# Anti-Contamination Project  —  Final Report

**Community Name: Spokane County and City of Spokane**

**Additional Partners: Waste Management and Sunshine Disposal and Recycling**

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## INTRODUCTION

Over the last two years it became clear to the City of Spokane (City) and Spokane County (County) that contamination in the recycling stream was an issue that deserved attention. The City set a goal of reducing its average percentage of contamination from 13% to 5% by 2021. The County did not have a specific goal to reduce contamination by a certain percentage in single family residential curbside recycling but knew there was room for improvement in contamination levels that spanned 5-40%, according to conversations with local haulers.

As has been demonstrated by The Recycling Partnership (TRP)[1] and jurisdictions[2,3,4], cart tagging in various forms could help reduce contamination in single family residential curbside recycling. Spokane County was granted funds by TRP to conduct a cart tagging project in the summer of 2020. The goals of this project were to:

1) Reduce contamination in single family residential curbside recycling;
2) Compare the effectiveness of two different forms of cart tagging: a) lid-lifting audits, and b) single-message tags; and
3) Provide consistent anti-contamination messaging to all households that receive recycling service in Spokane County.

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[1]Marshall, C. (2018). *Improving Recycling Metrics to Reach Goals, SPC Impact 2018* [PowerPoint presentation]. 38th Annual Washington State Recycling Association Conference & Trade Show, Blaine, WA. https://wsra.net/wp-content/uploads/2019/12/Marshall_WSRA-2018_Measureing-Behavior-Change-at-the-Curb.pdf

[2] Ludington, S. (2019). *Clackamas County Recycle Right Pilot Project* [PowerPoint presentation]. 39th Annual Washington State Recycling Association Conference & Trade Show, Spokane, WA. https://wsra.net/wp-content/uploads/2019/12/WSRA_Slides_3b.pdf

[3] Harless, D. (2018). *Clark County Recycling Done Right Campaign* [PowerPoint presentation]. Washington State Recycling Association WRED Event, Tacoma, WA. https://wsra.net/wp-content/uploads/2019/12/Harless_WRED-presentation-032918-KDH.pdf

[4] Cascadia Consulting Group. (2018). *Contamination Reduction Tag Study* [White paper].

This report describes the project in the following sections:
- Background
- Project Description
    - Scheduling
    - Daily Logistics
    - Info-card
- Outcomes
    - Set out and tag rates
    - Contamination reduction
    - Financial
    - Local support
- Lessons Learned
- Next Steps


**BACKGROUND**

The County administers the Spokane County Regional Solid Waste System which includes all jurisdictions within the political borders of the County except the City of Spokane Valley, Liberty Lake, and Cheney. There are three curbside recycling haulers in Spokane County—City of Spokane, Sunshine Disposal and Recycling (Sunshine) and Waste Management (WM), and one Material Recovery Facility (MRF) owned and operated by WM known as the Spokane Materials and Recycling Technology (SMaRT) Center. Curbside recycling outside of the City of Spokane is provided by Sunshine and WM, who provide every other week service. The "County routes" are made up of Sunshine and WM routes. The City of Spokane has their own solid waste collection service and provided every week service for curbside recycling during this study.

The total number of recycling carts within the Spokane County Regional Solid Waste System that received curbside recycling at the time of this project were as follows:

Table 1: Total curbside recycling carts in Spokane County Regional Solid Waste System

| Jurisdiction | Number of carts |
|---|---|
| City | 71,687 |
| County | 29,170 |
| Total | 100,857 |


**PROJECT DESCRIPTION**

The project identified 30 routes for this study, in which 29,844 carts would receive tags. These 30 routes represented 30% of the total number of curbside recycling carts in the Spokane County Regional Solid Waste System. Fifteen of these 30 routes were located in the City of Spokane (City) and underwent lid-lifting audits—where each cart that was set out on the curb was checked for contamination and tagged with an "Oops" tag if any non-recyclable items were seen. If contamination was not seen, no "Oops" tag was left. If the cart was heavily

contaminated, the cart was tagged for rejection, dumped as trash, and the resident was billed a $7 fee.

The other 15 routes were located in other jurisdictions and unincorporated areas of Spokane County[5], and all carts on these routes received a single message tag informing the resident to keep plastic bags out of the recycling cart. None of the carts that received the single message tag were flagged for rejection. All 30 routes were tagged four consecutive times. Of these 30 routes, nine City and nine County routes (60% of all routes in this project) received a truck audit at the SMaRT Center before and after tagging to determine what method of cart tagging is more effective at reducing contamination.

Table 2 displays high-level attributes about the project. In general, the County routes represented areas of lower population density and therefore had a lower average number of carts per route compared to the City.

Table 2: Project attributes

| Attribute | County routes | City routes |
|---|---|---|
| Total carts in jurisdiction[5] | 31,354 | 71,687 |
| Tagging method | Single message | Lid-lift |
| Carts on selected routes | 12,869 | 16,975 |
| Average carts on route | 858 | 1,132 |
| % carts tagged | 41% | 24% |
| # of Taggers | 3 | 8 |
| Tagged routes receiving SMaRT Center audits | 9 | 9 |

**Scheduling**

Table 3 displays the weekly schedule of audits and tagging coordinated between the 3 Info-card-only routes (see page 7 for information on the Info-card component of this project), 15 lid-lifted routes, and 15 single-message routes. The planning phase of this project extended from late February to mid-May.

- Each County or City group (e.g. County Group #1) corresponds to five routes that received tags. Each of the five routes landed on a different day of the week, Monday through Friday.
- Each route received four consecutive cart tags, labeled in the table as Tag #1-4.
- "Audit" cells represent the weeks when three of the five routes had their loads audited for contamination at the SMaRT Center. The same three routes were audited before and after cart tagging. To the extent possible, routes were scheduled for the service week

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[5]*Carts included in the County route total include 2 City routes that were tagged using the single message tagging method because neither WM or Sunshine had Friday curbside recycling routes that could be part of this study.*

immediately prior to or immediately after cart tagging but some had to be shifted due to holidays or the audit capacity of the SMaRT Center.

- The "Info-card" cell is the week that the Info-cards were distributed (see page 7 for information on the Info-card component of this project).
- The week of "Tagger Training" occurred right before the start of actual cart tagging.

Table 3: Weekly timeline for the cart tagging project

| Week | Start | End | Info-card-only | County Group #1 | County Group #2 | County Group #3 | City Group #1 | City Group #2 | City Group #3 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5/4/20 | 5/8/20 | Audit | | | | | | |
| 2 | 5/11/20 | 5/15/20 | | | | | Audit | | |
| 3 | 5/18/20 | 5/22/20 | Info-card | Audit | | | | | |
| 4 | 5/25/20 | 5/29/20 | Tagger Training | | | | | | |
| 5 | 6/1/20 | 6/5/20 | Audit | Tag #1 | | | Tag #1 | | |
| 6 | 6/8/20 | 6/12/20 | | | Audit | | Tag #2 | | |
| 7 | 6/15/20 | 6/19/20 | | Tag #2 | | | Tag #3 | | |
| 8 | 6/22/20 | 6/26/20 | | | Tag #1 | | Tag #4 | Audit | |
| 9 | 6/29/20 | 7/3/20 | | Tag #3 | | | | Tag #1 | |
| 10 | 7/6/20 | 7/10/20 | | | Tag #2 | | Audit | Tag #2 | |
| 11 | 7/13/20 | 7/17/20 | | Tag #4 | | Audit | | Tag #3 | |
| 12 | 7/20/20 | 7/24/20 | | | Tag #3 | | | Tag #4 | Audit |
| 13 | 7/27/20 | 7/31/20 | | Audit | | Tag #1 | | | Tag #1 |
| 14 | 8/3/20 | 8/7/20 | | | Tag #4 | | | Audit | Tag #2 |
| 15 | 8/10/20 | 8/14/20 | | | | Tag #2 | | | Tag #3 |
| 16 | 8/17/20 | 8/21/20 | | | Audit | | | | Tag #4 |
| 17 | 8/24/20 | 8/28/20 | | | | Tag #3 | | | Audit |
| 18 | 8/31/20 | 9/4/20 | | | | | | | |
| 19 | 9/7/20 | 9/11/20 | | | | Tag #4 | | | |
| 20 | 9/14/20 | 9/18/20 | | | | | | | |
| 21 | 9/21/20 | 9/25/20 | | | | Audit | | | |

The schedule was adhered to, except for two missed truck audits that were rescheduled at the SMaRT Center for the following week.

**Daily Logistics**

Table 4 summarizes the logistic attributes of the two different types of tagging methods carried out in this project.

Table 4: Logistical attributes of each tagging method

| Attribute | City routes | County routes |
|---|---|---|
| Tagging method | Lid-lift | Single message |
| # of taggers per route | 6-8 (split into 4 teams of 1-2) | 3 (worked as 1 team) |
| Type of route map provided | Rubicon app on iPhone & PDF | PDF |
| Tagging start time | 5am | 7am |
| Truck start time | 7am | 5:30am-7am |
| Average # of hours to complete tagging per day | 3-4 hours | 6-7 hours |
| Time constraints | Had to complete lid-lift before truck serviced cart | Could tag before or after truck serviced cart. |

*City lid-lift method*

Each City route was subdivided into 4 sub-routes using an app called Rubicon. Rubicon is a sophisticated software that enables users to see a map of carts on a route, color-coded for different tagging outcomes (clean recycling, contamination, or cart not out). Each team was assigned a sub-route and equipped with an iPhone loaded with the Rubicon app to log photos and comments. Taggers started early and worked quickly because they had to lift the lid before the recycling truck serviced the cart.

Exhibit 1: City lid-lifting team



Taggers were trained to identify the following types of recycling contamination:

1. plastic bags/film
2. bagged recyclables (e.g. recyclables contained in paper or plastic bags)
3. food packaging/mailing (e.g. food wrappers, padded envelopes, Styrofoam)
4. yard/food waste (e.g. compostable items such as branches, food, greasy pizza boxes)
5. bulk items (e.g. car parts, furniture, hoses, electronics, clothing)
6. other/undetermined (e.g. shredded paper, cigarettes, broken glass, or items unable to identify from photo)

City taggers performed the following steps:
- Lifted the lid on the recycling cart and looked for any contamination.
  - If no contamination was found, marked cart as clean in the Rubicon app and moved to next cart.
  - If contamination was found, marked what type(s) in the app and took a photo, uploading it to the Rubicon app.
    - Marked types of contamination on an "Oops" tag (Exhibit 2) and stapled around the handle of the recycling cart for the resident to see.
  - If recycling cart was almost all trash or highly contaminated [6], marked types of contamination in the Rubicon app, marked corresponding contamination types on "Oops" tag and stapled that around the handle of the recycling cart. Stapled additional rejection tag on handle to notify resident that cart would be serviced as trash and called City solid waste dispatch to notify them of the address.

After each route was noted as "complete" in Rubicon, the City Project Manager (PM) exported the route's excel sheet and edited data accordingly to ensure each cart with an "other" contaminant was specified.

Exhibit 2: City "Oops" tag for lid-lifted routes, back and front



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[6] *Only 20 carts per day maximum could be rejected due to limited driver time, so only the most heavily contaminated carts were rejected.*

*County single-message method*

The County method did not involve lid-lifting or tracking any contaminants at the curb. For County routes (WM and Sunshine routes), tags were stapled around handles of every recycling cart placed on the curb for collection. Because this method allowed for carts to be tagged before or after they were serviced, it was common for the tagging team to tag carts on both sides of the street at the same time. Two different cart tags were developed. Single-message tag #1 (Exhibit 4) was stapled on cart handles during the first two tagging weeks for each route, while single message tag #2 (Exhibit 5) was provided in weeks 3 and 4 for each route. Exhibit 3 on the right shows a cart tagger stapling a single message tag around the handle of a WM recycling cart.



Exhibit 3: County route cart tagger

Exhibit 4: Single-message tag #1 for County Routes, front and back



Exhibit 5: Single-message tag #2 for County routes, front and back

*SMaRT Center Audits*

The SMaRT Center agreed to audit three out of every five routes before and after they were tagged, and audited three Info-card- only routes (see Info-card section below for more information). City routes were chosen for audit based on higher contamination levels. County routes were chosen for audits based on higher contamination levels and geographic representation of different areas of the County. Audit staff at the SMaRT Center took a sample from the specified route's load and separated it by commodity type until all that was left was dust. The sample size target was 400 pounds, but ranged from 162 to 850 pounds, depending on the volume of the sample. Each material type was weighed and recorded, including a "residual" category. Data from these audits was communicated directly between the SMaRT Center's lead auditor and the City PM. The City PM then calculated total contamination from each audit.

Exhibit 6: SMaRT Center Audit



**Info-card**

In pursuit of the project's third goal to provide consistent anti-contamination messaging, Info-cards were sent to 84,120 addresses in Spokane County before the cart tagging began. This number is smaller than the total number of carts, because the distribution list factored in accounts with multiple carts for one service address and duplicate billing addresses. The Info-cards, pictured below, explained what should and should not be placed in the recycling cart. There were two different Info-cards mailed out because the City has a different acceptable recyclable list than Sunshine and WM, who share the same accepted recyclables list.

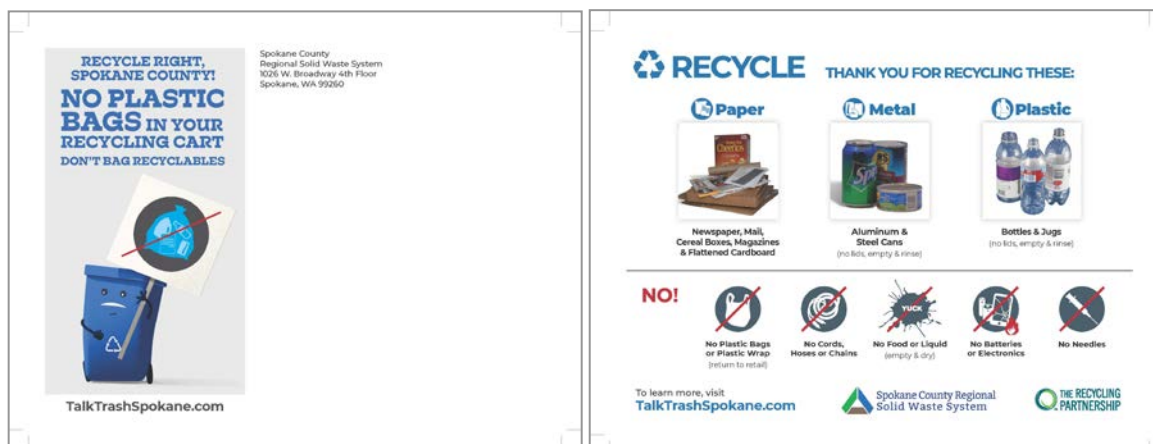Exhibit 7: County Info-card, front and back

Exhibit 8: City Info-card, front and back



The County's Info-card was not sent to residents of the City of Medical Lake (count of 1,600) who instead chose to receive similar information in a mailed utility bill insert. The City also sent a utility bill insert to all 71,687 of its utility bill customers which included some residents just outside city boundaries who have WM or Sunshine as a service provider. For more information about this overlap, read the "Info-card" subsection under Lessons learned, page 21. The table below lists the different mailed communications in this project.

Table 5: Summary of project's mailed communications

| Jurisdiction | Number of Info-cards | Number of utility bill inserts |
|---|---|---|
| ALL County (includes City of Spokane) | 84,120 | |
| City of Spokane ONLY | | 71,687 |
| City of Medical Lake ONLY | | 1,600 |
| **Total Communications** | **84,120** | **73,287** |

In total, residents at 85,720 (All County Info-card + City of Medical Lake) addresses received similar anti-contamination messaging. Prior to this project, the City and County had never been able to spend the time, effort, and money to reach that wide of an audience with a common message.

There were three routes in the study that received a SMaRT Center audit but were not tagged. These three audits were conducted to determine any discernable impact of an Info-card on contamination. Given the very small number of audits in this group these results should be interpreted as anecdotal only.

**OUTCOMES**
**Set out and tag rates**
Data analyzed through the Rubicon app on the City's lid-lifted routes provided a detailed view of how often residents placed their recycling bins at the curb for service. The "set out rate" is the percentage of the total carts on the route that had a recycling cart set out at the curb on any given service week. Through this project, it was learned that Spokane had a fairly consistent set-out rate of 50-60% for recycling (see figures in the Appendix for more specific set out and tag rates for each route). This is consistent with another cart tagging study conducted in Clackamas County, Ore. which found that their community's set out rate was 53%.[7] This rate was lower than the 70-80% set out rate anticipated by the project team during the planning phase.

The "tag rate" is the percentage of curbside recycling carts on lid-lifted routes that received an "Oops" tag. The City had a positive change in recycling behavior, as observed by a decreasing tag rate throughout the 4 weeks of tagging, as shown in Graph 1.

Graph 1: City of Spokane set out rate and tag rate, averaged over all 15 routes
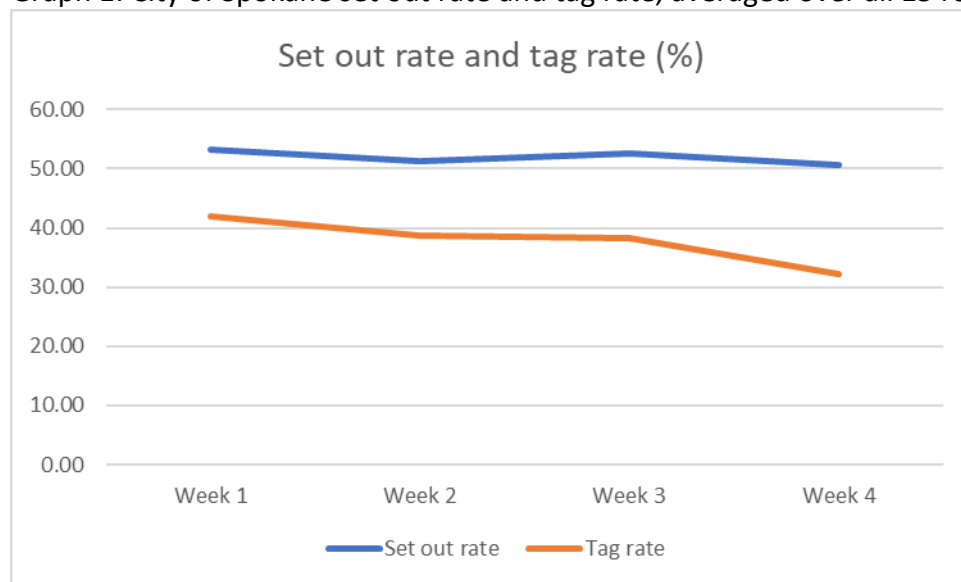


What makes the decrease in tag rate appear more moderate in the first two weeks of tagging is that, due to limited training, taggers did not consistently tag all contamination in the first weeks of the study. Thus, tag rates increased for several Group 1 routes from Weeks 1 to 3 but decreased by Week 4. This skewed the study results slightly making the decrease in tag rate appear less impressive. With practice, by July and August, tagging methods became more uniform and Graph 2 provides an example of a sharper decrease in tag rates in Group 3 compared to all routes averaged together.

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[7] Ludington, S. (2019). *Clackamas County Recycle Right Pilot Project* [PowerPoint presentation]. 39th Annual Washington State Recycling Association Conference & Trade Show, Spokane, WA. https://wsra.net/wp-content/uploads/2019/12/WSRA_Slides_3b.pdf

Graph 2: City of Spokane Group 3 set out rate and tag rate
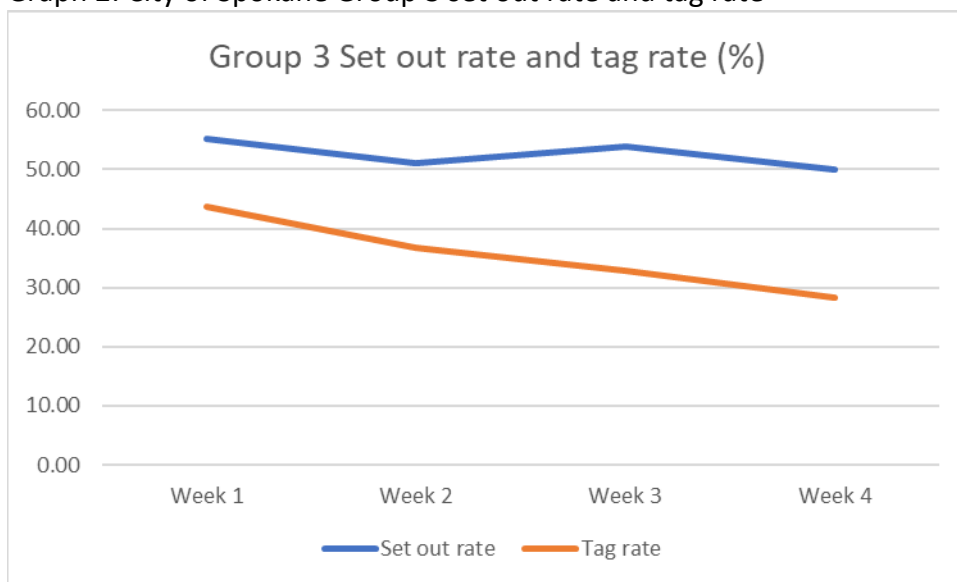


For City lid-lifted routes, there were nearly 17,000 carts inspected over the course of the study. "Oops" tags decreased from 3,686 distributed during the first tag week for all 15 routes, to 2,705 for the final tag week. As mentioned previously, the taggers were given a cap of 20 carts that could be rejected on any given day, so the number of carts rejected was never large. There was still a decrease in carts rejected from 54 for the first week of tagging to 28 for the final week of tagging. Examples of some of the rejected carts can be seen in Exhibit 9 below. The number of hours it took each team to tag stayed consistent throughout the study, after the initial week of tagging (see Table 6 below).

Table 6: City lid-lift method cart figures

|  | Week 1 | Week 2 | Week 3 | Week 4 |
|---|---|---|---|---|
| Carts inspected | 16,831 | 16,893 | 16,973 | 16,968 |
| "Oops" tags distributed | 3,686 | 3,325 | 3,336 | 2,705 |
| Carts rejected | 54 | 49 | 50 | 28 |
| Tagging hours per team | 59 | 55 | 55 | 55 |

Exhibit 9: Heavily contaminated and rejected recycling carts



**Contamination reduction**

The SMaRT Center audits of both lid-lifting and single message cart tagging methods produced similar results. This study found an average 12.9 percentage point reduction in contamination for lid-lifted routes, and an average 10.9 percentage point reduction for single-message routes, and an average 3.4 percentage point reduction for the Info-card-only group that was not tagged. These findings are summarized in Table 7 below. One lid-lifted route's audit was excluded from the analysis in Table 7 because it was thoroughly contaminated with human waste and auditors were unable to sort it safely.

Table 7: Summary of tagging method contamination reductions

| Tagging Method | Pre-tagging contamination (% weight) | Post-tagging contamination (% weight) | Percentage point reduction |
|---|---|---|---|
| Lid-lifted (8 routes) | 30.4% | 17.5% | 12.9 |
| Single-message tag (9 routes) | 22.9% | 12.0% | 10.9 |
| Info-card-only (3 routes) | 16.5% | 13.1% | 3.4 |

Graph 3 is a visual depiction of pre-tagging and post-tagging audit contamination levels for each of the audited routes in the study. Two lid-lifted routes and one single-message route had impressive 30+ percentage point reductions in contamination (44, and 51.3 and 31, respectively). Thirteen tagged routes showed decreases in the amount of contamination from the pre-tagging audit to the post-tagging audit, while four routes had modest increases in contamination.

Graph 3: routes' pre- and post-tagging audit contamination levels
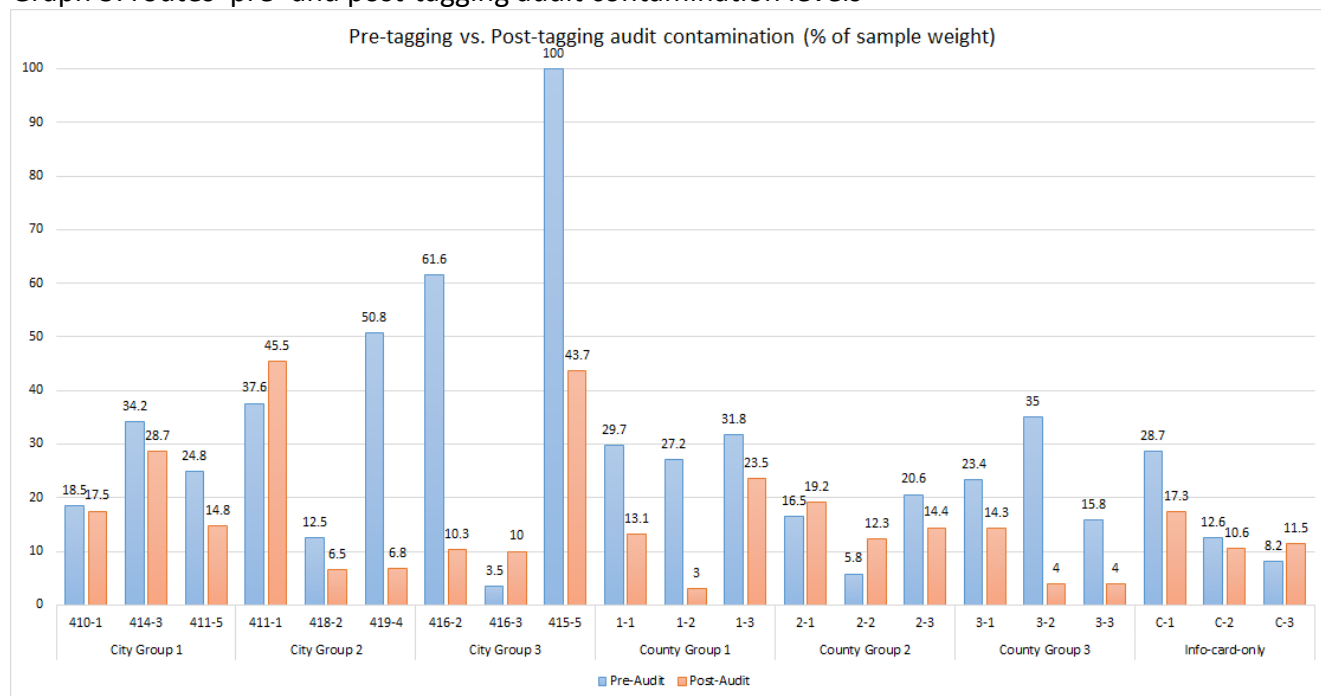


Another way to look at contamination is through the types of contamination noted on each "Oops" tag given on lid-lifted routes. Contamination types stayed consistent throughout the study on lid-lifted routes, with plastic bags and bagged recyclables being the most common contaminants (Graph 4, next page). Green waste (yard and food waste), food packaging/ mailing, and bulk items followed, while miscellaneous/undetermined were a small portion of the tags delivered. Contamination type was considered undetermined if the tagger hadn't specified the contamination type in Rubicon, and it could not be determined from looking at the photo.

Graph 4: Types of contamination observed



Contamination types (% of oops tags)
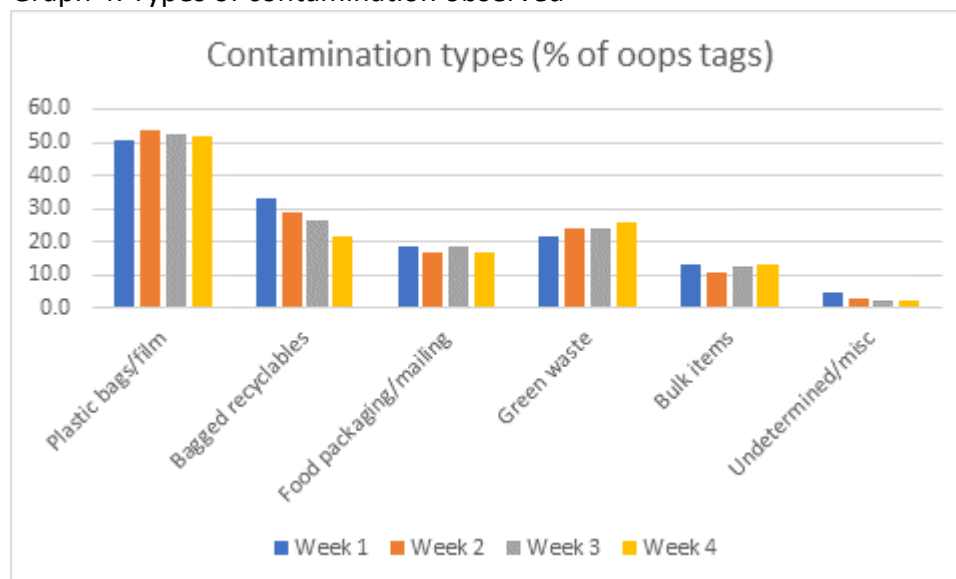
The rate of "Oops" tags for the most common contaminants, plastic bags and bagged recyclables decreased over four weeks of tagging, as observed in Graph 5 below. Plastic bag tags decreased from 21.1% in week 1 to 16.7% in week 4, while bagged recyclable tags decreased from 13.6% in week 1 to 6.8 in week 4. This decrease in plastic bag and bagged recyclable contamination was also seen in the comparison of the pre-tagging audit results to the post-tagging audit results.

Graph 5: City of Spokane plastic bag and bagged recyclables tag rate



PLASTIC BAG AND BAGGED RECYCLABLES TAG RATE (% OF CONTAINERS OUT)
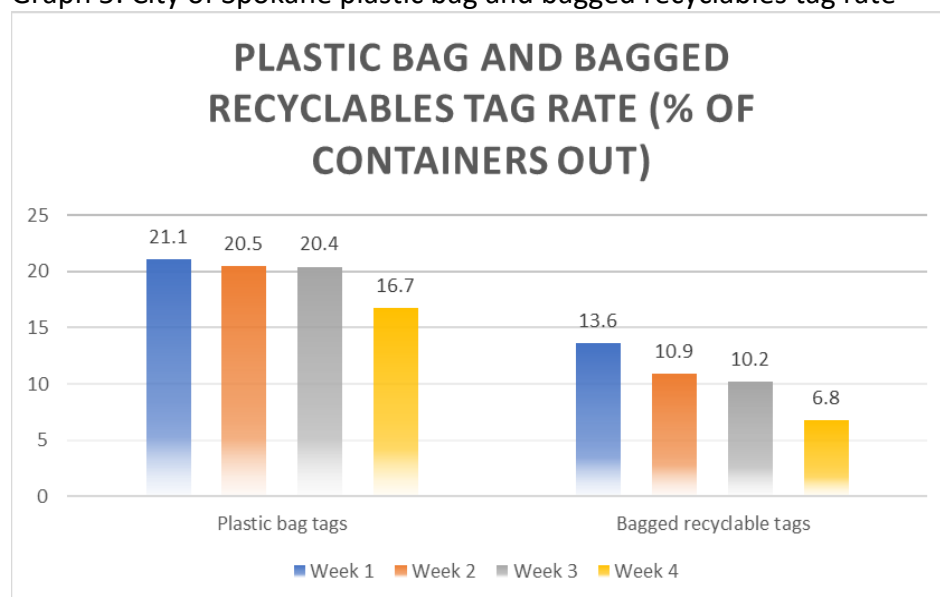
The City was able to categorize the types of tagging patterns observed for each household and came up with the following behavior profiles in Table 8. Households were divided into four behavior profile categories. **Stars** never got an "Oops" tag, they had at least one clean cart and the rest were not out (or missed). The **Learners** were households that showed improvement—they got an "Oops" tag at some point but had a clean cart after that**. Non-learners** got an "Oops" tag but did not have a clean cart afterwards. **Non-participants** never set their cart out.

Table 8: City household behavior profiles

| Behavior Category | Percent of total households |
|---|---|
| Star | 32.5% |
| Learner | 21.9% |
| Non-learner | 28.7% |
| Non-participant | 16.9% |

As indicated in Table 8, 54.4% of lid-lifted households were either **Stars** or **Learners**, meaning that they were either already good recyclers or they learned from receiving an "Oops" tag and subsequently cleaned up their recycling. 28.7% of households did not appear to learn from receiving an "Oops" tag. They got another "Oops" tag after, or perhaps they didn't set their cart out, or they received a tag during the fourth week of tagging, so the team didn't get the opportunity to see if they would have cleaned up their cart. It is possible with this category that the second "Oops" tag was for a different contaminant than the first tag. **Non-participants,** who never set out their cart in the 4 weeks of tagging, were 16.9% of the studied households.

Knowing the types of recycling behaviors in a neighborhood could help tailor the contamination reduction/tagging strategy. In Graph 6 (next page), it appears that the Northwest neighborhood—which consists of five different routes in Northwestern Spokane—has the highest percentages of Stars and Learners and the lowest percentages of Non-learners and Non-participants. This neighborhood seems well-tailored for future cart tagging projects. In contrast, the East Central neighborhood—with a larger percentage of Non-learners and Non-participants—would be better suited for a more tailored contamination reduction approach such as door-knocking or individualized report card-style outreach.

Graph 6: City of Spokane behavior profiles by neighborhood
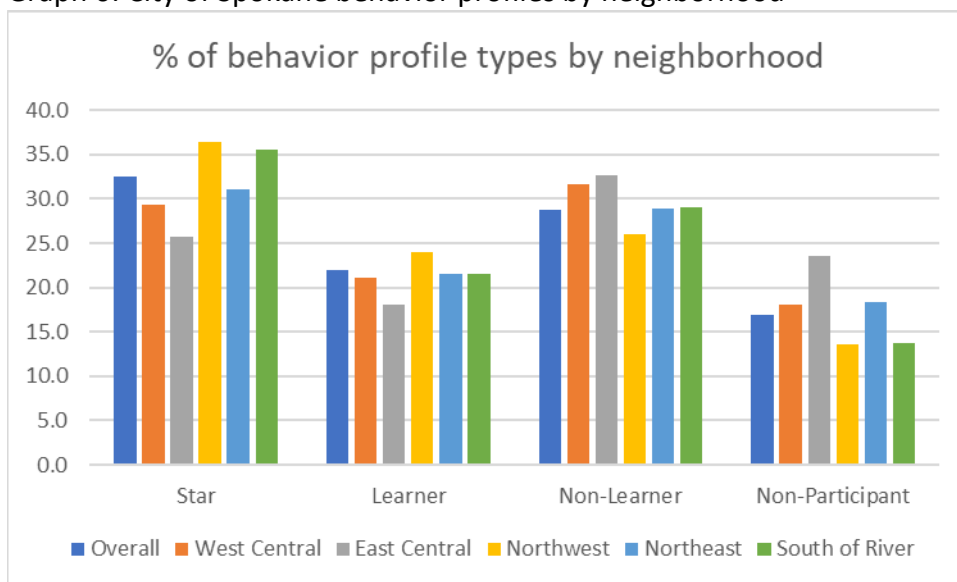


The following describes the neighborhood categories and how many routes were in each category:

- West Central: 2 routes
- East Central: 2 routes
- Northwest: 5 routes, encompassing Balboa, South Indian Trail, Five Mile Prairie, Northwest, Audubon, and Downriver
- Northeast: 4 routes, encompassing Bemiss, Hillyard, Nevada Heights, and Shiloh Hills
- South of River: 2 routes, encompassing Latah/Hangman, Comstock, Browne's Addition, Peaceful Valley, and West Hills.

Further analyses could elucidate what types of contamination are common in different neighborhoods, and how education/outreach strategy could be tailored accordingly. The City of Spokane Solid Waste Collections Department noted that the neighborhoods that were the least responsive to cart tagging, West Central and East Central, have a higher proportion of rental units. An analysis of neighborhood statistics, such as mean income or percentage of home ownership, could help determine what contamination reduction strategy might be more effective. See a chart in Appendix A for a different visualization of each behavior profile type, separated by neighborhoods.
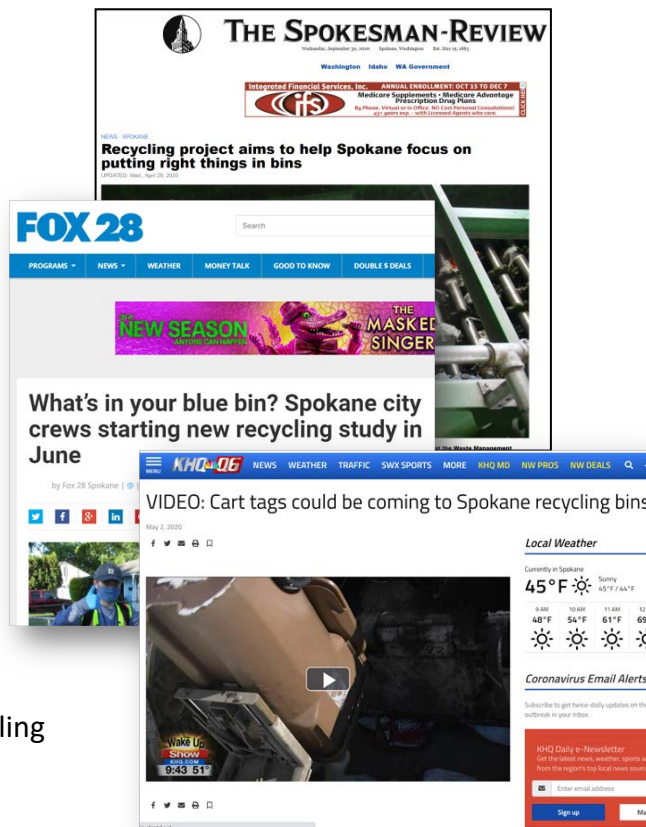
**Local support**

The cart tagging project received local political support from the following:

- County's Board of County Commissioners
- County's Environmental Services Director
- Spokane City Council
- Spokane Mayor's Office.

The project team pursued local media coverage including:

- Joint City-County news conference
- Joint City-County-haulers media release
- City & County Facebook posts and videos, shared on other community organizations' pages
- City blog posts, shared on local news outlets
- TV coverage featuring reporters walking with tagging staff explaining purpose and importance of cart tagging
- Coordinated media releases leading up to the cart tagging project with local Recycling Taskforce[8]
  - Social media ads
  - Newspaper ads
  - TV commercials
  - Radio ads and PSAs
  - Website promotion of the Waste Directory, and County and City recycling webpages.

In addition to the political support and positive press from local news agencies, the source of consistent and reliable support came from TRP. The cart tagging team--which included the County, the City, Resource Synergy, and TRP--met weekly to discuss challenges, successes, and to keep the immediate team abreast of new developments. TRP staff were readily available to troubleshoot problems and share best practices from other communities who had undergone similar experiences. When difficulties arose that were Spokane-centric, the local team brainstormed and implemented solutions.

As with any project that seeks to change personal behavior, staff did receive some negative feedback through phone calls, emails, and social media comments/messages, as well as direct interaction between residents and cart taggers. However, the amount of negative feedback was

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[8] The Recycling Task Force was formed in 2019 with a goal to promote solid waste best practices. Recycling Taskforce members include Spokane County, the City of Spokane, Waste Management, Spokane River Forum, Washington State Department of Ecology, and other guests as they are interested.

insignificant. Out of 660 total recycling/yard waste-related calls to the City's Customer Service Line (311) during the cart tagging study, only 95 were related to the cart tagging study (14.4%). Most comments (89.5%) were seeking more information, such as:

- Resident thought the item listed on the "Oops" tag was recyclable or didn't think they had put that item in their cart.
- Residents were curious about why their cart was tagged and wanted to know more about the program.
- Residents wanted to know if they'd be charged or if their cart wouldn't be collected.
- The resident couldn't read the tag due to illegible handwriting and wanted to know more.

There were no more than a dozen complaints categorized as follows:

- One respondent thought it was "creepy" that taggers were looking in carts.
- Two respondents complained that the cart taggers were loud or rude.
- Some residents were upset because they didn't think they should have been tagged.

The County's recycling hotline received 15 calls during the duration of the cart tagging project.

- Thirteen of the 15 calls were residents wanting to know why they were receiving a flyer about placing plastic bags in their carts when they didn't put plastic bags in their recycling carts.
- One caller wanted to know more about the program.
- One caller wanted to lodge a formal complaint that this type of education was too invasive.

Given the individualized feedback provided through the City's lid-lifting, it's not a surprise that they received more calls.

**Financial**

In Table 9 on the next page, the costs to perform the two different types of cart tagging are summarized. Notes about the calculations are as follows:

- The cost for Info-cards was scaled down to represent only the Info-cards sent to households on tagged routes, assuming that each household had only one recycling cart.
- "Tag-printing" costs include printing four tags for each County route being tagged, and enough "Oops" tags for the City's tagged routes.
- The cost of "Tagging" includes an extrapolated fee for labor coordination which was estimated based on the number of labor hours spent in each tagging method, and then applied to the number of carts on each tagged route. This is why the "Tagging" figure for the City is 2.5x that of the County, when the actual labor hours are closer to a 2:1 ratio, City to County (see Table 10). As expected, the costs for the City's lid-lifting method exceeded that of the County's single message method by almost two-fold yet provided more individualized education to curbside recycling residents.

Table 9: Costs of two different tagging methods

| Cost | County routes: Single message | City routes: Lid-lift |
|---|---|---|
| Info-card - printing & mailing* | $ 1,521 | $ 2,006 |
| Tag -printing | $ 2,381 | $ 1,338 |
| Tagging (labor coordination, labor, mileage) | $ 24,064 | $ 66,705 |
| Total | $ 28,054 | $ 70,165 |

| Cost per cart | $2.17 | $4.13 |
|---|---|---|

Another way to compare the different tagging methods is to look at the strict labor hours that each required, not including labor coordination estimates. The City lid-lift tagging method required 2 times the labor hours that the County single-message method required. However, when those labor hours are attributed per cart, the labor per household drops to a ratio of 1.6.

Table 10: Labor hours of County and City tagged routes

| | County | City |
|---|---|---|
| Labor hours | 910 | 1951 |
| Labor minutes/cart | 4.2 | 6.9 |

It's important to note that Tables 9 and 10 do not include in-kind labor contributions of the cart tagging team. While Resource Synergy was subcontracted to manage the labor for the actual cart tagging, it was difficult to estimate all the hours required to manage and execute this project. The planning phase leading up to cart tagging spanned from mid-February to late-May in which substantial hours were logged by both City and County PMs. County and City support staff contributed to various aspects of the project as well. Staff from haulers also put in time and effort to select routes and procure route maps, attend planning meetings, and check in with their drivers. The following in-kind contributions are estimated for the project team.

Table 11: In-kind contributions of project team

| Team Member | Hours |
|---|---|
| County PM | 390 |
| City PM | 780 |
| City Oversight Staff | 156 |
| SMaRT Center Audit crew | 252 |
| TOTAL | 1,578 |
| *Estimated in-kind labor* | *$83,442* |

Table 12 shows the budget for this project. Note that the Info-card costs differ from the costs listed in Table 9 because one of the goals of this project was distributing an Info-card to ALL single-family households subscribed to curbside recycling within the Spokane County Regional Solid Waste System.

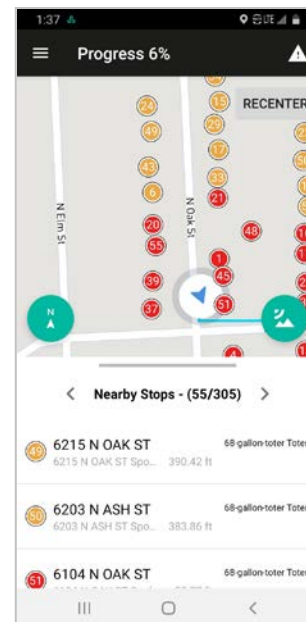Table 12: Budget for Spokane County cart tagging project

| Item | Expenses | |
| --- | --- | --- |
| | TRP Grant Funds | County and Partners In-kind Funds |
| Cart Tagging Labor Management, Labor, Mileage & Supplies | $91,752 | |
| Info-card (includes printing, postage, distribution) | $10,060 | |
| Cart Tags | $2,841 | $878 |
| Other Communications (utility bill inserts, advertisements) | $473 | $9,500 |
| Project Team In-kind contributions | | $83,442 |
| TOTAL | $105,126 | $93,820 |

**LESSONS LEARNED**
**Rubicon**

Exhibit 10: Rubicon screenshot



1. Initially the team was excited to experiment with the Rubicon app because the City of Spokane solid waste drivers already were using Rubicon for collection route management. The team had hoped for better integration between the driver and tagger portals, but the two portals did not communicate with each other which caused inefficiencies in how carts were rejected.
2. There were many days when the app wouldn't load correctly, or it would freeze. The software made editing entries difficult and the need to export data into Excel for editing was cumbersome.
3. There were also inconsistencies with how the Rubicon data displayed. For example, when the tagging staff chose "other" on the exceptions list, they were asked to put a comment to describe what the item was. About half of the time the comment would not show up on the spreadsheet of the exported data. Additional time was spent during the data cleaning phase to go through each entry on the Route Tracker in Rubicon to see what the original comment was.
4. Another issue was that the Exceptions Reports would not calculate the set-out rate or tag rate accurately for much of the study.

These are opportunities for Rubicon to improve its powerful app. The City and TRP PMs spent more time than anticipated dealing with these issues and cleaning up the data.

**Info-card**
Sending postcards to every curbside recycling resident within the County proved to be challenging. Because the City of Spokane has a different accepted materials list than the other two curbside haulers, WM and Sunshine, two different postcards had to be created. From the address lists provided by each hauler, several dozen residents would receive both postcards. This was puzzling at first, but it was realized that the City of Spokane address list was generated from the Utility bill address list. These utility bill recipients included residents who were a part of the City of Spokane's water service area which extends beyond the City limits. Solid waste services are limited to residents and businesses within the City limits. Therefore, there were residents who subscribed to Sunshine or WM solid waste services but had City of Spokane water service and therefore received both postcards.

One other hurdle with the postcard was that one of the haulers was unwilling to provide addresses in a specific jurisdiction. The County had to then work directly with the jurisdiction to ensure that residents received the same information as others in the project scope. Despite these setbacks, the information presented on the Info-cards was delivered accurately to an estimated 98% of all curbside recycling customers within the County.

**Internal Training Time**
Training for cart taggers was shortened from the suggested two weeks to one week. Because of this, more time was spent cleaning up data that was entered into the Rubicon app incorrectly, or without necessary detail. It would have been beneficial to spend more time in training figuring out how to divide up contaminant categories so that the initial "other" category wasn't so large, ensuring taggers knew to enter an "other" comment, and teaching taggers how to take a clear photo.

**RECOMMENDATIONS**
**Cart Tag Phrasing**
Some County residents who received an information only cart tag thought they were receiving a violation. To remedy this, better wording should be included to indicate that the cart tag was educational only and distributed to every cart on a route.

**Contamination reduction return on investment**
Based on the similar rates of contamination reduction for both single-message and lid-lifted routes, it seems the most cost-effective option is to focus on widespread single-message cart tagging to reach a larger number of households at a lower cost, while still seeing reductions in contamination. If there are problematic neighborhoods that don't respond to generic, single-message cart tagging, small-scale door knocking or individualized report carts about their cart contamination may be a more effective approach.

**Frequent communication**

A tagging project's complexity seems to increase exponentially with the number of stakeholders involved. This project was successful because relationships were built with all the organizations involved with the program—local haulers, MRF, local government staff, PMs and media relations managers. Advice to other jurisdictions that are considering implementing a cart tagging project is to make sure there is consistent communication through all phases of the project, from planning through implementation and wrap up.

For this project, communications between stakeholders included:

- kick-off meetings with staff representing operations, media-relations, and customer service
- discussion of the project with both City and County law enforcement
- weekly check-ins with TRP
- weekly reminder emails to route supervisors and the SMaRT Center lead auditor about which routes were scheduled to be tagged or audited the following week
- direct conversations with stakeholders whenever issues came up

One thing the Spokane team could improve upon next time is more reminders about the project to customer service staff. The customer service staff for the City and County hotlines as well as the haulers' customer service staff were given reminders about the project before the start of cart tagging and another about halfway through cart tagging. Perhaps monthly or every other week reminders on the status of the project would be helpful additions.

**NEXT STEPS**

Actions that the City and County will continue to reduce contamination include but are not limited to the following:

- Continue participation in the harmonized recycling and waste reduction messaging of the Recycling Taskforce.
- Continue the #RecycleRightSpokane media outreach.
- Maintain signs that have been placed on the Big Belly recycling receptacles in downtown Spokane with information on how to "Recycle Right."
- Dependent upon funding, continue cart tagging in unincorporated Spokane County on WM routes the summer of 2021.
- Pursue multifamily recycling contamination reduction with partners the City, County, Resource Synergy and TRP.

*For questions about this report, please contact Lindsay Chapman at lchapman@spokanecounty.org.*

## Appendix A
## Additional City of Spokane cart tagging charts



Group 1 Set Out and Tag Rates (%)



Group 2 Set Out and Tag Rates (%)

Group 3 Set Out and Tag Rates (%)



Behavior Profile Types by Neighborhood (%)