

These “control surveys” were intended to measure the use of natural yard care practices by comparable nonparticipant households and to measure differences in knowledge, understanding, and behaviors between nonparticipants and participants.

Survey Data Analysis

The evaluation team analyzed survey results using statistical analysis to compare yard care practices reported by participants and nonparticipants before (baseline) and after (medium-term post-outreach) the programs. The demographics and attitudes of participants and nonparticipants were also statistically compared within each region (North Sound and South Sound). To match responses for all three surveys

while ensuring respondent confidentiality, respondents were assigned a unique identification number associated with each survey they completed. During the analysis phase, the evaluation team limited the comparison of practices before and after the program to participants who completed both a baseline and medium-term post-outreach survey.

Participant Interviews and Program Staff Surveys

To obtain more information on behavior changes and obtain participant feedback on the programs, the evaluation team interviewed 20 participants from each program after conducting the medium-term post-outreach surveys.

The evaluation team also distributed web-based surveys to program staff to obtain feedback on program successes, challenges, and recommended improvements.

Surveys of participants and program staff as well as interviews with participants were summarized in narrative reports (presented in the appendices) to identify program successes as well as opportunities for improvements.

Reporting

This evaluation report summarizes findings from these sources to develop recommendations for conducting natural yard care education programs in the future. Additional details on evaluation methods and results are presented in the appendices.

- Appendix A—Evaluation Plan: Participant recruitment methods, sample selection for nonparticipants, survey distribution methods, and evaluation considerations.
- Appendices B and D—Detailed survey summary tables.
- Appendices C and E—Survey instruments and interview guides.
- Appendix F—Statistical analysis of survey results.
- Appendix G—Summaries of program staff surveys and participant interviews.

Document Map

The remainder of this evaluation report presents evaluation findings and recommendations organized into the following sections:

2. North Sound Program Evaluation
3. South Sound Program Evaluation
4. North and South Sound Program Comparison
5. Summary Recommendations
6. Appendices

2. North Sound Program Evaluation



Program Goals and Overview

In 2014, Snohomish County—in partnership with Snohomish Conservation District and 13 local cities, the Snohomish Conservation District, and the WSU Master Gardener Program—implemented a natural yard care education program using a classroom-lecture model. Implemented in greater Snohomish County, this program is referred to as the North Sound program. The North Sound project team consisted of staff members from Snohomish County and Snohomish Conservation District.

The program’s goal was to reduce pollutant runoff and improve yard health and resiliency by promoting natural yard care practices associated with lawns and other areas of yards.

Program History

In 2009, Snohomish County began developing an outreach program on “yard care practices protective of water quality” in response to a requirement in its 2007–2013 NPDES permit. Snohomish County’s pilot program was based on the successful King County and Seattle models, which the county used with permission. Because these models had been developed for urban areas, Snohomish County adapted them for residents of suburban and rural areas.

In 2010, Snohomish County piloted lecture workshops after developing supporting resources, including a County webpage, locally appropriate versions of the *Natural Lawn & Garden Guides* (originally developed by the City of Seattle), and a regional website (in coordination with King County).

Snohomish County used social marketing techniques to refine the program’s target audience, logistics, and program elements. The workshops were fully implemented in 2012, with additional refinements in 2013.

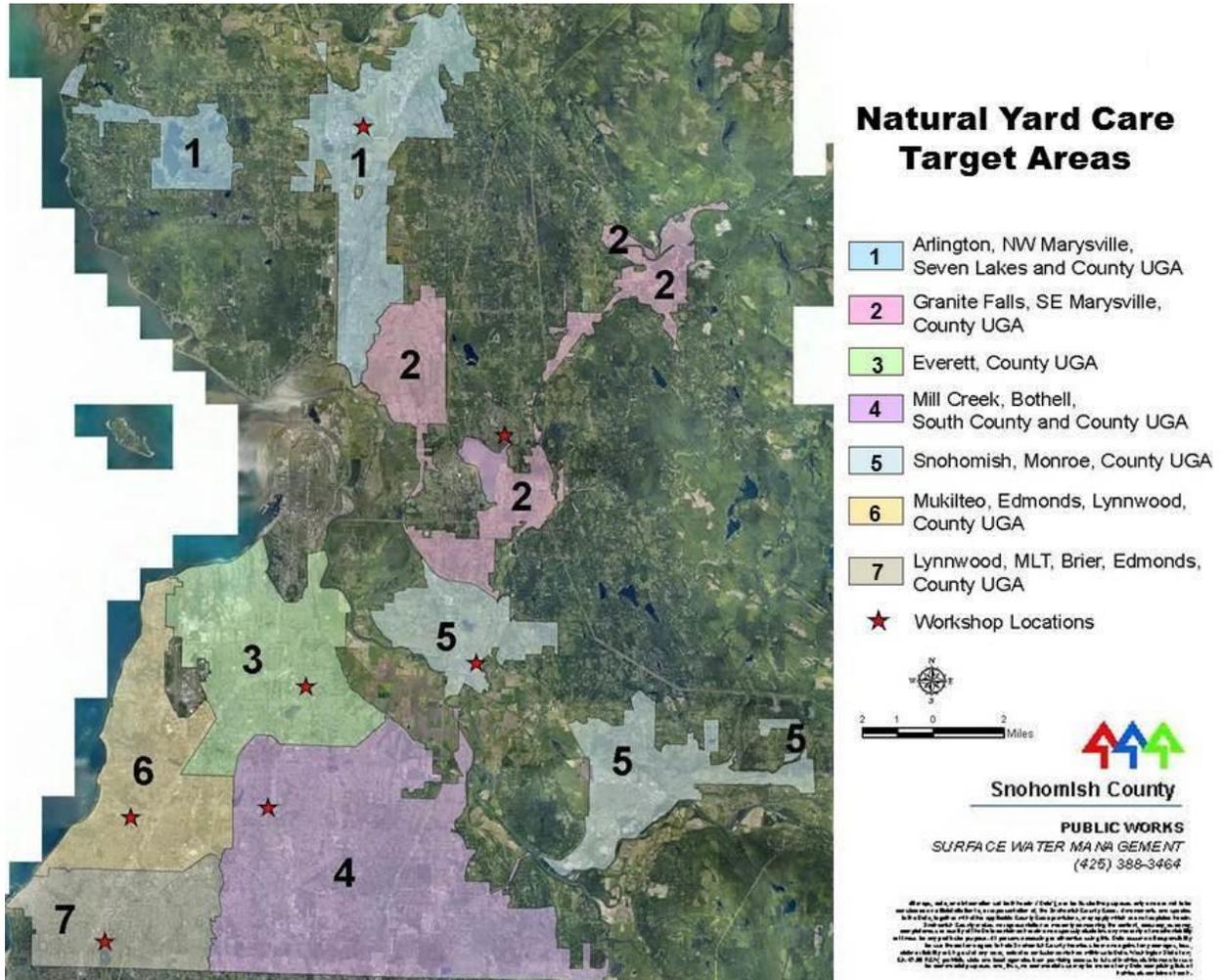
Participant Recruitment

In 2014, the North Sound project team offered a three-part lecture series in seven locations across Snohomish County, drawing from seven geographic areas shown in Figure 9. Snohomish County Surface Water Management used a geographic information system (GIS) to identify eligible households in each of the seven areas. All residents of detached single-family homes on properties sized less than one acre located within selected incorporated cities, urban growth areas (UGAs), or urban-type areas of unincorporated Snohomish County were eligible. Residents of eligible parcels were randomly selected and invited to attend the workshops. Workshop advertising included one direct mail flier and one postcard.

The seven areas can be categorized into two groups based on location within Snohomish County. The north county (areas 1, 2, and 5) is composed of areas generally considered to be in a rural setting; however, program staff noted that participants from area 5 appeared to come from more urban parts of north Snohomish County. The south county (areas 3, 4, 6, and 7) is considered to be an urban setting; however, program staff noted that participants from area 4 appeared to come from more rural parts of south Snohomish County. The program recruited from these different areas to assess whether there were differences between urban and rural participants. The lecture workshop series were held at two different times in 2014: in spring for areas 3, 4, and 6 and in fall for areas 1, 2, 5, and 7.

Appendix B-21 presents tables that compare behavior change by north versus south county, urban versus rural areas, and spring versus fall participation. These comparisons did not find substantial differences between participant based on geographic area or timing of participation.

Figure 9. North Sound program target areas



Yard Care Topics

Participants learned about six natural yard care topics during the three-evening lecture workshop series, mirroring topics from Snohomish County’s www.naturallyard.surfacewater.info web site. Most lecture topics included a visual element or indoor demonstration, shown in Figure 10.

Figure 10: North Sound topics and lecture demonstrations

Topic	Lecture Demonstration
Natural Lawn Care	Sheet mulching
Smart Watering	(No demonstration)
Building Healthy Soil	What’s in soil
Sustainable Landscape Design	Soil jar shake test
Right Plant, Right Place	Plant showcase
Natural Pest, Weed & Disease Control	Crop rotation

Program Delivery Model

At each lecture, participants learned about two natural yard care topics from landscape professionals, received take-home materials on each topic, and had the opportunity to consult with WSU Master Gardener volunteers. WSU Master Gardener volunteers assisting with this program had previously received 24 hours of intensive natural yard care training from Snohomish County to supplement their regular Master Gardener training. The North Sound program held a total of 21 lecture workshops reaching 451 households and 627 unique participants. Because many people attended multiple workshops within a series, the total “seats filled” were 1,272.

More details on program activities and logistics can be found in Appendix H-01—Final Project Report for G1400481 and Appendix H-02—North Sound Logistics Guide.

Evaluation Approach and Activities

The evaluation team evaluated the education program using surveys, interviews, and program data described in *Section 1—Introduction and Overview*. Immediate post-workshop surveys were distributed at each workshop for participants to complete and return before leaving. Figure 11 summarizes the schedule of evaluation and education activities for participants in each of the seven areas. Figure 12 on page 30 presents additional details on participant and nonparticipant surveys, including distribution methods and response rates.

Figure 11. North Sound evaluation and education schedule

Evaluation and Education	Spring workshops (areas 3, 4, and 6)	Fall workshops (areas 1, 2, 5, and 7)
Baseline surveys	Spring 2014, before workshops	Fall 2014, before workshops
Lecture workshops and immediate post-outreach surveys (3 workshops)	Spring 2014, integrated with workshops	Fall 2014, integrated with workshops
Medium-term post-outreach surveys	Summer 2015	Summer 2015
Interviews (20 participants)	Summer 2015	Summer 2015

Survey data were analyzed to develop tables comparing responses by geographic subgroups. Participant data were analyzed to present comparisons for each of the seven workshop areas and by location within Snohomish County (north county versus south county). Data for nonparticipants in the North Sound area were summarized by north county (areas 1, 2, and 5) versus south county (areas 3, 4, 6, and 7), due to the limited number of households in certain areas of the county.

Additional details on evaluation methods and results for the North Sound are presented in the following appendices.

- Appendix A—Evaluation plan.
- Appendix B —Survey data summary tables.
- Appendix C—Survey instruments and interview guides.
- Appendix G—Summaries of program staff surveys, and summaries of participant interviews.

Figure 12. North Sound surveys and participation rates

	Evaluation Elements	Respondents & Response Rates
Baseline survey	Participants: Web-based survey on practices and understanding (spring and fall 2014, incorporated into registration form)	Participants Total attending households: 451 Survey respondents: 457, of which between 383 and 417 attended a workshop* Response rate: 85–92%
	Nonparticipants: Mail-based paper survey with link for web-based responses on practices and understanding (May–June 2014)	Nonparticipants Invited households: 2,000 Survey respondents: 453 Response rate: 23%
Immediate post-outreach survey	Participants: Paper surveys for program feedback and intended actions (after each workshop)	Participants Workshop 1 (<i>Lawn Care/Smart Watering</i>) Attending households: 334 Survey respondents: 288 Response rate: 86% Workshop 2 (<i>Right Plant/Healthy Soil</i>) Attending households: 314 Survey respondents: 303 Response rate: 96% Workshop 3 (<i>Design/Pest & Weed Control</i>) Attending households: 297 Survey respondents: 287 Response rate: 97%
Medium-term post-outreach survey	Participants: Web-based survey on practices, changes in practices, and program feedback (May–July 2015) Chinook Book incentive and mail-based paper version to obtain more responses (August–September 2015)	Participants Participating households: 451 Survey respondents: 284 Response rate: 63%
	Nonparticipants: Mail-based paper survey with link for web-based responses on practices (May–June 2015)	Nonparticipants Invited households: 2,000 Survey respondents: 521 Response rate: 26%
Medium-term post-outreach interviews	Participants: Phone interviews for more information on changes and program feedback (July–August 2015)	Participants 20 interviewees

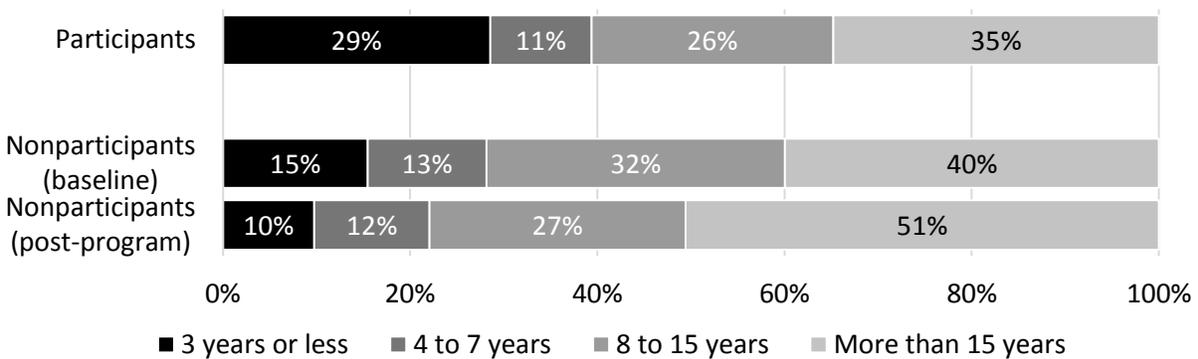
* Some households completed the survey but did not attend a workshop, while others attended but did not complete a survey. In addition, due to a tracking error, respondent IDs were not recorded for 30 baseline survey respondents from Areas 3 and 6, so these surveys cannot be categorized as belonging to an attending or non-attending household. It is not possible to estimate how these respondents might have influenced survey results.

Demographics

Both the baseline and post-outreach nonparticipant surveys included questions about demographics. Participants were asked demographic questions in only the baseline survey, under the assumption that these demographics did not change during the program. Figure 13 through Figure 18 summarize these key demographics. Chart captions notated with (PNP) indicate that differences in the demographics of participants and nonparticipants were statistically significant.

Years in Home

Figure 13. Years living in current home among North Sound participant and nonparticipants (PNP)



Participants were twice as likely to have lived in their homes three years or less, indicating that this audience is particularly receptive to attending natural yard care education.

While all types of residents attended the workshops, newer homeowners had a higher participation rate.

Subgroup Comparison by Years in Home

Participant baseline, post-outreach, and behavior change levels were cross-tabulated and compared for subgroups based on their years in their current home. Differences were not statistically tested and are reported in Figure 14 only when they were greater than 25 percentage points.

Figure 14. North Sound participant subgroup comparisons by years in home

Practice	Greatest change in behavior or understanding	Least change in behavior or understanding
HARMFUL PRACTICE: Using fast-release or weed-and-feed fertilizer	Three years or less (50% decrease) <ul style="list-style-type: none"> ■ 62% baseline ■ 12% post-outreach 	Eight to fifteen years and fifteen or more years (16 to 25% decrease) <ul style="list-style-type: none"> ■ 45% to 47% baseline ■ 29% to 22% post-outreach
Aerating at least every 2 years	Three years or less (16% increase) <ul style="list-style-type: none"> ■ 18% baseline ■ 34% post-outreach 	Four to seven years (11% decrease) <ul style="list-style-type: none"> ■ 30% baseline ■ 19% post-outreach
Always match a plant to where it thrives	Fifteen years or more (53% increase) <ul style="list-style-type: none"> ■ 13% baseline ■ 66% post-outreach 	Four to seven years (27% increase) <ul style="list-style-type: none"> ■ 42% baseline ■ 69% post-outreach
Always look for a plant’s watering needs	Fifteen years or more (29% increase) <ul style="list-style-type: none"> ■ 38% baseline ■ 66% post-outreach 	Four to seven years (12% decrease) <ul style="list-style-type: none"> ■ 60% baseline ■ 48% post-outreach
Know to mix materials into soil 6-8 inches deep	Eight to fifteen years (28% increase) <ul style="list-style-type: none"> ■ 17% baseline ■ 45% post-outreach 	Four to seven years (11% decrease) <ul style="list-style-type: none"> ■ 30% baseline ■ 19% post-outreach

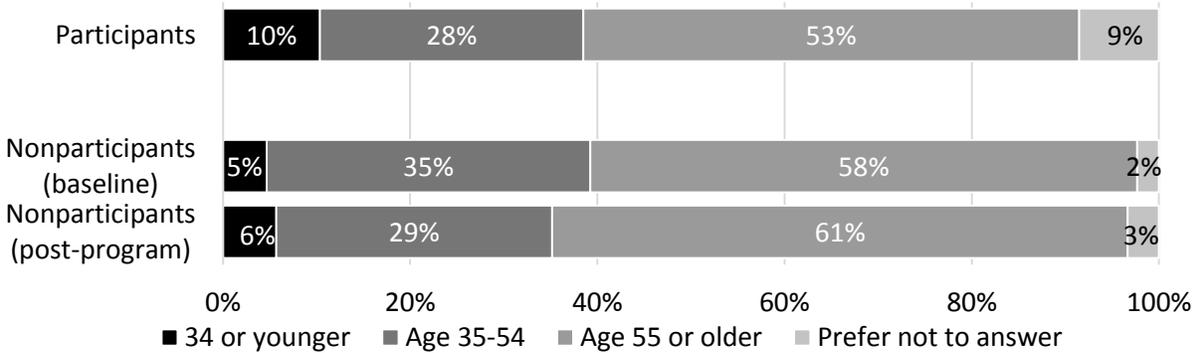
Unexpected decreases were observed among the following practices for those who had been in their home for four to seven years:

- Aerating at least every 2 years
- Always looking for a plants watering needs
- Knowing to mix materials into soil six to eight inches deep

Although the subgroup comparisons found differences among the subgroups for individual practices, there was no clear trend in natural yard care practices overall relative to length of time in the home. Appendix B-21 presents a summary table with complete subgroup comparison data.

Age

Figure 15. Age among North Sound participant and nonparticipants (PNP)

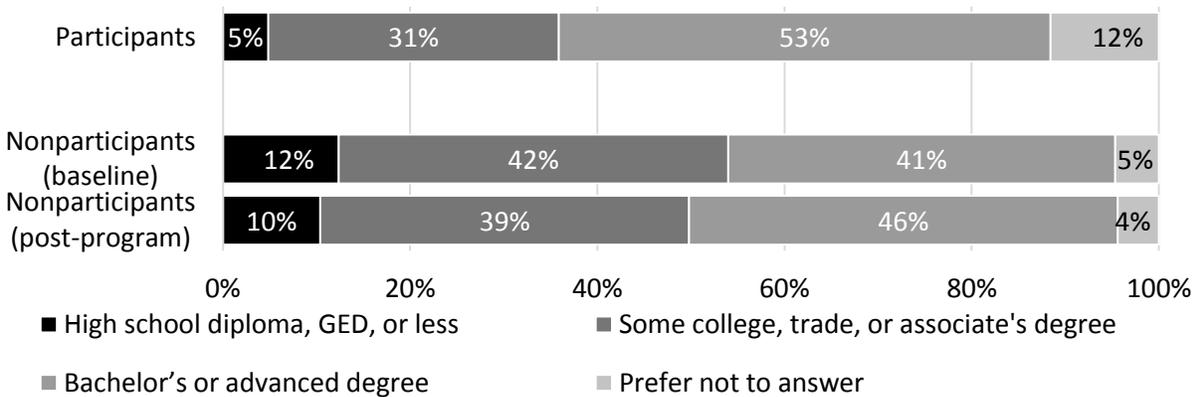


Participants were slightly more likely to be age 34 or younger

They are also less likely to provide their age, possibly because they were also providing identifiable contact information when completing the baseline survey.

Education

Figure 16. Highest level of education among North Sound participant and nonparticipants (PNP)



Participants were slightly less likely to have a high school diploma or GED as their highest level of education and more likely to have a college or advanced degree.

Participants were also less likely to provide their education level (possibly because they were also providing identifiable contact information when completing the baseline survey).

Home Ownership and Yard Appearance Guidelines

Figure 17. Home ownership among North Sound participant and nonparticipants

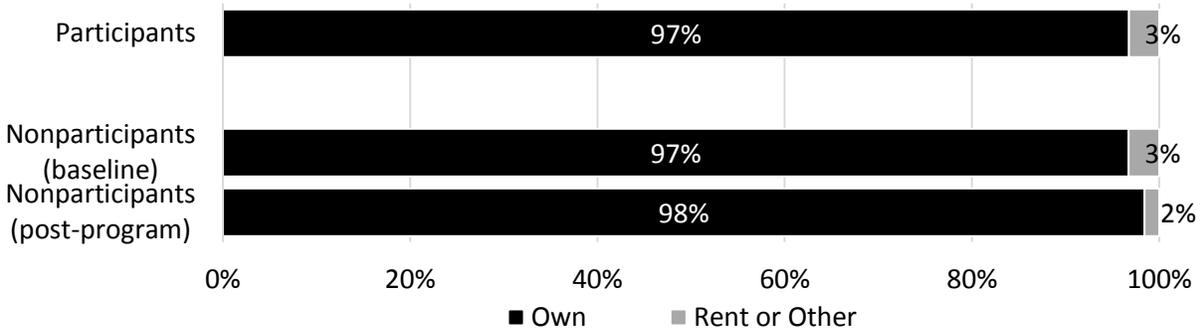
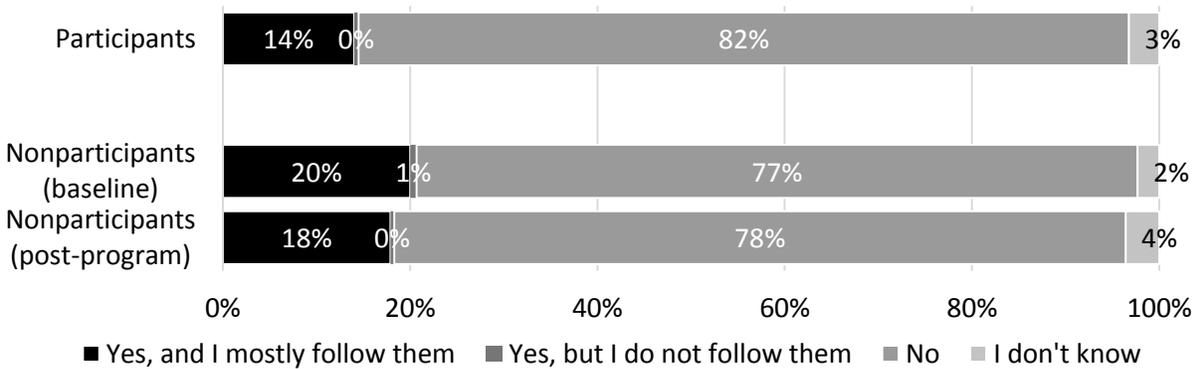


Figure 18. Whether a homeowners association or landlord sets guidelines for yard appearance among North Sound participant and nonparticipants



Differences in home ownership and whether a homeowners association or landlord sets guidelines for yard appearance were not statistically significant.

Almost all participants and nonparticipants owned their home.

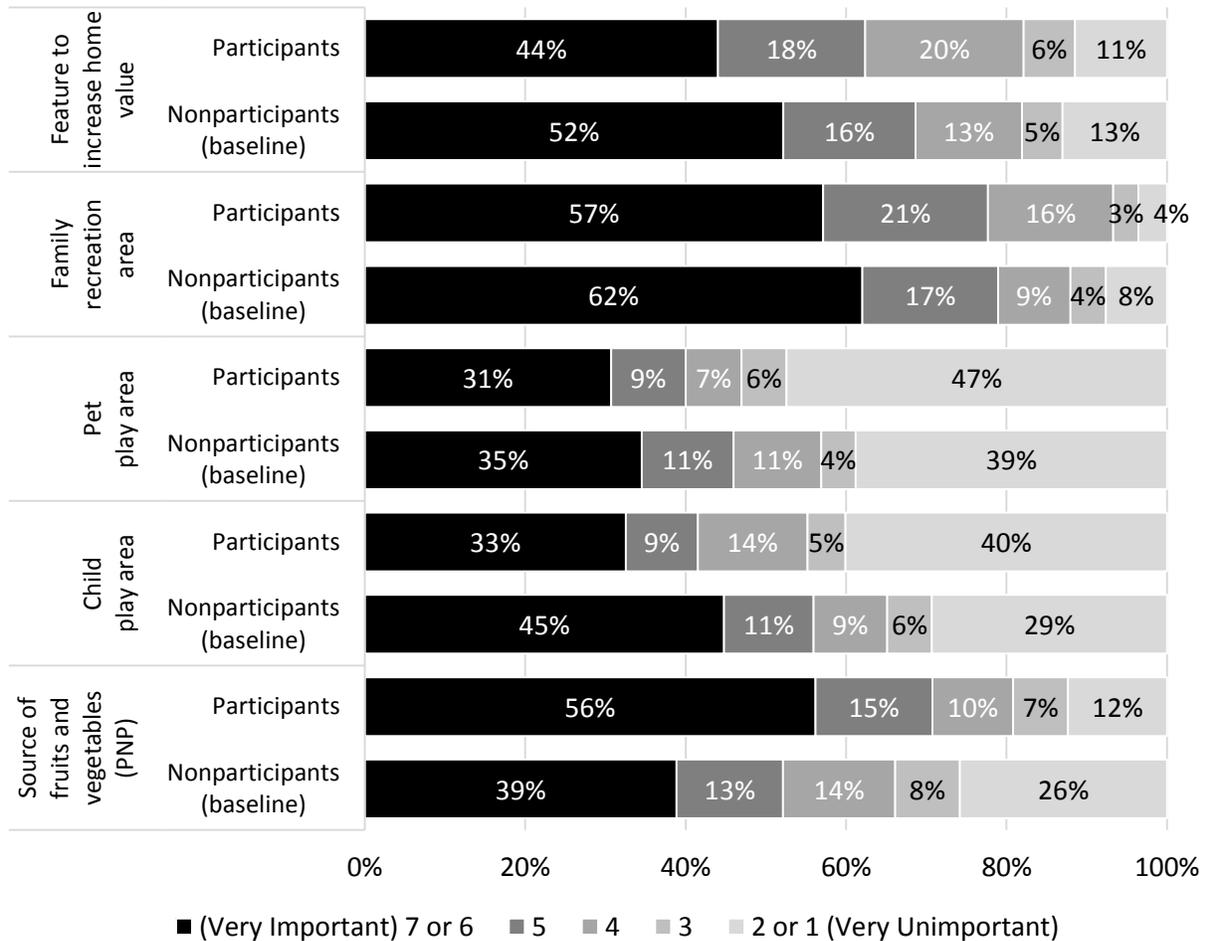
Attitudes and Understanding

Baseline surveys included several questions about attitudes and understanding related to yards and yard care. In this section, chart captions or axis labels notated with (PNP) indicate that differences in the attitudes, knowledge, and understanding of participants and nonparticipants were statistically significant.

Importance of Yard Uses

In baseline surveys, participants and nonparticipants were asked to rate how important they felt various uses of their yard were, on a seven-point scale from 7 (very important) to 1 (don't care at all).

Figure 19. North Sound participant and nonparticipant rating of importance of various uses of their yard



Compared to nonparticipants, workshop participants placed more importance on using their yard as a source of fruits and vegetables.

Residents who signed up for workshops may be interested in future specialized workshops dedicated to growing edible plants or may be more motivated to apply natural yard care practices when edible gardens are used as examples in lectures, displays, and demonstrations.

Subgroup Comparison by Important Yard Uses

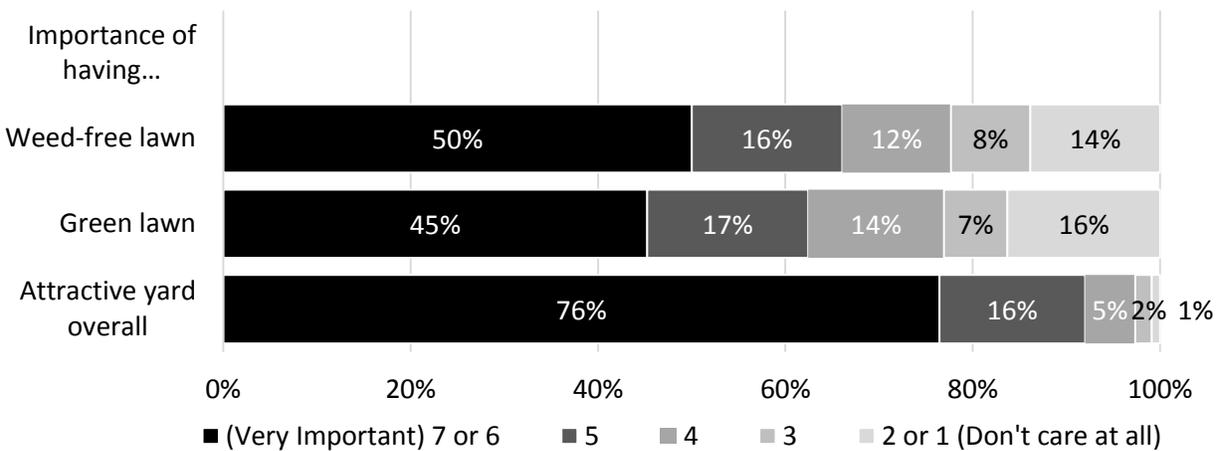
Participant baseline, post-outreach, and behavior change levels were cross-tabulated and compared for subgroups that placed high importance (a rating of six or seven on the seven-point scale) on each of the

five potential yard uses. Differences were not statistically tested and are not reported here because no difference was greater than 25 percentage points. Appendix B-21 presents a summary table with complete subgroup comparison data.

Importance of Yard Characteristics

Participants were also asked to rate the importance of having an attractive, weed-free, and green yard or lawn, on a seven-point scale from 7 (very important) to 1 (don't care at all). Nonparticipants were not asked these questions.

Figure 20. North Sound participant rating of importance of yard characteristics



Participants place more importance on having an attractive yard than on having a green or weed-free lawn.

The survey did not define “weed-free” or “attractive,” so participants may have different ideas of what these terms mean.

Subgroup Comparison by Importance of Yard Characteristics

Participant baseline, post-outreach, and behavior change levels were cross-tabulated and compared for subgroups based on their importance ratings for having a weed-free lawn, green lawn, or attractive yard overall. Differences were not statistically tested and are reported in Figure 21 only when the difference was greater than 25 percentage points. Appendix B-21 presents a summary table with complete subgroup comparison data.

Figure 21. North Sound participant subgroup comparisons of behavior change by importance of yard characteristics

Practice	Greatest change in behavior or understanding	Least change in behavior or understanding
Always look for a plant's watering needs	Somewhat important (rating of 4 or 5) for weed-free lawn, green lawn, and attractive yard (30% to 39% increase) <ul style="list-style-type: none"> 26% to 35% baseline 64% to 70% post-outreach 	Very important (rating of 6 or 7) for weed-free lawn, green lawn, and attractive yard (9% to 15% increase) <ul style="list-style-type: none"> 46% to 48% baseline 57% to 62% post-outreach

In this subgroup comparison, baseline levels for practices related to fertilizing, using weed-and-feed, and mulch mowing varied based on the importance participants placed on having a weed-free or green lawn (with slightly smaller differences in behavior change), as shown in Figure 22. At baseline, participants who placed high importance on a green or weed-free lawn were less likely to have implemented recommended practices and more likely to have implemented harmful practices.

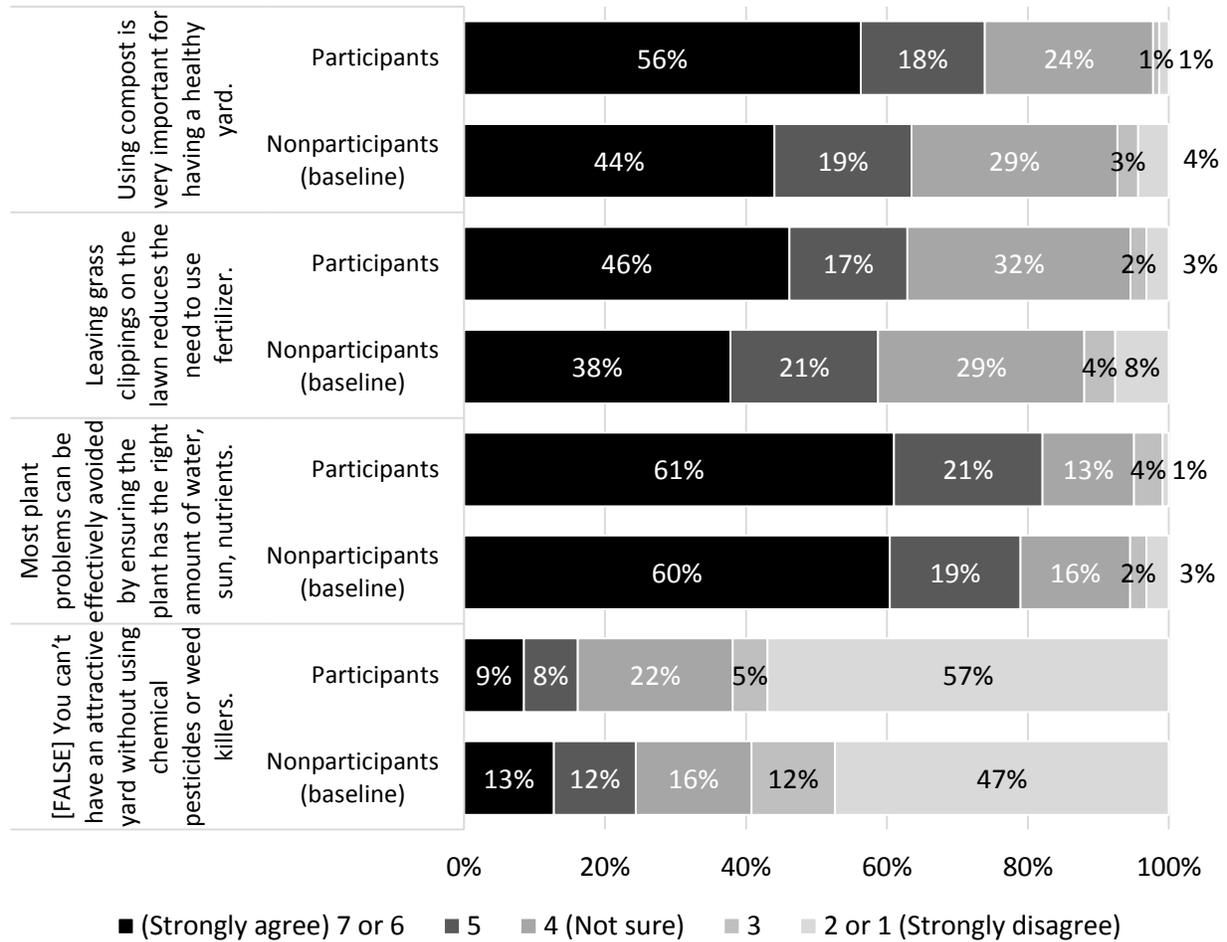
Figure 22. North Sound participant subgroup comparisons of baseline implementation by importance of yard characteristics

Practice	Highest baseline implementation	Lowest baseline implementation
"HARMFUL PRACTICE: Use weed-and-feed (any amount)	Very important (rating of 6 or 7) for green lawn (63% decrease) <ul style="list-style-type: none"> 80% baseline 10% post-outreach 	Somewhat important (rating of 4 or 5) for green lawn (42% decrease) <ul style="list-style-type: none"> 52% baseline 5% post-outreach
HARMFUL PRACTICE: Use fast-release or weed-and-feed fertilizer	Very important (rating of 6 or 7) for weed-free or green lawn (36% decrease) <ul style="list-style-type: none"> 62% to 63% baseline 26% post-outreach 	Somewhat important (rating of 4 or 5) for weed-free or green lawn (17% to 18% decrease) <ul style="list-style-type: none"> 31% to 34% baseline 14% to 17% post-outreach
Use slow release, organic or natural fertilizer	Somewhat important (rating of 4 or 5) for green lawn (10% increase) <ul style="list-style-type: none"> 50% baseline 60% post-outreach 	Very important (rating of 6 or 7) for green lawn (34% increase) <ul style="list-style-type: none"> 19% baseline 53% post-outreach
Sometimes or always mulch mow in wet or dry wet months	Very important (rating of 6 or 7) for green lawn (24% to 26% increase) <ul style="list-style-type: none"> 32% to 36% baseline 56% to 62% post-outreach 	Not important (rating of 1, 2 or 3) for green lawn (2% to 4% increase) <ul style="list-style-type: none"> 64% to 71% baseline 69% to 73% post-outreach

Understanding of Natural and Conventional Yard Care Practices

In baseline surveys, participants and nonparticipants were asked to rate their level of agreement with various statements about natural and conventional yard care practices, on a seven-point scale from 7 (strongly agree) to 1 (strongly disagree).

Figure 23. North Sound participant and nonparticipant knowledge and understanding of natural and conventional yard care practices



Participants and nonparticipants had similar baseline levels of understanding of key concepts related to natural yard care, showing some knowledge but also substantial room for increased education.

Baseline knowledge and understanding was highest for knowing that most plant problems can be avoided by proper plant care and lowest for knowing that mulch mowing reduces the need to use fertilizer.

Behavior Change, Knowledge, and Understanding Outcomes

Before the program, North Sound program participants took a baseline survey on their yard care habits regarding mowing; fertilizer use; lime and aeration; watering and mulching; pest, disease, and weed management; choosing new plants; and preparing soil for new plants. Six to twelve months after the program they took a follow-up survey covering many of these topics and changes they had made since the workshops. This section summarizes behavior change outcomes measured by these surveys. The medium-term post-outreach survey was conducted in spring and summer 2015 to meet the deadline for NPDES permit reporting requirements.

Randomly selected nonparticipants took similar “baseline” and “post-outreach” surveys; this report notes where similar changes in behavior were seen in nonparticipants.

Figures in this report are been rounded to the nearest percentage point. As a result, the sum of “baseline” and “change” figures may not appear to equal the “post-outreach” figure, but each figure is independently the most accurate rounded amount.

In the narrative findings, two icons indicate the **level of behavior change** (**H**, **M**, or **L**) from baseline to medium-term post-outreach surveys and the **post-outreach use** (✓, ▲, ●) as follows:

Behavior Change	Post-Outreach Use
<p>H High behavior change</p> <ul style="list-style-type: none"> ■ 20 or more percentage points 	<p>✓ High post-outreach use</p> <ul style="list-style-type: none"> ■ 70% or more for preferred practices ■ 25% or less for harmful practices
<p>M Moderate behavior change</p> <ul style="list-style-type: none"> ■ 10 to 19 percentage points 	<p>▲ Moderate post-outreach use</p> <ul style="list-style-type: none"> ■ 40% to 69% for preferred practices ■ 26% to 60% for harmful practices
<p>L Low behavior change</p> <ul style="list-style-type: none"> ■ Less than 10 percentage points 	<p>● Low post-outreach use</p> <ul style="list-style-type: none"> ■ Less than 40% for preferred practices ■ More than 60% for harmful practices

Unless otherwise noted, charts and tables use the following notations regarding the statistical analysis:

- (P) Indicates that only participants showed a statistically significant difference between baseline and medium-term post-outreach adoption levels.
- (NP) Indicates that only nonparticipants showed a statistically significant difference between baseline and medium-term post-outreach adoption levels.
- (P)(NP) Indicates that both participants and nonparticipants showed a statistically significant difference between baseline and medium-term post-outreach adoption levels.
- (W) Indicates that question wording was different between before and after survey, requiring responses to be combined for statistical comparison. This notation can be combined with (P), (NP), and (P)(NP).

Additional details on results are presented in Appendix B—North Sound Survey Data Summary Tables.

Key Findings

Figure 24. North Sound yard care practices, by practice type

Type	Yard Care Practice or Understanding	Baseline Use	Change in Behavior/Understanding	Post-Outreach Use
Using Weed-and-Feed	HARMFUL PRACTICE: Use weed-and-feed (any amount) (P)(W)	66%	H -53%	14%
Fertilizing	HARMFUL PRACTICE: Use fast-release or weed-and-feed fertilizer (P)	50%	H -27%	23%
	Use slow release, organic or natural fertilizer (P)	30%	H	24%
Managing Pests	HARMFUL PRACTICE: Pests/diseases: broadly apply product (P)(NP)	11%	L -8%	4%
	Pests/diseases: remove, prune, use netting or collars, or tolerate	74%	L -2%	73%
Applying Lime	Apply lime at least every 2 to 3 years (W)	22%	L	4%
Aerating	Aerate at least every 2 years (W)	19%	L	8%
	Top-dress with compost, if aerated (P)	23%	H	25%
Applying Mulch	HARMFUL PRACTICE: Bed cover: landscape fabric, plastic, or bare soil (W)	38%	M -12%	26%
	Bed cover: mulch, grass clippings, or plants (W)	82%	L	5%
Mulch Mowing	Sometimes or always mulch mow in dry months (P)	48%	M	18%
	Sometimes or always mulch mow in wet months (P)	46%	M	18%
Mowing Height	Mow 2-3" or higher (P)	87%	L	9%
Choosing Plants	Always match plant to where it thrives (P)	23%	H	42%
	Always look for a plant's soil drainage needs (P)	27%	H	30%
	Always look for whether a plant is native to Pacific Northwest (P)	18%	H	28%
	Always look for a plant's pest and disease resistance (P)	15%	H	28%
	Always look for a plant's full-grown size (P)	50%	H	23%
	Always look for a plant's cold temperature tolerance (P)	35%	H	20%
	Always look for a plant's watering needs (P)	45%	M	18%
	Always look for a plant's sun/shade needs (P)	67%	M	17%
	Has sketched a map of the yard	NA	NA	NA
Preparing Soil	Know to prepare soil with compost (P)	65%	H	26%
	Know to mix materials into soil 6-8 inches deep	26%	M	11%
Watering	Measure sprinkler watering rate (tuna can test), if waters	23%	M	12%
	Water lawn once a week or less (P)	68%	L -8%	61%
	ACCEPTABLE PRACTICE: Water lawn two to three times per week	26%	L	5%
	HARMFUL PRACTICE: Water lawn daily or every other day	6%	L	2%

Note: The unusually dry weather in 2015, when participants took the medium-term post-outreach survey, may have affected watering practices.

Figure 25. North Sound yard care practices, by level of change

Type	Yard Care Practice or Understanding	Baseline Use	Change in Behavior/Understanding	Post-Outreach Use
Using Weed-and-Feed	HARMFUL PRACTICE: Use weed-and-feed (any amount) (P)(W)	66%	H -53%	14%
Planting	Always match plant to where it thrives (P)	23%	H	42%
Planting	Always look for a plant's soil drainage needs (P)	27%	H	30%
Planting	Always look for a plant's pest and disease resistance (P)	15%	H	28%
Planting	Always look for whether a plant is native to Pacific Northwest (P)	18%	H	28%
Fertilizing	HARMFUL PRACTICE: Use fast-release or weed-and-feed fertilizer (P)	50%	H -27%	23%
Preparing Soil	Know to prepare soil with compost (P)	65%	H	26%
Aerating	Top-dress with compost, if aerated (P)	23%	H	25%
Fertilizing	Use slow release, organic or natural fertilizer (P)	30%	H	24%
Planting	Always look for a plant's full-grown size (P)	50%	H	23%
Planting	Always look for a plant's cold temperature tolerance (P)	35%	H	20%
Planting	Always look for a plant's watering needs (P)	45%	M	18%
Mowing	Sometimes or always mulch mow in dry months (P)	48%	M	18%
Mowing	Sometimes or always mulch mow in wet months (P)	46%	M	18%
Planting	Always look for a plant's sun/shade needs (P)	67%	M	17%
Watering	Measure sprinkler watering rate (tuna can test), if waters	23%	M	12%
Applying Mulch	HARMFUL PRACTICE: Bed cover: landscape fabric, plastic, or bare soil (W)	38%	M -12%	26%
Preparing Soil	Know to mix materials into soil 6-8 inches deep	26%	M	11%
Mowing	Mow 2-3" or higher (P)	87%	L	9%
Aerating	Aerate at least every 2 years (W)	19%	L	8%
Managing Pests	HARMFUL PRACTICE: Pests/diseases: broadly apply product (P)(NP)	11%	L -8%	4%
Watering	Water lawn once a week or less (P)	68%	L -8%	61%
Watering	ACCEPTABLE PRACTICE: Water lawn two to three times per week	26%	L	5%
Applying Mulch	Bed cover: mulch, grass clippings, or plants (W)	82%	L	5%
Applying Lime	Apply lime at least every 2 to 3 years (W)	22%	L	4%
Watering	HARMFUL PRACTICE: Water lawn daily or every other day	6%	L	2%
Managing Pests	Pests/diseases: remove, prune, use netting or collars, or tolerate	74%	L -2%	73%
Planting	Has sketched a map of the yard	NA	NA	NA

Note: The unusually dry weather in 2015, when participants took the medium-term post-outreach survey, may have affected watering practices.

Practices that Protect Water Quality

After the program, 70% or more of participants were using at least one key practice that directly protect water quality, as shown in Figure 26. Notably, the program achieved a high level of behavior change in reducing weed-and-feed use: the share of participants who used this product decreased from 66% to 14%. As described below, the program also achieved varying levels of behavior change in practices that support a healthy yard and reduce the weed, pest, and disease reasons people use toxic yard care products.

Figure 26. North Sound adoption of practices that protect water quality

H ✓	Avoiding weed-and-feed use
H ✓	Avoiding fast-release fertilizer use
L ✓	Avoiding broad application of pesticides
M ▲	Not leaving beds bare or covered in landscape fabric or plastics
H ▲	Top-dressing lawns with compost after aerating
L ●	Aerating every two to three years

Where the Program is Working Effectively

H ✓ Substantial change resulting in high post-outreach use

- Avoiding weed-and-feed.
- Avoiding fast-release fertilizer.
- Knowing to prepare the soil with compost.

Whether asked about the fertilizers they use or asked directly about weed-and-feed, less than one-quarter of participants reported using harmful weed-and-feed or fast-release fertilizers after the workshop, a substantial decrease.

Interviewed participants also frequently mentioned using compost and composting when asked to name the most useful thing they learned in the workshops.

M ✓ Moderate change resulting in high post-outreach use

- Always looking for a plant's sunlight and shade needs and full-grown size when planting.

Both sunlight and shade needs and full-grown size are often listed on plant tags, enabling participants to find this information easily when choosing plants.

L ✓ Little change because of high adoption levels before the workshops

- Mowing two to three inches or higher.
- Using at least one least-toxic weed management technique.
- Not broadly applying pesticides

While most participants were using some least-toxic pest management techniques before and after the program, interviewed participants reported that they need more information and resources to manage weeds and pests. Including this information in the workshops is helpful for reinforcing preferred behaviors and strengthening the audience’s understanding of how these behaviors contribute to a healthy yard and result in less need to manage weeds and pests.

H ▲ Substantial change with room for additional improvement

- Always matching a plant to where it thrives.
- Always looking for a plant’s soil drainage needs, pest and disease resistance, watering needs, cold temperature tolerance, and status as native to the Pacific Northwest.
- Using slow-release, organic, or natural fertilizer.

While participants frequently mentioned “Right Plant, Right Place” principles when asked to name the most useful thing they learned from the workshops, they may need more hands-on education or tools to help them apply these practices.

While more participants reported using slow-release, organic, or natural fertilizer, nearly half were not using this product after the workshops.

Where the Program Achieved Moderate Change but Room for Improvement Remains

M ▲ Moderate changes with moderate post-outreach use

- Mulch mowing, especially in wet months
- Not leaving beds bare or covered in landscape fabric or plastics.

After the program about two-thirds of participants reported mulch mowing at least sometimes (67% in dry months and 64% in wet months). Fewer reported that they *always* mulch mow (43% in dry months and 46% in wet months).

When asked why they did not always mulch mow, participants most frequently said they do not leave clippings when the grass is too long, they do not want to track grass clippings into the house, and they do not like lots of grass clippings on the lawn.

Participants may have multiple beds, some of which follow natural yard care practices and some of which do not.

M ● Moderate changes with low post-outreach use or understanding levels

- Measuring their sprinkler watering rate:
- Knowing to mix materials six to eight inches deep in soil when planting

Despite the unusually hot and dry year, many participants did not follow the important conservation practice of measuring their sprinkler watering rate. After the program, about 37% of participants selected the correct way to mix planting materials into the soil, although another 30% selected mixing in materials to a shallower depth of four to six inches deep.

Where the Program Achieved Little Change

L ▲ Little change with moderate post-outreach use

- Lawn watering frequency: participants did not reduce lawn watering frequency, with participants watering slightly more frequently after the workshop, potentially due to the unusually dry weather in 2015.

Watering lessons may need to emphasize more that this practice results in a healthier lawns. Education on proper watering and on other techniques to reduce the need to water (such as using mulch and top-dressing) during times of watering restrictions may be important given predictions that 2016 will also be unusually dry.

L ● Little change with low post-outreach use

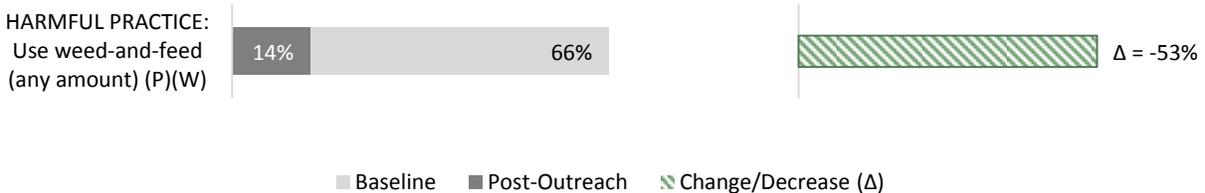
- Aerating: after the program 27% of participants reported having aerated, an increase of 8 percentage points compared to before the program
- Applying lime: after the program 26% of participants reported having applied lime, an increase of 4 percentage points compared to before the program.

The change in implementation of these practices after the program were statistically significant but relatively small—as were the levels of post-outreach use. While a larger percentage of participants say they *plan* to aerate (another 44% of respondents) and apply lime (another 44%), more education, hands-on demonstrations, or incentives may be needed to promote these practices. Although few participants aerated after the workshops, nearly half who did aerate said they also top-dressed with compost, an improvement from before the program (23% baseline and 48% post-outreach).

Detailed Findings

Weed-and-Feed Use

Figure 27. North Sound participant weed-and-feed use



H ✓ The share of participants who reported having used weed-and-feed decreased substantially after the workshops.

In this comparison, participants were asked directly about weed-and-feed, with a definition of the product, to help clearly identify the material.

H ✓ While 14% of participants used weed-and-feed after the program, slightly more (19%) plan to use it in the future.

Participants reduced their use of weed-and-feed but may not want to rule out all future use of weed-and-feed. However, two-thirds of participants (64%) who plan to use it in the future reported they would use it less than they did before the program.

Subgroup Comparison by Weed-and-Feed Use

Participant baseline, post-outreach, and behavior change levels were cross-tabulated and compared for subgroups based on their baseline use of weed-and-feed in the following categories:

- Never fertilized at all.
- Fertilized but never used weed-and-feed.
- Used weed-and-feed once a year or less.
- Used weed-and-feed two to three times per year.

Differences were not statistically tested and are reported in Figure 28 only when the difference was greater than 25 percentage points. The differences do not show a clear trend across the subgroups as baseline weed-and-feed use increases. Appendix B-21 presents a summary table with complete subgroup comparison data.

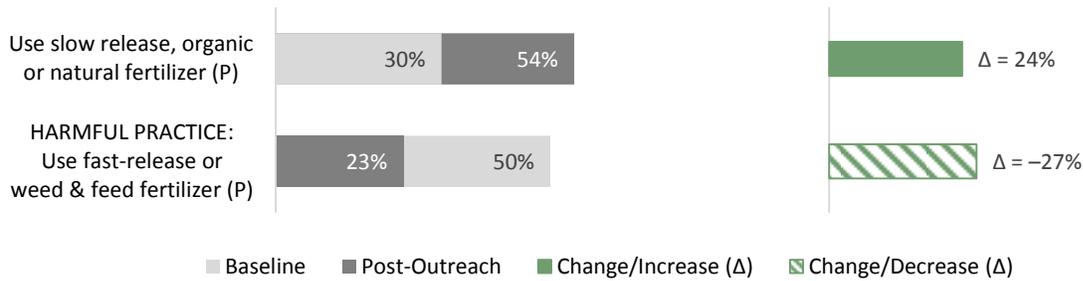
Figure 28. North Sound participant subgroup comparisons by baseline weed-and-feed use

Practice	Greatest change in behavior or understanding	Least change in behavior or understanding
Remove, prune, use netting or collars, or tolerate pests and diseases	Fertilized but never used weed-and-feed (13% increase) <ul style="list-style-type: none"> ■ 79% baseline ■ 92% post-outreach 	Used weed-and-feed once a year or less or never fertilized (11% to 13% decrease) <ul style="list-style-type: none"> ■ 73% to 86% baseline ■ 60% to 75% post-outreach
Aerating	Never fertilized (11% increase) <ul style="list-style-type: none"> ■ 2% baseline ■ 13% post-outreach 	Fertilized but never used weed-and-feed (15% decrease) <ul style="list-style-type: none"> ■ 45% baseline ■ 30% post-outreach
HARMFUL PRACTICE: Cover beds with landscape fabric, plastic, or bare soil	Used weed-and-feed two to three times per year (37% decrease) <ul style="list-style-type: none"> ■ 56% baseline ■ 19% post-outreach 	Used weed-and-feed once per year (1% decrease) <ul style="list-style-type: none"> ■ 32% baseline ■ 31% post-outreach
Know to prepare soil with compost	Never fertilized (38% increase) <ul style="list-style-type: none"> ■ 55% baseline ■ 92% post-outreach 	Fertilized but never used weed-and-feed (6% increase) <ul style="list-style-type: none"> ■ 89% baseline ■ 95% post-outreach

Fertilizer Choices

In this section, participants were asked to choose from a long list of fertilizer types, including weed-and-feed.

Figure 29. North Sound participant fertilizer type choices



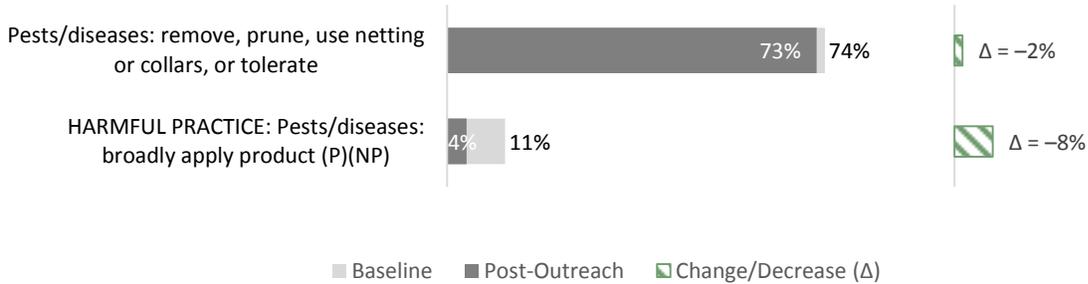
H  **More participants who fertilize reported using slow-release, organic, or natural fertilizer after the workshops, but nearly half still do not use these products.**

H  **Among those who fertilize, fewer participants reported using fast-release fertilizer or weed-and-feed after the workshops, although nearly a quarter still used at least one of these products.**

This question came before the question focused on weed-and-feed, so participants may not have realized that they used the product without the extended definition that weed-and-feed contains both fertilizer and weed killer. Alternatively, participants who used weed-and-feed might have selected a different description of the product (such as “chemical fertilizer”) when asked to mark which fertilizers they use.

Pest and Disease Management

Figure 30. North Sound participant pest, disease, and weed management practices



✔ After the program, fewer participants broadly applied products while the share who used at least one non-toxic practice remained fairly constant.

Participants were allowed to mark that they used both harmful and preferred practices. Most participants were using at least one non-toxic pest and disease management practice—removing or pruning affected plants, using netting or collars to keep out pests, or tolerating pests and diseases—both before and after the workshops.

Fewer nonparticipants also reported broadly applying products (34% baseline and 13% post-outreach).

Soil Conditions

Applying Lime

Figure 31. North Sound participant lime practices (percentage who implemented the practice)

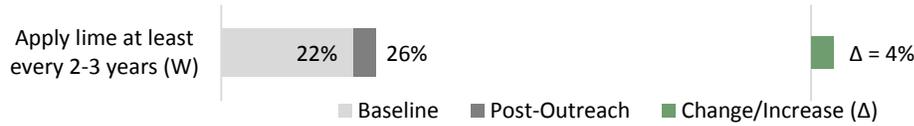
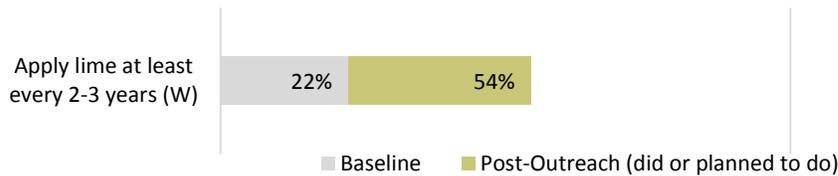


Figure 32. North Sound participant lime practices (percentages who implemented or *plan* to implement the practice)



● Changes in the percentage of participants who applied lime after the workshop were not statistically significant. After the workshops, one-quarter of participants reported using this practice, although more participants said they *plan* to apply lime in the future.

Overall, 54% of participants either applied lime after the workshops or plan to apply lime; however, intentions do not necessarily translate into actions, particularly for practices that require substantial effort.

Aerating and Top-Dressing with Compost

Figure 33. North Sound participant aerating practices (percentage who implemented the practice)

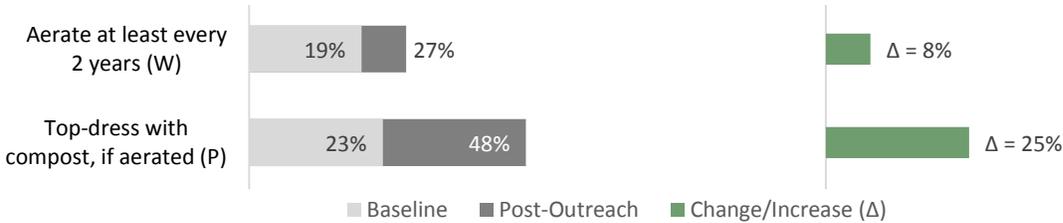
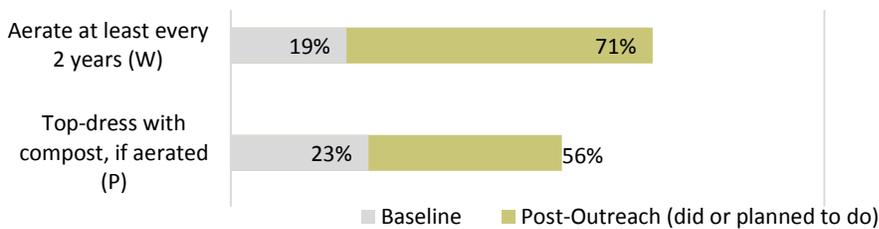


Figure 34. North Sound participant aerating practices (percentage who implemented or *plan* to implement the practice)



L ● Changes in the percentage of participants who aerated after the workshop were not statistically significant. After the workshops, just over one-quarter of participants reported using this practice although more participants said they *plan* to aerate in the future.

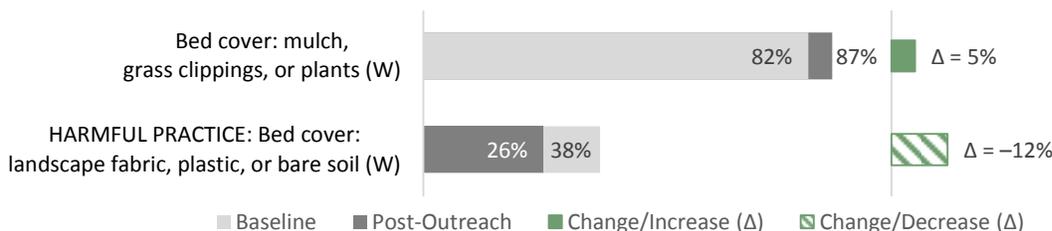
Overall, 71% of participants aerated since the workshop or plan to aerate; however, intentions do not necessarily translate into actions, particularly for practices that require substantial effort.

H ▲ Among participants who expended the effort to aerate, more than twice as many participants reported top-dressing with compost after the workshops.

Overall, 56% of participant who did or plan to aerate *also* did or plan to top-dress with compost.

Applying Mulch to Landscaped Beds

Figure 35. North Sound participant watering and mulching practices



L ✓ Differences in mulching practices were not statistically significant. Most participants were already covering beds with mulch and plants before the workshops.

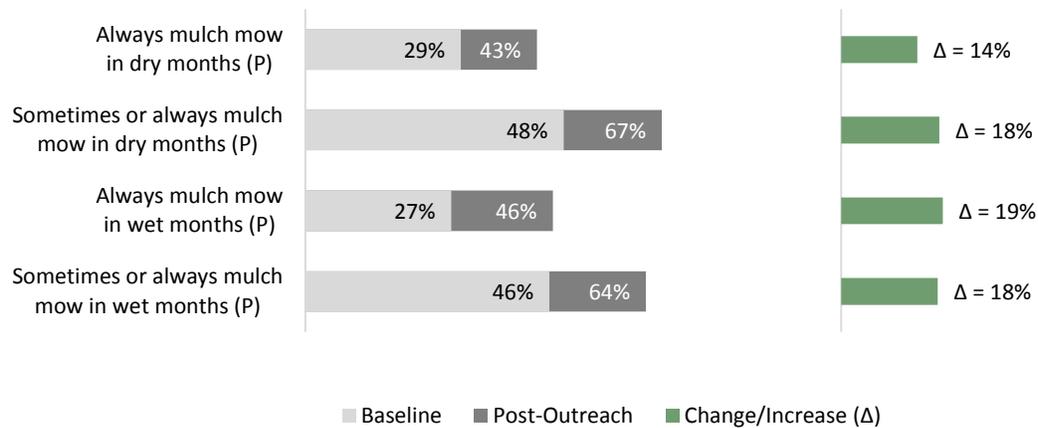
After the program a quarter of participants left soil bare or used landscape fabric or plastic.

Mowing

Lawn care practices were among the most common practices that interviewed participants mentioned when asked to name the most useful thing they learned in the workshops and the biggest change they had made since the workshops. However, the lawn and watering lecture (*Natural Lawn Care and Smart Watering*) had the lowest attendance of the three workshop evenings. Additional research is needed to determine whether participants are less interested in learning about these topics or whether a change in marketing messages could increase attendance for this topic.

Mulch Mowing

Figure 36. North Sound participant mulch mowing



M ▲ Participants increased mulch mowing in all months, but about one-third never mulch mow, and half do not always mulch mow.

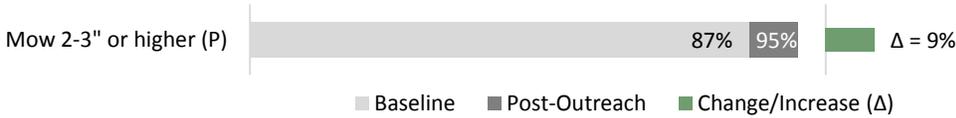
Program participants were more likely to say they had mulch mowed after the program than before in all months, including the wetter months of April, May, and October. While a dry fall 2014 and spring 2015 may have further encouraged participants to mulch mow in April and October, participants also reported increasing their mulch mowing in the typically dry months of June through September.

Barriers to Mulch Mowing

When asked what prevents them from mulch mowing, participants most frequently said they do not leave clippings when the grass is too long, they do not want to track grass clippings into the house, and they do not like lots of grass clippings on the lawn. Other common responses were that they do not have the right equipment or do not leave grass clippings when the lawn is wet. Respondents were allowed to write in other responses, commonly saying they use grass clippings in compost or mulch or they remove grass clippings to prevent the spread of weeds.

Mowing Height

Figure 37. North Sound participant mowing height



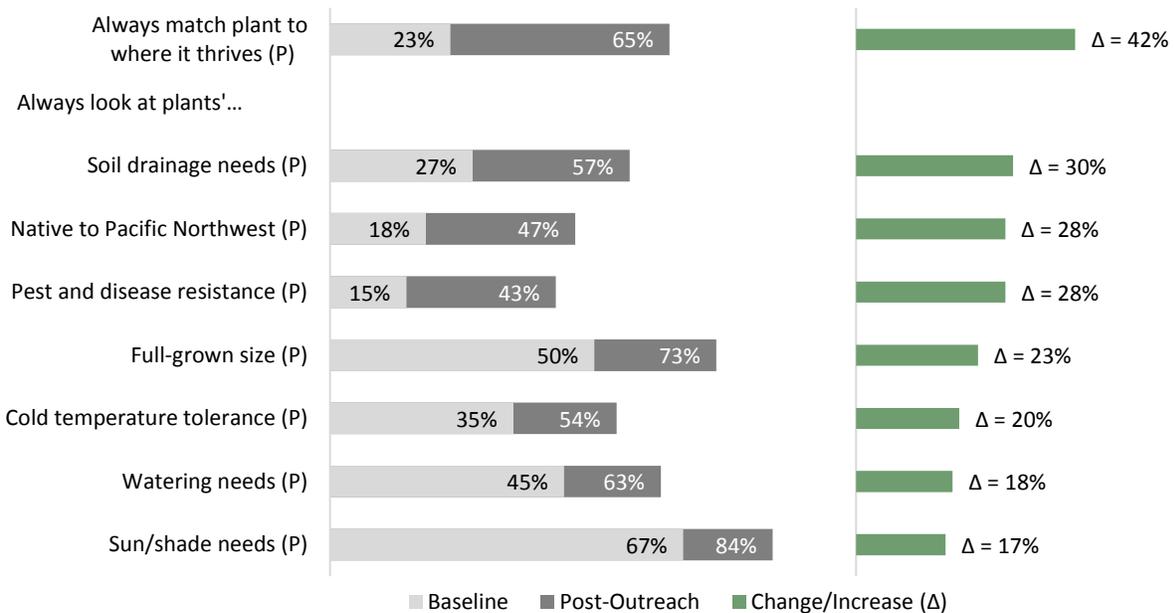
L ✓ Most participants mowed high both before and after the program, with 95% mowing two to three inches or higher after the program.

Planting

Choosing New Plants

When interviewed participants were asked to name the most useful thing they learned in the workshops or the biggest change they had made since the workshops, they most commonly mentioned plant selection and placement.

Figure 38. North Sound participant plant choices



H ▲ Nearly three times more participants said they always match a plant to where it will thrive when planting compared to before the workshops, with two-thirds of participants adopting this principle.

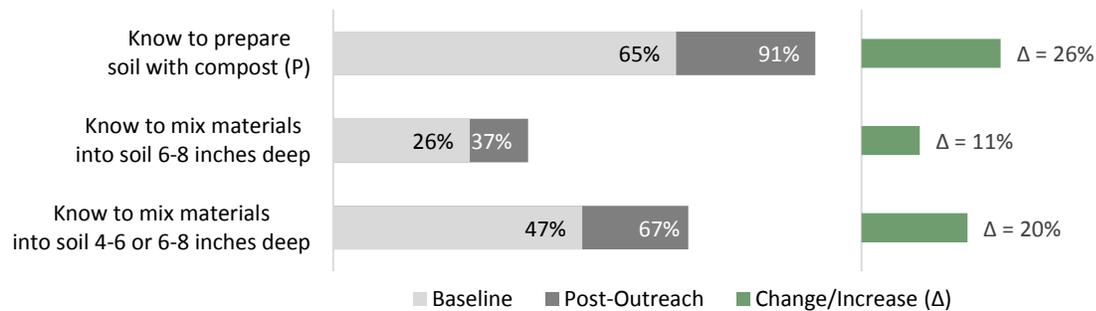
“Right Plant, Right Place” was frequently mentioned by participants when surveyed about the most useful thing they learned in the workshops.

M to H ▲ to ✓ More participants say they always look for important characteristics when choosing new plants compared to before the workshops, but more room for improvement remains on looking for pest and disease resistance, native status, cold tolerance, and drainage needs.

The share of participants always looking for specific plant characteristics increased for all the characteristics listed, but participants were more likely to report looking for information that is typically listed on plant tags, such as sunlight needs and full-grown size, than for characteristics that may require additional research, such as pest and disease resistance. Participants may need additional demonstrations or resources on how to determine this information.

Preparing Soil for New Plants

Figure 39. North Sound participant understanding of preparing soil for planting beds



Note: the recommended practice is to mixing compost into the soil six to eight inches deep; the percentage of respondents who selected either four to six or six to eight inches is provided for context.

H ✓ Almost all participants now know to use compost when preparing soil for planting, a substantial increase from before the workshops.

Soil preparation, including adding compost, was frequently mentioned by participants when surveyed about the most useful thing they learned in the workshops.

M ● While participants learned to use compost, fewer learned *how* to use it.

Changes in the share of participants who knew that soil preparation materials should be mixed into soil six to eight inches deep throughout entire beds were not statistically significant. After the workshops, less than two-fifths of participants understood how to conduct this practice after the workshop. More participants gave a partially correct response (mix materials four or more inches deep), indicating that participants may just need a more compelling visual aid or reminder about how deep to mix materials.³

³ Results for the partially correct were not statistically tested for significance.

Baseline Planting Knowledge and Understanding

Participants were asked questions to gauge baseline knowledge and understanding about how to plant a new plant. These questions were not asked on the post-outreach survey due to space constraints.

Figure 40. North Sound participant baseline understanding of how dig a hole for a new plant

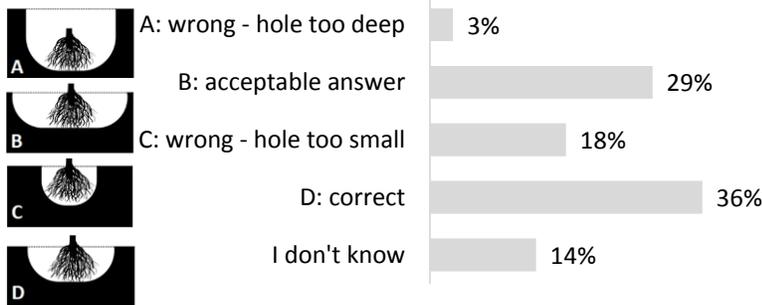


Figure 41. North Sound participant baseline understanding of how to place a plant in a planting hole

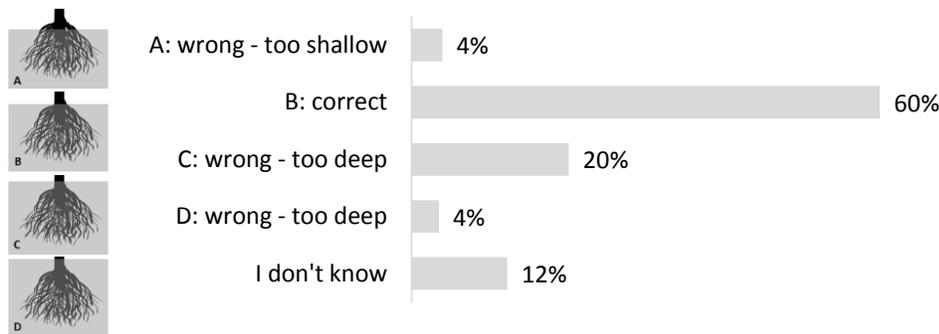
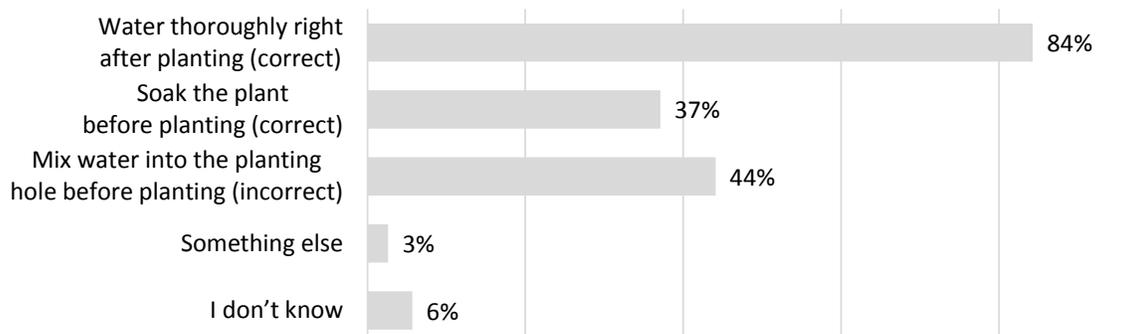


Figure 42. North Sound participant baseline understanding of how to water a newly planted plant



About two-thirds of participants knew how to dig and place a new plant into a planting hole, but some participants needed education on ensuring the hole is large enough and the plant is not planted too deeply.

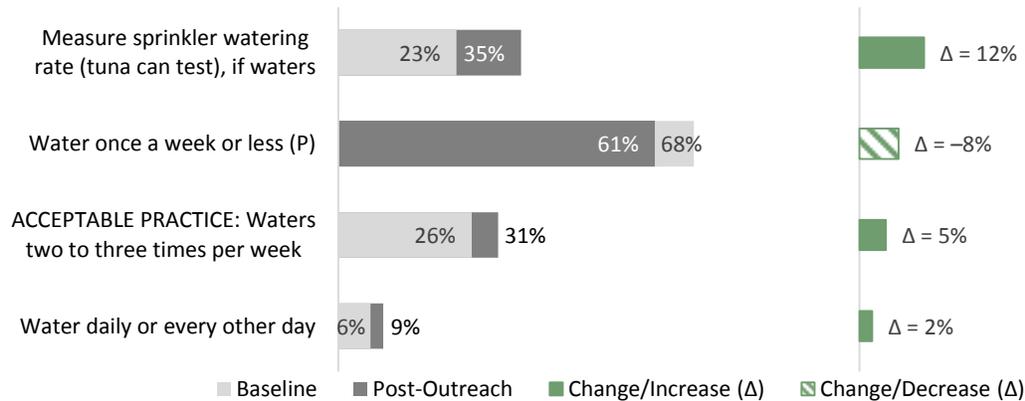
Similarly, most participants know to water a plant right after planting, but nearly two-thirds do not know they should also soak the plant *before* planting.

Watering

Participants took the survey baseline survey in either spring 2014 or fall 2014, depending on which lecture series they attended. Participants took the post-program survey in June through September 2015. The unusually hot and dry summer may have influenced changes in watering practices, particularly for participants who took the survey later in 2015 after the extent of the drought became clear.

Watering Measurement and Frequency

Figure 43. North Sound participant watering measurement and frequency



M ● More participants who water using a sprinkler said they measured their sprinkler watering rate (such as using tuna cans to track water depth after sprinkler use), but two-thirds of people using sprinklers did not use this one-time practice despite the unusually hot summer.

Nonetheless, additional education, tools, or incentives appear to be needed to encourage residents to adopt this important practice, as adoption remained low even during a drought when participants would have been expected to adopt water conservation practices.

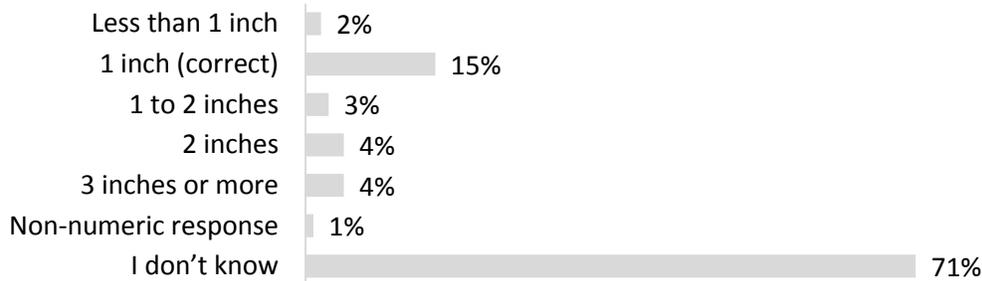
L ▲ Participants did not reduce lawn watering frequency, and some who had not watered before the workshop started watering, potentially because of the unusually hot summer.

Slightly fewer participants reported watering once a week or less while slightly more reported watering every other day or more. After the workshops, fewer participants reported never watering their lawn, potentially following a workshop recommendation to water once a month during the dry season to maintain soil health.

Knowledge and Understanding of Watering Amount per Week

Participants were asked about how much water a lawn needs per week to stay green in the summer to gauge baseline knowledge and understanding. This question was not asked on the post-outreach survey due to space constraints.

Figure 44. North Sound participant baseline knowledge and understanding of watering amount per week for a green lawn



Before the workshops, more than two-thirds of participants did not know how many inches of water a lawn needs per week to stay green in the summer. Half of participants who provided an amount wrote in the correct quantity of one inch per week.

Education on the correct amount to water per week for a green lawn, as well as for a brown lawn during a drought, will be important to conserve water in future years.

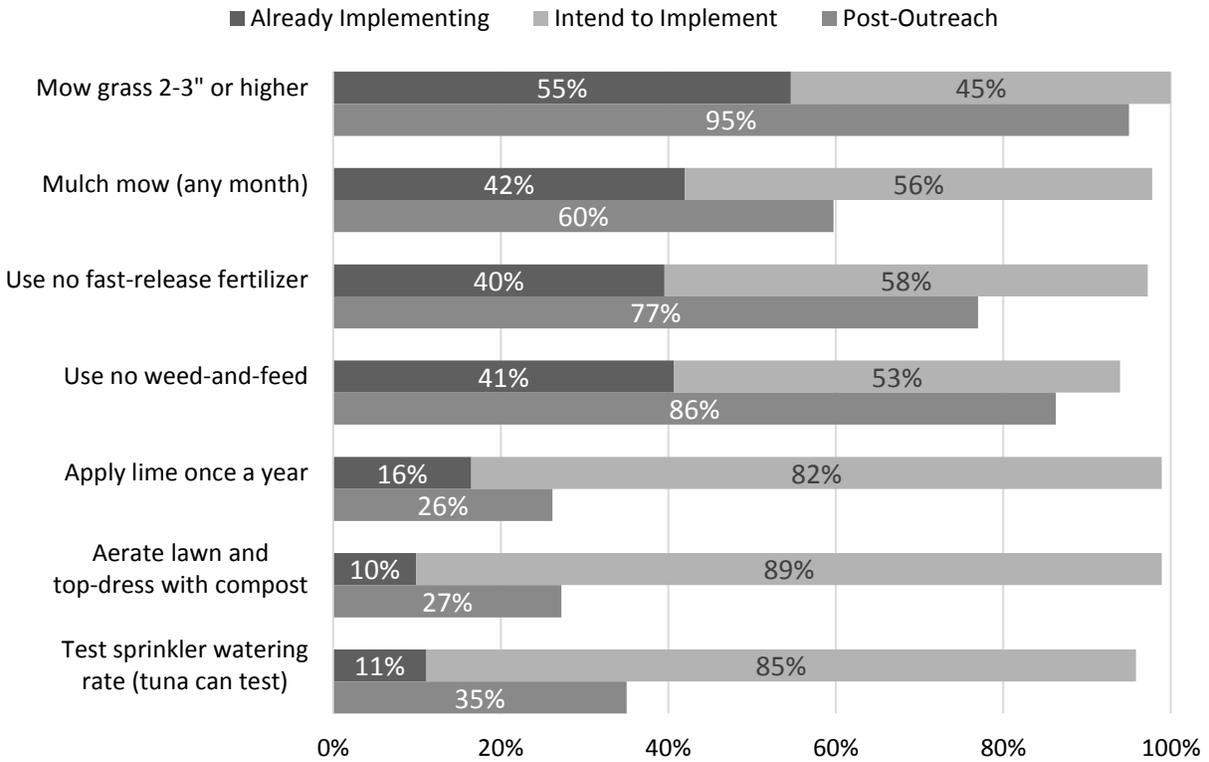
Comparison of Intentions and Reported Behaviors

Many programs can afford to administer a survey only at the end of the program asking about *intentions* to change but cannot afford to follow up with participants to learn whether they made the intended changes. This evaluation provides an opportunity to compare intentions to reported changes. For participants who completed both the immediate post-workshop surveys and the medium-term post-outreach survey, this section compares:

- Immediate post-outreach: percentage who reported at the workshop that they already implemented or intended to implement the practice.
- Medium-term post-outreach: percentage who reported doing the practice since the workshops.

These comparisons are presented below in Figure 45, Figure 46, and Figure 47.

Figure 45: Comparison of participant intentions and reported behaviors for lawn care and watering practices



Note: Use no fast-release fertilizer was compared to the question about fertilizer choices, while use no weed-and-feed was compared to the question specifically on weed-and-feed. The post-outreach percentage for aerate lawn and top-dress with compost includes only participants who used both practices together.

Figure 46. Comparison of participant intentions and reported behaviors for garden design and pest control practices

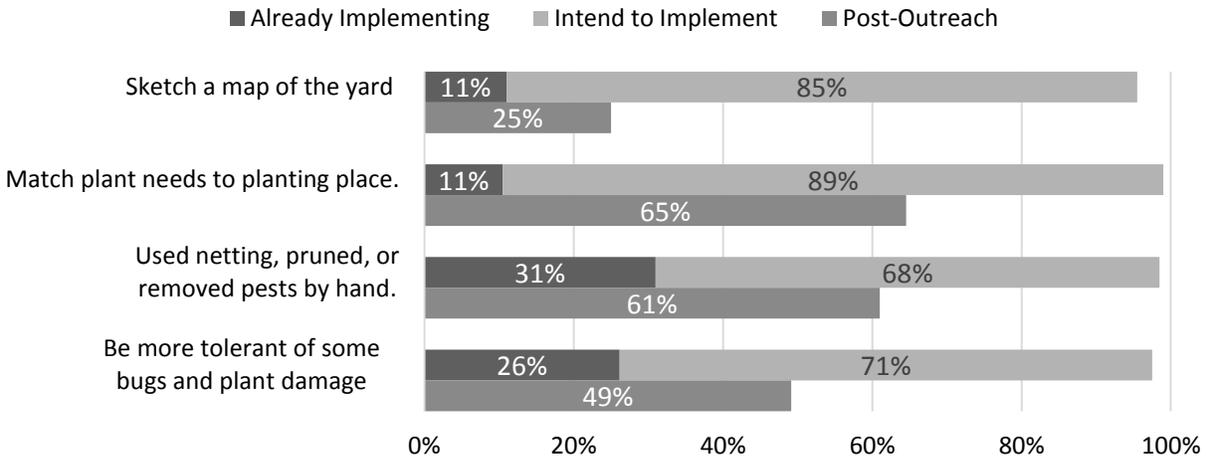
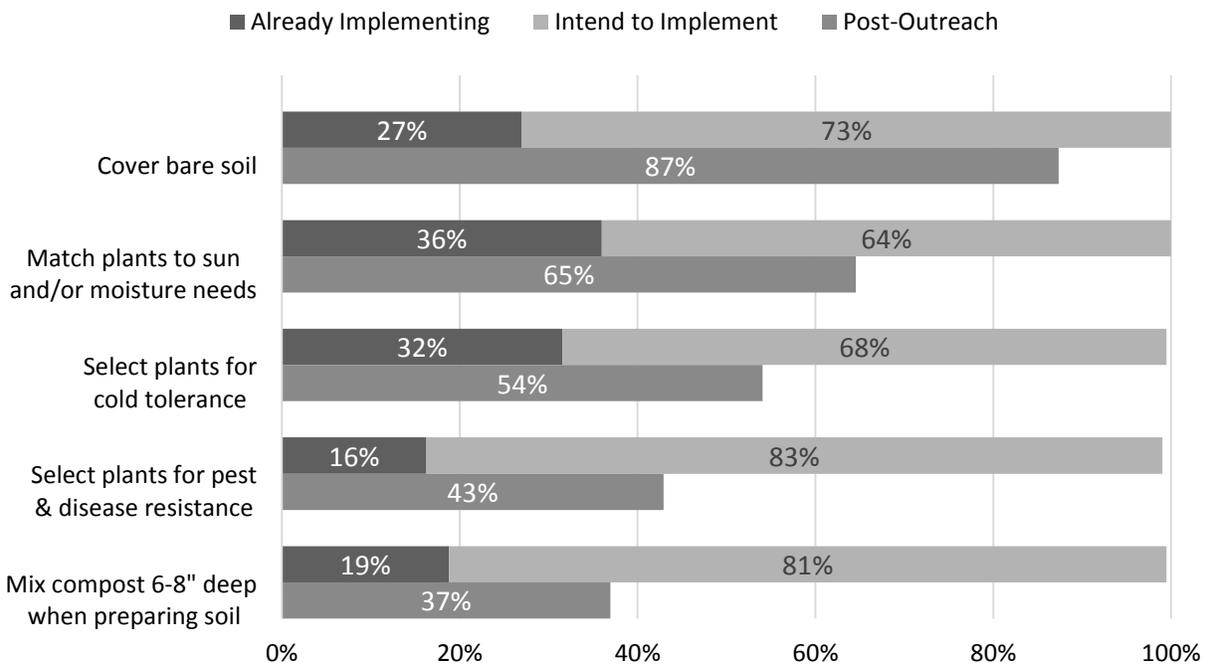


Figure 47. Comparison of participant intentions and reported behaviors for plants and soil practices



For all of the natural yard care practices presented above, at least 95% of the participants surveyed immediately post-outreach said they already did or intended to implement them.

While the reported current use of practices varied substantially, nearly all participants intended to use the practices after the workshops. Consequently, *willingness* to implement these practices does not appear to be a barrier, indicating that programs need to identify and address other barriers that arise after participants have left the workshop.

For all practices, more participants intended to change their behavior than reported actually doing so in the medium-term outreach survey.

Intentions overestimated the amount of behavior change that the program would achieve within the span of time between the workshop and the medium term survey.

Current and intended behaviors reported at the end of workshops do not vary predictably with behaviors reported six to twelve months later.

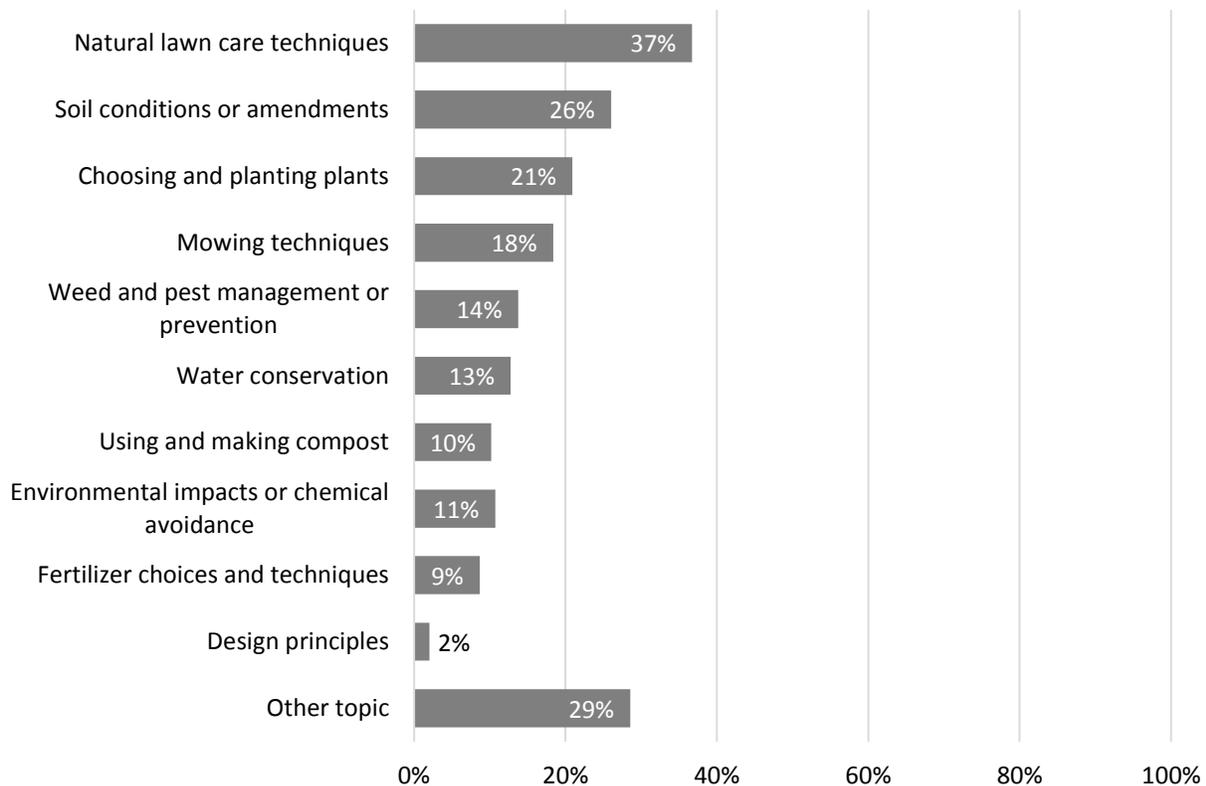
Results from surveys administered at the end of workshops cannot be used to project accurate, actual behavior change by participants. The relationship between current behavior, intentions, and reported behavior change does not appear to show a clear trend; instead it varies by practice which prevents programs from predicting behavior change based on immediate post-outreach surveys.

Most Useful Information and Social Diffusion

In the medium-term post-outreach survey, participants were asked about the most useful things they learned during the program and about whether they shared information with others (social diffusion).

Most Useful Information

Figure 48: North Sound participants—most useful topics learned during the program



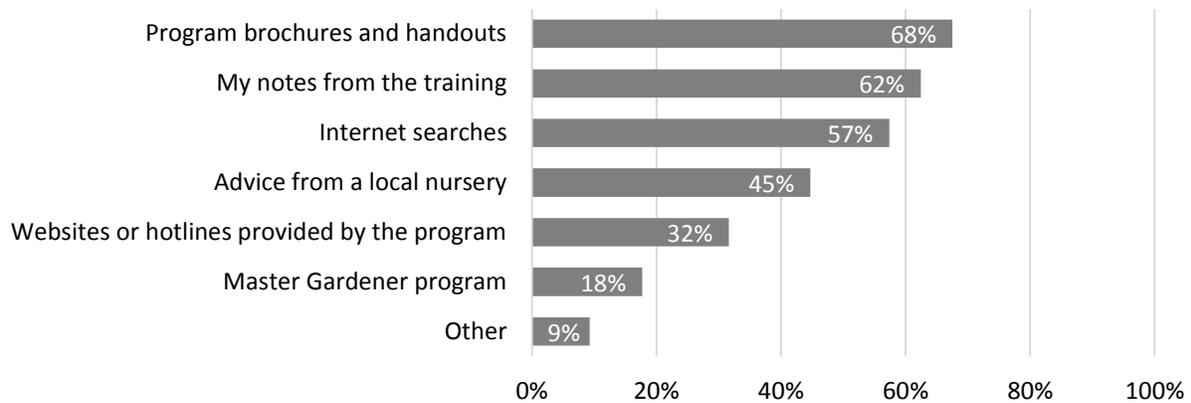
In the medium-term post-outreach survey, respondents were asked to write in the most useful things they learned in the workshops. Their responses were categorized into commonly mentioned topics, with some comments included in multiple categories. For example, a participant who mentioned mulch mowing and using slow-release fertilizer would have been counted in three topics: natural lawn care techniques, mowing techniques, and fertilizer choices and techniques.

More one-third of participants mentioned natural lawn care topics, particularly mulch mowing, using applying, and aerating. Approximately one-quarter of participants mentioned soil conditions or amendments (particularly using compost and mulch), and one-fifth mentioned planting (particularly “Right Plant, Right Place” principles along with choosing native plants). Some commonly mentioned topics correspond to practices that did not show large behavior change (such as applying lime and aerating) but that participants reported they *intend* to implement in the future.

In interviews conducted with 20 participants, four or five interviewees each stated that the most useful things they learned were proper mowing height, backyard composting, better watering practices, mulch mowing, plant selection and placement, and general yard care practices. When asked about topics for future education programs and educational videos, interviewed participants mentioned a wide variety of topics with no common themes.

Resources Used After Program

Figure 49: North Sound participants—resources used when trying practices after the workshops



The information and resources provided by the program were useful to participants. More than two-thirds of participants reported using the program brochures and handouts as they tried to implement the practices taught in the workshops, and almost as many used their workshop notes. Many participants also sought outside information by conducting internet searches (57%) or asking advice from a local nursery (45%).

Social Diffusion

Figure 50: North Sound participants—number of people shared with, among survey respondents



Note: As with other figures, these numbers include only participants who completed the medium-term post-outreach survey.

The North Sound program reached a total of 627 individuals in 451 households. Participating households were asked in the medium-term post-outreach survey whether they shared information about natural yard care with others. Three-quarters of survey respondents (77%, or 185 participating households) reported sharing information, reaching a total of nearly 1,040 additional people. As a result, survey respondents that reported sharing information are calculated to have reached an additional 5.6 people on average per household. These additional people increase the reach of the program from 627 individuals to 1,667 individuals.

Participants who did not complete the survey may also have shared information, further increasing social diffusion. If these calculations are applied to all 451 participating households, social diffusion may have reached a total of nearly 1,950 additional individuals (451 households x 77% x 5.6 people per household). Based on the estimates, social diffusion may have expanded the program reach more than four times to approximately 2,575 individuals.

Figure 51: North Sound participants—type of people shared with, among participants who shared

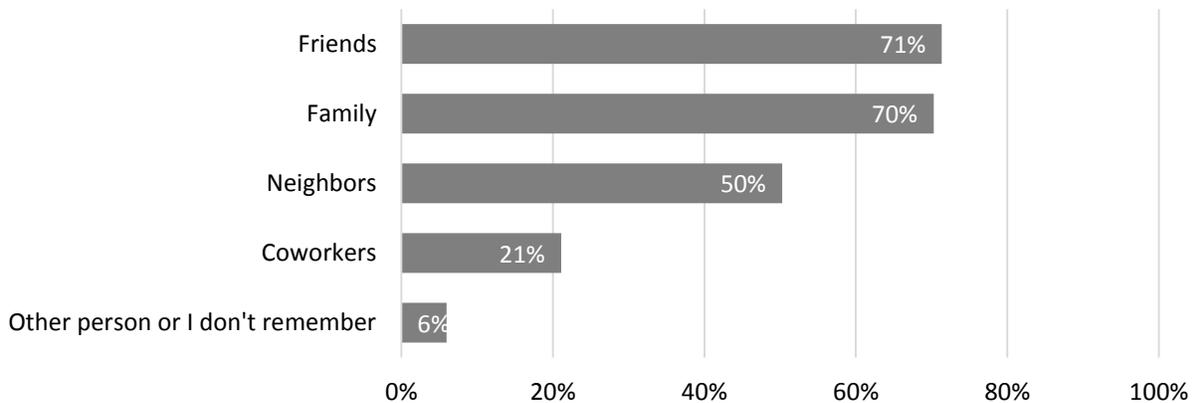
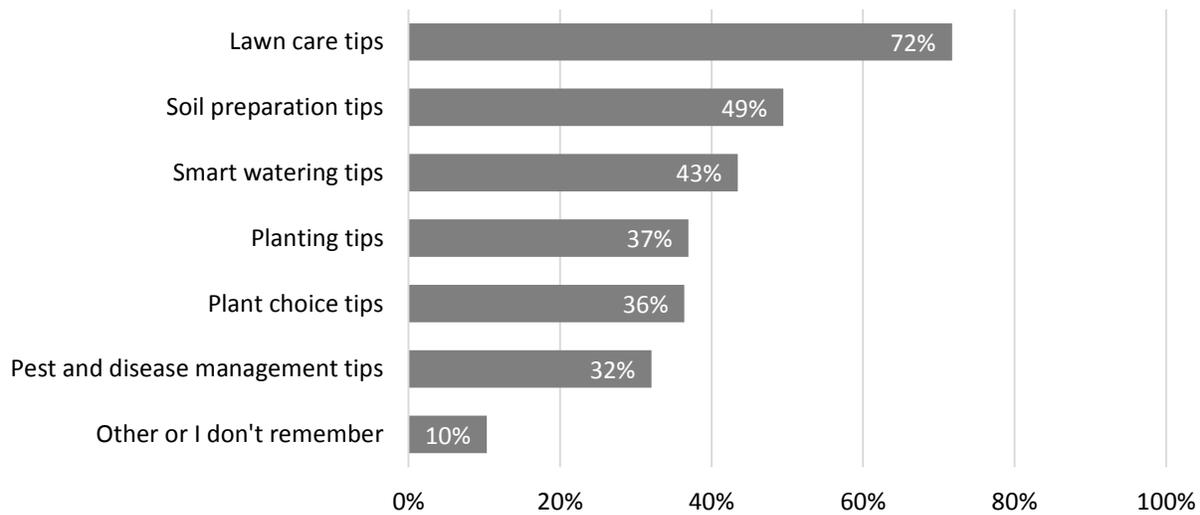


Figure 52: North Sound participants—topics shared, among participants who shared



Participants most frequently shared information with friends (71%), family (70%), and neighbors (50%). They most frequently shared information on lawn care (72%), soil preparation (49%), smart watering (43%), planting (37%), plant choices (36%), and pest and disease management (32%).

Program Costs

Snohomish County staff provided program cost figures for implementing the North Sound program in 2014. Costs for grant administration were excluded to enable comparison to the South Sound program, which was funded by a different grant with different administration requirements. Costs for program evaluation were excluded because future programs are not expected to conduct such intensive evaluations. Implementation costs do not include time spent by WSU Master Gardener volunteers at lecture workshops; however, Snohomish County contributes approximately \$20,000 to \$25,000 per year to implement a training and certification program to have trained Master Gardener volunteers support lecture workshops.

The 2015 North Sound program cost just over \$113,000 to reach 451 households for a cost of \$250 per household, as shown in Figure 53. Nearly half of program implementation costs went to staff time for workshop labor (46%). Staff time was significantly higher than in previous years due to the complexity of the project, coordination of and attendance by multiple partner jurisdictions, and the need to ensure consistent delivery across all seven series for the rigorous program evaluation. Recruitment expenses, including staff time to develop targeted mailing lists, accounted for 39% of costs. Snohomish County has consistently found that 1% of invited households register and attend the lectures when the county uses direct mail advertising.

Figure 53. North Sound 2014 program costs

Cost Category	Type	Total Cost (for 7 series)	Average Cost (for 1 series)
Recruitment costs		\$44,285	\$7,376
Printing mailers (postcard and flyer)	Expense	\$16,962	\$2,423
Postage	Expense	\$24,383	\$3,483
Mailing list generation and clean up (twice)	Staff time	\$2,940	\$1,470
Lecture workshop expenses		\$16,790	\$2,720
Presenters	Consultant	\$9,275	\$1,325
Language translation (two workshops)	Consultant	\$900	\$450
Facility rental	Expense	\$3,255	\$465
Take-home resources	Expense	\$2,100	\$300
Door prizes	Expense	\$1,260	\$180
Lecture workshop labor		\$52,500	\$7,500
Workshop coordination	Staff time	\$15,540	\$2,220
Project management	Staff time	\$18,480	\$2,640
City staff (2 people/series; 8 hours/person)	Staff time	\$18,480	\$2,640
Total program cost		\$113,575	\$17,596
Participating households		451	
Cost per household		\$252	

Note: this table excludes costs for grant administration, program evaluation, and Master Gardener volunteers.

3. South Sound Program Evaluation



Program Goals and Overview

In 2014, the City of Olympia, in partnership with the City of Tumwater and Thurston County, implemented a natural lawn care education program using an intensive education model featuring home visits, demonstration workshops, and incentives. Implemented in Olympia, Tumwater, and unincorporated Thurston County, this program is referred to as the South Sound program. The South Sound project team consisted of staff members from the City of Olympia, with support from staff members from the City of Tumwater and Thurston County.

The program's goal was to reduce nutrient and pesticide runoff resulting from traditional lawn care practices used on residential lawns and to improve yard health and resiliency by promoting natural lawn care practices.

Program History

In 2009, the City of Olympia began developing an outreach program on “yard care practices protective of water quality” in response to a requirement in its 2007–2013 NPDES permit. Olympia commissioned two research studies to identify its target audience and the barriers and motivators to using natural lawn care practices.⁴

In 2012, Olympia piloted its natural lawn care education model (home visits, demonstration workshops, and incentives), with full implementation in 2014.

Participant Recruitment

Residents were eligible for the program if they (1) lived in detached single-family homes on properties sized less than one acre, (2) owned their home, (3) maintained their own lawn, and (4) applied fast-release chemical fertilizer to their lawn in the past year. The three jurisdictions recruited residents using the following methods:

- **Olympia:** Residents in the southeast quadrant of the city with the target property type received a direct-mail postcard; in addition, neighborhood association contacts and people within the southeast quadrant who had participated in previous city-sponsored lawn aeration or mulch mowing programs were sent emails.
- **Tumwater:** All city residents with the target property type received a direct-mail postcard.
- **Unincorporated Thurston County:** All residents in selected subareas of the county (urban growth areas around Olympia, Tumwater, and Lacey) with the target property type received a direct-mail postcard and all residents (of any property type) received a newsletter advertising the program.

Invited households were instructed to register on a webpage using a pre-screening form to determine eligibility. A total of 190 households participated in the South Sound program in 2014: 75 from Olympia, 30 from Tumwater, and 85 from unincorporated Thurston County. Olympia repeated the program in 2015 with minor modifications, reaching an additional 143 households. Because the 2015 program was still being implemented at the time the evaluation report was written, results presented in this document included data from only 2014 participants.

Lawn Care Topics

Participants learned the following key practices:

- Mulch mowing two to three inches high using a sharp mower blade.
- Testing soil to determine lawn nutrient needs and to accurately calculate needed fertilizer and lime.
- Using slow-release and natural fertilizers instead of fast-release fertilizers or weed-and-feed.

⁴ City of Olympia, “Residential Community-Based Social Marketing Behavior Barriers and Motivators Research,” conducted by Frause Research, 2009. City of Olympia, Homeowner Lawn and Garden Care Ethnographic Research,” conducted by Ethnographic Insight, Inc., 2009.

- Improving soil health by aerating and applying lime.
- Overseeding and top-dressing with compost.
- Watering deeply and infrequently, and proper watering during summer drought dormancy.
- Replacing areas where lawn is unsuccessful with planting beds and native plants.

Program Delivery Model

The South Sound program’s goal was to reduce nutrient and pesticide runoff resulting from traditional lawn care practices used on residential lawns and to improve yard health and resiliency by promoting natural lawn care practices. During the year-long program, South Sound participants received the following education and incentives:

- Free soil test in spring.
- Spring and fall lawn coach consultations through home visits covering current lawn and soil conditions based on soil test results and visual inspection, desired results, and recommended practices to achieve those results.
- Demonstration workshops covering:
 - Lawn and soil health and water quality protection.
 - Calibrating spreaders and proper application of fertilizer and lime.
 - Aerating, top-dressing with compost, and overseeding.
 - Mowing and watering.
- Free slow-release fertilizer and lime in quantities based on participants’ soil test results.
- \$30 rebate towards lawn aeration service or free rental of lawn aerator equipment.

More information on program activities, logistics, and details can be found in Appendix H-01—Final Project Report for G1400481 and Appendix H-03—South Sound Logistics Guide.

Evaluation Approach and Activities

The evaluation team evaluated the education program using surveys, interviews, and program data described in *Section 1—Introduction and Overview*. For the South Sound, immediate post-workshop surveys were distributed by email in summer 2014 after participants had received the spring lawn coach visit; received the incentives; and had attended the demonstration workshop. Figure 54 summarizes the schedule of evaluation and education activities for participants. Figure 55 on page 68 presents additional details on participant and nonparticipant surveys, including distribution methods and response rates.

Figure 54. South Sound evaluation and education schedule

Evaluation and Education	All participants
Baseline survey	Spring 2014, before soil test
Spring lawn coach visit; free soil test, fertilizer, and lime; aerator rental discount; demonstration workshop	Spring to early summer 2014
Immediate post-outreach survey	Summer 2014
Fall lawn coach visit	Fall 2014
Medium-term post-outreach survey	Summer 2015
Interview (20 participants)	Summer 2015

Survey data were analyzed to develop tables comparing responses by geographic subgroups (sometimes called cross-tabulation). Participant data were analyzed to present comparisons by each of the three participating jurisdictions: City of Olympia, City of Tumwater, and unincorporated Thurston County.

Additional details on evaluation methods and results for the South Sound are presented in the appendices.

- Appendix A—Evaluation Plan: Additional details on participant recruitment methods, sample selection for nonparticipants, survey distribution methods, and evaluation considerations.
- Appendix D—Detailed survey summary tables.
- Appendix E—Survey instruments and interview guides.
- Appendix G—Summaries of program staff surveys, and summaries of participant interviews.

The evaluation team evaluated the education programs using surveys, interviews, and program data. Evaluation elements intended to measure behavior change and obtain feedback from participants are listed in Figure 55.

Figure 55. South Sound surveys and participation rates

	Evaluation Elements	Respondents & Response Rates
Baseline survey	Participants: Web-based survey on practices and understanding before program (spring 2014 separate from application form and 2015 incorporated into application form)	Participants Participating households: 190* Survey respondents: 170 Response rate: 89%
	Nonparticipants: Mail-based paper survey with link for web-based responses on practices and understanding (May-June 2014)	Nonparticipants Invited households: 2,000 Survey respondents: 652** Response rate: 33%
Immediate post-outreach survey	Participants: Web-based survey for program feedback (June 2014)	Participants Participating households: 190 Survey respondents: 124 Response rate: 65%
Medium-term post-outreach survey	Participants: Web-based survey on practices, changes in practices, and program feedback, with incentive of free lime for completing the survey (May-July 2015)	Participants Participating households: 190 Survey respondents: 124 Response rate: 65%
	Nonparticipants: Mail-based paper survey with link for web-based responses on practices (May-June 2015)	Nonparticipants Invited households: 2,000 Survey respondents: 731* Response rate: 37%
Medium-term post-outreach interviews	Participants: Phone interviews for more information on changes and program feedback (July-August 2015)	Participants 20 interviewees

* For one housing development in unincorporated Thurston County, one resident coordinated all aspects of the program, including completing participant surveys.

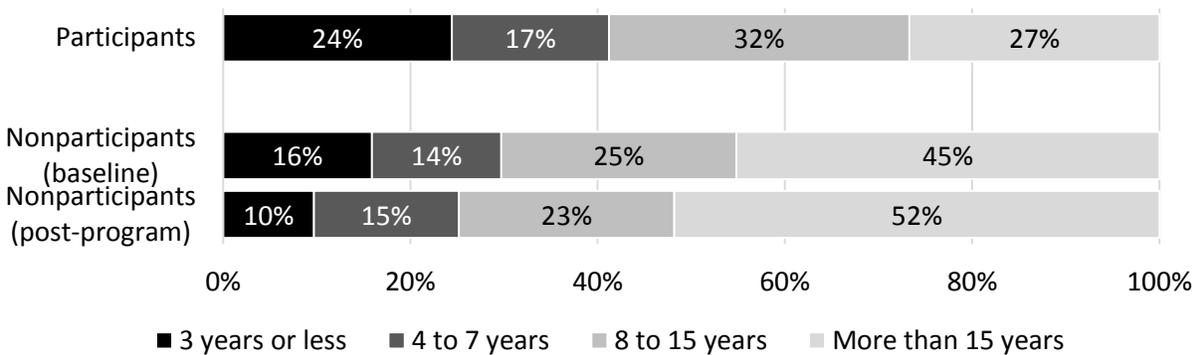
** For parts of the analysis, nonparticipant respondents were limited to those who would have been eligible for the education program.

Demographics

Both the baseline and post-outreach nonparticipant surveys included questions about demographics. Participants were asked demographic questions in only the baseline survey, under the assumption that these demographics did not change during the program. Figure 56 through Figure 61 summarize these key demographics. Chart captions notated with (PNP) indicate that differences in the demographics of participants and nonparticipants were statistically significant.

Years in Home

Figure 56. Years living in current home among South Sound participants and nonparticipants (PNP)



Participants were more likely to have lived in their homes three years or less, indicating that this audience is particularly receptive to attending natural yard care education.

While all types of residents participated, newer homeowners had a higher participation rate.

Subgroup Comparison by Years in Home

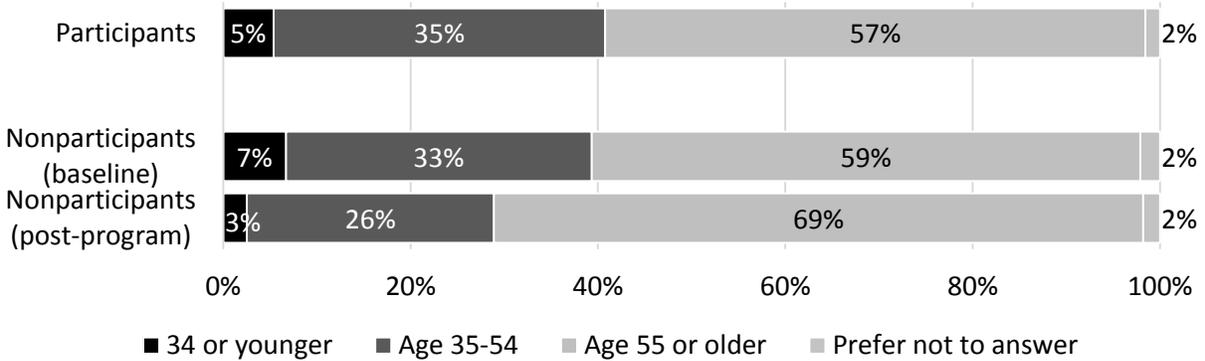
Participant baseline, post-outreach, and behavior change levels were cross-tabulated and compared for subgroups based on their years in their current home. Differences were not statistically tested and are reported in Figure 57 only when they were greater than 25 percentage points. Differences in practices do not appear substantial enough cause programs to target one group over another. Appendix D-14 presents a summary table with complete subgroup comparison data.

Figure 57. South Sound participant subgroup comparisons by years in home

Practice	Greatest change in behavior or understanding	Least change in behavior or understanding
Calibrate spreader when using new fertilizer	Seven years or less (52% increase) <ul style="list-style-type: none"> 24% baseline 76% post-outreach 	More than fifteen years (22% increase) <ul style="list-style-type: none"> 52% baseline 73% post-outreach
Measure sprinkler watering rate, if waters	Seven years or less (54% increase) <ul style="list-style-type: none"> 4% baseline 58% post-outreach 	Eight to fifteen years (18% increase) <ul style="list-style-type: none"> 27% baseline 45% post-outreach

Age

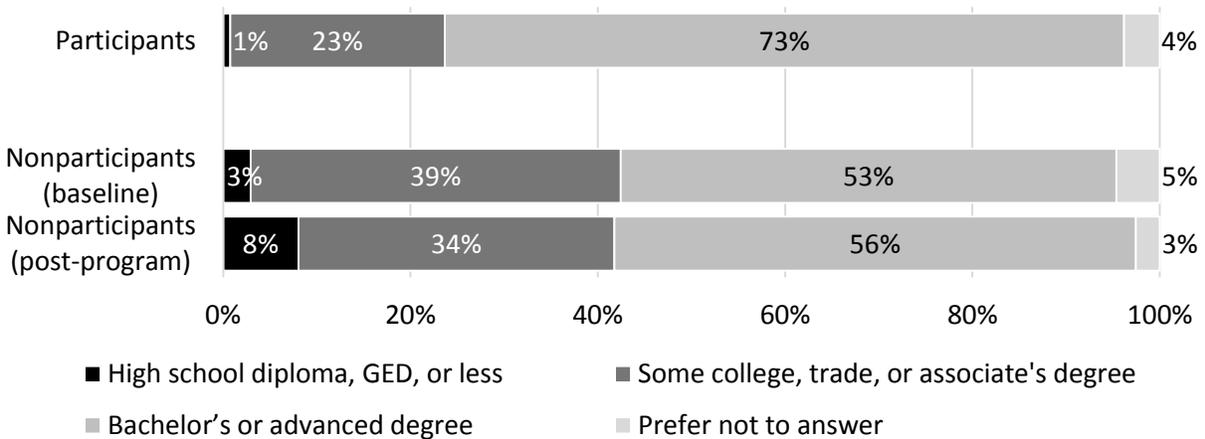
Figure 58. Age among South Sound participant and nonparticipants (PNP)



Participants had similar age profiles as nonparticipant respondents to the baseline survey but were generally younger than nonparticipant respondents to the post-program survey.

Education

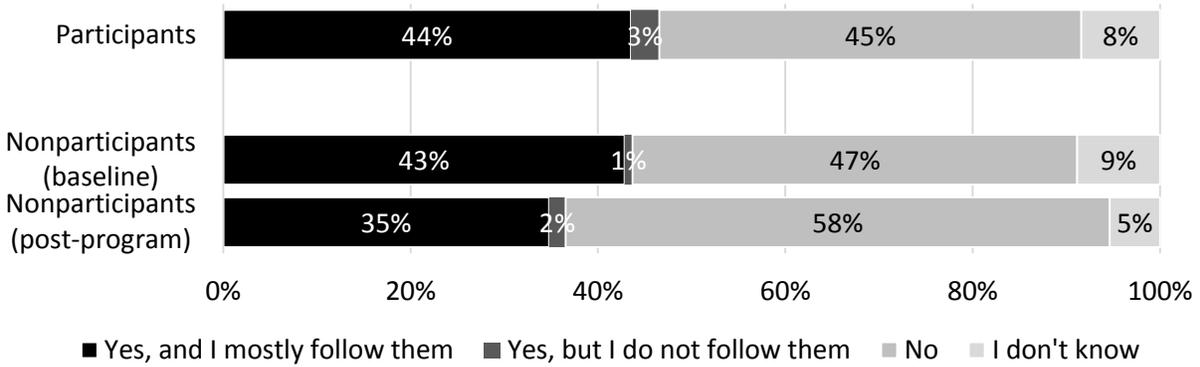
Figure 59. Highest level of education among South Sound participant and nonparticipants (PNP post-program)



Participants were more likely to have a college or advanced degree and slightly less likely to have a high school diploma or GED as their highest level of education.

Yard Appearance Guidelines

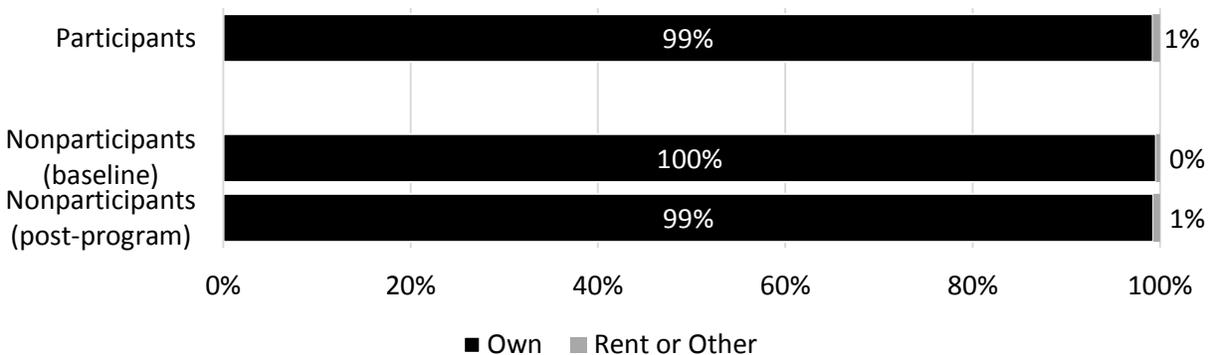
Figure 60. Whether a homeowners association or landlord sets guidelines for yard appearance among South Sound participant and nonparticipants (PNP post-program)



Survey respondents were asked whether a homeowners association or landlord sets guidelines for yard appearance. Similar shares of participants and nonparticipants in the baseline survey reported having and following guidelines, while nonparticipants in the post-program survey were less likely to have and follow guidelines.

Home Ownership

Figure 61. Home ownership among South Sound participant and nonparticipants



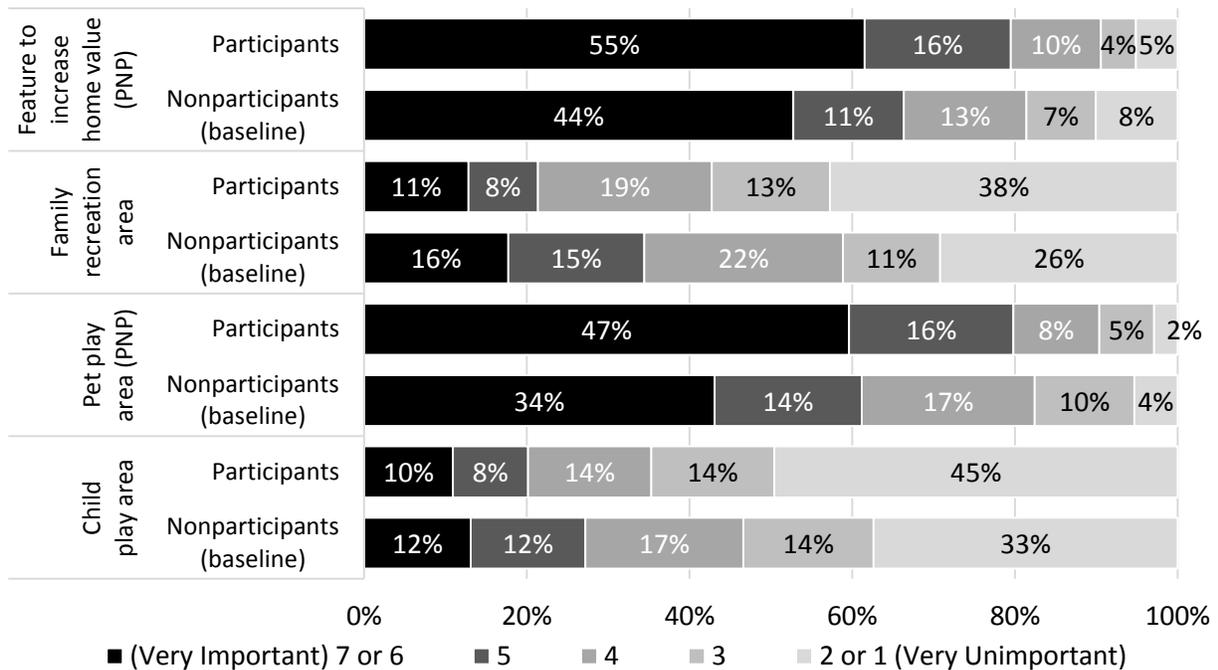
Nearly all participants and nonparticipants owned their homes. Individuals who reported renting were screened out of the program, although a few individuals who reported neither owning nor renting were not screened out.

Attitudes and Understanding

Baseline surveys included several questions about attitudes and understanding related to yards and yard care. In this section, chart captions or axis labels notated with (PNP) indicate that differences in the attitudes and understanding of participants and nonparticipants were statistically significant.

Importance of Lawn Uses

Figure 62. South Sound participant and nonparticipant rating of importance of various uses of their yard



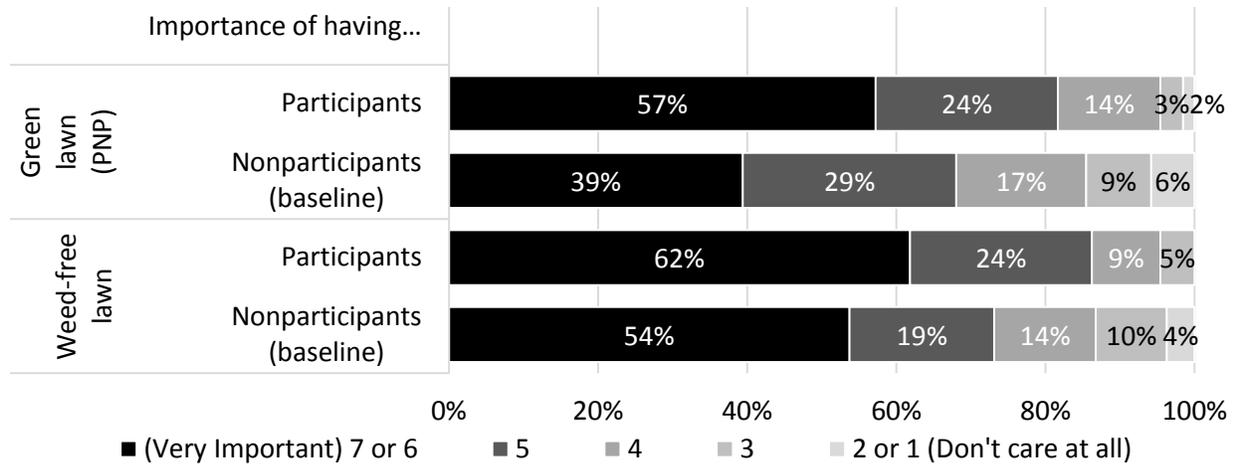
Participants placed more importance on using their yards as a feature to increase home value and as an area for pets to play.

Subgroup Comparison by Important Yard Uses

Participant baseline, post-outreach, and behavior change levels were cross-tabulated and compared for subgroups that placed high importance (a rating of six or seven on the seven-point scale) on each of the five potential yard uses. Differences were not statistically tested and are not reported here because no difference was greater than 25 percentage points. Appendix D-14 presents a summary table with complete subgroup comparison data.

Importance of Lawn Characteristics

Figure 63. South Sound participant rating of importance of yard characteristics



South Sound program participants placed more importance on having a green lawn when compared to nonparticipants.

Subgroup Comparison by Importance of Yard Characteristics

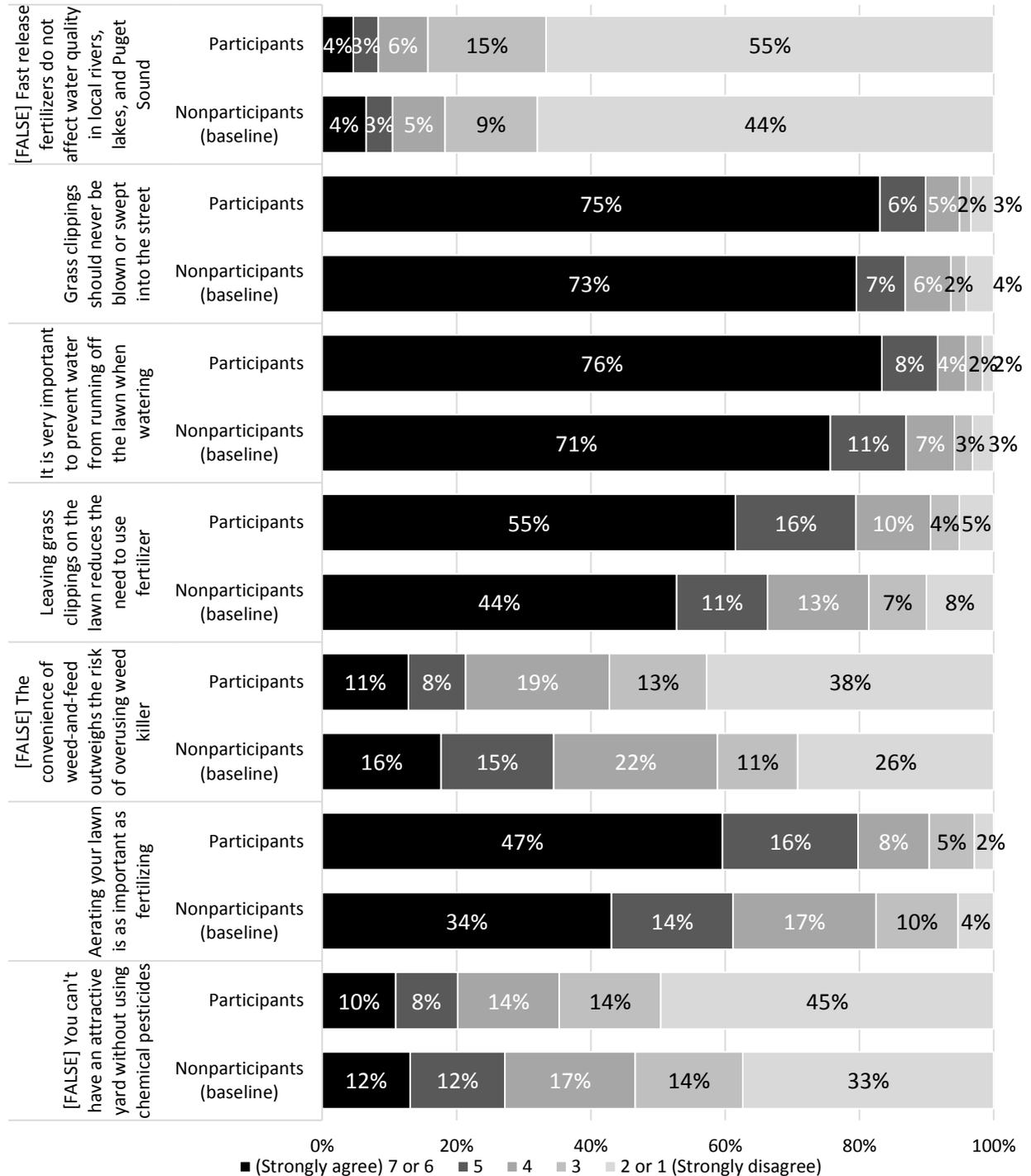
Participant baseline, post-outreach, and behavior change levels were cross-tabulated and compared for subgroups based on their importance ratings for having a weed-free lawn and green lawn. Differences were not statistically tested and are reported in Figure 64 only when the difference was greater than 25 percentage points. In general, participants who placed more importance on having a weed-free or green lawn showed lower levels of behavior change. Appendix D-14 presents a summary table with complete subgroup comparison data.

Figure 64. South Sound participant subgroup comparisons by importance of yard characteristics

Practice	Greatest change in behavior or understanding	Least change in behavior or understanding
Calculate lawn area and application rate to determine fertilizer use	Weed-free lawn, somewhat important (64% increase) <ul style="list-style-type: none"> 11% baseline 75% post-outreach 	Weed-free lawn, very important (40% increase) <ul style="list-style-type: none"> 22% baseline 62% post-outreach
Always sweep fertilizer back onto the lawn	Weed-free lawn, somewhat important (37% increase) <ul style="list-style-type: none"> 25% baseline 62% post-outreach 	Weed-free lawn, very important (2% increase) <ul style="list-style-type: none"> 43% baseline 45% post-outreach
Fertilize in May, September, or October	Weed-free lawn or green, somewhat important (27% to 29% increase) <ul style="list-style-type: none"> 53% to 56% baseline 79% to 85% post-outreach 	Green or weed-free lawn, very important (8% decrease to 3% increase) <ul style="list-style-type: none"> 71% to 69% baseline 63% to 72% post-outreach

Understanding of Natural and Conventional Lawn Care Practices

Figure 65. South Sound participant and nonparticipant understanding of natural and conventional lawn care practices

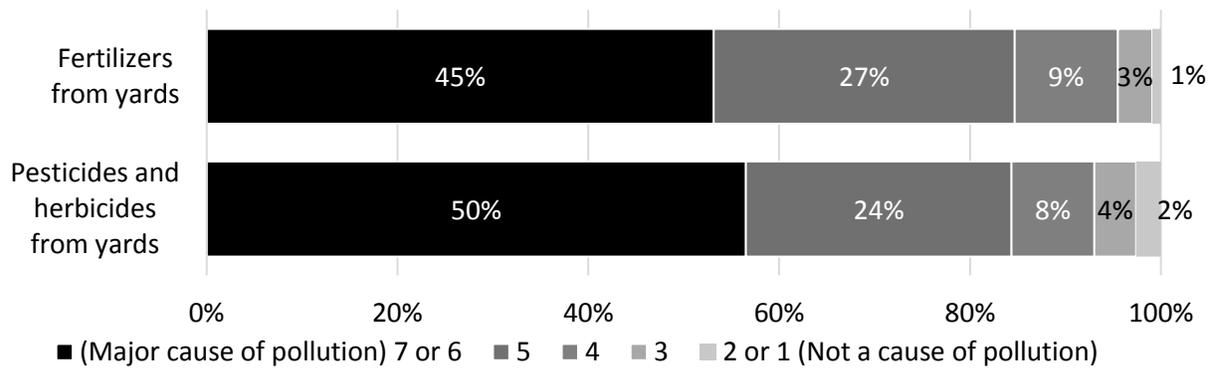


Participants and nonparticipants understanding of lawn care practices varied by practice.

Both groups had a strong baseline understanding regarding keeping grass clippings out of the street and preventing runoff when watering. About 70% of participants and 53% of nonparticipants disagreed with a false statement that fast-release fertilizers do not affect Puget Sound. About 51% of participants and 37% of nonparticipants disagreed with a false statement that the convenience of weed-and-feed outweighs the risk of overusing weed killer (meaning they agree that the risk is not worth using weed-and-feed); these lower percentages indicate that more outreach will be needed on the risks of weed killer and techniques for controlling weeds efficiently.

Understanding of Yard Care Product Contribution to Water Pollution

Figure 66. South Sound participant understanding of the contribution of yard care products to water pollution



At baseline, most participants understood that fertilizers, pesticides, and herbicides from yards were a major cause of water pollution.

Nonparticipants were not asked these questions. Participants may have signed up for the program because they had a greater baseline understanding of the effects of these products.

Subgroup Comparison by Understanding of Yard Care Product Contribution to Water Pollution

Participant baseline, post-outreach and behavior change levels were cross-tabulated and compared for subgroups based on their baseline understanding of whether key yard care products contribute to water pollution. Differences were not statistically tested and are reported in Figure 67 only when the difference was greater than 25 percentage points. In general, participants who strongly agreed that fertilizers and pesticides are a major cause of water pollution showed higher levels of behavior change for the practices where differences were substantial than participants who only somewhat agreed. Appendix D-14 presents a summary table with complete subgroup comparison data.

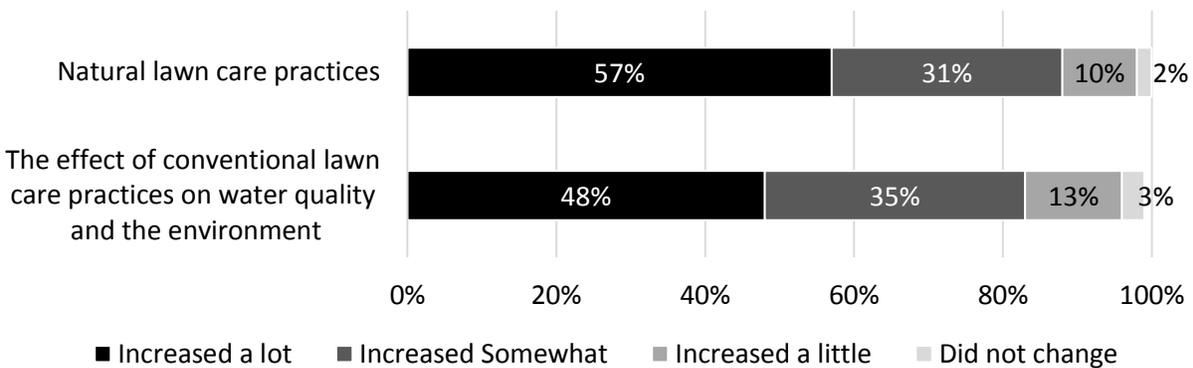
Figure 67. South Sound participant subgroup comparisons by understanding of yard care product contribution to water pollution

Practice	Greatest change in behavior or understanding	Least change in behavior or understanding
HARMFUL PRACTICE: Use weed-and-feed (any amount)	Strongly agree (6 or 7) that fertilizers and pesticides are a major cause of water pollution (64% decrease) <ul style="list-style-type: none"> ■ 69% to 70% baseline ■ 4% to 6% post-outreach 	Somewhat agree (4 or 5) that fertilizers and pesticides are a major cause of water pollution (25% to 27% decrease) <ul style="list-style-type: none"> ■ 46% to 50% baseline ■ 21% to 23% post-outreach
HARMFUL PRACTICE: Use fast-release fertilizer or weed-and-feed	Strongly agree (6 or 7) that pesticides are a major cause of water pollution (61% decrease) <ul style="list-style-type: none"> ■ 67% baseline ■ 6% post-outreach 	Somewhat agree (4 or 5) that pesticides are a major cause of water pollution (27% decrease) <ul style="list-style-type: none"> ■ 43% baseline ■ 17% post-outreach
Always sweep fertilizer back on the lawn	Strongly agree (6 or 7) that fertilizers and pesticides are a major cause of water pollution (33 to 34% increase) <ul style="list-style-type: none"> ■ 26% to 29% baseline ■ 61% to 62% post-outreach 	Somewhat agree (4 or 5) that pesticides are a major cause of water pollution (11% decrease) <ul style="list-style-type: none"> ■ 41 baseline ■ 29% post-outreach
Fertilize in May, September, or October	Strongly agree (6 or 7) that fertilizers are a major cause of water pollution (29% increase) <ul style="list-style-type: none"> ■ 51% baseline ■ 80% post-outreach 	Somewhat agree (4 or 5) that fertilizers are a major cause of water pollution (5% decrease) <ul style="list-style-type: none"> ■ 71% baseline ■ 67% post-outreach

Change in Understanding of Lawn Care Practices and Effects on Water Quality

In the post-outreach survey, participants were asked to self-assess their change in understanding about natural yard care practices and the effects of conventional yard care practices.

Figure 68: South Sound participant change in understanding of lawn care practices and effects on water quality



Almost all participants said the program increased their understanding of natural lawn care practices and of the effect of lawn care practices on water quality and the environment.

Supporting these survey results, 15% of participants mentioned avoiding chemical use as one of the most useful practices they learned from the program when asked in the medium-term post-outreach survey.

Behavior Change, Knowledge, and Understanding Outcomes

After being accepted into the program, South Sound participants took a baseline survey on their yard care habits regarding mowing; fertilizer use; watering; lime, aeration, and soil testing; pest, disease, and weed management; and general understanding of natural lawn care practices. While the final lawn care coach home visits took place in fall 2014, participants received program reminder emails and were able to claim the aeration rebate through March 2015. Six months after completing the lawn coaching and three months after the formal program end date, they took a follow-up survey covering many of these topics and changes they had made since the workshops.

This section summarizes behavior change outcomes measured by these surveys. Randomly selected nonparticipants took similar “before” and “after” surveys. This report notes where changes in participant behavior may be due to outside factors (such as weather, region-wide education, or yard care product manufacturer advertising) where similar changes were seen in nonparticipants.

Figures in this report are been rounded to the nearest percentage point. As a result, the sum of “baseline” and “change” figures may not appear to equal the “post-outreach” figure, but each figure is independently the most accurate rounded amount.

In the narrative findings, two icons indicate the **level of behavior change** (**H**, **M**, or **L**) from baseline to medium-term post-outreach and the **post-outreach use** (✓, ▲, ●) as follows:

Behavior Change	Post-Outreach Use
<p>H High behavior change</p> <ul style="list-style-type: none"> ■ 20 or more percentage points 	<p>✓ High post-outreach use</p> <ul style="list-style-type: none"> ■ 70% or more for preferred practices ■ 25% or less for harmful practices
<p>M Moderate behavior change</p> <ul style="list-style-type: none"> ■ 10 to 19 percentage points 	<p>▲ Moderate post-outreach use</p> <ul style="list-style-type: none"> ■ 40% to 69% for preferred practices ■ 26% to 60% for harmful practices
<p>L Low behavior change</p> <ul style="list-style-type: none"> ■ Less than 10 percentage points 	<p>● Low post-outreach use</p> <ul style="list-style-type: none"> ■ Less than 40% for preferred practices ■ More than 60% for harmful practices

Unless otherwise noted, charts and tables use the following notations regarding the statistical analysis:

- (P) Indicates that only participants showed a statistically significant difference between baseline and medium-term post-outreach adoption levels.
- (NP) Indicates that only nonparticipants showed a statistically significant difference between baseline and medium-term post-outreach adoption levels.
- (P)(NP) Indicates that both participants and nonparticipants showed a statistically significant difference between baseline and medium-term post-outreach adoption levels.
- (W) Indicates that question wording was different between before and after survey, requiring responses to be combined for statistical comparison. This notation can be combined with (P), (NP), and (P)(NP).

Additional details on results are presented in Appendix D—South Sound Results Tables.

Key Findings

Figure 69. South Sound lawn care practices, sorted by practice type

Type	Yard Care Practice or Understanding	Baseline Use	Change in Behavior/Understanding	Post-Outreach Use
Using Weed-and-Feed	HARMFUL PRACTICE: Using weed-and-feed (any amount) (P)(NP)	63%	H -47%	16%
Choosing Fertilizer	Use slow release, natural, or organic fertilizer (P)	38%	H	55%
	HARMFUL PRACTICE: Use fast-release fertilizer or weed-and-feed (P)	60%	H -51%	9%
	Calculate lawn area and application rate to determine fertilizer use (P)	18%	H	47%
	Calibrate spreader when using new fertilizer (P)(NP)	35%	H	36%
	Know how much nitrogen was applied (any amount) (P)	3%	H	25%
Applying Fertilizer	Always sweep fertilizer back onto lawn	36%	M	11%
	Fertilize in May, September, or October	64%	L	7%
	HARMFUL PRACTICE: Fertilize in January or February	5%	L	6%
Managing Weeds	HARMFUL PRACTICE: Weed: broadly apply weed-and-feed or weed killer (P)	46%	H -35%	11%
	Weeds: pull, dig, tolerate, or spot-treat	89%	L	6%
Soil Testing	Plan to test soil every 3 years or more often (P)	3%	H	59%
Applying Lime	Apply lime every 2-3 years (P)	31%	H	60%
Aerating	Aerate lawn every 2 years (P)(NP)	34%	H	49%
Mowing	Sharpen mower blade every year (P)	27%	H	37%
	Sometimes or always mulch mow in dry months (P)	51%	H	21%
	Sometimes or always mulch mow in wet months (P)	48%	M	17%
	Mow 2-3" or higher (P)	91%	L	6%
Watering	Measure sprinkler watering rate (tuna can test), if waters (P)	17%	H	43%
	Water once a week or less	36%	M	11%
	ACCEPTABLE PRACTICE: Water two to three times per week	46%	L -9%	36%
	HARMFUL PRACTICE: Waters daily or every other day	19%	L -2%	17%

Notes: For measures of soil testing, baseline use describes actual past behavior, while the change in behavior reflects the intention of participants to conduct a soil test in the future. The unusually dry weather in 2015, when participants took the medium-term post-outreach survey, may have affected watering practices.

Figure 70. South Sound lawn care practices, sorted by level of behavior change

Type	Yard Care Practice or Understanding	Baseline Use	Change in Behavior/Understanding	Post-Outreach Use
Applying Lime	Apply lime every 2-3 years (P)	31%	H 60%	91% ✓
Soil Testing	Plan to test soil every 3 years or more often (P)	3%	H 59%	62% ⚠
Fertilizing	Use slow release, natural, or organic fertilizer (P)	38%	H 55%	93% ✓
Fertilizing	HARMFUL PRACTICE: Use fast-release fertilizer or weed-and-feed (P)	60%	H -51%	9% ✓
Aerating	Aerate lawn every 2 years (P)(NP)	34%	H 49%	84% ✓
Using Weed-and-Feed	HARMFUL PRACTICE: Using weed-and-feed (any amount) (P)(NP)	63%	H -47%	16% ✓
Fertilizing	Calculate lawn area and application rate to determine fertilizer use (P)	18%	H 47%	65% ⚠
Watering	Measure sprinkler watering rate (tuna can test), if waters (P)	17%	H 43%	60% ⚠
Mowing	Sharpen mower blade every year (P)	27%	H 37%	64% ⚠
Fertilizing	Calibrate spreader when using new fertilizer (P)(NP)	35%	H 36%	71% ✓
Managing Weeds	HARMFUL PRACTICE: Weed: broadly apply weed-and-feed or weed killer (P)	46%	H -35%	11% ✓
Fertilizing	Know how much nitrogen was applied (any amount) (P)	3%	H 25%	28% ●
Mowing	Sometimes or always mulch mow in dry months (P)	51%	H 21%	72% ✓
Mowing	Sometimes or always mulch mow in wet months (P)	48%	M 17%	65% ⚠
Watering	Water once a week or less	36%	M 11%	47% ⚠
Fertilizing	Always sweep fertilizer back onto lawn	36%	M 11%	48% ⚠
Watering	ACCEPTABLE PRACTICE: Water two to three times per week	46%	L -9%	36% ●
Fertilizing	Fertilize in May, September, or October	64%	L 7%	71% ✓
Mowing	Mow 2-3" or higher (P)	91%	L 6%	98% ✓
Managing Weeds	Weeds: pull, dig, tolerate, or spot-treat	89%	L 6%	94% ✓
Fertilizing	HARMFUL PRACTICE: Fertilize in January or February	5%	L 6%	11% ✓
Watering	HARMFUL PRACTICE: Waters daily or every other day	19%	L -2%	17% ✓

Notes: For measures of soil testing, baseline use describes actual past behavior, while the change in behavior reflects the intention of participants to conduct a soil test in the future. The unusually dry weather in 2015, when participants took the medium-term post-outreach survey, may have affected watering practices.

Practices that Protect Water Quality

After the program, at least 40% of participants were using all the key practices that directly protect water quality, as shown in Figure 71. At least 70% were avoiding products that harm water quality: weed-and-feed, fast-release fertilizer, and broadly applied weed killer.

Notably, the program achieved a high level of behavior change in reducing weed-and-feed use: the share of participants who used this product decreased from 62% to 16%.

As described below, the program also achieved varying levels of behavior change in practices that support a healthy yard and reduce the weed, pest, and disease reasons for which people typically use toxic yard care products.

Figure 71. South Sound adoption of practices that protect water quality

H ✓	Avoiding weed-and-feed use
H ✓	Avoiding fast-release fertilizer use
H ✓	Aerating every two to three years
H ✓	Calibrating the fertilizer spreader when using a new fertilizer
H ✓	Avoiding broad application of weed killer
H ▲	Calculating the lawn area and fertilizer application rate
M ▲	Sweeping fertilizer back onto the lawn

Where the Program is Working Effectively

H ✓ The largest reported percentage changes in participant behavior were in practices associated with program incentives: applying lime, using slow-release or organic fertilizer instead of fast-release fertilizer, aerating, and avoiding weed-and-feed.

The largest observed behavior changes after the program were in practices related to program demonstrations and incentives. Lime application, use of slow-release or organic fertilizer (with consequent avoidance of fast-release fertilizer and weed-and-feed), and aeration of lawns increased among participants by at least 45 percentage points each. More than three-quarters of participants were using these practices at the end of the program.

These results are consistent with participant survey responses indicating these practices were among the most useful things they learned during the program and the information they most commonly shared with others.

H ✓ Practices with the next largest reported percentage changes were related to calibrating spreaders, avoiding broad application of weed killers, and mulch mowing in dry months.

These practices are all associated with outdoor demonstrations. In addition, avoiding broad application of weed killers (which also includes weed-and-feed) could also be associated with the program incentives, which provided a free fertilizer that participants could use instead of pollution-generating alternatives.

L ✓ While there were low to no changes in fertilizing timing, mowing height, using at least one least-toxic weed management technique, and watering frequency, these practices were high to begin with.

While use of these practices was high before and after the program, these topics should not be removed from future programs. For example, while reported behavior change was relatively small, some participants mentioned in the post-outreach survey that mowing height (14% of participants) and mulch mowing (12%) were among the most useful things they learned. In contrast, while most participants were using at some least-toxic weed management techniques before and after the program, interviewed participants reported that they need more information and resources to manage weeds and pests, particularly large infestations.

H ▲ Participants made substantial changes but have room for improvement in planning to test their soil every three years, calculating lawn area to determine fertilizer use, measuring sprinkler watering rates, and sharpening mower blades.

While participants made substantial changes in these areas, the post-outreach use for the practices (60% to 65%) indicates that more education or incentives may be needed to motivate the remaining participants. For soil testing, 62% of participants plan to test their soil again within the recommended three years, although more plan to test within five years (73% total).

H ● A quarter more participants know how much nitrogen was applied to their lawn, but substantial room for improvement remains.

Before the program, almost no participants (3%) could state how much nitrogen was applied to their lawn, compared to 28% after the program. Even fewer reported that it was no higher than the recommended amount (16%). The low knowledge after the program may be due in part to the fertilizer incentive: participants were not required to calculate and purchase the correct quantity of fertilizer they needed because the program provided exactly the quantity they needed.

Where the Program Achieved Moderate Change but Room for Improvement Remains

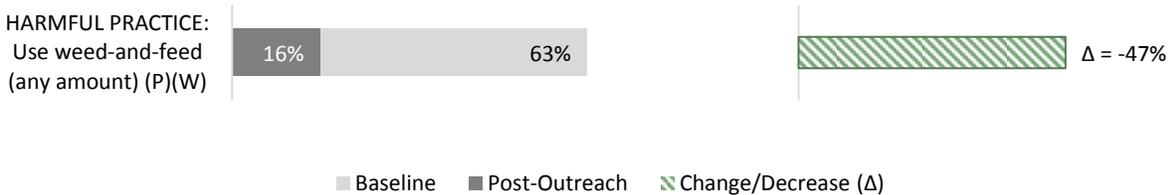
M ▲ Participants made modest changes and have substantial room for improvement in mulch mowing in wet months and always sweeping fertilizer back onto the lawn.

While participants made modest changes in these areas, the post-outreach use for the practices indicate that more education or incentives may be needed to motivate participants. Fewer than half of participants reported always sweeping fertilizer (48%) after the program.

Detailed Findings

Weed-and-Feed Use

Figure 72: South Sound participant weed-and-feed use



H ✓ The share of participants who reported having used weed-and-feed decreased by nearly three-quarters after the workshops.

While the share of nonparticipants using weed-and-feed did not change substantially (32% in baseline and 35% post-outreach), those using it reported using it more frequently in the post-program survey compared to the baseline survey.

H ✓ While 16% of participants used weed-and-feed after the program, about one-quarter (27%) may use it in the future.

In the medium-term post-outreach survey, participants were presented with a list of the natural lawn care practices they had been taught during the program and asked to mark them as “will use,” “won’t use,” and “not sure.” One of the practices was “never use weed-and-feed.” Approximately 27% of participants selected “won’t use” for this practice, a higher share than reported using weed-and-feed in 2014. There are two likely explanations for this discrepancy. First, the results may be inaccurate as question wording may have confused participants into thinking they should mark “won’t use” if they planned to follow the practice of “never use weed-and-feed” rather than “will use” (which they marked for the other BMPs in the list). Second, the results may be accurate if participants are not willing to rule out the possibility of ever using weed-and-feed in the future.

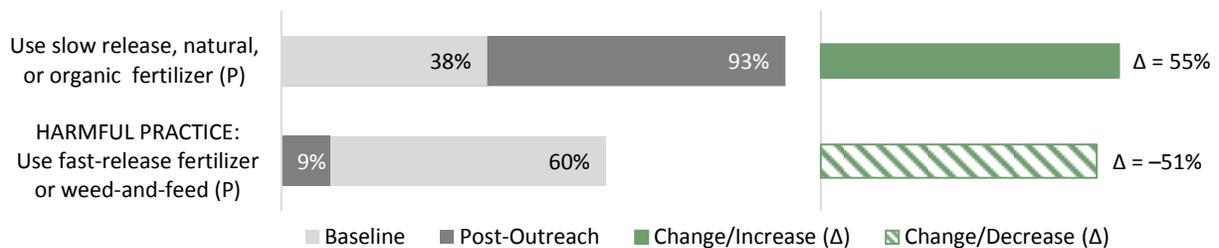
The evaluation team believes that it is equally or more likely that participants are reluctant to rule out all future use of weed-and-feed. When put in context of the entire question with the other practices, the question is less confusing than when presented alone. In addition, compared to other practices, many more participants said they were “not sure” whether they would never use weed-and-feed, supporting

the hypothesis that participants were hesitant to rule it out rather than confused. In addition, several interviewed participants mentioned challenges with or requested more information on eliminating weeds and pests without toxic chemicals, indicating they may not yet feel confident they can avoid chemicals such as weed-and-feed.

Fertilizer Choices

In this section, participants were asked to choose from a long list of fertilizer types. In this comparison, participants were asked to select from a long list of fertilizers, including weed-and-feed.

Figure 73: South Sound participant fertilizer type used



✓ Use of slow-release or organic fertilizers more than doubled, with almost all participants using these products after starting the program.

The statistically significant increase in the use of slow-release or organic fertilizer was supported by the free fertilizer provided to all program participants, in addition to hands-on lessons on why and how to use this product. While most participants (96%) plan to continue using slow-release fertilizer, jurisdictions may need to help them overcome key challenges mentioned by participant during interviews: they perceive that slow-release fertilizer is carried by few yard care stores and perceive the product to be costly.

✓ Participants also substantially decreased use of fast-release fertilizer or weed-and-feed after starting the program.

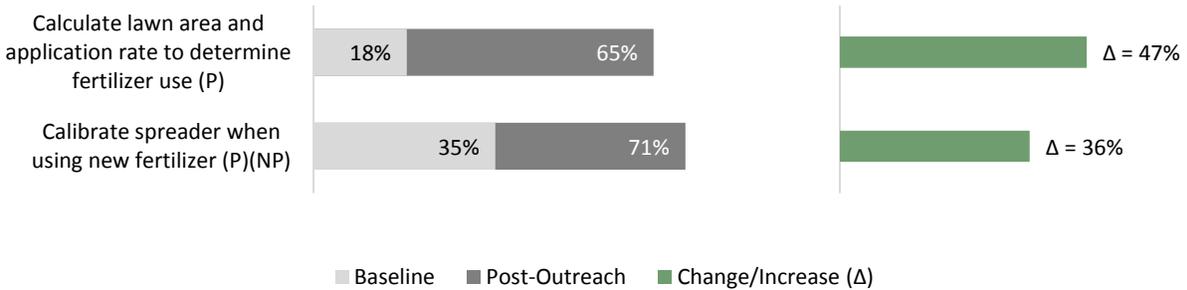
Again, this change was likely supported by the free slow-release fertilizer provided to participants. In this comparison, participants were asked to select from a long list of fertilizer types, including weed-and-feed.

Note that this question came before the question focused on weed-and-feed, so participants may not have realized that they used the product without the extended definition that weed-and-feed contains both fertilizer and weed killer. Alternatively, participants who used weed-and-feed might have selected a different description of the product (such as “chemical fertilizer”) when asked to mark which fertilizers they use.

Fertilizer Application Methods

Application Practices

Figure 74: South Sound participant fertilizer application practices



H ▲ The share of participants who calculated their lawn area to determine how much fertilizer to use substantially increased, although one-third did not perform this practice.

During the program, program staff calculated lawn area and provided the recommended amount of fertilizer for the participants, which may have reduced the share who said they performed this practice in 2014. The vast majority of participants (88%) intend to continue this practice in the future.

H ✓ The share of participants who calibrated spreaders when using new fertilizer substantially increased after the program, although nearly one-third did not perform this practice.

Spreader calibration posed challenges that additional education, personalized assistance, or information on choosing spreaders that are easier to calibrate could address. Program staff said that the time allocated to fertilizer application demonstrations was too short, and several participants reported struggling with spreader settings in both surveys and phone interviews. Despite these challenges, most participants (79%) plan to continue calibrating their spreader in the future.

In the same period, more nonparticipants reported calibrating their spreaders (15% baseline and 26% post-outreach), but the increase was not nearly as large as the change among participants.

Awareness of Nitrogen Quantities

Figure 75: South Sound participant nitrogen awareness

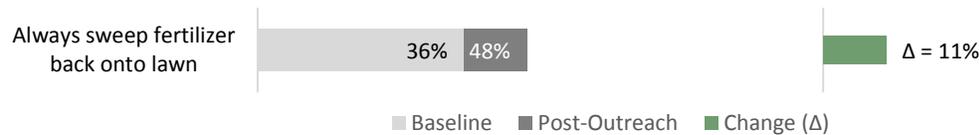


H ● The share of participants who knew how much nitrogen was applied to their lawn substantially increased after the program, but most still did not know the amount.

One possible explanation is that the program provided participants with the amount of fertilizer they needed, so participants may not have fully absorbed the information in the same way they would have if they had to perform the calculations and purchase fertilizer themselves.

Fertilizer Clean-up Practices

Figure 76: South Sound participant fertilizer clean-up practices

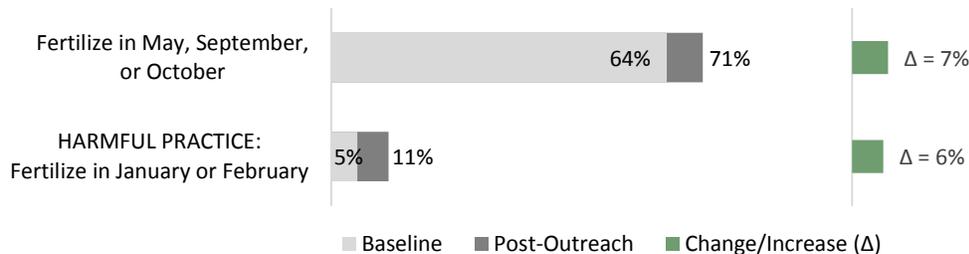


M ▲ The increase in participants who sweep excess fertilizer back onto their lawns was not statistically significant, and less than half of participants reported doing this practice in the post-program survey.

While almost all participants said they intend to perform this practice in the future (93%), it seems unlikely they will start sweeping without additional education or motivation if they did not do so during the program.

Fertilizer Timing

Figure 77: South Sound participant fertilizer timing

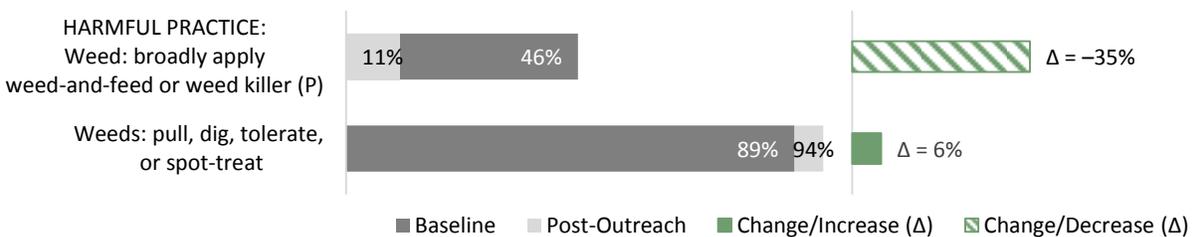


L ✓ There was no statistically significant difference in the months when participants fertilized, and one-quarter continued to fertilize during mid-winter and mid-summer.

Fertilizer is best applied in late spring or early fall (May, September, or October) and should not be applied in winter (January or February). Most participants were already fertilizing during the recommended periods, and the small change was not statistically significant. However, slightly more participants fertilized in mid-winter after the program (indication that behavior change went in the wrong direction, although the difference was not statistically significant).

Weed Management

Figure 78: South Sound participant pest, disease, and weed management practices



H ✓ Fewer participants used toxic weed management techniques, with one in ten using an undesirable technique after the program.

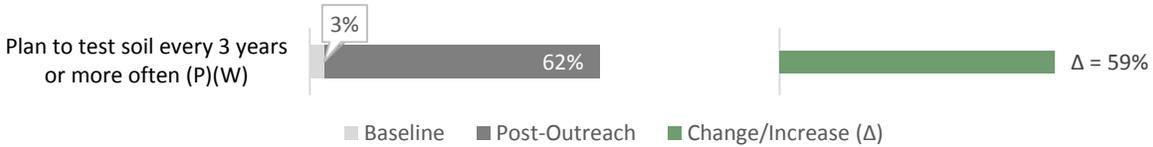
When asked how they manage weeds, fewer participants reported broadly applying weed-and-feed or weed killers after the program. While participants significantly improved this behavior, interview results indicate that participants still want more information on how to treat weeds, pests, and disease particularly large infestations. Without additional education and assistance, these behavior gains may be temporary. During interviews, several participants mentioned difficulty addressing weeds and pests without toxic products as a challenge and asked for more information on identifying and eliminating pests, weeds, and moss.

L ✓ Most participants were already using at least one least-toxic weed management technique before the program and continued doing so.

A large majority of participants reported using the recommended pest, disease, and weed management techniques of hand-pulling, digging, spot-treating with vinegar-based or clove oil products, or tolerating some weeds.

Soil Testing

Figure 79: South Sound soil testing intentions

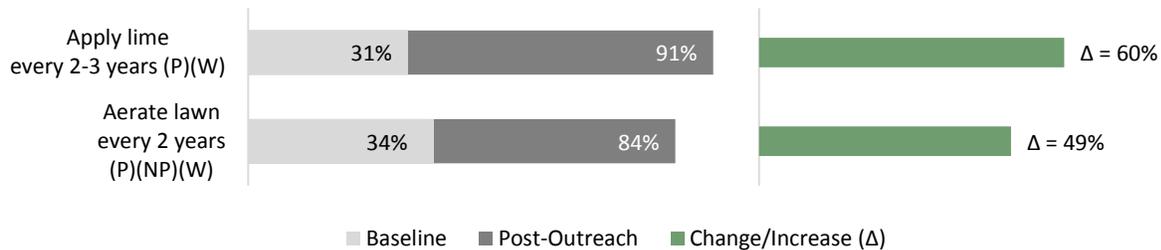


H ▲ Participants learned the value of soil tests: more than 60% of them plan to test their soil within the next three years, whereas almost none had tested before the program.

73% plan to test their soil within five years. In an open-ended survey question about the most useful lessons from program, soil pH and the soil test results were frequently mentioned.

Lime and Aeration

Figure 80: South Sound lime and aeration practices



H ✓ Three times as many participants applied lime compared to before the program, and almost all plan to continue in the future.

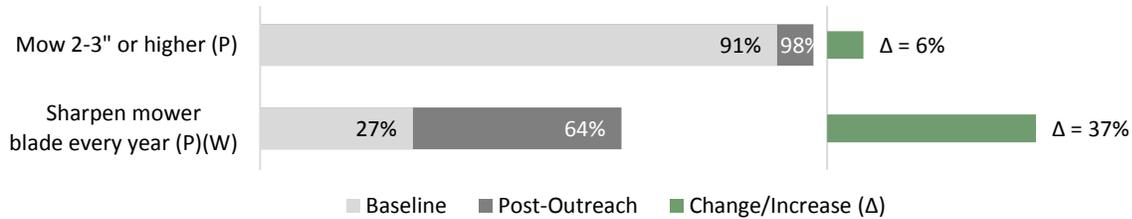
Similar to slow-release fertilizer, the significant increase in the use of lime was supported by the free lime incentive. Also similarly, most participants (93%) plan to continue using lime in the future.

H ✓ More than twice as many participants aerated compared to before the program.

While high overall, the share of participants who aerated their lawn showed a smaller increase and lower post-outreach use than the share who used slow-release fertilizer and lime practices. While participants received a free aerator rental, several interviewed participants mentioned experiencing challenges in renting and transporting the aerator. Participants were also offered a \$30 discount on hiring a professional lawn aeration service, but interviewed participants did not mention this option. Participants were not asked whether they plan to continue aerating lawns in the future. Because aerating is important for maintaining healthy soil, additional education or assistance may be needed to increase this practice. While nonparticipants also changed their use of this practice, the difference appears minor, particularly in comparison to the change in participant practices. In the same period, nonparticipants were slightly more likely to aerate their lawn every three years or more (15% baseline and 19% post-outreach).

Mowing

Figure 81: South Sound participant mowing practices



L ✓ Slightly more participants reported mowing two to three inches or higher after the workshops.

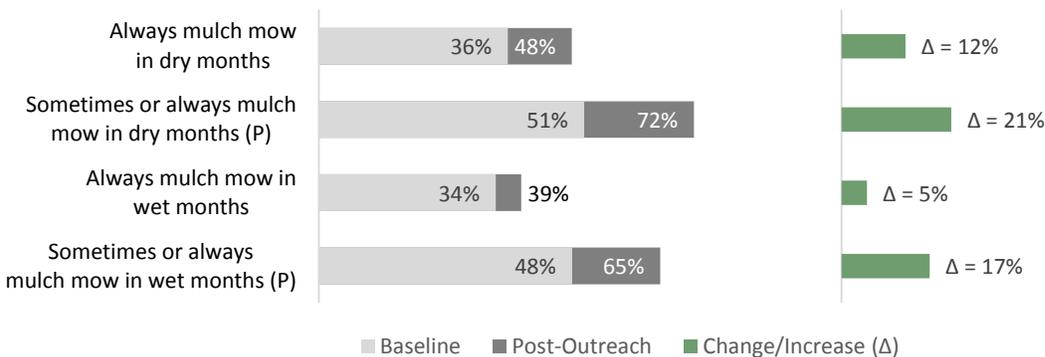
After the workshops, more participants reported mowing two to three inches or higher (91% baseline to 98% post-outreach). When asked what practices they plan to continue in the future, 97% selected mowing two to three inches high.

Despite the small amount of reported behavior change measured in the surveys, during the interviews and surveys, participants frequently mentioned mowing higher as among the most useful things they learned or biggest changes they made.

H ⚠ More than twice as many participants reported sharpening their mower blades compared to before the program, and even more plan to do so in the future.

The number of participants who sharpened their mower blades at least once in the last year increased substantially (27% baseline and 64% post-outreach). More participants (85%) said they would continue to sharpen mower blades at least annually in the future. Despite the large behavior change, some room for improvement remains.

Figure 82: South Sound participant mowing practices



H ✓ Participants reported a large behavior change in sometimes or always mulch mowing in dry months, but nearly 30% never mulch mow even in dry months.

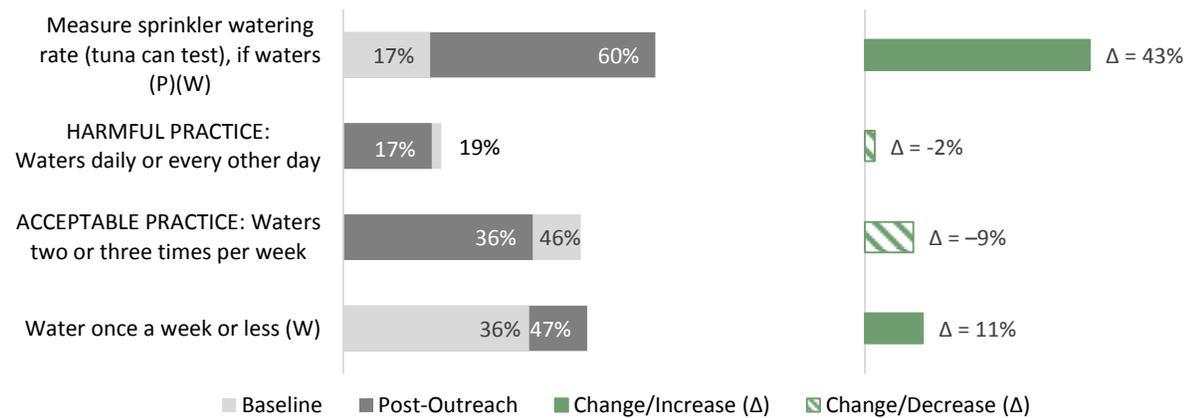
M ▲ Participants reported a smaller change in always mulch mowing in dry months and in mulch mowing in wet months.

While a dry fall 2014 and spring 2015 may have further encouraged participants to mulch mow in the typically wet months of April, May, and October, participants also reported increasing mulch mowing in the typically dry months of June through September. The majority of participants (71%) say they plan to continue mulch mowing, although they may not intend to leave clippings on the lawn every time they mow.

In contrast, *fewer* nonparticipants reported always mulch mowing in dry months in the post-program survey (31% baseline and 24% post-program).

Watering

Figure 83: South Sound participant watering practices



H ▲ More than three times as many participants measured their sprinkler water time compared to before the program, but half of participants using sprinklers did not conduct this one-time practice, despite the unusually hot summer.

Despite the unusually dry summer (participants were surveyed in June through August 2015) and rising cost of water (for example, in Olympia), additional education or tools appears to be required to cause residents to adopt this important yet simple practice.

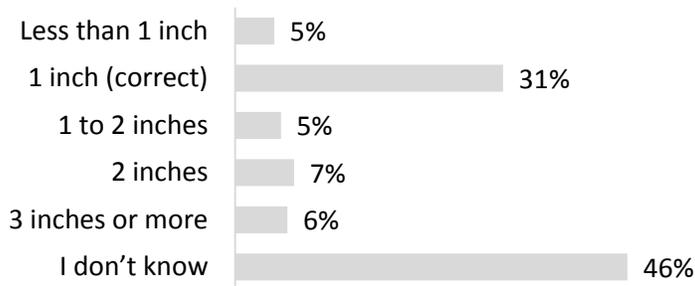
M ▲ More participants watered once a week or less, primarily shifting from watering two to three times a week before the program.

At the same time, some participants started watering daily or every other day. These mixed results may have been, in part, due to an unusually hot summer. The program’s recommendation was to water one inch per week spread over two watering sessions.

Understanding of Watering Amount per Week

Participants were asked about how much water a lawn needs per week to stay green in the summer to gauge baseline understanding. This question was not asked on the post-outreach survey due to space constraints, although participants may have increased their knowledge and understanding by attending the workshops.

Figure 84. South Sound participant baseline knowledge and understanding of watering amount per week for a green lawn



Before the program, nearly half of participants (46%) said they did not know how many inches of water a lawn needs per week to stay green in the summer.

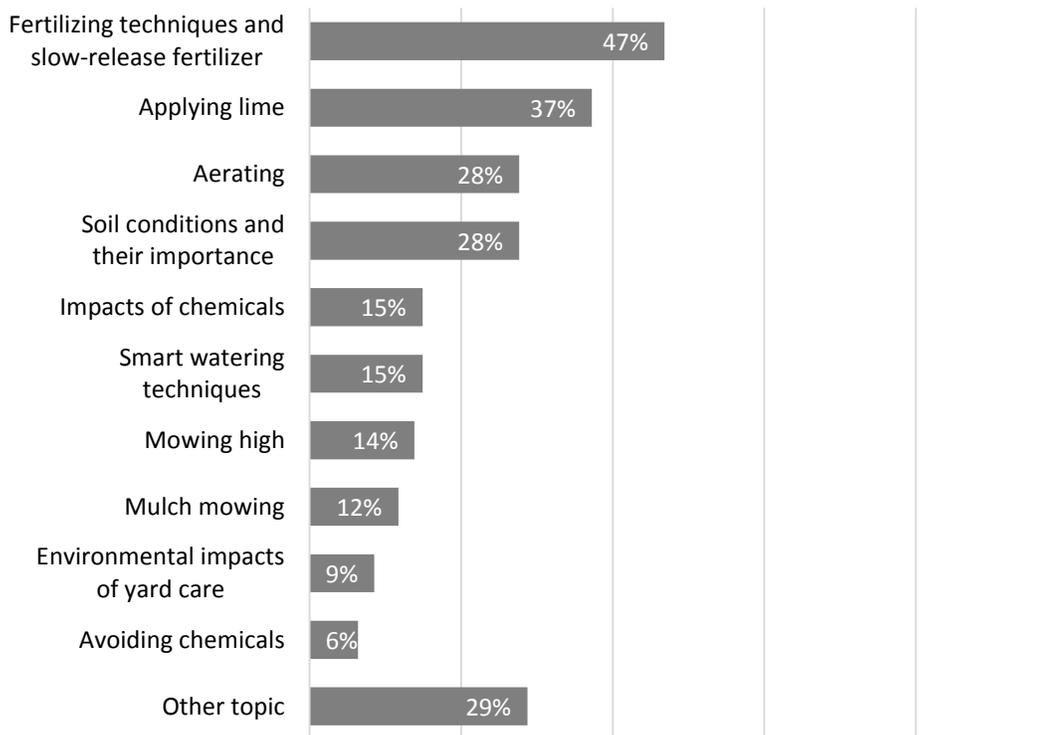
In contrast, nearly one-third of participants wrote in the correct quantity of one inch per week on the baseline survey. Watering amount was not asked on the medium-term survey, so the change in understanding was not measured. Education on the correct amount to water per week for a green lawn, as well as for a brown lawn during drought dormancy, will be important to water conservation efforts in future years.

Most Useful Information and Social Diffusion

In the medium-term post-outreach survey, participants were asked about the most useful things they learned during the program and about whether they shared information with others (social diffusion).

Most Useful Information

Figure 85: South Sound participants—most useful topics learned about during the program



When asked in the medium-term post-outreach survey to name most useful things they learned in the program, nearly half of participants (47%) mentioned fertilizer, including using slow-release fertilizer and proper measurement and application techniques. Other frequently mentioned topics were applying lime (37%), aerating (28%), and understanding soil conditions (28%). Participants also mentioned the impacts of chemicals (15%), smart watering methods (15%), and mowing higher (14%).

In interviews conducted with 20 participants, more than a third of interviewees stated that the most useful thing they learned was the need to switch to environmentally friendly products. Many interviewees appreciated learning about how to build and maintain healthy soil by fertilizing properly, applying lime, and aerating. Several also mentioned proper mowing technique—particularly mowing higher and mulch mowing—as one of the most useful things they learned. When asked about topics for future education programs and educational videos, interviewed participants commonly suggested non-toxic weed and pest management along with the core soil and mowing practices.

Social Diffusion

Figure 86: South Sound participants—number of people shared with, among survey respondents



Note: As with other figures, these numbers include only participants who completed the medium-term post outreach survey.

Participants were asked in the medium-term post-outreach survey whether they shared information about natural yard care with others. Four-fifths of respondents (82%) reported sharing information, reaching an estimated 500 additional people. Social diffusion more than tripled the program’s reach from a base of 190 households.

The South Sound program reached a total of 190 households; the number of individuals represented by those households was not measured. Participating households were asked in the medium-term post-outreach survey whether they shared information about natural yard care with others. Four-fifths of respondents (82%, or 98 households) reported sharing information, reaching a total of 500 additional people. As a result, survey respondents that reported sharing information are calculated to have reached an additional 5.1 people on average per household.

Participants who did not complete the survey may also have shared information, further increasing social diffusion. If these calculations are applied to all 190 participating households, social diffusion may have reached a total of 800 additional individuals (190 households x 82% x 5.1 people per household).

Figure 87: South Sound participants—type of people shared with, among participants who shared

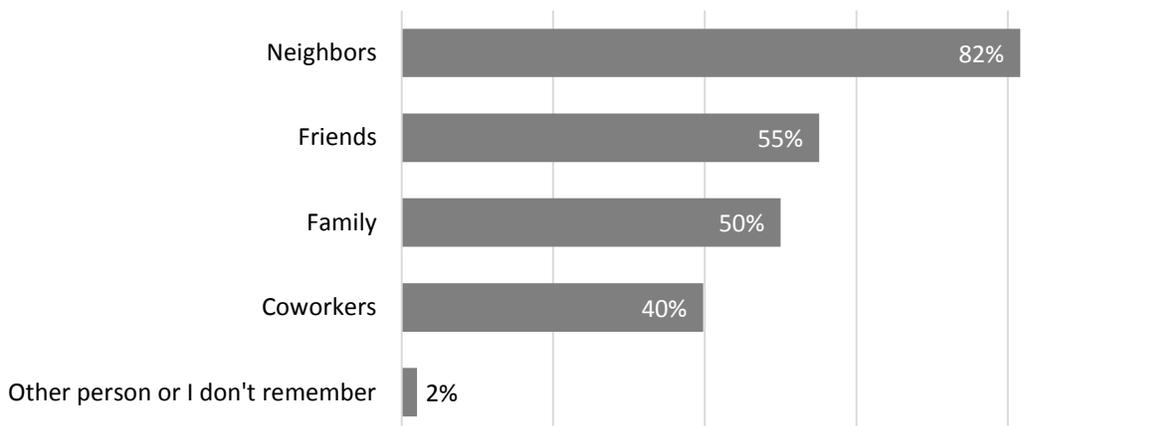
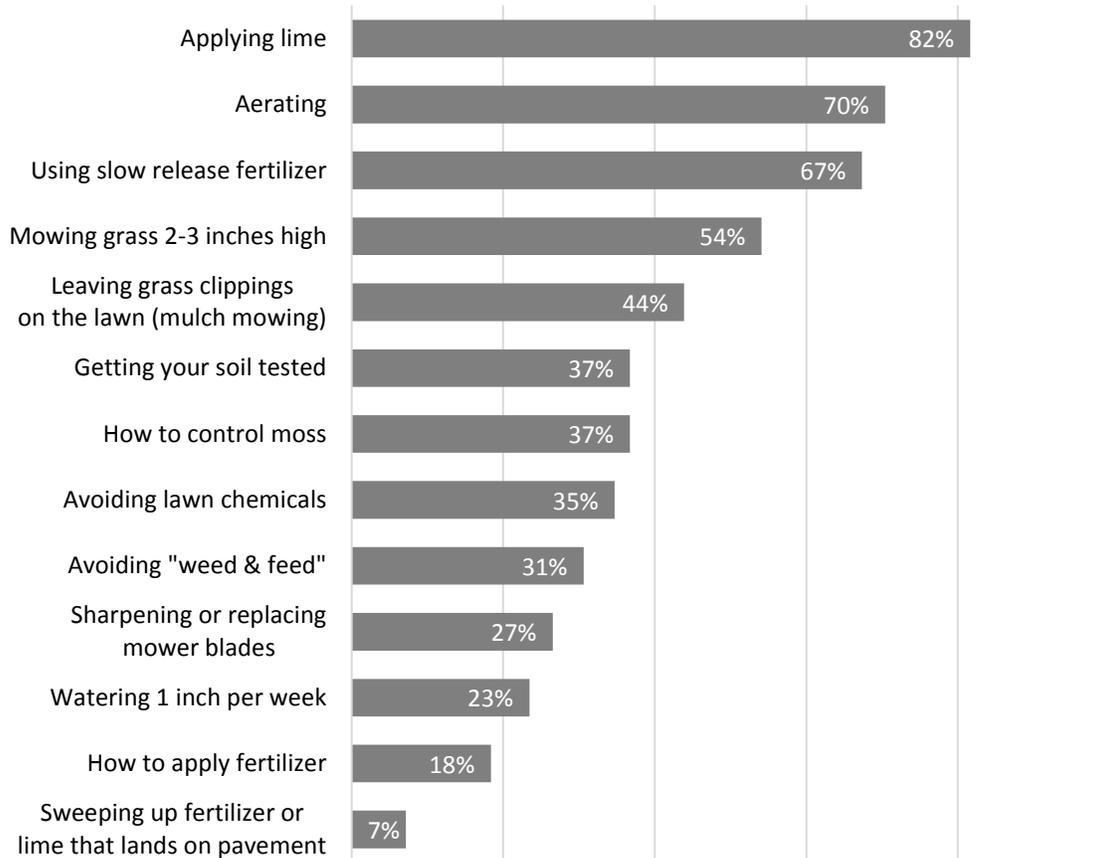


Figure 88: South Sound participants—topics shared, among participants who shared



Participants most frequently shared information with neighbors (82%) and also shared information with friends (55%), family (50%), and coworkers (40%). They most frequently shared information on applying lime (82%), aerating (70%), using slow-release fertilizer (67%), and mowing two to three inches high (54%).

Program Costs

City of Olympia staff provided program cost figures for implementing the South Sound program. The core project team and evaluation team determined that program costs in 2015 would better represent the costs of this program model because Olympia incurred one-time startup costs in 2014—the first year this program was fully implemented—that it will not incur in the future. Costs for grant administration were excluded to enable comparison to the North Sound program, which was funded by a different grant with different administration requirements. Costs for program evaluation were excluded because future programs are not expected to conduct such intensive evaluations. Implementation costs do not include 34 hours of time from volunteers at the demonstration workshops.

The 2015 South Sound program cost approximately \$77,000 to reach 141 households for a cost of nearly \$550 per household, as shown in Figure 89. Nearly half of program implementation costs went to lawn coach home visits (49%), while incentives and the demonstration workshops accounted for 23% of costs

each. Although lawn coach visits and incentives were costly, participants rated these elements highly in helping change their lawn care practices.

Figure 89. South Sound 2015 program costs

Cost Category	Type	Total Cost
Recruitment		\$3,615
Recruitment mailing	Expense	\$1,552
Recruitment and participant selection	Staff time	\$2,063
Lawn coach home visits		\$37,712
Meetings with lawn coaches	Staff time	\$834
134 spring and 112 fall visits	Consultant	\$30,448
Assessment forms (printing expenses)	Expense	\$203
Data entry for property evaluations	Staff time	\$6,227
Free soil test incentive (151 properties)		\$6,618
Soil analysis (Wilbur Ellis)	Expense	\$5,220
Sample collection and lawn measurement (Washington Conservation Corps)	Consultant	\$1,398
Free fertilizer and lime incentive		\$8,570
Fertilizer and lime purchase	Expense	\$8,570
Aerator rental \$30 rebate incentive		\$2,508
33 rebates	Expense	\$990
Rebate processing	Staff time	\$1,518
Demonstration workshops (7 workshops on 3 days)		\$18,092
Planning	Staff time	\$5,189
Implementation	Staff time	\$4,068
Presenters	Consultant	\$7,771
Door prizes	Expense	\$275
Space rental	Expense	\$664
Supplies	Expense	\$125
Total program cost		\$77,115
Participating households		141
Cost per household		\$547

Note: this table excludes costs for grant administration and program evaluation.

4. North Sound and South Sound Comparisons

Overview

While the two programs addressed some of the same behaviors—such as proper mowing, fertilizer choices, using lime, and aerating—they cannot be compared statistically because the two programs differed substantially in their target audiences, breadth of topics covered, goals, and level of outreach intensity, as shown in Figure 90. When compared qualitatively, the results should be considered within each program’s particular context.

For instance, in the North Sound, participants received 50 minutes of lecture on natural lawn care in a large workshop format (up to 75 participants per lecture). In the South Sound, participants received six hours of hands-on education on this topic area including two hours in a personalized home visit and four hours in small demonstration workshops (no more than 20 participants per workshop). The South Sound program also provided incentives that directly support the desired behavior change (free soil test, free lime and fertilizer, and discount aerator rental).

More information on the elements, activities, logistics, and details of each program can be found in:

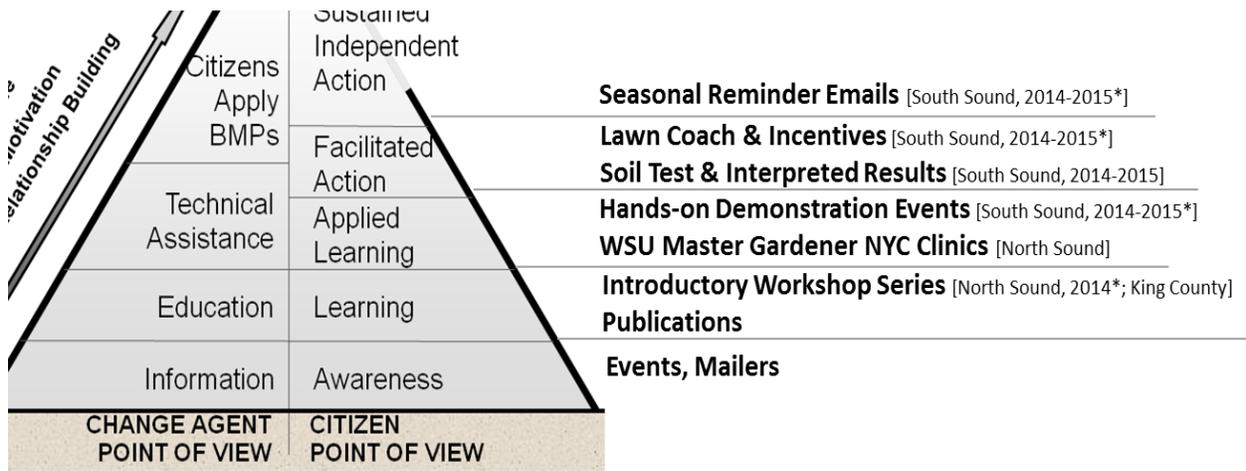
- Appendix H-01—Final Project Report for G1400481
- Appendix H-02—North Sound Logistics Guide
- Appendix H-03—South Sound Logistics Guide

Figure 90. Summary of key differences between North and South sound programs

	North Sound Program	South Sound Program
Target Audience	Residents of detached single-family homes on properties sized less than one acre within urban growth areas. The program reached 451 households in 2014.	Residents who (1) live in detached single-family homes on properties sized less than one acre, (2) own their home, (3) maintain the lawn themselves, and (4) currently use fast-release chemical fertilizers. The program reached 190 households in 2014.
Topics covered	Natural lawn and yard care practices including planting; “Right Plant, Right Place” principles; healthy soils; composting; sustainable landscape design; and natural pest, weed and disease control.	Natural lawn care practices addressing grass lawns and not planting beds.
Goals	Reduce all pollutant runoff from lawns and planting beds.	Reduce nutrient and pesticide pollutant runoff from lawns.
Outreach intensity	<p>Education and technical assistance, reaching more households at a lower level of engagement.</p> <ul style="list-style-type: none"> ▪ Three 2-hour lecture workshops with up to 75 participants per workshop ▪ Diagnostic and identification technical assistance from WSU Master Gardeners at lecture workshops <p>Participants received 6 hours total of education that included just under one hour on each of the following 6 topics: <i>Natural Lawn Care; Smart Watering; Right Plant, Right Place; Natural Pest, Weed & Disease Control; Growing Healthy Soil; and Sustainable Landscape Design.</i></p>	<p>Education and technical assistance, reaching fewer participants at a higher level of engagement.</p> <ul style="list-style-type: none"> ▪ 2 hours of personalized, at-home education from lawn care professionals, spread over two home visits ▪ 4 hours of hands-on demonstrations with no more than 20 participants per demonstration ▪ Ongoing lawn care email updates throughout the year-long program <p>Participants received 6 hours of education on <i>Natural Lawn Care.</i></p>
Incentives	Small incentives used to reward participants for attending lectures and completing surveys.	<p>Large incentives used to directly support behavior change:</p> <ul style="list-style-type: none"> ▪ Free soil test ▪ Free lime and slow-release fertilizer ▪ Discount on aerator rental <p>Small incentives also used to reward attending workshops and completing surveys.</p>
Program History	<p>Well-established program:</p> <ul style="list-style-type: none"> ▪ Piloted in 2010 ▪ Full implementation in 2012 ▪ Refinements in 2013 	<p>New program:</p> <ul style="list-style-type: none"> ▪ Piloted in 2012 ▪ Full implementation in 2014

Figure 91 shows the elements of each program in the context of a continuum of public involvement. Programs that provide more intensive outreach with technical assistance (such as the South Sound program’s site visits) are typically expected to result in more action and behavior change *per participant*, although they often reach a smaller number of *total participants*. In addition, incentives that directly support behavior change (such as the free lime and fertilizer provided by the South Sound program) are typically expected to increase behavior change, at least during the period in which the incentives are provided. Additional research is needed to determine whether specific incentives create lasting behavior change.

Figure 91. Natural yard care (NYC) programs, 2014 public involvement continuum



Laszlo & DiClemente, Stages of Change Model

***Grant funded NYC programs implemented 2014-2015**

North Sound – Snohomish County, 13 partner NPDES city jurisdictions, Snohomish Conservation District, WSU Master Gardeners
South Sound – City of Olympia, Thurston County, City of Tumwater

Source: Snohomish County Surface Water Management, 2015

Key Findings

As noted above, results were not analyzed statistically; this analysis considers a difference of 10 percentage points in survey responses to be meaningful. This section compares changes in mowing, fertilizing, using lime, aerating, and watering. While both programs addressed weed management, making direct comparison is impractical because the South Sound survey instrument asked only about practices to manage weeds in lawns while the North Sound survey instrument also addressed practices to manage weeds in planting beds (such as covering bare soils with mulch to prevent weeds).

Figure 92: Comparison of lawn-focused North Sound and South Sound program behavior changes levels

Practice	North Sound Behavior Change	South Sound Behavior Change	South Sound Extra Strategies
Apply lime at least every 2-3 years	L 4%	H 60%	Incentive Demonstration
Aerate at least every 2 years	L 8%	H 49%	Incentive Demonstration
Used slow-release or organic fertilizer	H 24%	H 55%	Incentive Demonstration
HARMFUL PRACTICE: Used fast-release fertilizer or weed-and-feed	H -27%	H -51%	Incentive Demonstration
Measure sprinkler watering rate (tuna can test), if waters	M 12%	H 43%	Demonstration
ACCEPTABLE PRACTICE: Water two to three times per week	L 5%	L -9%	
HARMFUL PRACTICE: May use weed-and-feed in future	H -48%	H -36%	
Water once a week or less	L -8%	M 11%	
Always mulch mow in wet months	M 19%	L 5%	Demonstration
Sometimes or always mulch mow in dry months	M 18%	H 21%	Demonstration
HARMFUL PRACTICE: Used weed-and-feed (since outreach)	H -53%	H -47%	
Sometimes or always mulch mow in wet months	M 18%	M 17%	Demonstration
Mow 2-3" or higher	L 9%	L 6%	Demonstration
Always mulch mow in dry months	M 14%	M 12%	Demonstration
HARMFUL PRACTICE: Water daily or every other day	L 2%	L -2%	

Note: this table shows changes in behavior as a percentage of total surveyed participants, not scaled to the baseline level of behavior. For example, 22% of North Sound participants applied lime in the baseline and 26% applied lime post-outreach, for a change of 4% of participants (26% minus 22%).

Both programs resulted in significant and substantial behavior change in many of the practices they addressed.

This substantial behavior change indicates that both programs used effective program models and were well implemented. Both participants and program staff praised the programs and recommended continuing them in the future, with some modifications.

Both programs had varied results in behavior change and participant use of key practices after the programs.

While a few practices in each program showed little to no behavior change, most showed moderate to high levels of behavior change with remaining room for improvement.

South Sound incentives, supported by outdoor demonstrations, appear to have been a major factor in short-term behavior change.

After the programs, a much higher share of South Sound participants reported using practices that were supported by incentives (free fertilizer, free lime, and \$30 discount on aerator rental) compared to North Sound participants. These practices were also supported by outdoor demonstrations. As a result, the incentives coupled with demonstrations appear to have contributed substantially to behavior change in the associated practices. However, additional research is needed to assess whether South Sound participants continue using slow-release fertilizer, applying lime, and aerating without the incentives and, if so, what is the optimal level and format of incentives to maximize behavior change while minimizing program costs.

South Sound outdoor demonstrations also appear to be a strong factor, although behavior change results varied by practice.

The South Sound program provided outdoor demonstrations without incentives for watering and mowing practices. South Sound participants had higher levels of behavior change for measuring sprinkler watering rates but similar or lower levels of behavior change for mulch mowing.

The South Sound program cost more than twice as much per participating household as the North Sound program while addressing fewer practices.

While the South Sound program achieved greater behavior change in specific lawn care practices, it also cost more than twice as much per household compared to the North Sound program (\$550 South Sound and \$250 North Sound) and did not address as many other yard care practices that can protect water quality.

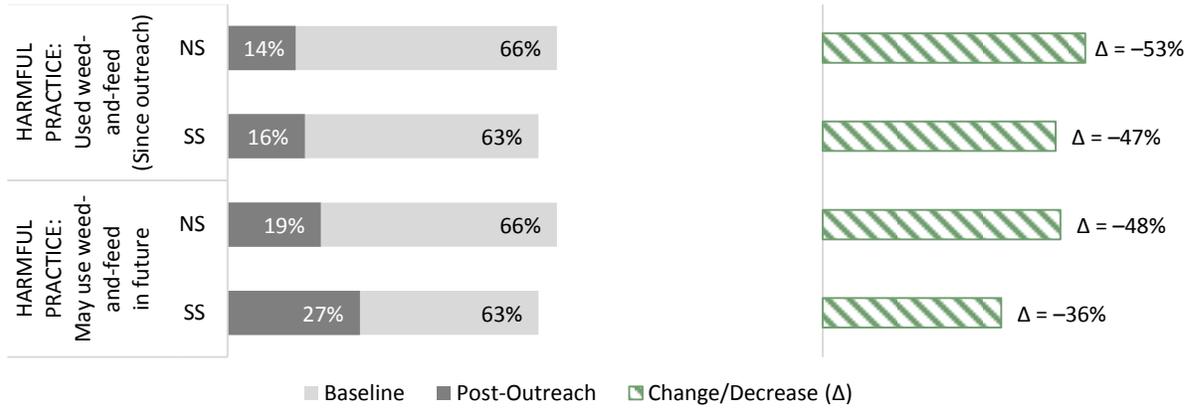
Jurisdictions would benefit from testing a hybrid program that combines large lectures and small outdoor demonstration workshops, with and without incentives.

Given the differences in program cost and results, jurisdictions would benefit from testing whether a program with lectures and outdoor demonstrations—but without the lawn coach home visits and incentives—results in a similarly high level of behavior change. In addition, the South Sound program should evaluate whether the incentives given to 2014 participants resulted in lasting behavior change in 2016 or 2017.

Detailed Findings

Weed-and-Feed Use

Figure 93. North and South Sound weed-and-feed use

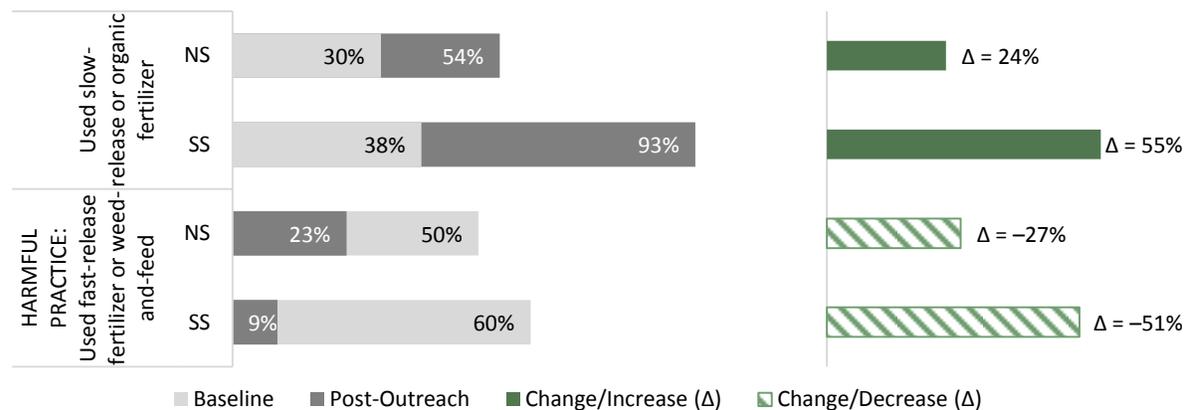


Both programs decreased the use of weed-and-feed in similar amounts, when participants were asked directly about this product.

More participants reported using weed-and-feed when asked directly about the product than when asked as part of a broader question about fertilizer use. When asked this way, similar percentages of participants reported using weed-and-feed before (66% North Sound and 63% South Sound) and after (14% North Sound and 16% South Sound) the outreach.

Fertilizer Choices

Figure 94. North and South Sound fertilizing practices

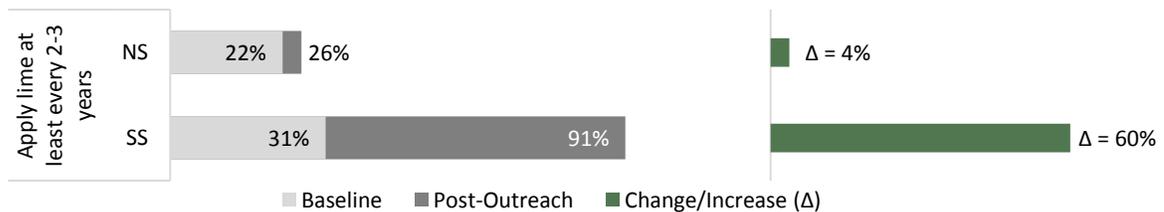


While both programs increased the use of recommended fertilizers and decreased the use of discouraged fertilizers, free fertilizer combined with a hands-on demonstration appears to have made the South Sound program more effective.

Participants in both programs increased their use of recommended slow-release, natural, or organic fertilizers and decreased their use of discouraged fast-release fertilizer and weed-and-feed. The South Sound program’s larger behavior change, resulting in almost all participants (93% South Sound) using the recommended fertilizer, was likely due to three factors (1) participants signed an agreement to use these products during the program, (2) the program gave participant free slow-release fertilizer, and (3) participants received more intensive education including a hands-on demonstration of how to use this product. To adopt this practice, North Sound participants needed to find and purchase fertilizer on their own, leading a smaller share (54% North Sound) of participants to use the recommended fertilizer. While most South Sound participants said they would continue using recommended fertilizers, future research is needed to assess whether this behavior change will be sustained over time once they must obtain fertilizer on their own.

Applying Lime

Figure 95. North and South Sound lime use



While both programs increased the use of lime, South Sound participants were more likely to have used these practices than North Sound participants.

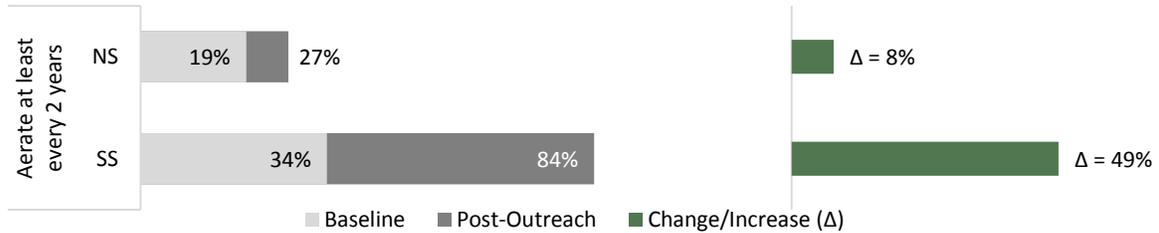
Applying lime nearly tripled among South Sound participants (31% baseline and 91% post-outreach). While the reported application of lime increased only slightly among North Sound participants (22% baseline and 26% post-outreach), many participants said they plan to apply lime in the future (56% did or plan to apply). Some potential explanations for these differences include that South Sound participants:

- Received a free soil test.
- Heard a lecture on the importance of soil pH on lawn health.
- Received a hands-on demonstration on how to apply lime.
- Had access to spreader equipment (also used for applying fertilizer).
- Were given free lime.

In contrast, the North Sound lecture workshops spent minimal time on the importance and use of lime. As with fertilizer use, future research is needed to determine whether South Sound participants will continue to use this practice without the free lime incentive.

Aerating

Figure 96. North and South Sound aerating practices

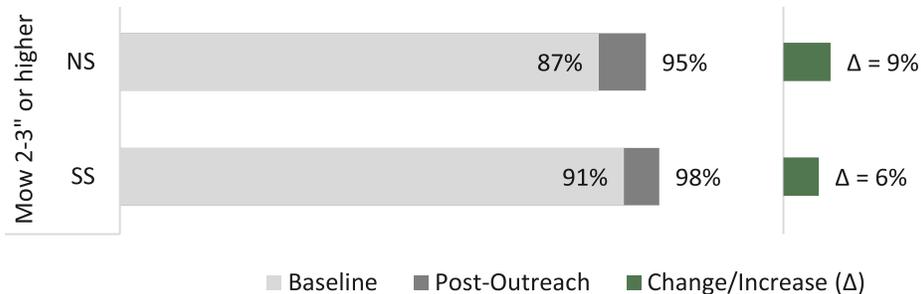


Similarly, both programs increased the use of aeration, with South Sound participants more likely to have used these practices than North Sound participants.

While the reported use of aeration increased among North Sound participants (19% baseline and 27% post-outreach) about the same amount as reported lime use, more participants said they plan to aerate in the future (71% did or plan to apply). In the South Sound, participants substantially increased use of aeration (34% baseline and 84% post-outreach).

Mowing

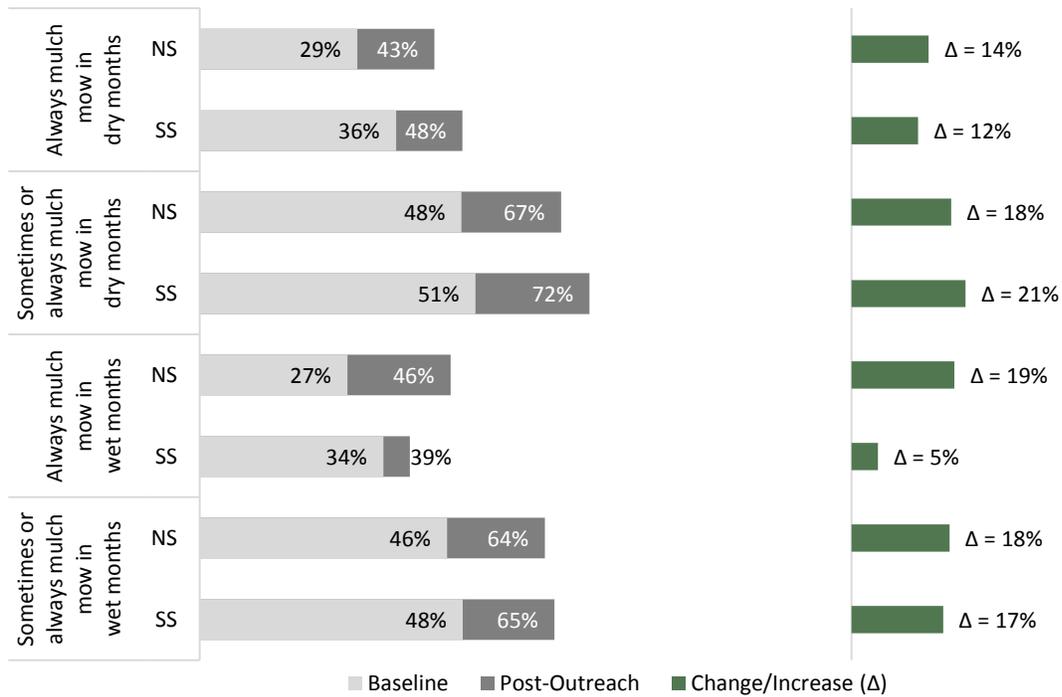
Figure 97. North and South Sound mowing height



Both programs had similar effects on mowing two to three inches or higher, with most participants doing this practice both before and after the programs.

While participants in both programs reported similar levels of mowing two to three inches or higher both before and after the programs.

Figure 98. North and South Sound mulch mowing practices (for participants who mowed)

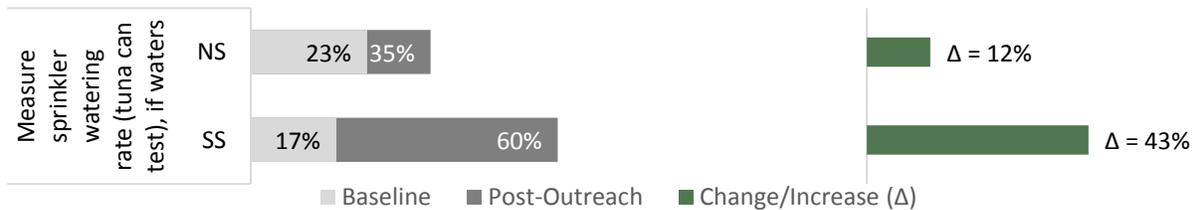


Both programs had similar effects on always or sometimes mulch mowing in dry months, but the North Sound program yielded greater change in reporting always mulch mowing in wet months.

Participants who reported “always” mulch mowing or “not mowing” at all during specific months were characterized as always mulch mowing when they mowed. A second analysis added in participants who reported “sometimes” mulch mowing. Most behavior change levels were similar between the two programs except that North Sound participants reported a larger increase in always mulch mowing in wet months compared to South Sound participants.

Watering

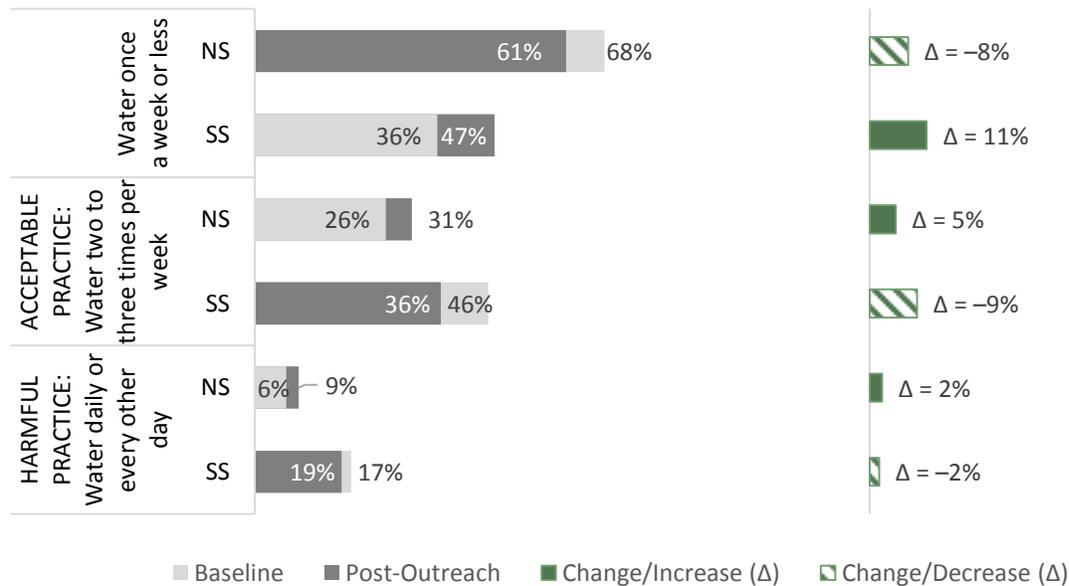
Figure 99. North and South Sound watering measurement practices



More participants in the North and South Sound measured the watering rate of their sprinkler after the programs, with a much larger increase in the South Sound.

The share of South Sound participants who had measured their sprinkler watering rate more than doubled after the program, whereas the share of North Sound participants increased at a lower rate. While the South Sound program did not provide an incentive for this practice, it was included in the outdoor demonstration workshops. South Sound participants received visual, hands-on learning for this practice; North Sound participants did not.

Figure 100. North and South Sound watering frequency practices



North Sound participants slightly increased watering frequency while of South Sound participants reduced their watering.

While the South Sound program recommended watering one inch per week spread over two watering sessions, 11% of participants shifted from watering two to three times per week to watering once a week or less. After the outreach, fewer North Sound participants watered once a week or less.

Social Diffusion

Participants in both programs shared information widely, expanding the reach of both programs. While slightly more participants in the South Sound shared information with others, each participant in the North Sound who shared information reached slightly more people (Figure 101 and Figure 102).

Figure 101: North Sound participants—number of people shared with, among survey respondents



Figure 102: South Sound participants—number of people shared with, among survey respondents



Social diffusion was measured to have more than double the reach of the North Sound program from a base of 627 participants to an additional 1,040 people. If participating households that did not respond to the survey shared information at the same level, social diffusion may have expanded the program’s reach more than four times to about 2,575 individuals (additional reach = 451 total households x 77% x 5.6 people per household). North Sound participants who shared information were more likely to have shared with friends (71%) and family (70%) than with neighbors (50%).

In the South Sound, social diffusion also expanded the program’s reach from a base of 190 households to an estimated 500 additional people. If participating households that did not respond to the survey shared information at the same level, social diffusion may have expanded the program’s reach to approximately 800 additional individuals (190 households x 82% x 5.1 people per household). South Sound participants who shared information were more likely to have shared with neighbors (82%) than with friends (55%) or family (50%). The South Sound program did not track the number of individuals in each participating household, preventing direct comparison with social diffusion in the North Sound.

Seeking and sharing information in yard care from friends and neighbors is common nationwide. A national gardening survey in 2014 found that half of consumers with a lawn or garden (51%) obtained plant and gardening information from friends and family.⁵

⁵ Garden Writers Association Foundation, “Garden Trends Research Report: October 2014 Survey,” conducted by TechnoMetrica Market Intelligence, 2014.

5. Recommendations

This section presents the evaluation team’s recommendations for improving natural yard and lawn care education programs in the Puget Sound region. Recommendations are based on a survey of program leads, staff members, workshop presenters, lawn coaches, and WSU Master Gardener volunteers (described collectively as “program staff”); surveys and interviews of program participants; and the analysis of behavior change results from the program evaluation surveys.

Detailed results, findings, and additional recommendations from the interviews and surveys used to develop these recommendations can be found in the following appendices:

- Appendix G-01—Participant Interview Summary
- Appendix G-02—Program Leads, Staff, Instructor, and WSU Master Gardener Survey Summary

Logistics Guides

These recommendations should be used in conjunction with the North Sound Logistics Guide (Appendix H-02) and South Sound Logistics Guide (Appendix H-03), which provide more details on how these programs were conducted. The recommendations in this section are intended to highlight program activities that were particularly successful and should be repeated as well as to identify areas where the logistics guide could be modified to reflect lessons learned from this evaluation.

Regional Programs and Resources

In considering these recommendations, it is important to understand that these programs benefit from the support of other regional programs and resources, such as those described below. Without these other programs and resources, the North Sound and South Sound programs would be less effective.

WSU Master Gardener Program

The North Sound lecture workshops rely on WSU Master Gardener volunteers certified through additional training to provide recommendations on natural yard care. Snohomish County contributes \$20,000 to \$25,000 per year to implement the Master Gardener training and certification program so that trained volunteers are available to support the North Sound program’s lecture workshops.

Publications by Other Local Jurisdictions

Both the North Sound and South Sound programs also rely on information resources developed by other local jurisdictions. The North Sound program uses *Natural Lawn & Garden Guide* publications developed by the City of Seattle and revised with permission for Snohomish County audiences. The South Sound program uses *Common Sense Gardening* publications developed by Thurston County based on previous publications by WSU, the City of Seattle, King County, and others.

Grow Smart, Grow Safe

Both programs also rely on the www.growsmartgrowsafe.org website, a unique resource that residents can use to research the toxicity of yard care products and identify the least-toxic techniques and products to address their weed, pest, and disease problems. The website provides a user-friendly way to look up the hazard rating of specific yard care products registered for sale in Washington State. This resource is currently funded by King County, Thurston County, and Metro (Oregon).

Recommendations Organization

The recommendations are organized into the following sections:

- Program Model
- Strategies for Teaching Specific Practices
- Participant Recruitment
- Participant Communication
- Partner Coordination
- Program Logistics
- Take-Home Materials
- Program Evaluation

Program Model

This section provides guidance for choosing a program model. Because similar natural yard and lawn care practices can be used throughout the Puget Sound region, state and local jurisdictions should coordinate to develop curriculum modules that individual jurisdictions can use as starting points and can provide as a model for contracted presenters to use. Modules should include detailed outlines, talking points, key messages, photos and other visuals (as feasible), demonstration ideas or materials, electronic versions of take-home materials, videos, and online resources that any jurisdiction in the region can customize and use. One example of regional cooperation is the effort to update the *Natural Lawn & Garden Guides*.⁶

Both program models were effective, but they had different cost levels and breadth of coverage. Accordingly, the evaluation team recommends that jurisdictions use a core program model consisting of lectures and outdoor demonstrations. These methods were found to be effective at a lower cost than lawn coach home visits, while covering a broader range of topics. Though they are effective, lawn coach home visits are not recommended as a core program model because jurisdictions are not likely to be able to sustain the substantially higher costs and more intensive staff time for coordination that this model requires.

⁶ Snohomish County hosts these guides on its website.

Natural Yard Care: <http://snohomishcountywa.gov/DocumentCenter/View/7260>

Natural Lawn Care: <http://snohomishcountywa.gov/DocumentCenter/View/7258>

Core Program Delivery Model: Lecture and Demonstration Workshops

Combine lecture workshops with an outdoor demonstration workshop. Workshops must be taught by dynamic, engaging, and informed yard care professionals who have proven expertise both in using natural yard care practices (such as ecoPRO-certified professionals) and in presenting these practices in workshops, lectures, and demonstrations. Program should use engaging experts as speakers to achieve the same level of results measured in the North and South Sound programs.

Visuals and Displays

Workshops should involve extensive use of photographs, visual aids, and hands-on demonstrations. Lecture workshops should include display stations with additional information resources, visual or hands-on demonstrations, and experts to provide personalized education. Outdoor workshops should primarily consist of hands-on demonstrations, described in more detail in strategies for teaching specific practices.

Opportunity for Personalized Assistance

Lecture and outdoor workshops should offer participants the opportunity to ask questions and receive personalized assistance from lawn and yard care professionals and WSU Master Gardener volunteers who can identify plants and diagnose problems. Participants should be strongly encouraged to bring plant samples, information on site conditions, lawn measurements, soil test results, and photos of their yards or of plant problems.

Take-home Materials

All programs should provide take-home materials that support the core practices covered and list other reliable and locally appropriate yard care resources including the city or county natural yard care website (if available), www.naturalyardcare.info (if the local city or county site does not provide the same resources), WSU Master Gardener volunteers, the local conservation district (if it provides resources on natural yard care), www.growsmartgrowsafe.org, pertinent WSU Extension websites, and books. Programs should balance providing participants with resources that cover the wide range of their information needs with not overwhelming participants with too many resources. Programs might achieve this balance by listing available resources in the core take-home materials and offering supplemental resources only in a self-serve kiosk at the workshop or on a program website.

Outdoor Demonstrations

Demonstration workshops can be structured in two main ways: with a set schedule through which all participants are rotated or a more flexible model in which participants choose which demonstration sessions to attend. We recommend an approach similar to the South Sound demonstration workshops in which participants rotate through demonstration stations on a set schedule, with time for questions at the end of each session. This structure works well for a demonstration event with three to six stations where it is important that participants learn key information from each station.

However, a more flexible model may work better for a workshop that covers a wider variety of topics and where some practices may not be relevant to some participants (such as turf aeration is not relevant for participants without lawns). In the flexible model, presenters would start their demonstrations on a published schedule, and participants would choose which demonstrations to visit.

Programs should choose the demonstration sessions that address the key practices covered in the lectures. Suggested lists of sessions are presented in the demonstration workshop logistics section on page 140.

If the program requires multiple workshops to reach all participants, continue to hold more than one workshop on the same day (if held on a weekend) to reduce staff time for set-up and clean-up and to reduce facility rental or custodial fees.

As with lectures, continue to use dynamic, engaging, and experienced yard or lawn care professionals as instructors. In the South Sound program, these experts supplied the majority of demonstration equipment in addition to being professional, knowledgeable, and trusted by participants.

Seasonal or Monthly Email Prompts

Programs should also invite participants to sign up for seasonal emails providing timely reminders that serve as prompts for key practices, such as an email in spring about slow-release fertilizer and an email in summer about smart watering. Programs can invite participants to sign up both during registration and at each workshop.

Emails can also remind past participants how to use key resources (such as WSU Master Gardener volunteers) and to use alternatives to chemical pesticides. Emails also keep past participants engaged and enable social diffusion of program messages through ease of forwarding to neighbors, friends, and family. Each email should include both subscribe and unsubscribe features.

Natural Yard Care Information Website

A well-organized website with natural yard and lawn care tips, detailed information, videos, and links to other resources will support past participants who need reminders or more information and will enable them to share information easily with others. Hosting this information on a collaborative regional website, such as www.naturalyardcare.info, with links to local jurisdiction websites as appropriate, would allow jurisdictions to pool funding and provide a wider range of information resources than if each jurisdiction produced a separate website. In addition, cost savings from regional collaboration could be used to optimize the website and resources for use on mobile devices.

The City of Olympia is developing video and radio advertisements promoting natural yard care and the www.naturalyardcare.info website, to be completed in early 2016. STORM should collaborate to bulk-purchase regional advertising space for these promotions, after modifying to include information for all funding partners.

Optional Add-on Elements to Core Program Model

Online Videos

Online videos showing key practices from demonstration workshops allow participants to review lessons after the workshop and share information with others to extend the reach of the program. Many videos demonstrating natural yard care practices have been created by jurisdictions around the country. Local programs should assess whether existing, publicly available videos can meet their needs, rather than creating new videos. Using existing videos greatly reduces the cost of providing these valuable resources to participants.

Videos should focus on step-by-step demonstrations (such as how to choose, use, and maintain equipment; how to assess a yard's sunlight and drainage conditions; and how to plant new plants). If new videos or locally appropriate adaptations must be created, STORM and local governments should participate in a joint effort because videos will be relevant region-wide. New videos created in a regional partnership with STORM should use the *Puget Sound Starts Here* brand and have a consistent style within a video series.

The City of Olympia, in partnership with STORM, is developing a natural lawn care video series that will be available online in 2016 on the regional www.naturallyardcare.info website. The series covers the following topics:

- Introduction and overview of natural lawn care.
- Mowing: how to mulch mow, proper mowing height, and how to sharpen a mower blade.
- Soil testing—how to collect soil samples.
- Fertilizer and lime—how to choose and apply slow-release fertilizer and lime, avoid weed-and-feed, and when and how much product to apply.
- Watering—how much, how often, and how to care for lawns during drought.
- Aerating, top-dressing with compost, and overseeding as the best defense against weeds and moss.

Jurisdictions and STORM should collaborate to develop additional videos covering other natural yard care topics, such as:

- Weed, pest, and disease problems—how to collect samples, use WSU Master Gardener volunteers and other resources to diagnose the problem, and use www.growsmartgrowsafe.org to choose the least-toxic management method.
- Mulch in beds—how to apply mulch to beds, factors to consider when choosing a mulch, benefits of applying mulch, and how to sheet-mulch to replace lawns with beds.
- Planting—how to prepare soil and new plants for planting.
- “Right Plant, Right Place”—how to sketch a map of the sunny versus shady and wet versus dry areas of a yard, perform a soil jar shake test, and use the *Right Plant, Right Place* guide to choose plants.

Curriculum Updates

Periodically expand the curriculum with new topics. Consider offering two-year programs rotated through target geographic areas with an introductory series in one year and a series with specialized topics in the second year.

Consider pilot-testing additional, shorter series on more advanced or specialized topics that build on the current workshops and that may include more hands-on or demonstration components. In addition, cross-promote workshops offered by local agencies (university extensions, conservation districts, cities, and counties). Advanced or specialized topics may include:

- Edible plants, including fruits and vegetables.
- Backyard composting.
- Rain gardens.
- Pruning for plant health.
- Container gardening.
- “Right Plant, Right Place” topics for specific garden challenges such as dry shade gardening, plants for wet areas, or native plants.
- Water-saving irrigation techniques such as drip irrigation, timers, and irrigation audits.

Personalized Assistance through Home Visits

Providing personalized assistance through home visits increases both the amount of total education provided and the amount of education that is relevant to each participant, but it also substantially increases costs. These increased costs per participant may limit the number of participants a program can reach. In addition, programs that want to reach many participants may not be able to find enough yard and lawn care professionals who are also experts in educating about natural yard and lawn care. For example, South Sound program staff reported difficulties in finding and engaging qualified lawn coaches from their area who used natural yard care practices.

Incentives

The South Sound program plans to survey 2014 participants again in spring 2016 or 2017 to evaluate whether they continue to use slow-release fertilizer, apply lime, and aerate when no additional incentives are provided. If incentives are shown to create lasting behavior change, consider adding incentives that reduce participant costs and other barriers to using recommended practices. Incentives should directly address real or perceived barriers faced by participants, such as the cost or difficulty of obtaining natural yard care products or equipment. If incentives are not shown to create lasting behavior change, focus on offering or developing program elements that are effective and easier to obtain funding for (such as demonstration workshops, more personalized education, or ongoing prompts such as reminder emails).

To avoid confusing participants, incentives should be uniform for all participants in a given program, unless the program is testing the effects of different incentive levels or formats.

If the South Sound program's additional survey of 2014 participants indicates that incentives offered only once result in long-term change, jurisdictions should test different incentive models and amounts that could reduce program costs, including:

- Provide the product for free: this incentive model is most costly but reduces multiple barriers, including cost and finding the product.
- Provide a coupon or rebate that participants use at private retailers: this model may be easier to implement but does not reduce barriers other than cost to participants. However, because participants who take advantage of this incentive implement all the steps for obtaining the product, coupons and rebates may foster the habit of identifying and purchasing natural yard care products for themselves.
- Provide the product at cost or a discount (sold by the program): this incentive model reduces barriers to finding and obtaining the product but recoups some of the expense to reduce program costs. This incentive model may require a nongovernmental partner to facilitate the sale of the products.

When using incentives, incorporate a natural lawn care pledge to use the practices in the long term and offer participants a yard sign to display their commitment to natural lawn and yard care. Social marketing research shows that written pledges and public commitments increase the likelihood that participants will follow through on conducting the covered activities.

Engagement of Local Nurseries or Corporate Home and Garden Stores

When possible, engage local nurseries or corporate home and garden stores in natural yard care education, either through selling and promoting recommended products or through staff training to provide natural yard care advice to customers. Programs can use point-of-sale shelf stickers or notices that promote using the GrowSmartGrowSafe.org website or mobile app and that help identify natural yard care products the store carries. Nurseries and garden stores may also be willing to offer discounts or promotions for recommended products such as compost, mulch, slow-release fertilizer, lime, drought-resistant plants, pest- and disease-resistant plants, drip irrigation, and other water-saving devices.

Natural Yard Care Stewards

In an intensive program (such as the South Sound program), invite and train past participants to receive additional training to become natural yard care stewards. These trained stewards can help support demonstrations and recruitment in their neighborhoods. Feature the yards of active past participants as examples of success.

Self-Guided Tours of Public Demonstrations of Natural Yard Care

Develop a self-guided tour of public gardens and parks that use and demonstrate natural yard care.

Strategies for Teaching Specific Practices

Jurisdictions should choose which topics to cover based on the goals of their program and the interests of their target audience. This section identifies strategies to increase the adoption of specific yard and lawn care practices included in the North Sound and South Sound programs.

To meet NPDES permit requirements, programs should ensure they address the following topic areas that directly reduce polluted runoff:

- Avoiding weed-and-feed use.
- Choosing and properly applying slow-release fertilizer.
- Controlling weeds, pests, and diseases using least-toxic methods.
- Applying mulch to planting beds.
- Aerating and top-dressing with compost.
- Storage and use of garden products.

Programs should then address relevant topic areas that reduce the need to use fertilizers and pesticides:

- Building healthy soil through soil testing, applying lime, and preparing soil with compost.
- Using “Right Plant, Right Place” principles and proper planting techniques.
- Mulch mowing to feed the soil.
- Using proper watering techniques for plant health and water conservation.

When teaching natural yard care, programs should integrate information on the connection between yard care practices and the health of people, pets, and Puget Sound into lessons rather than presenting environmental hand health information in a stand-alone workshop introduction session.

Strategies in this section are labeled by type using the following icons:



Outdoor demonstration—stations and hands-on activities to include in outdoor demonstration workshops.



Indoor display—displays to include in lecture workshops, for information conveyed visually on a poster, three-dimensional display, or hands-on activity that can be conducted indoors.



Tools and assistance—strategies that directly help participants use a practice by reducing barriers, such as difficulty recognizing recommended products in stores.



Information resource—such as fact sheets, guides, and webpages. Programs should avoid overwhelming participants with too much information by listing key resources in the core take-home materials and by providing supplemental resources online or by request. Programs should identify and use existing guides to avoid duplication before creating new materials.



Messaging—key points to convey when teaching a practice.



Videos—visual lessons, often on practices presented in outdoor demonstrations, to allow participants to review techniques at home.



Incentives—strategies that provide rewards or reduce costs to participants to encourage the use of practices.

Strategies are also labeled according to their recommended priority level:

- **High**—strategies that are expected to have high impact while being feasible and cost-effective to implement.
- **Moderate**—strategies that are expected to have moderate to high impact but may be more costly or otherwise difficult to implement.
- **Low**—strategies expected to have lower impact and be more difficult and costly to implement.

Fertilizer Use

Use Slow-Release, Natural, or Organic Fertilizer and Avoid Weed-and-Feed

In both programs, large changes in participant behaviors indicate that education on avoiding use of weed-and-feed was very effective. South Sound participants who were given free slow-release fertilizer used the product instead of fast-release fertilizer or weed-and-feed and said they intend to continue using it. However, programs will need to help participants overcome two key barriers to obtaining slow-release fertilizer: having stores carry the product and having participants identify the product in stores. Snohomish County has found that stores are increasingly carrying slow-release fertilizer but that residents may not know how to identify the product in stores. Thurston County and Olympia have found that stores in their area do not reliably keep slow-release fertilizer in stock; some national retailers may not restock slow-release fertilizer after selling out in early spring and require customers to special-order the product. When stores run out of slow-release fertilizer, residents may be more likely to use the fast-release fertilizer that is readily available in stock.

Figure 103. Strategies for fertilizer choices

Type	Description	Priority
	<p>In lectures, videos, and a webpage, show participants how to identify and choose slow-release fertilizer:</p> <ul style="list-style-type: none"> ■ How to read the guaranteed analysis (NPK numbers). ■ Words that signal the fertilizer contains slow-release nitrogen. ■ Benefits and drawbacks between types of slow-release nitrogen. <p>Fertilizer is covered in the City of Olympia’s new video series, but information on how to identify slow release fertilizer will need to be added.</p>	High
	<p>Offer a coupon with a discount on slow-release fertilizer redeemable at stores that have agreed to promote this product. In addition to providing a discount, the coupon is intended to inform participants how to identify slow-release fertilizer and which stores carry the product.</p> <p>Consider asking retailers and manufacturers of slow-release fertilizer if they would fund the coupon values while the local jurisdiction funds the design, printing, and distribution costs.</p>	High

Type	Description	Priority
	<p>Through a STORM natural yard care work group, coordinate on a local level with individual stores and store managers to regularly stock and promote slow-release fertilizer—and list participating stores and fertilizer information on program webpages.</p> <p>While independent nurseries are often more receptive than national retailers, Northwest Natural Yard Days had some success in the past working with individual store managers of chain stores. In addition, a community effort on Vashon Island successfully worked with local store managers of both national chain stores and local retailers to remove the most toxic pesticides. Thurston County and Seattle Tilth are also working on point-of-purchase programs to promote recommended yard care products. Programs should review the successes and challenges faced by these programs before implementing a similar campaign.</p>	<p>Moderate (because costly and takes a lot of coordination)</p>
	<p>If additional research on the South Sound program shows that providing a one-time incentive of free slow-release fertilizer creates lasting behavior change, seek funding to provide free fertilizer sufficient for one application for each participant (based on soil test results and lawn measurements). This incentive could also be used to encourage participants to pay for a professional soil test.</p>	<p>Low (because costly)</p>

Fertilizer Application Techniques

Participants in the South Sound made moderate to high changes in fertilizer application techniques, but room remains for increasing the use of recommended practices. North Sound participants were not taught these practices.

Figure 104. Strategies for fertilizer application techniques

Type	Description	Priority
	<p>Offer an outdoor demonstration and create or promote an easy-to-use online calculator that allows participants to use their lawn measurement figures and soil test results to calculate the amount of:</p> <ul style="list-style-type: none"> ■ Nitrogen in each bag or pound of fertilizer they are purchasing. ■ Fertilizer per square foot their lawn needs. ■ Total fertilizer they would need to buy. <p>Ideally, participants would need to have measured their lawn and obtained a soil test before the workshop. Consider raffling a prize (such as slow-release fertilizer) to participants who complete this task using their actual lawn size and soil results.</p> <p>Make sure to emphasize that no more than one pound of nitrogen per 1,000 square feet should be applied in any one application.</p> <p>Demonstrate how to weigh fertilizer and properly store leftover fertilizer.</p>	High
	<p>Offer a video on how to apply fertilizer (covered in the City of Olympia’s new video series).</p>	High
	<p>Offer an outdoor demonstration and website information on:</p> <ul style="list-style-type: none"> ■ How to choose an easy-to-calibrate spreader. ■ Links to instruction on how to calibrate the spreaders most commonly sold by local retailers. <p>If the demonstration is small enough, invite participants to bring their spreaders for one-on-one calibration assistance after the sessions.</p>	High
	<p>In fertilizer application lectures, fact sheets, and demonstrations, include messages about the importance of sweeping fertilizer off hard surfaces and the effects of fertilizer running off into local waterways (e.g., algae blooms that close beaches for swimming and shellfish harvesting, fish kills)</p>	High

Fertilizer Timing

Participants in the South Sound made low changes in the timing of fertilizer application, and room for improving this practice remains. North Sound participants were not taught these practices.

Figure 105. Strategies for fertilizer timing

Type	Description	Priority
	Provide a one-page calendar on paper and online that identifies the proper months for fertilizing and how to time fertilizing around aerating, top-dressing with compost, and applying lime. Similar to the South Sound information and record-keeping sheet (See example in the South Sound Logistics Guide in Appendix H-03), include a space on the calendar for participants to record their soil conditions, fertilizer needs, and spreader calibration. On the reverse side, include key natural lawn care tips and links or phone numbers for more resources. Consider using cardstock so the calendar can be hung in a garden shed or garage.	High
	If creating a natural yard care blog or sending seasonal or monthly email updates, include timely reminders of the proper times to fertilize (and cautions during times people improperly fertilize). Include tips and links to resources on how to choose and apply fertilizer properly. Encourage recipients to share emails and messaging through social media.	High

Weed, Pest, and Disease Control

Many participants in both programs reported using at least one recommended technique before and after the outreach. Participants in both programs reported large reductions in using weed-and-feed. Nonetheless, in interviews many participants from both programs asked for more information on weed, pest, and disease control methods.

Figure 106. Strategies for weed, pest, and disease control

Type	Description	Priority
 	<p>Continue to emphasize:</p> <ul style="list-style-type: none"> ■ The importance of correctly diagnosing yard and plant problems before applying a treatment. ■ The availability of and how to use key resources: <ul style="list-style-type: none"> — WSU Master Gardener volunteers (including how to find them) — <i>Grow Smart, Grow Safe</i> (www.growsmartgrowsafe.org) — WSU Hortsense website (http://hortsense.cahnrs.wsu.edu/Home/HortsenseHome.aspx) — Fact sheets available from the lecture program, such as the <i>Natural Pest, Weed, & Disease Guide</i>. ■ Preventing problems is easier and cheaper in the long run and protects the resident, pets, children, the local environment, and Puget Sound. ■ Problems can be prevented through using “Right Plant, Right Place” principles, creating a healthy soil ecosystem, and maintaining a thick, healthy lawn that can outcompete problems such as moss or weeds. <p>During the lecture, guide participants through the process of diagnosing and choosing a control method for one or two of the most common weeds, pests, or diseases.</p>	High
	<p>Continue to have WSU Master Gardener volunteers available at workshops and strongly encourage participants to bring plant samples for diagnosis.</p>	High
	<p>Work regionally to preserve and maintain www.growsmartgrowsafe.org website. This guide is a unique resource that residents can use easily to research the toxicity of yard care products and identify the least-toxic techniques and products to address their weed, pest, and disease problems. This resource provides a user-friendly way to look up the hazard rating of specific yard care products registered for sale in the State of Washington.</p> <p>Communicate and collaborate with King County and other funding partners (such as Thurston County and Metro in Oregon) to preserve and maintain this resource. Explore developing and implementing a regional campaign to inform the general public about this resource and how to use it.</p>	High

Type	Description	Priority
	<p>Encourage participants to use the WSU Extension’s online fact sheets that show how to diagnose and manage common weeds, pests, and diseases that affect yards in Puget Sound. Collaborate with WSU as needed to make the fact sheets more visual, address commonly misdiagnosed issues (such as crane flies, which rarely damage lawns in this region), and cover emerging problems.</p> <p>Many information resources already exist that programs could use with or without customizing. Examples of sources include WSU, Seattle Public Utilities (<i>ProIPM</i> series), and Seattle Tilth.</p>	High
	<p>Demonstrate crop rotation in a lecture demonstration or display. The North Sound used this demonstration in its “Pest, Weed, and Disease Control” lecture.</p>	High
	<p>Provide lecture displays showing how to diagnose and manage the top one or two weed, pest, and disease problems that relate to the lecture topic. For example, provide a display on managing moss and dandelions at a lecture on lawn care.</p>	Moderate
	<p>Consider supporting a coordinated, region-wide effort to train all WSU Master Gardener volunteers consistently on how to use www.growsmartgrowsafe.org. Master Gardener volunteers can use this web resource at their in-store clinics, once they diagnose a problem, to help residents know and understand which control techniques are least toxic for the issue at hand. As budget allows, provide more comprehensive training on natural yard care practices to supplement the regular Master Gardener volunteer training.</p>	Moderate
	<p>Create a video showing the steps to diagnose and manage problems:</p> <ul style="list-style-type: none"> ■ Collect samples properly. ■ Consult with WSU Master Gardener volunteers or use other information resources. ■ Use www.growsmartgrowsafe.org to select the least-toxic management method. 	Moderate

Soil Conditions

Soil Testing

While soil testing is important for understanding soil conditions, residents rarely test their soil. Few South Sound participants had tested their soil before the outreach, although many planned to test it again in the future now that they understand the importance of soil testing.

Figure 107. Strategies for soil testing

Type	Description	Priority
	Demonstrate the components of soil and how it affects plants in a lecture display or demonstration. The North Sound program used a lecture demonstration titled “What’s in soil” in the “Healthy Soil and Composting” lecture. Include pictures of the effects of improving soil conditions.	High
	Demonstrate in a lecture display how to find a soil-testing service (listing local options if possible) and how to read, interpret, and act on soil test reports. The South Sound program used a lecture and slide presentation at its outdoor demonstration workshops. Include pictures of the effects of applying the proper amount of lime and fertilizer.	High
	Provide a fact sheet or webpage on how to find a soil-testing service and how to read, interpret, and act on soil test reports. Include an annotated soil test in the fact sheet as an example.	High
	Create a video showing how to collect a soil sample properly for soil testing (covered by the City of Olympia’s new video series).	High

Type	Description	Priority
	<p>Facilitate soil testing through partnering with a local agencies or soil-testing service to offer a low-cost soil test in conjunction with the workshop. Work with the soil-testing entity to:</p> <ul style="list-style-type: none"> ■ Use a standardized, easy-to-interpret report. ■ Measure lawn or bed area while collecting the soil test (unless cost-prohibitive). ■ Provide clear instructions on how to use the test results. <p>WSU encouraged residents to register for a reduced-cost soil test during the first two sessions of its 10-part Growing Grocers Education Series held in 2015. The first two sessions covered healthy soil. Conduct additional research with WSU to assess the cost and effectiveness of this strategy.</p> <p>To ensure accurate results, program staff or partners (such as a soil-testing service provider) should collect soil samples or provide detailed instructions and guidance for the homeowner to collect soil samples; past programs have found that residents sometimes collect samples improperly (such as by collecting potting soil). To make sample collection more efficient, try to concentrate participants in one neighborhood and collect soil samples all on one day.</p>	Moderate

Applying Lime

In the South Sound program, the combination of information on the importance of proper soil pH (to allow nutrient uptake and support lawn health) along with the hands-on demonstration and incentive of free lime appeared effective. In the North Sound, few participants applied lime after the program, indicating substantial room for improvement. Unlike slow-release fertilizer, lime is sold by many stores that carry yard care products, although residents may not understand why and how to use it properly.

Figure 108. Strategies for applying lime

Type	Description	Priority
	<p>Continue to emphasize that applying lime to improve soil conditions (in conjunction with aerating) is important to:</p> <ul style="list-style-type: none"> ■ Help lawns use the nutrients from fertilizer. ■ Prevent moss (if soil pH is the key contributor). ■ Support overall lawn health. 	High
	<p>Refer participants to online resources that provide instructions for how to apply lime and show conditions of lawns before and after lime and aeration.</p>	High

	Demonstrate how to apply lime in an outdoor demonstration or video, in conjunction with demonstrations on how to apply fertilizer. Applying lime is covered by the City of Olympia's new video series.	High
	If additional research shows that providing a one-time incentive of free or discounted lime creates lasting behavior change, seek funding to provide free lime sufficient for one application (based on soil test results and lawn measurements). This incentive could also be used to encourage participants to pay for a professional soil test.	Moderate to High (if incentives shown to produce lasting behavior change)

Aerating and Top-Dressing with Compost

In the South Sound program, the hands-on demonstration and the incentive of a discount on renting an aerator appeared effective, at least in the short term. Other strategies (described below) may also increase aerating of lawns. In the North Sound, few participants aerated their soil after the outreach, indicating substantial room for improvement.

Figure 109. Strategies for aerating and top-dressing with compost

Type	Description	Priority
	<p>Offer an outdoor demonstration and video showing:</p> <ul style="list-style-type: none"> How to use an aerator. How to top-dress with compost after aerating. The difference that aerating and top-dressing with compost makes to soil and soil health. <p>Aerating and top-dressing with compost is covered by the City of Olympia’s new video series.</p>	High
	<p>Encourage participants who live in the same neighborhood to coordinate on renting an aerator and compost top-dressing equipment.</p>	High
	<p>Help participants hold an aeration day in which all participants in a neighborhood can jointly rent an aerator and top-dressing equipment (or can jointly hire a professional to aerate and top-dress).</p> <ul style="list-style-type: none"> For example, Snohomish Conservation District offers free “compost parties,” typically reaching three to six households per party. If facilitating a fee-based aeration day, consider offering a financial incentive (such as free compost for their yard) to the participant who leads the coordination for their neighborhood to compensate them for their additional effort. As another example, the City of Olympia’s Neighborhood Lawn Aeration Program offers reimbursement for one-day rental of lawn aerator equipment when three or more residents team up to aerate their lawns. <p>Invite participants who sign up when they register for lectures and demonstrations and again at the workshops.</p>	Moderate
	<p>Consider offering a rebate on renting top-dressing equipment or purchasing a top-dresser to loan to participants, in addition to offering a rebate on renting aeration equipment or hiring an aeration professional.</p>	Moderate

Applying Mulch

By the end of the outreach, most North Sound participants reported keeping planting beds covered and not using landscape fabric or plastic. However, they may benefit from additional visual displays or demonstrations on mulching techniques.

Figure 110. Strategies for applying mulch

Type	Description	Priority
	<p>Demonstrate in a lecture display and lead attendees through information in the <i>Building Healthy Soils</i> guide:</p> <ul style="list-style-type: none"> ■ Problems caused by bare soil, landscape plastic, and landscape fabric. ■ Benefits of applying mulch, including water conservation. ■ Proper materials to use for mulching. ■ Factors to consider when choosing the proper mulching material, including photos showing the different looks achievable with each mulching material. ■ How to apply the different mulch materials, including tools to use, the depth of mulch to apply, and how to calculate how much mulch is needed. ■ How to tell when to apply more mulch. 	High
	<p>Demonstrate in an outdoor workshop or video:</p> <ul style="list-style-type: none"> ■ How to apply the different mulch materials, including tools to use, the depth of mulch to apply, and how to calculate how much mulch is needed. ■ Reinforce information taught in the lecture display: <ul style="list-style-type: none"> — Problems caused by bare soil, landscape plastic, and landscape fabric. — Proper materials to use for mulching. — Factors to consider when choosing the proper mulching material, including photos showing the different looks achievable with each mulching material. — How to tell when to apply more mulch. 	High
	<p>If the program is teaching participants how to remove or replace lawn, present sheet mulching visually in a lecture display using photographs or videos or in an outdoor demonstration workshop. Provide samples of different mulches and photos showing how they look in application.</p>	Moderate

Preparing Soil for Planting

After the North Sound lecture workshops, most participants reported following recommendations for mulching beds. While most also knew to use compost when preparing soil for planting, room for improvement remains on knowing to mix compost into the soil six to eight inches deep across the entire planting bed (not to individual planting holes).

Figure 111. Strategies for preparing soil for planting

Type	Description	Priority
	<p>Offer an outdoor demonstration and a video showing:</p> <ul style="list-style-type: none"> ■ That compost is the proper soil amendment. ■ How to mix compost 6 to 8 inches into the soil across an entire bed (visually showing how deep this is and explaining why this depth is important). ■ How to prepare soil when planting a single plant rather than an entire bed. ■ How large a hole to dig and how deep to plant the plants. ■ How to handle plants when planting them. <p>Refer participants to the <i>Right Plant, Right Place</i> guide for more information and for plant lists.</p>	<p>High</p>

Mowing

Mulch Mowing

Both programs created moderate behavior change with moderate post-outreach use of mulch mowing, indicating some room for improvement.

Figure 112. Strategies for mulch mowing

Type	Description	Priority
	Education should emphasize that mulch mowing supplies 25% to 50% of a lawn’s nitrogen needs, reducing the need for fertilizer.	High
	Offer an outdoor demonstration or video using several mowers to show: <ul style="list-style-type: none"> How to determine if a mower is a mulching or non-mulching mower. How to choose and install a mulching blade (as an alternative to replacement). Mulch mowing tips for wet and dry months. Mulch mowing is covered by the City of Olympia’s new video series.	Moderate
	Offer a coupon or rebate for purchasing an electric mulching mower or a mulching blade for an existing mower.	Low

Mowing Height

Little additional education is needed because use of recommended mowing heights was high both before and after outreach.

Figure 113. Strategies for mowing height

Type	Description	Priority
	Lecture display or webpage with photographs showing grass cut at different heights and different cutting amounts (e.g., cutting one-third per mowing), with notes on how each height and amount of cutting affects lawn health. Mowing height is also covered by the City of Olympia’s new video series.	High

Blade Sharpening

South Sound participants made substantial changes but have room for improvement in sharpening or replacing mower blades.

Figure 114. Strategies for blade sharpening

Type	Description	Priority
	Offer an outdoor demonstration or video showing how to sharpen a blade at home (covered in the City of Olympia’s new video series).	High
	Provide a lecture display or webpage showing: <ul style="list-style-type: none"> ■ The difference between mowing with a sharp versus a dull blade. ■ When to replace a blade versus sharpen a blade. ■ How quickly a blade becomes dull. ■ How to find a blade-sharpening professional. ■ The typical cost for professional blade sharpening. ■ A blade-sharpening guide with photos for homeowners. 	High

Right Plant, Right Place

In the North Sound program, participants reported large changes in understanding and using “Right Plant, Right Place” principles, but additional room for improvement remains. Few participants reported having sketched a map of the sunlight and drainage conditions in their yard. Participants may also need assistance choosing plants for their yard conditions.

Figure 115. Strategies for “Right Plant, Right Place”

Type	Description	Priority
	Continue to provide lists of plants that thrive in specific (especially challenging) conditions and resources for finding more information and plant lists. Walk participants through the <i>Choosing the Right Plants</i> guide, which includes a template with instructions on how to identify and sketch a map of wet versus dry, sunny versus shady, and heat sink areas of their yard.	High
	Use a plant showcase display or slide show in lecture workshops to show examples of plants that thrive in specific (especially challenging) conditions.	High
	Continue to demonstrate the importance of soil conditions when following “Right Plant, Right Place” principles using a “soil jarshake test” in a lecture display with both a jar and photographs.	High

	<p>Demonstrate in a lecture display or outdoor workshop how to conduct research to determine a plant’s needs and characteristics, particularly pest and disease resistance, cold temperature tolerance, and drainage needs. Show participants how to:</p> <ul style="list-style-type: none"> ■ Look up plant information online using common and Latin names. ■ Use online resources and books for information. ■ Seek information from Master Gardener volunteers and nursery professionals. 	<p>High</p>
	<p>Hold a workshop or create a video on how to sketch a map of their yard and provide a template that participants can use at home. This workshop should involve each participant sketching one designated area of the workshop site with the demonstration instructor.</p> <p>Alternatively, the program could ask participants to bring a satellite view of their yard from an online mapping service (such as Google Maps, Yahoo Maps, Mapquest, and Bing Maps) for the sketching workshop.</p>	<p>Moderate</p>

Watering

While the South Sound program created high behavior change in measuring the sprinkler watering rate, room for improvement remains. Most participants in both programs who watered their lawns watered three times per week or less, with 47% to 61% watering once a week or less. Given predictions of a dry year in 2016, programs should consider partnering with water purveyors to increase education on efficient watering techniques, including during a drought.

Figure 116. Strategies for watering

Type	Description	Priority
	<p>Demonstrate measuring the sprinkler watering rate in outdoor workshops (potentially as a display rather than as part of an active session) and in a video (many already exist online). Watering is covered in the City of Olympia’s new video series.</p>	<p>High</p>
	<p>Watering lessons may need to better emphasize that proper watering frequency results in a healthier lawn. Include instructions on how to water lawns during a drought, either to keep a green lawn or to allow the lawn go dormant. Continue to provide visuals demonstrating the connection between watering frequency and lawn rooting depth.</p>	<p>High</p>

Type	Description	Priority
	Provide a fact sheet, such as the <i>Smart Watering</i> guide, with instructions on how to measure the sprinkler watering rate, a calculation template for determining how long to water, instructions on watering frequency for green and dormant lawns, and visuals showing the connection between watering frequency and lawn rooting depth.	High
  	Given predictions for drier and hotter summers in the future, consider developing a lecture, lecture display, or outdoor demonstration focused on protecting and maintaining a landscape through extended dry seasons. STORM should consider reaching out to regional water purveyors to collaboratively develop and implement education campaigns that increase awareness of and teach residents practices including: <ul style="list-style-type: none"> ■ Make every drop count by measuring the sprinkler watering rate, fixing leaks, adjusting watering times, and using drip irrigation for garden beds. ■ Aerate and top-dress lawns with compost to retain moisture. ■ Mulch landscaped beds with compost or other appropriate materials to retain moisture. ■ Determine a plant’s watering needs before buying and match the plant’s needs to your garden conditions. 	High
 	Provide containers that participants can use to measure their lawn sprinkler watering rate. If using educational home visits, have the lawn coach set out the containers at the end of the site visit to encourage participants to conduct the test immediately.	Moderate to Low

Participant Recruitment

Program staff in both programs reported that recruitment worked well, and participants interviewed recommended expanding recruitment to reach more people. North Sound program staff were very positive about the mailers used for recruitment, with many noting that they must have worked well given the large attendance at workshops. Program staff from both programs also expressed that methods used to communicate with participants (primarily email) worked well and that similar methods should be used for future efforts.

Recommendations for recruitment in the future are described in the sections below.

Continue to Recruit Using Direct Mail and Flyers

Continue to use direct mailing for recruitment. For programs targeting specific geographic areas, continue to use geographically targeted mailers and add other location-specific recruitment methods as budget allows (such as flyers at community centers and utility bill inserts).

For multi-jurisdictional programs, continue inter-jurisdictional partnerships so that more widespread workshop promotions can include residents of multiple jurisdictions. For instance, in the North Sound program, a sign at the Mill Creek post office may be seen by residents that reside within the nearby jurisdictions of Lynnwood, Everett, Mill Creek, Bothell, and unincorporated Snohomish County.

Update Marketing Materials Periodically

Vary the look of marketing materials periodically and test alternative materials for rural residents (who appeared to have lower participation rates than urban residents in the North Sound). Include messages and visuals that address the benefits of natural yard care:

- Using the yard for a family recreation area; amenity to increase home value; pet play area; and source of fruits, vegetables, and herbs. Participants identified these as important ways they use their yard or lawn.
- Improving the look and function of yards and making yard care more efficient.
 - North Sound interviewed participants most commonly reported improving the look and function of yards and making yard care more efficient as motivating their changes to yard care practices.
 - North Sound nonparticipants who reported making changes in the post-outreach survey said their motivations were to make their yard look better (59%); spend less time on their yard (36%); and avoid toxic pesticides, weed killers, or fertilizers (25%).⁷
 - South Sound nonparticipants who reported making changes in the post-outreach survey most frequently said their motivations were to make their yard look better (39%). About quarter of respondents each chose the other responses: to avoid toxic pesticides, weed killers, or fertilizers; to protect local water resources; because they learned new information about lawn care; and to spend less time on their yard.

Expand Recruitment Methods

Expand recruitment methods

Recruit Using Past Participants

Recruit past participants to serve as neighborhood stewards who can invite and assist new participants. Also feature lawns of past participants as examples of success. Offer participants lawn signs that promote the program.

⁷ Respondents were allowed to select multiple responses.

Encourage Participants to Invite Others

In the marketing materials and reminder emails to past participants, encourage participants to invite their neighbors, friends, and family so they can share information and support each other after the workshops. The North and South Sound programs did not use this tactic in 2014 so that the evaluation could assess randomly selected participants and nonparticipants.

Promote Online

Promote the program through community websites (such as NextDoor.com) and social media.

Continue to Offer Translations at Workshops

Continue to offer language translation at workshops and consider conducting market research and a pilot project to market a lecture series specifically for Spanish speakers as demand increases.

Consider Recruiting Door-to-Door in Target Neighborhoods

Other programs, such as Natural Yard Care Neighborhoods in Bothell, have found door-to-door recruitment more effective than mailings alone. While this method reduces mailing costs, it increases staff time, and King County jurisdictions have reported variable results, including high “no-show” rates at workshops. When successful, this method could help a program to concentrate participants in one neighborhood to obtain the following benefits:

- Increase the effects of social norming (that is, natural yard care practices become normal and expected in that neighborhood).
- Reduce costs for collecting soil samples (if offering this service or incentive),
- Enable the program to hold an aeration day for multiple participants.
- Enable the program to locate workshops in a convenient location for all participants.

Future programs should obtain more information from jurisdictions that have used this method on its challenges and successes.

Use Online Registration

Continue to use an online registration form, integrated with a baseline survey.

For programs that accept only participants who meet certain criteria, continue to include the clearly defined participant selection criteria in recruitment materials and the registration form.

Place the registration link on an established webpage that has been optimized for search engines, such as directly on the program’s main page (for example, on www.naturalyardcare.info as a regional portal or on www.naturalyard.surfacewater.info for Snohomish County programs).

Audience Targeting

Consider focusing recruitment on residents who have purchased a home within the past three years (based on information from county auditor or assessor offices) because these residents were more likely to register for the program than residents who had lived in their homes longer than three years. However, programs should continue to accept all residents who otherwise meet program criteria.

Programs addressing practices related to fertilizing, using weed-and-feed, and mulch mowing should target participants who place high importance on having a green or weed-free lawn. In the North Sound at baseline, these participants were less likely to have implemented recommended practices and more likely to have implemented harmful practices compared to participants who placed less importance on these yard characteristics. However, these participants may also need extra encouragement or incentives to make changes. In the South Sound, participants who placed more importance on having a weed-free or green lawn showed *lower* levels of behavior change for the three practices where differences in behavior change were substantial.

A comparison of subgroups in the South Sound found that participants who strongly agreed in the baseline survey that fertilizer and pesticides are a major cause of water pollution showed higher levels of behavior change than other participants for practices related to use of these products. At the same time, participants who strongly agreed with these statements before the program were also *less* likely at *baseline* to be implementing natural lawn care practices related to these products. Accordingly, programs should consider including messages about protecting water quality in recruitment materials.

Otherwise, comparing survey results by subgroups did not identify clear trends to inform audience targeting.

Participant Communication

Communicate Primarily by Email

Continue to use email, supplemented by phone calls as needed, for participant communication. For its efficiency and effectiveness, email is recommended as the main communication method. In addition, continue to provide a phone number that residents can call for questions and to register if they lack internet access.

For efficient communication, continue to use pre-scripted welcome and reminder emails with mail-merge tools, updated as needed.

Increase Participant Engagement

Participants interviewed expressed enthusiasm about the program and requested ways to connect with other participants in their neighborhood, obtain follow-up assistance, and continue participating in the program.

Maintain Contact with Participants

Maintain contact with participants throughout the program by sending monthly emails with tips and updates and by providing a contact person, or at least a handbook, reference guide or website, for when participants have questions or need reminders.

Foster Neighborhood Connections

Create opportunities for participants in the same neighborhood to connect. Options include:

- List neighborhoods on participant nametags at workshops and encourage participants to arrive early and mingle over coffee or refreshments to promote community.
- Provide program yard signs so participants can see which neighbors are participating or have participated in the past.
- Work through established homeowners' associations or key community organizers, if known. Consider creating a program listserv or invitation-only Facebook group where participants in a given program can share information and ask questions of each other. A listserv would also allow the program coordinator to communicate easily with all participants, when personalized communication is not needed.

Maintain Contact after the Program

Interviewed participants in the South Sound also requested ways to obtain follow-up assistance and continue participating in the program. Continued engagement with past participants in all programs can support behavior change through prompts, reminders, and information on new recommended behaviors.

- Offer a quarterly email with reminders to perform season-specific natural yard care practices (such as when to aerate and top-dress with compost), prompts to contact the WSU Master Gardener program (or other resources when appropriate) with questions, and promotions for natural yard care educational videos and how-to demonstrations after the program. Contact Seattle Public Utilities to learn what worked well with their quarterly "Savvy Gardener" email communication to past participants, as well as the reasons it was discontinued.
- Maintain contact with past participants and consider having them serve as neighborhood ambassadors to share lawn care information with friends, family, and neighbors and to recruit new program participants.
 - Invite past participants to demonstration workshops or hold dedicated follow-up workshops with reminders on key practices, information on new topics of interest, and the opportunity to ask experts for advice.
 - Feature the lawns of past participants as examples of success. Invite participants to take part in a "before-and-after" series in which the program photographs their yard every year or two to show change over time.

- For intensive programs, such as in the South Sound, consider training past participants to become yard or lawn stewards who can help support demonstrations (led by yard or lawn care professionals) and recruitment in their neighborhoods for future educational efforts.

Partner Coordination

Communication among Program Partners

Frequent communication among program partners was essential. Recommendations for future multi-jurisdictional efforts are described below.

Designate a Lead Entity and Delegate Work to Partners

Continue to have one lead organization responsible for managing the overall program in a defined geographic area, but delegate work among partnering jurisdictions to share the burden of costs not covered by grant funding. For example, each STORM Stormwater Outreach Group can coordinate activities within its area, with one jurisdiction taking the lead while other jurisdictions provide support.

Communicate Regularly Using Email, Meetings, and Calls

Continue to use regular email updates and reminders, standing inter-jurisdictional meetings, and dedicated conference calls among partner jurisdictions.

Continue to communicate after the workshops have ended through debrief meetings after each series and through periodic email updates, such as on evaluation progress if appropriate.

Post Materials and Schedules on a Central Website

Continue to post locally appropriate materials and schedules to the STORM Natural Yard Care internal web pages as appropriate and needed. Post documents to the web pages and send emails to partners with hyperlinks to appropriate documents.

Curriculum Development and Communication with Presenters

Comments on the curriculum development process generally were positive for both programs. However, in the South Sound, communication between the program staff and lawn coaches posed some challenges in 2014 that were addressed in the 2015 program.

Establish Clear Expectations with Presenters and Communicate Regularly

Continue establishing clear expectations between presenters and program staff on communication protocols, project schedule, recommended practices, and workshop content before the program begins. For home site visits, such as lawn coaches, also establish clear expectations with program staff regarding site visits and reporting requirements. Incorporate these expectations into the presenter or lawn coach

contract, potentially using Olympia's 2015 contract as a template. Include in the contract any required planning and debrief meetings designed to tailor the curricula and presentation format.

Continue frequent, consistent communication with instructors and staff before workshops.

Develop Curriculum Guidelines Using Existing Resources or New Research

For a program covering a broad range of yard care topics, such as the North Sound program, continue to base curriculum on the *Natural Lawn & Garden Guides* developed by the City of Seattle, updated and tailored to local conditions as needed.

For programs developing or updating guidelines or curriculum, such as the South Sound program, continue to conduct literature reviews and internet research on best practices for lawn and yard care and also consult lawn and yard care professionals. South Sound program staff reported that the research and consultation they conducted was very helpful.

Give Presenters Clear Curriculum Objectives

Continue to give presenters and instructors clear objectives and program information as they develop curriculum, particularly if they will be required to teach specific practices.

Emphasize that presenters are expected to cover all specified topics they are contracted to lecture on and to ensure their lectures do not conflict with the curriculum guideline document (such as the *Natural Lawn & Garden Guides*). Work with the planning team and presenters to adjust curricula or workshop length to cover all specific topics within an appropriate amount of workshop or demonstration time.

Require Visuals or Demonstrations in Lectures

Require lecture presenters to include a hands-on demonstration in their presentation intended to convey how to implement a key practice. This element may be as simple as showing a brief video which conveys "how to."

Help Presenters Tailor Curriculum to Local Conditions

If applicable, hold a briefing meeting or share information on county- and city-specific yard care programs, resources, and landscape examples (such as local demonstration gardens or parks).

At least one week before the workshop, provide presenters with a list of the top three or four relevant questions that participants most frequently asked during registration. As feasible, presenters should incorporate these topics into the regularly scripted lecture or be prepared to answer these questions after the lecture.

Program Logistics

Program Planning and Timing

Begin Planning at Least Six Months Ahead

Start upfront planning at least six months before the first workshop. This schedule allows sufficient time for activities such as booking presenters, creating program and evaluation forms, designing and testing the registration process, preassembling packets, and determining the timing and script for email evaluations. Plan to finalize and test all forms and processes at least one month before beginning recruitment.

Lecture Workshops Logistics

Comments from North Sound program staff about workshop logistics were generally positive. They offered suggestions on keys to success and opportunities for improvement, as summarized below.

Select Appropriate Venues and Ensure Adequate Venue Staffing

Continue to use venues with good locations, sizes, parking availability, functionality, and venue staffing:

- Continue to meet with venue staff ahead of time to understand particular venue considerations and set-up needs, including acoustics, sightlines, sound equipment, and lighting.
- Consider using venue staff, if possible, to help with set-up and take-down to give program staff and WSU Master Gardener volunteers more time to interact with participants.
- If using translators, locate them where they will not distract other attendees.

Facilitate a Smooth Check-in Process

Continue to ensure participant check-in at the workshops runs smoothly.

- For large workshops (50 or more participants) continue splitting participant check-in into two lines by last name and having two dedicated staff members for check-in.
- Provide an incentive to arrive early to reduce the check-in rush before the presentation starts, such as by advertising that WSU Master Gardener table will be available for consultation at least half an hour before the presentation starts or by offering a door prize to people who arrive by a set time.
- Continue to meet with check-in staff before every workshop to review the process, roles, and expectations to ensure consistent, excellent customer service across all workshops.

Engage Residents during Workshops

For multi-jurisdictional programs, continue to involve city staff in engaging their residents:

- Encourage city staff to be proactive in greeting and checking in participants, collecting evaluations, and handing out door prizes.
- Consider budgeting for the host jurisdictions to provide a refreshment table or an information booth to create a place where participants can connect and learn about city programs and resources.

Involve WSU Master Gardener Volunteers

Continue to invite WSU Master Gardener volunteers and continue to encourage participants in emails and announcements at lectures to arrive early or stay late to ask questions one-on-one or in small groups with these yard care experts.

Ask WSU Master Gardener volunteers to bring resources primarily on identifying plants and diagnosing problems. Continue to provide additional natural yard care training to WSU Master Gardener volunteers. Train WSU Master Gardener volunteers to know and point to the information in the take-home materials when providing advice to participants. Continue to hold debrief meetings with participating WSU Master Gardeners volunteers after each workshop series season.

Modify Lecture Content

Integrate *Smart Watering* into Other Relevant Presentations

Integrate watering and irrigation into other yard care presentations rather than presenting it as a standalone topic (such as integrating lawn irrigation with lawn care and bed irrigation with plant care). According to program staff, several participants left during the break before the *Smart Watering* session and some commented that they “already know how to water.” Integrating watering into other presentations will ensure participants learn about this topic.

Reduce Overlap between *Right Plant, Right Place* and *Sustainable Garden Design*

Revise the *Right Plant, Right Place* and *Sustainable Garden Design* presentations to avoid overlap and to focus more on practical, concrete information, including the following topics:

- How to determine a plant’s needs and characteristics when choosing new plants, particularly pest and disease resistance, cold temperature tolerance, and drainage needs (also cover these topics in demonstration workshops).
- How to use the *Plant List* booklet provided during the lectures to find plants that thrive in specific (especially challenging) conditions and resources for more information and other plant lists.
- More emphasis that the right plants fail in the wrong place.
- More details on how to handle and plant new plants (also cover in demonstration workshops).

- How to use the *Choosing the Right Plants* guide, which includes a template with instructions on how to identify and sketch a map of wet versus dry, sunny versus shady, and heat sink areas of their yard.

Integrate Edibles, Where Appropriate

When asked to rate various uses of their yard, North Sound participants gave higher importance ratings than did nonparticipants for using their yard as a source of fruits, vegetables, and herbs. For practices presented in general workshops that apply to both edible and ornamental plants, include examples of both types of plants.

Demonstration Workshop Logistics

South Sound participant feedback regarding the workshop implementation was positive. At least 85% of participants for each of the sessions rated the workshop as very good or good, and 90% overall found it to be worth attending. Nearly 80% said they experienced a moderate to large increase to their understanding of how to implement lawn care practices. Based on program staff, lawn coach, and participant feedback, the evaluation team offers the following recommendations for holding demonstration workshops.

Cover Key Lecture Practices in Demonstration Sessions

Programs should choose the demonstration sessions that address the key practices covered in the lectures. Figure 117 presents suggestions for sessions to include in outdoor demonstration workshops, with notes on timing and possible incentives to offer as “door prizes” for attending. Ensure participants have adequate time for questions by scheduling time for questions both at the end of each session and at a dedication question session at the end of each workshop so participants can return to stations where they had additional questions. Encourage participants to bring paper and pens for notetaking.

Figure 117: Suggested outdoor demonstration sessions

Topics	Potential Incentives	Spring	Fall
Soil conditions, interpreting soil test results, and calculating lawn fertilizer and lime amounts	Free or discounted soil test	X	
Applying fertilizer and lime to lawns, weighing quantities, and calibrating spreaders	Free or discounted fertilizer or lime	X	X
Aerating, overseeding, and top-dressing with compost	Free or discounted aeration, aerator rental, or compost		X
Mowing (height, mulch mowing, and blade sharpening)	Free blade sharpening at event	X	
Watering lawns (measuring sprinkler watering rate and calculating watering times)	Free cups or timer to measure watering	X	
Controlling weeds and pests in lawns		X	X
Assessing yard conditions by sketching a yard map and testing soil (shake test)	Free or discounted soil test	X	X
Choosing the right plant for the right place (hold in same workshop and planting right)		X	X
Planting right: preparing soil, digging and filling planting holes, handling plants, watering new plants (hold in same workshop as choosing the right plant)	Free or discounted compost	X	X
Choosing and applying mulch	Free or discounted mulch	X	X
Watering: choosing, inspecting, and adjusting irrigation systems	Free watering timer or quick disconnect fitting	X	
Preventing weeds, pests, and diseases in planting beds		X	X

Continue to Use Yard Care Professionals as Presenters

Continue to use yard care professionals as instructors at the demonstration workshops, which allows participants an opportunity to ask their questions to trusted experts. In addition, yard care professionals often can supply equipment to use in demonstrations.

Ensure All Sessions Cover All Key Learning Objectives

To ensure all sessions cover all key learning objectives:

- Develop a schedule and a script or key talking points for each workshop session.
- Continue to ask presenters to rehearse and time their presentations on their own. If using yard care professionals who are not experienced presenters, consider holding a dress rehearsal to provide feedback as needed.

Incentive Logistics

Lessons learned on incentives logistics are based on the South Sound program's experience.

Provide Door Prices for Attending Workshops

The North Sound and South Sound programs both found that drawing for small "door prize" incentives related to the workshop topic, such as a watering timer during a watering lecture, were effective for encouraging attendance, engaging participants, and demonstrating natural yard and lawn care items.

Distribute Incentives in Conjunction with Workshops

If possible, distribute lime and fertilizer only on the same days as the workshops for participant convenience and as an added incentive to attend the workshop. If possible, hold the workshops at or near where the lime and fertilizer are delivered; transporting these incentives on workshop days is usually not feasible.

If incentives cannot be delivered on workshop days, distribute them after the workshops only to participants who attended the workshops, ideally from one central location during a short period of time to reduce staffing requirements.

Assure Participants that Fertilizer and Lime Quantities are Accurate for their Lawn

When handing out fertilizer, explain that participants are being given the correct amount and explain why they need less than they may have used in the past. Potentially provide a handout with the free fertilizer that shows their soil test results, lawn size, and the calculations used to determine their fertilizer amount. Consider holding a demonstration session or pre-workshop homework in which participants calculate their fertilizer and lime needs using an easy-to-use worksheet; use the free fertilizer and lime as an incentive for completing this exercise.

Increase Promotion of Discount Aerator Rental Incentive

While all participants received the free soil test and most participants used the free lime and slow-release fertilizer, fewer participants aerated their lawn. Ask lawn coaches to more strongly encourage participants to take advantage the aerator rental incentive (if continuing) and to better emphasize the benefits of aeration.

Continue to Offer the Free Soil Test

Continue to offer the free soil test. Although the soil test was less popular with the lawn coaches, participants rated it as among the most useful program elements that helped them make changes. Because the South Sound program was focused on reducing nutrient runoff, a soil test is vital so participants can accurately determine how much fertilizer and lime to apply.

Yard or Lawn Coach Home Visit Logistics

These recommendations apply only to programs that choose to offer a yard or lawn coach home visit as an add on to the core program. As discussed previously, this program model is costly and should be used only if the core program model of lecture and outdoor demonstration workshops are not achieving the desired level of behavior change.

Consider Offering Only One Home Visit

Consider offering only one lawn coach home visit per participant, potentially with an option to purchase a second site visit for participants who request it. In interviews, some participants did not think the second lawn coach visit was needed. In addition, lawn coaches noted that it was harder to schedule the second lawn coach visit, possibly indicating that many participants did not value it as much as the first visit.

In addition, consider replacing the second home visit with a second set of demonstration workshops to serve as a refresher with more time given to questions. Ask participants to bring photos of their lawns and of any pest, weed, or other issues they are concerned about with their lawn. Include a session on how to care for their lawn the following year.

Ensure Smooth Coordination of Lawn Coach Visits

To ensure smooth coordination and communication between lawn coaches, jurisdiction staff, and participants:

- Streamline lawn coach visit scheduling by using an online scheduling system and providing contact information only for participants who are ready for their visits.
- Improve the system for obtaining permission to collect soil samples, potentially by obtaining permission electronically during registration or by asking all registrants to print, sign, and mail the permission form when registering (even before they know whether they have been accepted to the program).

- Communicate to participants before both the first and second visits regarding the importance of scheduling and following through with visits, especially before the second visit, which participants appeared less interested in.

Lawn Coach Home Visit Program Timing and Schedule

The South Sound program had been designed to recruit participants before they applied fertilizer for that year, requiring the early recruitment. However, the South Sound program staff found recruitment to be a challenge in December when residents may have been thinking about holidays rather than their lawns. A surge of late applications delayed other program activities such as soil testing and resulted in scheduling challenges.

Consider Starting Lawn Program in Fall

Consider starting the program in fall to avoid the spring rush and test whether residents will sign up earlier in the recruitment process if recruitment is conducted during summer. Otherwise, use additional tools to encourage residents to sign up in January and February, such as asking previous participants to recruit their friends and neighbors, going door-to-door in targeted neighborhoods, or offering extra incentives for signing up by a specific date. For programs offering a soil test, ensure participants know not to apply any lawn care products for eight weeks before the soil test.

Consider Alternative Schedule for Spring Start

If continuing to start the lawn program in spring, consider the following alternative program schedule:

- Spring: soil test, lawn coach visit, and workshop on spring and summer practices (mowing, watering, applying fertilizer and lime, and pest and weed management).
- Early fall: workshop on fall practices (aerating, top-dressing, overseeding, applying fertilizer and lime, and pest and weed management) with optional lawn coach visit.

Take-Home Materials

Program staff in both programs recommended continuing to provide the take-home materials. North Sound program staff particularly noted that they were attractive, informative, and gave participants something to refer to later.

Continue to Provide Core Printed Take-Home Materials Used in Previous Programs

More than two-thirds of North Sound participants reported using the program brochures and handouts as they tried to implement the practices taught in the workshops, and almost as many used their workshop notes. For handouts created by the program, consider formatting to leave space for participants to take notes.

For the South Sound program, consider including individual soil test results and recommendations in participant handouts.

For the North Sound program, organize the materials by workshop to provide them to participants who missed a particular workshop.

Teach Participants How to Use Key Information Resources

As applicable, teach participants how to use the key take-home materials and information resources (such as www.growsmartgrowsafe.org) either by requiring presenters to incorporate them into their lectures or by having program staff demonstrate them in a short presentation before or after the lectures.

Continue to Provide Additional Take-Home Materials in a Self-Serve Display and Online

Continue to provide additional take-home materials in a self-serve display at lecture and demonstration workshops along with information on how to access additional information online. Additional resources for natural yard care programs could include existing pamphlets (such as *How to Landscape a Septic Drainfield*, *How to be a Salmon-Friendly Gardener*, *Garden-Wise*, and *Noxious Weeds that Harm Washington State*), videos, information on alternatives to invasive plants, and information on rain gardens and backyard composting.

Provide a Summary of Information Resources

Refer participants to the various *Natural Lawn and Garden Guides* for a summary of information resources including links to:

- Online versions of the take-home materials (and/or host an easy-to-find page on the jurisdiction's website, such as www.naturalyard.surfacewater.info, with these links organized by workshop).
- Additional resources including:
 - WSU Master Gardener volunteers (office locations, hours, and phone numbers).
 - The local conservation district (contact information and services provided).
 - Other website such as www.growsmartgrowsafe.org, www.naturalyardcare.info (a regional portal), and WSU Extension websites.
 - Reliable books.

Give participants the website address for online access on an item they are likely to keep (such the workshop handouts or a refrigerator magnet) so they can easily refer to and share information, including through social media.

Program Evaluation

These programs were implemented with a rigorous evaluation component specifically to meet National Pollutant Discharge Elimination System (NPDES) permit reporting requirements for measuring the understanding and adoption of targeted behaviors related to water quality. Because this evaluation demonstrated that both program models significantly affect behavior, future education programs using these models will not need to conduct such a rigorous evaluation unless they are conducting research on specific program elements. All future programs should include:

- Short baseline survey (7–10 questions on key practices) conducted as part of an online registration form.
- Signed pledge form on which participants commit to using key practices.
- Questionnaire to obtain participant feedback and suggestions, to be completed at the workshop.
- Short post-outreach survey (7–10 questions on key practices) conducted online 12–18 months after education.

The North and South Sound programs should also conduct additional research to assess the long-term effects of their education and to evaluate specific program elements in more detail. Due to grant and NPDES permit reporting requirements, this present program evaluation was not able to obtain long-term survey data (12–24 months) from South Sound participants.

Recommendations for Additional Research

Evaluate Long-Term Effects of South Sound Incentives

The evaluation team strongly recommends surveying South Sound participants again in 2016 or 2017 to evaluate whether behavior changes during the program proved lasting, particularly those related to the program incentives: fertilizer choices (including weed-and-feed use), lime, and aeration. This additional research is vital to determine whether future programs should offer incentives. (Note: the South Sound program offered one free bag of lime to participants who completed the medium-term post-outreach survey, so the survey would need to address whether they used only the free lime or also purchased additional lime on their own).

In addition, another survey of South Sound participants could help assess the extent to which the weather (hot and dry versus cool and wet) affects mulch mowing practices.

The South Sound program should send the survey using email and an online survey system and be prepared to make follow-up phone calls or send paper surveys if the response rate is low.

Evaluate Long-Term Changes by North Sound Participants

In addition, consider surveying North Sound participants again in 2016 or 2017 to evaluate whether planned behavior changes during the program took place, particularly among fall workshop attendees who had less time to use the practices. In addition, another survey of North Sound participants could

help assess the extent to which the weather (hot and dry versus cool and wet) affects mulch mowing practices.

Based on the medium-term survey response rates, the North Sound program will likely need to send a paper survey to obtain a sufficient number of responses.

Research the Effectiveness of Incentive Structures

If this additional research shows that South Sound participants continued using practices associated with incentives, the evaluation team also recommends conducting additional research to separate the effects of the incentives from the more intensive education that South Sound participants received by providing education to two groups of participants: give one group lawn coach home visits without incentives and a second group incentives without home visits.

A lecture and demonstration workshop program that is large enough could offer incentives or additional program elements (such as personalized onsite assistance) for research purposes in a drawing for participants who attend all the workshops. Allocating these add-ons by drawing after the workshops would enable random selection of otherwise similar participants, ensure that costly add-ons are offered only to participants who completed the core program, and provide participants with a fair and transparent explanation for why some did not receive the add-ons. Programs should consult with jurisdictions, such as the City of Bellevue, that have offered drawings in the past to learn from their experience.

Compile and Summarize Information on Regional Natural Yard Care Programs

Many jurisdictions in the Puget Sound region have conducted natural yard care education programs, such as King County's Northwest Natural Yard Days. In addition, the water purveyors Seattle Public Utilities and Cascade Water Alliance have conducted water-conservation programs using natural yard care practices. Future programs should compile evaluation reports from these programs and conduct a meta-analysis to assess the results of various program models, common elements of successful programs, practices that are more and less adopted by participants, and common themes among participant characteristics.

King County may be leading an effort to improve overall awareness of yard care impact on Puget Sound and promote natural yard care by allowing all STORM members to use the regional www.naturalyardcare.info website to post workshop and event information. The effort may also seek to cooperate on purchasing mass-media advertising across Puget Sound to promote the website, natural yard care practices, workshops, and demonstration events as well as conduct evaluation surveys to allow for regional comparison.

Recommendations for Ongoing Program Evaluations

Define Program Goals and Targeted Practices before Beginning Evaluation Planning

If conducting the North Sound and South Sound programs again and if the program schedule allows, develop and test all the surveys (participant and nonparticipant, baseline and medium-term post-outreach) at the same time. (Note the program and grant schedules did not allow the project and evaluation team to develop all survey instruments before implementing the baseline participant surveys.)

If possible, define program goals and specific practices that participants should either start or stop before beginning evaluation planning. At a minimum, begin evaluation planning at least three months before launching the program to allow time to:

- Select, refine, and define practices the evaluation will cover, to focus the evaluation on the most important practices with clear and consistent definitions of recommended and discouraged practices.
- Test baseline surveys online at least one month before registration begins.
- Develop baseline and follow-up surveys at the same time.

Separate a Pledge to Use Practices from a Survey to Obtain Participant Feedback

At the end of each workshop, use separate documents to record intent to use natural yard care practices and to obtain participant feedback on the program.

- Pledge to use key practices—ask participants to sign a pledge to use key practices covered in the workshop. Programs should recognize that actual behavior change is likely to be lower than pledged intent to change and cannot necessarily be estimated based on the share of participants pledging to use the practices.
- Survey for participant feedback—Use a survey completed at the end of workshops primarily to obtain participant feedback on the education program, such rating speaker effectiveness.

Continue to give participants time to complete the pledge and the survey during the workshop and offer small prizes in a drawing as an incentive for completing both items.

Conduct Shorter Baseline and Post-Outreach Surveys to Measure Behavior Change

To measure of behavior change and if budget allows, conduct a much shorter baseline survey before the program and a shorter post-outreach survey one full growing season after all education has ended. If budget allows, continue to use a unique identification number system to remove responses from participants who did not attend the program or who did not complete both the baseline and post-outreach surveys.

Conduct Baseline Survey during Registration

Continue to integrate the baseline survey into an online registration form. Consider requiring participants to complete the survey in order to participate in the program.

Conduct Post-Outreach Surveys by Email and Online for More Intensive Programs

Use email and an online survey system for programs in which participants were highly engaged and received and responded to emails during the program, such as the South Sound program. Email and online surveys cost less per respondent but require participants to recognize and be motivated to read the program's email, without losing it in a junk mail folder.

Email worked well for the South Sound program's survey, although program staff needed to conduct phone calls to obtain a high response rate for the medium-term post-outreach survey. The South Sound program also gave respondents a bag of lime as an incentive to complete the survey.

Conduct Post-Outreach Surveys by Postal Mail for Less Intensive Programs

Use a paper mail-based survey for programs in which participants were less engaged and received but did not need to respond to emails during the program, such as the North Sound program. When participants are less engaged and more likely to ignore a program email, a paper copy with a self-addressed, stamped envelope can increase response rates.

The North Sound program sent a paper survey to participants who did not respond by email. To increase response rates after sending the survey invitation and two reminder emails, the North Sound program added an incentive of a one-year subscription to the Chinook Book phone app to the subsequent reminder email and mailed paper version.

Recommendations on Shortening Participant Surveys

Focus Surveys on the Most Important Practices the Program Covers

After clearly defining program goals and the specific practices the program will cover, review surveys to remove questions not related to those practices and prioritize the remaining questions based on environmental or human health impact of the practices and on the amount of time spent on the practice during the program.

Remove Questions Not Related to Yard Care Practices

Unless conducting audience research or needed to satisfy grants, NPDES permits, or other requirement remove questions on attitudes, opinions, and information resources. If a program promotes one or two specific resources, consider including them in a direct question asking whether participants had used that resource (rather than presenting them with a long list of resources they may have used).

Remove or reduce demographic questions unless including to track participant diversity or gender or to meet outside requirements.

Remove or Revise Questions on Certain Practices

Consider removing or revising questions on the following practices that showed little change and remained in high use after the programs:

- Mowing height: remove this question because most participants mow the proper height.
- Mulch mowing: collapse question to ask about mulch mowing in wet months versus dry months rather than in each month individually.
- Fertilizer choices: ask directly in two separate questions whether they use slow-release fertilizer and whether they use weed-and-feed (providing a definition for this product). Include an option for “I do not fertilize.”
- Weed, pest, and disease management: revise these questions to ask how frequently participants use the recommended practices (either individually or as a set of practices) and how frequently they use harmful practices.

6. Appendices

The following appendices follow this report:

Appendix A. Evaluation Plan

Appendix B. North Sound Survey Data Summary Tables

- B-01. North Sound participant baseline data (all respondents, cross-tabulated by Areas 1–7)
- B-02. North Sound participant baseline data (all respondents, cross-tabulated by North vs. South County)
- B-03. North Sound participant baseline survey comments
- B-04. North Sound participant baseline data (took both baseline and medium-term surveys, cross-tabulated by Areas 1–7)
- B-05. North Sound participant baseline data (took both baseline and medium-term surveys, cross-tabulated by North vs. South County)
- B-06. North Sound participant immediate post-outreach survey data (lawn and watering)
- B-07. North Sound participant immediate post-outreach survey comments (lawn and watering)
- B-08. North Sound participant immediate post-outreach survey data (plants, soil, and compost)
- B-09. North Sound participant immediate post-outreach survey comments (plants, soil, and compost)
- B-10. North Sound participant immediate post-outreach survey data (garden design and pest control)
- B-11. North Sound participant immediate post-outreach survey comments (garden design and pest control).
- B-12. North Sound participant medium-term post-outreach survey data (all respondents, cross-tabulated by Areas 1–7)
- B-13. North Sound participant medium-term post-outreach survey data (all respondents, cross-tabulated by North vs. South County)
- B-14. North Sound participant medium-term post-outreach survey comments
- B-15. North Sound participant medium-term post-outreach survey data (took both baseline and medium-term surveys, cross-tabulated by Areas 1–7)
- B-16. North Sound participant medium-term post-outreach survey data (took both baseline and medium-term surveys, cross-tabulated by North vs. South County)
- B-17. North Sound nonparticipant baseline survey data, cross-tabulated by North vs. South County
- B-18. North Sound nonparticipant baseline survey comments
- B-19. North Sound nonparticipant medium-term survey data, cross-tabulated by North vs. South County
- B-20. North Sound nonparticipant medium-term survey comments
- B-21. North Sound participant high-level summary data (additional cross-tabulations)

Appendix C. North Sound Survey Instruments

- C-01. North Sound participant baseline (survey instrument)
- C-02. North Sound participant immediate post-outreach (survey instruments for three lectures)
- C-03. North Sound participant medium-term term post-outreach (survey instrument)
- C-04. North Sound nonparticipant baseline (invitation postcard, invitation letter, survey instrument, reminder postcard)
- C-05. North Sound nonparticipant medium-term (invitation postcard, invitation letter, survey instrument, reminder postcard)
- C-06. North Sound participant post-outreach interview guide
- C-07. North Sound staff and instructor survey instrument

Appendix D. South Sound Survey Data Summary Tables

- D-01. South Sound participant baseline survey data, cross-tabulated by Olympia, Tumwater, and Thurston (all respondents)
- D-02. South Sound participant baseline survey data, cross-tabulated by Olympia, Tumwater, and Thurston (took both baseline and medium-term)
- D-03. South Sound participant baseline survey comments
- D-04. South Sound participant immediate post-outreach survey data, cross-tabulated by Olympia, Tumwater, and Thurston
- D-05. South Sound participant medium-term post-outreach survey data, cross-tabulated by Olympia, Tumwater, and Thurston (all respondents)
- D-06. South Sound participant medium-term post-outreach survey comments
- D-07. South Sound participant medium-term post-outreach survey data, cross-tabulated by Olympia, Tumwater, and Thurston (took both baseline and medium-term)
- D-08. South Sound nonparticipant baseline survey data, cross-tabulated by Olympia, Tumwater, and Thurston (all respondents)
- D-09. South Sound nonparticipant baseline survey data, cross-tabulated by Olympia, Tumwater, and Thurston (all respondents eligible for the program)
- D-10. South Sound nonparticipant baseline survey comments
- D-11. South Sound nonparticipant medium-term post-outreach survey data, cross-tabulated by Olympia, Tumwater, and Thurston (all respondents)
- D-12. South Sound nonparticipant medium-term post-outreach survey data, cross-tabulated by Olympia, Tumwater, and Thurston (all respondents eligible for the program)
- D-13. South Sound nonparticipant medium-term post-outreach survey comments
- D-14. South Sound participant high-level summary data (additional cross-tabulations)

Appendix E. South Sound Survey Instruments

- E-01. South Sound participant baseline (survey instrument)
- E-02. South Sound participant immediate post-outreach (survey instruments for lawn coach visits and demonstration workshops)

- E-03. South Sound participant medium-term post-outreach (survey instrument)
- E-04. South Sound nonparticipant baseline (invitation postcard, invitation letter, survey instrument, reminder postcard)
- E-05. South Sound nonparticipant medium-term (invitation postcard, invitation letter, survey instrument, reminder postcard)
- E-06. South Sound participant post-outreach interview guide
- E-07. South Sound staff and instructor survey instrument

Appendix F. Statistical Analysis Report

Appendix G. Participant Interview and Staff Survey Summaries

- G-01. North Sound and South Sound participant post-outreach interview summaries
- G-02. North Sound and South Sound staff and instructor survey summaries

Appendix H. Logistics Guides and Related Reports

- H-01. GROSS Grant Final Report
- H-02. North Sound Logistics Guide
- H-03. South Sound Logistics Guide