

# People as Part of Stormwater Infrastructure:

Integrating Education, Evaluation, & Partnerships  
into Large-Scale Sustainable Stormwater Management Programs

New Partners for Smart Growth – Seattle, WA February 5, 2009



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**Portland State**  
UNIVERSITY



# Outline

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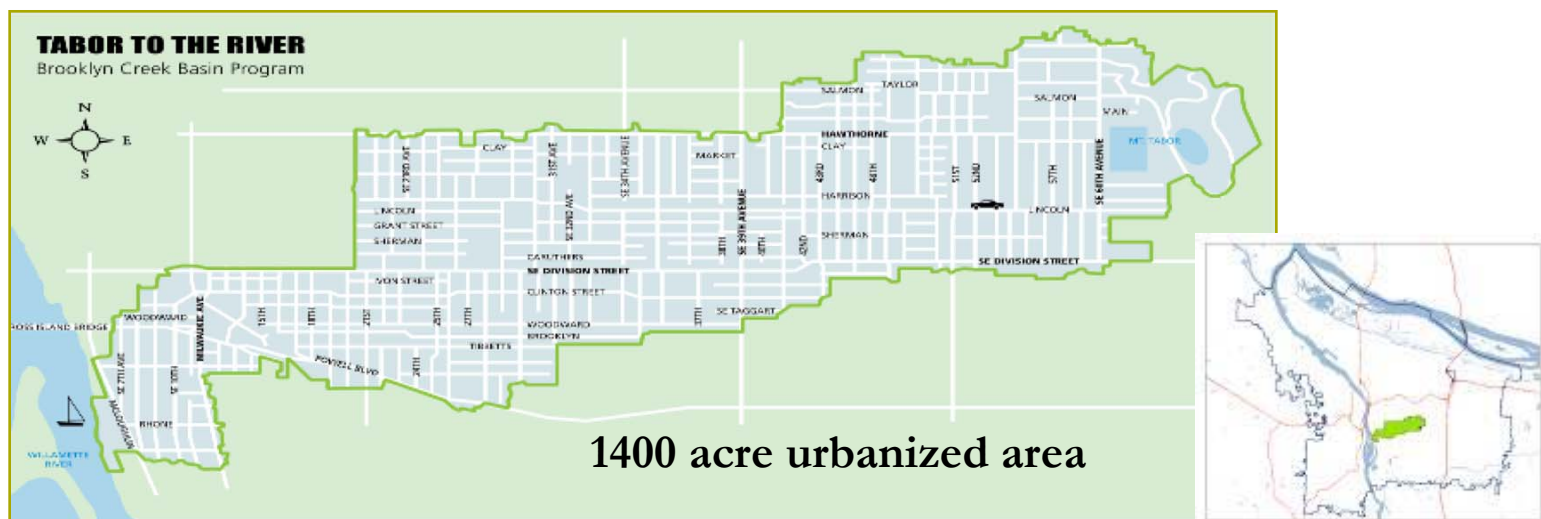
- Overview of Portland's largest stormwater distributed project
  - Tabor to the River
- Survey: Resident perceptions of stormwater
  - Knowledge, attitudes, behaviors
  - Social determinants of stewardship
- Workshop: Opportunities for engagement
  - Based on our understanding, how of resident perceptions, how would you engage this community? Your community?

# Tabor to the River Program Mission

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- Integrate watershed approach into a system capacity and pipe rehabilitation project
- Implement solution to address multiple objectives of watershed health
  - improved water quality and hydrology
  - sewer system improvements
  - healthy native vegetation
- Develop a replicable framework inclusive of education

- Integrated approach
  - Plant nearly 4,000 street trees
  - Add 500-600 sustainable stormwater facilities
  - Repair or replace 81,000 feet of sewer pipe
  - Remove invasive plants from key areas
  - Encourage community action on private property
  - Community education and develop partnerships



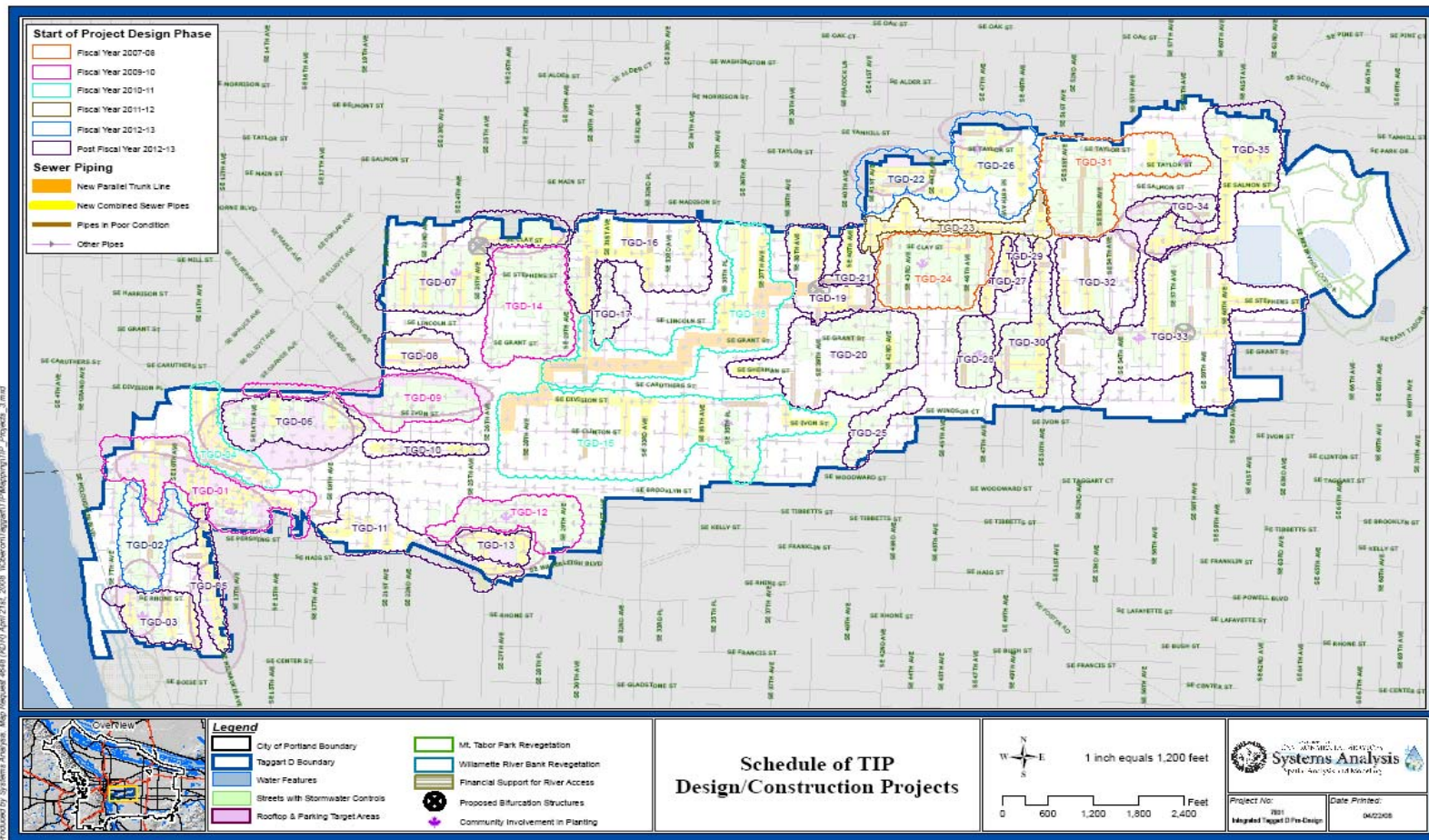
# Tabor to the River Background

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- Why the Tabor to the River basin?
  - Combined sewer system
  - Sewer Backups
  - Flooding
  - Structurally Deficient Pipes
  - Water Pollution
  
- Why an integrated approach?
  - Changing city culture
  - City effort to control stormwater on-site
  - History of successful pilot projects
  - Bureau managers initiated integrated approach



# 35 project areas constructed over 10+ years



# Why people are part of infrastructure

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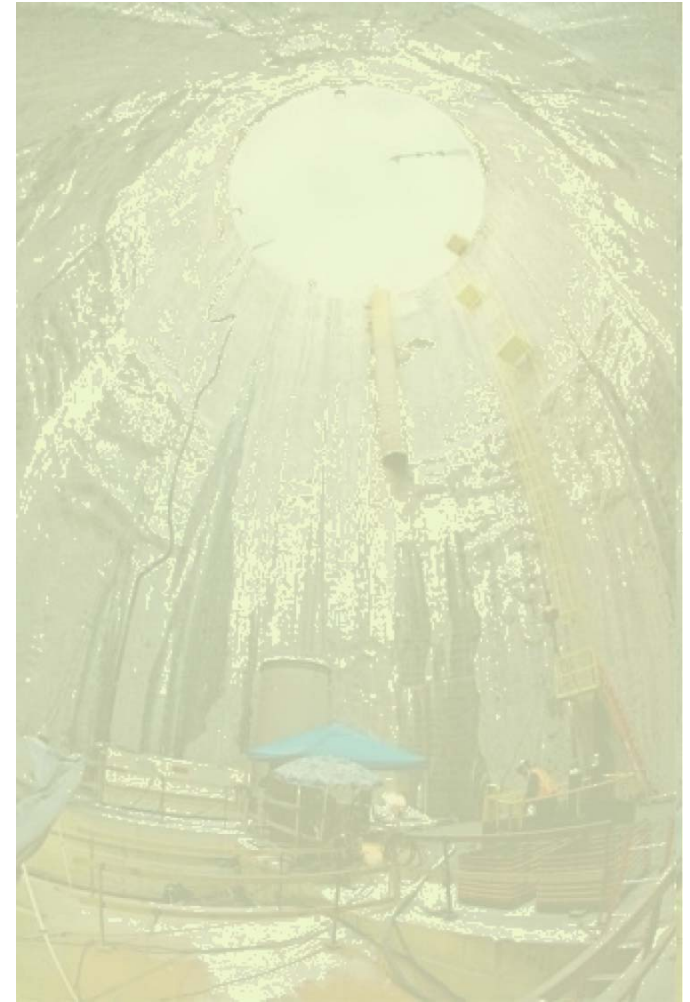
- ❑ Adjacent property owners are ultimately the stewards of trees and green stormwater facilities
- ❑ All actions matter
- ❑ We all have a part to play in watershed health



# SE Portland Neighborhood Survey

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- ❑ Mailed out to resident in May 2009
  - Pre-emptive and reminder postcards
- ❑ Sent to over 2,500 household in target areas and control areas
- ❑ Background information on Tabor to the River and stormwater projects provided
- ❑ Prizes included gift cards for native plants, local coffee and a tour of the Eastside Big Pipe



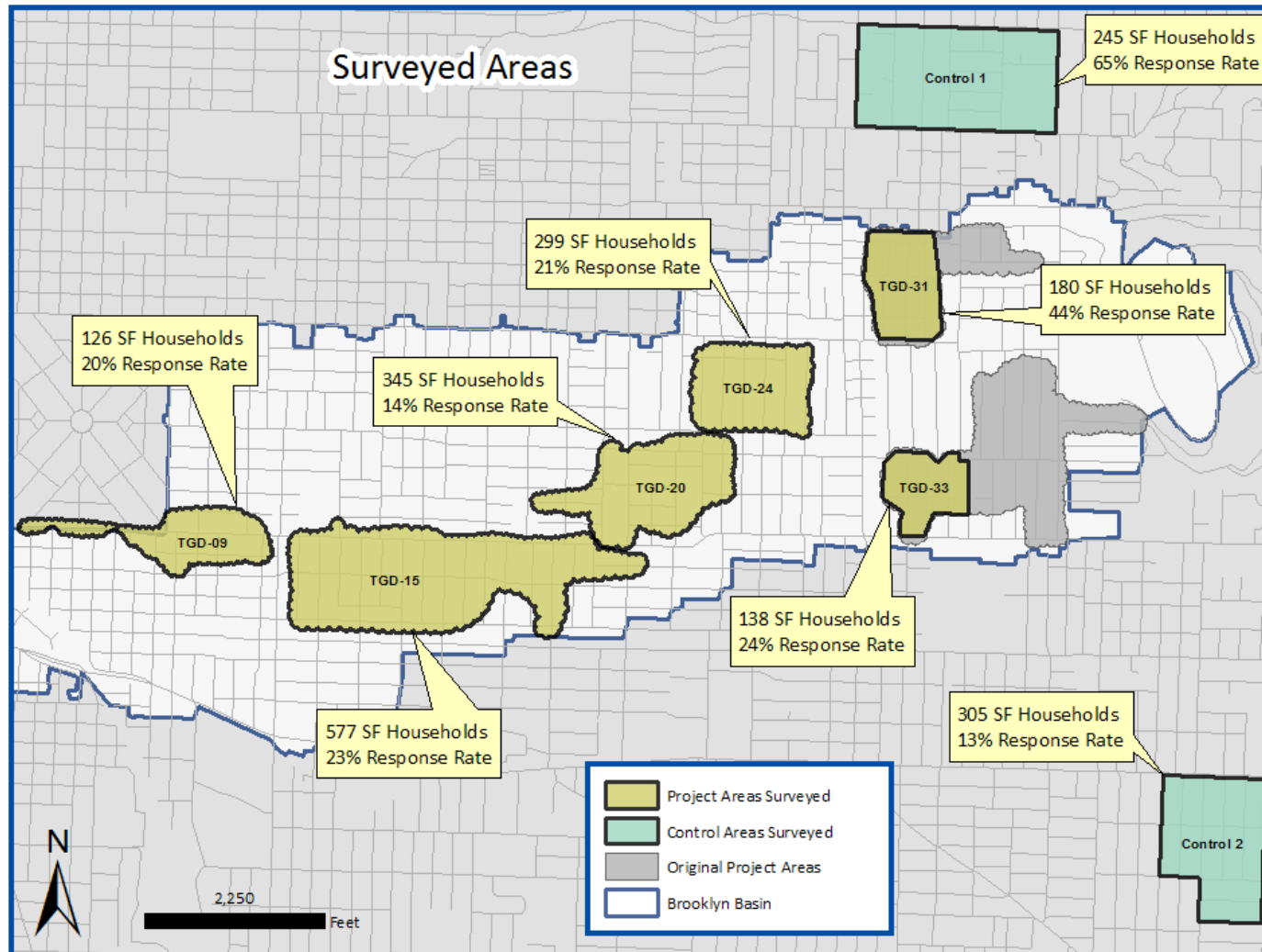


# SE Portland Neighborhood Survey

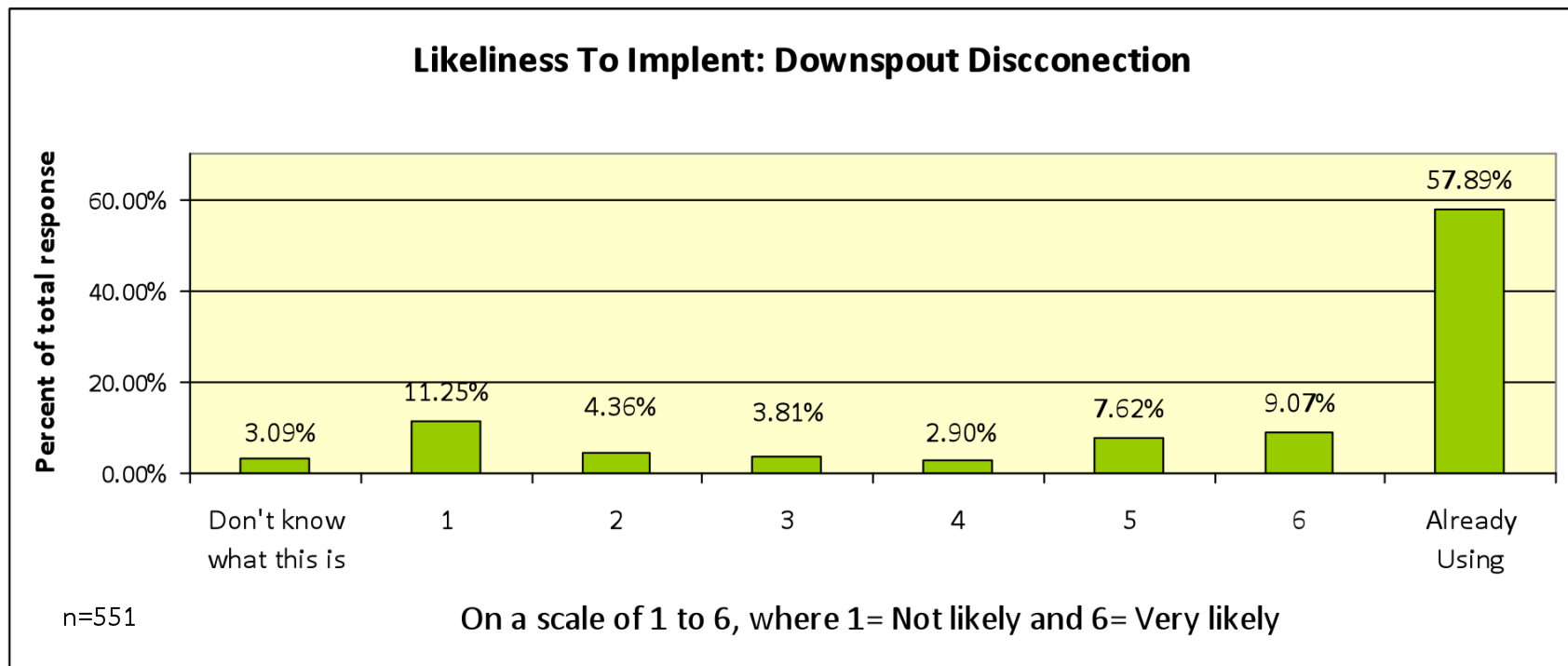
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- Practical guidance for City and theoretical contributions to discourse on collaborative governance
  - Section A: Information Sources
    - Evaluation of city outreach efforts
    - Targeting specific types of outreach
  - Section B: Perceptions of the Neighborhood and Resident Involvement
    - Prior to installation of stormwater facilities
  - Section C: Focusing on Stormwater Management Strategies
    - Potential for citizen stewardship

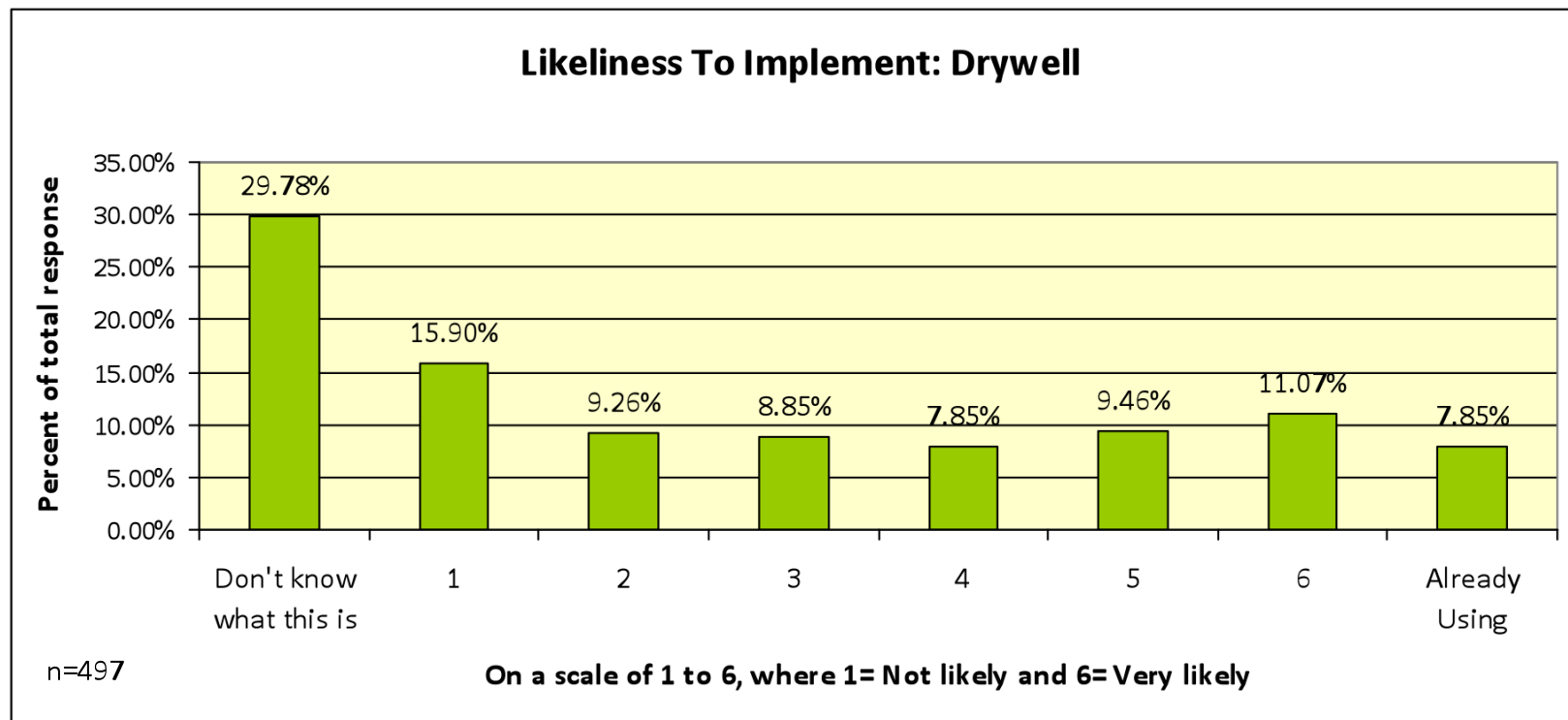
# Project Areas Surveyed



# Results: Implement Downspout Disconnect

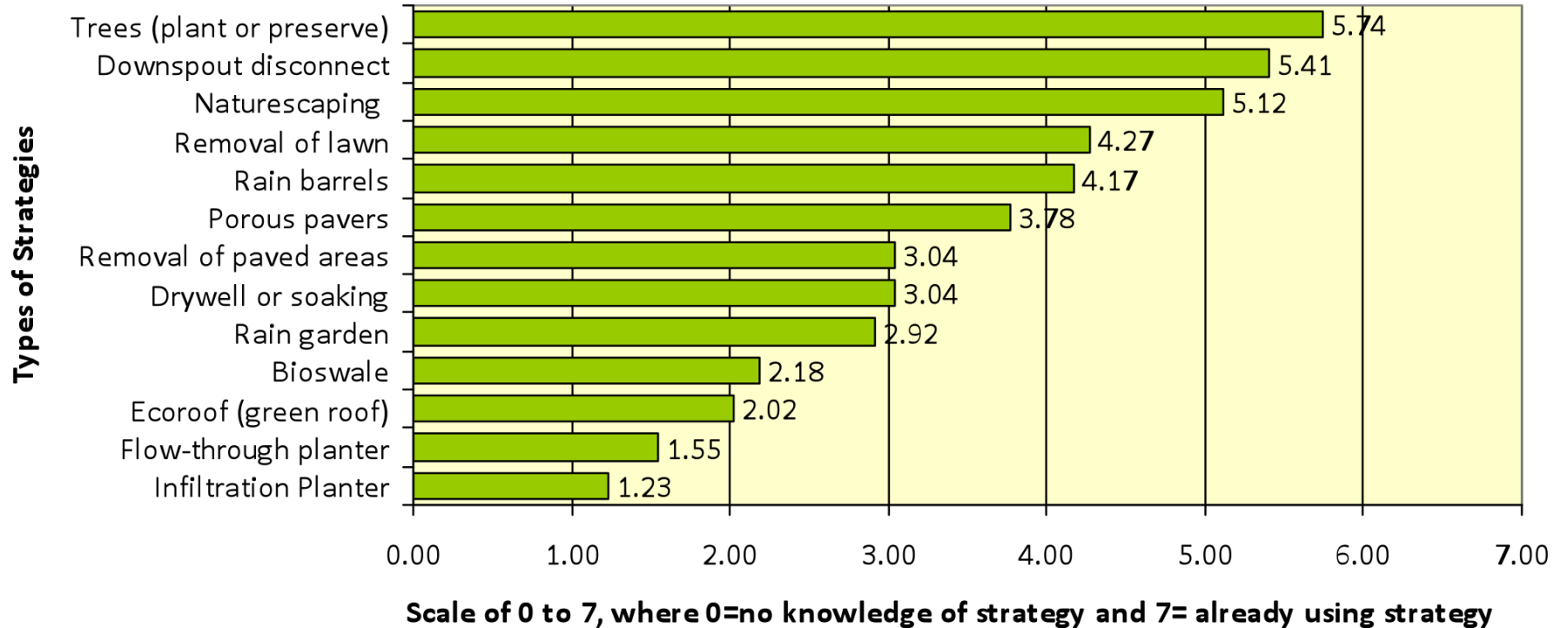


# Results: Implement Drywells



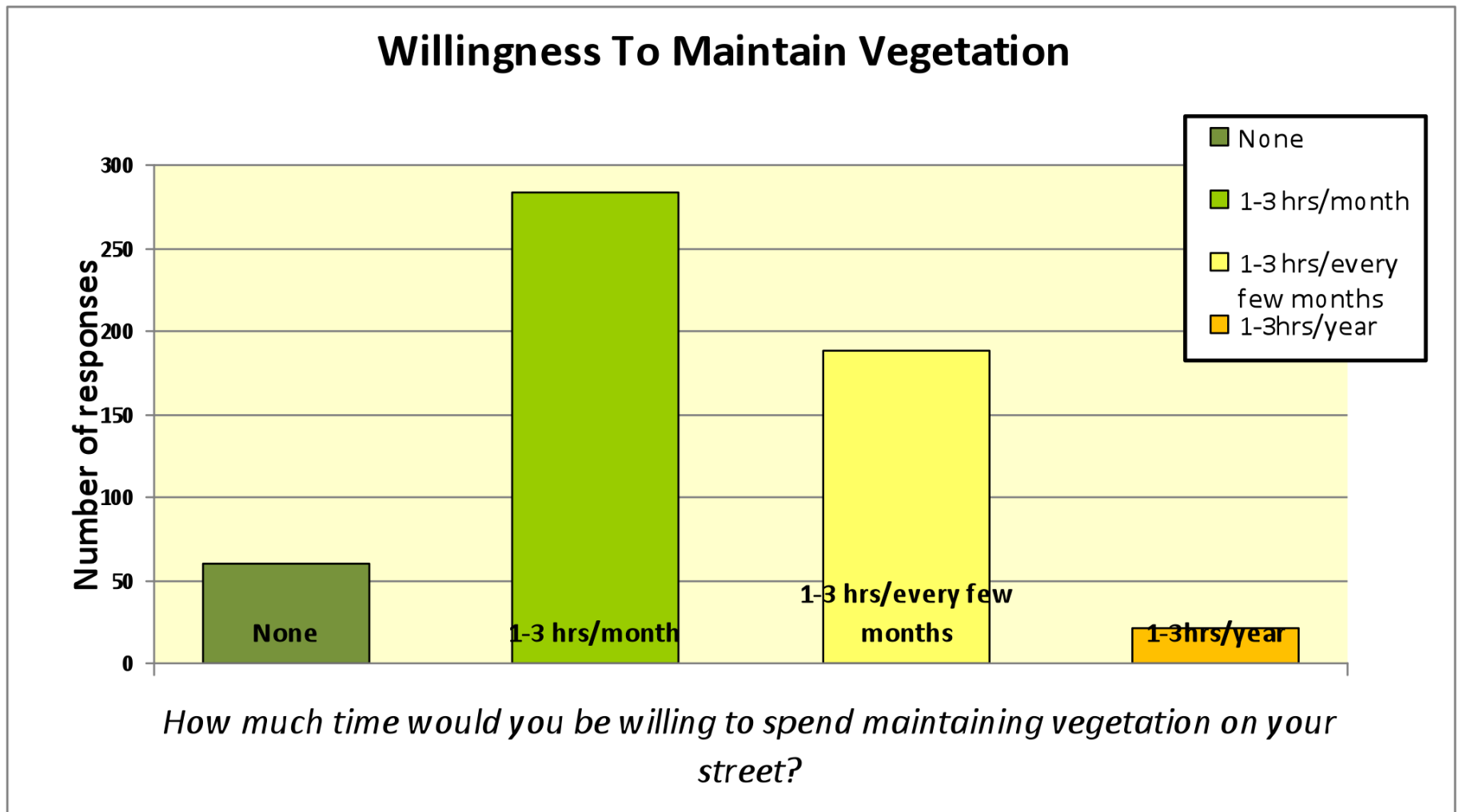
# Results: Likeliness to Implement

## Likeliness To Implement Stormwater Strategies on Individual Property



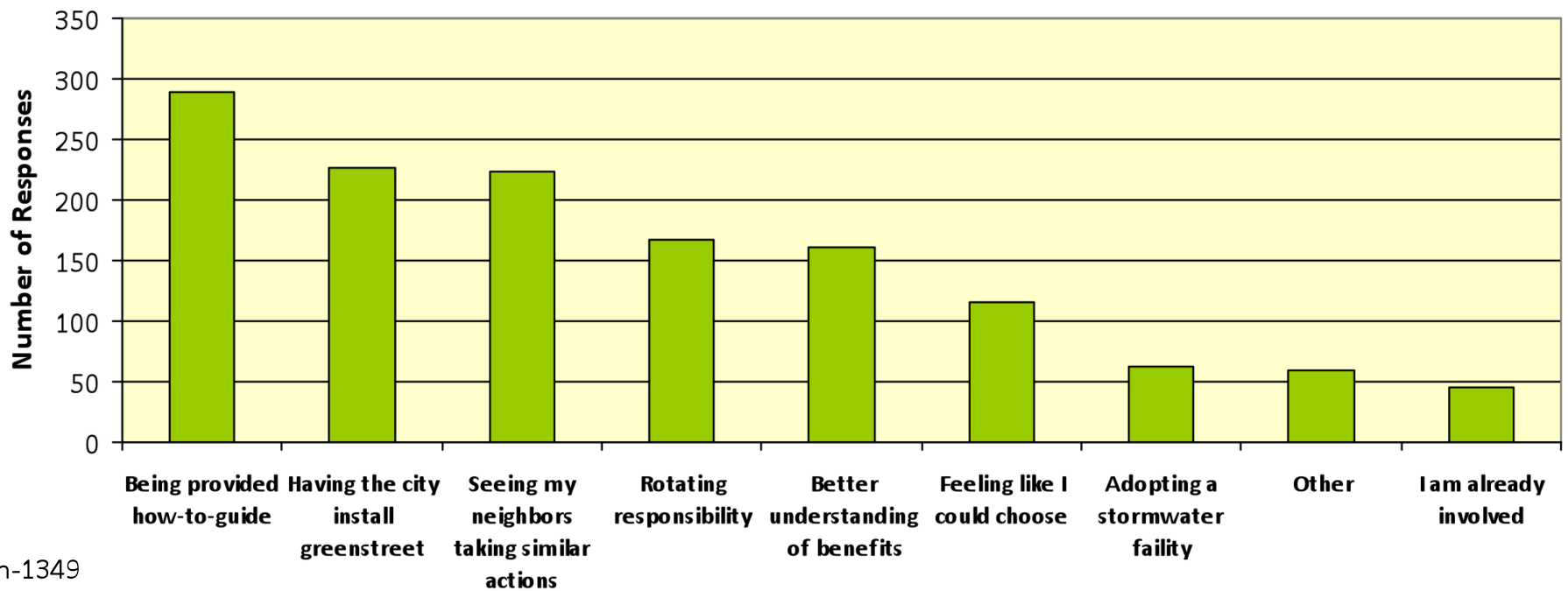


# Results: Time on Stewardship



# Results: Implementing Strategies

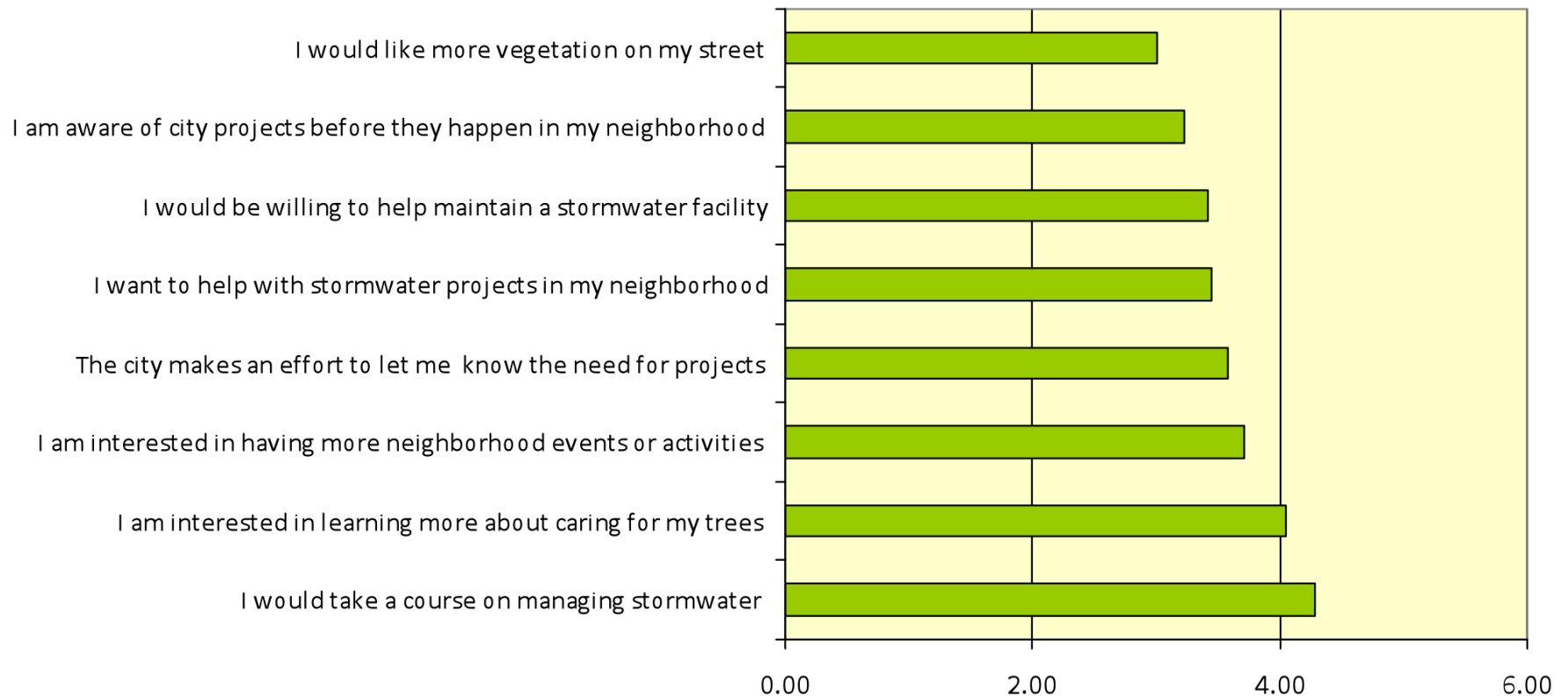
## Encouragement to Implement Stormwater Strategies





# Results: Respondent Interest

## Statements Regarding Storm Water Management Projects and Facilities



*Please tell us how you feel about the following statements... (0= Not applicable, 1=Strongly disagree and 6=Strongly agree)*

# What's next?

- Targeted outreach
  - What are your suggestions for engaging community groups in private and public stormwater management?
- Sustaining stewardship of public stormwater facilities
  - What mechanisms will increase the likelihood of residents stewarding new facilities over the long term?
    - Role of City? Role of research?



# Acknowledgements and Contact Information

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**Anne Nelson**

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**Carine Arendes, Research Assistant**

School of Urban Studies and Planning

**Cathy Cibor, Research Assistant**

School of Urban Studies and Planning

**Barry Messer, Faculty**

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## Contact Information

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# Thank you



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[www.portlandonline.com/bes/tabortoriver](http://www.portlandonline.com/bes/tabortoriver)

# Outreach Leads to Engagement

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## **Richmond Neighborhood News**

"Many of our neighbors have done their part to help the Willamette River by disconnecting their downspouts... It is time for homeowners to take the next step. [We can] by planting native plants in rain gardens around our homes..."

*Richmond Neighbor*

## **Division Street Fair**

"My wife reads your ads in the SE Examiner every month. We recently built a rain garden on our property after reading your tips and resources for stormwater management."

*SE Area Resident*

## **Atkinson Elementary School**

"We basically are going to have lots of fun harvest activities, tastings and crafts at the event---but again, would also like to add a local watershed and environmental emphasis."

*Food and Garden Educator*

# How did we get here?

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- ❑ Sustainable Stormwater Management
  - Test cases
  - Worked one-on-one with neighbors
  - Proved they worked
  - Built with grant money
  - Volunteer property owners
- ❑ Incorporated facilities into City-funded projects
- ❑ Database of interested property owners
- ❑ Outreach



# Overall outreach strategy

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- Prepare long-term evaluation methodology
- Assess baseline community knowledge & best means to engage in program
- Create opportunities for all learning styles
- Foster partnerships: residents - agencies – academia – business – community – organizations
- Involve community in long-term stewardship of project infrastructure

# Multiple Outreach Strands

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- ❑ Overall education on watershed function & stormwater management
- ❑ Outreach to properties adjacent to green stormwater facilities
- ❑ Incentives for private onsite stormwater management
- ❑ Tree planting & invasives removal funding & resources
- ❑ Classroom lessons & planting events for K-12 schools





# Indirect Outreach Strategies

- Mailings
  - Program newsletters
  - Project specific letters
  - Event invitations
- Educational Resources
  - Flyers & fact sheets
  - Educational bike tour maps
  - Info on technical & funding resources
- Public visuals
  - Art of Stormwater exhibits
  - Stormdrain markers
  - Roll-out curb extension



# Direct Outreach Strategies

- ❑ Engage all community facets
  - K-12 school events and lessons
  - Community events
  - Tree plantings
  - Bike, boat and walking tours
  - Workshops & presentations
  - Public meetings
  - Neighborhood & business association meetings
  - Property owner meetings



# Outreach with property owners

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- ❑ Education is integrated into project outreach
- ❑ Intensive communication throughout
- ❑ Participate in choosing plants



# Planting Plan

## GREEN STREET Planting Designs

Sustainable stormwater management for clean rivers - green street facilities mimic nature by collecting stormwater runoff and letting it soak into the ground, as plants and soil filter pollutants.



For a more formal, manicured neighborhood setting, the plants are tidy and compact with an emphasis on year-round flower and foliage color, full sun.



**California Gray Oak**  
Lanceolatus color  
• compact  
• full sun  
• moderate shade



**Non-toxic Bamboo**  
Bambusa nana  
• compact  
• full sun  
• moderate shade



**Little Pascal Holly**  
Ilex 'Pascal'  
• compact  
• full sun  
• moderate shade

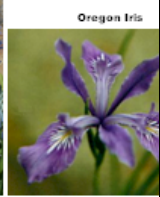


**Mighty Carpet Spirea**  
Spiraea japonica  
• compact  
• full sun  
• moderate shade

## blooming garden

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www.portlandoregon.gov/urbanstormwater

## Bulb Choices



## GREEN STREET Street trees - if NO powerlines

Sustainable stormwater management for clean rivers - green street facilities mimic nature by collecting stormwater runoff and letting it soak into the ground, as plants and soil filter pollutants.

Adding trees to landscaping is easy, attractive, and has many stormwater benefits. Trees capture and hold rainfall in leaves and branches. They slow runoff flow and can decrease stormwater volume by 25% or more for a small storm. A single mature tree with a 30 foot crown can intercept over 700 gallons of rainfall annually. Trees improve water quality by filtering rainwater and holding soils in place, and their shade reduces pavement heat. These trees have been selected to tolerate the unique green street conditions.



**Green Elizabeth White Maple**  
Acer glabrum 'White'™  
• 25' tall  
• 2" wide  
• Yellow fall color  
• Compact habit



**Japanese White Birch**  
Betula japonica  
• 25' tall  
• 2" wide  
• Yellow fall color  
• Fast growing



**Hackberry**  
Celtis occidentalis  
• 25' tall  
• 2" wide  
• Yellow fall color



**Skyline Spirella**  
Chamaecyparis 'Skyline'  
• 25' tall  
• 2" wide  
• Yellow fall color  
• Open habit and fine texture



**Black Tree**  
Rosa 'Black Tree'  
• 25' tall  
• 2" wide  
• Red, orange, yellow fall color



**Sooner**  
Quercus 'Sooner'  
• 25' tall  
• 2" wide  
• Red-orange fall color

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## TABOR to the RIVER

### Brooklyn Creek Basin Program

sewer, green stormwater and watershed enhancement improvements for clean rivers

## Planting Plan

Facility # << Facility # >>      Address << Address >>  
<< City >>      << Zip >>

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Submit your choices by November 25, 2008  
For information contact Elsie Drennon at 503-833-4004 or [elstie@portland.or.us](mailto:elstie@portland.or.us)

Planting Points Choices: Choose only one. If you will be sharing a facility with your neighbor, please make your choice together.

Gardens Blooms       Gold Garden       Grasses  
 Native Woods       Single Species       Woodland Garden

*Installed plants may vary slightly based on the availability of plant material.*

Trees: Choices: If utility lines run overhead along your curb you must choose from the power line list. If there are no utility lines running overhead along your curb you may choose from either tree list.

|   |   |
|---|---|
| <p><b>Power Line Trees</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> American Hornbeam</li> <li><input type="checkbox"/> Larch</li> <li><input type="checkbox"/> Imperial Honeylocust</li> <li><input type="checkbox"/> Goldenrain Tree</li> <li><input type="checkbox"/> Canada Red Chokeberry</li> <li><input type="checkbox"/> Buckhorn</li> </ul> | <p><b>Additional Choice, where power lines are NOT present</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Queen Elizabeth Hedge Maple</li> <li><input type="checkbox"/> Japanese Birch</li> <li><input type="checkbox"/> Hackberry</li> <li><input type="checkbox"/> Skyline Spirella</li> <li><input type="checkbox"/> Black Tree</li> <li><input type="checkbox"/> Sooner</li> </ul> |
|---|---|

Bulb Choices:  Camass       Oregon Iris       Daffodil

Sign your name please: (If you share a facility with your neighbor, both of you will need to sign.)

<< Name >> \_\_\_\_\_

<< Name >> \_\_\_\_\_

Phone: \_\_\_\_\_      Email address: \_\_\_\_\_

TGD 24-01

# At a Glance - 2 Years of Outreach ...

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- ❑ Reached **17,000 households** two times through the annual spring newsletter
- ❑ Engaged over **1,500 people** at over **45 outreach events**
- ❑ Developed and fostered **27 partnerships**
- ❑ Fulfilled **145 information requests**
- ❑ Responded to **200+ property owner/resident inquiries**
- ❑ Worked directly with **105 adjacent property owners** to place and design facilities
- ❑ Created **10 communication resources** and published **6 educational advertisements** in the community newspaper



# Partnerships

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- ❑ Work directly with more than 20 partners:
  - Non-profit organizations
  - Local businesses
  - Business & neighborhood associations
  - Universities & K-12 schools
  - Other City bureaus & bureau programs
- ❑ Mutually beneficial & cost effective
- ❑ Shared events, cross-marketing, broader audience



# K-12 partnerships

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- ❑ 1<sup>st</sup> tree planting of program by students
- ❑ Presentations to project-area schools
- ❑ Letters to parents on upcoming projects and what students are learning about them
- ❑ “Soak it Up” stormwater lessons for area schools



# University Partnerships

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- Long-term program evaluation partnership
- Research assistant cost-sharing program
- Coursework incorporates Tabor to River program as case study
- Student assistance with mapping, event implementation



# Evaluation

- Preliminary
  - Focus groups
  - Tracked conversation topics
  - Inventoried resource material distributed
  - Outreach report & maps
- Current
  - University Partnership: Survey project area residents pre-construction
- Next steps
  - Post-construction survey




**SE Portland Neighborhood Survey**


**We would like to know what you think about your neighborhood.**

A small group of Portland residents is receiving this survey, which is part of a long-term research project by Portland State University (PSU) and the City of Portland Bureau of Environmental Services.

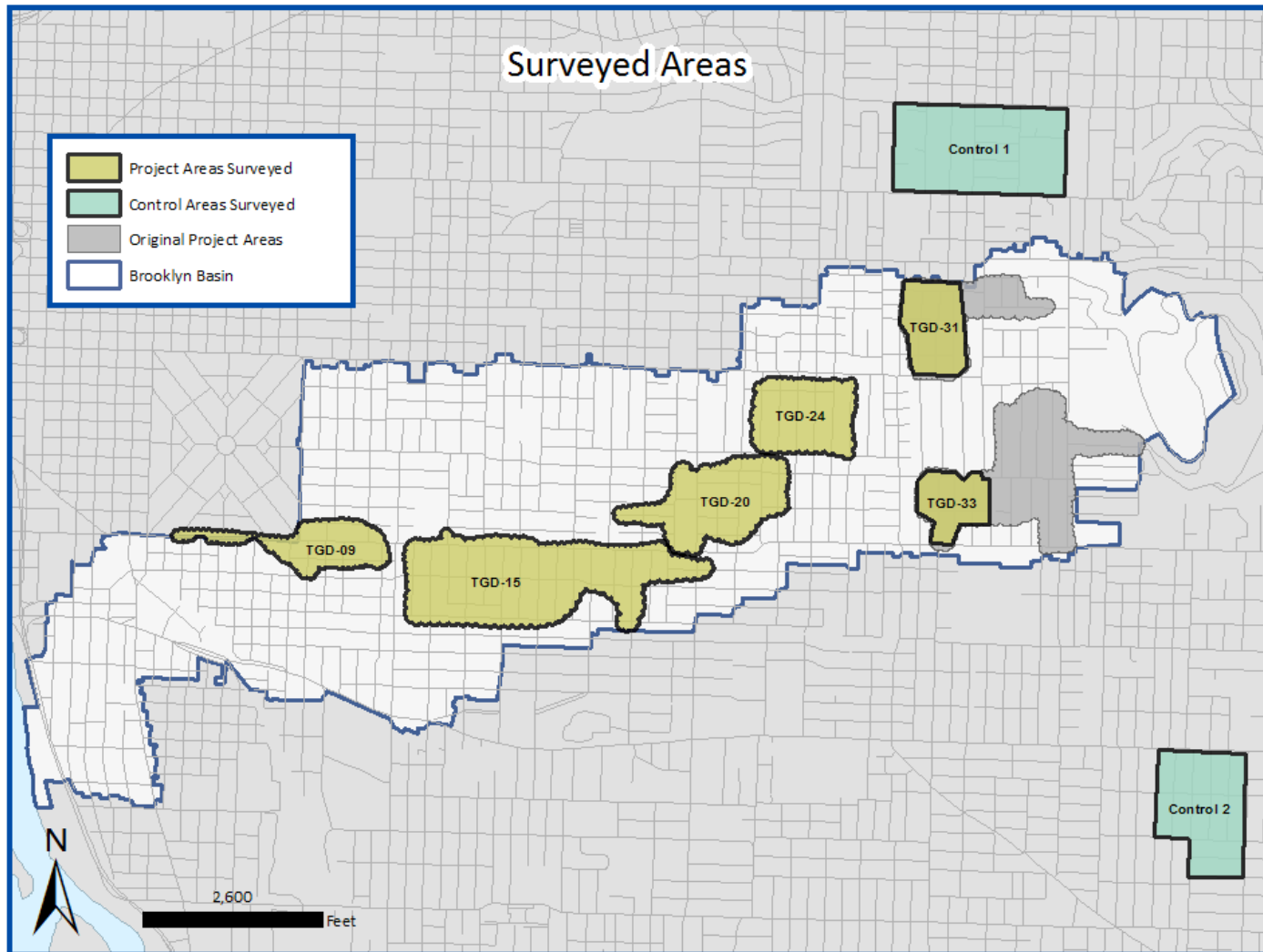
**Take the survey and be entered to win wonderful prizes.**

May 2009

 Portland State UNIVERSITY

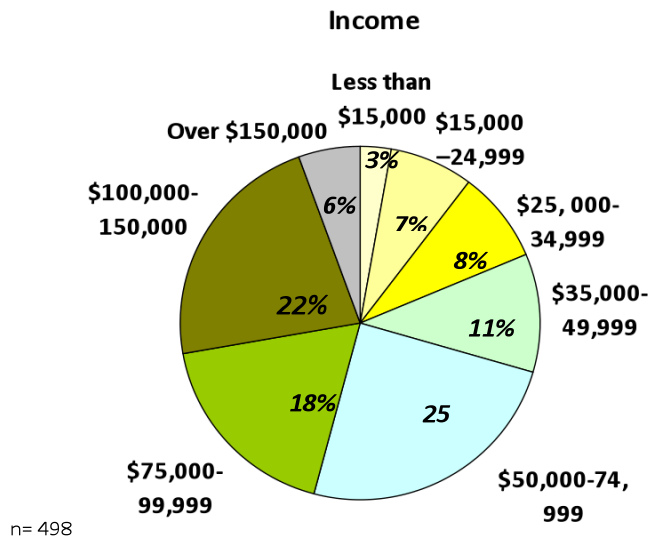
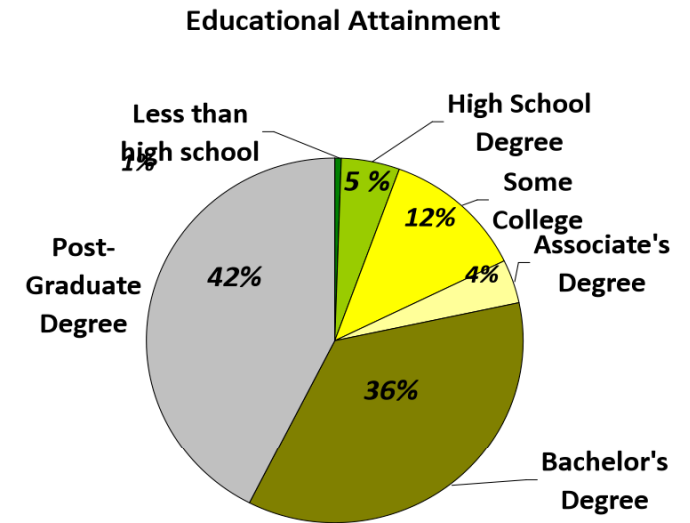
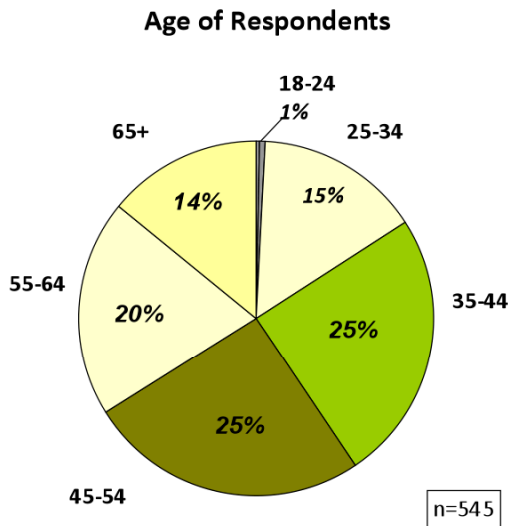
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# Project Areas Surveyed

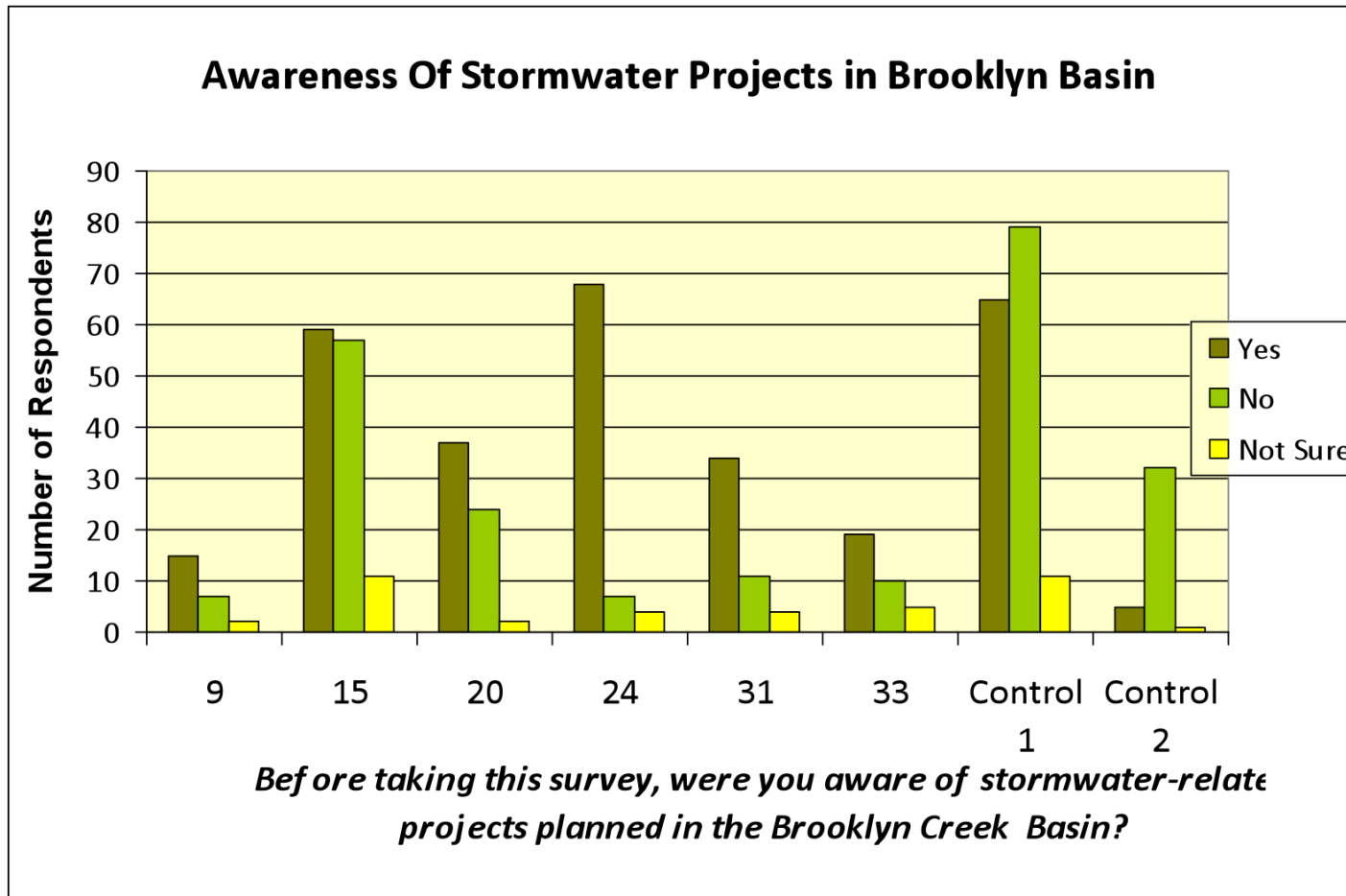


# Results: Respondent Profile

- 97.26% of respondents received survey at home address.
- 92.86% own their own home

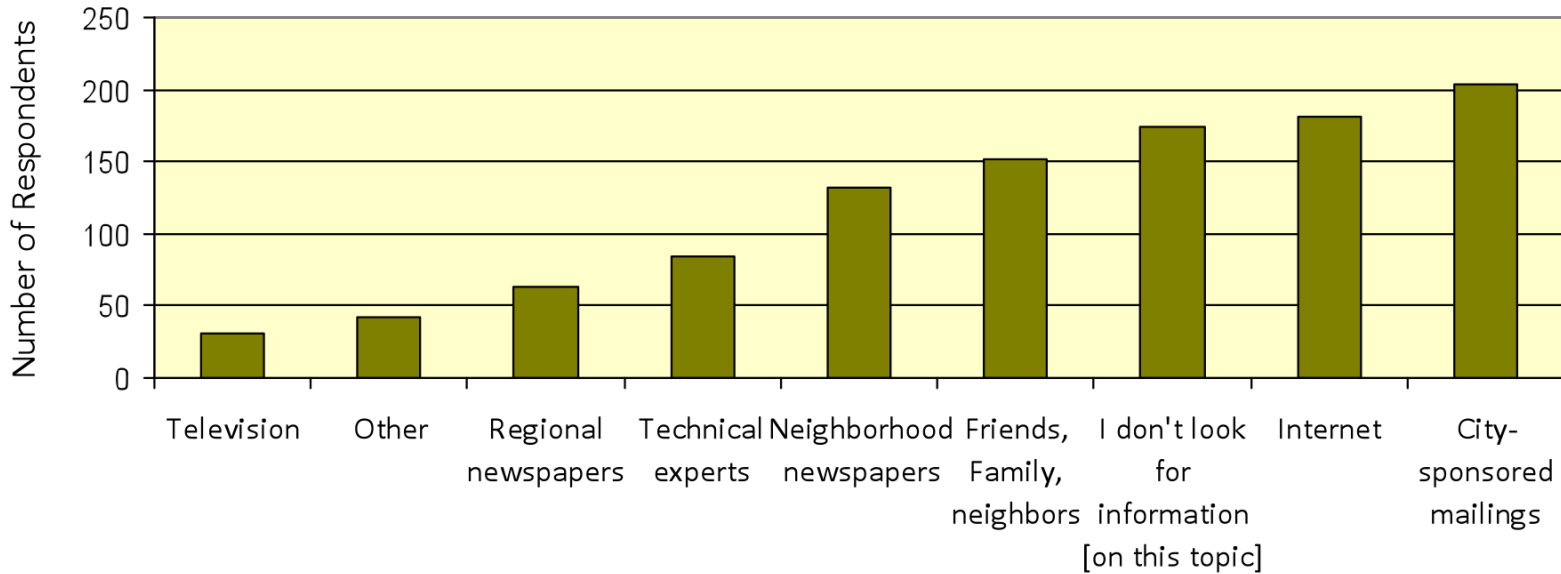


# Results: Outreach Effectiveness



# Results: Information Sources

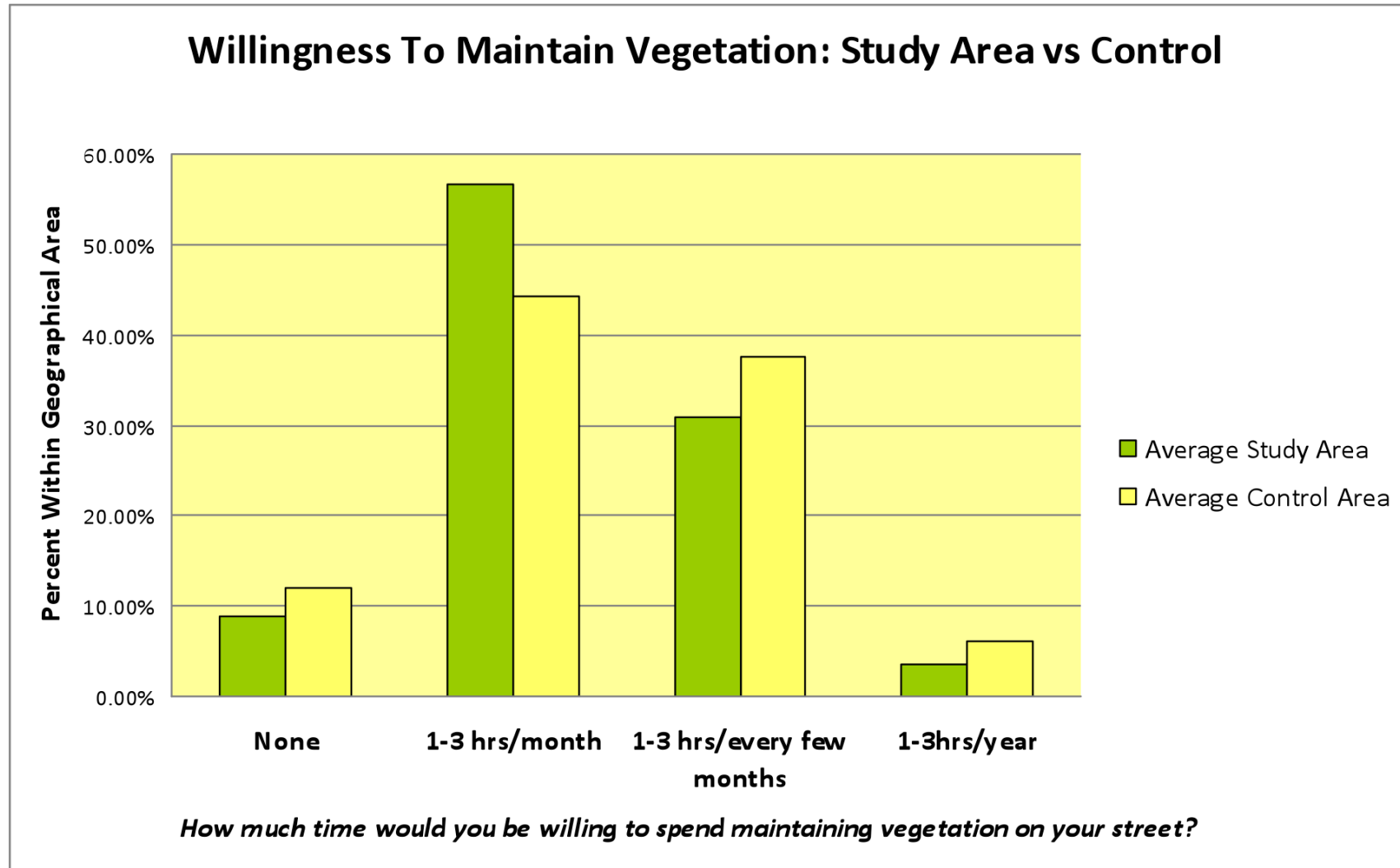
**Information Sources for Managing Stormwater on Individual Property**



***Where do you look for information about managing stormwater on your property?***

n=1063

# Results: Time on Stewardship



# Regression Analysis

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- “I would be willing to help maintain a stormwater facility.”
  
- Four comparisons:
  - Across each study area
  - **Project areas vs. control areas**
  - **2 income groups**
  - Those aware of stormwater projects vs. those not aware

# Income

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## Best Fit Linear Regression Models for Willingness to Help Maintain a Stormwater Facility

### Lower Income Households (Less than \$75,000)

| Variable              | Standardized Beta Coeff. | t-stat | Sig. |
|-----------------------|--------------------------|--------|------|
| Education             | 0.291                    | 3.830  | .000 |
| RateNeighAssociations | 0.367                    | 4.376  | .000 |
| RateParks             | -0.259                   | -3.118 | .002 |
| AGE                   | -0.220                   | -2.938 | .004 |
| Adjusted R-Squared    | .280                     |        |      |

### Higher Income Households (\$75,000 and greater)

| Variable                       | Standardized Beta Coeff. | t-stat | Sig. |
|--------------------------------|--------------------------|--------|------|
| InvolvedEnvProject             | 0.296                    | 3.697  | .000 |
| InvolvedReligiousOrg           | -0.293                   | -3.623 | .000 |
| HowOftenConversationsNeighbors | 0.213                    | 2.623  | .010 |
| RateParks                      | -0.203                   | -2.502 | .014 |
| Adjusted R-Squared             | .221                     |        |      |



# Awareness

## Best Fit Linear Regression Models for Willingness to Help Maintain a Stormwater Facility

### All Project Areas

| Variable                       | Standardized Beta Coeff. | t-stat | Sig. |
|--------------------------------|--------------------------|--------|------|
| Years                          | -.228                    | -3.131 | .002 |
| InvolvedEnvProject             | .293                     | 3.862  | .000 |
| RateNeighAssociations          | .339                     | 4.176  | .000 |
| RateParks                      | -.187                    | -2.392 | .018 |
| InvolvedKidsGrp                | .288                     | 3.656  | .000 |
| InvolvedSchoolGrp              | -.186                    | -2.347 | .020 |
| RateGreeneryTrees              | -.225                    | -2.743 | .007 |
| HowOftenNeighCommMtgs          | -.189                    | -2.511 | .013 |
| HowOftenConversationsNeighbors | .173                     | 2.415  | .017 |
| Adjusted R-Squared             | .325                     |        |      |

### Control Areas

| Variable                   | Standardized Beta Coeff. | t-stat | Sig. |
|----------------------------|--------------------------|--------|------|
| Education                  | .455                     | 4.824  | .000 |
| RateStreetCleaningServices | -.194                    | -2.063 | .042 |
| Adjusted R-Squared         | .189                     |        |      |

# Summary of Results

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- ❑ Outreach efforts are successful!
  - Knowledge of stormwater management
  - Downspout disconnect programs
  
- ❑ Extensive variation in perceptions and neighborhood involvement even within one area of the city
  
- ❑ Information alone may not be enough
  - Information requires a receptive audience
  
- ❑ Familiarity with neighbors, involvement in community projects (whether environmental or not) is tied to interest in managing stormwater facilities
  
- ❑ Opportunities to engage communities first, and environmental issues second

# Role of PSU – BES Partnership

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- ❑ Students have had opportunity to work with ‘real world’ challenges of environmental management
- ❑ Opportunity for faculty to know that their work will be considered by decision makers
- ❑ Evaluation can help to identify areas for expanding and refining outreach and education efforts
- ❑ Offers opportunity for conducting community-based participatory research
- ❑ Builds on a ‘problem-based’ approach to research and education

# Lessons Learned

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- ❑ Education is a key component of green stormwater infrastructure projects
- ❑ Know your audience – evaluation
- ❑ Address all styles of learning with varied outreach methods – bike tours, newsletters, peer-to-peer
- ❑ Partner with all components of community and help to connect them to each other
- ❑ Have fun



# Recommendations

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- ❑ Develop & foster partnerships
  - Neighborhoods
  - Universities
  - Businesses & Organizations
- ❑ Provide green stormwater education long before construction outreach
  - Pay for it upfront or later
- ❑ Offer technical assistance
- ❑ Outreach through partner venues
- ❑ Focus on plants & gardening to gain community interest
- ❑ Use pilot projects to highlight function & appeal

