



# 2016-2017 Statewide Waste Characterization Study Results



MISSOURI RECYCLING  
ASSOCIATION

AUGUST 11, 2017

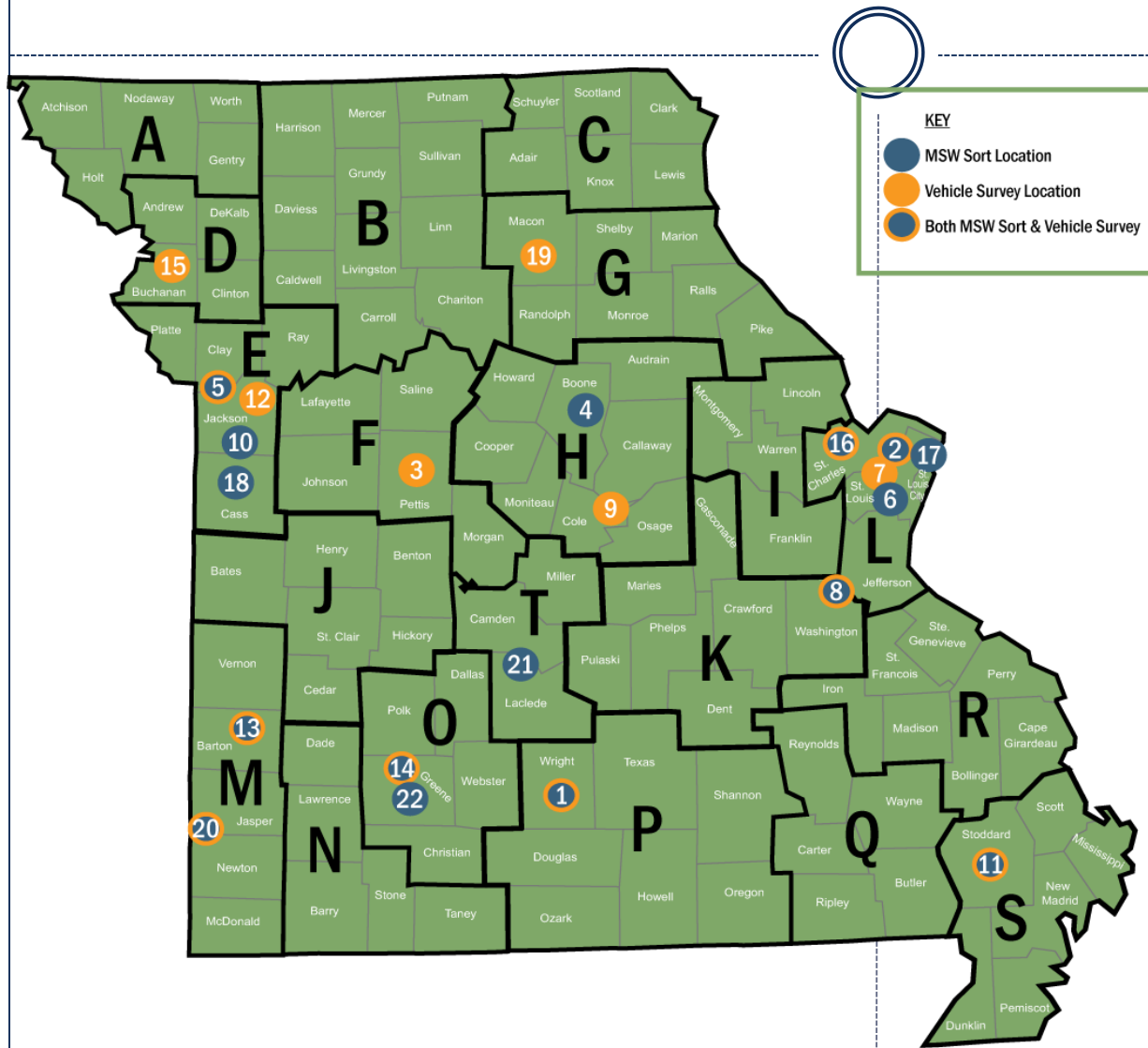


# Objectives

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- Summarize the results of Missouri's 2016-2017 Statewide Waste Characterization Study
- Compare results to prior studies
- Identify and refocus on diversion opportunities

# Host Facilities – THANK YOU!!!



1. Black Oak LF
2. Bridgeton TS
3. Central MO LF
4. Champ LF
5. Columbia LF
6. Courtney Ridge LF
7. F.W. Disposal TS
8. Jefferson City LF
9. Joplin TS
10. Lee's Summit LF
11. Lemons LF
12. Maple Hill LF
13. O'Fallon TS
14. Ozarks TS
15. Pink Hill Acres Demo LF
16. Prairie View LF
17. Springfield LF
18. Springfield Relay TS
19. St. Joseph LF
20. St. Louis Waste TS
21. Timber Ridge
22. Town & Country TS

# History



- **1996-1998: Inaugural Study**

- 19 facilities – MSW sort
  - ✦ 26 Material Categories
  - ✦ Three seasons over 2 years
- 14 facilities – non-MSW survey

- **2006-2008: Second Study**

- 15 facilities – MSW sort
  - ✦ 28 Material Categories
  - ✦ Two seasons
- 15 facilities – non-MSW survey

- **2016-2017: Current Study**

- 16 facilities – MSW sort
  - ✦ 48 Categories
  - ✦ Two seasons
- 15 facilities – non-MSW survey
  - ✦ Real-time Visual Volumetric Characterization
- Sampling Plan Based on Demographic Waste Flow

# Similarities Across Studies

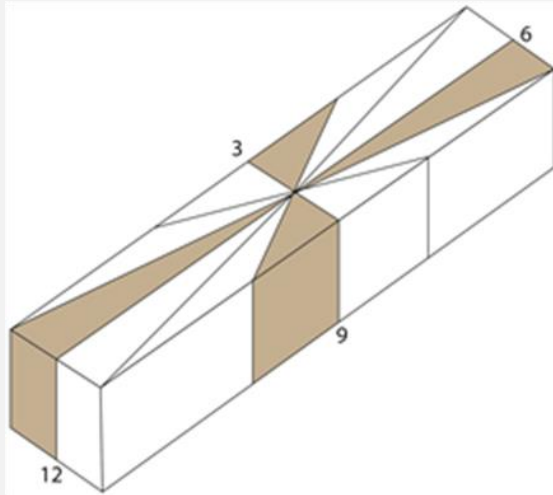


- Sample Sizes
  - 200-250 lbs
- Major Categories
  - MSW
  - Construction
  - Demolition
  - Industrial
  - Special
  - Other
- Many of the same facilities
- Continued segregation of Residential and CI wastes
  - Full statistical analysis
- Continued reporting on MSW and All Solid Waste
  - MSW + non-MSW Visuals
  - Divertibility Analysis

# New/Different Elements of 2016-17 Study



- Sampling Plan  
(Demographically)
- Sampling Methodology



- Visual Surveying  
Volumetric Load  
Characterization



- Independent Analysis of  
MSW-Residential and  
MSW-CI

# Interpreting Results

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- **Sample mean:** most likely estimate
- **Confidence Intervals:** reflect the upper and lower range within which the population mean can be expected to fall (to a 90% confidence level)

- Example –  
Newsprint 1.3 to 1.7% of this grouping with a 90% conf. int.

Material Category	Est. Percent	Conf. Int (+/-)
<b>Paper</b>	<b>24.1%</b>	<b>1.2%</b>
Corrugated Cardboard/Kraft	4.8%	0.7%
Newsprint	1.5%	0.2%
Magazines	1.3%	0.3%
High Grade Office Paper	1.4%	0.4%
Mixed Recyclable Paper	4.6%	0.4%
Compostable Paper	9.1%	0.5%
Remainder/Composite Paper	1.4%	0.3%
<b>Glass</b>	<b>3.5%</b>	<b>0.5%</b>
Clear Glass Containers	1.8%	0.2%
Brown Glass Containers	1.0%	0.3%

# MSW Sampling Plan – Demographic Tonnage basis

District	District Name	No. of Facilities Sampled	Tons (CY16)		Samples		Statewide Tons - Percent
			Tons	Percent of Total	Samples	Percent of Total	
A	Northwest Missouri SWMD	0	0	0.0%	0	0.0%	0.5%
B	North Missouri SWMD	0	0	0.0%	0	0.0%	0.0%
C	Northeast Missouri SWMD	0	0	0.0%	0	0.0%	0.4%
D	Region D Recycling & Waste Mgt. Dist.	0	0	0.0%	0	0.0%	2.0%
E	Mid-America Reg. Council SWMD	3	812,183	24.3%	57	22.4%	14.1%
F	West Central Missouri SWMD	0	0	0.0%	0	0.0%	8.5%
G	Mark Twain SWMD	0	0	0.0%	0	0.0%	4.5%
H	Mid-Missouri SWMD	1	340,757	6.6%	26	10.2%	5.9%
I	East Central SWMD	0	0	0.0%	0	0.0%	0.5%
J	Quad-Lakes SWMD	0	0	0.0%	0	0.0%	0.2%
K	Ozark Rivers SWMD	1	290,831	7.4%	8	3.1%	5.0%
L	St. Louis-Jefferson SWMD	4	2,182,889	17.6%	73	28.7%	37.9%
M	Region M SWMD	2	412,991	17.8%	25	9.8%	7.2%
N	Southwest Missouri SWMD	0	0	0.0%	0	0.0%	0.0%
O	Ozark Headwaters Recycling and Materials Mgmt. Dist.	2	254,776	8.7%	24	9.4%	4.4%
P	South Central SWMD	1	279,300	9.9%	17	6.7%	4.8%
Q	Ozark Foothills Regional SWMD	0	0	0.0%	0	0.0%	0.0%
R	Southeast Missouri SWMD	0	0	0.0%	0	0.0%	0.7%
S	Bootheel SWMD	1	197,124	7.8%	8	3.1%	3.4%
T	Lake of the Ozarks SWMD	1	0	0.0%	16	6.3%	0.0%
<b>Totals</b>		<b>16</b>	<b>4,770,851</b>	<b>100.0%</b>	<b>254</b>	<b>100.0%</b>	<b>100.0%</b>

# Facilities Sampled - MSW



Region	Facility	Demographic	Actual Samples		Total
			Residential	Commercial/ Institutional	
E	Courtney Ridge Landfill	Large Metro	10	15	25
E	Lee's Summit Landfill	Large Metro	9	7	16
E	Town & Country Transfer Station	Rural	9	7	16
H	Columbia Landfill	Small Metro	16	10	26
K	Timber Ridge Landfill	Rural	3	5	8
L	Bridgeton Transfer Station	Large Metro	12	13	25
L	F. W. Disposal Transfer Station	Large Metro	8	8	16
L	St. Louis Waste Transfer Station	Large Metro	5	11	16
L	O'Fallon Transfer Station	Large Metro	10	6	16
M	Prairie View Landfill	Rural	2	6	8
M	Joplin Transfer Station	Small Metro	10	7	17
O	Springfield Relay Transfer Station	Small Metro	4	4	8
O	Springfield Landfill	Small Metro	10	6	16
P	Black Oak Landfill	Rural	14	3	17
S	Lemons Landfill	Rural	4	4	8
T	Ozarks Transfer Station	Rural	11	5	16
		<b>Total</b>	<b>137</b>	<b>117</b>	<b>254</b>

# MSW Generator Sectors

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- **Residential** Waste



- **Commercial/Institutional**



# Taking Samples





# Manual Sorting & Weighing



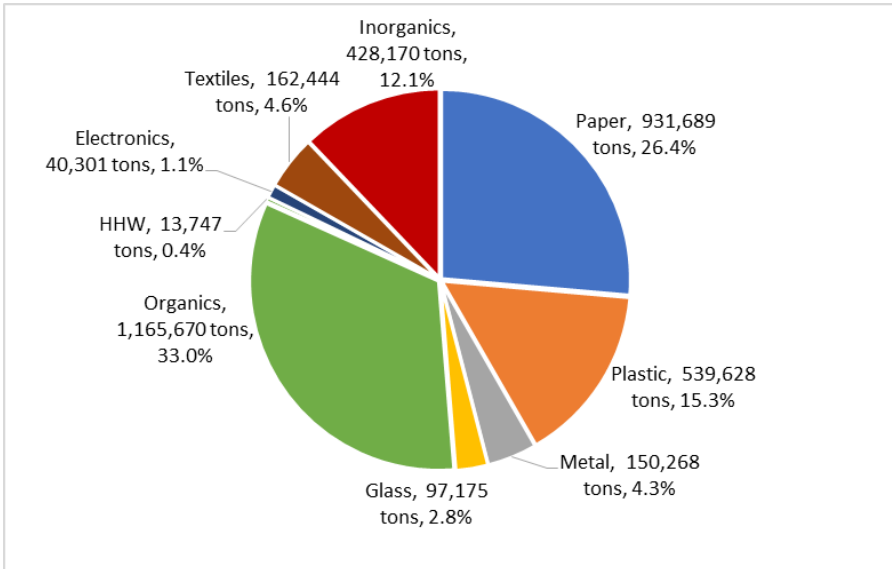
# MSW Results



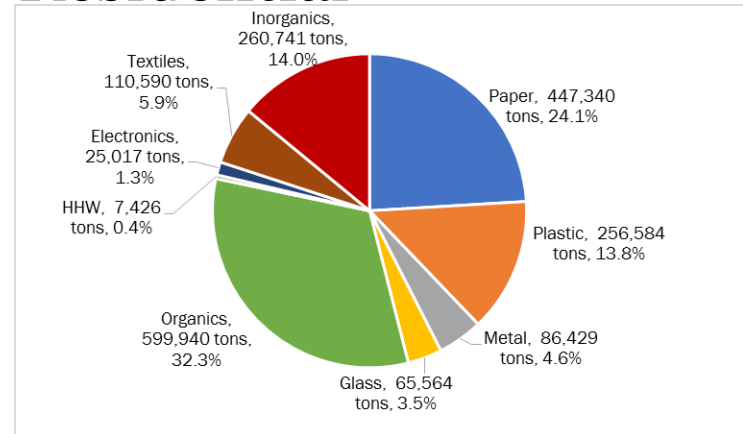
# Results by Material Group



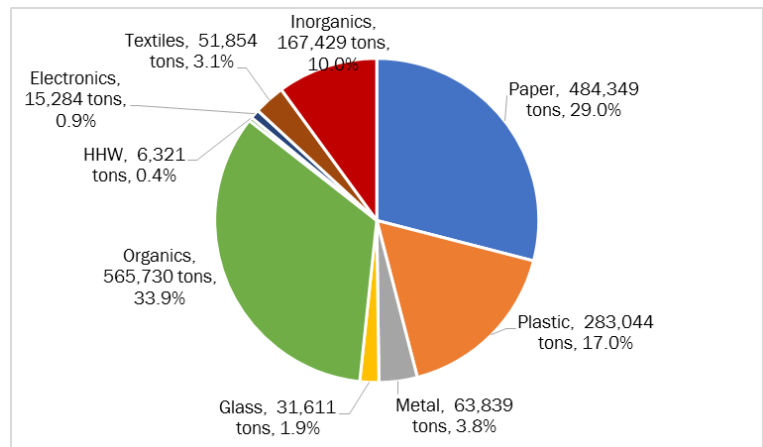
- Statewide MSW



- Residential

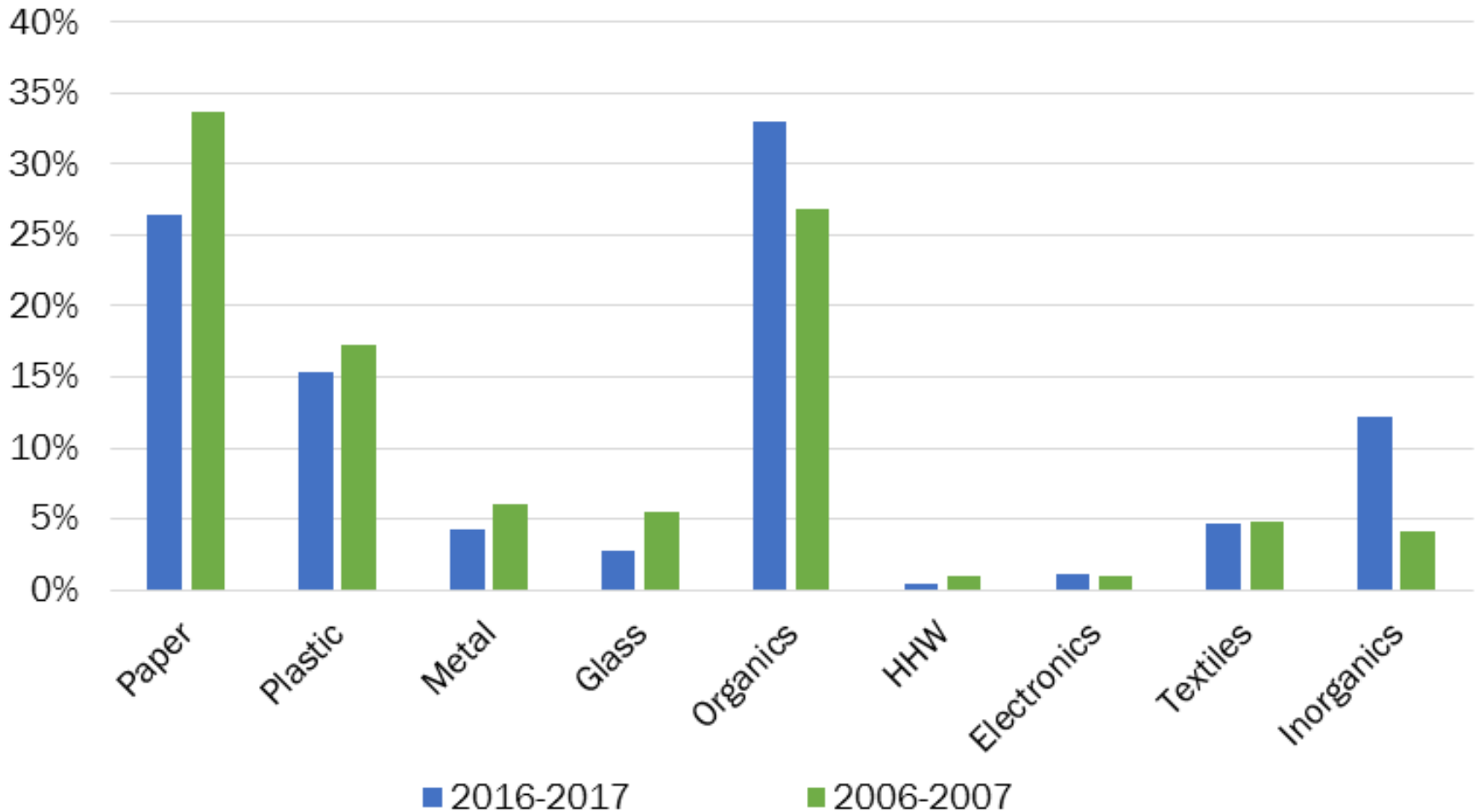


- CI



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# Changes in MSW since 2006-07



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# MSW Changes vs. 2006-08 Study



## Materials that Increased

- OCC/Kraft
- Organics
- Inorganics

## Materials that Decreased

- High Grade Office Paper
- Clear, Brown & Green Glass
- Mixed Recyclable Paper
- Newsprint
- Aluminum Cans & Containers
- Tin/Steel Containers
- PET Bottles/Containers
- HDPE  
Containers(Nat.+Colored)

# Comparison of Most Prevalent in MSW



	Rural	Small Metro	Large Metro
1	Food Waste - 15.3%	Food Waste - 17.0%	Food Waste - 10.7%
2	Compostable Paper - 7.1%	Compostable Paper - 8.8%	Non-Recyclable Paper - 10.3%
3	Contaminated Film/Other Film - 6.8%	OCC/Kraft - 8.6%	OCC and Kraft Paper - 8.5%
4	OCC/Kraft Paper (Uncoated) - 6.7%	Contaminated Film/Other Film - 5.1%	Film/Wrap/Bags - 7.5%
5	Wood - Clean/Untreated - 4.9%	Yard Waste - 4.6%	Mixed Recyclable Paper - 5.4%
6	Wood - Painted/Stained/Treated - 4.8%	Wood - Painted/Stained/Treated - 4.3%	Fines - 5.2%
7	Mixed Recyclable Paper - 4.5%	Wood - Clean/Untreated - 3.8%	Demolition/Renovation/Construction - 4.8%
8	Remainder/Composite Organic - 4.2%	Remainder/Composite Organic - 3.4%	Other Film Plastic - 4.8%
9	Diapers/Sanitary Products - 3.3%	Mixed Recyclable Paper - 3.3%	Textiles and Leather - 4.2%
10	Carpet & Carpet Padding - 2.7%	Carpet & Carpet Padding - 3.0%	Wood – Treated - 3.6%
	<b>Cumulative – 80.1%</b>	<b>Cumulative – 59.1%</b>	<b>Cumulative – 62.8%</b>

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# Comparison of Most Prevalent by Generator



	<b>MSW</b>	<b>Residential</b>	<b>CI</b>
1	Food Waste - 15.3%	Food Waste - 15.1%	Food Waste - 15.5%
2	OCC/Kraft - 9.5%	Compostable Paper - 9.1%	OCC/Kraft - 13.7%
3	Compostable Paper - 8.0%	Contaminated Film/Other Film - 4.8%	Contaminated Film/Other Film - 7.2%
4	Contaminated Film/Other Film - 6.1%	OCC/Kraft Paper (Uncoated) - 4.8%	Compostable Paper - 7.1%
5	Wood - Painted/Stained/Treated - 4.7%	Mixed Recyclable Paper - 4.6%	Wood - Clean/Untreated - 6.7%
6	Wood - Clean/Untreated - 4.2%	Yard Waste - 4.3%	Wood - Painted/Stained/Treated - 5.9%
7	Mixed Recyclable Paper - 3.8%	Diapers/Sanitary Products - 4.2%	Remainder/Composite Organic - 3.1%
8	Remainder/Composite Organic - 3.4%	Carpet & Carpet Padding - 4.0%	Mixed Recyclable Paper - 3.0%
9	Disposable Diapers & Sanitary Prod. - 2.8%	Remainder/Composite Organic - 3.8%	Remainder/Composite Plastic - 2.8%
10	Yard Waste - 2.7%	Wood - Painted/Stained/Treated - 3.5%	Other/Not Classified - 2.2%
	Cumulative – 68%	52.7% of MSW	47.3% of MSW

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# Focus on Fiber and Containers - MSW



Material	Residential	CI
High Grade	1.4%	1.3%
Magazines/Catalogs	1.3%	0.6%
Mixed Paper	4.6%	3%
Newsprint	1.5%	1.4%
OCC/Kraft	4.8%	13.7%
<b><i>All Fiber</i></b>	<b>24.1%</b>	<b>29.0%</b>
<b><i>All Containers</i></b>	<b>8.1%</b>	<b>4.6%</b>
<b>Total</b>	<b>32.2%</b>	<b>33.6%</b>

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# Focus on Compostable Organics - MSW



Material	Residential	CI
Compostable Paper	9.1%	7.1%
Yard Waste	4.3%	1.3%
Food Waste	15.1%	15.5%
Wood – Untreated	1.3%	6.7%
<b>Total</b>	<b>34.4%</b>	<b>30.6%</b>

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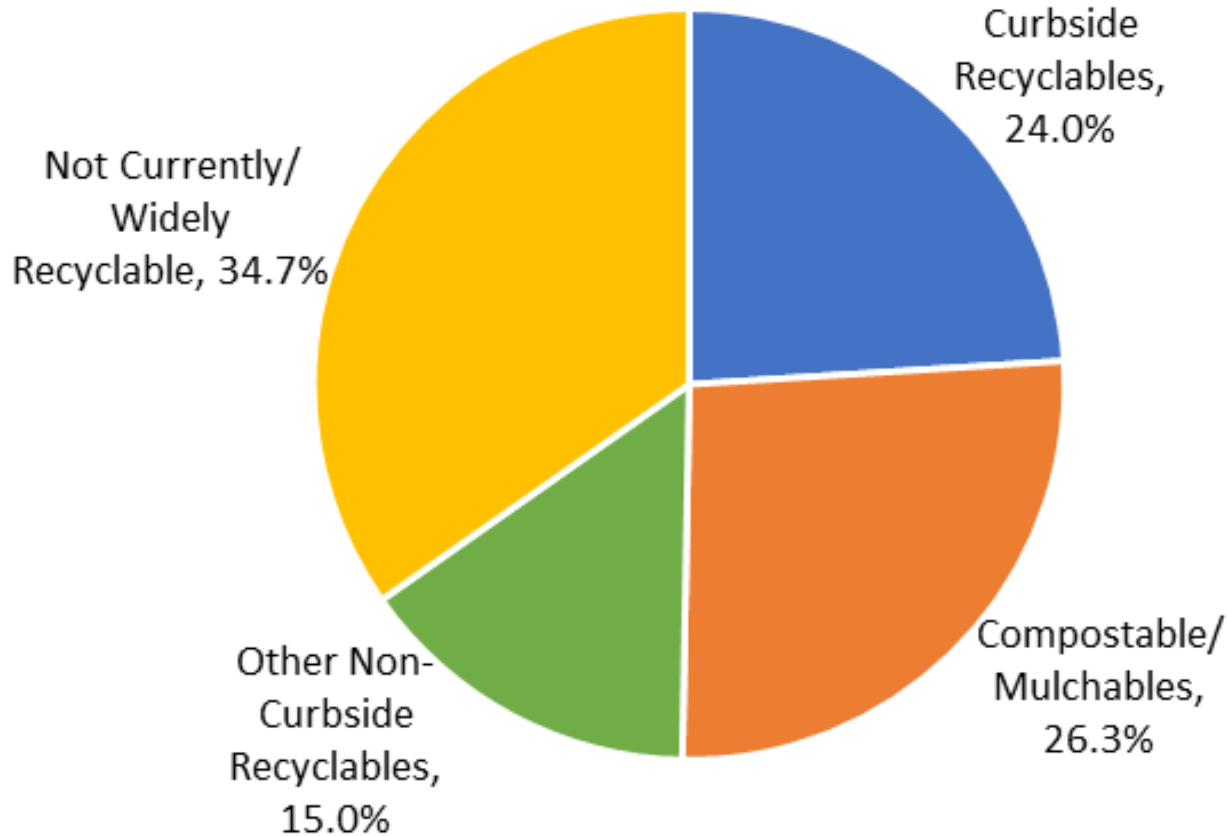
# Focus on C&D -MSW



Material	Residential	CI	MSW
Wood – Untreated	1.3%	6.7%	4.2%
Wood – Treated	3.5%	5.9%	4.7%
Asphalt Pavement, Brick, Rock, and Concrete	0.4%	0.6%	0.5%
Drywall/Gypsum Board	0.7%	0.4%	0.5%
Carpet and Carpet Padding	4.0%	1.0%	2.4%
Other C&D	1.4%	2.0%	1.7%
<b>Total</b>	<b>11.9%</b>	<b>16.8%</b>	<b>14.6%</b>

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# Divertibility Analysis - MSW



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# Non-MSW Results



# Non-MSW Gate/Visual Volumetric Surveying



- Gate Survey

- 6 Sector Breakdown

- ✦ MSW
  - Residential
  - Commercial
- ✦ Construction
- ✦ Demolition
- ✦ Industrial
- ✦ Special
- ✦ Other

- Non-MSW Visual Volumetric Load Survey

- Assess up to 30 loads per site of Construction, Demolition, Industrial
  - ✦ 45 Material Categories
  - ✦ Real-time data balancing

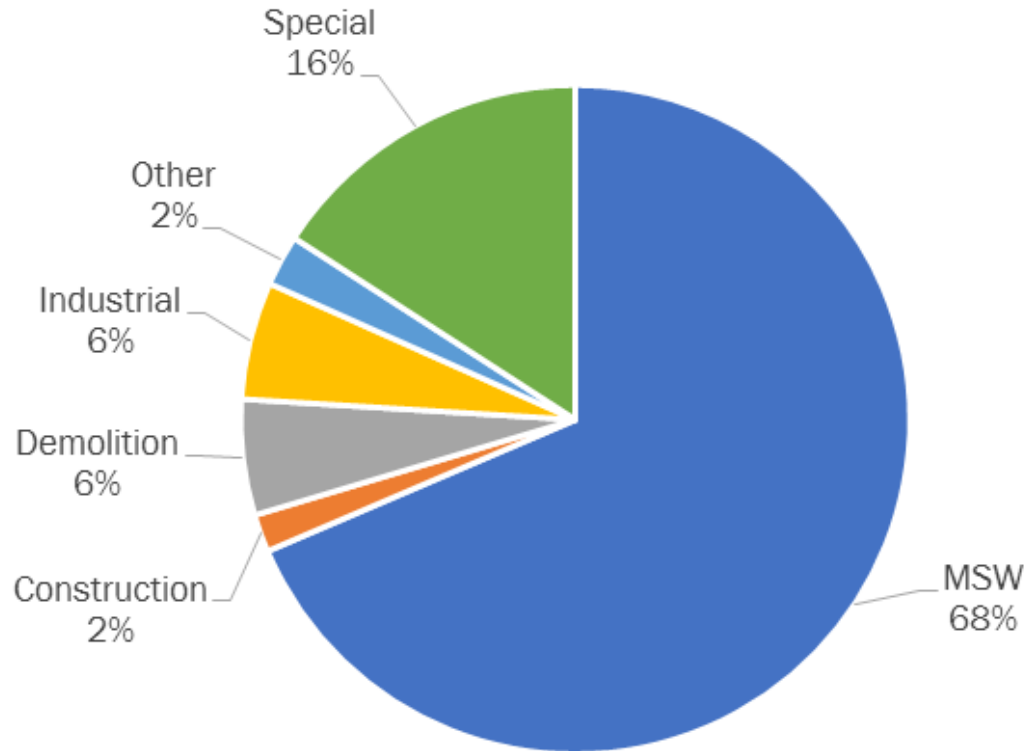
# Gate Survey Results – 6 Sectors



Waste Sector	Percent of Waste Surveyed 2017	Applied to 2016 Statewide Tonnage
MSW	68.6%	3,953,254
Construction	1.8%	104,600
Demolition	5.6%	322,606
Industrial	5.7%	327,305
Special	15.9%	914,606
Other	2.5%	142,283
	<b>100.0%</b>	<b>5,764,654</b>

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# Gate Survey → Statewide Generator Sectors

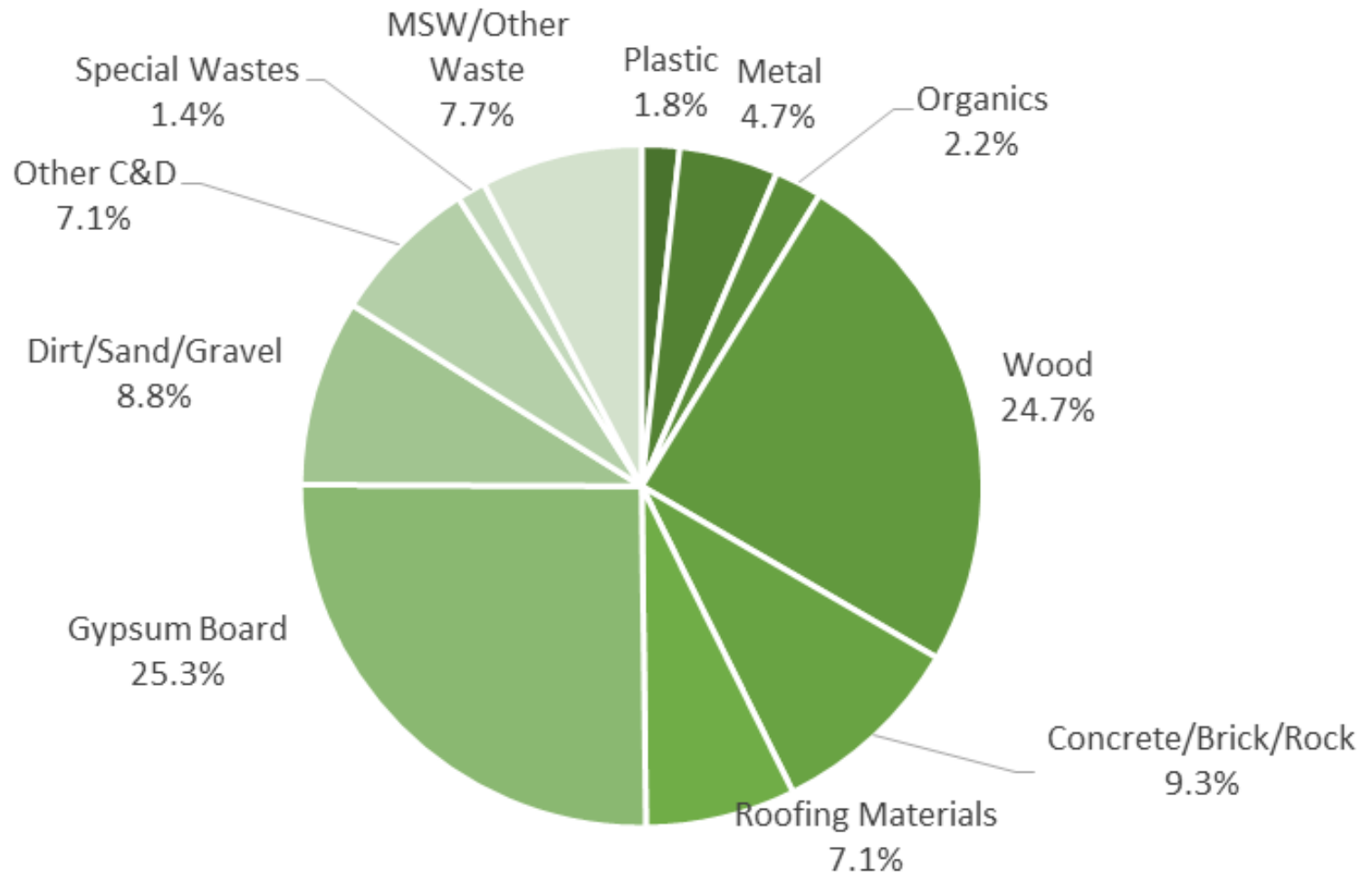


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# Visual Volumetric Surveying

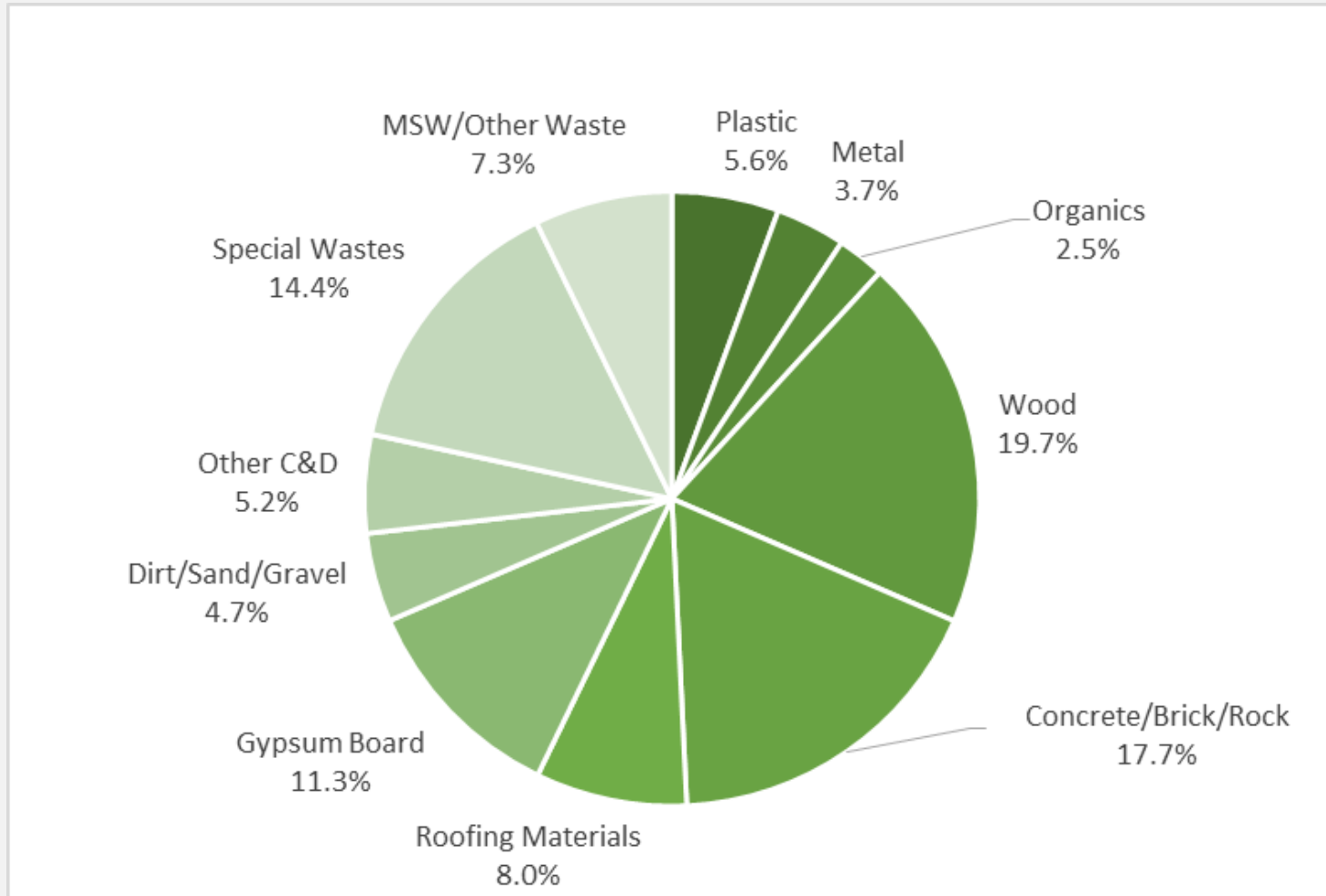


# Non-MSW Category Results - Construction



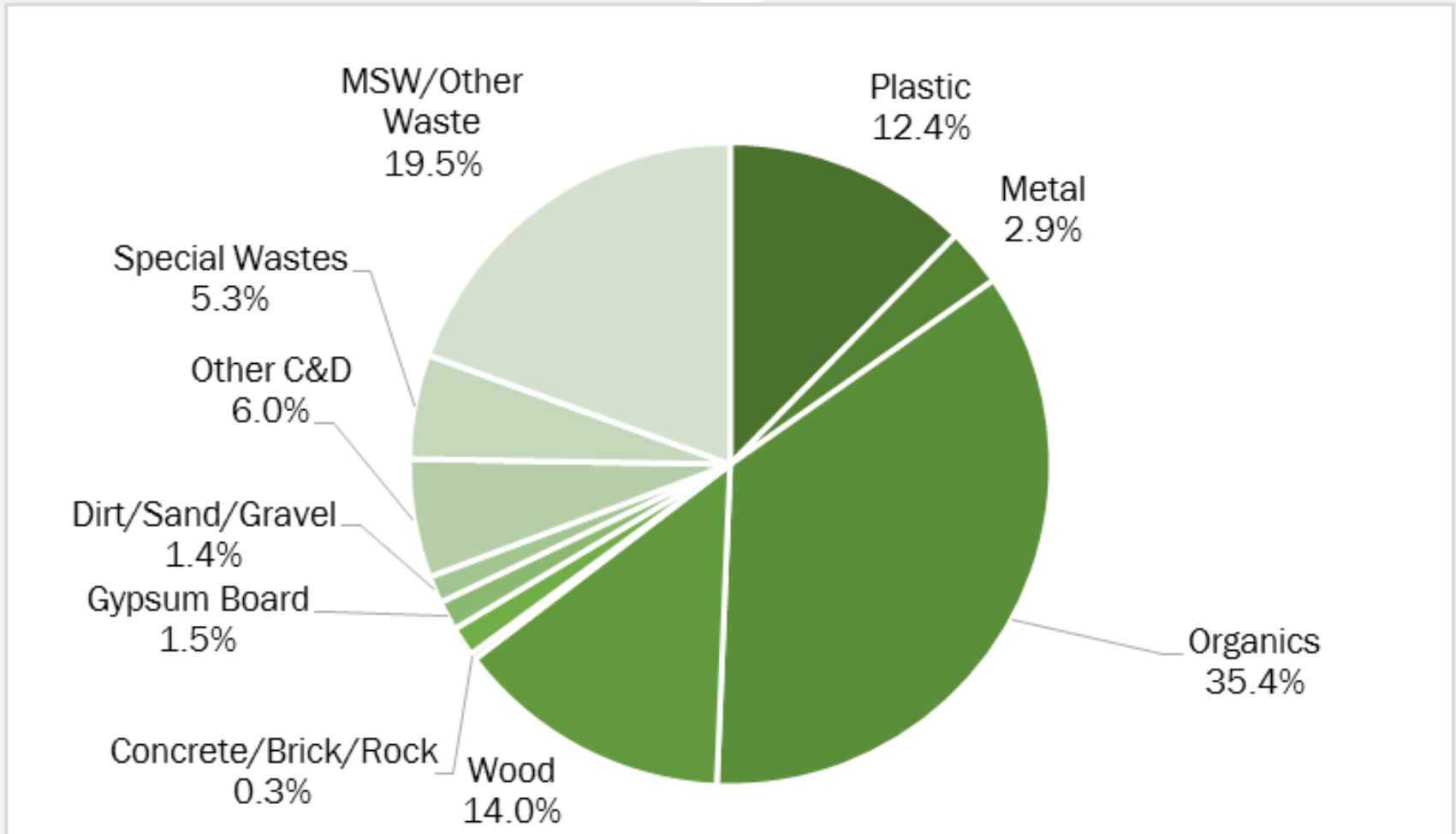
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# Non-MSW Category Results - Demolition



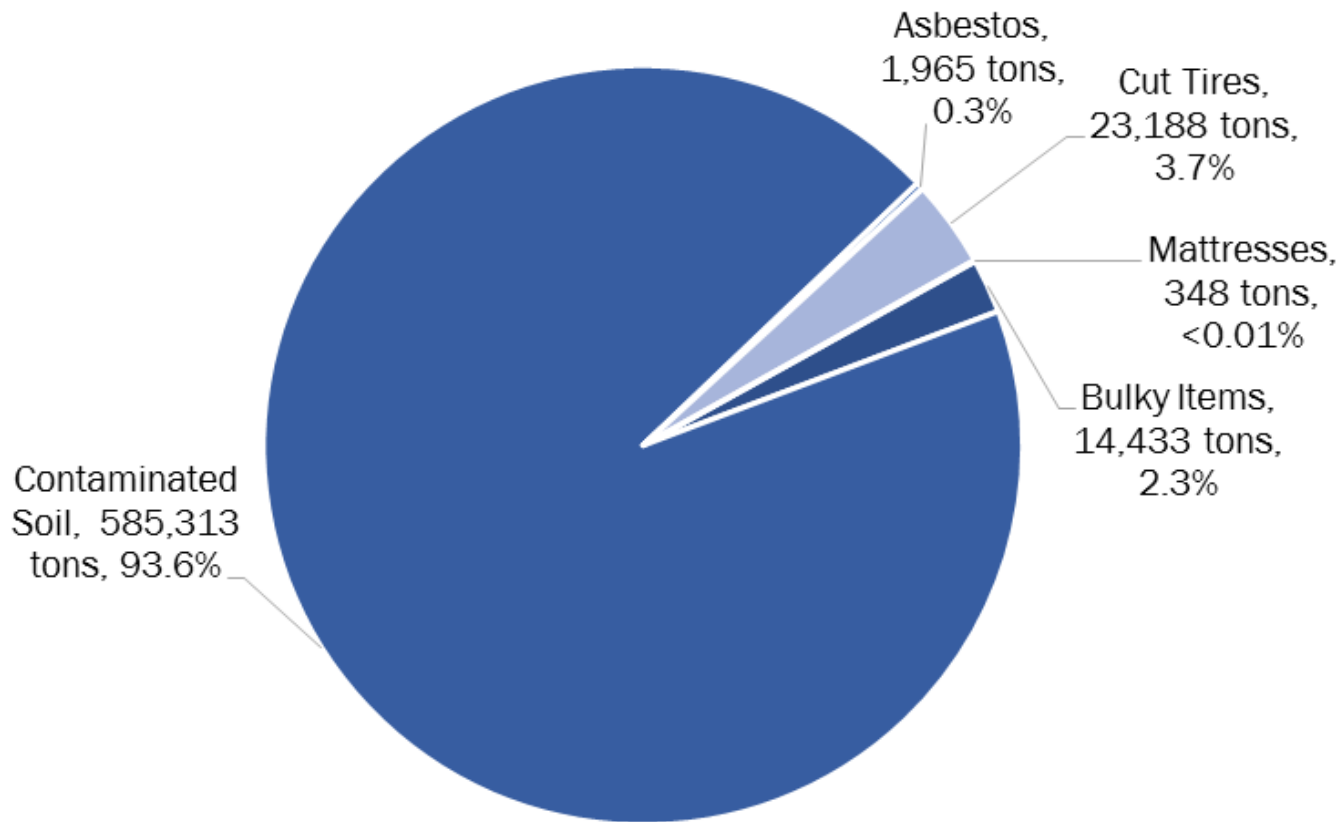
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# Non-MSW Category Results - Industrial



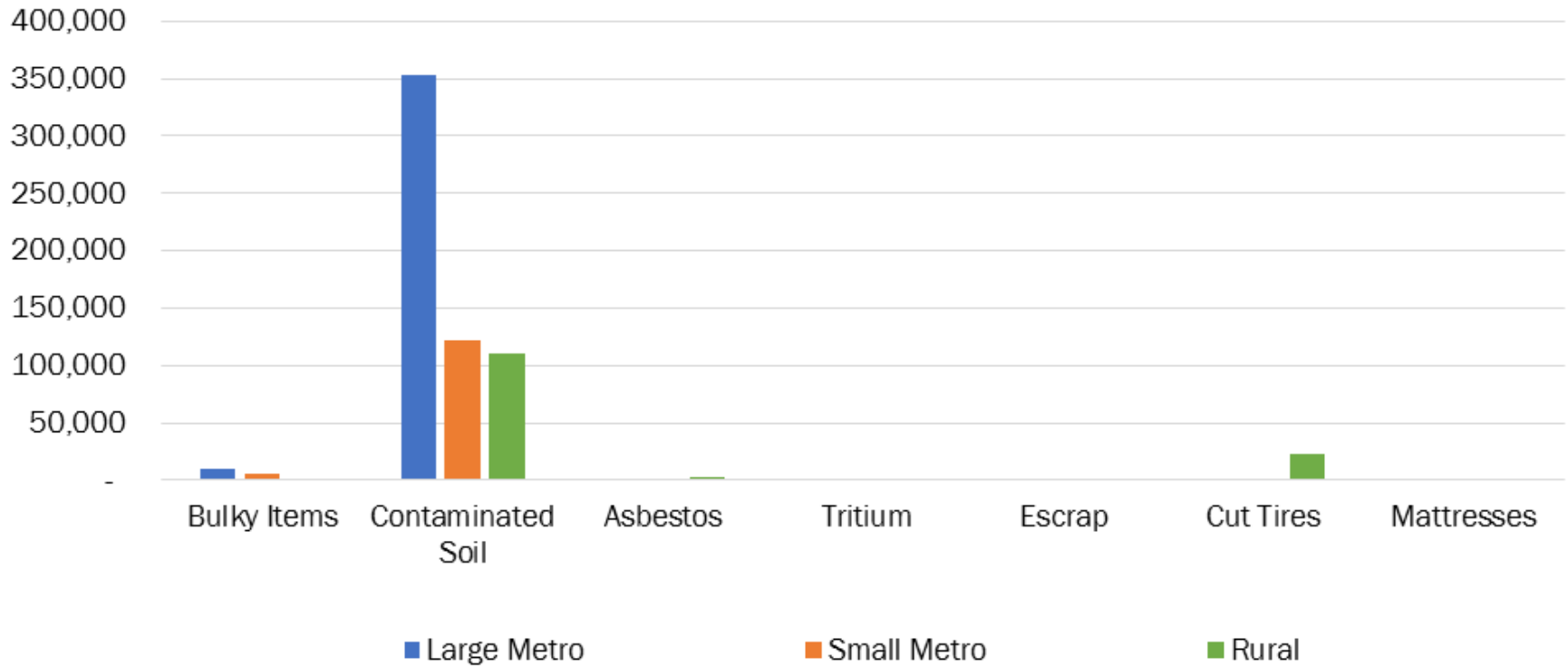
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# Non-MSW Category Results – Special



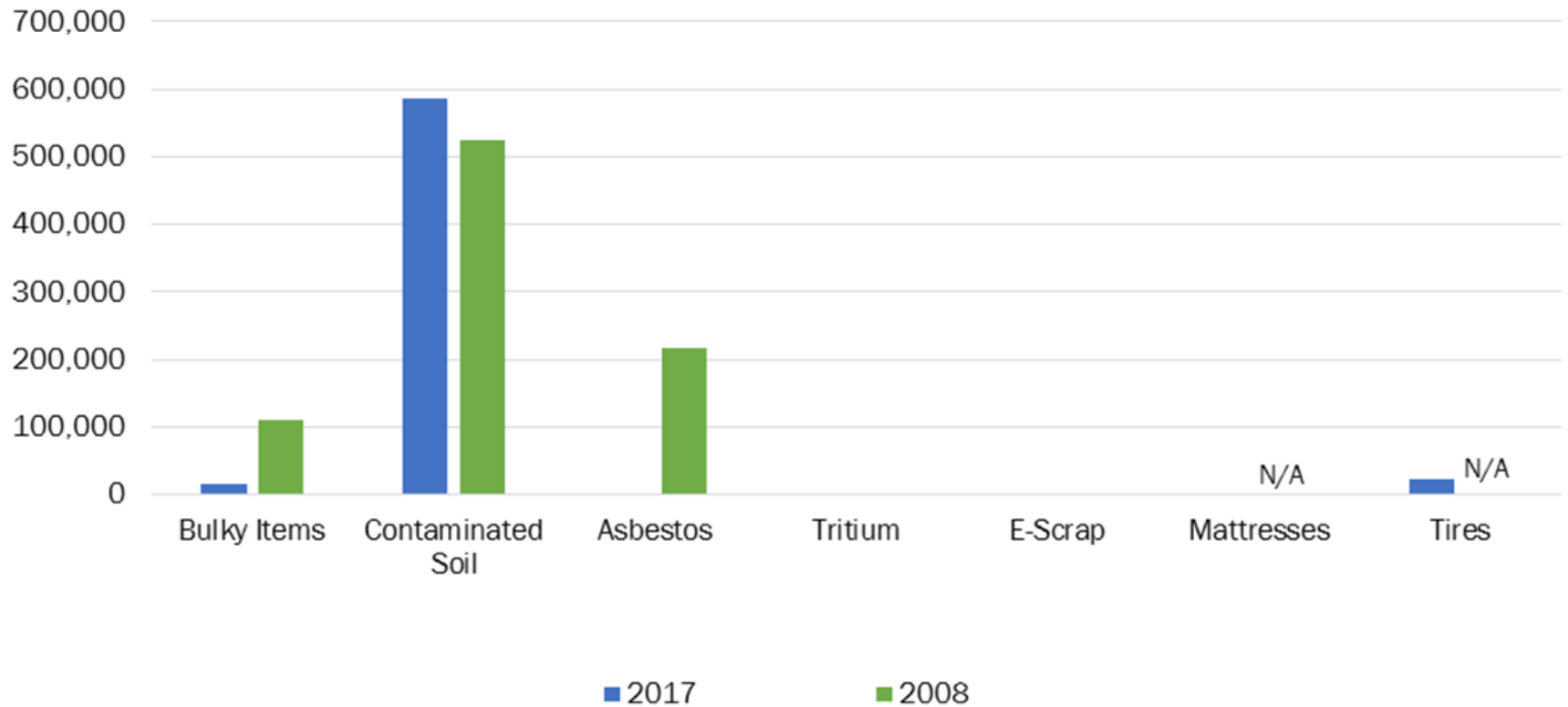
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# Special Waste - Demographically



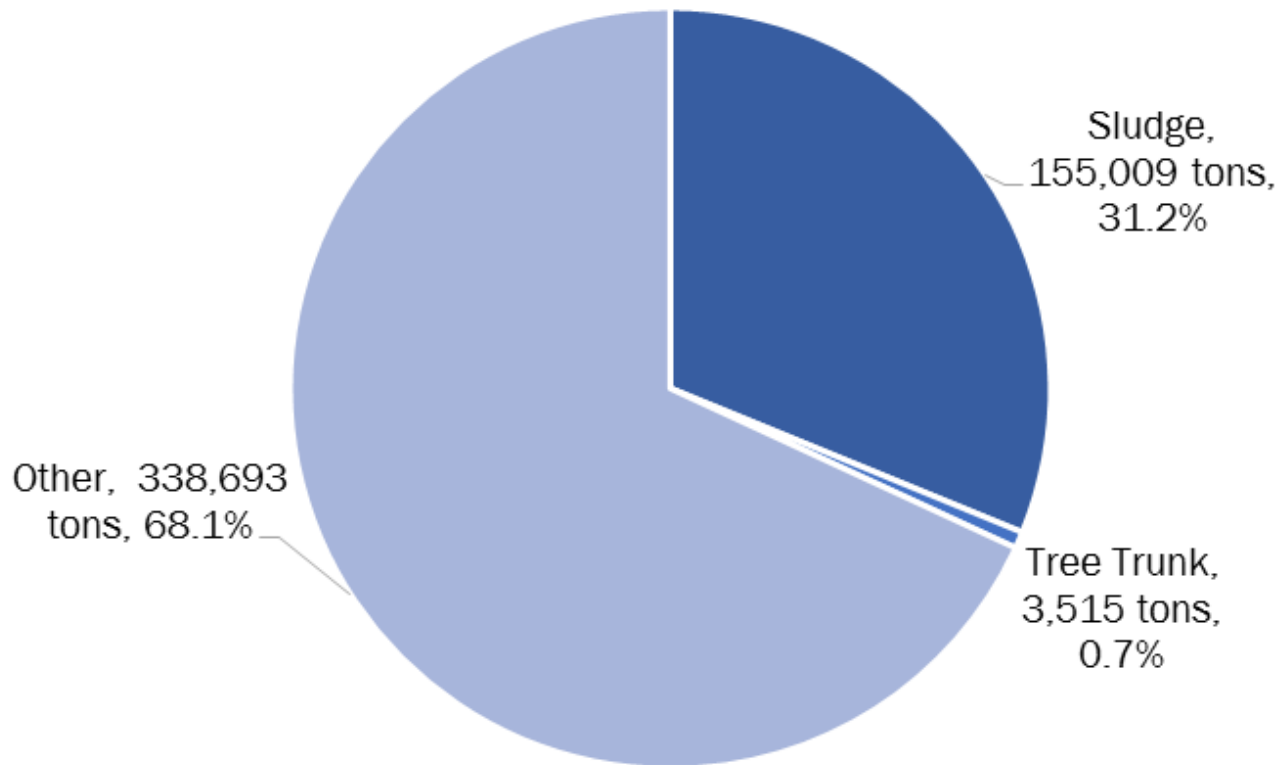
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# Special Waste vs. 2008



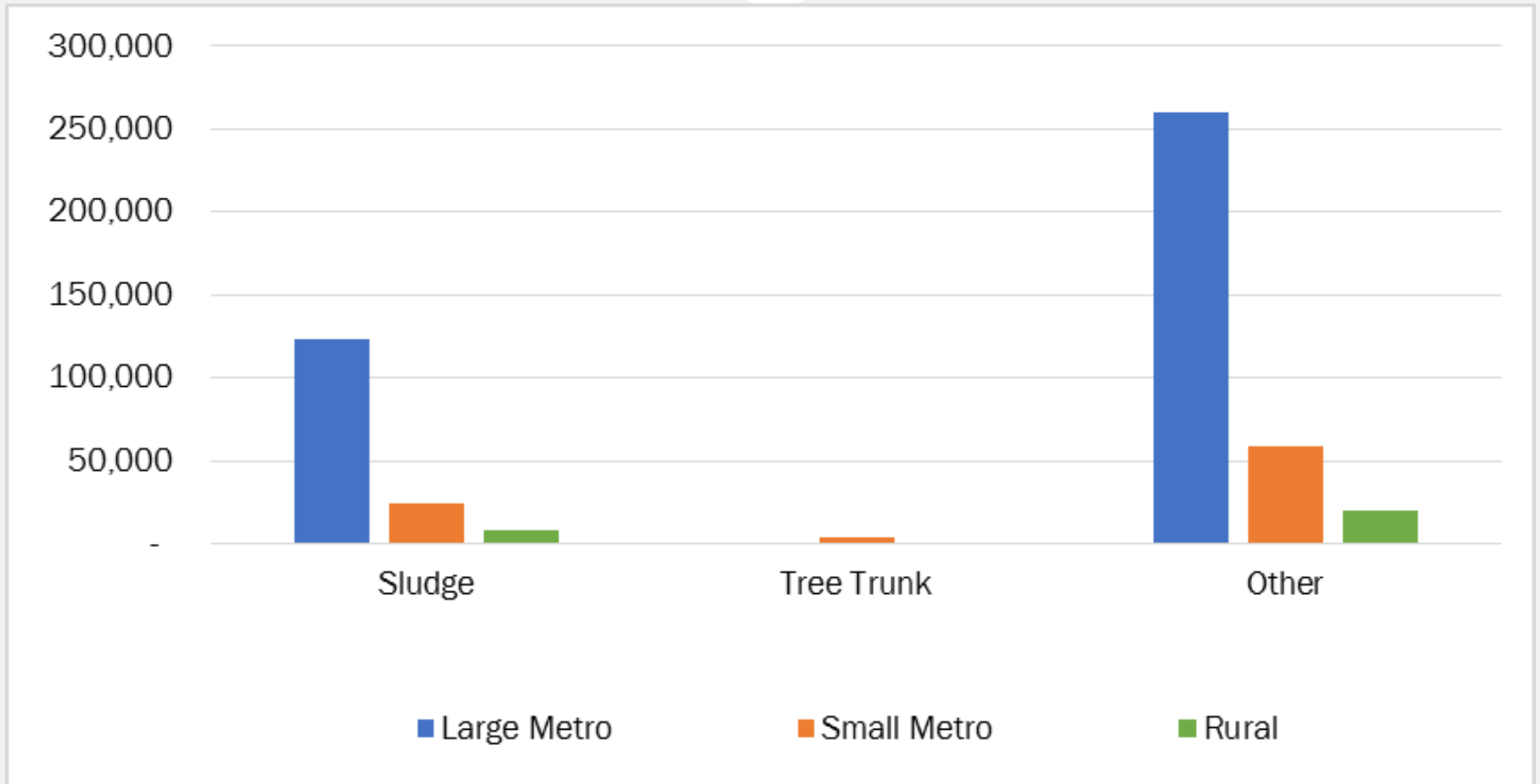
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# Non-MSW Category Results - Other



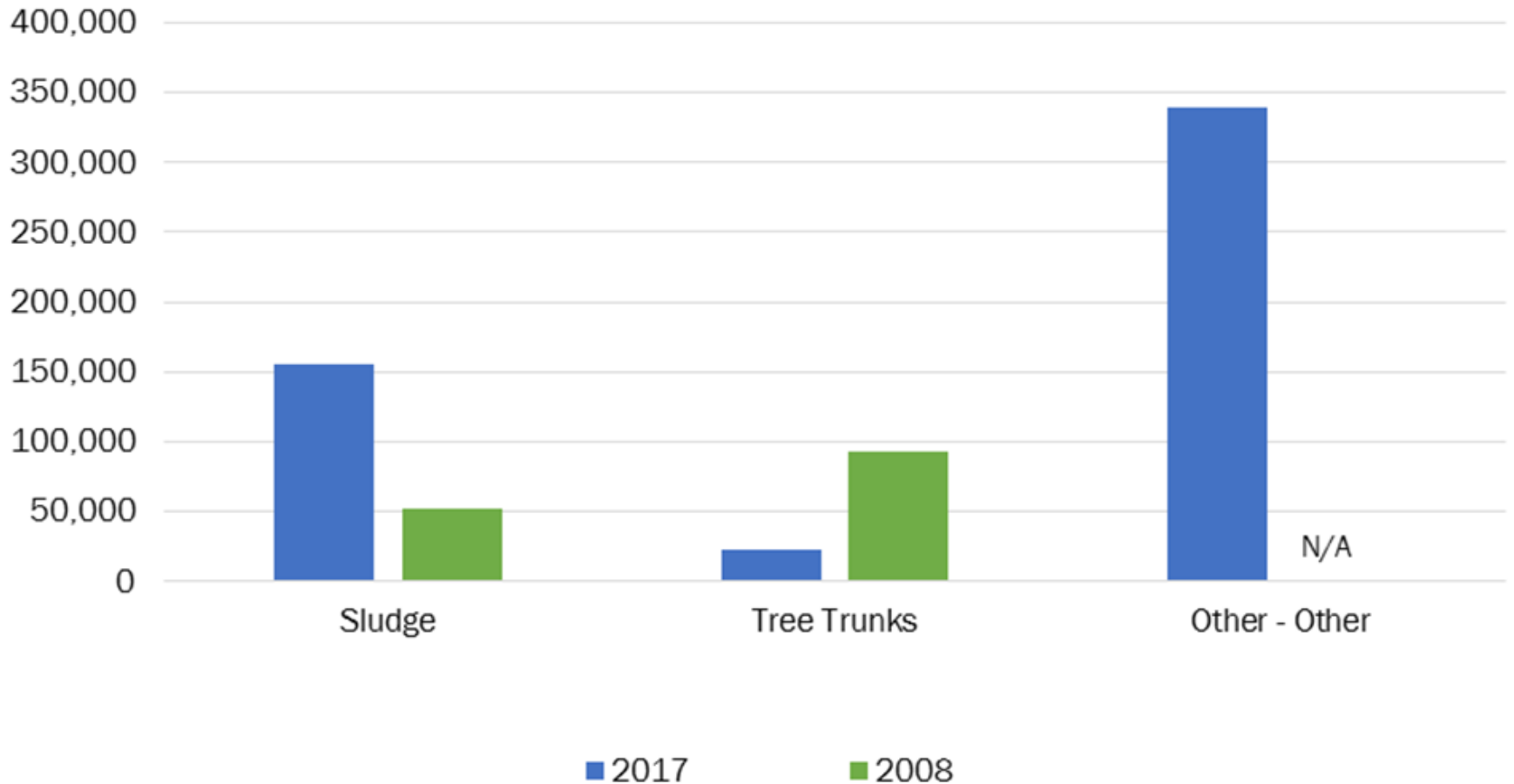
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# Other Waste – Demographically



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# Other Waste vs. 2008



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# Conclusions



- Dwindling incidence of many recyclable materials in disposed waste stream
  - Light-weighting
  - Online vs. printed materials
  - Successful programs are making a difference
- Significant opportunities still exist to boost diversion
  - Organics diversion is still evolving
    - ✦ Spike in yard waste disposal – seasonal or carts?
  - C&D is a significant fraction of the waste stream
    - ✦ Source separated and mixed in MSW
- Significant potential diversion in Industrial stream

# Recommendations



- **Continue to perform statewide waste characterization studies**
  - Invaluable for evaluating recycling program effectiveness
  - Five to seven year interval is reasonable to inform on changes in waste stream
- **Possible Enhancements to future studies**
  - Targeted generator sampling (grocery, retail, restaurant, multi-family residential, etc.)
  - Analysis of contamination and moisture to refine results
  - Energy or higher heating value calculations
  - Include curbside recycling capture rate analysis by including a few recycling facilities

# Questions?



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