The Recycling Partnership and The City of Red Wing Minnesota

Cart Transition Impact

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Circular Matters

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1. Executive Summary

The City of Red Wing, Minnesota, transitioned from bin-based weekly multi-sort recycling collection to single-stream recycling collection using 96-gallon carts collected every other week in September of 2019. The goal of the transition was to increase target recyclables collected.

Waste and recyclables data were targeted for collection from 108 single-family homes before and after the system transition occurred. The data collected confirmed that the system change and accompanying promotion and education of residents by the City did in fact achieve the goal and resulted in a 25.2 percent increase in target recyclables collected, increasing from 301 to 377 pounds per occupied single-family home per year in the City.[1] The single-family home recycling rate for targeted recyclables, also known as the recycling capture rate, increased from 60.8 to 71.5 percent. Participation by households in the recycling program also increased.

Although contamination of recyclables by non-requested materials increased slightly from 5.0 to 6.2 percent, this level is still low compared to other communities using cart-based single-stream recycling collection programs. Furthermore, non-conforming bagged recyclables, which are often disposed by MRFs because they cannot efficiently sort them, decreased from 9.4 percent to 2.1 of the recycling stream, resulting in a significant improvement in the recycling stream. This reduction in bagged recyclables is a direct result of the City's recycling education efforts.

Red Wing's recycling performance after the system transition far exceeds that of other communities:

- Red Wing's 71.5 percent capture rate of curbside recyclables available in the city is well above Recycling Partnership data of 52 percent for communities of similar size.
- Red Wing's 6.2 percent contamination rate is also well below the average rate of 16.7 percent from a 2019 Recycling Partnership survey of more than 400 cities nationwide.

In summary, the City's transition from bin-based weekly multi-sort recycling collection to single-stream recycling collection using carts, in combination with the City's recycling promotion and education efforts, resulted in more recyclables collected for recycling, meeting the goal of the transition. While contamination in recycling increased slightly, the reduction in bagged recyclables improved the overall quality of the recycling stream.

[1] These figures include all single-family homes, whether households participate in recycling or not, but exclude vacant homes. During this study, 4.7 percent of single-family homes were observed to be vacant. This vacancy rate is consistent with home vacancy data that the U.S. Census Bureau has gathered for Red Wing in the past.

2. Project Background

The Recycling Partnership (TRP) provided a grant to the City of Red Wing, Minnesota, to transition 7,500 households from weekly bin-based to every-other-week 96-gallon cart-based curbside recycling collection. The City of Red Wing collects both waste and recyclables using city trucks and staff, and materials are delivered to the City's Solid Waste Campus located at 1873 Bench Street, Red Wing, MN. At this campus the City of Red Wing operates a transfer station and a facility that processes municipal solid waste to further capture recyclable commodities still in the waste before preparing Refuse Derived Fuel (RDF) for consumption by Xcel Energy. With the implementation of cart-based recycling, recyclables collected in the City's curbside recycling program is being transferred to a regional Material Recovery Facility (MRF) for processing and the remaining wastes are processed at the City's RDF facility.

Red Wing incentivizes recycling through pay-as-you-throw waste disposal pricing, with a charge of $20.51 per month for a 48-gallon waste cart or $34.38 per month for a 96-gallon waste cart. This did not change during the transition to recycling carts. The City also charges an additional fee to collect waste that does not fit in the waste cart. While some households may misuse the recycling cart if their waste cart is full, Circular Matters only observed a couple of instances where this may have occurred over the course of the study.

The purpose of this study was to document the impact of the system transition, including the total quantity of recyclables generated by Red Wing households, the quantity of target recyclables collected for recycling, for the purpose of analyzing the change in recycling capture rates for specific commodities with the transition from bins to carts. In addition, TRP desired detailed data of the composition of film and flexible plastics placed in the recycling and waste setouts, and how the transition from bins to carts impacts contamination.

3. Methodology

Circular Matters conducted this study by sampling recyclables and disposed waste from representative households before and after the system transition occurred. Documentation of impacts on recycling collection efficiency and processing of collected recyclables was beyond the scope of Circular Matters' services for this project.

The study methodology for this project was to sample waste and recyclables at the curb from 108 representative single-family homes. In order to improve the accuracy of before and after comparisons, samples were collected from the same homes (i.e., same addresses) before and after the system transition. The homes selected came from 12 different streets in Red Wing that reflected the diversity of the City. The City assisted in selecting the streets. The time frames for sample collection were:

- July 22-August 1, 2019; and
- November 12-21, 2019.

Some 80 percent of all homes in the City are single-family homes, which are defined to be four or

less units in a structure. Single-family homes also have higher waste generation rates than multifamily homes. Therefore, the vast majority of impacts that recycling system changes have come from single-family homes rather than multifamily homes. Gathering representative data from multifamily homes on a per-home basis is also challenging. For these reasons, the documentation of system impacts focused exclusively on single-family homes, with the understanding that similar impacts would likely be observed at multifamily homes, but to a lesser extent.

Recycling carts were distributed at the end of August and the first few days of September, and recycling collection under the new system began on September 16. The dates for the "after" sampling occurred a full four weeks, or two recycling collection cycles, after the new system began. This gave time for resident set-out patterns for recycling to be established while avoiding the Thanksgiving and Christmas seasonal holidays.

The sampling methodology entailed collecting the full waste and recycling materials set-out from each home selected for inclusion in the study. Samples were collected from homes regardless of whether they had a recycling set-out. On any given day some homes had a recycling set-out but no waste set-out and other homes had a waste set-out but no recycling set-out; however, most homes had both waste and recycling set-outs. Because notes were taken on which homes had set-outs of waste and/or recycling over the two-week study period each season it was possible to form an estimate of recycling participation rates.[2]

The samples of waste and recyclables were kept separate from each other as they were collected and transported to the Solid Waste Campus where they were sorted in accordance with the study categories and then weighed. The categories and definitions are in the Appendix of this report.

Analysis of the field data began with reviewing the set-out data to identify homes that appeared to be vacant, at least for the period of the study, due to no waste or recycling set-outs over the two-week period, and to calculate recycling set-out/participation rates for those homes that had at least one set-out of waste or recycling over the two weeks. Next, weight data by sort category was converted to a pounds per home per year value for each of the 12 streets sampled. These values were averaged to provide the before and after comparison values for the City of Red Wing.

It should be noted that during the November data collection event, two homes from different parts of the city each placed a large volume of polyethylene film in their recycling cart that appeared to be cleaning out material that had been stockpiled. One home had approximately 67 pounds and the other home had approximately 10 pounds of polyethylene film. In both cases the film was a mixture of clear and colored bags, but both also included heavy duty clear sheeting. In order to avoid biasing study results, the film from both these homes was weighed for record purposes but otherwise not included in the data analysis.

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[2] Participation is generally defined to mean a home sets out recyclables at least once a month. Because data on setouts were only collected over a two-week period, actual participation rates could be higher than reported in this study. Also, because of recycling promotion to residents just before data were collected for this study, participation rates may decline to more normal levels in the future.

4. Results

4.1. Changes to the Recycling System

The following recycling program elements changed between the July data collection period and the November data collection period:

- From up to five set-out streams composed of paper, plastic, metal cans, clear glass, brown glass, and green glass to a single stream with all materials commingled;
- Collection container volume increased from one set-out bin, which residents had to supplement with self-provided additional set-out containers, to a single 96-gallon recycling cart;
- From weekly recycling collection to every other week recycling collection;
- Addition of polypropylene plastic containers as an accepted recyclable material;
- Clarification that aseptic and gable-top cartons are an accepted recyclable material (previous educational materials did not clearly identify them as accepted); and
- Educational messaging that clearly states that no film plastic or bagging of recyclables is allowed in the recycling cart.

Because of the transition, there had to be additional education and awareness messaging. This additional recycling communication occurred only a few weeks before the November data collection event and may have contributed to a boost in recycling participation and capture of desired recyclables. It is possible that some of these gains in participation rate and amount of recyclables captured for recycling may decline from what was observed during the snapshot in time when the November data were collected. Periodically reminding residents of the importance of recycling can help to keep recycling participation high.

4.2. Recycling Participation and Set-out

The recycling participation rate increased from 81.6 to 94.2 percent. In both the July and November data collection periods, 5 of the 108 homes appeared to be vacant, a 4.6 percent vacancy rate. This vacancy rate is consistent with data that the U.S. Census Bureau has collected from Red Wing in the past. The recycling participation statistics in this section exclude the homes that appeared to be vacant, and so are only for occupied homes.

There were 10 households that set our recyclables in July that did not wheel their cart down for the data collection event in November. We believe that those households are likely still recycling, but that their large capacity cart may not have been full and they may have waited for the next recycling opportunity to wheel their cart to the curb. We counted these ten homes in arriving at the 94.2 percent participation rate figure. This participation rate figure is a snapshot in time and may decline somewhat once the excitement of the program change dies down.

Circular Matters field staff also took note of the fullness of the waste and recycling carts that were set out for collection. This was a rough visual assessment rounded to 25 percent, 50 percent, 75 percent, or 100 percent full. On average recycling carts were 71 percent full. By comparison, the

waste carts in November, made up of both cart sizes, were 78 percent full each week.

4.3. Summary Level Comparison

Table 1 provides a summary level comparison of before and after the transition to recycling carts was made. Unless otherwise noted, all values are on an occupied homes basis for all homes on route regardless of whether households participate in recycling or not. The values can be reduced by 5.4 percent each season to convert the results to a total homes-on-route basis that includes vacant homes, if desired. Discards generation is the sum of waste and recycling set out for curbside collection. Recycling of targeted materials from participating homes is a calculated value, which is calculated by dividing the recycling of targeted materials value by the participation rate.

Table 1 – Summary Level Impacts of System Transition

Metric	Before	After	Change
Discards generation	1,884 lbs./home/yr.	1,814 lbs./home/yr.	-3.4%
Recycling participation rate	81.6%	94.2%	+15.4%
Target recyclables capture rate	60.8%	71.5%	+17.6%
Recycling, including contamination	315 lbs./home/yr.	402 lbs./home/yr.	+27.6%
Recycling, targeted materials	301 lbs./home/yr.	377 lbs./home/yr.	+25.2%
Recycling, targeted materials from participating homes	369 lbs./home/yr.	400 lbs./home/yr.	+8.4%
Recycling contamination	14 lbs./home/yr.	23 lbs./home/yr.	+64.3%
Recycling contamination rate	5.0%[1]	6.2%	+24.0%
Bagged recyclables	9.4%	2.1%	- 77.7%

Note 1: Polypropylene bottles and containers were originally contamination but were reclassified as an accepted recyclable commodity with the system transition. To better show the impact of the transition to single-stream and carts on contamination, polypropylene has not been included as a contaminant in this comparison.

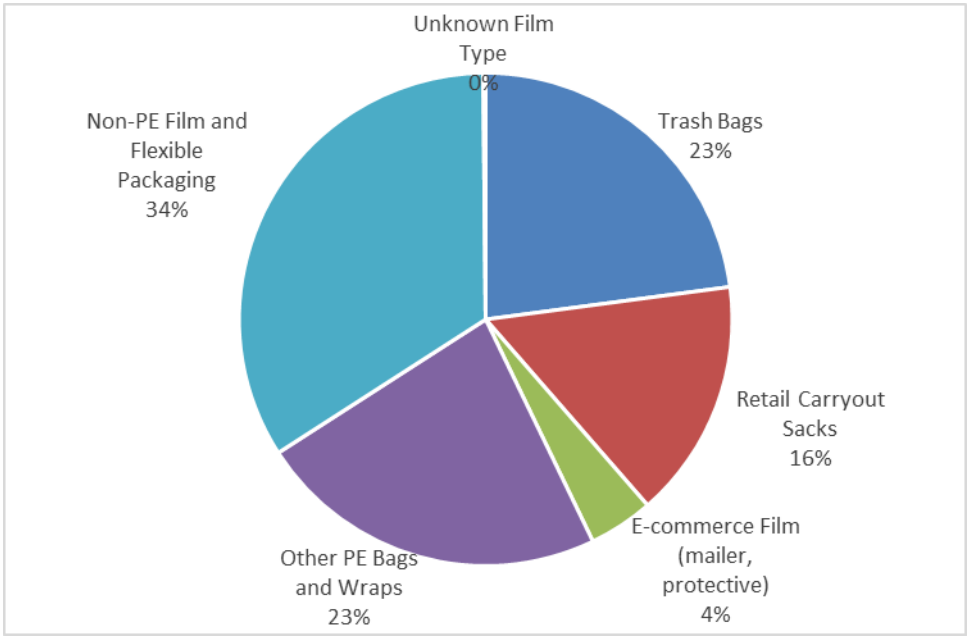
As Table 1 shows, capture of targeted recyclables increased by approximately 80 pounds per occupied home per year. This improvement came from a combination of increased recycling participation and increased capture of recyclables from participating homes. Although the amount of bagged recyclables dropped significantly, overall contamination increased from 5.0 to 6.2 percent. Red Wing started with a low recycling contamination rate that was hard to improve upon. Before the switch to recycling carts, collection crews loaded different recyclables into different compartments of their collection vehicles. This allowed city collection employees to leave behind obvious contamination that was not accepted for recycling collection. The transition to carts makes inspection for contamination more difficult.

4.4. Focus on Film and Flexible Packaging Generation

Figure 1 shows the composition of film and flexible packaging plastics generated and discarded from the home, including film and flexible packaging found in both the waste and the recycling

streams. The percentages in Figure 1 come from data collected for the November sort.

Figure 1 – Composition of Film and Flexible Packaging Plastics Generated



Note: retail carryout sacks, e-commerce film, and other PE bags and wraps do not include polyethylene film that has been returned to retail for recycling

Figure 2 shows the disposition of retail carryout sacks discarded at home.

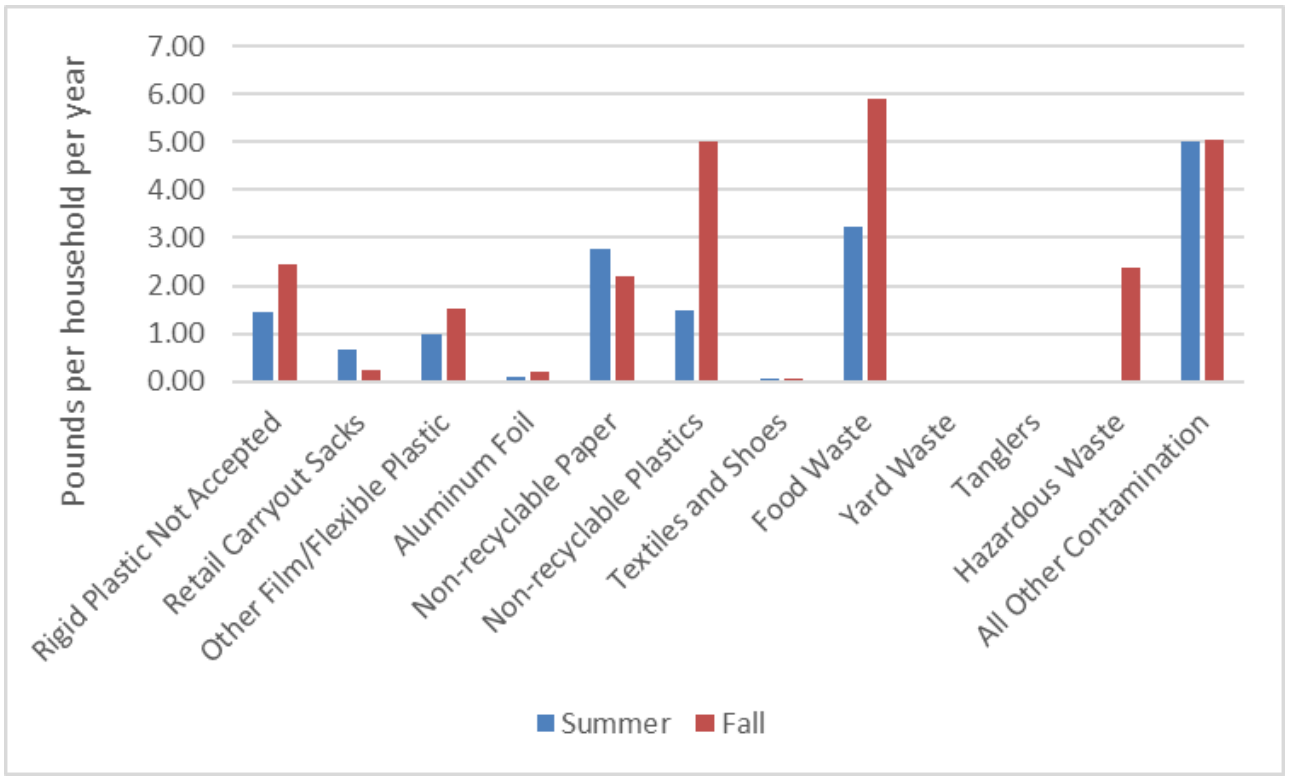
Figure 2 – Disposition of Retail Carryout Sacks

As figure 2 shows, the amount of retail carryout sacks used to bag recyclables declined after the cart transition. As part of the transition the City conducted messaging that loose film bags or bagged recyclables are not allowed in the City's recycling program. The City's education campaign to not bag recyclables was effective. An unknown amount of retail carryout sacks was returned to retail for recycling through the proper collection channels. The amount of retail carryout sacks found in the combined waste and recyclables streams declined from the July "before transition" data collection period and the November "after transition" data collection period, and this decline led to the increase in percentage of bags disposed as waste. It is possible that the messaging on the importance of recycling may have increased the amount of retail sacks returned to retail, which was not counted in this study; however, this was not able to be verified.

4.5. Contamination in Recycling

Except for non-recyclable paper and retail carryout sacks in recycling that declined, all other contamination categories slightly increased with the transition to single-stream recycling and use of carts when measured on a pounds-per-household basis. This is illustrated in Figure 3. Although there were contamination categories for yard waste and tanglers, those types of contaminants were not observed in recycling set-outs from the homes that were participating in recycling in either the July or the November data collection periods. Rigid plastic not accepted includes #3, 4, 6, 7 Bottles and Containers and bulky plastic items such as buckets. Non-recyclable plastics includes EPS foam, PS (#6), plastic cutlery, loose caps and closures, hangers, tubes, and non-container plastic items. Definitions for the other categories, with product examples, can be found in Appendix A. As discussed previously, Red Wing had a low contamination rate before the system transition occurred and it only increased a small amount after the change, rising from 5.0 to 6.2 percent. In comparison to other single-stream communities, Red Wing's recycling contamination rate is low. Many single-stream MRFs dispose of bagged recyclables because they cannot efficiently debag them and sort the contents. For those MRFs, Red Wing's non-conforming materials (i.e., contamination plus bagged recyclables or waste in recycling) dropped from14.4 to 8.3 percent.

Figure 3 – Contamination in Recycling



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4.6. Desired Recyclables Capture Rates

Table 2 shows how capture rates of desired recyclables improved after the transition to single-stream collection with recycling carts. Some of this improvement is due to increased participation in recycling and some from true improvements in recyclables capture from participating homes.

Table 2 – Improvement in Desired Recyclables Capture Rates

Material Category	Before	After
Paper		
Corrugated Cardboard	83.0%	90.6%
Aseptic and Gable Top Cartons	33.2%	35.1%
Mixed Paper (Recyclable)	54.2%	63.6%
Rigid Plastics		
PET Bottles and Jars	62.2%	74.0%
Other PET Packaging	32.4%	43.0%
Natural HDPE Bottles and Jars	81.1%	88.5%
Pigmented HDPE Bottles and Jars	66.2%	70.0%
Other HDPE Containers	64.8%	17.5%
PP Bottles and Containers	24.2%[1]	50.4%
Metal		
Aluminum Cans	53.9%	75.5%
Steel Cans	61.2%	78.8%
Glass Containers	62.0%	72.0%

Note 1: Polypropylene bottles and containers were originally contamination but were reclassified as an accepted recyclable commodity with the system transition.

As Table 2 shows, all categories showed improvement in their recycling capture rate, except for Other HDPE Containers, which are packages such as butter tubs. This category had the least amount of material in the study with very few observed containers. We believe that the category did not decline, and that the observed packages were simply not frequent enough to provide reliable data. It should be noted that PP containers were not accepted for recycling before the transition but were accepted after the transition. The capture rate of PP containers more than doubled from 24.2 percent to 50.4 percent.

4.7. Detailed Categories Comparisons

Table 3 provides a comparison of the per-home disposal, recycling, and generation rates, percentage compositions, and recycling capture rates for each of the study categories before the recycling system underwent its transition. Table 4 provides corresponding detail after the transition occurred. Figures in red font in the recycling stream are nonconforming and not accepted for recycling in Red Wing. Bagged recyclables were first weighed separately and then emptied and the contents included in the detailed categories in the tables below.

Table 3 – Detailed Composition Data Before Recycling System Transition

Material Category[1]	Waste Lbs./HH/Year	Recycling Lbs./HH/Year	Total Generation Lbs./HH/Year	Waste Stream %	Recycling Stream %	Total Discards %	Recycling Capture Rate
Bagged waste in recycling		4.07			1.3%		
Bagged recyclables in recycling		29.76			9.4%		
Paper							
Corrugated Cardboard	11.12	54.45	65.57	0.7%	17.3%	3.5%	83.0%
Aseptic and Gable Top Cartons	2.46	1.22	3.68	0.2%	0.4%	0.2%	33.2%
Mixed Paper (Recyclable)	94.73	112.03	206.76	6.0%	35.6%	11.0%	54.2%
Subtotal Paper	***108.32***	***167.70***	***276.02***	***6.9%***	***53.2%***	***14.7%***	***60.8%***
Rigid Plastics							
PET Bottles and Jars	16.77	27.61	44.38	1.1%	8.8%	2.4%	62.2%
Other PET Packaging	6.32	3.03	9.35	0.4%	1.0%	0.5%	32.4%
Natural HDPE Bottles and Jars	1.95	8.37	10.32	0.1%	2.7%	0.5%	81.1%
Pigmented HDPE Bottles and Jars	3.48	6.81	10.29	0.2%	2.2%	0.5%	66.2%
Other HDPE Containers	0.13	0.24	0.37	0.0%	0.1%	0.0%	64.8%
PP Bottles and Containers	10.44	3.34	13.78	0.7%	1.1%	0.7%	24.2%
#3, 4, 6, 7 Bottles and Containers	4.17	0.88	5.05	0.3%	0.3%	0.3%	17.3%
Bulky Rigid Plastics	9.24	0.58	9.82	0.6%	0.2%	0.5%	5.9%
Subtotal Rigid Plastics	***52.50***	***50.86***	***103.36***	***3.3%***	***16.1%***	***5.5%***	***49.2%***
Flexible Plastics							
Trash Bags		0.29			0.1%		
Retail Carryout Sacks Reused[2]	4.35	0.48	4.83	0.3%	0.2%	0.3%	
Retail Carryout Sacks	5.04	0.19	5.23	0.3%	0.1%	0.3%	
E-commerce Film (mailer, protective)	0.82	0.03	0.86	0.1%	0.0%	0.0%	
Other PE Bags and Wraps		0.28			0.1%		
Non-PE Film and Flexible Packaging		0.40			0.1%		
Unknown Film Type		0.00			0.0%		
Subtotal Flexible Plastics		***1.67***			***0.5%***		

Material Category[1]	Waste Lbs./HH/Year	Recycling Lbs./HH/Year	Total Generation Lbs./HH/Year	Waste Stream %	Recycling Stream %	Total Discards %	Recycling Capture Rate
Metal							
Aluminum Cans	10.84	12.66	23.50	0.7%	4.0%	1.2%	53.9%
Aluminum Foil/Trays	2.16	0.11	2.27	0.1%	0.0%	0.1%	4.7%
Steel Cans	6.82	10.76	17.59	0.4%	3.4%	0.9%	61.2%
Subtotal Metal	***19.83***	***23.53***	***43.36***	***1.3%***	***7.5%***	***2.3%***	***54.3%***
Glass Containers	***36.03***	***58.67***	***94.70***	***2.3%***	***18.6%***	***5.0%***	***62.0%***
Recycling Contaminants							
Non-recyclable Paper		2.76			0.9%		
Non-recyclable Plastics		1.50			0.5%		
Textiles and Shoes		0.06			0.0%		
Food Waste (& food in containers)		3.22			1.0%		
Yard Waste		0.00			0.0%		
Tanglers[3]		0.00			0.0%		
Hazardous Waste		0.00			0.0%		
All Other Contamination		5.02			1.6%		
Subtotal Recycling Contaminants		***12.57***			***4.0%***		
Other Waste	***1,341.67***		***1,354.24***	***85.5%***		***71.9%***	
Total	**1,568.56**	**314.99**	**1,883.55**	**100%**	**100%**	**100%**	

Notes:
1 Values are only for single-family home weekly collection of household waste and recycling by City of Red Wing collection crews – separate leaf or yard waste collection, bulky item collection, and delivery of other discards such as household hazardous waste or recyclables to third party recyclers are not included in the figures.
2 Retail carryout bags reused as trash bags, bags to consolidate recycling, pet cleanup, etc.
3 Light strings, cords, wire, hoses, etc.

Table 4 – Detailed Composition Data after Recycling System Transition

Material Category[1]	Waste Lbs./HH/Year	Recycling Lbs./HH/Year	Total Generation Lbs./HH/Year	Waste Stream %	Recycling Stream %	Total Discards %	Recycling Capture Rate
Bagged waste in recycling		2.59			0.6%		
Bagged recyclables in recycling		8.36			2.1%		
Paper							
Corrugated Cardboard	8.93	86.29	95.22	0.6%	21.5%	5.2%	90.6%
Aseptic and Gable Top Cartons	2.44	1.32	3.76	0.2%	0.3%	0.2%	35.1%
Mixed Paper (Recyclable)	81.16	141.72	222.87	5.7%	35.3%	12.3%	63.6%
Subtotal Paper	***92.52***	***229.33***	***321.85***	***6.6%***	***57.1%***	***17.7%***	***71.3%***
Rigid Plastics							
PET Bottles and Jars	8.61	24.52	33.13	0.6%	6.1%	1.8%	74.0%
Other PET Packaging	4.22	3.19	7.41	0.3%	0.8%	0.4%	43.0%
Natural HDPE Bottles and Jars	1.32	10.09	11.41	0.1%	2.5%	0.6%	88.5%
Pigmented HDPE Bottles and Jars	3.00	7.02	10.02	0.2%	1.7%	0.6%	70.0%
Other HDPE Containers	0.21	0.04	0.25	0.0%	0.0%	0.0%	17.5%
PP Bottles and Containers	5.66	5.74	11.40	0.4%	1.4%	0.6%	50.4%
#3, 4, 6, 7 Bottles and Containers	3.30	1.13	4.42	0.2%	0.3%	0.2%	25.4%
Bulky Rigid Plastics	6.34	1.33	7.67	0.4%	0.3%	0.4%	17.3%
Subtotal Rigid Plastics	***32.66***	***53.05***	***85.71***	***2.3%***	***13.2%***	***4.7%***	***61.9%***
Flexible Plastics							
Trash Bags	9.44	0.20	9.64	0.7%	0.0%	0.5%	
Retail Carryout Sacks Reused[2]	1.82	0.10	1.92	0.1%	0.0%	0.1%	
Retail Carryout Sacks	4.55	0.15	4.70	0.3%	0.0%	0.3%	
E-commerce Film (mailer, protective)	1.64	0.15	1.79	0.1%	0.0%	0.1%	
Other PE Bags and Wraps	8.80	0.91	9.71	0.6%	0.2%	0.5%	
Non-PE Film and Flexible Packaging	14.09	0.21	14.30	1.0%	0.1%	0.8%	
Unknown Film Type	0.00	0.07	0.07	0.0%	0.0%	0.0%	
Subtotal Flexible Plastics	***40.35***	***1.78***	***42.13***	***2.9%***	***0.4%***	***2.3%***	

Material Category[1]	Waste Lbs./HH/Year	Recycling Lbs./HH/Year	Total Generation Lbs./HH/Year	Waste Stream %	Recycling Stream %	Total Discards %	Recycling Capture Rate
Metal							
Aluminum Cans	6.64	20.47	27.11	0.5%	5.1%	1.5%	75.5%
Aluminum Foil/Trays	2.03	0.22	2.26	0.1%	0.1%	0.1%	9.9%
Steel Cans	3.66	13.63	17.29	0.3%	3.4%	1.0%	78.8%
Subtotal Metal	***12.33***	***34.32***	***46.66***	***0.9%***	***8.5%***	***2.6%***	***73.6%***
Glass Containers	***24.40***	***62.70***	***87.09***	***1.7%***	***15.6%***	***4.8%***	***72.0%***
Recycling Contaminants							
Non-recyclable Paper		2.22			0.6%		
Non-recyclable Plastics		5.02			1.3%		
Textiles and Shoes		0.05			0.0%		
Food Waste (& food in containers)		5.91			1.5%		
Yard Waste		0.00			0.0%		
Tanglers[3]		0.00			0.0%		
Hazardous Waste		2.38			0.6%		
All Other Contamination		5.03			1.3%		
Subtotal Recycling Contaminants		***20.61***			***5.1%***		
Other Waste	***1,209.68***		***1,230.29***	***85.7%***		***67.8%***	
Total	***1,411.94***	***401.79***	***1,813.73***	***100%***	***100%***	***100%***	

Notes:
1 Values are only for single-family home weekly collection of household waste and recycling by City of Red Wing collection crews – separate leaf or yard waste collection, bulky item collection, and delivery of other discards such as household hazardous waste or recyclables to third party recyclers are not included in the figures.
2 Retail carryout bags reused as trash bags, bags to consolidate recycling, pet cleanup, etc.
3 Light strings, cords, wire, hoses, etc.

4.8. Conclusion

The transition to single-stream recycling collection using 96-gallon carts collected every other week resulted in an increase in target recyclables collected from 301 to 377 pounds per occupied home per year on route. The capture rate for targeted recyclables increased from 60.8 to 71.5 percent. The recycling participation rate also increased. Although the recycling contamination rate increased from 5.0 to 6.2 percent, it is still low compared to other communities using cart-based single-stream recycling collection programs. Furthermore, non-conforming bagged recyclables, which are often disposed by MRFs, decreased from 9.4 percent to 2.1 of the recycling stream, resulting in a significant improvement in the recycling stream.

APPENDIX

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Appendix A: Sort Categories and Definitions

Material Category	Description / Examples
Paper	
Corrugated Cardboard	Unwaxed and uncoated corrugated container boxes. Mostly clean pizza boxes.
Aseptic and Gable Top Cartons	Polycoated paper cartons for flowable foods and beverages - milk, dairy, dairy substitutes, soups, broths
Mixed Paper (Recyclable)	Includes newspaper, glossy paper, office paper, bagged shredded paper, mail, magazines, colored papers, greeting cards, paper bags, boxboard, paperback books, paper egg cartons, paper tubes, and phone books
Rigid Plastics	
PET Bottles and Jars	Caps left on if attached
Other PET Packaging	Thermoforms, some to-go drink cups
Natural HDPE Bottles and Jars	Caps left on if attached
Pigmented HDPE Bottles and Jars	Caps left on if attached
Other HDPE Containers	Injection molded tubs (e.g., butter tubs)
PP Bottles and Containers	Yogurt containers, to-go packaging, some to go drink cups
#3, 4, 6, 7 Bottles and Containers	All other bottles and containers not otherwise classified, excluding large plastic buckets
Bulky Rigid Plastics	Plastic products intended for long term use or to be reused multiple times. Examples include large toys, milk crates, plastic pallets, plastic pipes, and buckets.
Flexible Plastics	
Trash Bags	Purchased bags to contain trash
Retail Carryout Sacks (as trash bags)	Retail carryout sacks reused as trash bags
Retail Carryout Sacks	Retail carryout sacks not reused
E-commerce Film (mailer, protective)	Outer mail pouch made from polyethylene plastic, air cushion pillows, bubble wrap (excludes EPS foam and other original manufacturer packaging such as extruded polyethylene foam and component bags)
Other PE Bags and Wraps	Product overwrap (paper towels, napkins, disposable cups and dinnerware), case wrap (bottled water), newspaper bags, bread bags (bread, muffins, bagels, tortillas), bulk produce bags (apples, potatoes, food storage bags (e.g. zipered), furniture and electronic wrap, single use produce bag (found on rolls in produce aisles) – unless marked

Material Category	Description / Examples
	compostable, cereal box liners (unless it tears like paper), cake mix and other dry powder box liners (unless it tears like paper)
Non-PE Film and Flexible Packaging	Pouches and other related multilayer flexible packaging, meat and cheese wraps, sachets and bags, any film or flexible packaging with H2R's "not yet recycled" label, any film or packaging with RIC #1(PET) or #5(PP), any film or packaging that is labeled as compostable. Common examples: produce wrap (shrink wrapped individual peppers, cucumbers), salad bags (prepared salads, greens), pasta bags, cookie packages, candy and granola bar wrappers, ramen bags, chip bags (potato chips, corn chips), plastic pet food bags, heavy gauge bags (mulch, pellets), six pack rings.
Unknown Film Type	Unlabeled film whose composition cannot be readily determined.
Metal	
Aluminum Cans	Empty aluminum beverage, food, pet food, and aerosol cans
Aluminum Foil/Trays	Foil, trays, and plates
Steel Cans	Food and aerosol cans (place aerosol cans with substantial contents remaining in hazardous waste)
Glass Containers	Glass food and beverage bottles and jars
Recycling Contaminants	
Non-recyclable Paper	Includes waxed/coated corrugated containers, paper towels, paper plates, waxed paper, tissues, food soiled paper, paper with a plastic coating or other materials attached (e.g. orange juice cans and spiral notebooks), carbon copy paper, hardcover books, and photographs.
Non-recyclable Plastics	EPS foam, PS (#6), plastic cutlery, loose caps and closures, hangers, tubes, disposable razors, pens, lighters, toothbrushes, credit cards, and 3-ring binders.
Textiles and Shoes	Clothing, rags, bed sheets, towels, and shoes.
Food Waste (& food in containers)	Food including eggshells, rinds, peelings, coffee grounds. Include contents of food and beverages still in containers.
Yard Waste	Includes leaves, grass clippings, branches, plants, prunings, and gardening residuals (e.g., weeds and identifiable garden foods).
Tanglers	Electrical cords, garden hoses, caution tape, streamers, and chains

Material Category	Description / Examples
Hazardous Waste	Oil, antifreeze, paints, solvents, glues, adhesives, caulk, medicines, household chemicals, pesticides/herbicides, oil/gas/fuel tanks, any substances or products containing potentially hazardous chemicals, and all household batteries. Place empty containers that previously held hazardous materials in All Other Contamination.
All Other Contamination (recycling)	Remainder of materials in the recycling stream
All Other Material (waste)	Remainder of materials in the waste stream