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Colorado Water Conservation Board

Water Plan Grant Application

Instructions

To receive funding for a Water Plan Grant, applicant must demonstrate how the project, activity, or process (collectively referred to as "project") funded by the CWCB will help meet the measurable objectives and critical actions in the Water Plan. Grant guidelines are available on the CWCB website.

If you have questions, please contact CWCB at (303) 866-3441 or email the following staff to assist you with applications in the following areas:

Supply and Demand Gap Projects: Rebecca.Mitchell@state.co.us

Water Storage Projects: Anna.Mauss@state.co.us

Conservation, Land Use Planning: Kevin.Reidy@state.co.us

Education & Innovation Activities: Ben.Wade@state.co.us

Agricultural Projects: Gregory.Johnson@state.co.us

Environmental & Recreation Projects: Linda.Bassi@state.co.us

Applicants interested in submitting an 'Intent to Apply' in the future are encouraged to check here ☐ and fill in all sections with the best information available at the time. Exhibits excluded.

This "Intent to Apply" will help CWCB prioritize Projects that are not ready for fully completed Water Plan Grant Application due to the initial timeframe and deadlines required.

Water Project Summary

Name of Applicant	The Greenway Foundation
Name of Water Project	Clean River Design Challenge

CWP Grant Request Amount	$24,500
Other Funding Sources Anonymous Family Foundation	$16,000.00
Other Funding Sources Riverfront Park Community Foundation	$5,000.00
Applicant Funding Contribution	$3,500.00
Total Project Cost	$49,000.00

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Applicant & Grantee Information	
Name of Grantee(s)	The Greenway Foundation
Mailing Address	1855 S. Pearl St., Suite 40, Denver, CO 80210
FEIN	51-0193575
Organization Contact	Devon Buckels
Position/Title	The Water Connection Director
Email	devon@thewaterconnection.org
Phone	720-837-3289
Grant Management Contact	Rachel Gillette
Position/Title	Education and Grants Director
Email	rachel@greenwayfoundation.rog
Phone	303-743-9720 ext. 920
Name of Applicant (if different than grantee)	
Mailing Address	
Position/Title	
Email	
Phone	

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Description of Grantee/Applicant
Provide a brief description of the grantee's organization (100 words or less).
Since 1974, The Greenway Foundation (TGF) has been a major force behind the transformation of Denver's South Platte River and its tributaries from neglected and polluted eyesores into thriving ecological and recreational resources. By partnering with numerous public, private and philanthropic organizations, TGF has helped substantially improve water quality and recreational opportunities along these urban waterways and has facilitated the creation of 20 riverside parks and a nationally-recognized urban trail system, collectively known as the South Platte River Greenway. The organization recently renewed its focus on water resources through the addition of The Water Connection, TGF's policy and water resource arm.

Type of Eligible Entity (check one)	
	Public (Government): Municipalities, enterprises, counties, and State of Colorado agencies. Federal agencies are encouraged to work with local entities. Federal agencies are eligible, but only if they can make a compelling case for why a local partner cannot be the grant recipient.
	Public (Districts): Authorities, Title 32/special districts (conservancy, conservation, and irrigation districts), and water activity enterprises.
	Private Incorporated: Mutual ditch companies, homeowners associations, corporations.
	Private Individuals, Partnerships, and Sole Proprietors: Private parties may be eligible for funding.
x	**Non-governmental organizations (NGO):** Organization that is not part of the government and is non-profit in nature.
	Covered Entity: As defined in Section 37-60-126 Colorado Revised Statutes.

Type of Water Project (check all that apply)	
	Study
	Construction
	Identified Process or Program
x	Other

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Category of Water Project (check all that apply)		
	Supply and Demand Gap Projects - Multi-beneficial projects and those projects identified in basin implementation plans to address the water supply and demand gap. (Applicable Exhibit A Task(s) _____)	
	Water Storage Projects - Projects that facilitate the development of additional storage, artificial recharge into aquifers, and dredging existing reservoirs to restore the reservoirs' full decreed storage capacity. (Applicable Exhibit A Task(s) _____)	
	Conservation and Land Use Planning Projects - Activities and projects that implement long-term strategies for conservation, land use, and drought planning. (Applicable Exhibit A Task(s) _____)	
X	Engagement & Innovation Projects - Activities and projects that support water education, outreach, and innovation efforts. Please fill out the Supplemental Application available on the website. (Applicable Exhibit A Task(s) CRDC & Implementation of Winning Design)	
	Agricultural Projects - Projects that provide technical assistance and improve agricultural efficiency. (Applicable Exhibit A Task(s) _____)	
	Environmental & Recreation Projects – Projects that promote watershed health, environmental health, and recreation. (Applicable Exhibit A Task(s) _____)	
	Other	Explain:

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Location of Water Project	
Please provide the general county and coordinates of the proposed project below in **decimal degrees**. The Applicant shall also provide, in Exhibit C, a site map if applicable.	
County/Counties	Denver Metropolitan Area
Latitude	NA
Longitude	NA

Water Project Overview
Please provide a summary of the proposed water project (200 words or less). Include a description of the project and what the CWP Grant funding will be used for specifically (e.g., studies, permitting process, construction). Provide a description of the water supply source to be utilized or the water body affected by the project, where applicable. Include details such as acres under irrigation, types of crops irrigated, number of residential and commercial taps, length of ditch improvements, length of pipe installed, and area of habitat improvements, where applicable. If this project addresses multiple purposes or spans multiple basins, please explain. The Applicant shall also provide, in Exhibit A, a detailed Statement of Work, Budget, Other Funding Sources/Amounts and Schedule.
TGF is seeking funding for its Clean River Design Challenge (CRDC), which aims to develop innovative solutions for the problem of trash in Denver's urban waterways. This year, the CRDC engaging approximately forty students from three area universities: Metro State University, Colorado School of Mines, and University of Colorado Denver. Similar participation is anticipated in 2018-2019. The CRDC has two rounds, each culminating with presentations to a panel of expert judges. Round one produces designs, and in the second round, scale models of the devices are built and tested on a custom made flume. To aid in the design process, TGF connects the teams with professionals from a variety of professional disciplines. TGF will also pursue the implementation of a winning trash removal device if it shows significant potential for real-world success. Through connections with local engineers and governmental departments, prototypes will be constructed and tested in the waterway, with the goal of permanent installation. TGF is requesting $28,975 in support of this project in 2018-2019. $21,350 will cover costs to run the 2018-2019 CRDC. $7,625 will cover the staff and engineering time to determine the feasibility of implementing a winning design.

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Measurable Results		
To catalog measurable results achieved with the CWP Grant funds, please provide any of the following values as applicable:		
	New Storage Created (acre-feet)	
	New Annual Water Supplies Developed or Conserved (acre-feet), Consumptive or Nonconsumptive	
	Existing Storage Preserved or Enhanced (acre-feet)	
	Length of Stream Restored or Protected (linear feet)	
	Efficiency Savings (indicate acre-feet/year OR dollars/year)	
	Area of Restored or Preserved Habitat (acres)	
	Quantity of Water Shared through Alternative Transfer Mechanisms	
	Number of Coloradans Impacted by Incorporating Water-Saving Actions into Land Use Planning	
x	Other	Explain: - 6-10 student design teams participating in the 2018-2019 CRDC - 6-10 designs and scale models for in-stream trash removal devices developed through the 2018-2019 CRDC - A feasibility study and cost estimates for a working prototype of a device designed through the 2018-2019 CRDC. - Results from pre- and post-competition surveys taken by participating students measuring awareness and understanding of issue of trash in Denver area waterways - Information on trash in Denver area waterways distributed to 8,000+ Denver area residents through TGF community outreach efforts

Water Project Justification
Provide a description of how this water project supports the goals of Colorado's Water Plan, the most recent Statewide Water Supply Initiative, and the applicable Roundtable Basin Implementation Plan and Education Action Plan. The Applicant is required to reference specific needs, goals, themes, or Identified Projects and Processes (IPPs), including citations (e.g. document, chapters, sections, or page numbers). The proposed water project shall be evaluated based upon how well the proposal conforms to Colorado's Water Plan Framework for State of Colorado Support for a Water Project (CWP, Section 9.4, pp. 9-43 to 9-44;)

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Water Project Justification

This project addresses key themes in the Colorado Water Plan and South Platte / Metro Basin Implementation Plans, including: maximize water resources, protection of watersheds, enhance water quality, protection of recreational and environmental assets, and promote education and innovation. These plans also acknowledge the connection between water supply and water quality. The CRDC supports the State in developing innovative strategies to protect the urban water supply from trash and its many associated pollutants.

A primary goal of the Colorado Water Plan is to address the State's supply and demand challenges while protecting the health of rivers, streams and watersheds. This project supports the State in achieving this goal by facilitating the removal of a visible and pervasive pollutant from the watershed's urban waterways. Watershed health affects water supply – the gap will only grow if our available water is ruined with pollutants.

The CRDC has two key goals: Raising awareness of the importance of protecting our valuable water resources and awareness of the urban waterway trash problem in particular through education and outreach, and 2) facilitating innovation that can lead to solutions to a complex, pervasive water quality problem.

By engaging students from a variety of backgrounds and disciplines in three Universities, TGF is reaching budding professionals who may not have been exposed to water resources as a discipline, and who may not be planning to work in the water field. In addition to reaching students, the CRDC reaches thousands of people through TGF's social media and email newsletter distribution, as well as media coverage of the competition's final demonstration and judging day.

Relevant Colorado Water Plan Sections are listed below:
Education, Outreach and Innovation (bold added)
Colorado's Water Plan sets a **measurable objective to significantly improve the level of public awareness and engagement regarding water issues statewide by 2020**, as determined by water awareness surveys. Colorado's Water Plan also sets a measurable objective to engage Coloradans statewide on at least five key water challenges (identified by CWCB) that should be addressed by 2030. Colorado's Water Plan will expand outreach and education efforts that engage the public to promote well-informed community discourse and decision making regarding balanced water solutions. **This work will be collaborative and include state, local, and federal partners. As one component of this overall strategy, the CWCB will work with Colorado's innovation community, education and outreach experts, research institutions**, and the Governor's Colorado Innovation Network (COIN) **to address Colorado's water challenges with innovation and "outside-the-box" creativity.**
(Colorado Water Plan Executive Summary p. 15)

Watershed Health, Environment and Recreation:
Colorado's Water Plan sets a measurable objective to cover 80 percent of the locally prioritized lists of rivers with stream management plans, and 80 percent of critical watersheds with watershed protection plans, all by 2030. The environment and recreation are too critical to Colorado's brand not to have robust objectives; a strong Colorado environment is critical to the economy and way of life. In addition, the WQCC identified a strategic water quality objective to have fully supported classified uses—which may include drinking water, agriculture, recreation, aquatic life, and wetlands—of all of Colorado's waters by 2050.
(Colorado Water Plan Executive Summary p. 16)

The CRDC also supports the following sections from the South Platte Basin Implementation Plan:
- Appendix E – Water Quality, p. 16, 3.6 Cherry Creek Basin

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Water Project Justification

The Cherry Creek Basin Water Quality Authority (CCBWQA) goals include achieving and maintaining a chlorophyll-a standard (18 ug/L) for Cherry Creek Reservoir, reducing sediment loads from the watershed, and maintaining and enhancing the overall diversity of habitat in the watershed.

The CRDC supports this goal through the development of new ways to remove trash from urban waterways, which enhances the habitat of diverse species.

Executive Summary, p.8, S.3.7 Water Quality Issues
A major challenge in the South Platte Basin relates to adequacy of the water quality for domestic and municipal water uses. … **Major technological innovations are needed** for delivery, treatment, and disposal of the waste streams from currently available complex water treatment systems, which results in significant cost to customers, impacts to the environment, and uncertain regulatory permitting processes. **Relying exclusively on South Platte River supplies in the face of decreasing water quality will be a major challenge in the South Platte Basin**."

The CRDC addresses the challenges highlighted in this section by providing a relatively low cost method for the development of innovative solutions to a water quality issue in the South Platte River.

Appendix E – Water Quality
From a water quality perspective in the South Platte Basin, the following examples demonstrate the diversity of concerns relative to current and future Statewide planning:
"5. The threat of emerging contaminants (including pharmaceuticals and personal care products) being only partially removed by current state-of-the-art wastewater technologies and potentially being introduced into water bodies downstream of wastewater treatment facility discharges and septic systems..." P.2

Waterway trash can contribute to the amount of emerging contaminants found in Denver's urban waterways. The installation of a trash removal device would reduce the amount of such contaminants.

- SWSI Executive Summary
5. Support meeting Colorado's non-consumptive water needs by working with Colorado's water stakeholders to help.
Protect or enhance environmental and recreational values that benefit local and statewide economies. p. 41

The CRDC brings together stakeholders from the business, academic, water management, environmental health, and recreation fields to address the challenges created by in-stream trash.

Related Studies

Please provide a list of any related studies, including if the water project is complementary to or assists in the implementation of other CWCB programs.

A number of studies have been conducted in recent years analyzing both the type and quantity of trash in Denver's urban waterways, as well as public perception of water quality issues in the Metro area:

- 2013 Nonpoint Source Trash Characterization Inventory, Segment 14 of the South Platte River, Denver, Colorado

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Related Studies

- Market Perceptions 2012 Survey of Denver Metropolitan Residents' Attitudes and Behaviors Surrounding Pollution
- Denver Environmental Health 2011 Survey of Confluence Park Users' Knowledge and Attitudes toward Water Quality

Please see Exhibit C for reports related to each of these studies.

The engineering firm Merrick & Company also reviewed the feasibility of installing in-stream trash removal devices in the South Platte River or Cherry Creek. The results of their analysis can be found in the 2016 memorandum also attached in Exhibit C.

The CRDC competition also advances innovative solutions to the issue of trash in Denver's urban waterways "pitched" at a recent CWCB TAP-IN event.

Note: We have not provided a map because there is not a specific location affiliated with this project.

Previous CWCB Grants, Loans or Other Funding

List all previous or current CWCB grants (including WSRF) awarded to both the Applicant and Grantee. Include: 1) Applicant name; 2) Water activity name; 3) Approving RT(s); 4) CWCB board meeting date; 5) Contract number or purchase order; 6) Percentage of other CWCB funding for your overall project.

The following is a list of previous CWCB funding awarded to The Greenway Foundation:
- South Platte River Recreation and Habitat Feasibility Study; Metro Basin RT and Statewide funds; Approved at 9/17/2008 meeting, Contract # C150442, $150,000 total approved amount
- South Platte River Recreation and Habitat Improvement Preliminary Design, Metro Basin RT and Statewide funds. Approved at 9/13/2011 meeting, Contract # C150493, $250,000 total approved amount
- Denver South Platte River Implementation Project, South Platte Basin & Metro RT, Approved at 9/28/2012 meeting, Contract # CTGG1 2015-392, $500,000 total amount approved, $300,000 from Statewide account
- Grant-Frontier Park West Bank Riparian Floodplain Design and Construction Project, Metro Basin RT, Approved at 9/24/2013 meeting, Contract # CTGG1 2015-1721, $350,000 total amount approved, $250,000 from Statewide account
- 8th Ave. to 20th St. In-River Recreation and Environmental Improvements and Floodplain Mitigation, Metro Basin RT and Statewide funds. Approved at 9/12/2014 meeting, Contract # CTGG1 2015, $450,000 total amount approved

Taxpayer Bill of Rights

The Taxpayer Bill of Rights (TABOR) may limit the amount of grant money an entity can receive. Please describe any relevant TABOR issues that may affect your application.

There are no known TABOR issues that would affect this application.

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Submittal Checklist	
x	I acknowledge the Grantee will be able to contract with CWCB using the Standard Contract.
Exhibit A	
	Statement of Work(1)
	Budget & Schedule(1) *(Spreadsheet)*
	Letters of Matching and/or Pending 3rd Party Commitments(1)
Exhibit C	
	Map(1) Note: We have not provided a map because there is not a specific location affiliated with this project.
	Photos/Drawings/Reports
	Letters of Support (Support letter from Basin Roundtable encouraged)
	Certificate of Insurance (General, Auto, & Workers' Comp.)
	Certificate of Good Standing with Colorado Secretary of State(2)
	W-9(2)
	Independent Contractor Form(2) (If applicant is individual, not company/organization)
Engagement & Innovation Grant Applicants ONLY	
	Engagement & Innovation Supplemental Application(1)

(1) Required with application.
(2) Required for contracting. While optional at the time of this application, submission can expedite contracting upon CWCB Board approval.

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Colorado Water Conservation Board
Water Plan Grant - Exhibit A

Statement Of Work	
Date:	**1/31/18**
Name of Applicant:	**The Greenway Foundation (TGF)**
Name of Water Project:	**Clean River Design Challenge**
Funding Source:	**Engagement & Innovation Activities**

Water Project Overview: Please provide a summary of the proposed water project (200 words or less). The same summary can be used from Page 5 of the CWP Grant Application.

TGF is seeking funding for its Clean River Design Challenge (CRDC), which develops innovative solutions to address trash in Denver's urban waterways. This two-part competition invites university students to design trash removal devices for placement in a Denver waterway. The 2017-2018 competition is focused on Cherry Creek, and has nine student teams participating from three area universities: Metro State University, School of Mines, and University of Colorado Denver. Similar participation is anticipated in the following school year.

The CRDC is divided into two rounds, each culminating with design presentations to a panel of expert judges. In the first round, students create detailed plans for their trash removal device, and in the second round, scale models of the devices are built and tested on a flume To aid in the design process, TGF connects the teams with professionals from engineering, public health, environmental, and regulatory agencies that are available for consultation throughout the competition.

TGF will also pursue the implementation of any trash removal device designed through this competition that shows significant potential for real-world success. Through connections with local engineers and governmental departments, prototypes will be constructed and tested in the waterway, with the goal of permanent installation.

Objectives: List the objectives of the project.

- At least 6 teams from local universities will participate in the 2018-2019 Clean River Design Challenge.
- At least 6 in-stream trash removal devices will be designed through the 2018-2019 Clean River Design Challenge.
- At least 6 professionals from local engineering, construction, environmental, or regulatory agencies will participate in the 2018-2019 Clean River Design Challenge as consultants and/or judges.
- At least 8,000 Denver metro residents will receive information on the 2018-2019 Clean River Design Challenge and the issue it addresses.
- TGF will pursue the implementation of the winning trash removal device in a Denver urban waterway.

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Tasks
Provide a detailed description of each project task using the following format:
Task 1 – Clean River Design Challenge
Description of Task:
- The Greenway Foundation will host the 3rd Clean River Design Challenge (CRDC) over the course of the 2018-2019 school year. Student design teams will be tasked with developing in-stream trash removal devices for a Denver urban waterway. Two rounds of judging will be held and winning design teams will receive cash prizes, promotion in the community, and the possibility of having a prototype of their design installed in a Denver waterway.
Method/Procedure:
- In September of 2018, TGF will work with Denver area universities to recruit at least 6 student design teams to participate in the 2018-2019 CRDC. - TGF will provide all student teams with detailed criteria for their designs and the competition itself. - All participating students will take a pre-test assessing their awareness and understanding of the issue of trash in Denver waterways - TGF will also recruit at least 6 professionals from engineering, construction, environmental, regulatory, or other relevant fields to act as consultants for the student design teams and serve on the judging panel - In December of 2018, TGF will host Round 1 judging of the student designs. Each design team will present detailed plans of their designs to the panel of judges and winning teams will be selected. All teams that complete Round 1 of the competition will be invited to participate in Round 2. - TGF will provide each design team with funding to construct a scale model of their device to be tested on a flume - TGF will include information on the CRDC and Round 1 winning designs to the community through its email newsletter. - In April of 2019, Round 2 judging will be held. Each team will test scale models of their trash removal devices and answer questions from the judging panel. Winning devices will be selected based upon their ability to collect and remove trash, durability, feasibility for real-world application, and aesthetics of the design. - In April of 2019, all participating students will take a post-test assessing their awareness and understanding of the issue of trash in Denver waterways - TGF will present cash prizes to the winning design teams and invite them to its 2019 Reception on the River to network with community leaders. - TGF will include information on the winning designs from Round 2 of the CRDC to the community through its email newsletter and provide a press release to local media outlets.
Grantee Deliverable: Describe the deliverable the grantee expects from this task
- At least 6 innovative designs for in-stream trash removal devices - Survey results measuring the change in participating students' awareness and understanding of the issue of trash in Denver waterways over the course of the CRDC. - At least one design for a trash removal device for which implementation can be pursued
CWCB Deliverable: Describe the deliverable the grantee will provide CWCB documenting the completion of this task
- A list of student teams and professionals participating in the 2018-2019 CRDC - Invitations to attend Round 1 and Round 2 judging of student designs - Written and visual documentation of Round 1 and Round 2 judging - Results from the pre- and post-surveys taken by students participating in the 2018-2019 CRDC - Media releases, emails, social media posts, and a list of media contacted will be provided. Any media articles, interviews or coverage will also be sent to the CWCB.

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Tasks
Provide a detailed description of each task using the following format:
Task 2 – Implementation of a Winning Design
Description of Task:
- TGF will pursue the implementation of a winning design from the CRDC in a Denver waterway. This may include additional feasibility studies, cost estimates for prototype construction, fundraising, and coordination with Denver Environmental Health and Urban Drainage and Flood Control District. If installation of the prototype is determined feasible and necessary funding and approvals are obtained, the device will be installed in a Denver waterway for further testing.
Method/Procedure:
- TGF will work with a local engineering firm to further study the implementation of a trash removal device resulting from the CRDC. - If feasible, TGF will work with a local firm to obtain full-scale designs and cost estimates for the construction of the trash removal device prototype - If the results of the feasibility studies and cost-estimates are determined to be reasonable, TGF will pursue funding for the construction of the prototype and obtain necessary permission from the City to install the device in a Denver waterway. - Finally, if installed, further study of the prototype device will occur, including measuring the type and amount of trash removed from the waterway, durability of the device, and amount of maintenance required.
Grantee Deliverable: Describe the deliverable the grantee expects from this task
- An overview of the feasibility of installing a winning CRDC trash removal device with input from a local engineering firm - If a design appears feasible, full-scale designs and cost estimates needed for implementation of a trash removal device that results from the CRDC. - Construction of a full-scale prototype of a winning CRDC trash removal device, contingent upon the results of the feasibility studies and cost estimate.
CWCB Deliverable: Describe the deliverable the grantee will provide CWCB documenting the completion of this task
- Results from any feasibility studies of winning CRDC trash removal devices - Cost estimates for construction and installation of the trash removal device prototype - Pictures of the trash removal device prototype, if constructed

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Budget and Schedule

This Statement of Work shall be accompanied by a combined Budget and Schedule that reflects the Tasks identified in the Statement of Work and shall be submitted to CWCB in excel format.

Reporting Requirements

Progress Reports: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of issuance of a purchase order, or the execution of a contract. The progress report shall describe the status of the tasks identified in the statement of work, including a description of any major issues that have occurred and any corrective action taken to address these issues. The CWCB may withhold reimbursement until satisfactory progress reports have been submitted.

Final Report: At completion of the project, the applicant shall provide the CWCB a Final Report on the applicant's letterhead that:

- Summarizes the project and how the project was completed.
- Describes any obstacles encountered, and how these obstacles were overcome.
- Confirms that all matching commitments have been fulfilled.
- Includes photographs, and engineering reports/designs.

The CWCB will withhold disbursement the last 10% of the budget until the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Water Plan Grant - Exhibit B
Budget and Schedule

Date: February 1, 2018

Name of Applicant: The Water Connection / The Greenway Foundation

Name of Water Project: Clean River Design Challenge

Task No.	Task Description	Start Date	End Date	Grant Funding Request	Match Funding	Total
1	Clean River Design Competition - time and expenses	Aug-18	May-19	16,875	16,875	$33,750
2	Implementation of 2019 winning design	May 2019	December 2020	$7,625	$7,625	$15,250
			Total	$24,500	$24,500	$49,000

Colorado Water Conservation Board
Water Plan Grant Application

Water Project Summary	
Name of Applicant	The Greenway Foundation
Name of Water Project	Clean River Design Challenge

EXHIBIT C

Clean Water Act Sec. 319
Nonpoint Source Trash Characterization Report
Segment 14 of the South Platte River, Denver, Colorado

Introduction

In 2011, The Greenway Foundation's Protect our Urban River Environment (PURE) team was awarded a Clean Water Act Sec. 319 grant by the State of Colorado's Water Quality Control Division to conduct a trash reduction campaign along the South Platte River as it passes through the City and County of Denver (CCD). Overall goals of the trash reduction campaign are described in the program's Project Implementation Plan (The Greenway Foundation, 2012a) and include development of a community-based social marketing (CBSM) program to change behaviors that lead to trash entering the river. The grant provided funding for data collection necessary to develop the CBSM and for pilot testing of CBSM education and outreach efforts. Data collection activities included conducting trash inventories along selected sections of the river and collecting information on perceptions of water quality and pollution through surveys and focus groups. This report summarizes the results of the trash inventories and will help inform development of the education and outreach efforts.

Trash Inventory Objectives and Methodology

The trash inventory was designed to investigate the occurrence, characteristics, and magnitude of trash in Segment 14 of the South Platte River in CCD. Results of the inventory were also intended to establish a baseline for the amount and types of trash present in the river. The baseline will be used to evaluate the success of CBSM education and outreach programs. The methodology for collection and characterization of trash is described in detail in the Sampling and Analysis Project Plan (SAPP) for the project (The Greenway Foundation, 2012b).

The project used volunteers to collect and inventory trash in three areas along the river (see Figure 1):

- Between the confluence of the South Platte River and Cherry Creek and City of Cuernavaca Park (Area A);
- Along the South Platte River adjacent to AquaGolf Pond (Upper Area B)and along the South Platte River adjacent to Johnson-Habitat Park (Lower Area B), and;
- Between the confluence of the South Platte River and Bear Creek and Hampden Ave (Area C).

Inventories were conducted on April 21, July 21, and September 29, 2012.

In general, inventory efforts followed the requirements of the SAPP, however; based on experience gained by the project team during the inventories, a few changes were made to the inventory areas and data classification forms. Changes to the inventory areas were the most significant changes to the effort. Two of the areas (Areas A and C) were shortened after the first inventory event. It was

Funding for the Greenway PURE Trash Reduction Campaign study comes from an Environmental Protection Agency Clean Water Act Sec. 319 grant administered by the Colorado Department of Public Health and Environment, Water Quality Control Division, Nonpoint Source Program and from the City and County of Denver Department of Environmental Health and Department of Parks and Recreation in addition to in-kind contributions from The Greenway Foundation, Urban Drainage and Flood Control District, Metro Wastewater Reclamation District, Confluence Kayaks, City and County of Denver Division of Wastewater Management, Colorado Whitewater Association, Metropolitan State University of Denver and a large array of non-profit organizations, private sector companies and volunteers. In addition, the following organizations provided support for the overall PURE (Protect our Urban River Environment) initiative: CH2M Hill, Comcast, Coca Cola, City of Englewood, City of Sheridan and the Kinney Brothers Foundation.

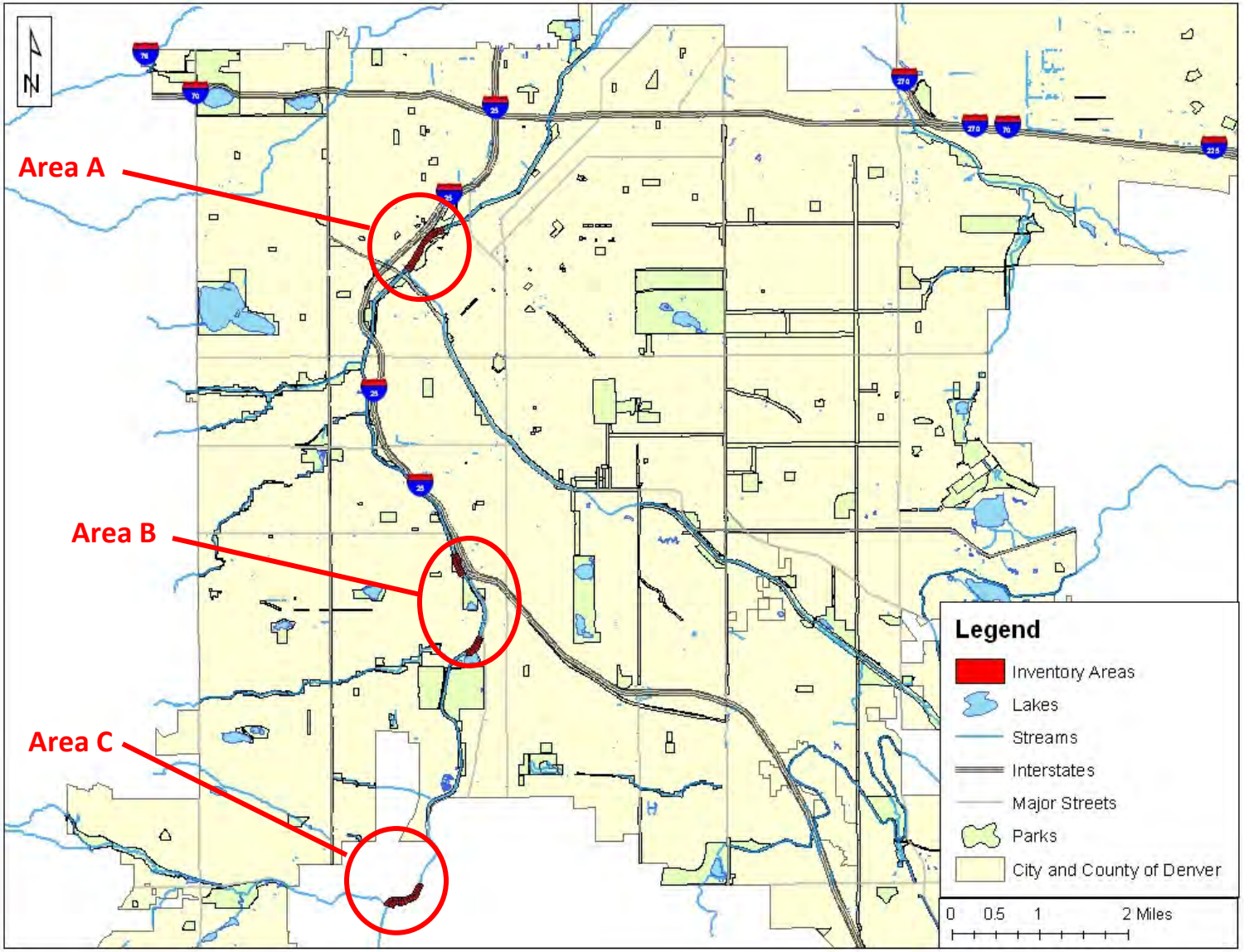
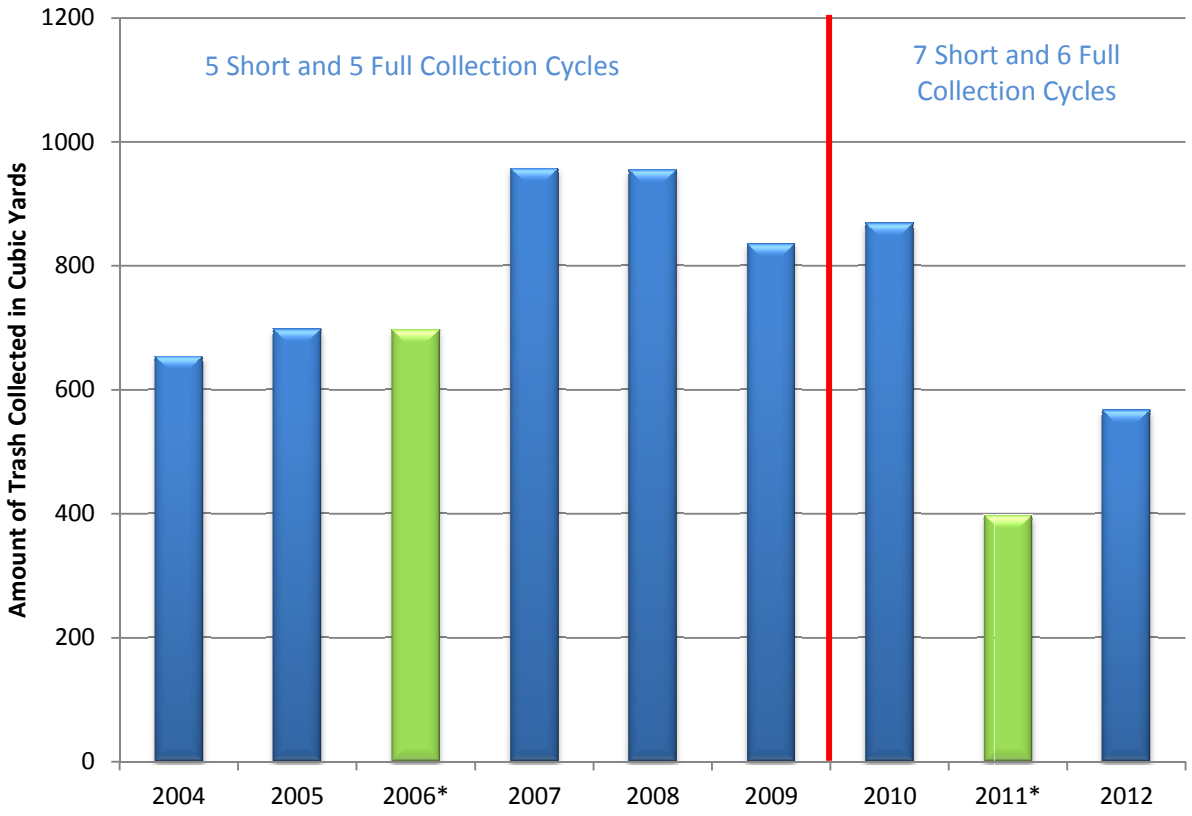


Figure 1 Inventory Area Locations

determined that these areas were too large to inventory in the allotted time. In addition, after the first inventory event, the upstream portion of the third area (Area B) was eliminated. This area was largely inaccessible on foot and was inventoried by raft. There was insufficient water in the river to float a raft during the second and third inventory events and as a result, inventorying this area was not possible. It was also not possible to inventory the floating unit of Area C during the third inventory event due to low flows. In addition to these changes, minor changes were made to the data classification forms after the first inventory event to better reflect the types of trash that were collected during the first inventory.

Existing Data

The Urban Drainage and Flood Control District (UDFCD) conducts routine maintenance and debris removal programs along the South Platte River in much of the Denver metro area. The programs are intended to improve flood control along urban stream corridors. The programs consist of removal of medium to large debris including tree branches, tires, shopping carts, and other items that have the potential to block and / or clog outfalls and drop structures and result in flooding. As part of the efforts, anything larger than four cubic inches is collected in order to enhance the environment. The program extends from West Coal Mine Avenue in Littleton to West 168th Avenue in Brighton. Debris and trash are collected from the entire area nine times a year and three additional times from the segment of the river between Bear Creek and Franklin Street in Denver.



* Columns shaded in green contain data from only part of the year. Some records from 2006 are missing and removal efforts were suspended in 2011 due to removal of contractor from project.

Figure 2 Estimated Annualized Amounts of Trash Removed by the UDFCD from the South Platte River in Cubic Yards, 2004-2012

Estimated amounts of trash collected by UDFCD from the South Platte River between Littleton and Brighton were summarized by UDFCD in a letter report to the PURE team (UDFCD, 2011) and updated in emails from the district since then. Annualized estimates for the amounts of trash collected from the South Platte River between 2004 and 2012 are shown in Figure 2. The estimated amount of trash collected varies from year to year, but has ranged from approximately 600 to 900 cubic yards per year over the past six years.

In 2011, UDFCD estimated the percentage of various classifications of trash at two different times of the year. The data is shown in Figure 3. The results shown in Figure 3 should be considered rough estimates; not all of the trash is inspected and the classification is done at random locations and on random days.

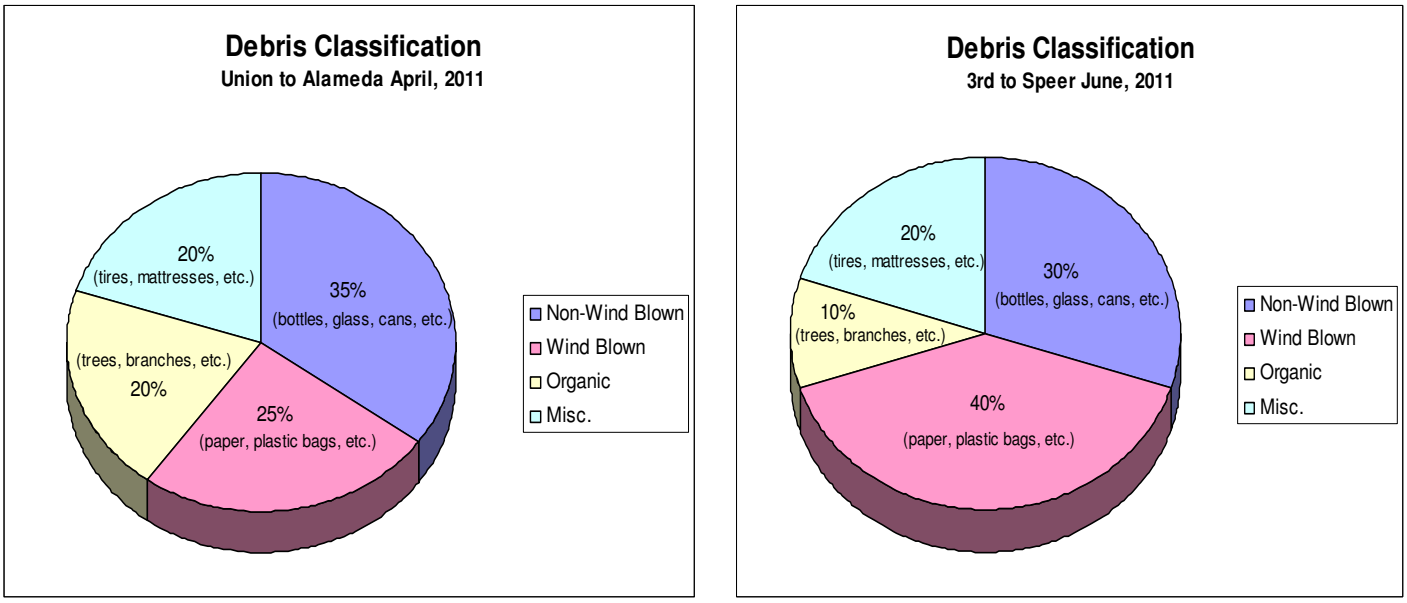


Figure 3 Classification of Debris Collected by the UDFCD from the South Platte River. Debris Collected on April 2011 between Union and Alameda and June 2011 between 3rd and Speer.

Results from the PURE Trash Inventory

The estimated volume of trash (in cubic yards) collected during the PURE trash inventory efforts is summarized in Table1. Estimates are based on the amount of trash collected in roll offs after each event. The amount of trash collected on April 21st and September 29th was much greater than the amount collected on July 21st because the first and third events coincided with The Greenway Foundation's RiverSweep events during which volunteers collected trash from areas that were not included in the inventory. Each inventory took approximately four hours to complete.

Table 1 Estimated Volume of Trash Collected during PURE Trash Inventories

Date	Estimated Volume of Trash Collected (Cubic Yards)[1]
April 21	40
July 21	6
September 29	50

Notes:

1 Total amount of trash from all three plot areas.

The remainder of this report evaluates the amount of trash collected and inventoried in each area. Data is presented as the total number of pieces or as a percentage of the total number of pieces. Analyzing the volume of trash may have yielded a more representative analysis of trash along the South Platte River, however; there was no practical way of determining volumes of trash within each category. In addition, since each individual piece of trash represents one person who is responsible for littering, looking at the number of pieces of trash may provide better insight into the types of CBSM programs that will be most effective at reducing trash in the South Platte River.

Most Commonly Encountered Categories of Trash

Trash collected and inventoried during one of the three trash inventory events was identified as belonging to one of three dozen categories of trash. Each time a piece of trash was collected, it was categorized and recorded on a data sheet. After the inventories were completed, information recorded on the data sheets was compiled into spreadsheets and evaluated using simple statistical and graphical techniques. The most common types of trash found in each area are summarized in Table 2 in order of most commonly to least commonly found.

Table 2 Categories of Trash Most Commonly Found Along the South Platte River

Overall[1,2]	Area A[2]	Area B[2]	Area C[2]
Tobacco	Tobacco	Food Packaging	Food Packaging
Food Packaging	Food Packaging	Paper & Cardboard	Paper& Cardboard
Paper & Cardboard	Plastic Bags	Styrofoam	Plastic Bags
Plastic Bags	Paper & Cardboard	Tobacco	Glass
Styrofoam	Styrofoam	Plastic Bags	Tobacco
Other Plastics	Other Plastics	Other Plastics	Styrofoam
Glass	Glass	Glass	Cups & Plates
Plastic Bottles	Plastic Bottles	Plastic Bottles	Plastic Bottles
Cups & Plates	Cups & Plates	Cups & Plates	Toys
Aluminum Cans	Aluminum Cans	Aluminum Cans	Other Plastics

Bank Units[1,2]	Floating Units[1,2]	Terrace Units[1,2]

Food Packaging	Styrofoam	Tobacco
Plastic Bags	Plastic Bottles	Food Packaging
Tobacco	Plastic Bags	Paper & Cardboard
Styrofoam	Food Packaging	Other Plastics
Paper & Cardboard	Aluminum Cans	Glass
Glass	Other Cans	Plastic Bags
Plastic Bottles	Tobacco	Styrofoam
Cups & Plates	Other Unknowns	Cups & Plates
Other Plastics	Balls	Plastic Bottles
Aluminum Cans	Cups & Plates	Aluminum Cans

Notes:

1 Composite of data from all three inventory areas.

2 Composite of data from all three inventory dates.

The order of the most commonly found categories of trash along the South Platte River does vary slightly from area to area and between the bank and terrace units, however; the top ten categories were essentially identical in all of the areas and units. The most commonly found categories of trash in the floating units were slightly different from those found in the other units; trash found in the floating units tended to be lighter and more likely to float (such as empty water bottles with caps).

Distribution of Trash

Adjacent land use and overall use are factors likely to explain the differences in the amount of trash found in each of the inventory areas (see Figure 4). Area A incorporates heavily used parks near residential areas in downtown Denver. The parks are a focus for recreational activities that draw users from throughout the metro Denver area, are surrounded by residential and commercial land uses, and also have a large homeless population. Area B includes a park area that receives periodic use by school groups for educational programs and is surrounded by industrial uses on one side and the interstate highway on the other (Lower B) and an area that is bordered by roads on either side with commercial and industrial use on one side and a lake and driving range on the other (Upper B). Area C is primarily used by walkers and bikers passing by on the bike trail. The area is heavily vegetated and somewhat inaccessible, and is surrounded by commercial land use and parking lots. The amount of trash collected in each area is most likely related to the amount of use the area receives. More trash was collected from Area A than from Areas B or C where the use is not as intense. Figure 4 includes all data from all three of the inventories.

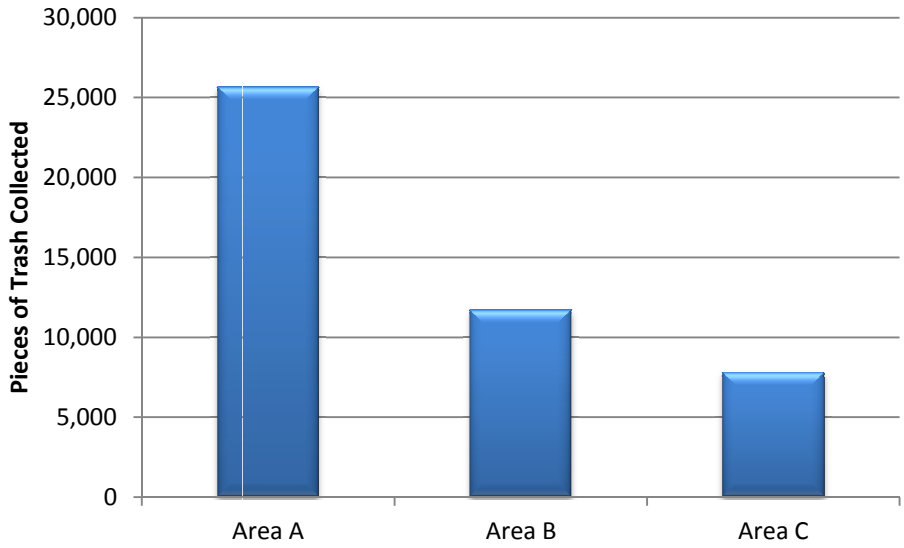


Figure 4 Amount of Trash Collected in Each Inventory Area

Figure 5 compares the amount of trash collected from the bank, terrace and floating units. Due to the amount of trash, available time, and number of volunteers, it was not possible to inventory terrace areas in all of Unit A. As a result, the chart indicates that the amount of trash found in the terrace areas was less than that collected from the bank areas.

Data Evaluation

More detailed evaluation of the data collected during the three trash inventory events focused on data from the most commonly found categories of trash. For the purposes of the evaluation, plastic bottles, aluminum cans, and cups and plates were added to the food packaging category because it was believed that the target audience for education and outreach campaigns related to that category would be the same. The detailed evaluation focused on the newly combined food packaging category, plus tobacco, plastic bags, Styrofoam, and paper and cardboard. Spatial analysis, simple graphical techniques, and descriptive statistics were used to determine if any patterns could be seen in the data. In Areas A and B, the results were also compared to land use in adjacent areas using GIS to see if any relationships between field observations and adjacent activities were apparent. It was not possible to conduct a spatial analysis of land use in Area C because the area is not in CCD and land use data was not available in GIS. Observed land use surrounding Area C is mostly commercial. In general, the spatial analysis proved to be only useful for pinpointing hot spots or areas where a specific type of trash was problematic.

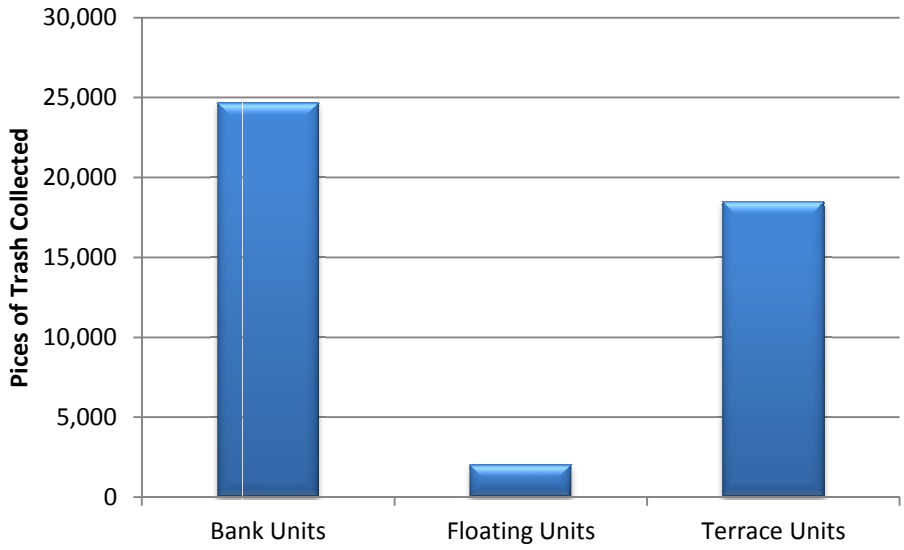


Figure 5 Amount of Trash Collected from Bank, Floating, and Terrace Units

Food Packaging

The combined food packaging category of food packaging, plastic bottles, aluminum cans, and plates and cups was the most commonly found type of trash. The amount of food packaging relative to the amount of all trash found during the inventories is summarized in Figure 6. Figure 6 includes data collected on all three inventory dates. Food packaging was common in all three units – bank, terrace, and floating, but was found as a greater percent of the total in the bank and floating units. Food packaging, in particular plastic bottles and aluminum cans, are lightweight when empty and tend to find their way into the river where they can be caught in recirculating holes and in eddies along the bank. Food packaging was also found in homeless encampments, along trails, and in areas with heavy use such as Confluence Park.

The September inventory in Area A revealed a much greater amount of food packaging than the other two inventories. These results may reflect the large number of homeless encampments that were encountered. Data from the September 29th inventory reveal food packaging to be concentrated in bank areas where homeless encampments were found. Food packaging was also concentrated in Confluence Park during the July and September inventories, probably reflecting heavy recreational use there and near the skate park. In Areas A and B, more food packaging was found during the April and July inventories than in September. Although the upper portion of Area B was only surveyed on one date, a large amount of food packaging was found in all of the plot areas.

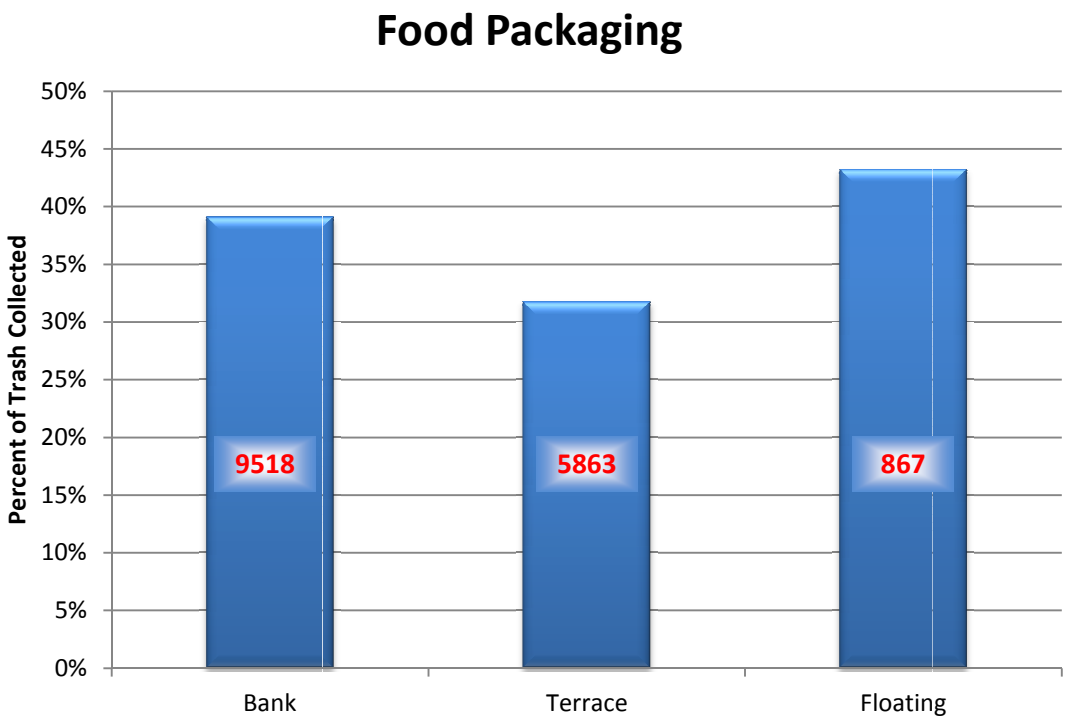


Figure 6 **Percent of Trash Collected during All Three Inventories that was Food Packaging, Shown by Unit**

Paper and Cardboard

The amount of paper and cardboard found during the three inventories is summarized in Figure 7. Figure 7 reveals that paper and cardboard were most commonly encountered in the terrace areas. In the upper portion of Area B paper and cardboard were concentrated in terrace areas along the road on the west side of the area suggesting a possible link to businesses across the street.

Plastic bags

Figure 8 summarizes the percentage of trash found that were plastic bags. The figure includes data from all three inventory dates. Like food packaging, plastic bags are lightweight when empty and are easily blown into vegetation along the banks and into the river. As a result, plastic bags were commonly found in the floating and bank units.

Styrofoam

Styrofoam is another lightweight pollutant that tends to find its way to the river where it can be caught in recirculating holes and in eddies along the bank. Since Styrofoam floats and is easily transported by wind, it was most commonly found in the floating units (see Figure 9).

Tobacco

As shown in Figure 10, tobacco and tobacco-related products were most commonly found in terrace areas. Tobacco products tended to be concentrated in areas with high use where there are no trash cans or ash trays, such as at picnic benches or park benches. Cigarette butts were fairly ubiquitous in Area A and C terraces, especially near businesses. In Area A, tobacco products were concentrated near businesses on the west bank of the river, in Confluence Park and Shoemaker Plaza, near the skate park,

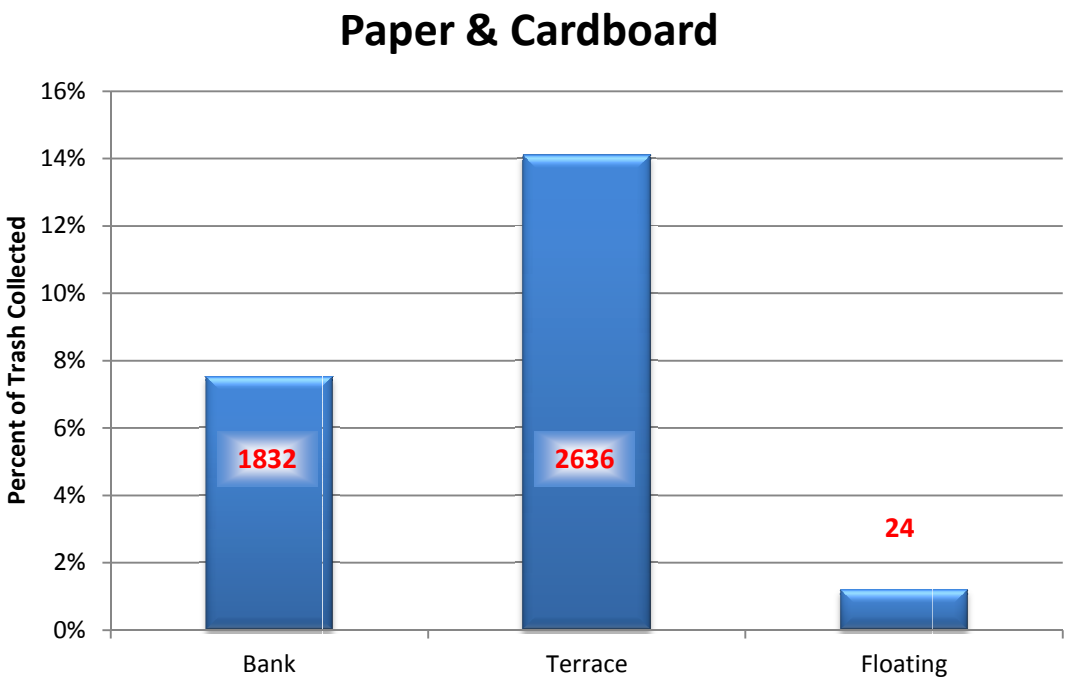


Figure 7 **Percent of Trash Collected during All Three Inventories that was Paper and Cardboard, Shown by Unit**

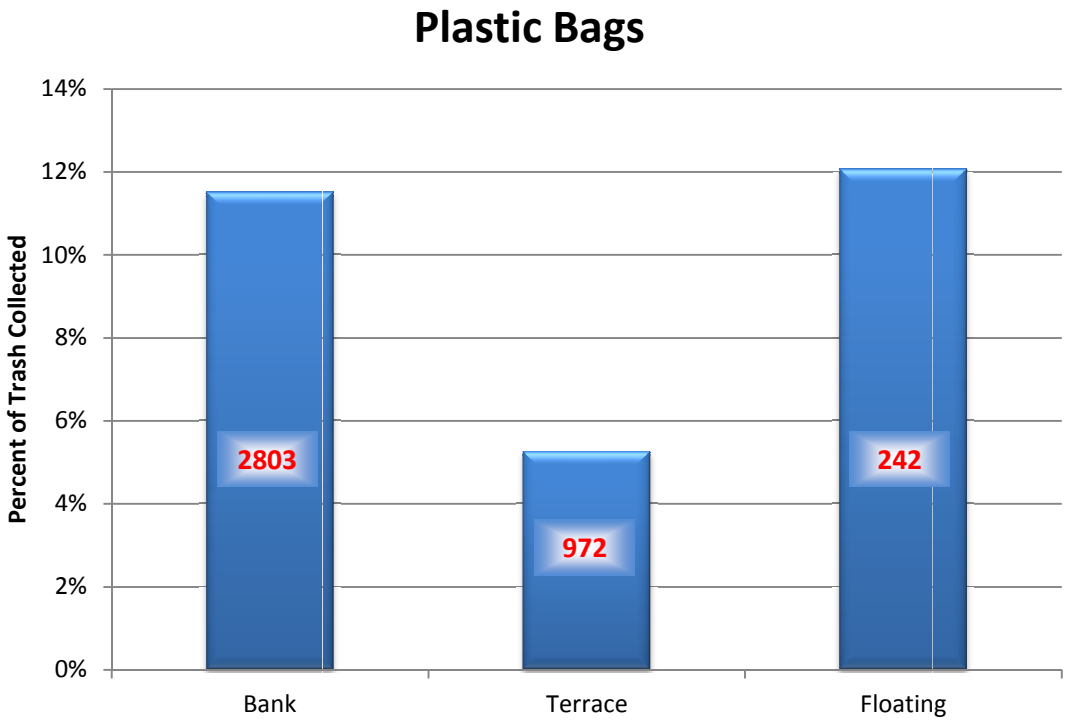


Figure 8 **Percent of Trash Collected during All Three Inventories that was Plastic Bags, Shown by Unit**

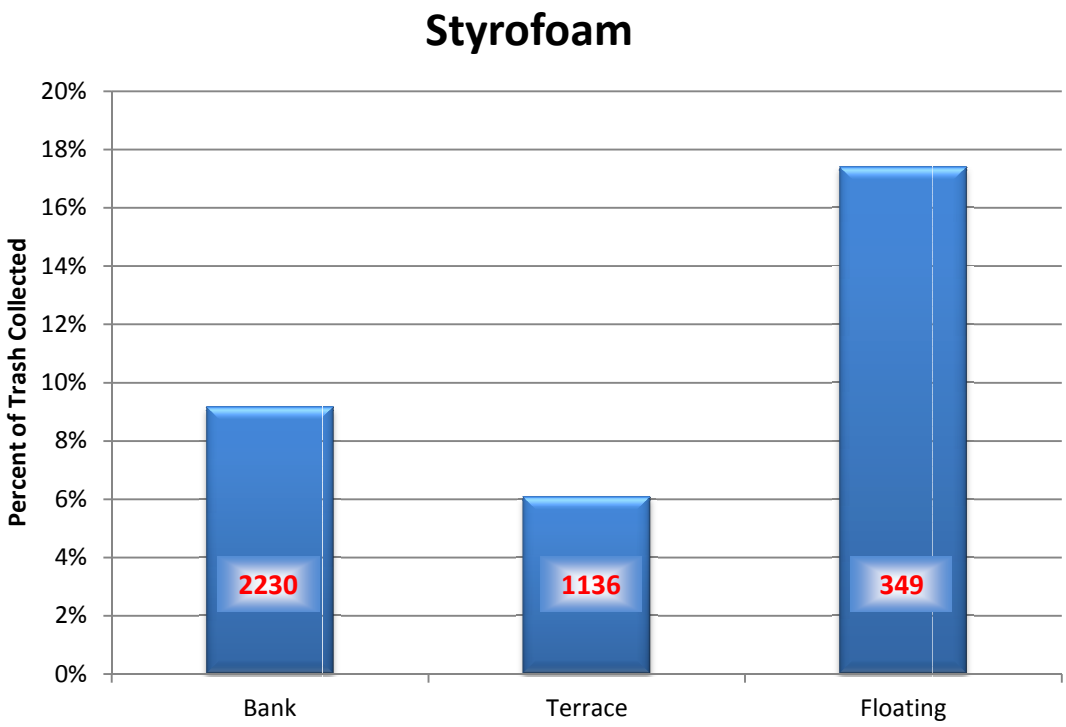


Figure 9 **Percent of Trash Collected during All Three Inventories that was Styrofoam, Shown by Unit**

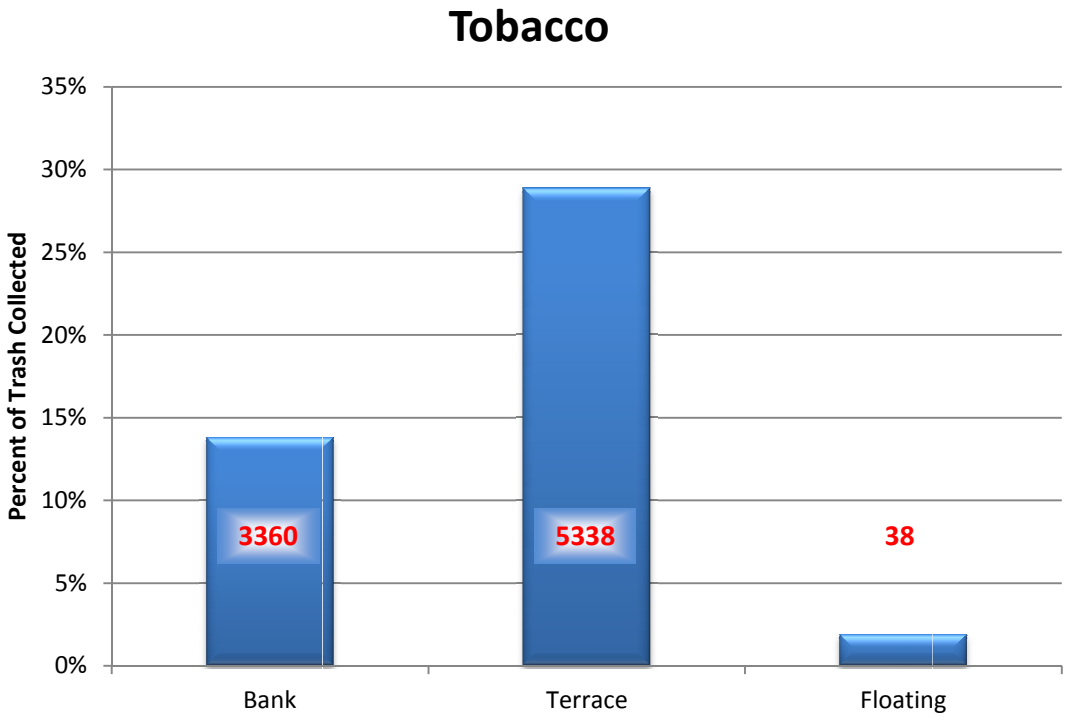


Figure 10 **Percent of Trash Collected during All Three Inventories that was Tobacco Related, Shown by Unit**

and in areas where seating is present, but no ashtrays or trash cans were available. Cigarettes were also commonly found in all of the plot areas where roads cross over or are next to the river and where homeless encampments were found. The September inventory in Area A revealed a much greater amount of tobacco products than in the other two inventories. The increase in tobacco products in Area A in September could be related to the increase in homeless encampments in the area. An increase in the number of homeless encampments was observed in Area A after a City ordinance banning camping in Denver went into effect in June.

Baselines

Results of the inventory were also intended to establish a baseline for the amount and types of trash present in the river. The baseline will be used to evaluate the success of CBSM education and outreach programs.

Since there was so much variation between plot areas, units, and inventory dates, the data were subdivided by inventory area and unit. Data were used from all three inventory dates and baselines were determined for each of the top five trash categories. In order to remove some of the variability in the data, baselines are the percentage of the total that each trash category represented. Successful implementation of CBSM programs should decrease the overall amount of trash (as a percent of the total) of each of the top trash categories. Baselines were calculated for the bank, terrace and floating units in Areas A, B, and C and are presented in Table 3.

Table 3 Baseline Levels of Different Trash Categories in the South Platte River[1]

Area	Unit	Plastic Bags	Styrofoam	Paper & Cardboard	Tobacco	Food Packaging	Other Types of Trash
A	All	8%	8%	8%	27%	35%	15%
	Bank	10%	9%	7%	20%	37%	17%
	Terrace	4%	5%	10%	42%	31%	8%
	Floating	20%	7%	2%	1%	46%	25%
B	All	11%	11%	13%	11%	35%	20%
	Bank	17%	12%	8%	6%	38%	19%
	Terrace	6%	9%	18%	16%	31%	19%
	Floating	8%	22%	1%	2%	40%	27%
C	All	9%	6%	12%	8%	42%	22%
	Bank	11%	6%	9%	2%	48%	24%
	Terrace	7%	4%	18%	16%	34%	21%
	Floating	5%	30%	2%	7%	47%	9%

Notes:

1 Based on trash inventories conducted on April 21, July21, and September 29, 2012.

QA Results

In order to determine the reproducibility of the trash inventories, a number of plot areas were inventoried by two teams as a quality assurance (QA) measure. The first team conducted an inventory and left the trash in place. The second team inventoried and removed the trash. QA was done on three or four plots for every inventory event and represented about 2.5% of the plots inventoried. Relative

percent differences (RPDs) were calculated for each trash category to determine the reproducibility of the data. Calculated RPDs revealed a high level of inconsistency between the team conducting the inventory and the team conducting the QA. The observed inconsistencies between the inventory and QA results are not surprising because of the amount of subjectivity inherent in the inventory process. Areas where error may have been introduced into the process include miscategorization of trash, missed pieces of trash, observer fatigue, littering or litter removal between the QA and inventory, inconsistent plot boundaries used by the QA and inventory teams, as well as issues related to interpretation of data on the data sheets and transcription errors during data input and analysis. The nature of the trash inventory project makes it difficult to eliminate all of these factors even with a SAPP and project procedures. Given the nature of the project, inconsistencies between the QA and inventory data were expected, however; the data collected and used for the analysis presented in this report should be considered to be an estimate of the actual amounts and types of trash present. Despite this caveat, the data is still believed to represent the trash present in the South Platte River in the three inventory areas on the inventory dates.

Conclusions

Although the order of the most commonly found categories of trash along the South Platte River varied from area to area, the top ten categories were essentially identical. This suggests that CBSM efforts would be most effective if focused on those categories of trash. Concentration of certain types of trash, such as tobacco products, in specific areas implies that the use of prompts (such as trash cans, ash trays, etc.) may also be successful.

References

The Greenway Foundation (2012a). Greenway PURE Trash Reduction Campaign 2011 Non-Point Source Project Final Project Implementation Plan. March 20, 2012, 18 pp.

The Greenway Foundation (2012b). Sampling and Analysis Project Plan (SAPP)for The Greenway Foundation's Trash Inventory of the South Platte River Segment 14 in the Denver Metro Area of Colorado, Describing Operations for the Year 2012. April 13, 2012, 38 pp.

UDFCD (2011). South Platte 2004-2011 Debris Report . Letter Report, 6 pp.

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A	[X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS-MADE [X] OCCUR includes professional and sexual misconduct GEN'L AGGREGATE LIMIT APPLIES PER: [X] POLICY [ ] PRO-JECT [ ] LOC [ ] OTHER:	Y	Y	2017-53157	10/09/2017	10/09/2018	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG [ ]	$ 1000000 $ 500000 $ 20000 $ 1000000 $ 2000000 $ 2000000 $
A	AUTOMOBILE LIABILITY [ ] ANY AUTO [ ] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS [X] HIRED AUTOS ONLY [X] NON-OWNED AUTOS ONLY	Y		2017-53157	10/09/2017	10/09/2018	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) [ ]	$ 1000000 $ $ $ $
A	[ ] UMBRELLA LIAB [X] OCCUR EXCESS LIAB [ ] CLAIMS-MADE [ ] DED [ ] RETENTION $			2017-53157-UMB	10/09/2017	10/09/2018	EACH OCCURRENCE AGGREGATE [ ]	$ 1000000 $ $
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y / N ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? [ ] (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A		4043282	05/01/2017	05/01/2018	[ ] PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ 100000 $ 100000 $ 500000
A	D & O			2017-53157-DO	10/09/2017	10/09/2018	retro 10/11/16	1000000 1000000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

General Liability include Professional Liability and Sexual Misconduct. Sexual Misconduct limits are 1000000 per occurrence and 1000000 aggregate. The City and County of Denver, its elected and appointed officials, employees and volunteers are named as additional insured with regards to the Commercial General Liability policy & Hired and Non owned Automobile coverage. Sexual Abuse, molestation or misconduct is included

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AUTHORIZED REPRESENTATIVE

June Schiff CPCU

Denver Residents' Attitudes Towards Litter

January 2013

THE GREENWAY FOUNDATION SINCE 1974

Market Perceptions

Key Findings

Key Finding #1: Perhaps the most important finding of this study is that once people become aware of how litter in neighborhoods can become litter in our riverways, many participants said they would change their behaviors. Four out of ten participants (41%) said that after learning about the litter issues discussed in this survey, they would be more likely to pick up litter in the future. The implication of this finding demonstrates that an effective educational communications strategy should have positive results in reducing local litter.

Key Finding #2: Current knowledge of local riverways is less than ideal. Nearly two out of ten participants were unaware of any local rivers (16%) in the Denver metropolitan area, 22% did not know how close the nearest river is to where they live, and three out of ten (29%) could not name the closest river to where they live. The implication of this is that it is difficult to move people to care about litter in our rivers if they don't know of them. However, as was indicated in the implication of Key Finding #1, education can lead to change.

Key Finding #3: Given how problematic participants feel about air, water and ground pollution in the metro area, it was surprising to see how little concern participants have regarding pollution. Even the most ardent, environmentally-friendly participants did not express extremely high levels of concern despite many considering air, water and ground pollution problems to be significant. This finding is consistent with several studies indicating that when the economy is down, as it is currently, other concerns such as unemployment will capture people's attention, while issues such as environmental concerns take a back seat. The implication of this finding is that though people may dislike litter and consider it a major problem, building concern to combat it may not be as easy as one might hope.

Key Findings (continued)

Key Finding #4: Water and ground pollution in the Denver metro-area are viewed as less of a problem than air pollution, which most consider the greatest issue. Additionally, riverway pollution is considered less important than water pollution in mountain lakes and reservoirs. The implication of this is that there appears to be a greater acceptance of pollution in our local waterways. Helping residents connect local water to water in wilderness areas as well as reservoirs will be important to elevating the need for reducing pollution in local waterways.

Key Finding #5: People who should be more concerned about riverways – those who live closest to riverways, frequent visitors to rivers and active outdoor types – are not more concerned about riverway litter than others. Those most likely to show concern are people engaged in very specific water activities, but even among this segment the difference in concern was not substantially greater. The implication of this finding is that there is not a large, strong core group to focus or rely upon to champion the riverway litter cause.

Key Finding #6: Somewhat surprisingly, those most likely to say they will make more of effort to combat litter are likely those who are currently complacent about littering. These include younger participants with lower incomes, singles, Latinos and those less formally educated. Many of these individuals live in areas where litter is more prevalent, including more urban neighborhoods without HOA covenants. While this may seem like an unlikely group to target, these data suggest this audience will provide the greatest opportunities for change. In fact, as age, income and education increases, willingness to change declines.

Background/Methodology

The Greenway Foundation commissioned this assessment among Denver metropolitan residents to understand their attitudes and behaviors surrounding pollution, focusing largely on waterways. Market Perceptions, Inc. was retained to conduct this assessment, surveying three-hundred Denver metropolitan residents by telephone between December 1st and December 7th, 2012. The survey was fairly extensive (averaging approximately 15 minutes to complete) and covered the following topics:

- General attitudes about the environment
- Awareness and usage of Denver metropolitan riverways
- Awareness and personal impact of litter along these riverways
- Awareness and personal impact of litter in neighborhoods
- Understanding of the litter process from personal littering to cleanup
- Active outdoor lifestyle
- Demographics

To ensure the sample data maintained a close representation to the demographic characteristics of residents in the area, quotas were established on respondent gender, age, ethnicity and county of residence, mirroring the population distributions based upon the most recent census data[1].

Residents from the eight following counties were surveyed in proportion to their respective population sizes.

- Adams
- Arapahoe
- Boulder
- Broomfield
- Denver
- Douglas
- Jefferson
- Weld

Beyond these demographic quotas, there were no screening criteria respondents needed to meet in order to qualify for the survey.

The maximum margin of sampling error is +/- 5.6 points on a sample size of 300 interviews; margins of error will be greater when looking at smaller subsets of the data.

[1]2010 Census Data

Background/Methodology (continued)

The Survey

Market Perceptions, Inc. used a 48-question telephone survey to collect this data among Denver metro-area residents. The survey used skip logic in order to present individuals with the questions that are most relevant to them, based upon how they responded to previous questions in the survey. Respondents were allowed to indicate when they do not know the answer to a particular question or not respond if they were uncomfortable providing an answer. For the purposes of this report, we have excluded these individuals on a question by question basis. Due to skip logic and these exclusions, the number of respondents (*n* value) varies for each question presented in the report, and is therefore noted on each slide.

Survey Response

The incidence of finding qualified participants (response rate) for the survey was 55%. However, most of those who were excluded were due to having already met our quota for the demographic that individual represented, as opposed to being excluded due to a certain requirement necessary of all participants.

Explanation of Terminology

This report uses research terminology that may be unfamiliar to many:

- *Top-Box Responses*: most survey questions allow participants to choose a response option from a scale such as "Strongly Agree," "Agree," "Somewhat Disagree," etc. When we refer to the "Top-Box" response, this is in reference to the highest level of agreement or most positive response option on the scale, such as the percentage of respondents who said "Strongly Agree" or "Extremely Important."
- *Top-Two Box Responses*: When we refer to the "Top-Two Box," we include the second highest response along with the top response. For example, on a question with an agreement scale, participants who answered "Strongly Agree" are combined with those who answered "Agree" and the percentage of these respondents out of all respondents is shown.
- *Statistical Significance Testing*: Statistical tests (t-tests of proportions) are used throughout the analysis to indicate which results are most likely to represent real differences in the data (as opposed to differences which fall within the margin of error). When a difference is said to be statistically significant, it is notated by either an arrow or a shaded cell when located within a table. The significance testing used in this analysis is always at the 95% level of confidence.
- *Messaging points*: these are key implications drawn from the data that should be considered when planning the communications effort.

Purpose

The purpose of this research is to provide an exploratory understanding of how a behavior change campaign might best be approached. The original research proposed for this project was to move through a progression of different research methods, from secondary research followed by qualitative research (focus groups), followed by a quantitative baseline assessment (with a quantitative post-assessment survey to be conducted after the campaign has been implemented). However, given significant uncertainty as to: who the campaign should focus upon (such as those who live close to the river versus anyone in the metro area); the media approach to be used for the campaign (from simple signage along river paths to a full-blown mass media campaign); the messaging focus of the campaign (from getting people to think about their personal littering habits, including simple behavior changes such as putting lids on trash cans and dumpsters to building awareness of how litter in neighborhoods can make its way to local rivers), determining the type(s) of people to invite to the focus groups became an impossible decision to make absent additional insights and information.

As a result, re-ordering the qualitative and quantitative research became necessary. However, this change represented far more than just a sequential ordering of events. When the quantitative research was to be conducted as a follow-up to the qualitative focus group research, the objective was to quantify specific ideas which resonated most strongly during those discussions. Now, with the quantitative research taking the lead, the survey needed to be much more comprehensive, covering as much ground as possible in order to identify communication opportunities and target audiences.

As such, the survey which was ultimately executed was far greater in length than originally envisioned, and the scope of the analysis required a significant exploratory investigation rather than a simple confirmation of which several communications message was most motivating. While requiring substantially greater effort, we believe the end result was worth that investment. Being able to identify messaging concepts which have the greatest potential from a much larger, and representative sample than we would have had available through focus groups, and now being able to identify which demographic groups are going to be most receptive to behavior change, we can now approach to the qualitative research with a clear understanding of who we need to talk with and the types of messages we need to explore.

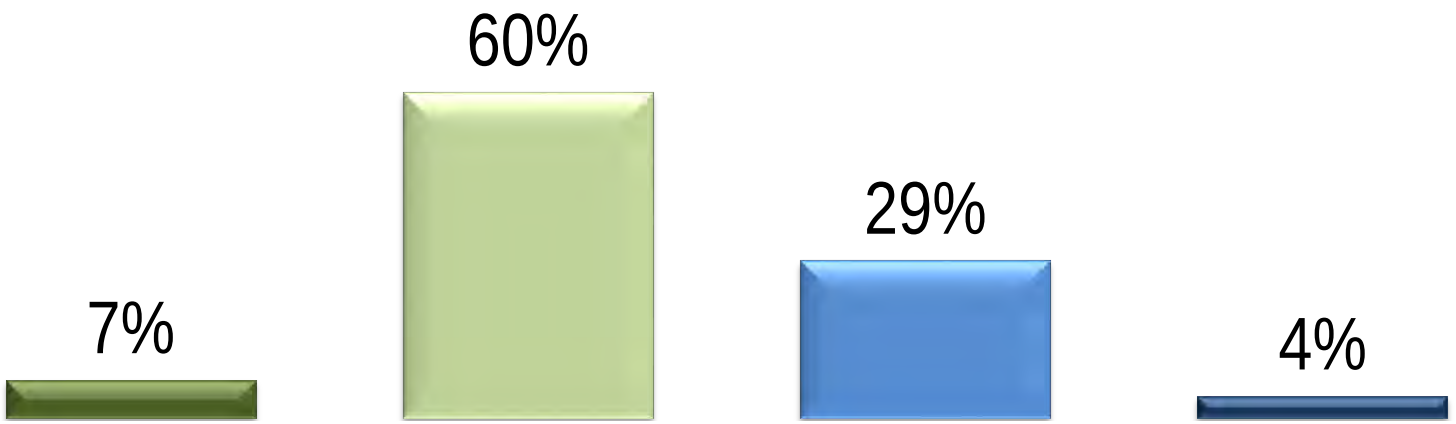
Attitudes Towards the Environment and Pollution

THE GREENWAY FOUNDATION SINCE 1974

Market Perceptions

Participants Are Typically Environmental

Environmental Beliefs of Participants



To provide some context in terms of how participants think about the environment, they were asked to describe their environmental beliefs. Very few participants (just 4%) said they "disagree with pretty much everything environmentalists have to say," while the majority (60%) considered themselves to be "moderate environmentalists," doing what they can to help, but not considering themselves to be activists. Just under one in ten (7%) chose the highest category of environmentalism, saying their friends would describe them as a "tree-hugger," while the rest (29%) fall towards the "middle of the road," opting not to agree nor disagree with most environmental arguments.

Question: Which of the four following statements best describes your attitudes toward environmentalism?

Base: All participants; n=300

Environmental Self-Description Broken Down

Environmental Self-Description % of participants by demographic	Gender		Age					Income				
	Male n=151	Female n=149	Under 25 n=23	25-34 n=56	35-49 n=96	50-64 n=82	65+ n=43	Less than $25K n=29	$25K-<$45K n=31	$45K - <$75K n=59	$75K-<$150K n=88	$150K or More n=37
Strong Environmentalist	6%	8%	9%	11%	5%	7%	5%	7%	7%	5%	7%	11%
Moderate Environmentalist	56%	65%	65%	59%	55%	61%	70%	62%	61%	71%	56%	51%
Middle of the Road	32%	26%	22%	30%	34%	29%	21%	28%	32%	22%	34%	33%
Those who Disagree	6%	1%	4%	0%	6%	3%	5%	3%	0%	2%	3%	5%

	Ethnicity			Household					Political Leanings		
	Caucasian n=228	Latino n=54	Other n=16	Married n=221	Single n=50	Other n=26	Kids n=176	No Kids n=119	Liberal n=111	Mixed n=42	Conservative n=91
Strong Environmentalist	6%	11%	6%	7%	10%	0%	8%	6%	13%	7%	0%
Moderate Environmentalist	61%	55%	63%	61%	58%	61%	61%	60%	70%	67%	48%
Middle of the Road	29%	30%	31%	29%	28%	35%	28%	31%	15%	24%	45%
Those who Disagree	4%	4%	0%	3%	4%	4%	3%	3%	2%	2%	7%

	Education			County						
	H.S. or Less n=53	Some College/Tech n=65	College Graduate n=170	Adams n=37	Arapahoe n=61	Boulder n=30	Denver n=62	Douglas n=32	Jefferson n=47	Weld n=27
Strong Environmentalist	9%	3%	8%	5%	3%	13%	10%	0%	15%	0%
Moderate Environmentalist	51%	57%	64%	57%	62%	70%	71%	59%	47%	52%
Middle of the Road	34%	38%	25%	33%	33%	17%	16%	38%	32%	44%
Those who Disagree	6%	2%	4%	5%	2%	0%	3%	3%	6%	4%

As we will see throughout this report, the greatest differences in attitudes toward the environment and pollution are typically found between those of differing political beliefs. Liberal-leaning participants tend to provide more environmentally-friendly responses than those holding more conservative attitudes. Other differences often stand out in terms of respondent gender, with females being more apt to hold environmentally-friendly attitudes than males. Environmentalism often increases with education, but not necessarily with income. Environmental attitudes also vary quite a bit by county of residence. Boulder and Denver participants are more likely to be environmentally-friendly, while participants residing in Douglas and Weld counties often have opposing views, and Jefferson county has a bit of both.

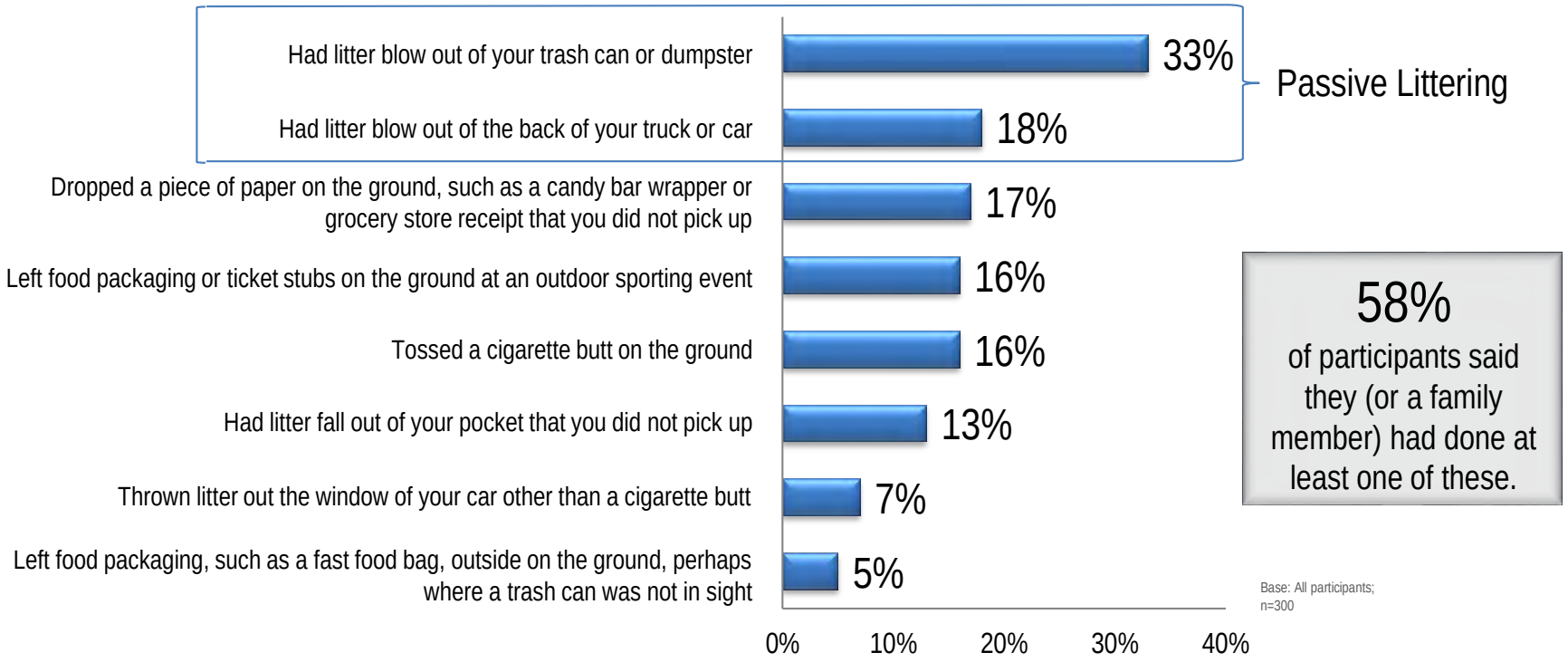
Question: Which of the four following statements best describes your attitudes toward environmentalism?

*Broomfield county is not reported because the sample size is too small (n=4)

Shaded cells indicate statistically significant differences from others at the 95% level of confidence.

Participants Are Seemingly Honest

"Can you tell me which of the following either you or perhaps a member of your family has done in the last year?"



58%
of participants said they (or a family member) had done at least one of these.

Base: All participants; n=300

Asking people about littering can be a touchy subject, as this is not considered a socially acceptable behavior. But when participants were asked if they, or a member of their family, had littered in the last year in any of the eight ways listed above, six out of ten (58%) responded "yes" to at least one. The most often mentioned forms of littering could be considered passive, such as having trash blow out of their trash can (33%) or out of the back of their truck or car (18%). Each of the other items represent more deliberate forms of littering, with the most common being dropping a small piece of trash on the ground (an easy to act to conceal) such as a candy bar wrapper or receipt (17%), followed by leaving trash at an outdoor sporting event (16%), along with the fairly common habit among smokers of tossing a cigarette butt on the ground (16%). The least often mentioned acts of littering were throwing trash out of one's car (7%) or leaving food packaging behind when a trash can was not in sight (5%).

Question: Can you tell me which of the following either you or perhaps a member of your family has done in the last year?

Participants Take Action

56% Have said something to someone they saw litter

65% Say they pick up trash in their neighborhood "most" or "all" of the time (23% "Every time")

88% Put the lid on their trash can "most of the time" (79% "every single time")

While 58% of participants admitted to littering, almost this same percentage (56%) said they have spoken up against someone who has littered (which may have been a family member). Interestingly, half (51%) of those who have admitted that they or a family member have littered have spoken to someone they saw litter. Speaking up against littering is only slightly higher (58%) among those who have not littered.

Two-thirds (65%) of all participants say they pick up trash in their neighborhood "most of the time they see it," and approximately 90% put a lid on their trash can or dumpster "most of the time."

	Have Littered	Have Not Littered
Have Said Something to a litterer	51%	58%
Have Not Said Something	49%	42%

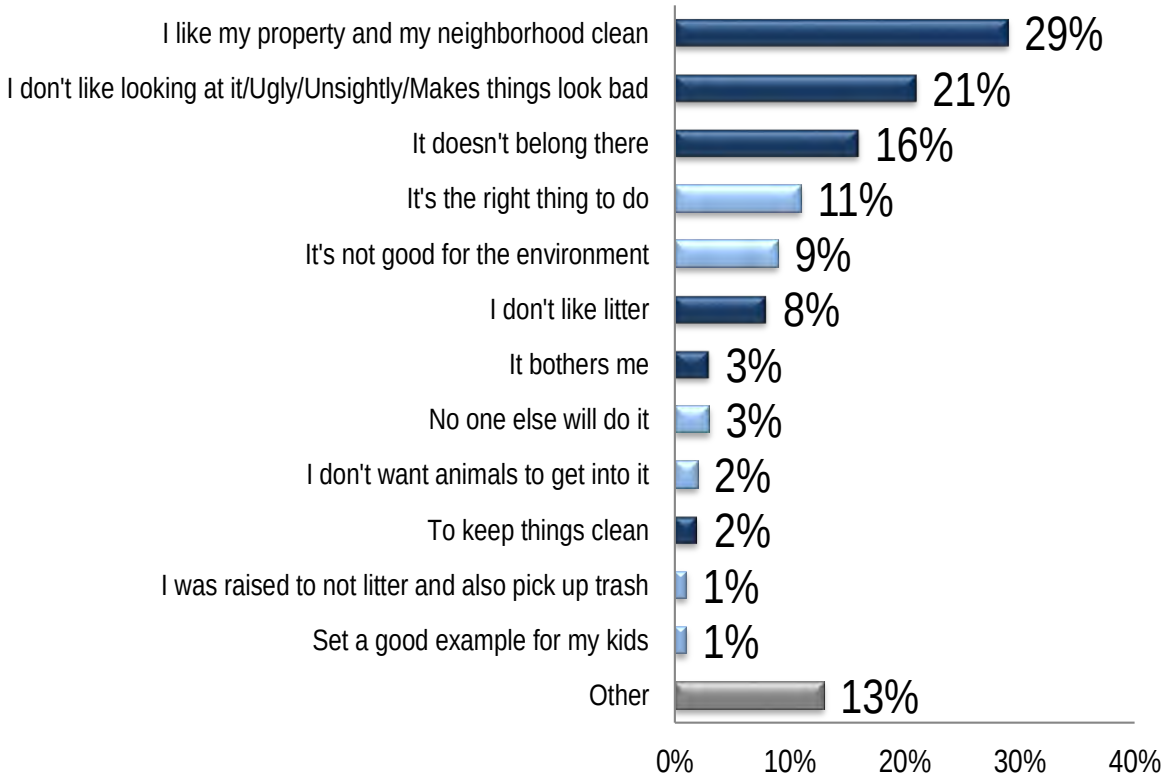
Messaging Point: Not littering does not make you an activist.

Questions: Have you ever said anything to someone who you saw litter, pointing out the fact that they did that?
How often do you pick up trash that you see in your neighborhood that someone else left behind?
When you take out the trash from your home, how often do you put the lids on the trash cans or close the lid on the dumpster?

Base: All participants; n=300

Why They Act

Reasons for Picking Up Litter



Personal/Aesthetic Reasons

"I prefer it not be seen in my neighborhood"

"Because I don't like how it looks toward my property or environment"

"Because I don't like looking at it"

"Because I don't like the way it looks"

"Because I don't like to see it"

"Because it affects my home"

"Because it is dirty and nasty"

Altruistic Reasons

"Because I do my part"

"Because it's wrong to litter"

"I care about the environment"

"It's just the right thing to do"

"Just to be a kind person"

Base: Those who pick up litter at least occasionally n=288

We asked those who said they pick up litter in their neighborhood at least "occasionally" (all, but 12 of the 300 people surveyed or 4%), why they pick up litter outside, even if the litter was not theirs. There is an interesting divide in the responses. The top reasons focus on aesthetics, that the trash simply looks bad and makes the neighborhood look bad: "I like my property and neighborhood clean" (29%), "It's unsightly" (21%) and "It doesn't belong there" (16%). Further down the list we start to see more altruistic reasons for picking up other people's trash, such as "It's the right thing to do" (11%) or "It's not good for the environment" (8%).

Question: Why do you pick up the litter that you see outside, even if it was someone else who left it?

Acting for Different Reasons

"Why do you pick up the litter that you see outside, even if it was someone else who left it?"

I pick up litter…	Every time I see it  23%	Most of the time  42%	About half of the time 15% 	Only Occasionally 19% 
Sample Size	*n=66*	*n=121*	*n=43*	*n=55*
I like my property and my neighborhood clean.	27%	31%	26%	29%
I don't like looking at it/Ugly/Unsightly/Makes things look bad	23%	22%	19%	20%
It doesn't belong there	26%	13%	14%	11%
It's the right thing to do	11%	10%	26%	4%
It's not good for the environment	3%	13%	9%	5%
I don't like litter	8%	13%	0%	5%
It bothers me	0%	3%	2%	7%
No one else will do it	3%	3%	2%	4%
I don't want animals to get into it	5%	2%	2%	2%
To keep things clean	3%	1%	2%	5%
I was raised to not litter and also pick up trash	2%	1%	2%	2%
Set a good example for my kids	0%	2%	0%	0%
Other	12%	8%	14%	22%

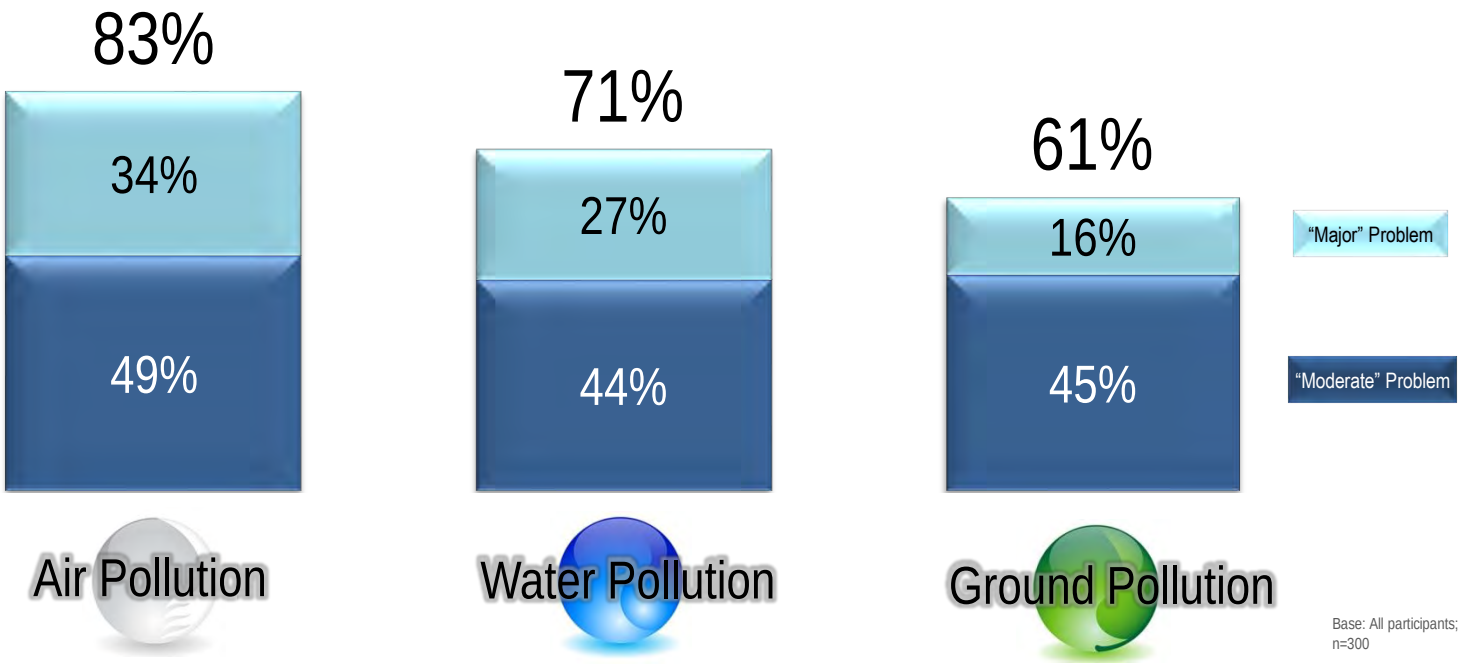
Regardless of how often participants pick up neighborhood litter, most do so to keep their property and neighborhood clean (about 30%), often because its unsightly (about 20%). Those who said they pick litter up every time they see it are significantly more likely to do so because "It doesn't belong there" (26%), and significantly less likely to mention the environment as the reason (0%). Participants who said they pick up neighborhood litter "most of the time" (but not "every time" were significantly more likely to cite the environment as a motivating factor (13%), while those who said they pick it up about half the time do so because they fee it is the right thing to do.

Questions: How often do you pick up trash that you see in your neighborhood that someone else left behind?
Why do you pick up the litter that you see outside, even if it was someone else who left it?

Messaging Point: Those who pick up litter all of the time are not motivated by environmental factors, but rather by aesthetics. Emphasizing the unsightliness of litter will be more important than the environmental impact.

Perceived Problem of Pollution

"Thinking about pollution in the Denver metropolitan area, how much of a problem do you consider each of the following?"



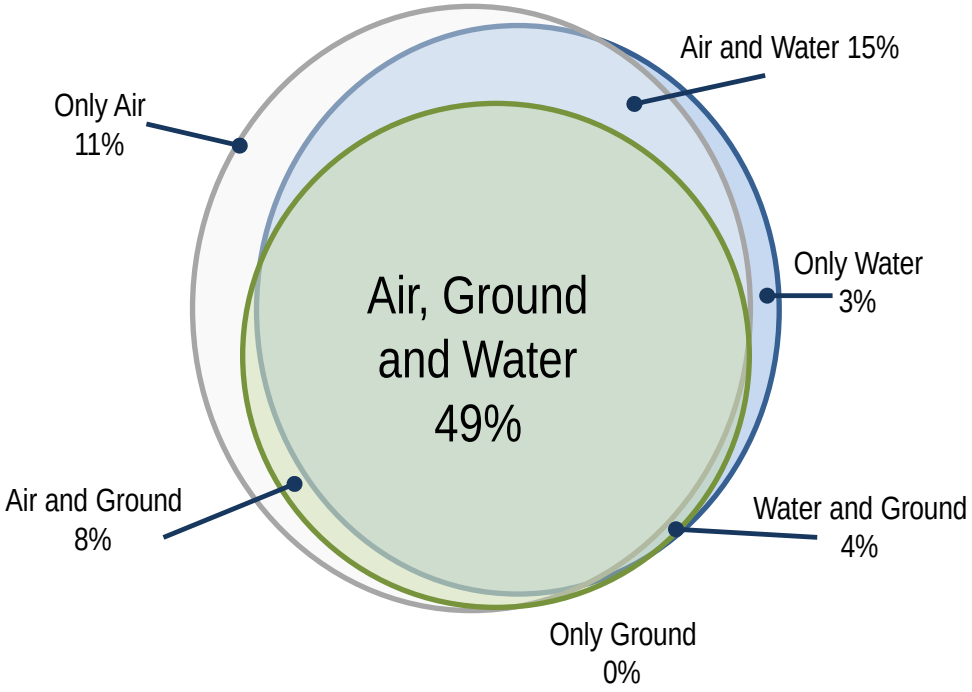
To gauge how participants think about local pollution, we asked them how much of a problem they consider air, water and ground pollution to be in the Denver metropolitan area. Of greatest concern to participants was air pollution, with 83% saying this is at least a "moderate" problem in the Denver area, and one-third (34%) considering it a "major" problem. As we will see throughout this report, water pollution typically comes second to air pollution, both of which are considered more of an issue than ground pollution. Twenty-seven percent of all participants consider water pollution a "major problem," while another 44% consider this a "moderate" problem (71% total). Ground pollution is considered at least a "moderate" problem by 61% of participants and a "major problem" by only 16% – half that of air pollution. About one out of twenty said each of these was "not a problem at all."

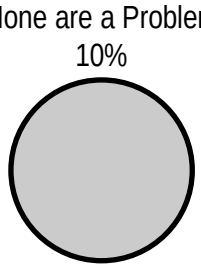
Question: Thinking about pollution in the Denver metropolitan area, how much of a problem do you consider…?

Messaging Point: Participants recognize that all forms of pollution in the metro-area are a problem.

Pollution Problem Overlap

Pollution Problems Grouped





Significant Differences from Those Who Consider All Three At Least a "Moderate Problem"

	All are Problems *n=147*	None Are Problems *n=28*
Male	41%	71%
Female	59%	29%
Douglas County Residents	6%	25%
Latinos	23%	7%
Income $100K or More	32%	64%
Income Under $45K	29%	5%
College Grad	52%	75%
High School or Less	22%	11%

Base: All participants; n=300

To get a feel for how these three types of pollution fit together, the above Venn diagram demonstrates the overlap of concern between each. Half of all participants (49%) believe that all three (air, water and ground pollution) are at least a "moderate" problem, while 15% consider only air and water pollution (but not ground) to be problematic. One out of ten (11%) said only air pollution is a problem, the only type of pollution singled out by over 10% (just three percent of participants considered water pollution to be the only problem) and no one said only ground pollution was a problem. One out of ten participants (10%) said that none of these three issues are even a "moderate" pollution problem in the metro area.

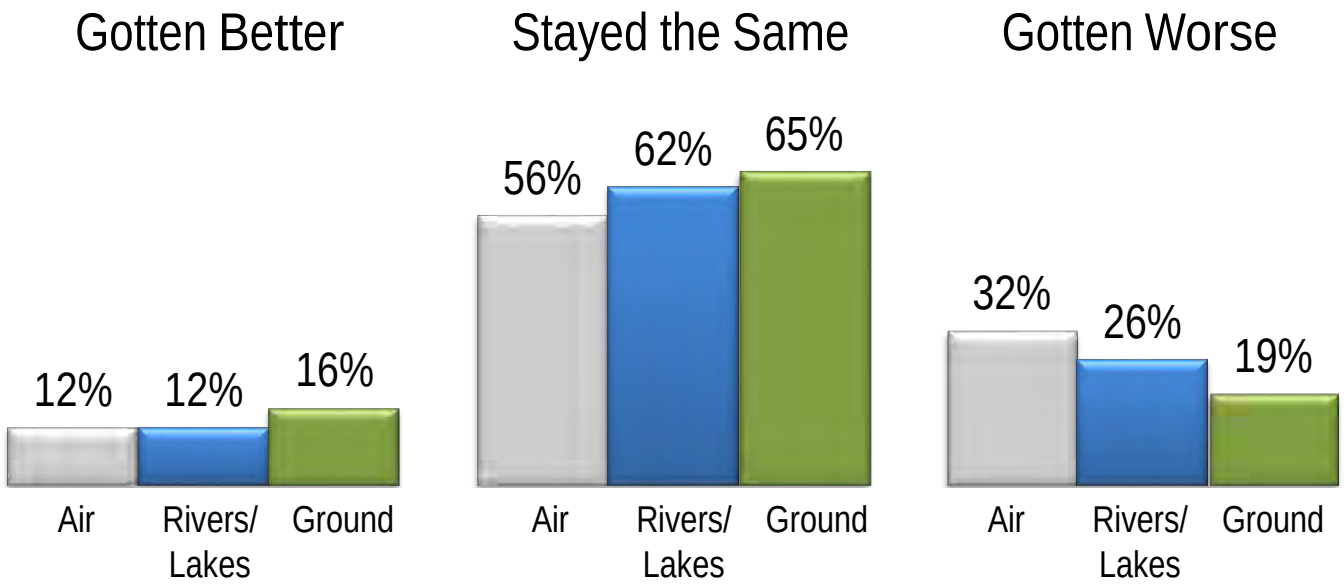
Messaging Point: People recognize the inter-related nature of different types of pollution. Talking about any in isolation won't make as much sense as talking about them collectively.

Question: Thinking about pollution in the Denver metropolitan area, how much of a problem do you consider…?

Shaded cells indicate statistically significant differences from others at the 95% level of confidence.

Perceived Pollution Improvement

"Do you think the amount of pollution we have in the Denver metro area has gotten better, worse or has stayed the same over the last two years?"



Participants were also asked about recent changes (within the past two years) with regard to air, water and ground pollution in the Denver metro area. At least two out of ten said all three forms of pollution have gotten worse over the past two years, with air pollution leading at 32%, followed by water (26%) and ground pollution (19%). Slightly more than one out of ten believe that pollution in all of these areas has gotten better, while half to two-thirds said pollution in these areas has stayed the same.

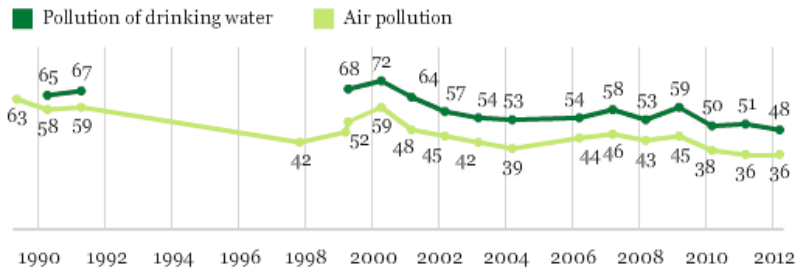
Question: Do you think the amount of pollution that we have in the Denver metro area has gotten better, worse or stayed the same over the last year?

Base: All participants; n=300

Gallup Chimes In

I'm going to read you a list of environmental problems. As I read each one, please tell me if you personally worry about this problem a great deal, a fair amount, only a little, or not at all.

% Worried a great deal



Percentage Worried "A Great Deal" About Environmental Problems, 2000 vs. 2012

	2000 %	2012 %	Change (pct. pts.)
Pollution of drinking water	72	48	-24
Air pollution	59	36	-23
Pollution of rivers, lakes, and reservoirs	66	48	-18
Contamination of soil and water by toxic waste	64	50	-14
Loss of tropical rain forests	51	37	-14
Global warming	40	30	-10
Extinction of plant and animal species	45	36	-9

Americans' Worry About Environmental Problems

	% Great deal	% Fair amount	% Only a little	% Not at all
Contamination of soil and water by toxic waste	50	28	16	5
Pollution of drinking water	48	30	15	6
Pollution of rivers, lakes, and reservoirs	48	31	17	4
The loss of tropical rain forests	37	27	24	12
Air pollution	36	35	22	7
Extinction of plant and animal species	36	29	23	12
Global warming	30	25	22	23

Gallup, March 8-11, 2012

A recent nationwide study from Gallup[1] indicates that concern about water pollution has declined since 2000, and suggests that people are more often focusing on daily issues such as the economy and jobs.

"Americans' concerns about environmental problems have dropped in recent years, coincident with their drop in support for various environmental policies and the higher priority they assign to economic growth than to environmental protection.

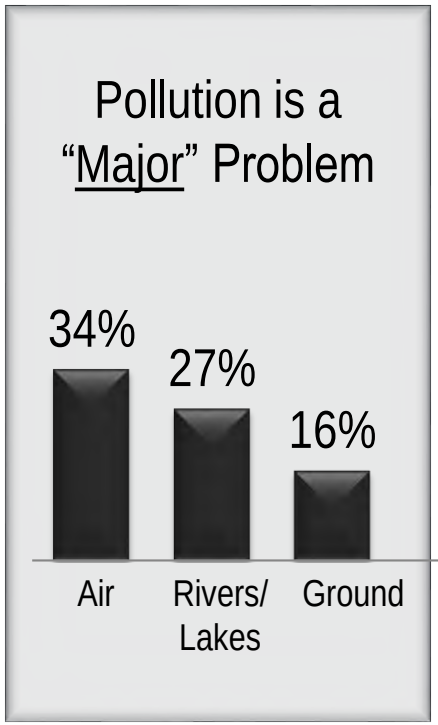
There are two likely explanations for the declining concern. First, Americans are a bit more positive now than they have been in the past about the quality of the environment. Second, the economic downturn has forced Americans to focus more on bread-and-butter economic issues than quality-of-life issues. It may be no coincidence that environmental concern was highest in 2000, when the U.S. was enjoying one of the strongest economies in recent memory, and that environmental concern has reached new lows recently, after the worst financial downturn in the last 25 years."

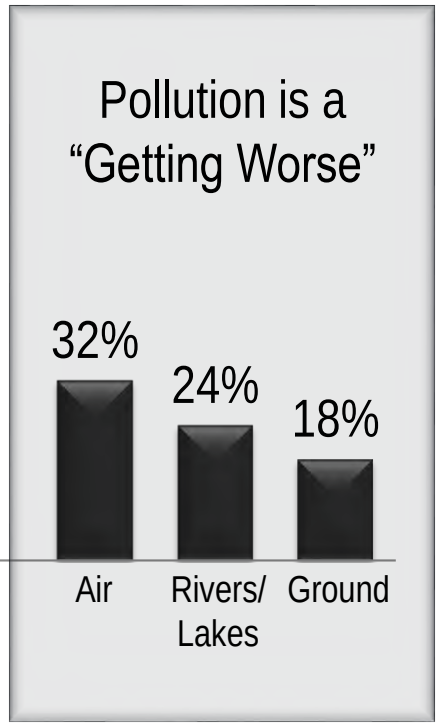
- Gallup

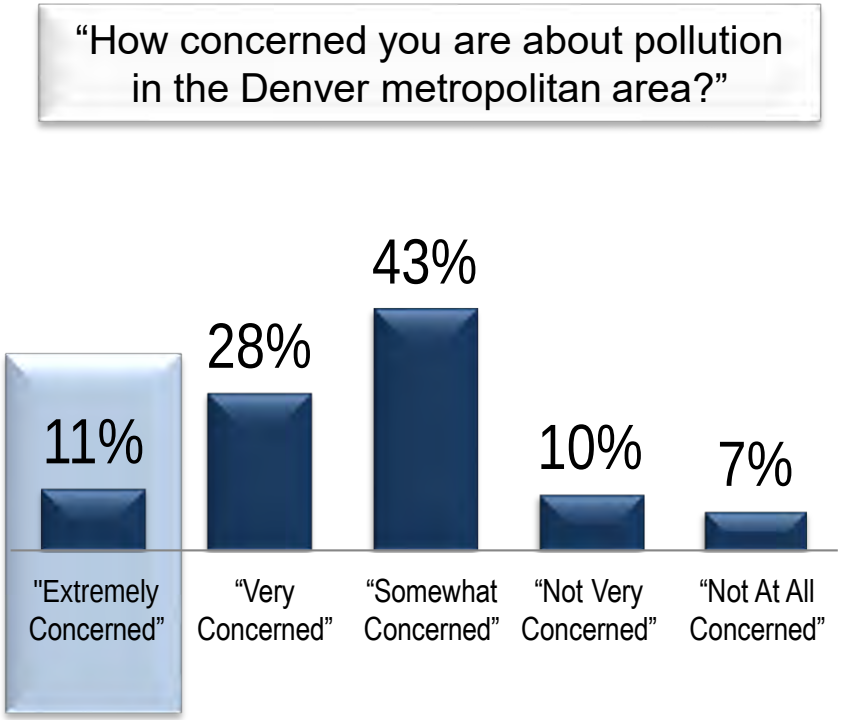
Messaging Point: We need to recognize that especially during difficult times, other issues are going to be capturing people's attention.

[1]Source: www.Gallup.com article: *Worry About U.S. Water, Air Pollution at Historical Lows* http://www.gallup.com/poll/153875/worry-water-air-pollution-historical-lows.aspx, April 13, 2012

Less General Concern About Pollution







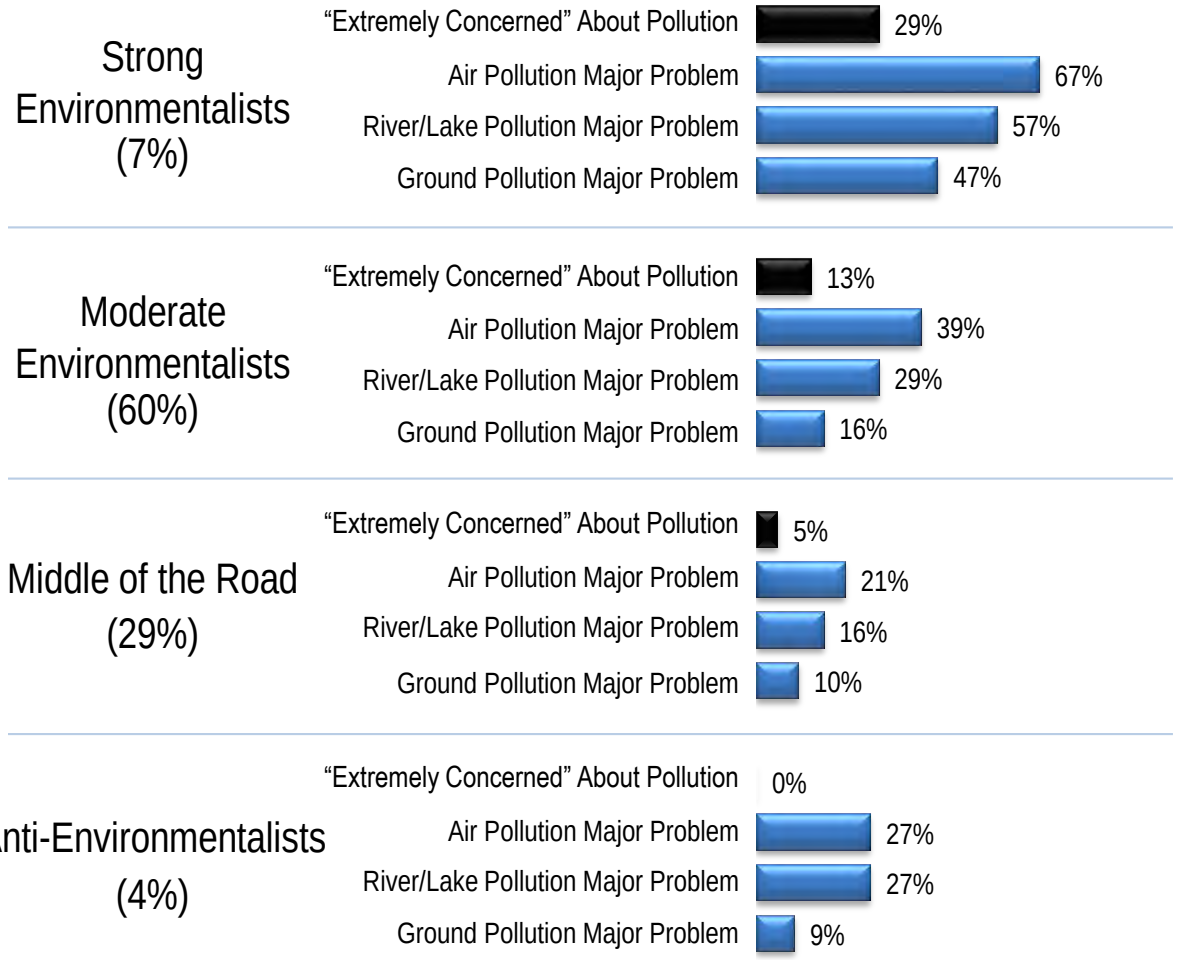
The conclusions of the Gallup study fit nicely with this research, where we see that many consider air, water and ground pollution to be a problem, but these problems are not creating a commensurate level of concern. To illustrate, the first chart on the left shows the percentage of respondents who believe these three types of pollution are a "major" problem in the metro area, and the second chart shows the percentage who feel these sources of pollution are "getting worse," all coming in at nearly 20% or higher for each, and reaching as high as over one-third when it comes to air pollution. Yet when participants were asked how concerned they are about pollution in the Denver metropolitan area (on the right), only11% said they were "extremely concerned." Granted, another 28% said they were "very concerned," but considering the percentages describing these as "major problems," it was apparently not enough of a problem to receive their fullest conviction when it comes to being a concern.

Messaging Point: Without concern, change will be difficult.

Questions: How concerned are you about pollution in the Denver metropolitan area?
Thinking about pollution in the Denver metropolitan area, how much of a problem do you consider…?
Do you think the amount of pollution that we have in the Denver metro area has gotten better, worse or stayed the same over the last year?

Base: All participants; n=300

Lack of Concern is Concerning



When we look at the level of concern one has about pollution in the Denver area in relation to their self-described environmental status, we see the same pattern. Even among those who consider themselves the strongest environmentalists, only 29% are "extremely concerned" about pollution in the metro-area, despite the fact that at least half considered air (67%), water (57%) and ground pollution (47%) in the area to be a "major" problem.

The level of concern one has about pollution in the metro area declines quickly with environmental status, from 29% among the strongest environmentalists to 13% among those in the moderate category to 5% for those in the middle of the road and 0% among anti-environmentalists.

Questions: How concerned are you about pollution in the Denver metropolitan area?
Thinking about pollution in the Denver metropolitan area, how much of a problem do you consider…?

Base: All participants; n=300

General Concern About Pollution

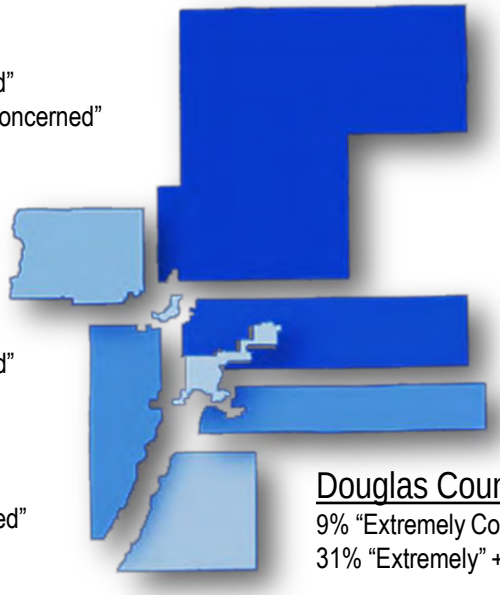
Strongest Correlated Metrics to "How concerned are you about pollution in the Denver metropolitan area?"

Metric	Correlation Coefficient
Thinking about pollution in the Denver metropolitan area, how much of a problem do you consider pollution in the air to be?	0.60
Thinking about pollution in the Denver metropolitan area, how much of a problem do you consider pollution in the rivers and lakes, including trash and litter to be?	0.41
Litter also ends up in the rivers by just blowing there from local neighborhoods, as well as from people who use the parks, bike paths and facilities along the rivers and leave trash behind. Does this bother you?	0.41
How would you describe your political leanings? Would you say you are:	0.40
Which of the four following statements best describes your attitudes toward environmentalism?	0.39
Some of the litter that goes to Denver-area rivers ends up on the banks of the river, other litter sinks to the bottom and other pieces of litter get washed further downstream. Does knowing this bother you?	0.38
How important is it to YOU that we have clean water in our metro-area rivers?	0.38
How important is it to YOU that we have clean water in our local reservoirs?	0.36
Thinking about pollution in the Denver metropolitan area, how much of a problem do you consider pollution on the ground, including trash and litter to be?	0.30
Do you think the amount of pollution In the air that we have in the Denver metro area has gotten better, worse or has stayed the same over the last two years?	0.30
How important is it to YOU that we have clean water in our mountain lakes and rivers?	0.27
How much did the litter you saw along the river bother you?	0.26
Do you think the amount of pollution In the rivers and lakes that we have in the Denver metro area has gotten better, worse or has stayed the same over the last two years?	0.20

To understand what respondents are thinking about when expressing their level of concern regarding pollution in the Denver metro area, we can examine how answers to this question correlate to other questions in the survey. From this correlation analysis, we find that concerns about pollution in general are tied most closely to attitudes toward air pollution, with a correlation coefficient of 0.60 (where 0 indicates no relationship whatsoever and 1.0 being a perfect one-to-one relationship). Air pollution is therefore once again clearly identified as the most critical component to how Denver-area residents think about pollution. Importantly, two water pollution-oriented metrics (river/lake pollution being seen as a problem, and being bothered by litter blowing into rivers) come in second, although with substantially lower correlation coefficients, both at 0.41.

Pollution Concerns by County

Concern About Metro Area Pollution



Boulder County
13% "Extremely Concerned"
33% "Extremely" + "Very Concerned"

Weld County
7% "Extremely Concerned"
33% "Extremely" + "Very Concerned"

Adams County
14% "Extremely Concerned"
51% "Extremely" + "Very Concerned"

Denver County
16% "Extremely Concerned"
44% "Extremely" + "Very Concerned"

Arapahoe County
7% "Extremely Concerned"
38% "Extremely" + "Very Concerned"

Jefferson County
11% "Extremely Concerned"
40% "Extremely" + "Very Concerned"

Douglas County
9% "Extremely Concerned"
31% "Extremely" + "Very Concerned"

Concern about pollution is fairly consistent throughout the metro-area, with approximately 10-15% of participants in each county saying they are "Extremely Concerned" about pollution and about one-third being "Extremely" or "Very Concerned." Only Adams county stands out, with 51% either "Extremely" or "Very Concerned," substantially higher than every other county.

Adams county participants are also significantly more likely to say that air, water and ground pollution is a "major" problem than residents of other counties (see table below). Other counties are fairly similar to one another on these ratings, with the exception of Douglas county, which is significantly less likely to consider any of these forms of pollution to be a "major" problem. Douglas County has the highest median household income of these counties ($101,193 compared to $57,685 for all of Colorado[1]).

[1]quickfacts.census.gov

	Sample Size	Adams n=37	Arapahoe n=61	Boulder n=30	Denver n=62	Douglas n=32	Jefferson n=47	Weld n=27
"Major" Pollution Problem	Air	57%	36%	33%	39%	13%	28%	30%
	Water	43%	23%	27%	35%	13%	23%	22%
	Ground	30%	11%	7%	23%	3%	17%	15%
Problem is "Getting Worse"	Air	43%	23%	28%	33%	34%	33%	37%
	Water	38%	15%	29%	27%	21%	34%	24%
	Ground	27%	8%	14%	22%	19%	25%	15%

*Broomfield county is not reported because the sample size is too small (n=4)

Shaded cells indicate statistically significant differences from others at the 95% level of confidence.

Pollution Concerns by Demographic

		Gender		Age					Income				
		Male	Female	Under 25	25-34	35-49	50-64	65+	Less than $25K	$25K- <$45K	$45K - <$75K	$75K- <$150K	$150K or More
	Sample Size	*n=151*	*n=149*	*n=23*	*n=56*	*n=96*	*n=82*	*n=43*	*n=29*	*n=31*	*n=59*	*n=88*	*n=37*
Concern about Denver Pollution	"Extremely Concerned"	11%	11%	4%	14%	4%	13%	23%	7%	6%	15%	9%	16%
	"Extremely" and "Very Concerned"	33%	46%	35%	32%	36%	39%	58%	38%	29%	46%	45%	30%
"Major" Pollution Problem	Air	31%	38%	26%	34%	38%	29%	42%	45%	45%	36%	35%	24%
	Water	25%	30%	52%	25%	28%	16%	37%	38%	29%	24%	24%	30%
	Ground	15%	17%	39%	21%	8%	11%	23%	31%	23%	10%	11%	14%
Problem is "Getting Worse"	Air	27%	37%	43%	33%	29%	28%	37%	28%	29%	30%	36%	24%
	Water	21%	31%	45%	20%	27%	21%	32%	33%	17%	23%	30%	17%
	Ground	15%	23%	30%	21%	18%	15%	21%	22%	19%	18%	18%	14%

Looking at this same set of questions, but this time by respondents' demographic characteristics of gender, age and income, reveals that males and females have different levels of concern about pollution in the Denver metro area, with nearly half of females (46%) "Extremely" or "Very Concerned," compared to a third of males (33%). Interestingly, males and females also differ significantly in their opinions of whether water pollution is getting worse, with females more likely to believe it is getting worse (31% versus 21% of males).

Older participants (those 65 years of age or older) were the most concerned about Denver-area pollution, having both the highest top-box rating of "Extremely Concerned," at 23% and top-two box rating of 58%. However, the youngest participants (those under 25 years of age) were the most likely to consider water and ground pollution to be a "major" problem, and were the only demographic group other than females to feel that the water pollution problem is getting worse (45%). Yet when asked about their concern about Denver pollution in general, these youngest respondents were tied with those 35 to 49 years of age for the lowest level of concern, with only 4% "Extremely Concerned."

Questions: How concerned are you about pollution in the Denver metropolitan area?
Thinking about pollution in the Denver metropolitan area, how much of a problem do you consider…?
Do you think the amount of pollution that we have in the Denver metro area has gotten better, worse or stayed the same over the last year?

Shaded cells indicate statistically significant differences from others at the 95% level of confidence.

Pollution Concerns by Demographic

		Ethnicity			Household					Political Leanings		
		Caucasian	Latino	Other	Married	Single	Other	Kids	No Kids	Liberal	Mixed	Conservative
	Sample Size	*n=228*	*n=54*	*n=16*	*n=221*	*n=50*	*n=26*	*n=176*	*n=119*	*n=111*	*n=42*	*n=91*
Concern about Denver Pollution	"Extremely Concerned"	12%	6%	25%	14%	4%	8%	11%	12%	17%	14%	7%
	"Extremely" and "Very Concerned"	41%	31%	50%	41%	28%	46%	41%	36%	57%	40%	24%
"Major" Pollution Problem	Air	33%	39%	38%	34%	34%	38%	35%	34%	49%	38%	19%
	Water	24%	44%	19%	27%	34%	12%	31%	22%	39%	24%	15%
	Ground	13%	28%	19%	13%	30%	12%	17%	14%	23%	12%	10%
Problem is "Getting Worse"	Air	31%	35%	38%	32%	34%	27%	30%	34%	40%	29%	21%
	Water	25%	31%	33%	27%	27%	14%	28%	23%	36%	19%	16%
	Ground	17%	21%	43%	20%	20%	12%	19%	19%	25%	13%	13%

We see additional differences in attitudes regarding pollution depending on participants' ethnicity, marital status, and political leanings. Caucasian participants are significantly less likely to believe that water and ground pollution are a "major" problem than Hispanics, with ratings at least 15 points lower on these two forms of pollution.

Married participants show greater concern about pollution at the top-box level (14% "Extremely Concerned") than singles (48%), but are significantly less likely to say that ground pollution is a "major" problem, at 13%, which is less than half that of singles (30%). Interestingly, whether or not there are children in the household has no impact on any of these attitudes surrounding pollution in the metro-area.

Liberal-leaning participants differ from conservative-leaning participants on nearly every one of these ratings. Liberal participants are typically at least twice as likely to be concerned about Denver-area pollution, to consider all of the different types of pollution to be "major" problems, and to say these forms of pollution are "getting worse" than their conservative participants.

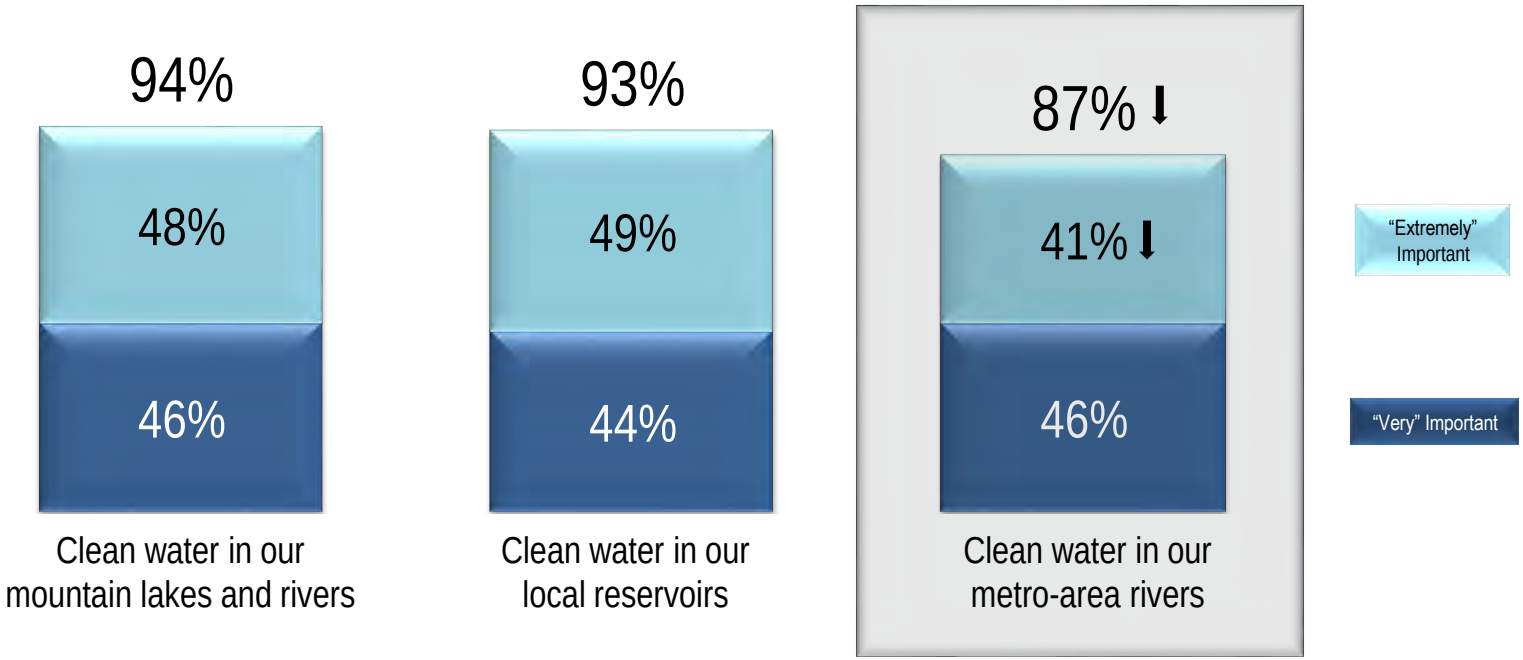
Questions: How concerned are you about pollution in the Denver metropolitan area?
Thinking about pollution in the Denver metropolitan area, how much of a problem do you consider…?
Do you think the amount of pollution that we have in the Denver metro area has gotten better, worse or stayed the same over the last year?

Shaded cells indicate statistically significant differences from others at the 95% level of confidence.

Local Water Concerns

Importance of Clean Colorado Water

"How important is it to you that we have…"



To more specifically address respondents' attitudes regarding water pollution, we asked them how important it is to have clean water: in the mountains; in local reservoirs; and in our metro-area rivers. Half of all participants said it was "Extremely Important" to have clean water in the mountains and local reservoirs, but this drops significantly to 41% when it comes to metro-area rivers. This may suggest that some people feel a certain amount of water pollution in the city riverways is to be expected. However, for all three water sources, no participants said it was "Not At All Important" to have clear water for each, and only 1% said clean water in our metro-area rivers was "Not Very Important." Therefore, nearly all participants consider having clean water in each of these places at least "Somewhat Important."

Question: How important is it to you that we have clean water in our…?

Base: All participants; n=300

Local Water Importance by Demographic

Top-Box Importance of clean water in our… (% "Extremely Important")	Gender		Age					Income				
	Male n=151	Female n=149	Under 25 n=23	25-34 n=56	35-49 n=96	50-64 n=82	65+ n=43	Less than $25K n=29	$25K-<$45K n=31	$45K -<$75K n=59	$75K-<$150K n=88	$150K or More n=37
Mountain Lakes/Rivers	45%	52%	48%	50%	50%	51%	37%	34%	26%	54%	60%	43%
Local Reservoirs	44%	54%	26%	55%	52%	54%	40%	41%	32%	53%	61%	51%
Metro-Area Rivers	38%	44%	35%	39%	46%	44%	33%	38%	23%	46%	51%	35%

	Ethnicity			Household					Political Leanings		
	Caucasian n=228	Latino n=54	Other n=16	Married n=221	Single n=50	Other n=26	Kids n=176	No Kids n=119	Liberal n=111	Mixed n=42	Conservative n=91
Mountain Lakes/Rivers	48%	48%	56%	48%	52%	47%	53%	41%	60%	45%	37%
Local Reservoirs	50%	43%	63%	50%	44%	50%	53%	44%	64%	45%	40%
Metro-Area Rivers	40%	44%	50%	40%	46%	38%	47%	33%	55%	36%	32%

	Education			County						
	H.S. or Less n=53	Some College/Tech n=65	College Graduate n=170	Adams n=37	Arapahoe n=61	Boulder n=30	Denver n=62	Douglas n=32	Jefferson n=47	Weld n=27
Mountain Lakes/Rivers	45%	43%	50%	51%	46%	57%	58%	44%	43%	37%
Local Reservoirs	42%	46%	52%	57%	51%	60%	56%	44%	38%	37%
Metro-Area Rivers	40%	37%	43%	49%	41%	47%	45%	38%	38%	26%

These ratings do not vary substantially by participant demographics. Clean water in metro-area rivers is rated the lowest in importance of the three areas of water pollution by every demographic group except those under 25 years of age, who instead consider clean water in local reservoirs to be the least important. Parents with children at home rate the importance of clean water in metro-area rivers significantly higher than average, at 47% compared to just 33% among those without kids, possibly a reflection of local river usage. There is also some difference in attitudes by income, as those with household incomes of $25,000 to $45,000 consider having clean water in each of these areas less important, while those earning $75,000 to $150,000 rate all sources significantly higher. Lastly, we see the familiar differences by political leaning.

Question: How important is it to you that we have clean water in our…?

*Broomfield county is not reported because the sample size is too small (n=4)

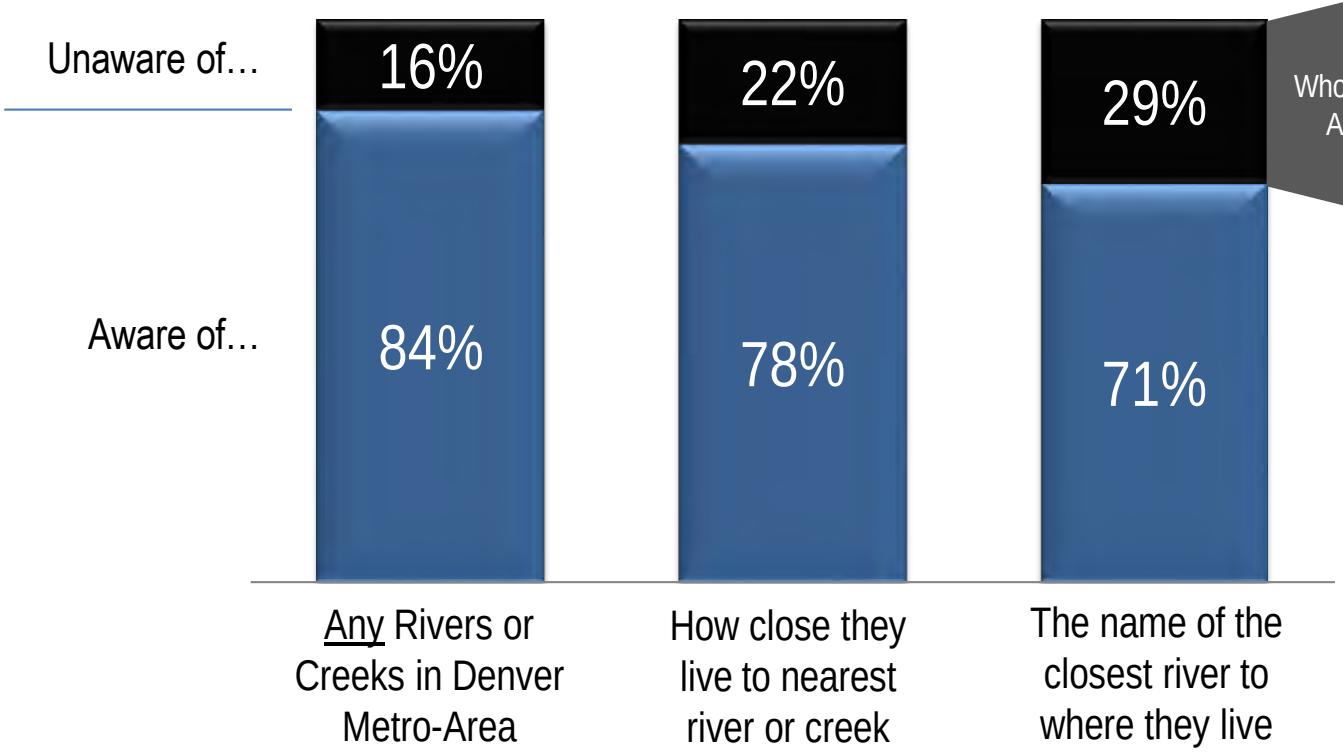
Shaded cells indicate statistically significant differences from others at the 95% level of confidence.

Awareness of Local Rivers and Creeks

THE GREENWAY FOUNDATION SINCE 1974

Market Perceptions

Local Water Awareness/Knowledge



Male	41%
Female	59%
18-24 Years of Age	11%
25-34	32%
35-49	27%
50-64	19%
65+	11%
Earn Under $45K/Year	40%
$45-75K/Year	25%
$75K-$100K/Year	6%
$100K/Year or More	28%
High School Education or Less	32%
Some Coll./Tech.	23%
College Graduate	45%
Liberal	55%
Mixed	19%
Conservative	26%
Caucasian	59%
Latino	30%
Adams County	15%
Arapahoe County	18%
Boulder County	13%
Denver County	24%
Douglas County	10%
Jefferson County	8%
Weld County	13%

Almost two out of ten respondents (16%) were unaware of *any* rivers or creeks that flow through the metro area, and of these, only one person has the "excuse" of living in the area for less than two years. Furthermore, one fifth of all participants (22%) did not know how far they lived from the nearest river or creek, and three out of ten participants (29%) were unable to name the river or creek that is close to where they live. The demographics of the individuals who have little or no awareness of metro-area rivers is a mixed bag. They are significantly more likely to be female (59%), ages 25 to 34 (32%), earn less (40% less than $45,000/year), less educated (32% high school degree or less), liberal in their views (55%) and Latino (30%).

Question: Are you aware of any rivers and creeks that flow through the Denver metropolitan area?
Do you know the name of the river or creek that is closest to where you live?
Do you know how far the nearest river or creek is to where you live?

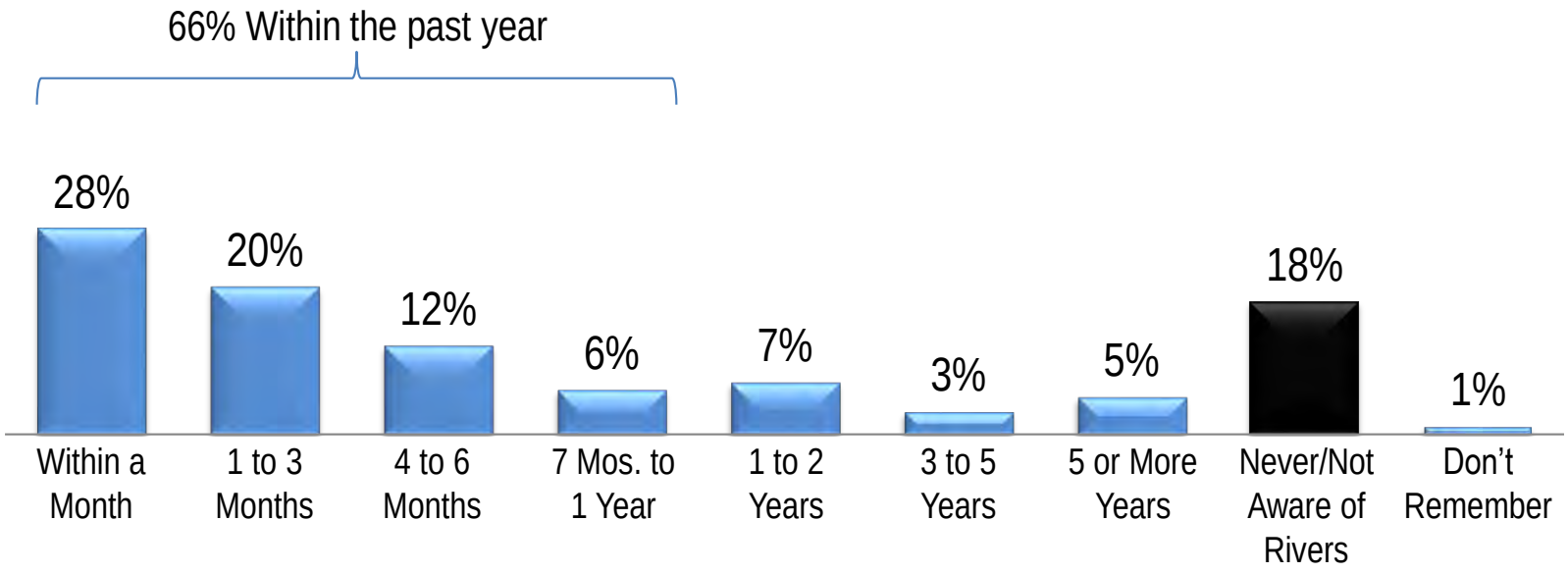
Messaging Point: We must recognize that almost one-third of participants do not have substantial knowledge and awareness of local rivers and creeks.

Base: All participants; n=300

Shaded cells indicate statistically significant differences from others at the 95% level of confidence.

Recent Visits

"When was the last time you went to any river or creek in the Denver metropolitan area?"



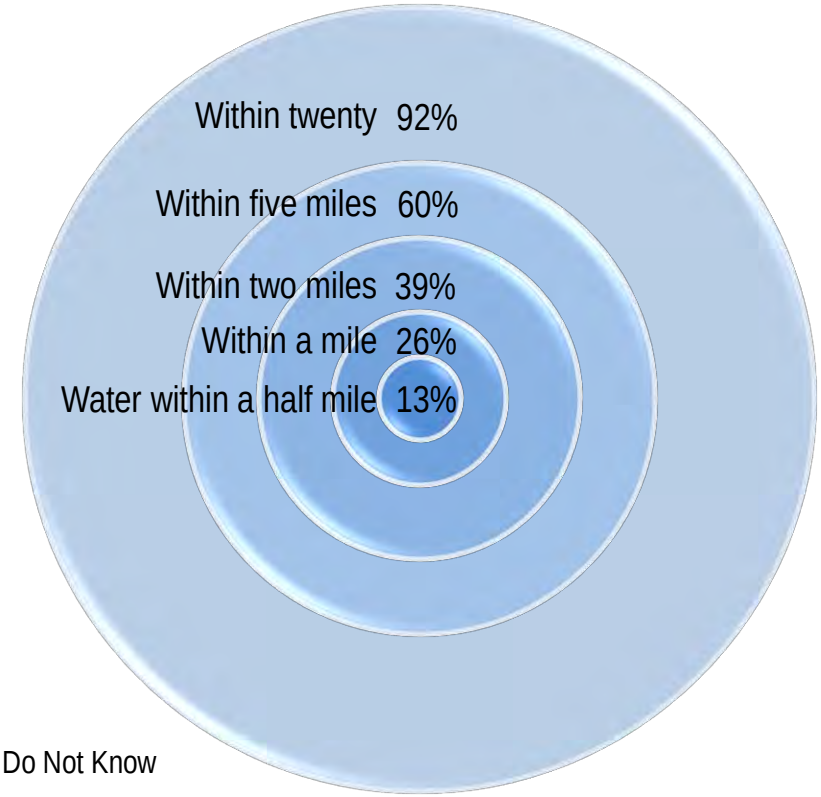
Nonetheless, two-thirds of all participants (66%) said they have visited a river or creek in the Denver-metro area within the past year, with half (48%) having done so within the past three months.

Question: When was the last time you went to ANY river or creek in the Denver metropolitan area?

Base: All Participants; n=300

Local Water

Residents' Proximity to Water



22% Do Not Know

Nearest River or Creek

South Platte 31%

Cherry Creek 15%

Clear Creek 4%

Bear Creek 3%

Boulder Creek 3%

Sand Creek 3%

All Others Less than 2%

No Idea 29%

Westerly Creek
Box Elder Creek
Little Thompson
North Creek
Kurk Creek
Blue River
Ralston Creek
Marshville Ditch
Brighton Canyon
Coal Creek
Four Mile Creek

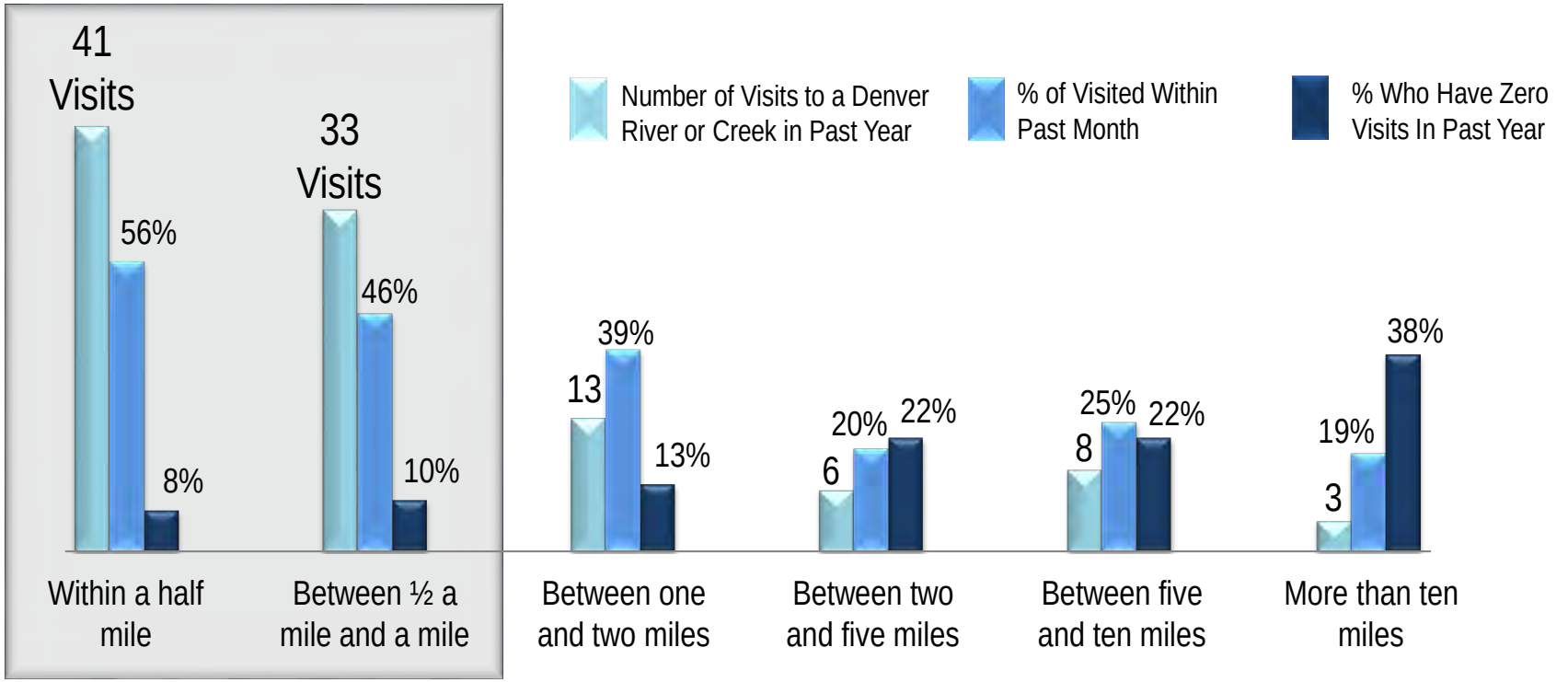
Most participants (84%) were aware of rivers or creeks flowing through the Denver metropolitan area, and four out of ten (39%) said they lived within two miles of water, 26% living within a mile and 13% within just a half mile. When asked for the name of the river or creek which is closest to where they live, the most common response was the South Platte, at 34%, followed by Cherry Creek (18%). Three out of ten (29%) did not know the name of the closest river or creek.

Question: Do you know how far the nearest river or creek is to where you live?
Do you know the name of the river or creek that is closest to where you live?

Base: All Participants; n=300

With Proximity Comes Activity

Frequency and Recency of Visits to Local Riverways



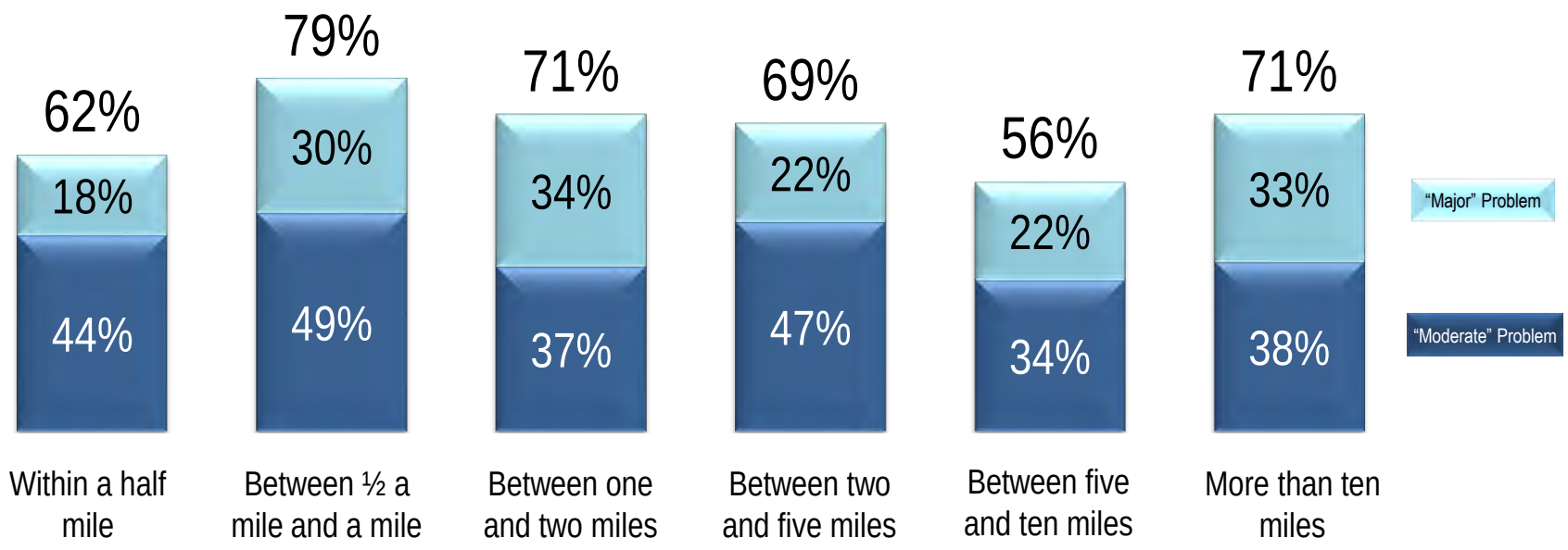
Not surprisingly, living within close proximity to a local river or creek has a substantial impact on how often residents visit the river. Those who live within a half-mile of a local river or creek reported visiting it almost every week, an average of 41 times over the past year. Those living between a half-mile and a mile reported visiting just slightly fewer times (33). But once one is a mile or further away, visits to the river drop off dramatically to just 13 times a year for those living between one and two miles and fewer than ten times a year for those living beyond two miles. Not only did those who live closer to a river or creek visit more often during the past year, but had also visited more recently, about half having been to the river within the past month, which also declines quickly as distance from water increases.

Question: How many times in the last year have you been to a Denver-area river or creek?
When was the last time you went to any river or creek in the Denver metro area?

Base: All participants; n=300

Proximity Does Not Guarantee More Awareness

"Thinking about pollution in the Denver metropolitan area, how much of a problem do you consider pollution in the rivers and lakes, including trash and litter to be?"



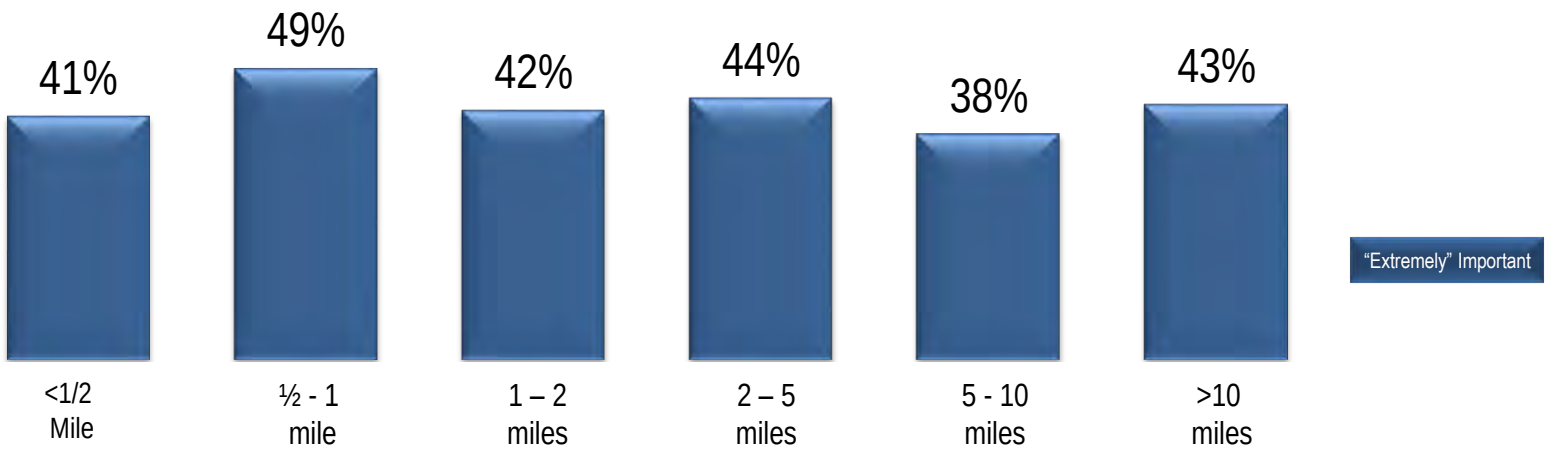
Despite higher levels of interaction with metro-area rivers and creeks by those who live closest to them, this does not impact their belief that river and lake pollution is a problem. In fact, those living closest to a Denver-area river, within just half a mile, are the least likely to consider pollution in rivers and lakes to be a "major" problem (18%).

Question: How much of a problem do you consider pollution in the rivers and lakes, including trash and litter to be?

Base: All participants; n=300

Proximity Does Not Guarantee More Caring

"How important is it to you that we have clean water in our metro-area rivers?"



Similarly, those living closest to rivers do not place greater importance on having clean water in metro-area rivers than those living further away.

Messaging Point: Those living closest to local waterways use them more, but are not any more concerned about the pollution in these waterways.

Question: How important is it to you that we have clean water in our metro-area rivers?

Base: All participants; n=300

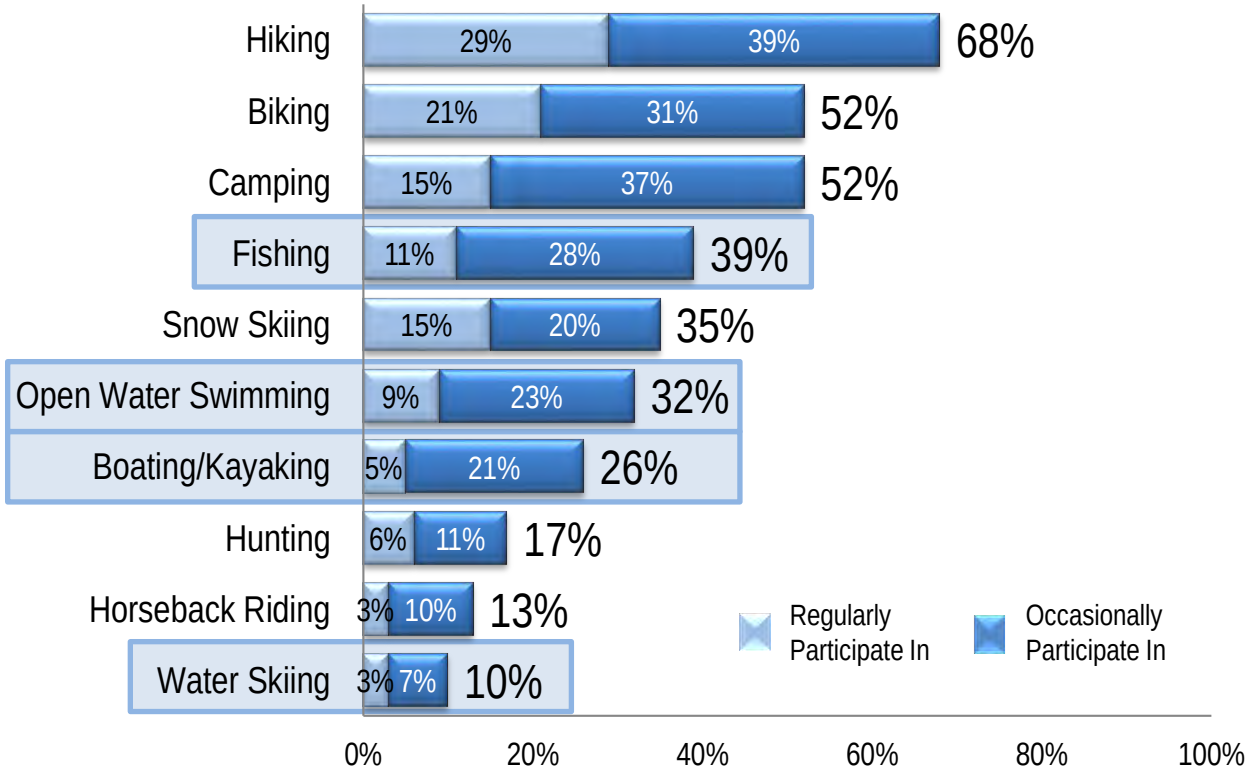
The Effect of an Active Lifestyle

THE GREENWAY FOUNDATION SINCE 1974

Market Perceptions

Active Participants

Outdoor Activities Engaged In By Participants

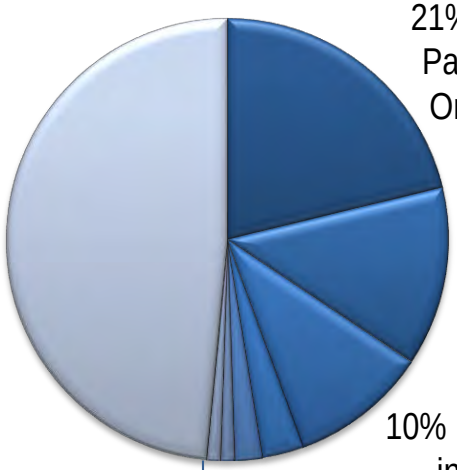


Participants were also asked which of the ten outdoor activities listed above they participate in, allowing us to determine if those who are more active outdoors are also more likely to be concerned about pollution in the metro area. The activity which most people engage in is hiking, with seven out of ten (68%) saying they hike at least "occasionally," and 29% doing so "regularly." Biking and camping are the next most popular outdoor activities (both 52% "occasionally"), followed by fishing, at 39%, which is the highest activity where there is direct contact with water. Other water-related activities include open-water swimming (32%), boating/kayaking (26%) and water skiing, which had the least participation, at 10%.

Question: How often do you participate in each of the following activities in the state of Colorado?

Base: All participants; n=300

Active Attitudes



Non-Active Participants	Active Outdoor Participants
8% "Extremely Concerned" About Pollution	14% "Extremely Concerned" About Pollution
30% Air Pollution Major Problem	39% Air Pollution Major Problem
27% River/Lake Pollution Major Problem	28% River/Lake Pollution Major Problem
15% Ground Pollution Major Problem	16% Ground Pollution Major Problem

Looking across all ten activities by frequency of participation reveals that half of all participants (48%) do not participate in any of these activities on a "regular" basis, 21% regularly participate in only one activity regularly, 13% participate in two activities on a regular basis and 7% participate in three or more.

Comparing active to non-active participants, we find slight, albeit not statistically significant differences, in terms of their attitudes regarding pollution. Active participants are more likely to be "Extremely Concerned" about local pollution (14% among active participants compared to 8% of non-active participants), especially air pollution, which 39% of active participants consider a "major" problem compared to 30% on non-active participants.

Questions: How often do you participate in each of the following activities in the state of Colorado?
How concerned are you about pollution in the Denver metropolitan area?
Thinking about pollution in the Denver metropolitan area, how much of a problem do you consider…?

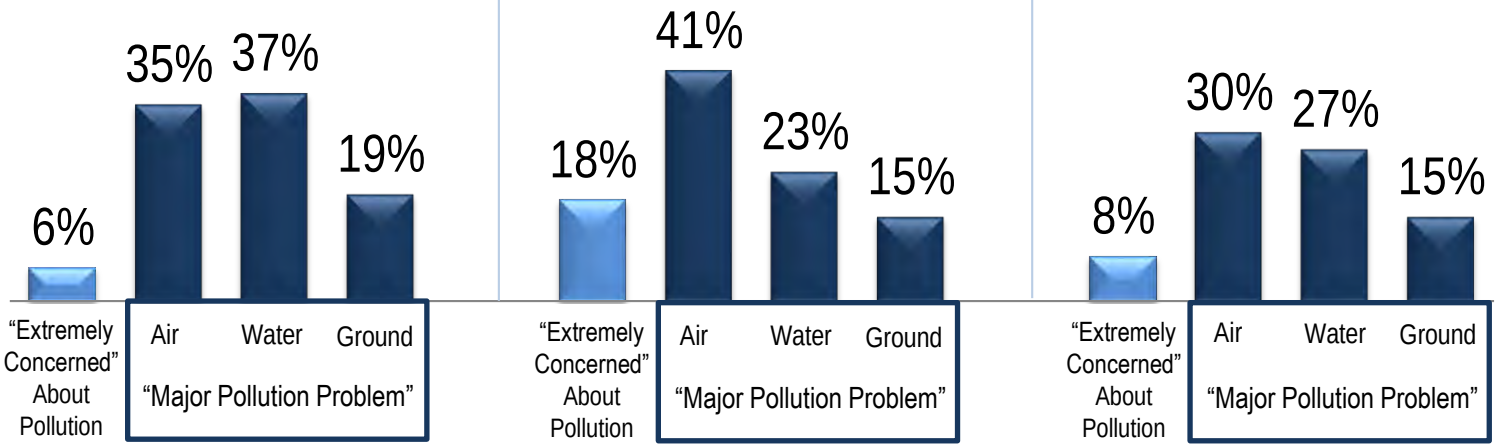
Base: All participants; n=300

Water Activities

Regularly Participate in Water Activities (17%)

Regularly Participate in Non-Water Activities (35%)

Do NOT Participate in Any of These Activities Regularly (48%)

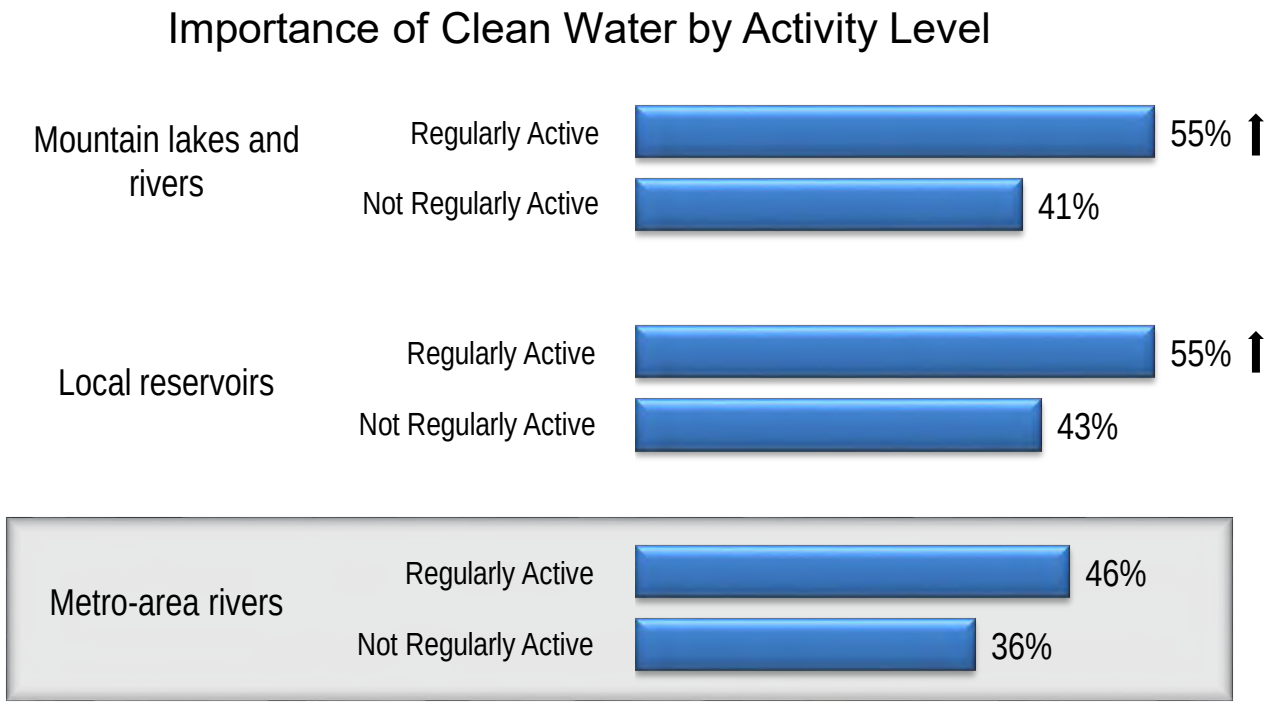


Taking this one step further by breaking out those who participate regularly in water-related activities (7% of all participants) reveals that these respondents who are actively engaged in water activities are the most likely to consider water pollution in the metro area to be a "major" problem, at 37%, compared to just 23% of those who participate in non-water activities and 27% of non-active participants. However, those active in water activities are the *least* concerned about pollution in the Denver metropolitan area, with only 6% "Extremely Concerned," one third the level of other active participants (18%).

Messaging Point: Those who use the local riverways are not much more concerned about water pollution that those who do not participate in any outdoor activities at all.

Questions: How concerned are you about pollution in the Denver metropolitan area?
Thinking about pollution in the Denver metropolitan area, how much of a problem do you consider…?

Impact of Activity



And while there were no differences between participants who regularly participated in water versus non-water activities, *all* active participants rate the importance of having clean water in mountain lakes and local reservoirs nearly 15 points higher than non-active participants (55% versus about 42%).

When it comes to the importance of having clean water in metro-area rivers, active participants rated this higher as well, although this time by only ten points, which is just shy of qualifying as being a statistically significant difference (46% versus 36% among non-active participants).

Question: How important is it to you that we have clean water in our…?

Messaging Point: Clean water in mountains and reservoirs is considered more important than clean water in our local rivers. Connecting local water to water in our wilderness will be important.

Base: All participants; n=300

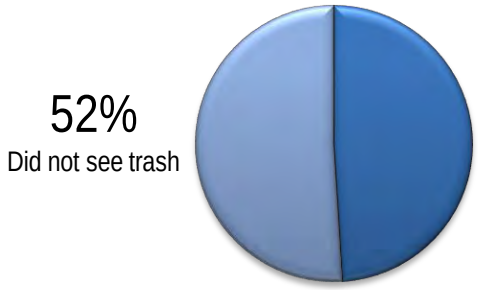
Local Litter Understanding & Impact

THE GREENWAY FOUNDATION SINCE 1974

Market Perceptions

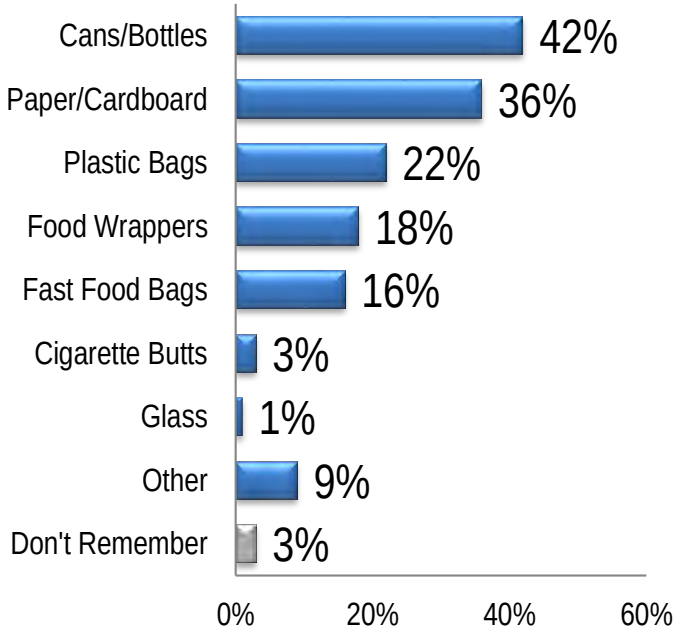
Recent Water Visit Litter Awareness

Litter Presence at Rivers and Lakes



What they saw

Types of Trash Present



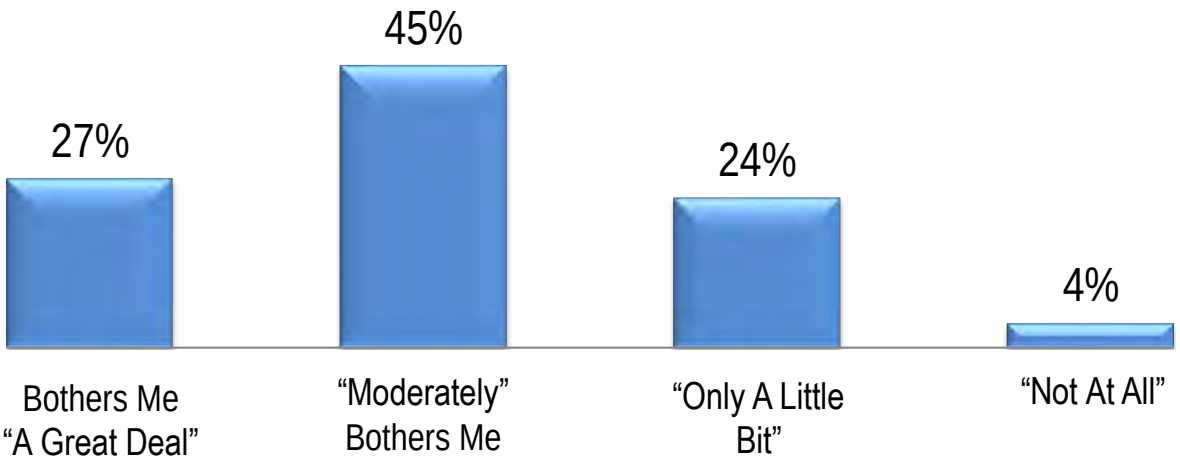
Participants who have recently visited a local riverway were asked if they had seen any litter along the river or creek, and half (48%) said they had. The types of litter most often seen were cans/bottles (42%) and paper/cardboard (36%). Seen about half as often as these two items were plastic bags (22%), food wrappers (18%) and fast food packaging (16%).

Questions: Did you notice any litter or trash the last time you were at a Denver-area river or creek?
What kind of litter or trash do you remember seeing?

Base: Participants who visited riverways recently (within past year); n=197

The Effect of Riverway Litter

"How much did the litter you saw along the river bother you?"



When asked how bothersome it was to see litter along the river, three out of ten participants (27%) say they were bothered "a great deal" and another four out of ten were bothered "moderately" (72% total). Only 4% say they are not bothered at all by seeing litter in the riverway, but one out of four (24%) said seeing litter along the river "only bothered them a little bit."

Question: How much did the litter you saw along the river bother you?

Base: Participants who visited riverways recently (within past year); n=197

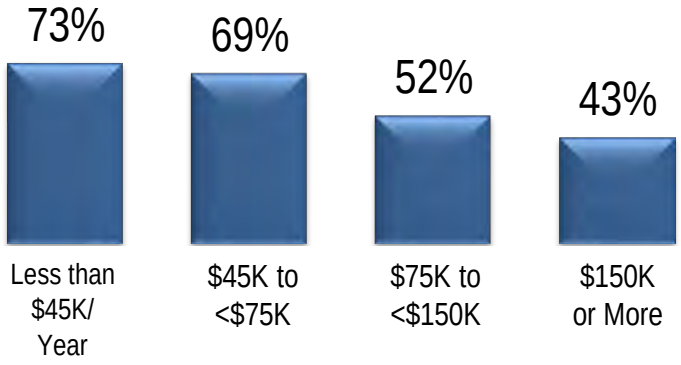
Neighborhood Litter Awareness

Presence of Litter in Their Neighborhood

47%
Do not have litter outside their home

58%
Report having litter visible outside their home

Neighborhood Litter by Household Income



Participants were also asked if they see litter on the ground outside their home. Six out of ten (58%) said if they were to walk outside around their house, litter would be present, which is ten points higher than what was noticed among those who recently visited a local river or creek (48%).

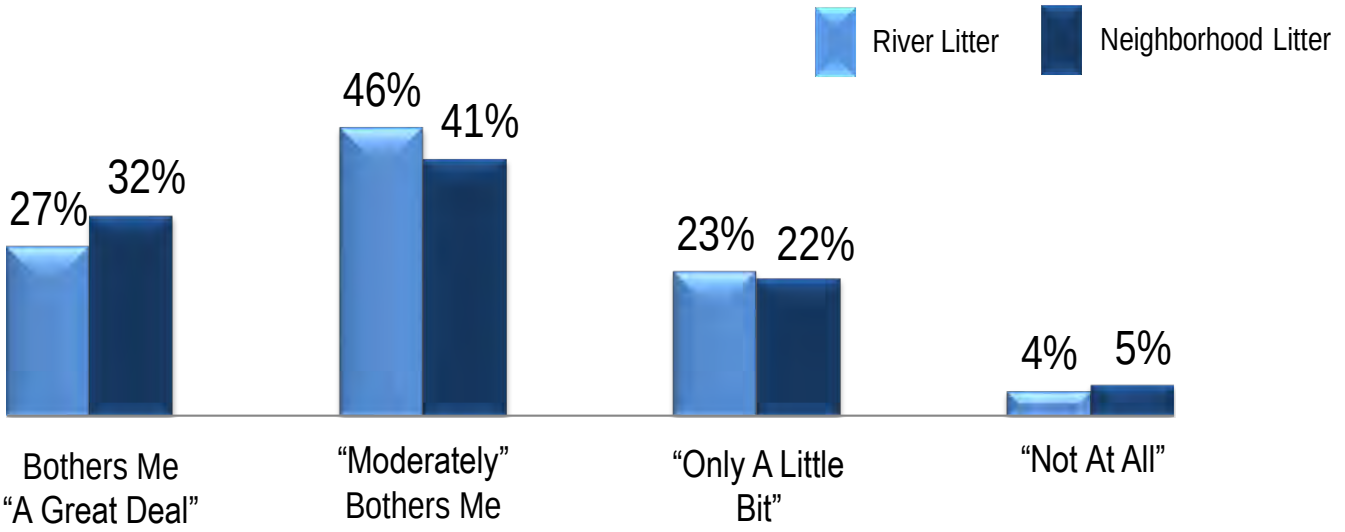
The presence of litter in one's neighborhoods varies considerably by household income, with those earning the least being the most likely to see litter outside of their homes (73% among those with household incomes of $45,000 or less per year). This declines steadily as income increases, with those earning the most ($150,000 or more) being the least likely to notice litter in their neighborhoods (43%).

Question: If you were to walk outside around your home, do you think you would see any litter on the ground?

Base: All participants; n=300

Which Litter Is More Bothersome

River versus Neighborhood Litter



When comparing how bothersome it is to see litter at a river versus litter in their neighborhood, there is very little difference. Three out of ten are bothered "a great deal" by litter in both of these places and only about 5% say they are not bothered at all. However, when looking at this by income, something interesting occurs. Neighborhood litter is equally bothersome at most income levels, but among those earning the most ($150,000 or more), river litter is significantly *less* bothersome with just 14% who are "bothered a great deal" compared to 38% of these in this highest income category who are "bothered a great deal" when they see litter in their neighborhoods.

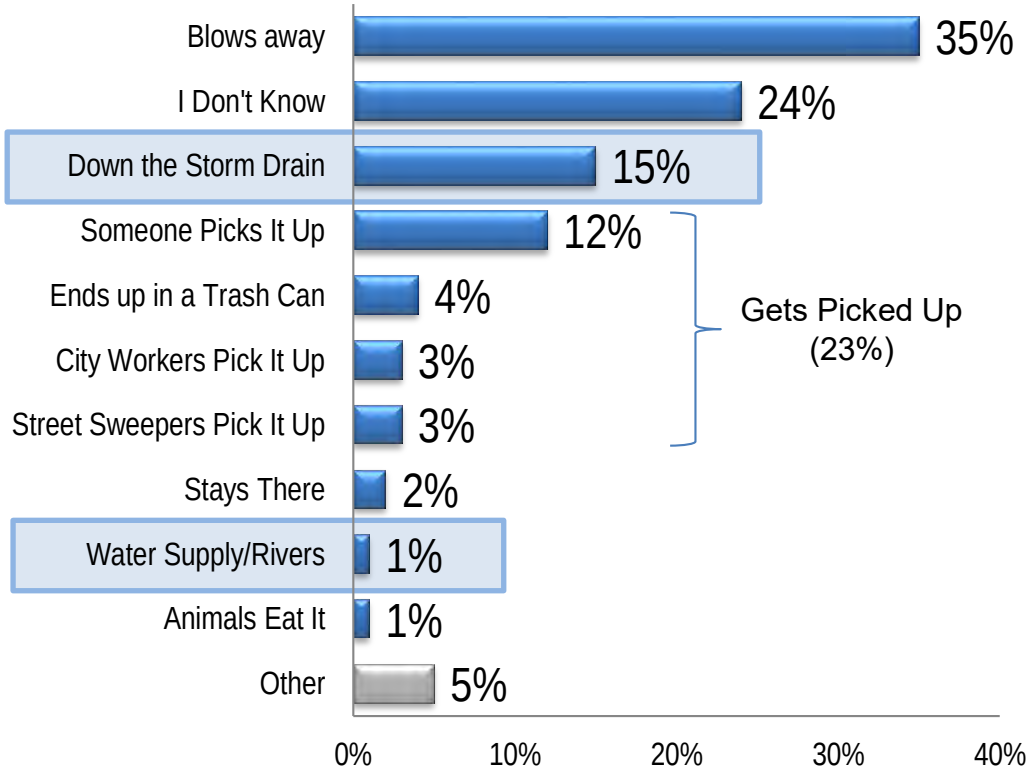
"Bothers Me A Great Deal" Ratings by Income	Income			
	Less than $45K	$45K - <$75K	$75K- <$150K	$150K or More
Creek/River Litter	26%	23%	30%	14%
Neighborhood Litter	34%	15%	41%	38%

Questions: How much did the litter you saw along the river bother you?
How much are you bothered by the litter you see outside in your neighborhood?

Base: All participants; n=300

Litter Disposal Understanding

"When you see trash in your neighborhood that does not get picked up, where do you think it goes?"



Most participants believe that the trash they see in their neighborhoods simply "goes away," either because the wind blows it somewhere (35%) or it goes down a storm drain (16%). One out of four (24%) couldn't even venture a guess as to where the trash in their neighborhood might go.

One out of four participants (23%) believe the trash in their neighborhood gets picked up, either by a person or a machine such as a street sweeper. Only 1% specifically said that the trash in their neighborhoods ends up in the rivers or water supplies.

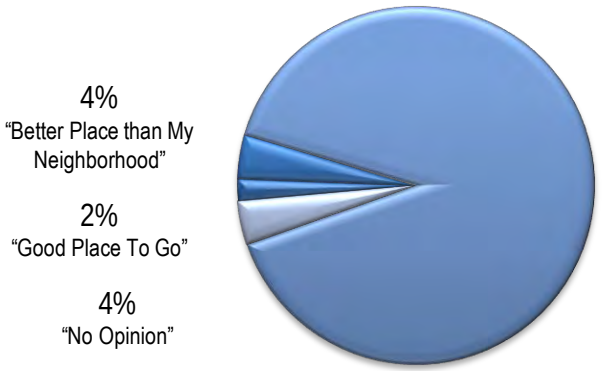
*Percentages exceed 100% due to multiple responses

Question: When you see trash in your neighborhood that does not get picked up, where do you think it goes?

Base: All participants; n=300

Storm Drains & Litter

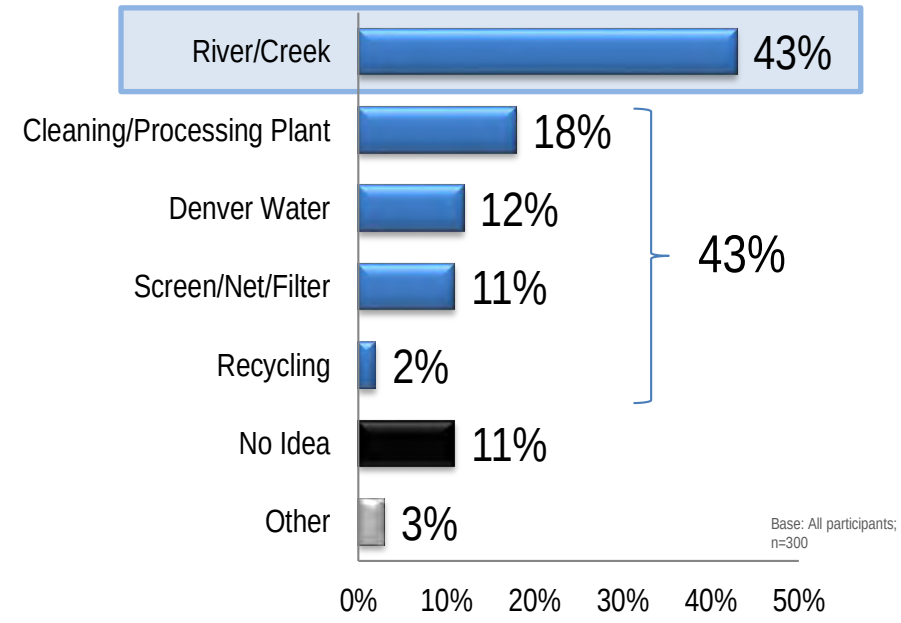
"Some of the litter that is blowing around in our neighborhoods, yards, streets and alleys gets washed down the storm drains. Thinking about all the places litter can go, what do you think about litter that goes down the storm drain?"



91%
Believe this is a bad place for it to go

Base: Participants unaware litter may enter storm drain; n=254

"When litter goes into the storm drain, where do you think it goes from there?"



Base: All participants; n=300

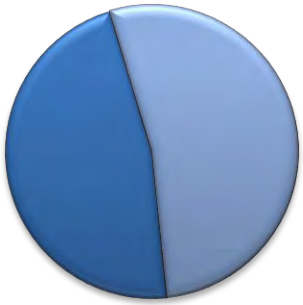
When told that litter can go down the storm drain, nearly everyone surveyed said this was a bad place for litter to go (91%). However, a handful of respondents thought going down the storm drain was a good place to go, or better than blowing around their neighborhoods (6%). When asked where the they thought litter went after entering the storm drains, respondents were divided between thinking it went directly into the river (43%) and thinking it was cleaned out before reaching a riverway (43%), such as by Denver Water or some other processing facility. One out of ten (11%) simply have no idea where litter goes after entering a storm drain. Those who thought litter going down the storm drain was a good thing all thought it would be filtered out before reaching the waterway. Clearly there is room to improve knowledge surrounding this problem.

Questions: Thinking about all the places litter can go, what do you think about litter that goes down the storm drain?
When Litter goes into the storm drain, where do you think it goes from there?

Water Pollution

Respondents were told that "litter that goes into the storm drain actually goes into the river" without a cleaning or filter process

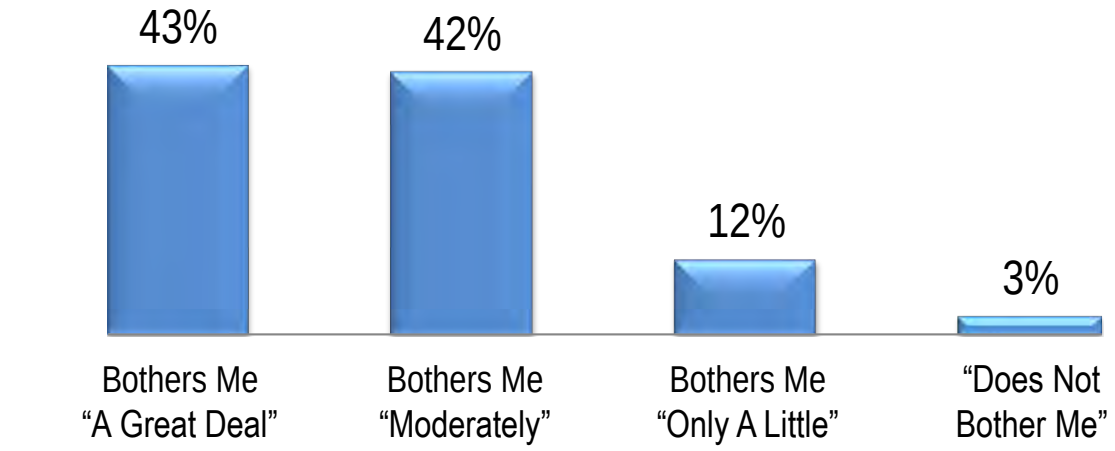
47%
Said this was a surprise to them



53%
Were not surprised

Base: Participants unaware storm drain leads to river; n=171

Amount Storm Drain Litter Bothers Participants



Base: All participants; n=300

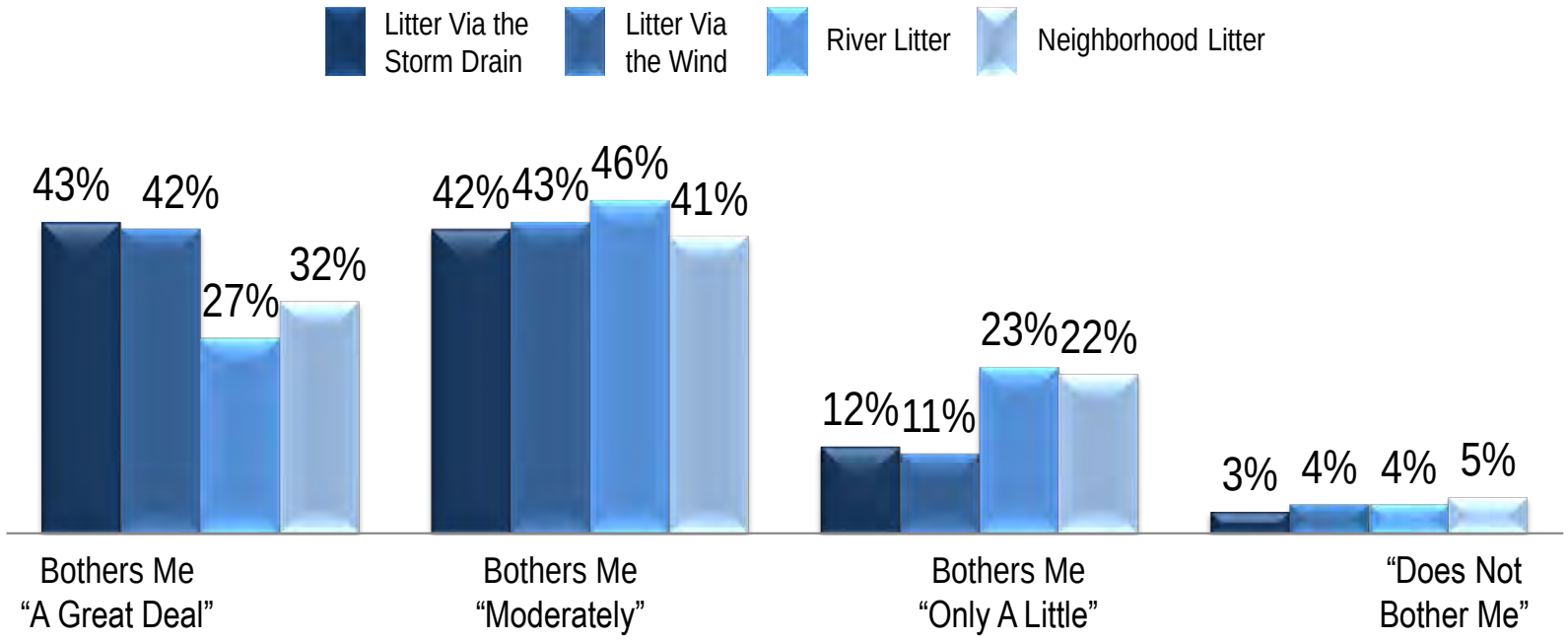
Participants who did not know that litter which enters a storm drain ultimately ends up in a river were told this is where it goes, without any filtering process. Respondents were evenly divided in terms of whether or not they found this to be surprising.

With everyone now aware that litter in the storm drain goes into the rivers, they were asked how much this bothers them. This time eight out of ten (85%) were at least "Moderately Bothered" by this fact and 43% were bothered a great deal, making this a substantially greater concern than seeing litter in their neighborhoods (73%) or seeing litter along the rivers (also 73%).

Questions: Litter that goes into the storm drain actually goes directly into the river. There is no cleaning or filter process. Does this surprise you?
Some of the litter that goes to Denver-area rivers ends up on the banks of the river, other litter sinks to the bottom and other pieces of litter get washed further downstream. Does this bother you?
Litter also ends up in the rivers by just blowing there from local neighborhoods, as well as from people who use parks, bike paths and facilities along the rivers and leave trash behind. Does this bother you?

Pollution Source Comparison

Storm Drain Litter Versus Wind-Driven Litter



Base: All participants; n=300

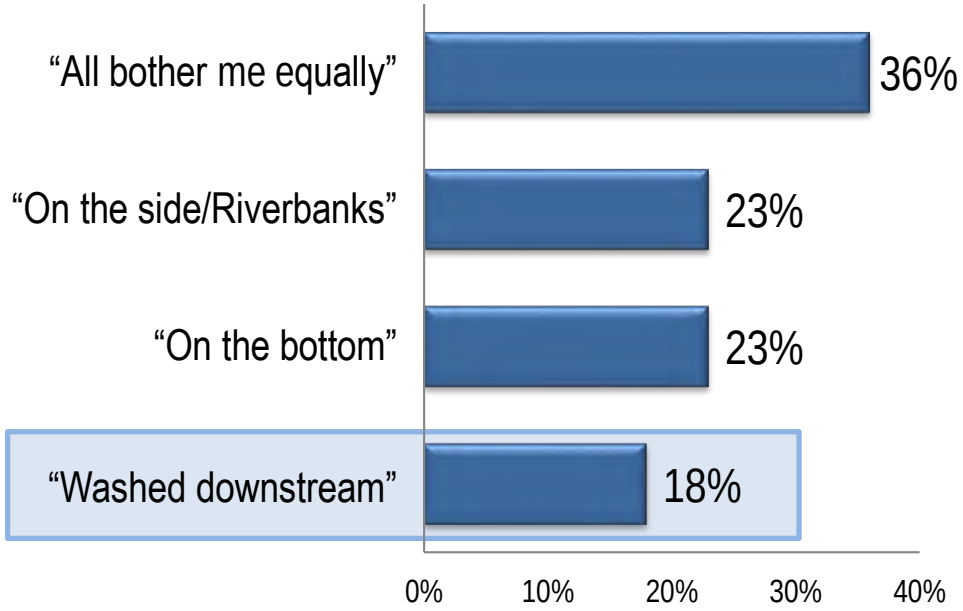
Participants were also told that litter which blows around their neighborhoods, parks and paths along the rivers also can make its way into local riverways. Regardless of where the litter came from, be it from storm drains or wind-blown, participants were equally bothered. Over eight out of ten participants (85%) finding the thought of litter from their neighborhoods making its way to local rivers at least "Moderately Bothersome" and four in ten saying they are bothered "A Great Deal" by this information. Hearing about litter from their neighborhoods entering the local rivers is considered much more bothersome than seeing litter in their neighborhoods or even seeing litter along the river.

Messaging Point: Connecting *their* litter to litter in the rivers is key.

Questions: Some of the litter that goes to Denver-area rivers (via storm drain) ends up on the banks of the river, other litter sinks to the bottom and other pieces of litter get washed further downstream. Does this bother you? Litter also ends up in the rivers by just blowing there from local neighborhoods, as well as from people who use parks, bike paths and facilities along the rivers and leave trash behind. Does this bother you?

Bothersome River Litter

"Which bothers you the most? The thought of litter ending up on the banks of the river, sinking to the bottom of the river, or getting washed downstream?"



Base: Participants bothered by different types of river litter; n=289

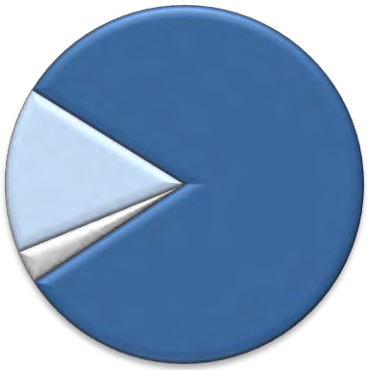
Litter can end up sinking, floating or getting stuck on the riverbanks. Most people 36% were bothered equally by the thought of litter in any of these places. However, about a quarter (23%) were bothered the most by either the idea of seeing litter on the riverbanks (visible) or on the bottom of the river. The least bothersome was litter that washed downstream (18%), which again suggests that litter that "goes away" is not as much their problem.

Messaging Point: Seeing the litter float away is the least effective unless it is connected to ending up in a wilderness area.

Question: Which bothers you the most? The thought of litter ending up on the banks of the river, sinking to the bottom of the river, or getting washed downstream?"

More People Should Help

Cleaning-up Litter



Base: All participants; n=300

When asked if more Denver-area residents should help pick up litter in their neighborhoods, eight out of ten participants (82%) said yes. Those who live in Adams county were significantly more likely to believe this, at 97%, compared to just 79% on average for all other counties. Parents with young children (under 10 years of age) were also significantly more likely to say that metro-area residents should help (85%).

Among the 15% who felt litter is already being sufficiently picked up included the oldest participants (28% among those 65 or older), highest earning participants (27% among those earning $150K or more per year) and residents of Denver county (29%).

Those Significantly More Apt to Say
More Residents Need to Help

- Residents of Adams county (97% versus 79% among others)
- Parents of children still living at home (85% versus 76% among others)

Those Significantly More Apt to Say
Litter is Sufficiently Taken Care Of

- Participants ages 65 and older (28% versus 13% among others)
- Those with household incomes $150,000 per year or greater (27% versus 12% among others)
- Residents of Denver county (29% versus 12% among others)

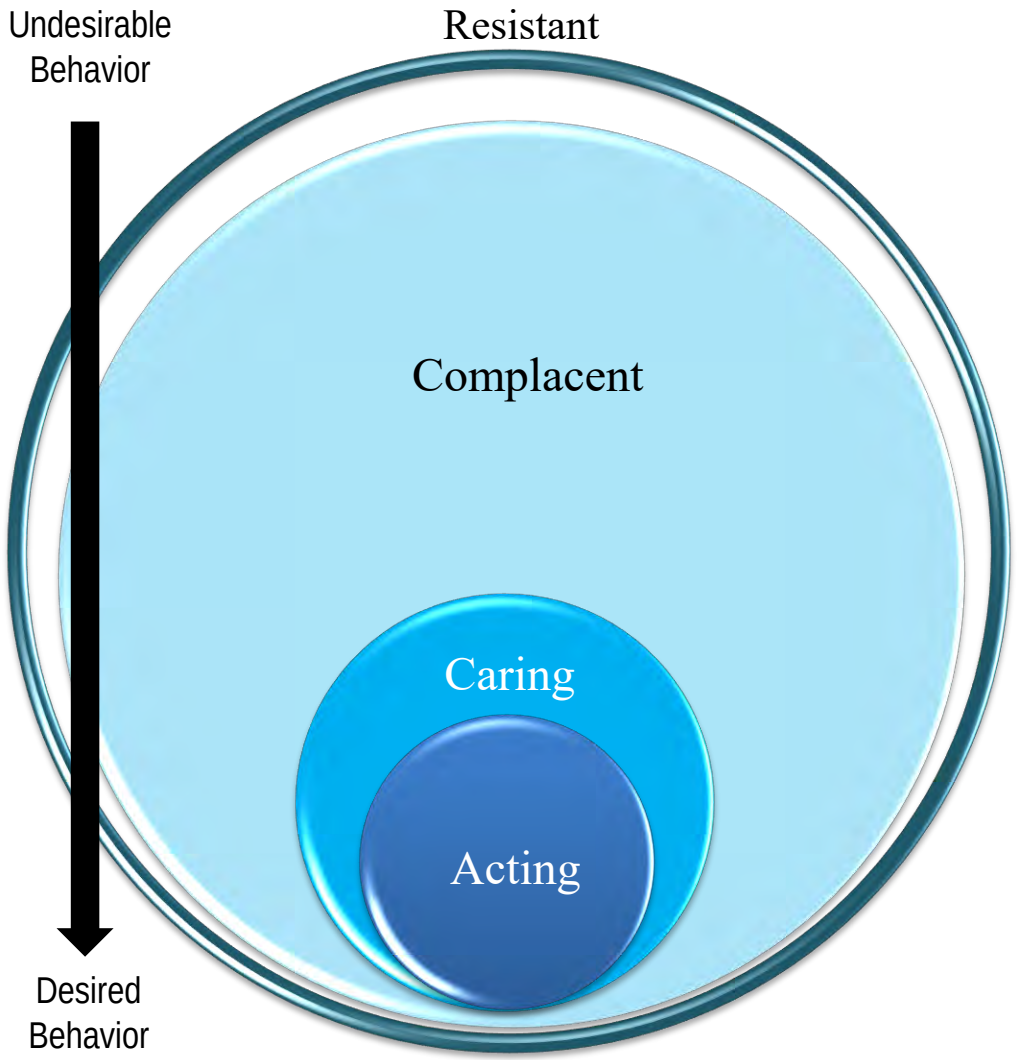
Question: Do you think picking up litter in our neighborhoods, streets and rivers is something more Denver-area residents need to help with, or do you believe it is being taken care of sufficiently already?

Bringing About Change

THE GREENWAY FOUNDATION SINCE 1974

Market Perceptions

Environmental Behavior Levels

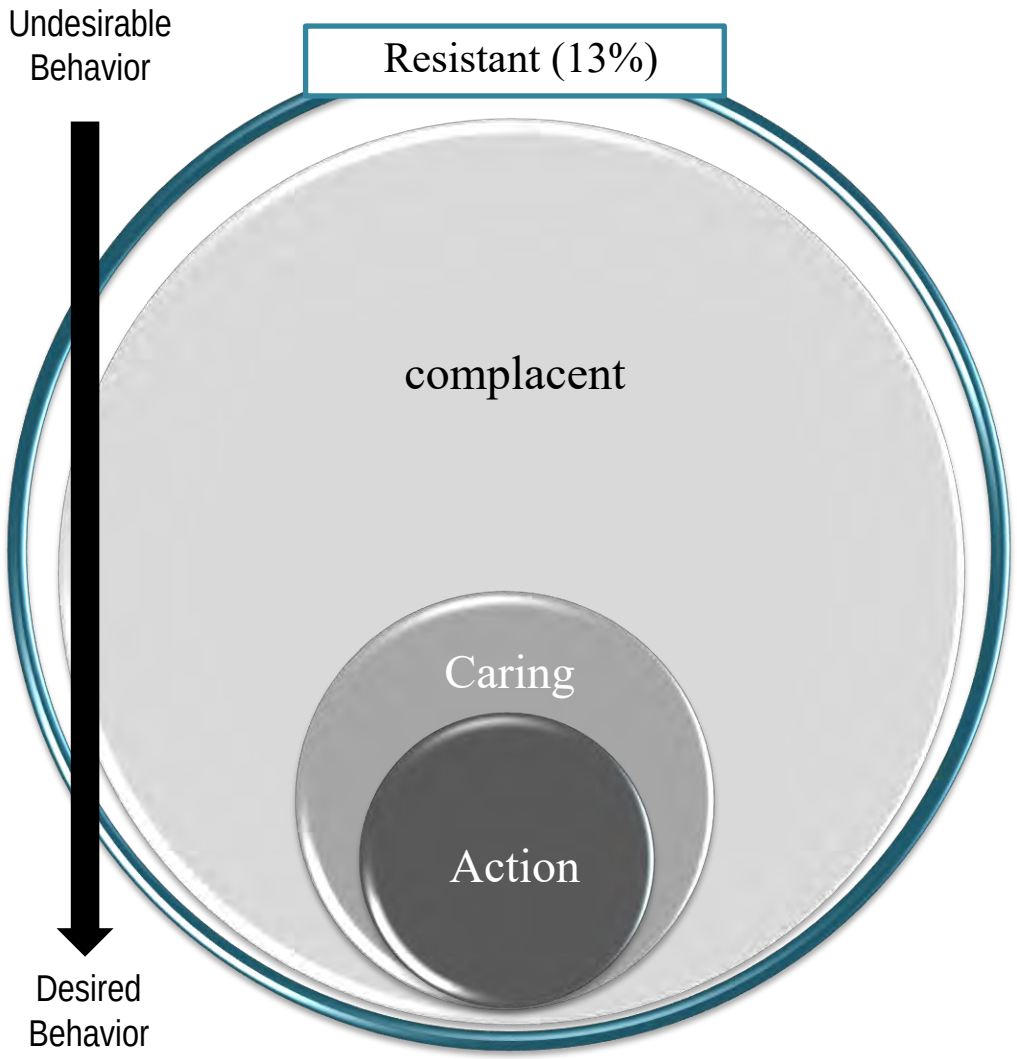


The goal of environmental efforts are not just to increase awareness of environmental problems, but to ultimately encourage people to take action by creating behavior change. Using the data from this study, we can estimate the levels of awareness of the problem as well as both positive and negative behaviors surrounding litter among those surveyed. The graphic to the left lays out a descriptive framework of four levels of thinking necessary for moving someone towards environmental action with regard to litter:

- Resistant
- Complacent
- Caring
- Acting

The desired direction is of course to move people from resistance to action. The following slides will detail the types of people at each of these levels.

Describing the Levels: Resistance



RESISTANT

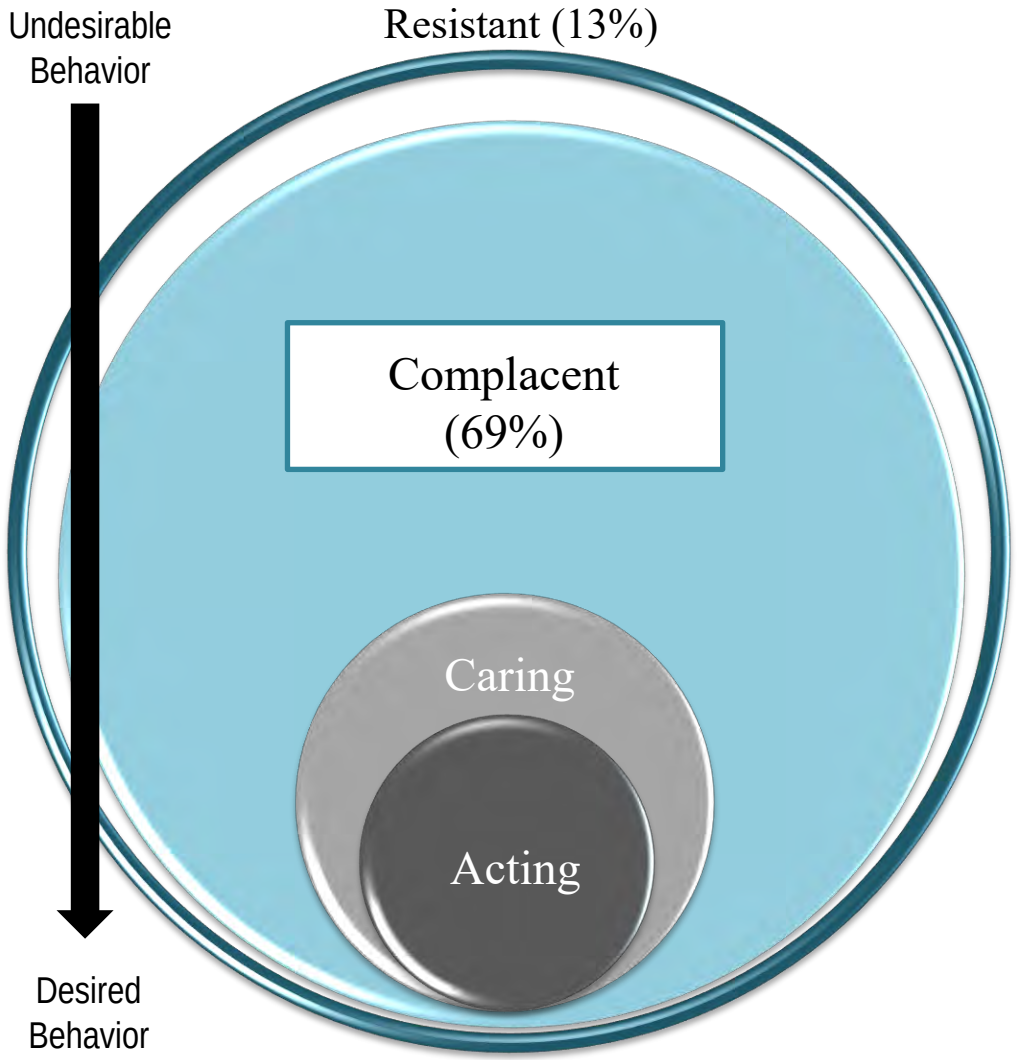
Those at the "resistant level" do not believe that pollution is a problem in the metro area.

As one might expect, this is a relatively small group, accounting for just 4% of study participants, and was defined as those who:

- Are "not very" or "not at all concerned" with Denver metro area pollution
- Think that air, water and ground pollution in the metro area are a "small problem" or "no problem at all."
- Only partly agree with environmentalists or disagree with them completely.

People in this segment can be considered outliers to mainstream attitudes and beliefs regarding metro-area pollution, and this is likely going to be a difficult segment to move.

Describing the Levels: Knowledge & Awareness



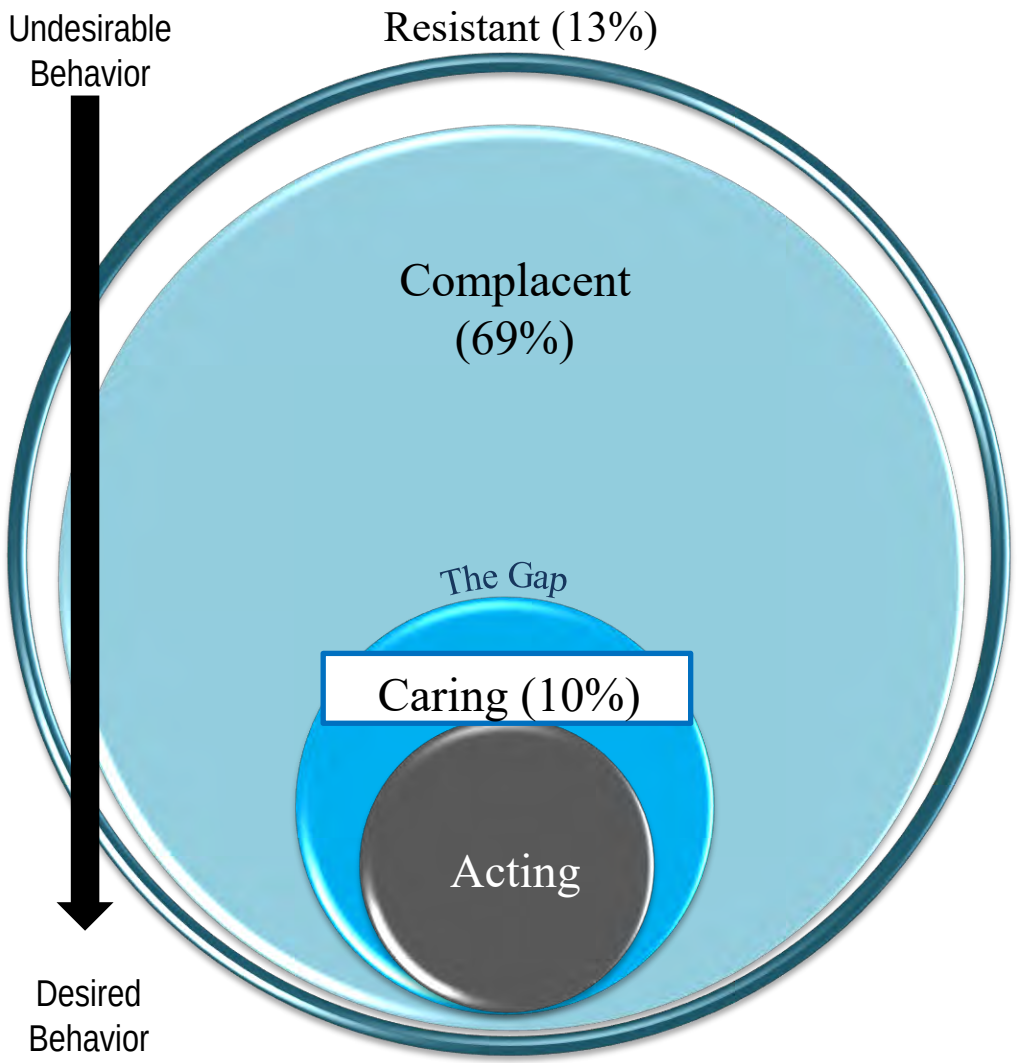
COMPLACENT

Those at the "Complacent" level represent the majority of our survey participants. They have an understanding of the environmental issues we face with regard to polluting, but they have not yet done anything to prevent or reduce it, and they are not very concerned about it.

This group accounts for 69% of all study participants, and are defined as not belonging to any other group.

This group represents the greatest potential, as they recognize pollution is a problem, but have not yet done anything to show they care, yet alone take any action to help make a positive difference.

Describing the Levels: Caring



CARING

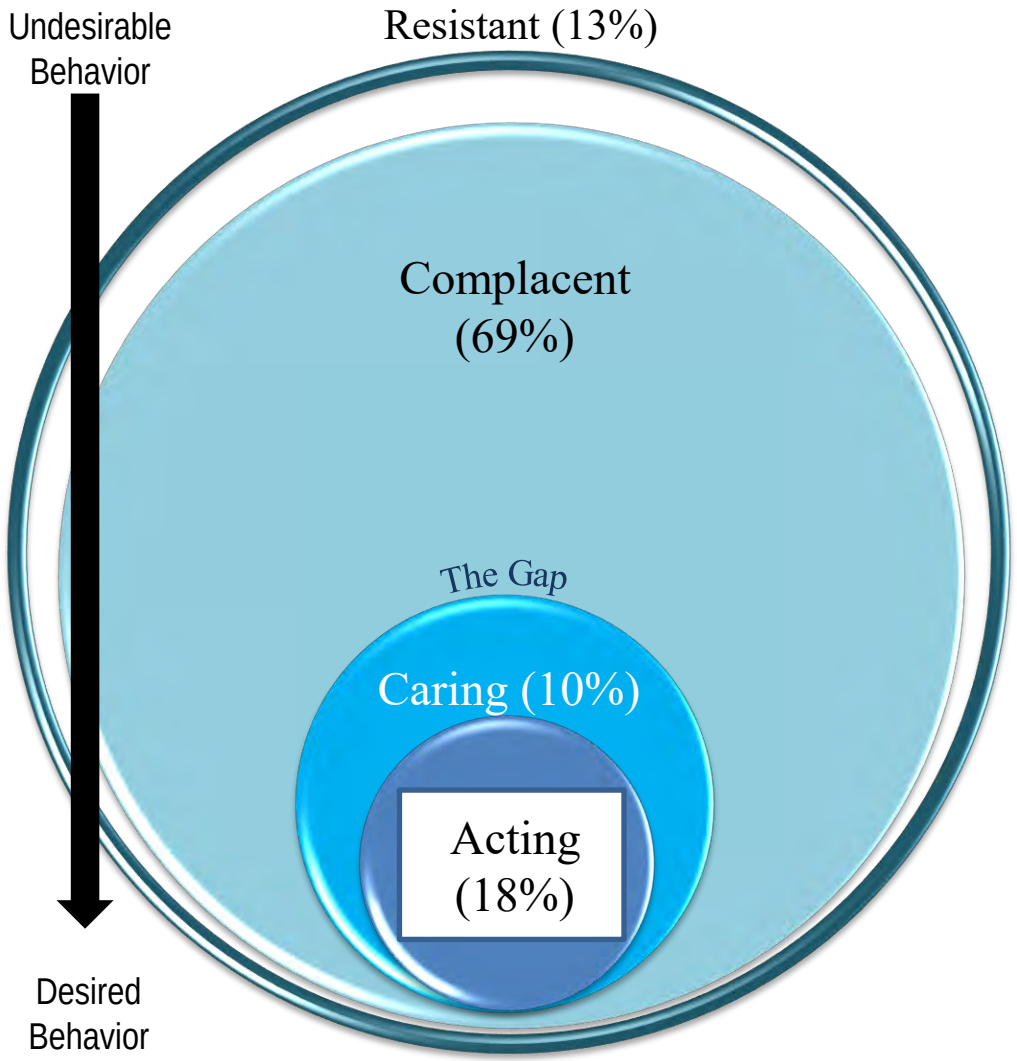
The "Caring" level is an important level because it defines the gap between knowing there are problems with metro area pollution (which pretty much everyone concedes) and being concerned about that problem. This is the first step towards action, because without caring, one can simply walk by a soda can without picking it up, despite seeing a trash can five feet away. This gap between complacency and caring must be bridged if we are going to get people to take action.

The Caring group accounts only for 10% of all study participants. It is likely a small segment because once a person starts caring, it is probably difficult not to act. This group was defined by meeting the following criteria:

- Being bothered either "a great deal" or "a moderate amount" by litter in their neighborhood
- Being bothered "a great deal" or "a moderate amount" by the litter seen during their last river or creek excursion
- Being "extremely" or "very concerned" about Denver metro-area pollution
- Not yet taking action as defined by the next group

This group should be in constant flux, as they should move into the action group, but then ideally replaced by those at the complacent level, shrinking that segment and growing the active group.

Describing the Levels: ACTION



ACTING

The Acting Level is the goal, where people pick up litter when they see it, speak out against litterers, and certainly do not contribute to the problem.

This group accounts for about one out of five participants (18%) and was defined not so much by attitudes and beliefs, but by action:

- Neither these participants nor anyone in their family has littered in the past year
- They have spoken out against someone who they saw litter
- They pick up litter "Most" of "Every Time" they encounter it in their neighborhood

It is only a short trip from caring to acting, so the goal should be to move everyone from Knowledge & Awareness across the gap to Caring. Ideally this is exactly what a behavior change campaign should accomplish, as it turns knowledge of problems into problems worth fixing.

Behavioral Group Demographics

% of Each Group	Gender		Age					Income				
	Male n=151	Female n=149	Under 25 n=23	25-34 n=56	35-49 n=96	50-64 n=82	65+ n=43	Less than $25K n=29	$25K-<$45K n=31	$45K -<$75K n=59	$75K-<$150K n=88	$150K or More n=37
Acting	16%	21%	9%	18%	16%	18%	33%	7%	10%	22%	20%	27%
Caring	9%	11%	9%	14%	7%	13%	5%	17%	19%	7%	11%	8%
Knowledgeable/Aware	70%	66%	83%	66%	71%	66%	60%	76%	71%	68%	65%	57%
Resistant	7%	2%	0%	2%	9%	2%	2%	0%	0%	3%	5%	14%

	Ethnicity			Household					Political Leanings		
	Caucasian n=228	Latino n=54	Other n=16	Married n=221	Single n=50	Other n=26	Kids n=176	No Kids n=119	Liberal n=111	Mixed n=42	Conservative n=91
Acting	20%	11%	19%	19%	12%	31%	14%	26%	18%	14%	20%
Caring	10%	15%	0%	9%	18%	4%	11%	9%	14%	14%	5%
Knowledgeable/Aware	67%	72%	75%	69%	66%	62%	72%	61%	68%	69%	66%
Resistant	5%	2%	6%	5%	4%	4%	5%	4%	0%	2%	10%

	Education			County						
	H.S. or Less n=53	Some College/Tech n=65	College Graduate n=170	Adams n=37	Arapahoe n=61	Boulder n=30	Denver n=62	Douglas n=32	Jefferson n=47	Weld n=27
Acting	9%	20%	21%	19%	25%	20%	11%	16%	19%	26%
Caring	17%	9%	9%	16%	7%	7%	16%	6%	11%	0%
Knowledgeable/Aware	74%	69%	65%	65%	64%	70%	71%	69%	66%	74%
Resistant	4%	2%	6%	0%	7%	3%	2%	13%	4%	4%

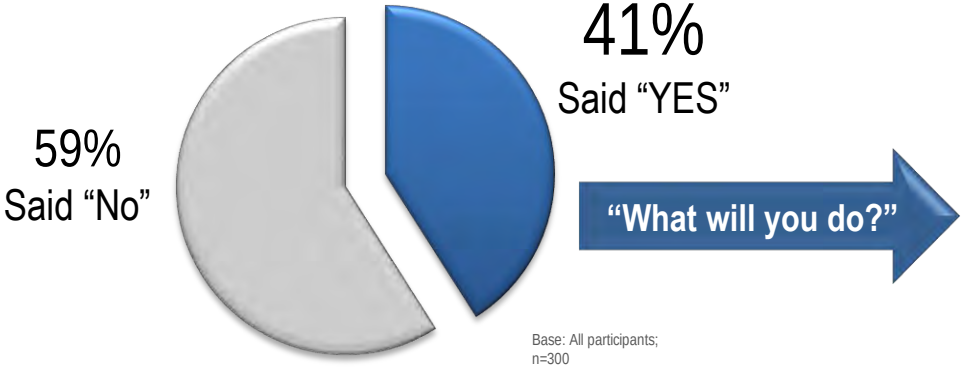
Comparing the demographics of the four behavioral groupings shows that most differences occur when contrasting the extreme ends of the spectrum: the Resistant and Acting groups. Significant differences among those in the Resistant group are found by gender, income and politics. Males are more prevalent in the resistant group (7% versus 2% among females), as are those with higher annual household incomes (highest among those earning $150K or more (14%) and conservatives (10%). No one who is liberal-leaning, earns less than $45K/year or lives in Adams county fell into the Resistant group. Significant differences in the "Acting" segment typically surround low income (7% under $25K/year), less educated (9% did not pursue higher education), Denver residents (11%) among those less likely to be in this group and participants over 64 years of age being more likely (33%).

*Broomfield county is not reported because the sample size is too small (n=4)

Shaded cells indicate statistically significant differences from others at the 95% level of confidence.

Impact of The Survey Alone

"Do you think you will do anything differently in the future because of something we talked about in this survey?"



If moving people across the gap seems daunting, we found from this survey effort that it may be easier than expected. We asked participants if simply hearing what we shared during the course of the this survey might lead them to change. Four out of ten (41%) said they will likely behave differently in the future because of what they heard during the survey, and their comments demonstrate that the actions they plan to take (some of which are shown to the right) are exactly what is needed. If a survey can accomplish this, a well-executed communications effort should certainly be able to have an impact.

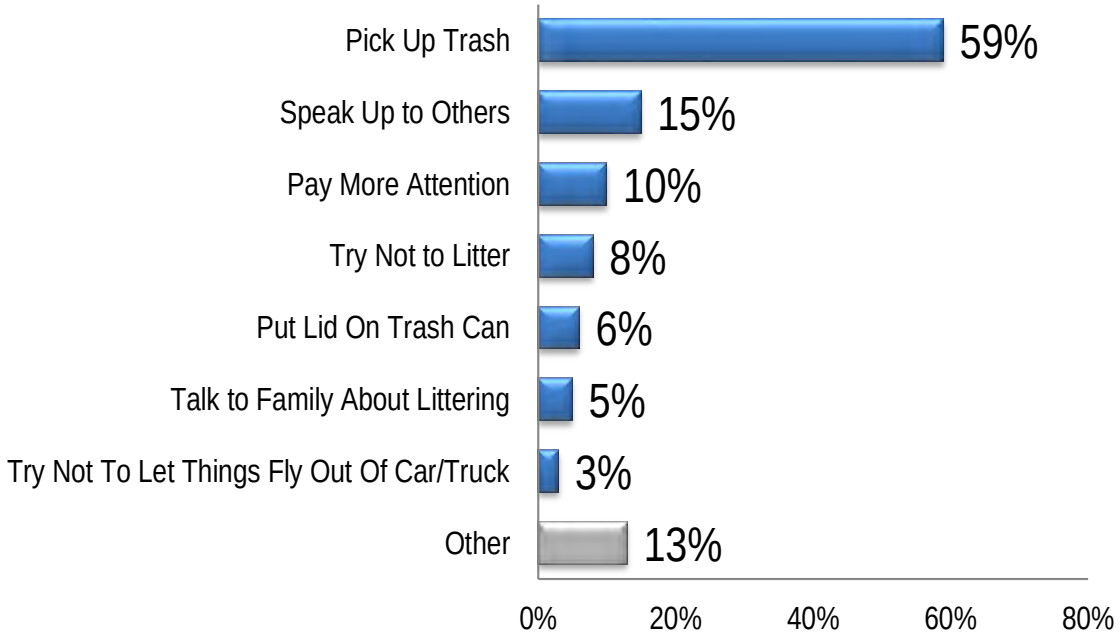
"Be aware of picking up my trash"
"Be more careful not to litter my cigarette butt"
"Confront somebody"
"Help pick up the neighborhood"
I'll start picking up more trash because the trash I see goes to the water runs"
"I try to do my best to pick it up when I see it"
"I will be more aware of my surroundings"
"I will increase the amount of litter I pick up in my neighborhood"
"If I see something I'll be more inclined to pick it up more often"
"My kids and I will take trash bags to pick up trash"
"Pick up more trash and teach my daughter to do it safely"
"Prevent it from going down the drain and try to take care of it"
"Speak up more when I see people drop litter"
"Start picking up trash more maybe once or twice a week"
"I'll pick up my trash when I go to sporting events"
"I'll strap my trash can lid down and check the bed of my pick up before I drive"
"Pick up more trash"
"Pick up more trash"
"Pick up more trash"
"Pick up more trash"
"Pick up more trash"

…..and many more just like this

Questions: Do you think you will do anything differently in the future because of something we talked about in this survey?
What will you do differently?

Impact of The Survey Alone

"What will you do differently?"



Six out of ten participants (59%) who said they would change their behavior after hearing the information provided in the survey said they will be more likely to "pick up trash in the future." This accounts for 23% of all participants interviewed. Each of the actions mentioned by participants would help with the problem of pollution, with speaking up being the next highest response, at 15%, followed by simply being more attentive (10%) and trying not to litter (8%).

Messaging Point: Visually focus behavior change on picking up a piece of trash rather than closing a trash can or dumpster lid.

Question: What will you do differently?

Base: Participants who said they would change; n=120

Who Will Change

% of Each Group	Gender		Age					Income				
	Male n=151	Female n=149	Under 25 n=23	25-34 n=56	35-49 n=96	50-64 n=82	65+ n=43	Less than $25K n=29	$25K-<$45K n=31	$45K -<$75K n=59	$75K-<$150K n=88	$150K or More n=37
Will Change	37%	45%	70%	50%	42%	34%	28%	54%	40%	47%	42%	28%

	Ethnicity			Household					Political Leanings		
	Caucasian n=228	Latino n=54	Other n=16	Married n=221	Single n=50	Other n=26	Kids n=176	No Kids n=119	Liberal n=111	Mixed n=42	Conservative n=91
Will Change	34%	69%	53%	40%	58%	23%	47%	34%	52%	46%	33%

	Education			County						
	H.S. or Less n=53	Some College/Tech n=65	College Graduate n=170	Adams n=37	Arapahoe n=61	Boulder n=30	Denver n=62	Douglas n=32	Jefferson n=47	Weld n=27
Will Change	55%	43%	36%	56%	45%	53%	33%	38%	36%	%33

Participants who said they are likely to change their behaviors are more likely to be Latino (69% compared to 34% of Caucasians), single (58%), have kids at home (47%), be liberal (52% versus 33% of conservative participants) and less formally educated (55% for high school or less compared to 36% of college graduates). There are fairly consistent trends indicating as age, income and education increases, willingness to change declines.

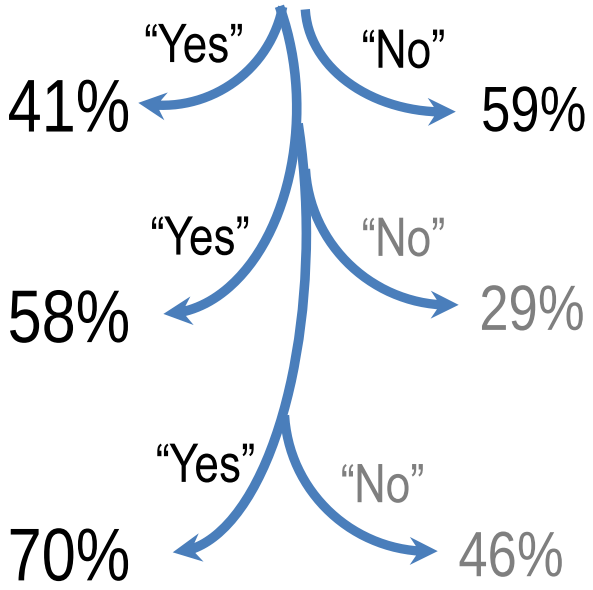
Questions: Do you think you will do anything differently in the future because of something we talked about in this survey?
What will you do differently?

*Broomfield county is not reported because the sample size is too small (n=4)

Shaded cells indicate statistically significant differences from others at the 95% level of confidence.

Understanding Their Motivation

"Do you think you will do anything differently in the future because of something we talked about in this survey?"



If participants said they "Picked up trash that they saw in their neighborhood that someone else left behind less than most of the time," their likelihood to change grows to 58%.

If they also said they were surprised that litter that goes into the storm drain actually goes directly into the river, their likelihood to change increases to 70%.

Using CHAID[1] analysis, we can predict how responses to certain questions affect other questions and, therefore, determine where efforts should be placed in order to most effectively achieve specific outcomes. Using this statistical modeling technique on respondents' willingness to change reveals that people are most likely to change if they A) are not among those who currently pick up litter in their neighborhoods and B) are surprised to learn that storm drain litter goes directly to the river. Fifty-eight percent of those who do not currently pick up litter in their neighborhoods (less than "most of the time"), said they are likely to change behaviors based on what they heard during the survey (versus 29% among those who already picked up litter) and if they were also surprised that storm drain litter is not filtered out and ends up directly in the river, likelihood to change behaviors increases to 70%. This demonstrates that by informing people of the consequences of their littering behaviors, change can be achieved.

[1]Chi-squared Automatic Interaction Detection

Contact Information:

Jonathon Reed

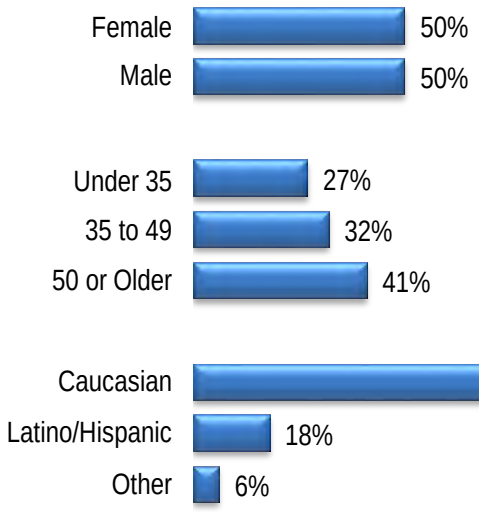
Senior Analyst, Market Perceptions, Inc.
Jreed@marketperceptions.com

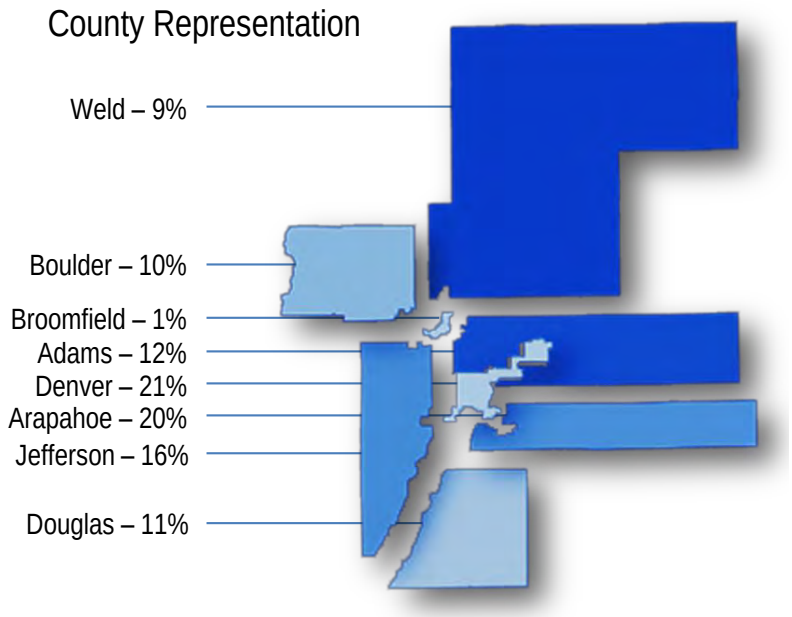
Appendix

Participant Demographics

Market Perceptions

Demographic Characteristics





92% have lived in the Denver Metro area for more than five years.

Demographically, the 300 Denver metro area residents surveyed were split equally between female and male respondents (50% each), with most residing in either Denver (21%), Arapahoe (20%) or Jefferson County (16%), in accordance to the most recent census data. One-fourth of all participants (27%) were under 35 years of age, 32% between 35 and 49 years of age and the remainder (41%) were over 50. Three-quarters (76%) were Caucasian followed by 18% being Latino/Hispanic, and 6% other. Five percent of all surveys were completed in Spanish.

Base: All participants; n=300

Other Demographic Characteristics

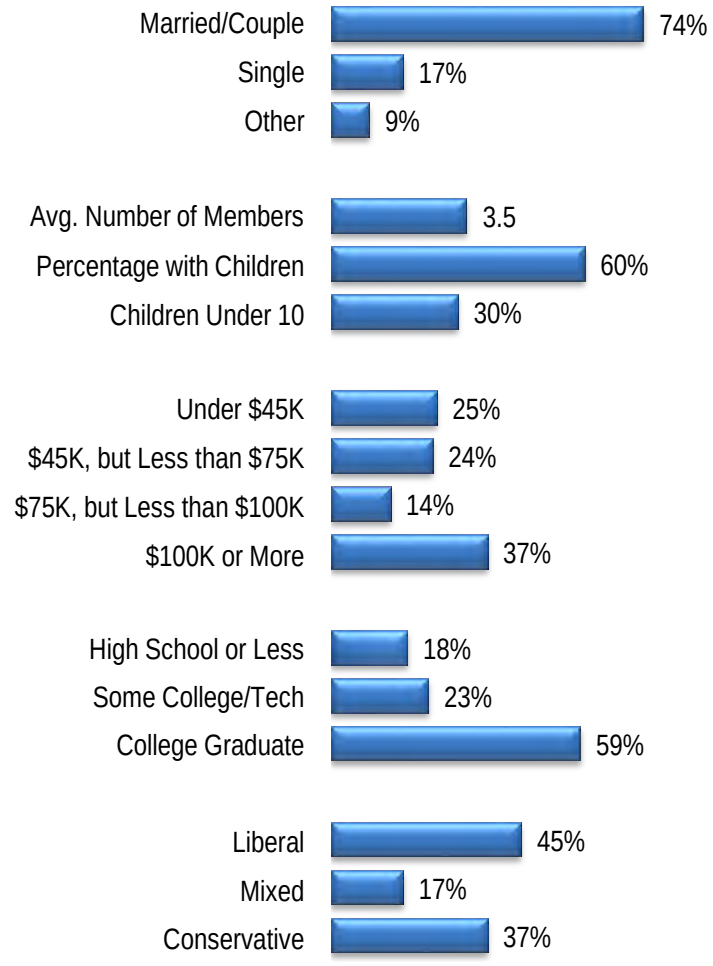
Marital Status

Household

Income

Education

Political Leanings



Most participants (74%) were married, 60% with children living at home (30% with children under 10 years of age at home).

One-fourth of participants (25%) had household incomes of less than $45,000 per year, another 38% earned between $45,000 and $100,000, while the remaining 37% earned more than $100K/year. Six out of ten surveyed (59%) had a college degree (26% with a post-graduate degree).

Additionally, participants were fairly evenly divided between having a liberal political position (46%) compared to conservative (37%), with 17% saying they fall somewhere in between.

Base: All participants; n=300

DRAFT

MEMORANDUM

June 1, 2016

TO: David Bennetts, Urban Drainage and Flood Control District
Devon Buckels, The Greenway Foundation

CC: Jeremy Hamer, City and County of Denver Public Works

FROM: Colin McKernan, Brooke Seymour, and Rick McLaughlin, Merrick and Company

RE: Consideration of Innovative Trash Collection Devices on the South Platte River

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A trash collection system is being considered for the South Platte River and an initial review was requested by UDFCD. Two trash collection devices, the Water Wheel and the Nautilus, have been reviewed from both a floodplain management and navigable waters perspective. Exhibits illustrating these two options are enclosed. Our knowledge and understanding of the trash collection alternatives were documented during the process and are summarized in the tables below.

Table 1. Water Wheel Trash Collector

Evaluation Criteria	Description
Background	A prototype of this device was installed in Baltimore on the Jones Falls River. The device is owned and maintained by the Waterfront Partnership of Baltimore and invented by Clearwater Mills, LLC.
Cost	The water wheel trash device constructed for Baltimore was reported to be $700,000. It is estimated by the supplier that the device for Denver would be somewhat smaller however there are many complicating issues to the application on the South Platte River such as widely and rapidly varying flows, shallow depths, and navigability/safety issues. Additionally, infrastructure such as access ramps and docks needed for routine trash removal, and a specialized mooring apparatus to address debris loads would likely be necessary and these costs will vary greatly upon the location. Therefore for initial conversation, a ball-park figure of at least $1m might be used for capital costs until a detailed study is completed. It should be realized that this is a new application of a new device and presenting costs at this point is a risky proposition.
Maintenance	The Baltimore water wheel annual maintenance has been estimated by others at $125,000. The largest portion of that cost is the changing out of dumpsters and disposing of the trash. Given the complicating issues listed above, it is likely that maintenance costs for application on the South Platte River would be greater.

Safety	The South Platte has been promoted and used for in-river recreation and navigation. Therefore safety is of paramount concern. This Baltimore system has a river-wide debris boom with a 2-2.5 foot deep skirt to collect trash. This could present a significant hazard to public safety, with concern for tubers and swimmers as well as inflatable and other recreational craft. While some users (kayak & canoe) may be able to traverse over the boom, the more common novice user (often without a PFD) would struggle against the boom and skirt system. There would be some hazard to in-river recreationalists from the device itself including the paddle wheel, but we believe this is less significant. **Potential Mitigation Measures**: The safety concern could be lessened by placing the boom and skirt across only a portion of the river. While this would likely lessen the effectiveness, several booms could be placed in the river to guide floatable trash to the collection mechanism while allowing recreational users a clear path abound the debris booms. The design of such a system would need to consider predominant wind patterns and local currents. Additionally, variations on the design of the debris boom system could include a shorter (or no) skirt, a smaller diameter debris boom, or booms made of different materials or shapes.
Floodplain	The water wheel device is designed to float and can raise and lower with changes in current. This provides for a much smaller surface area impeding flow. The round piers used in Baltimore are 16-inches, which are small relative to the floodplain. The piers would need to be constructed tall enough to allow the device to float up above the elevation of a major flood event. Debris getting lodged between the pier span is a concern, but could be lessened during design of the piers. It seems likely that the nominal impact to conveyance of floods could be mitigated or would be negligible depending upon the ultimate location of the device. Considering the existing sensitivity in some reaches due to levees and/or floodplain spills, there may be some locations where even this minimal impact to floodplain conveyance may not be tolerated.
Velocity	**Low Velocities:** The water wheel device is reported to require very little velocity to operate. When the velocity is low, the solar panels can provide additional power to move the water wheel. Estimation of power consumption and water velocity should be completed if further investigation is conducted. **High Velocities:** High velocities (compounded by debris) during flood flows would need to be considered in the design of the system. Breakaway booms, local currents, and the location of the device are all likely to be important factors.

Trash Collection Quantity	The water wheel device collects a substantial quantity of trash especially during a rainfall event. The Baltimore installation can handle up to 50,000 lbs. of trash/day or storm event
Visibility	The water wheel device was designed to be highly visible to the public but the dumpster is hidden by a tent roof that mimics the style of an architectural feature nearby in Baltimore.

Table 2. Nautilus Trash Collector

Evaluation Criteria	**Description**
Background	The Nautilus Trash Collector is a concept that resulted from the Clean River Design Challenge competition sponsored by the Greenway Foundation (TGF), in collaboration with Metropolitan State University. The concept was reportedly tested in an indoor facility but there has not been any real-world testing or prototype applications.
Cost	Estimated costs were not provided. It appears that each device would be relatively low cost compared with the Water Wheel Trash collector, however it is not known how many devices would be needed to remove the equivalent amount of trash.
Maintenance	Estimates of maintenance costs were not provided. Trash removal appears to be a manual operation. The unit tilts up out of the stream aiding in the manual dewatering and removal of the trash. Transport of the collected trash to a bin or dumpster would then be needed. This may require paths to each unit or perhaps collection via raft. Because of the distributed arrangement of these devices and manual collection, labor costs would likely be high – particularly per ton of trash removed.
Safety	Due to its small size, proximity to the stream bank and location in shallow waters, safety issues are reduced.
Floodplain	Due to its small size this device would likely have low impacts on the floodplain. Because it cannot float and would be blocked with debris it would be considered as impeding flow area. If incorporated into a jetty or drop structure (see below) its impact to the floodplain could be negligible.
Velocity	Details were not provided on the velocity needed to collect trash, but it appears that small floatables would be caught during normal river velocities.
Quantity	The quantity of trash collected in individual installations is limited due to its size. Large trash items could clog and weigh down the device making it difficult to empty. A series of devices would need to be installed to have a significant impact on reach-wide trash removal.
Visibility	The device is elegant, minimal and designed to be visible as an artistic feature.

Summary

The water wheel trash collector seems to be a promising device but due to the relatively high capital costs and uniqueness of the device and application, serious consideration and design efforts are necessary prior to committing to its implementation on the South Platte River. These considerations and efforts should address the issues outlined above, determine the best location, evaluate the capital cost of the entire system, and estimate long-term maintenance costs.

Due to the smaller scale and size of the Nautilus system, a test trial of the units could be implemented to help determine if this approach is practical. Some additional design of the apparatus and analysis to determine the most promising locations should be conducted. It may be worthwhile testing them on a relatively smaller waterway such as Cherry Creek. Furthermore, application and integration of this or a modified version of this system into jetties or drop structures could be promising. The fixed structure could multiply the effectiveness of the capture of debris. This could be accomplished by either retrofitting existing structures (likely to form a side-flow) or inclusion into new structures. The new jetty design proposed for the South Platte Feasibility Study would integrate well with this approach.

The Water Connection

Baltimore Solar Trash/Water Wheel Notes – January 2015

Cost: $700,000, but the Waterfront Partnership raised $800,000 up front so one year maintenance would be covered.

Annual maintenance: $125,000, of which the City contributes $35,000. The rest will be covered by funds raised through out Healthy Harbor Initiative and from our BID fees.
The largest cost is changing out the dumpsters, taking them to the dump and paying the tipping fees. After that, the largest expense is insurance - Commercial General Liability and US Longshoreman & Harborworkers Insurance. The next largest expense is staff time.

What's the longest period the wheel can go between dumpster swap outs?
It all depends on rain. Someone has to be on call 24/7 if rain is expected. A single storm can fill up two or more dumpsters so somebody must be watching the device (via webcam) when it's raining and be ready to switch out dumpsters as needed. If it doesn't rain for weeks then the dumpster will not need to be changed.

The Waterfront Partnership is a BID that collects revenues for harbor projects and maintenance like this.
Equipment maintenance is very simple – simple machine.
They track how much trash comes out – use estimates but estimates are pretty accurate.
How many times dumpster is dumped varies – storm events can bring thousands of pounds of trash.
Can handle up to 50,000 lbs of trash / single day / storm event.
Camera – like a baby monitor – allows remote monitoring.
Can turn power on and off with cell phone.
Solar is for backup power – mostly water powered.
Dumpster is on separate barge – they just bring an empty dumpster out, and push the full one away to haul out
Rakes at front end separate out clumps of trash
Buoys in water have skirt that goes down into the water to capture trash from 2-2.5 feet down.
Water flows under
Fish go under
Wheel only needs 6" of water depth to work
Baltimore wheel is roughly 50' X 28'
Wheel puts oxygen back into the water – added benefit

Per John Kellett – they looked at the site upriver of Confluence and said this would work. They would do a smaller version, maybe 2/3 the size. If we pay for their trip out they could do a plan with operations and maintenance plan.

THE GREENWAY FOUNDATION SINCE 1974

Wheel is owned and maintained by Waterfront Partnership of Baltimore
Invented and constructed by: Clearwater Mills, LLC
Trash disposal provided by: Baltimore City Department of Public Works
Funded by: Constellation and the Maryland Port Administration
Additional funding provided by: Brown Advisory, The Abell Foundation and Marriott Hotels
Design Architect: Ziger/Snead

http://healthyharborbaltimore.org/whats-happening-now/water-wheel

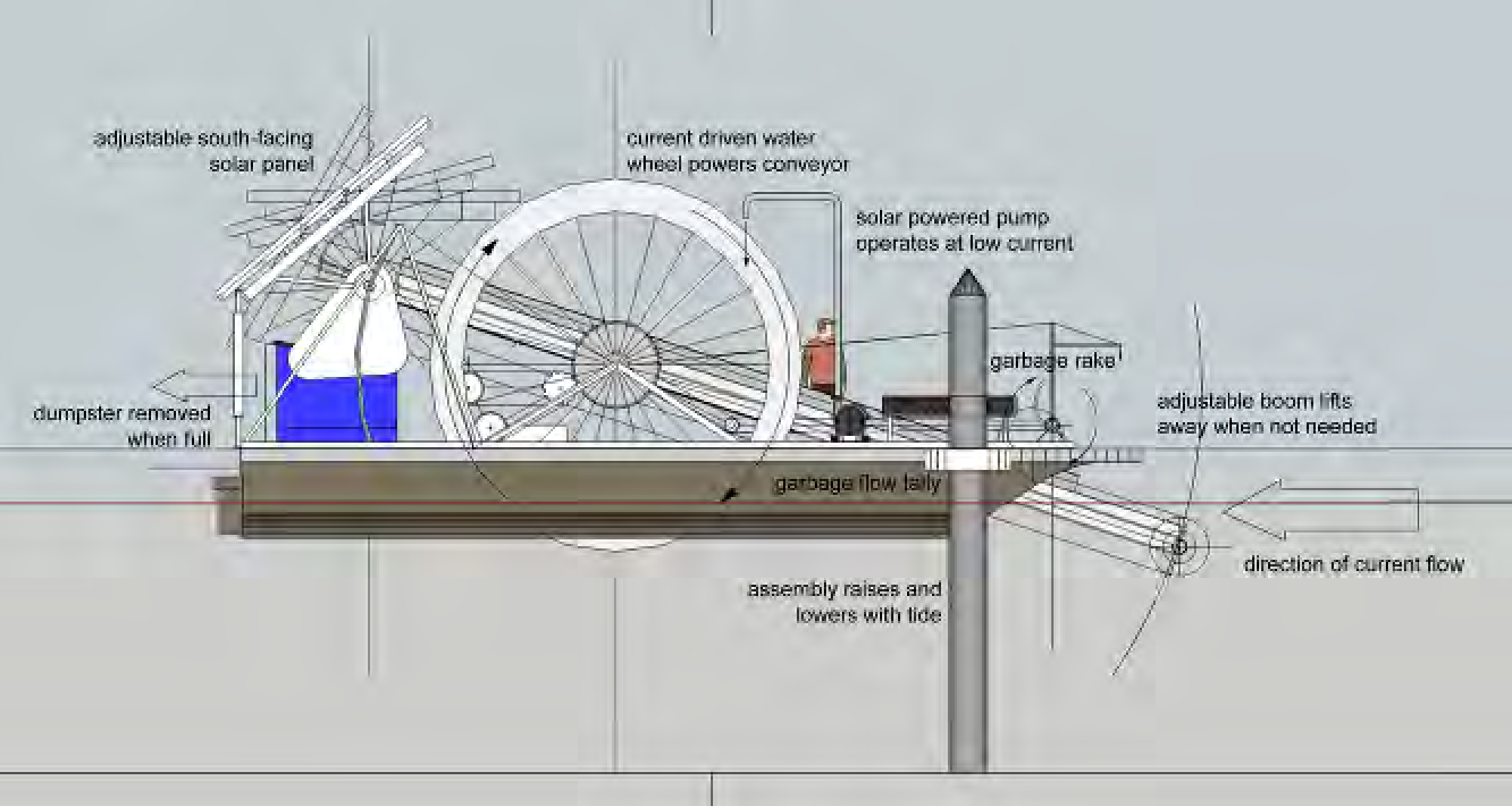
http://www.wbaltv.com/news/baltimores-new-water-wheel-to-capture-trash/25878202

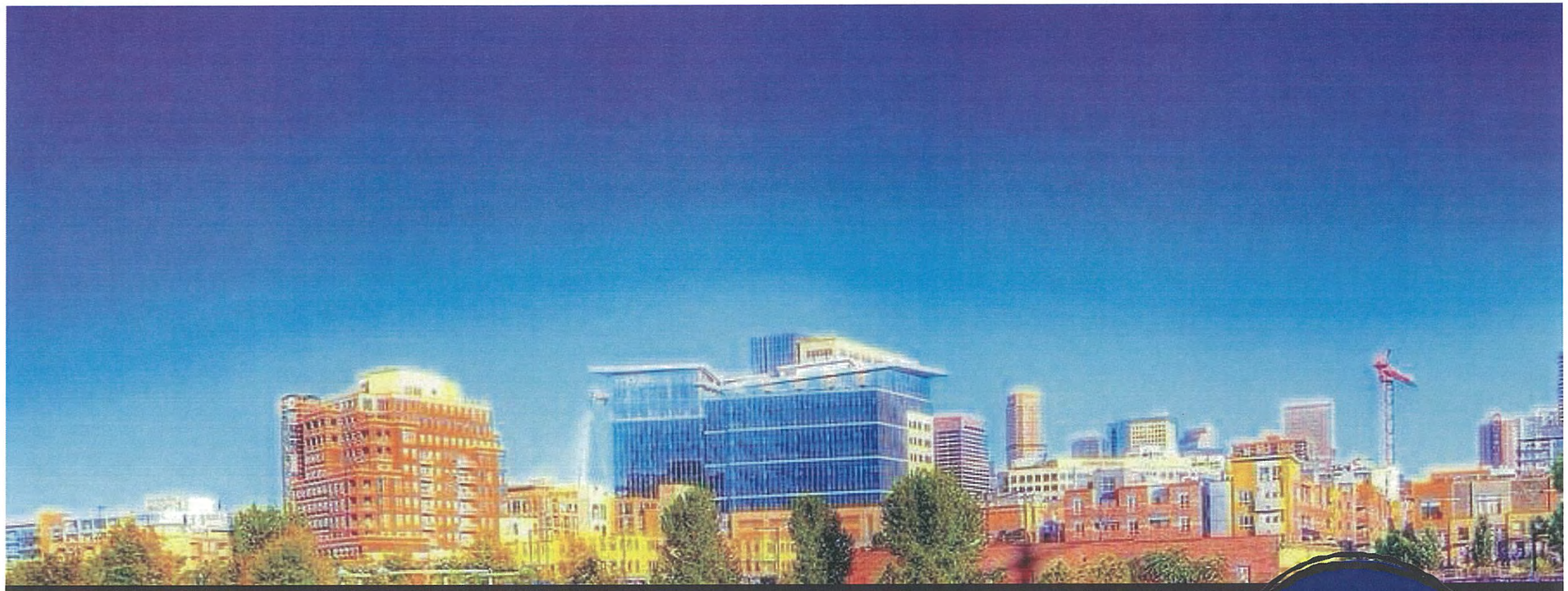
http://billmoyers.com/2014/07/22/solar-powered-water-wheel-can-clean-50000-pounds-of-baltimore%E2%80%99s-trash-per-day/

http://www.npr.org/2014/06/23/324738205/baltimores-water-wheel-keeps-on-turning-pulling-in-tons-of-trash

http://www.huffingtonpost.com/2014/05/20/baltimore-water-wheel-cleaning-the-harbor_n_5358858.html

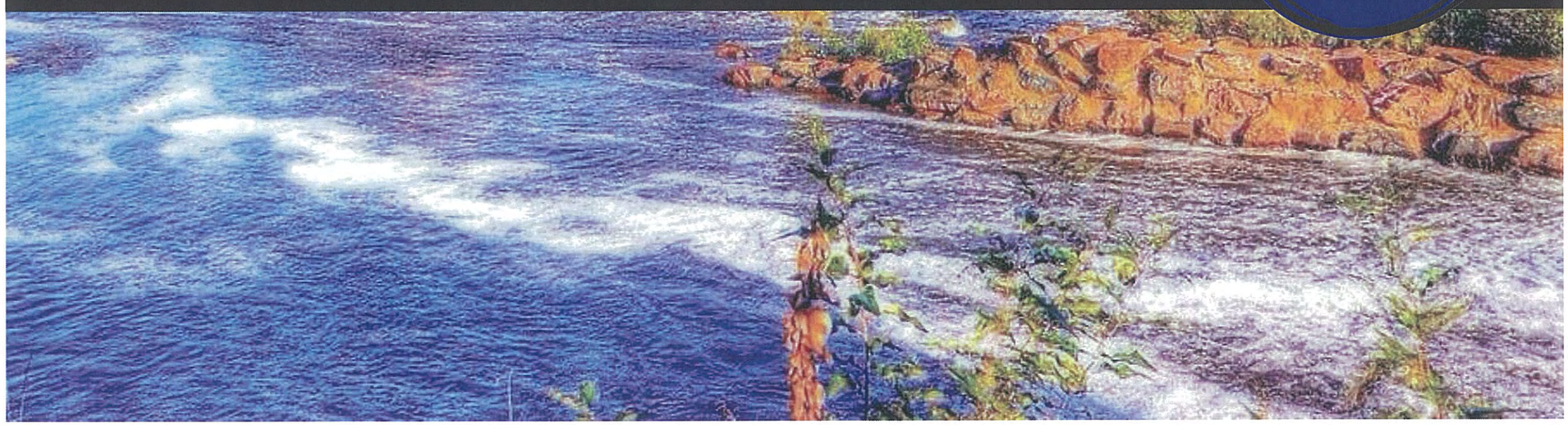
http://www.zigersnead.com/projects/details/baltimore-water-wheel/


adjustable south-facing
solar panel
current driven water
wheel powers conveyor
solar powered pump
operates at low current
garbage rake
dumpster removed
when full
adjustable boom lifts
away when not needed
garbage flow tally
direction of current flow
assembly raises and
lowers with tide



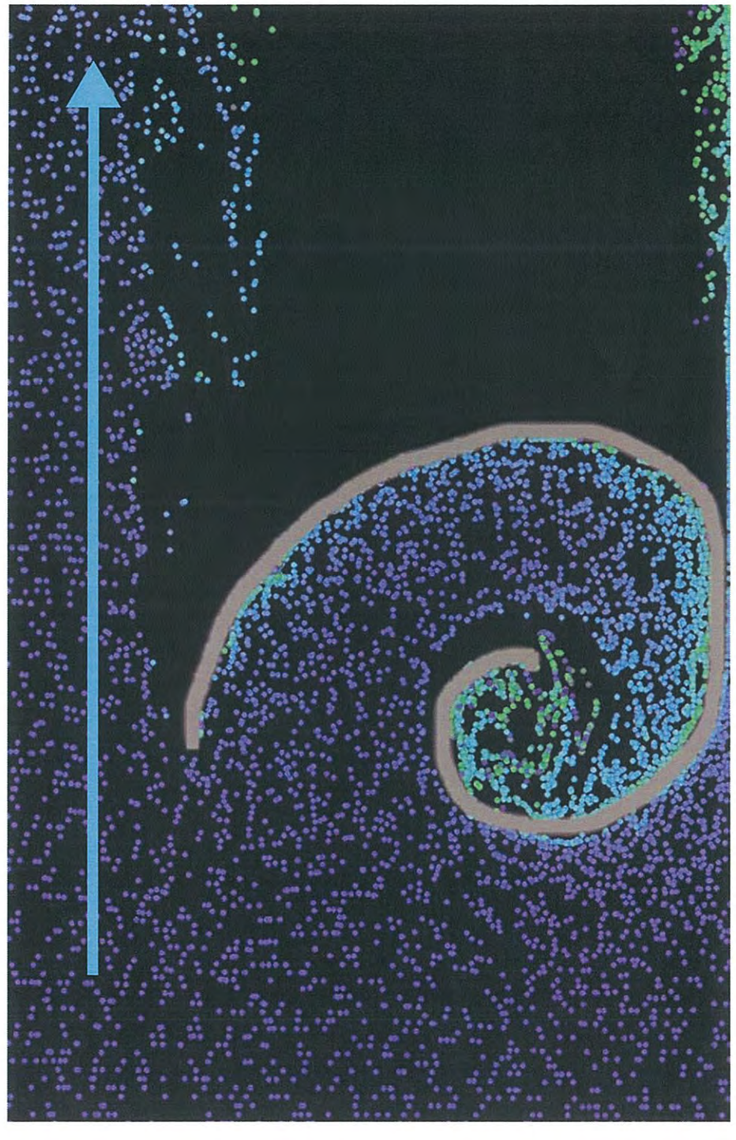
Clean River Design Challenge

TJ DiTallo & Mara Maxwell

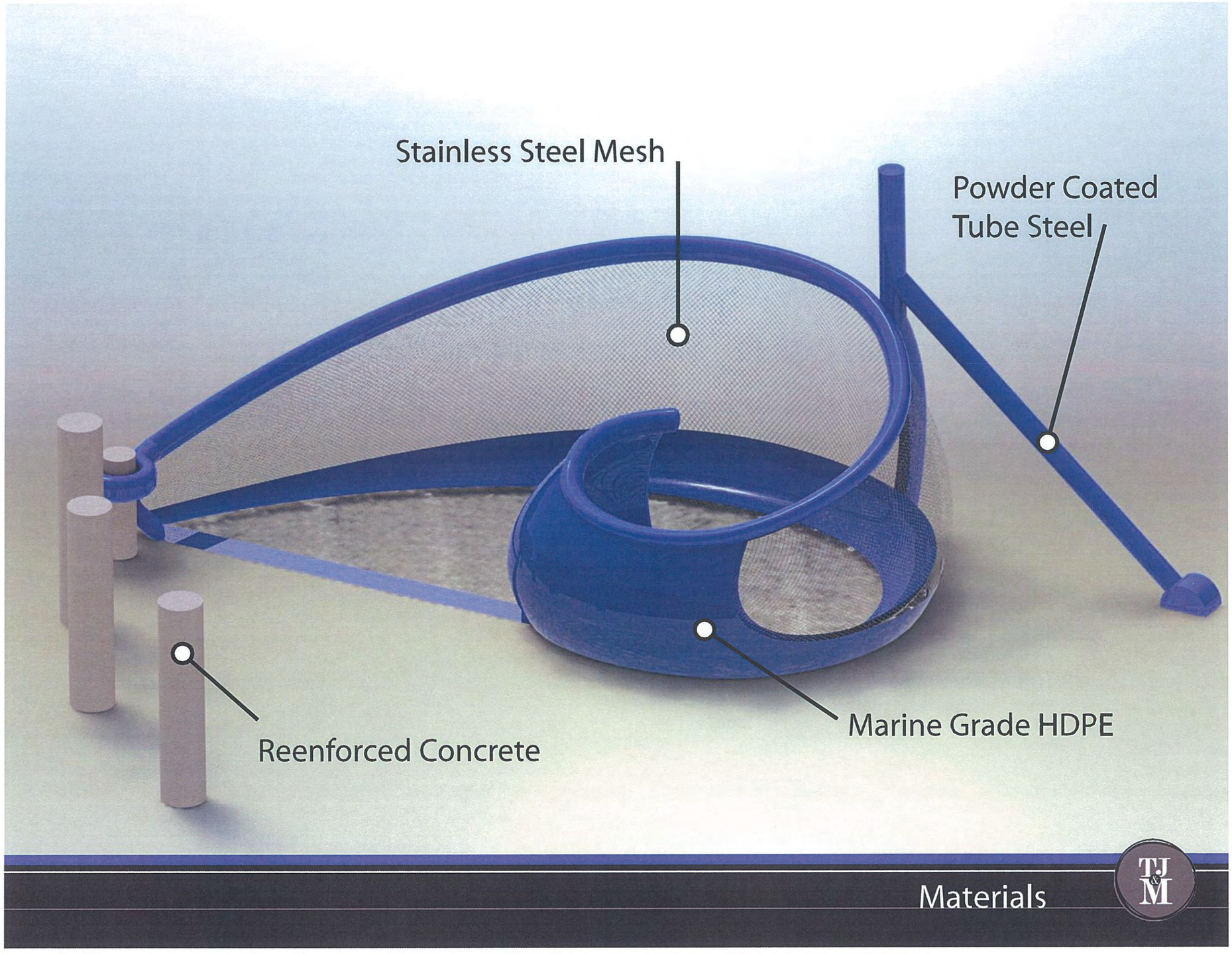


Nautilus

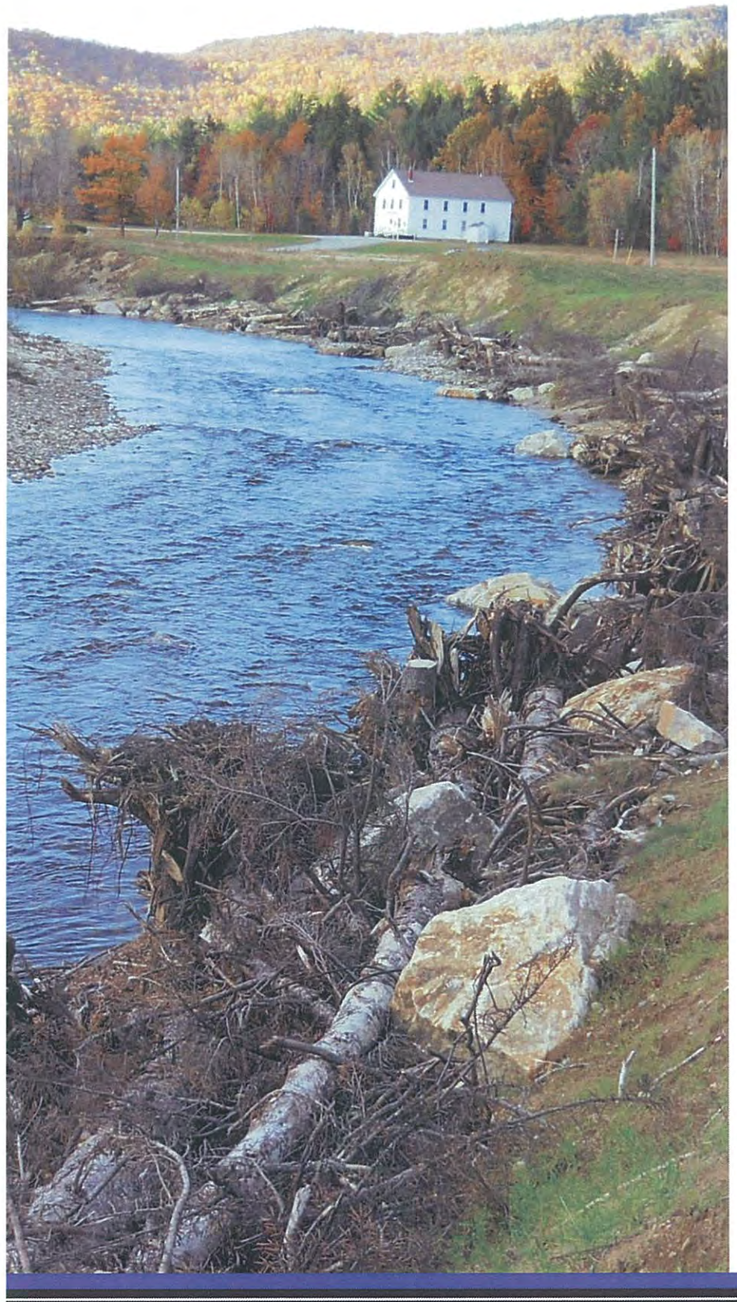
Concept



Particle flow simulation using Wind Tunnel application.


Stainless Steel Mesh
Powder Coated
Tube Steel
Reenforced Concrete
Marine Grade HDPE

Materials

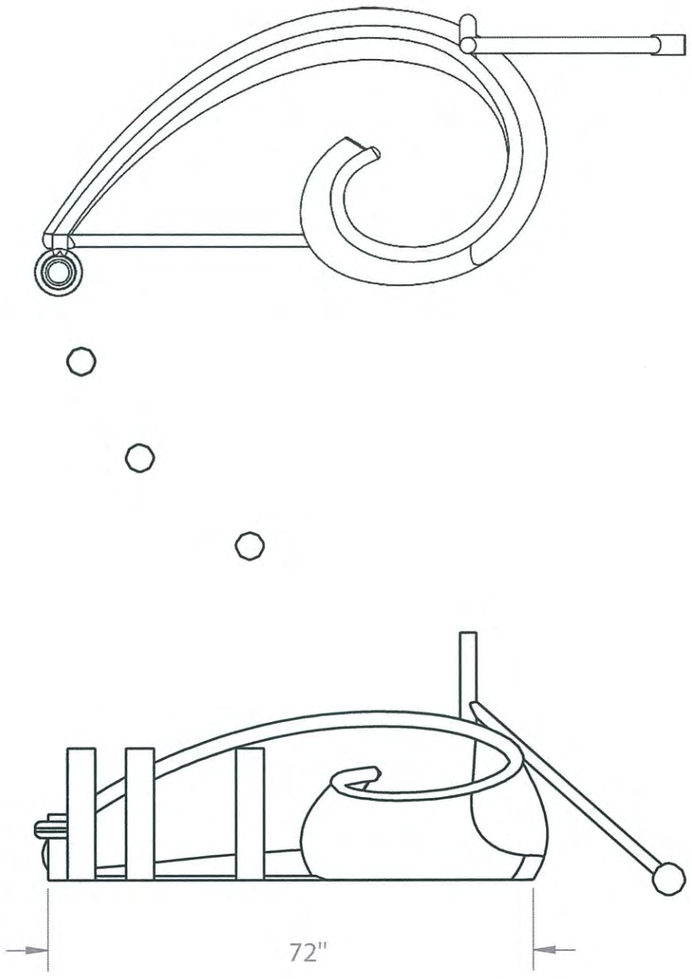


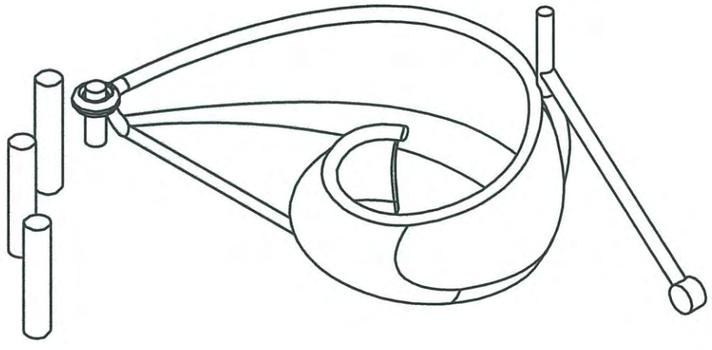
Goals-

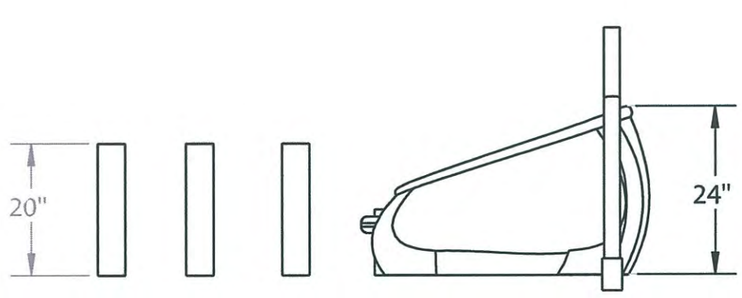
- Efficient river trash collection.
- Minimal maintenance.
- Easy to empty.
- Environmentally friendly.
- Community involvement.

Research-

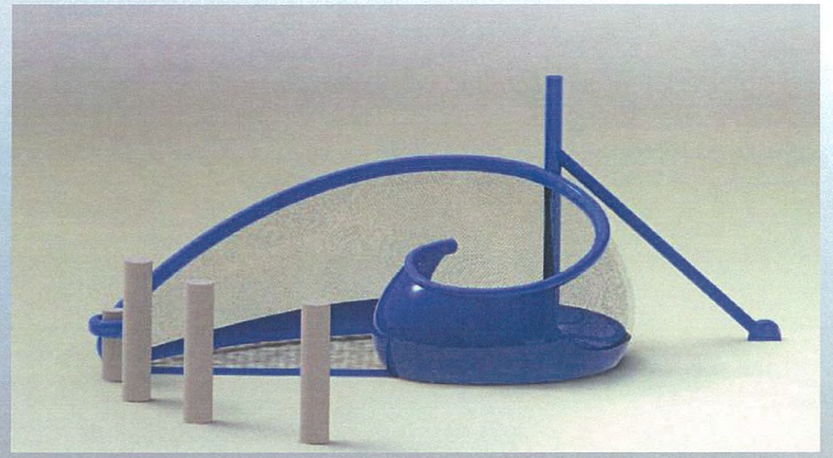
- Trash collects primarily on river banks.
- Outer banks on river bends build up the most trash.
- Majority of trash remains on the surface.



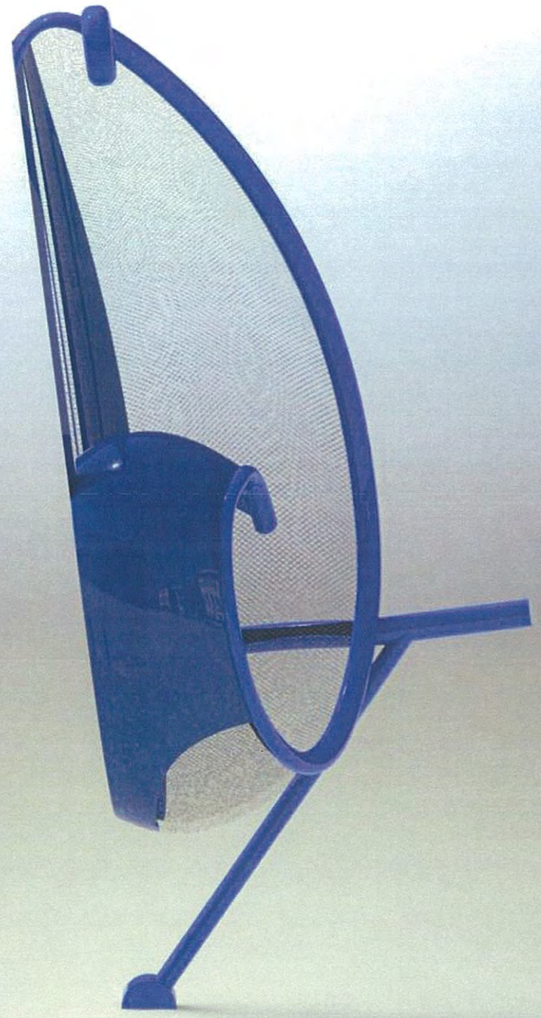




Tech Drawing



Lifts for easy
trash removal



How it Works

Department of Environmental Health
Division of Environmental Quality

200 W. 14th Ave, Dept. 310
Denver, CO 80204
p: 720-865-5452
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www.denvergov.org/deh

MEMORANDUM

Date: 8/29/2011

To: Lindsay Arell (DEH)
Jackie Berardini (CAO)
Bob Finch (Parks & Rec)
Susan Fry (Parks & Rec)
John Gaines (PW)
Meghan Hughes (DEH)
Bob Kochaver (PW)
Darren Mollendor (PW)
Scott Morrissey (Greenprint Denver)
Gordon Roberston (Parks & Rec)
Paul Sobiech (PW)
Jeannette Sutton (DEH)
Gregg Thomas (DEH)
Kelly Uhing (Parks & Rec)
Celia VanDerLoop (DEH)

From: Jon Novick, EQD

Re: **Summary of Results from Confluence Surveys, July 2011**

DEH staff conducted surveys of Confluence Park users during the summer of 2011 to determine user's knowledge about and attitudes towards water quality. Evaluation of the results of the surveys revealed the following:

1. Confluence Park users perceive that trash is a problem in the City's stream and rivers and that trash removal is a worthwhile effort for the City to conduct

2. Confluence Park users appear to have an understated perception of fertilizers as a source of pollution in the City's surface waters suggesting that the City's existing education and outreach campaign on proper use of fertilizers should be re-evaluated to determine if there are opportunities to increase the effectiveness of the program.

3. Most users at Confluence Park seemed unaware of City-led efforts to improve water quality suggesting that the City should explore ways to better promote those efforts.

4. There appears to be a group of people who would be willing to voluntarily participate in activities intended to improve the river.

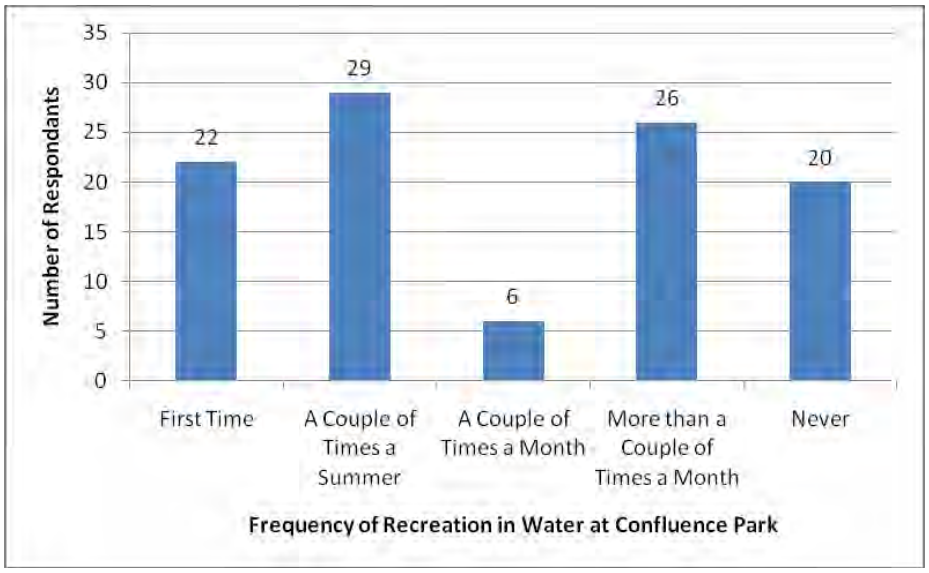
5. DEH needs to provide more effective and timely communication of water quality results and safety issues.

Detailed Results

On five dates in July 2011, DEH staff conducted surveys of Confluence Park users to determine their knowledge about and attitudes towards water quality. The surveys also sought to determine what value users placed on the efforts of DEH's water quality program and how the program could better deliver services. This memo summarizes the results of the surveys.

Surveys were conducted on June 29th, July 11th, and July 18th at Confluence Park, on July 21st at the concert in the park at Confluence Park, and on July 28th through 31st at the Denver County Fair. A total of 105 surveys were conducted. A day pass to pools at City Recreation Centers were used as incentives to take the survey.

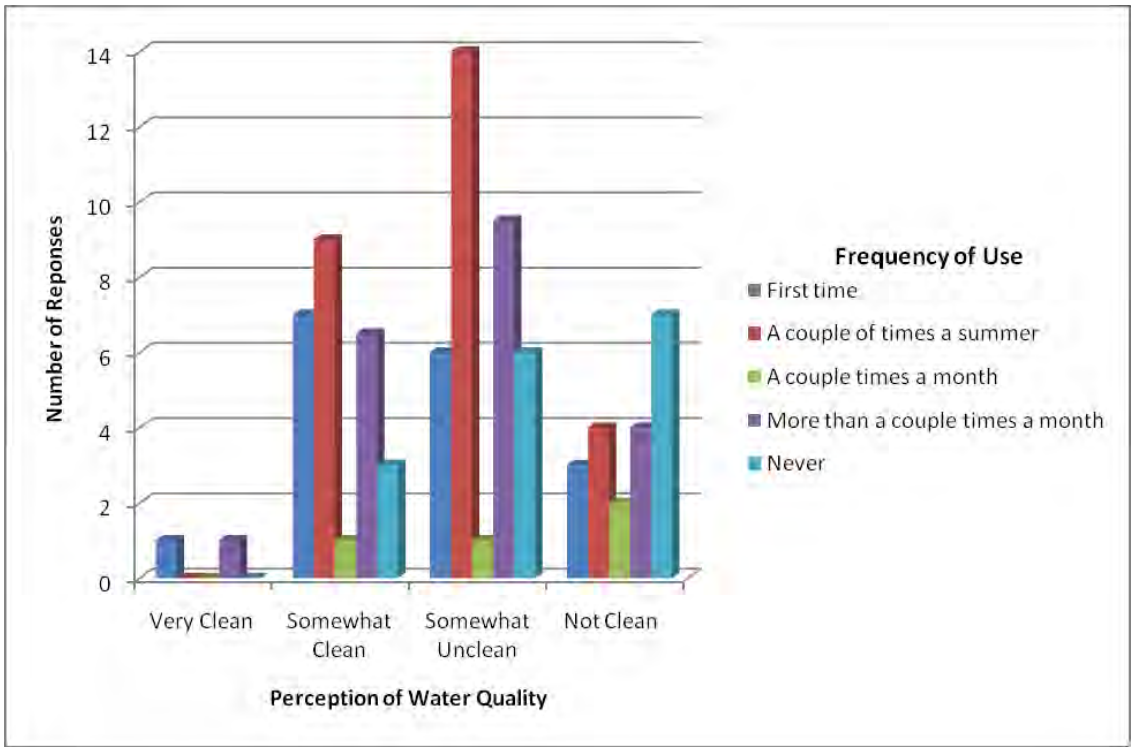
74 of the surveys were taken by Denver residents, 25 were taken by people living in the Denver Metro area, and the remaining 6 were taken by people living outside of the Denver Metro area. Frequency of recreation in the water at the Confluence was fairly evenly distributed among the 103 survey takers who responded to questions about frequency of use.



Frequency of Recreation in Water at Confluence Park

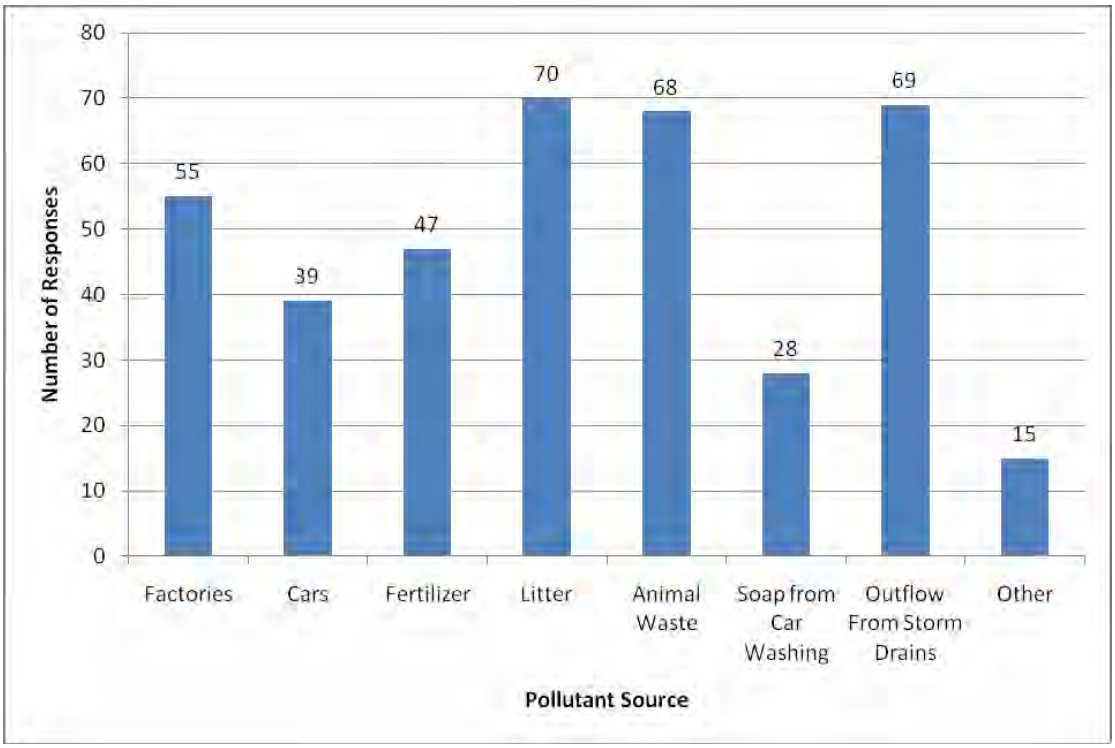
Respondents believed water quality at the Confluence to be somewhat clean (27 responses), somewhat unclean (37 responses), or not clean (20 responses). People who did not recreate in the water at Confluence Park were more likely to respond that the water quality was poor (somewhat unclean or not clean) while people who did recreate in the water believed it to be somewhat clean or somewhat unclean. People's perception of water quality at the Confluence was not influenced by the location of their residence.

83 respondents believed it was possible to get sick from swimming in waters containing bacteria while 16 did not (the remaining respondents wrote in unsure or maybe). Results of this question were consistent regardless of location of residence and frequency of recreation at the Confluence.



General Perception of Water Quality at Confluence Park

Perceived Pollution Sources



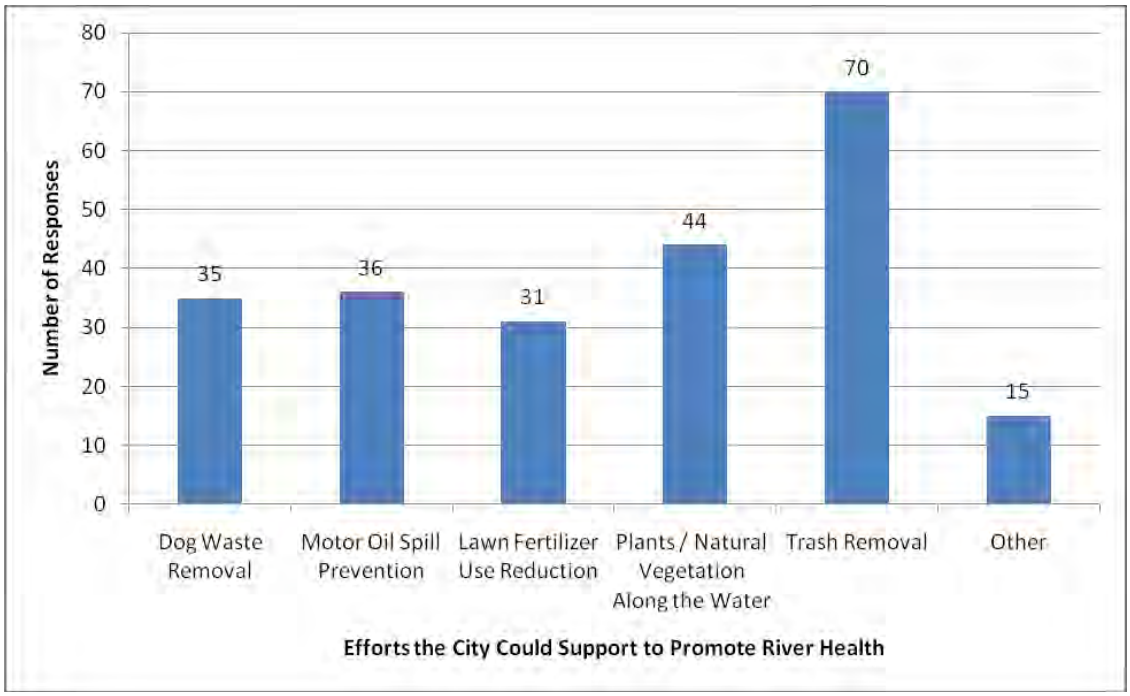
General Perception of Pollutant Sources at the Confluence

The survey presented survey takers with a list of potential pollution sources and asked them to select the two most important sources. A total of 391 responses, including write-ins, were received (many people picked more than two sources). The top ranked sources were litter (70 responses), outflow from storm sewers (69 responses), and animal waste (68 responses). Other popular sources included factories (55 responses) and fertilizer (47 responses). The most commonly perceived "other" source was human waste (from homeless people) which was written in seven times (almost half of the write-ins).

Perception of pollution sources was similar no matter how frequently the respondent recreated at the Confluence.

City Efforts to Improve Water Quality

The survey also provided survey takers with a list of options the City should support to improve river health and asked that they select their top two choices. A total of 231 responses, including write-ins, were tallied. By far, the most frequent response was trash removal (70 responses) followed by plants / natural vegetation along the water (44 responses). Dog waste pick up was the fourth most common response, however; some respondents suggested that dog waste pick up should be the responsibility of pet owners. Surprisingly, lawn fertilizer use reduction was the least commonly cited effort (31 responses).



General Public Support for Efforts the City Could Undertake to Promote River Health

Public Interest

The survey also included questions to determine the perceived value of sampling, what water quality related topics the public would be interested in learning about, and how they would like to receive that information.

An overwhelming majority of respondents (98) indicated that the City should continue water sampling efforts with 68 people indicating an interest in the results of sampling. Questions about what water quality related topics the public would be interested in learning about were open ended and as a result the

responses were fairly wide ranging. All of the relevant responses could be grouped into two categories – results and safety, and river clean up. Those requesting results and safety appeared to be interested in the quality of water at the time of recreation and knowing whether the water was safe to be in. Those interested in river clean up were interested in knowing about efforts being taken to clean up the river, what progress was being made, and how they could help out.

Communication Efforts

The final two questions on the survey were related to if and how people would like to receive information about water quality. Two thirds of (58) people responding to the survey said they were interested in receiving information about water quality. Of those people, 36 indicated they would like to receive results through Facebook and 29 indicated signage near the water was the preferred method of communicating water quality information. An additional 24 would like to receive direct emails and another 23 would like to see the information included in the newspaper. The remaining options for communicating the information, including updates on the City's web page, were selected by fewer than 15 respondents.

There were no obvious preferences for mode of communication based on frequency of use.

Recommendations

The surveys suggest that the city take several actions related to water quality that would be of interest to recreationalists at Confluence Park. The following recommendations are discussed in order of questions in the survey and are not intended to imply that any one recommendation is more important than another.

1. Because there is a perception among many users that trash is a problem and that trash removal is a worthwhile effort for the City to conduct, the City should enhance its efforts to address trash in the South Platte River and Cherry Creek. Efforts to address trash in the City's rivers and streams will likely yield results beyond addressing the most obvious urban pollutants by creating a core group of active participants who are interested in working with the City to address more difficult pollutants such as nutrients and bacteria. The City's role could include continuing involvement with The Greenway Foundation's efforts to develop a social marketing campaign to discourage littering. Ways the City could participate include providing in-kind support and / or funding to the effort; developing an adopt a stream program to encourage members of the general public to get involved in cleaning up litter along the City's surface waters, and; doing a better job of communicating Denver-funded trash removal efforts by the Urban Drainage and Flood Control District.

2. Confluence Park users appear to have an understated perception of fertilizers as a source of pollution in the City's surface waters. New, more stringent nutrient criteria that are currently being considered by the State of Colorado's Water Quality Control Commission and the Barr Milton Watershed pH TMDL will both restrict nutrient discharges from City infrastructure. As a result, the City may need to develop a more effective education and outreach campaign geared towards fertilizers before the nutrient criteria goes into effect and has a negative effect on the City's MS4 program.

3. The City's MS4 program has implemented a number of very effective programs intended to improve the quality of water discharging from the City's MS4, however; most of the users at Confluence Park seemed unaware of those efforts and some expressed interest in learning more about what the City is doing to improve water quality. The City should explore ways to better promote what it is doing to improve water quality and tout the effectiveness of those programs.

4. A number of those surveyed indicated that they would be interested in opportunities to participate in improving the river. A ready corps of volunteers may be able to help the City address certain issues without spending precious resources. Examples include an adopt the streams program, weed removal and replacement with native species.

5. It is clear from the surveys that DEH could provide more effective and timely communication of water quality results and safety issues. DEH should consider more effective signage and placement of signs in more visible locations. Optimum placement should be determined by an evaluation of usage patterns and sight lines. In addition, DEH should evaluate the use of social media such as Facebook as a tool to communicate recent sampling results, spills, and other important information related to conditions at the Confluence and other high use recreation areas in Denver. Finally, DEH should look into developing an email listserv that would facilitate communication about water quality in the City's surface waters. DEH's water quality information should be easily accessible, readily available, and easily understood.

Disclaimer: The results of the survey described in this memo were not collected in an unbiased; survey responses may have been influenced by presence of DEH staff. As a result, the results of the surveys are not considered to be scientifically or statistically defensible.

THE DENVER FOUNDATION

January 18, 2018

Congratulations. Your organization has been approved for a grant from Riverfront Park Community Fund, a donor-advised fund of The Denver Foundation. **It is important that you read and fully understand the conditions of the grant before endorsing the enclosed check.**

Grantee: The Greenway Foundation

Grant Amount: $15,000.00

Grant Number: DA-2018-73851

Grant Purpose or Restriction: restricted to support River Sweeps / Art on the River, SPREE Excursions, and Water Connection Initiative

Additional Information and Instructions: Please notify Rachel Gilette, Education & Grants Director, of this support.

- Donors to the Riverfront Park Community Fund and their family members may not receive any material benefit from your organization as a result of this grant. This includes, but is not limited to, goods, services, memberships, tickets, tuition, goods bought at auction, and tables for special fundraising events.
- It is not necessary to issue a tax receipt or acknowledgement letter to The Denver Foundation for this grant. However, our donors do like to receive acknowledgements. **If you choose to acknowledge this grant, please address it to the fund name and email ACK@denverfoundation.org.** Include Riverfront Park Community Fund and grant number DA-2018-73851 in the subject line.
- It is our understanding that The Greenway Foundation qualifies under Section 501(c)(3) of the Internal Revenue Code. If this is not the case, or a change is made to your tax-exempt status, please notify The Denver Foundation immediately.
- The Greenway Foundation must return any funds that are not spent for the purpose of this grant to The Denver Foundation with reference to grant number DA-2018-73851.
- **Endorsement of this check will indicate your acceptance of this grant and the conditions stated above.**

If you have any questions please contact our Grants Administration Associate at 303.951.9563.

55 Madison Street, 8th Floor, Denver, Colorado 80206 • 303.300.1790 • www.denverfoundation.org

OFFICE OF THE SECRETARY OF STATE
OF THE STATE OF COLORADO

CERTIFICATE OF FACT OF GOOD STANDING

I, Wayne W. Williams, as the Secretary of State of the State of Colorado, hereby certify that, according to the records of this office,

THE GREENWAY FOUNDATION

is a

Nonprofit Corporation

formed or registered on 06/22/1976 under the law of Colorado, has complied with all applicable requirements of this office, and is in good standing with this office. This entity has been assigned entity identification number 19871306691 .

This certificate reflects facts established or disclosed by documents delivered to this office on paper through 01/26/2018 that have been posted, and by documents delivered to this office electronically through 01/30/2018 @ 09:02:49 .

I have affixed hereto the Great Seal of the State of Colorado and duly generated, executed, and issued this official certificate at Denver, Colorado on 01/30/2018 @ 09:02:49 in accordance with applicable law. This certificate is assigned Confirmation Number 10688340 .

Secretary of State of the State of Colorado

**********End of Certificate**********

Notice: A certificate issued electronically from the Colorado Secretary of State's Web site is fully and immediately valid and effective. However, as an option, the issuance and validity of a certificate obtained electronically may be established by visiting the Validate a Certificate page of the Secretary of State's Web site, http://www.sos.state.co.us/biz/CertificateSearchCriteria.do entering the certificate's confirmation number displayed on the certificate, and following the instructions displayed. Confirming the issuance of a certificate is merely optional and is not necessary to the valid and effective issuance of a certificate. For more information, visit our Web site, http://www.sos.state.co.us/ click "Businesses, trademarks, trade names" and select "Frequently Asked Questions."

Form **W-9**
(Rev. December 2014)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Give Form to the requester. Do not send to the IRS.

Print or type
See Specific Instructions on page 2.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.
The Greenway Foundation

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification; check only **one** of the following seven boxes:
☐ Individual/sole proprietor or single-member LLC ☑ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate
☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶ _____
Note. For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member owner.
☐ Other (see instructions) ▶

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):
Exempt payee code (if any) _____
Exemption from FATCA reporting code (if any) _____
(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.)
1855 South Pearl Street, Suite 40

Requester's name and address (optional)

6 City, state, and ZIP code
Denver, Colorado 80210

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the instructions for line 1 and the chart on page 4 for guidelines on whose number to enter.

Social security number
			–			–				

or

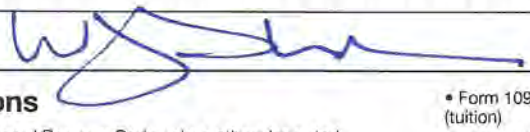
Employer identification number
5	1	–	0	1	9	3	5	7	5

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

Sign Here Signature of U.S. person ▶  Date ▶ 5-JAN-18

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at *www.irs.gov/fw9*.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following:

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See *What is backup withholding?* on page 2.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting?* on page 2 for further information.