

# Impact of a Change from Dual Stream to Single Stream Recycling

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# Acknowledgements

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Town of Brookhaven, NY

## Disclaimer:

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NYC

Town of Brookhaven

Curbside recycling program

Initiated in 1989

Mandatory

For 1,2,3 family households

# Until 2013

## Dual-stream recycling

*This week*

*Following week*

Monday

Wednesday

Thursday

Monday

Wednesday

Thursday

**Waste**

**Paper**

**Waste**

**Waste**

**Containers**

**Waste**

# Post Jan 1, 2014

## Single-stream recycling

*This week*

*Following week*

Monday

Wednesday

Thursday

Monday

Wednesday

Thursday

**Waste**

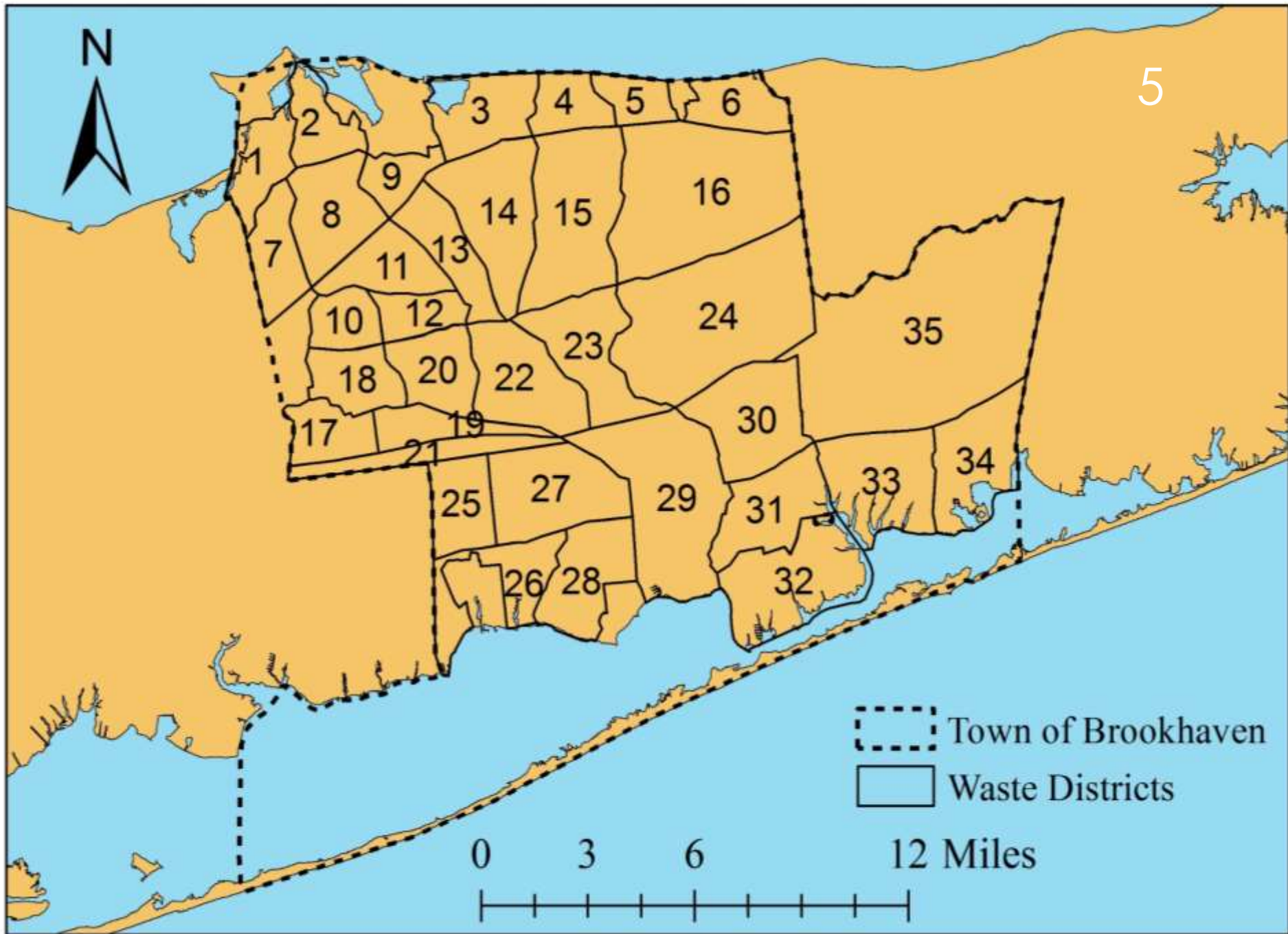
**All  
Recyclables**

**Waste**

**Waste**

**All  
Recyclables**

**Waste**



# Premise: Single-stream recycling

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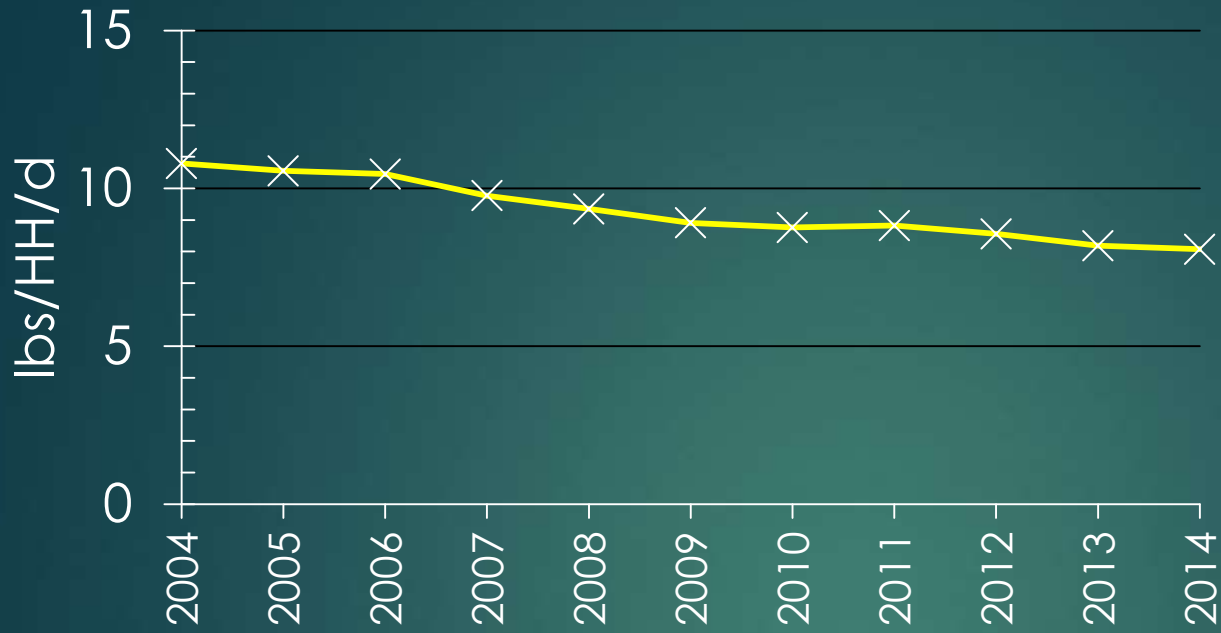
Simplifying collection will enable those who recycle to recycle more, and those who do not recycle to join in

## Approach

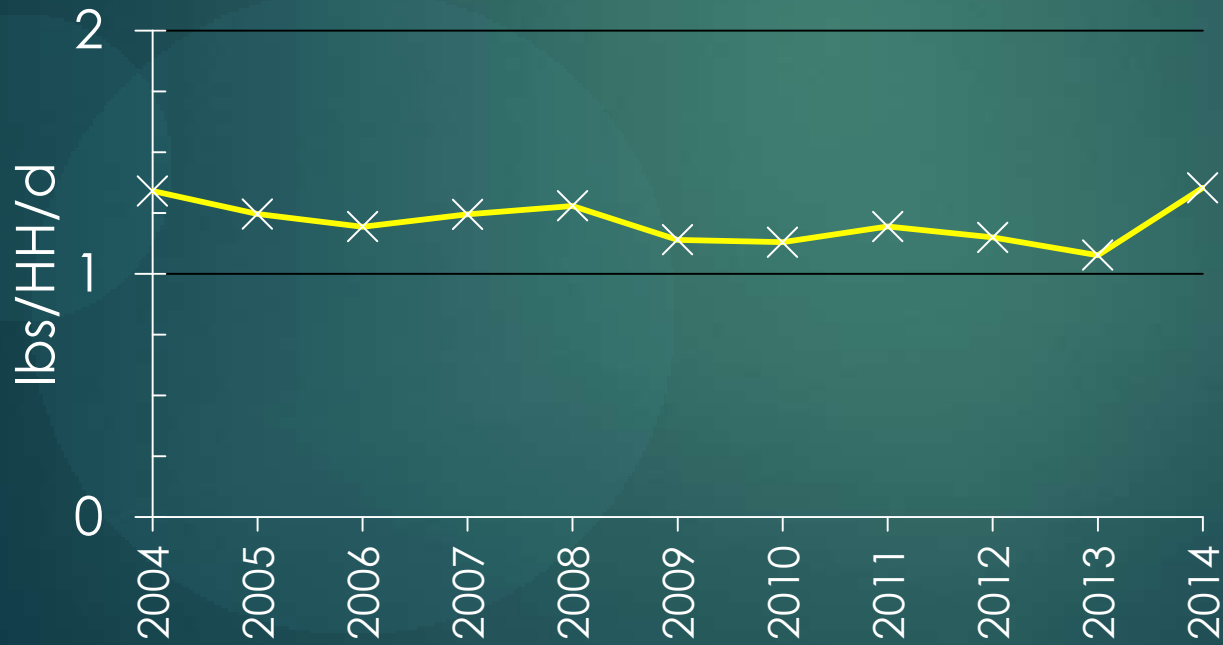
- Analyzed scale-house tonnages of materials entered / exited (Town-wide basis)
- Analyses of material composition via direct waste analysis (three waste districts)

# Town-wide trends





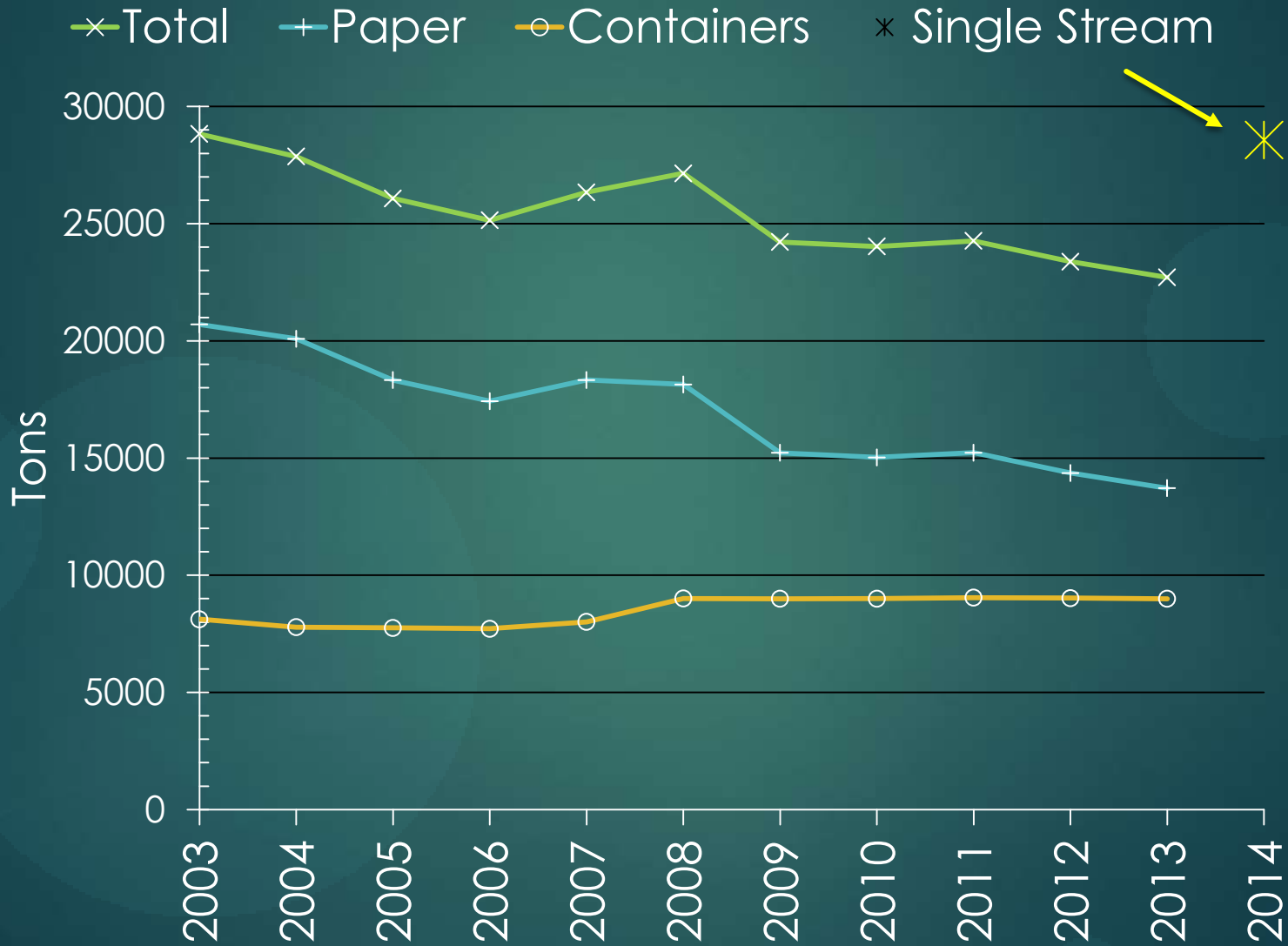
Waste disposal rate



Curbside recycling rate



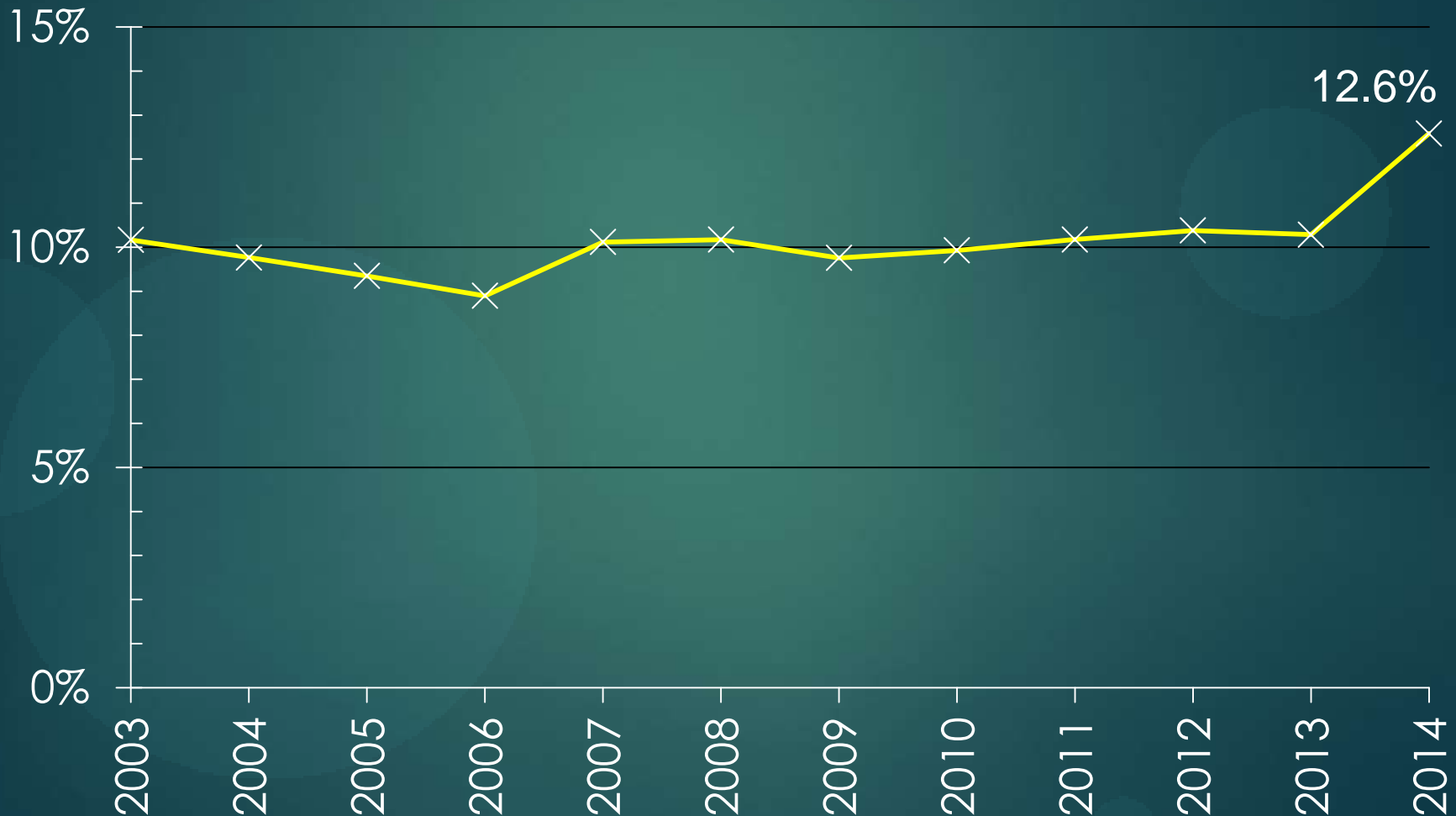
# Trends in recyclables collection



# Residential recycling percent

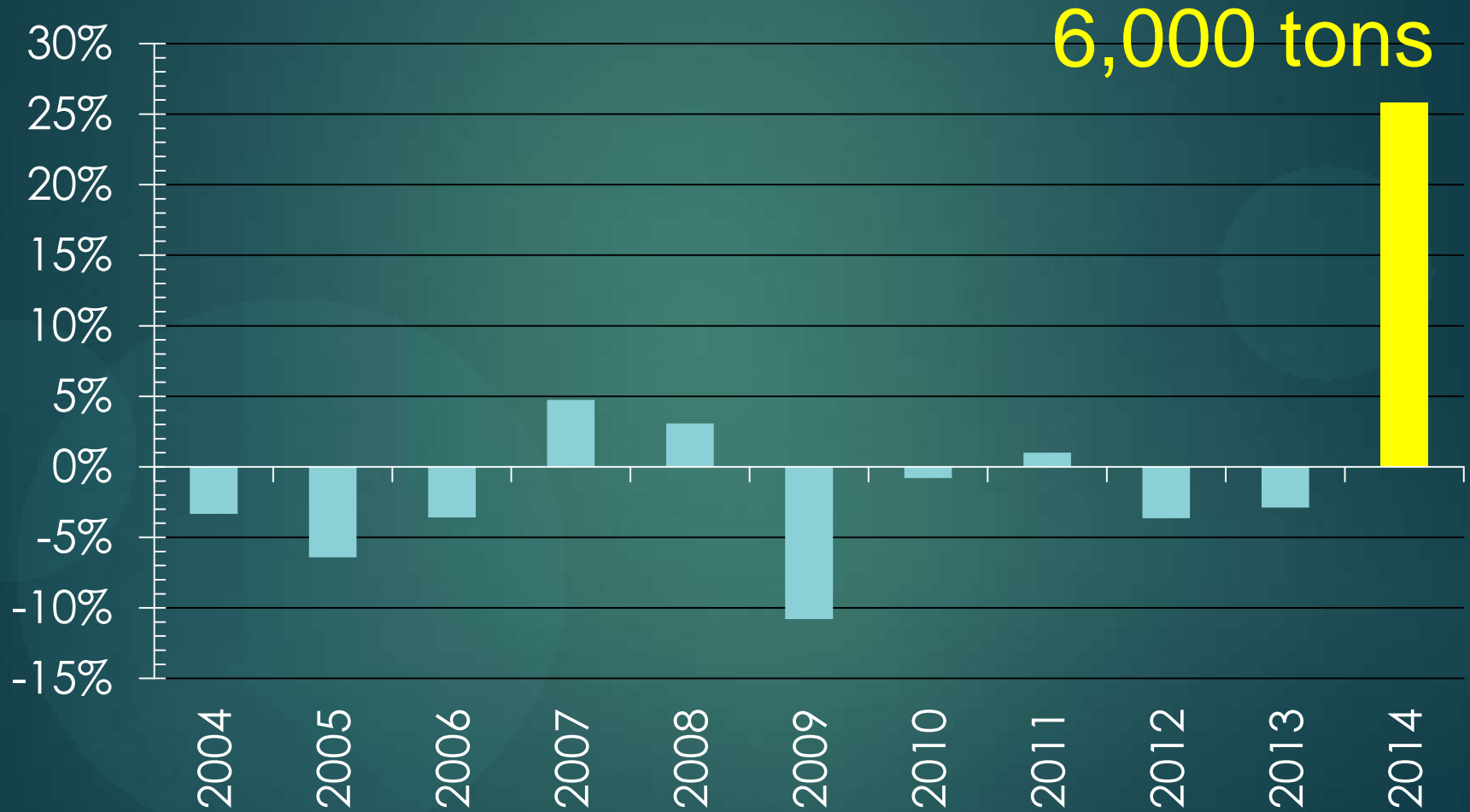
10

$$R\% = T_{\text{Recycled}} / (T_{\text{Recycled}} + T_{\text{Discarded}})$$



# Year-to-year change in recyclables collection tonnages (percent)

11



# Waste composition analyses

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# Waste composition analyses

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2 phases: Sept/Oct 2012 and Oct 2014

3 waste districts with variable recycling rates

(WD1 : High , WD18: Median , WD31: Low)

Sampling	2012	2014
# of samples	17 waste, 5 containers	6 waste, 3 combined Rs
# of estimates	5	3

Sample size: 200 lbs – 400 lbs

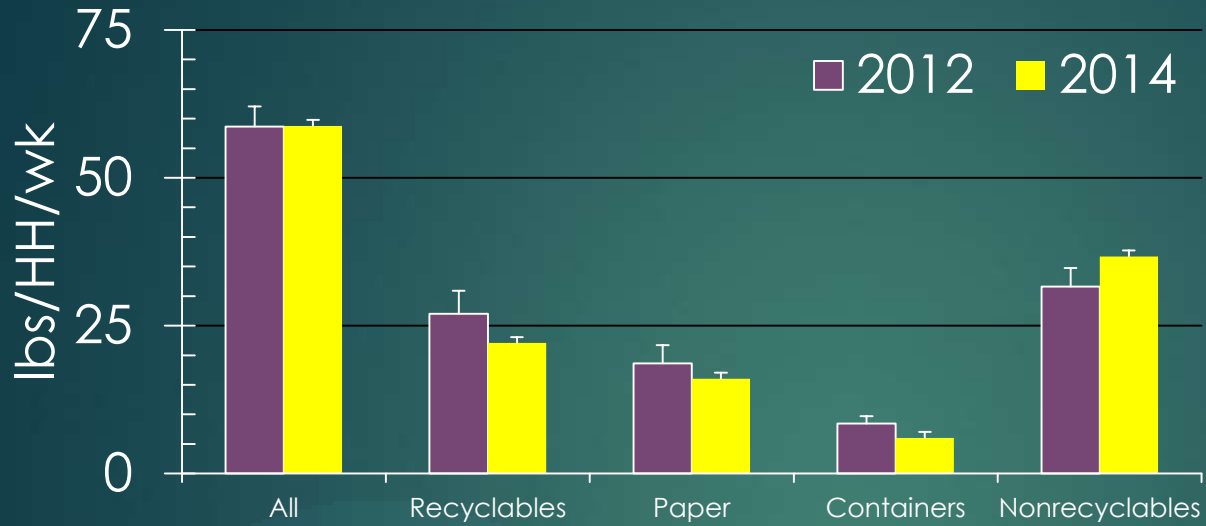
# 2014 materials categories

14

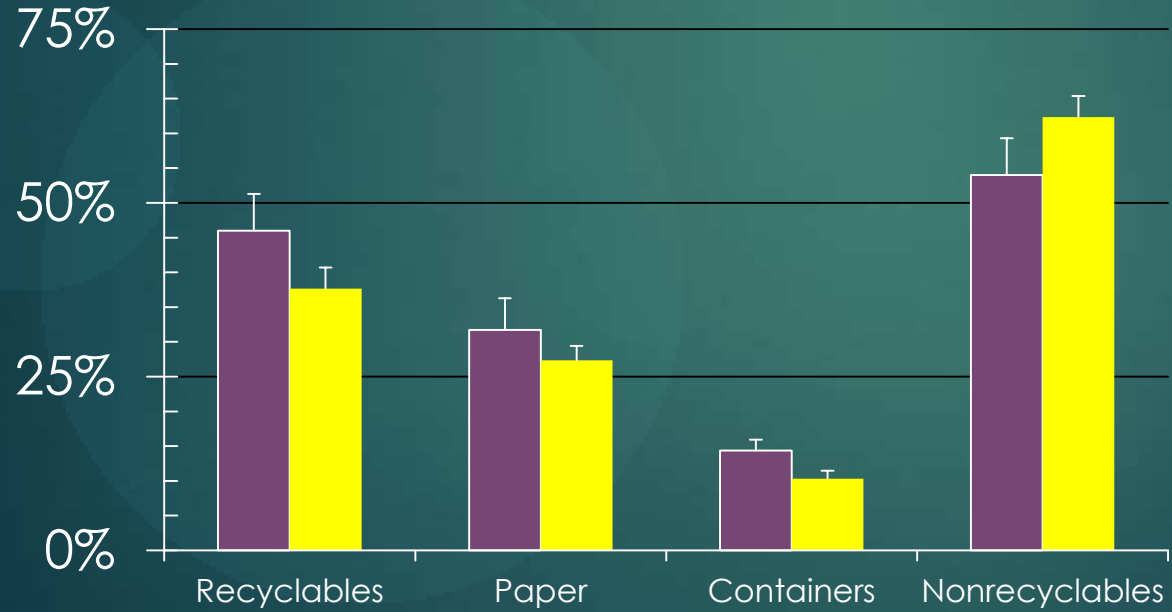
(\* = mandated source separated recyclables, by Town ordinance)

Derived Categories	Sorting Categories
Total paper	Mixed paper, corrugated cardboard, soiled paper
Recycled paper	Mixed paper, corrugated
2012 other organics	Other organics, soiled paper
Container recyclables	#1/#2 plastics, ferrous, aluminum, glass
Program recyclables	Recycled paper, container recyclables
MRF Recyclables	Program recyclables, rigid plastics, plastic bags
Recoverables	Program recyclables, yard waste

# District 1



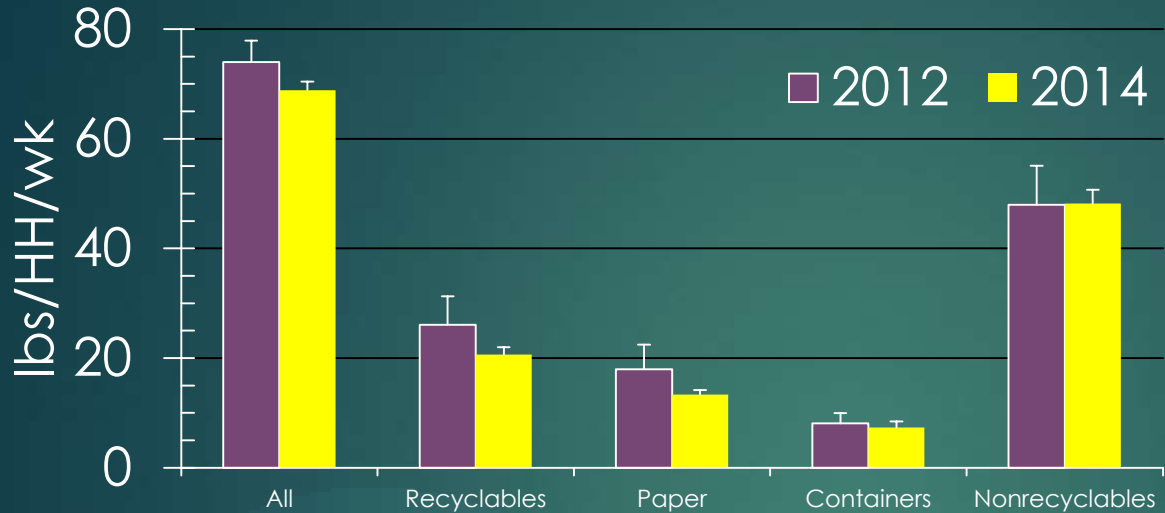
waste generation rates for key categories



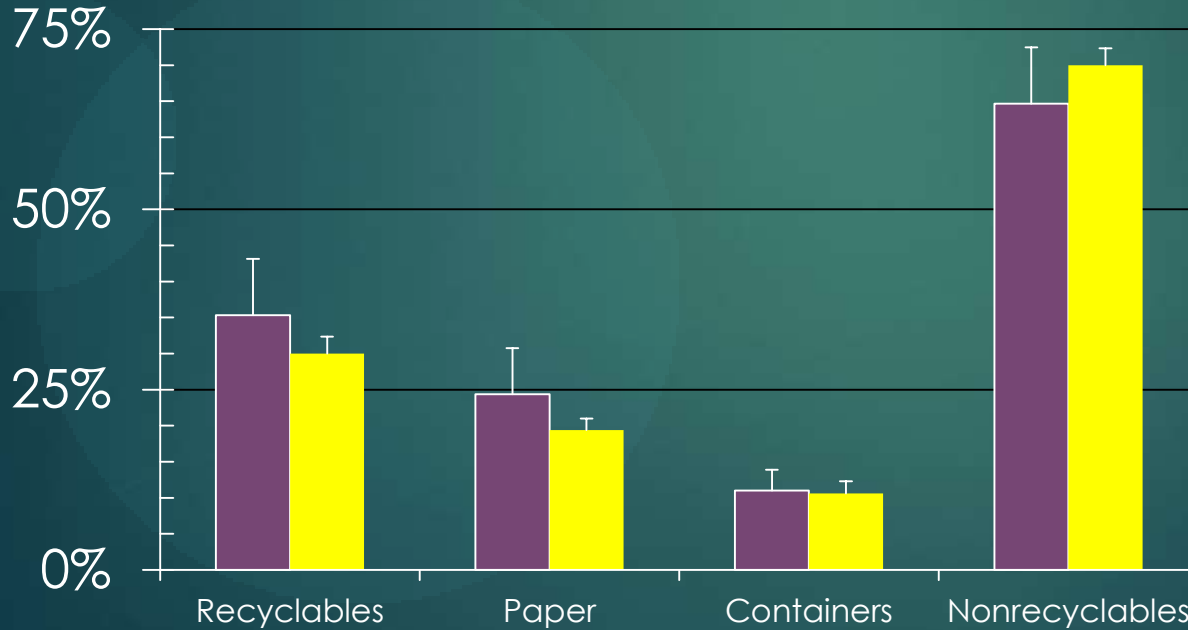
waste composition changes

# District 18

16



waste generation rates for key categories

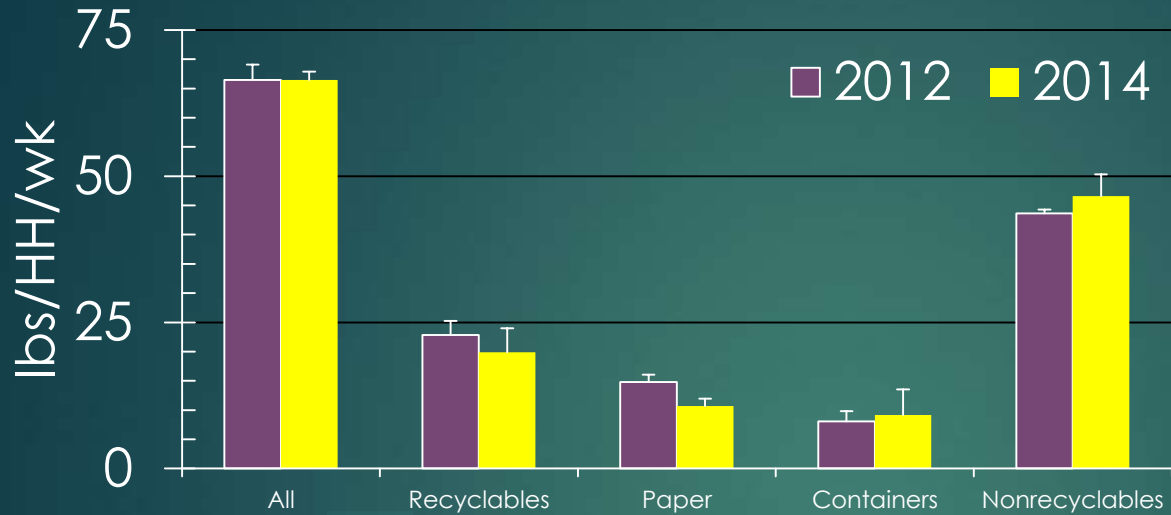


waste composition changes

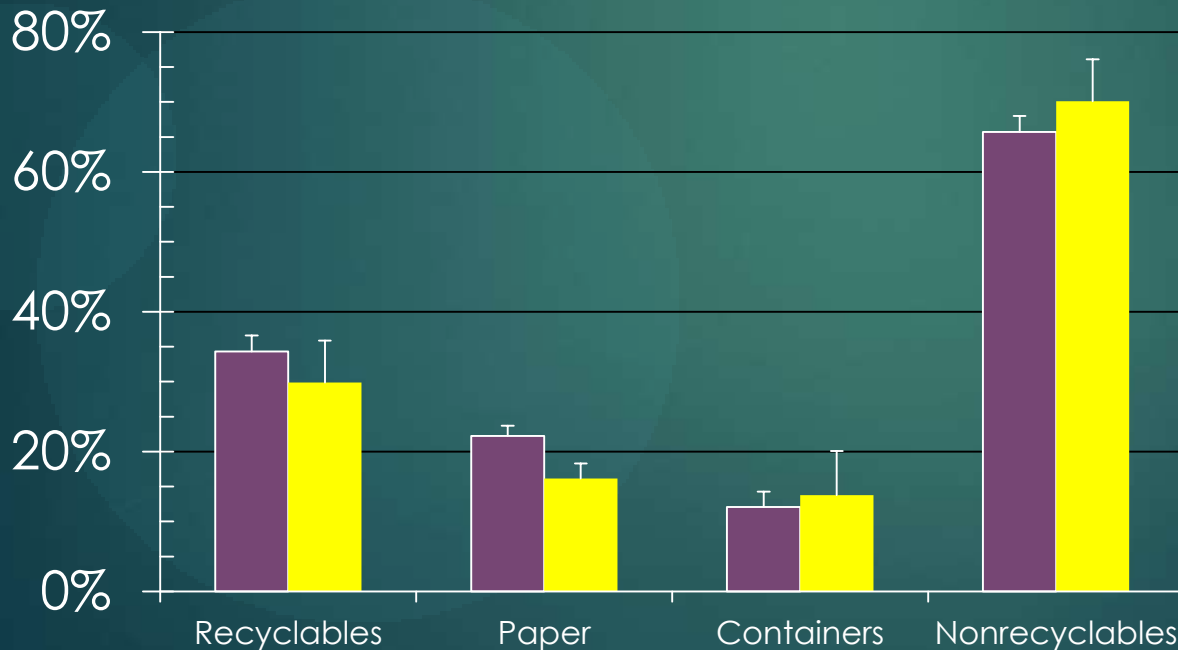


# District 31

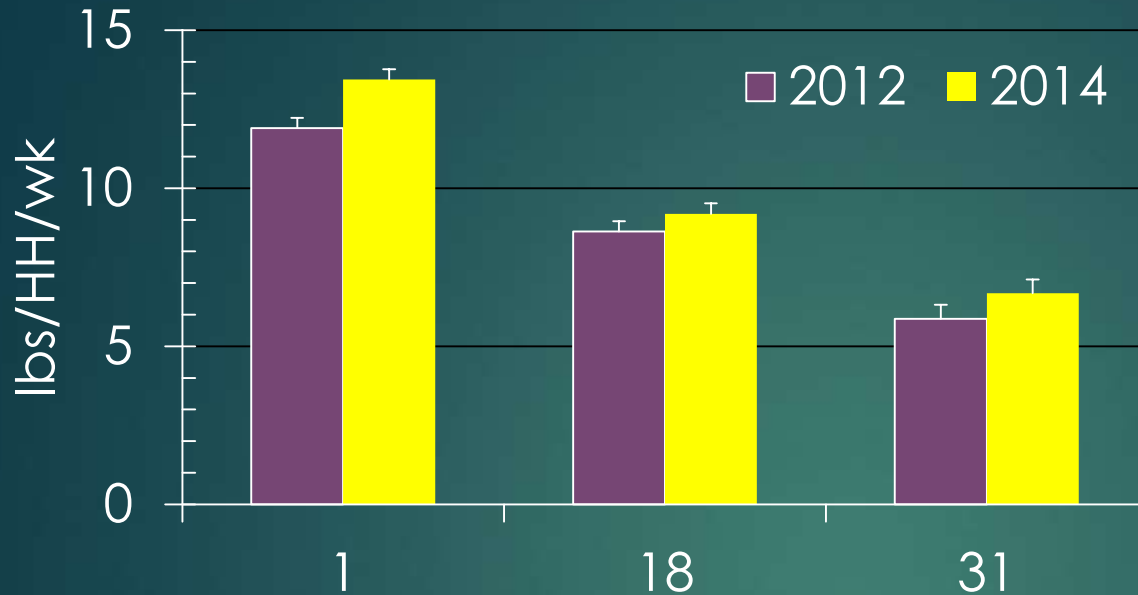
17



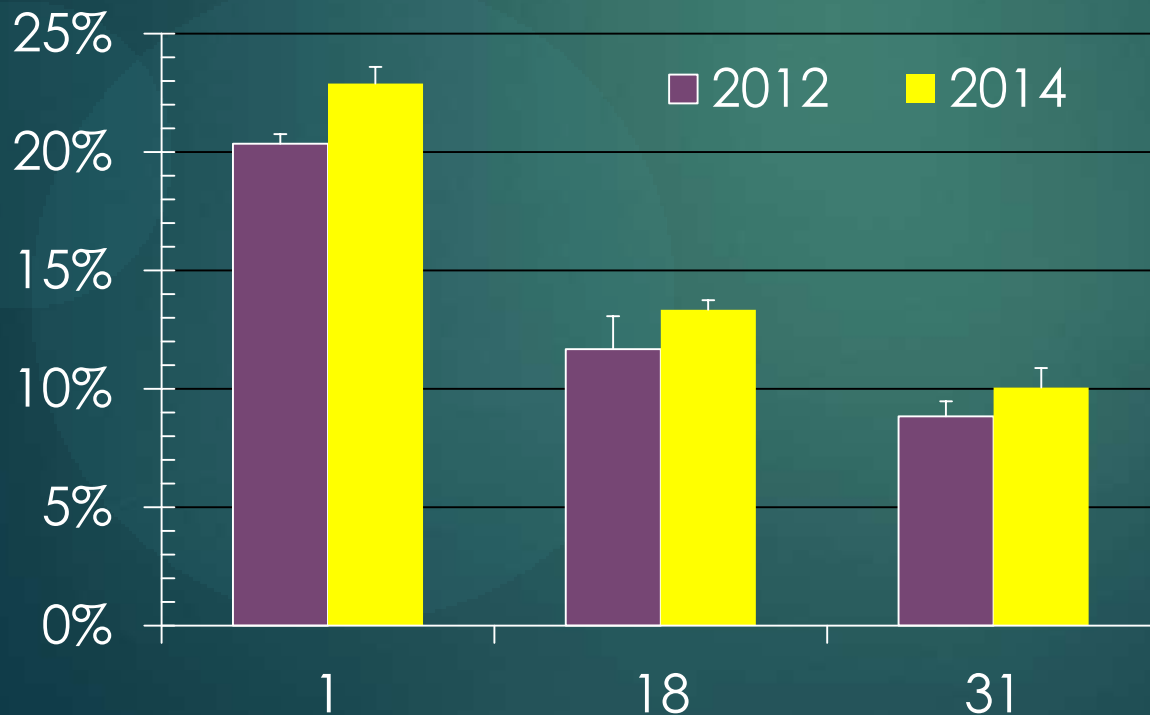
waste generation rates for key categories



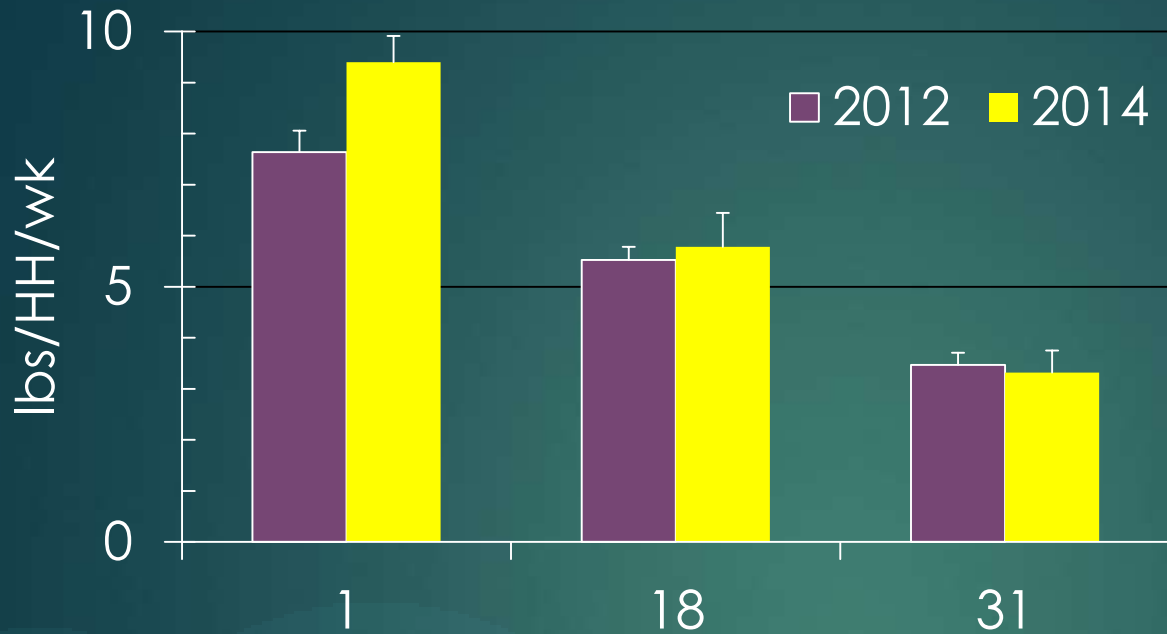
waste composition changes



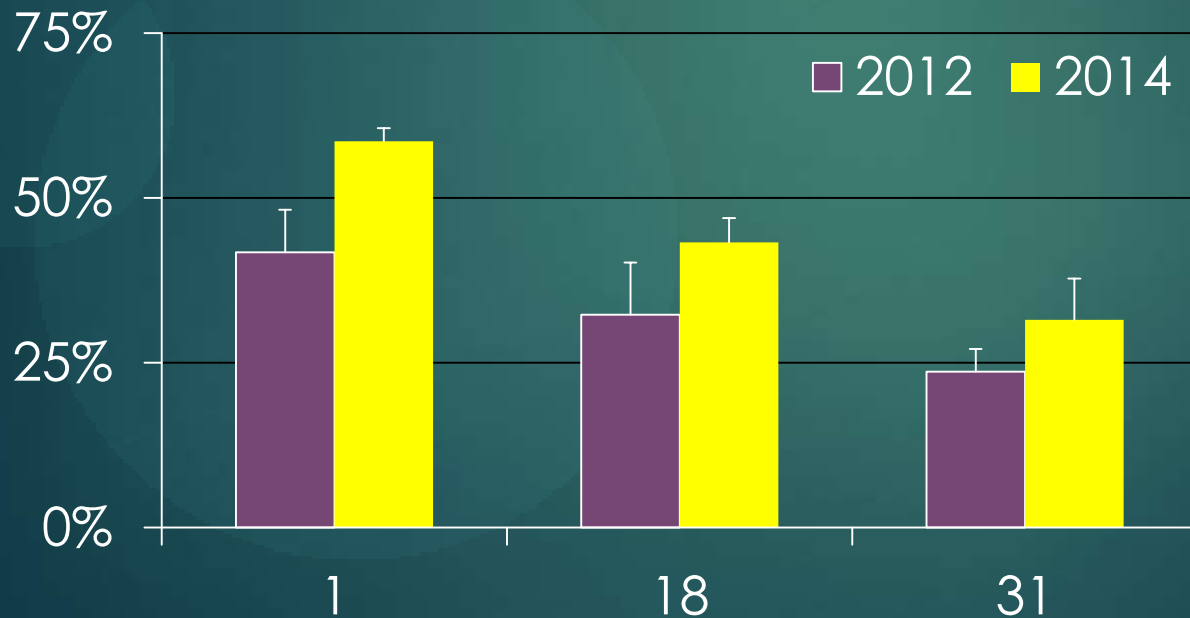
Difference in  
source  
separation  
rates



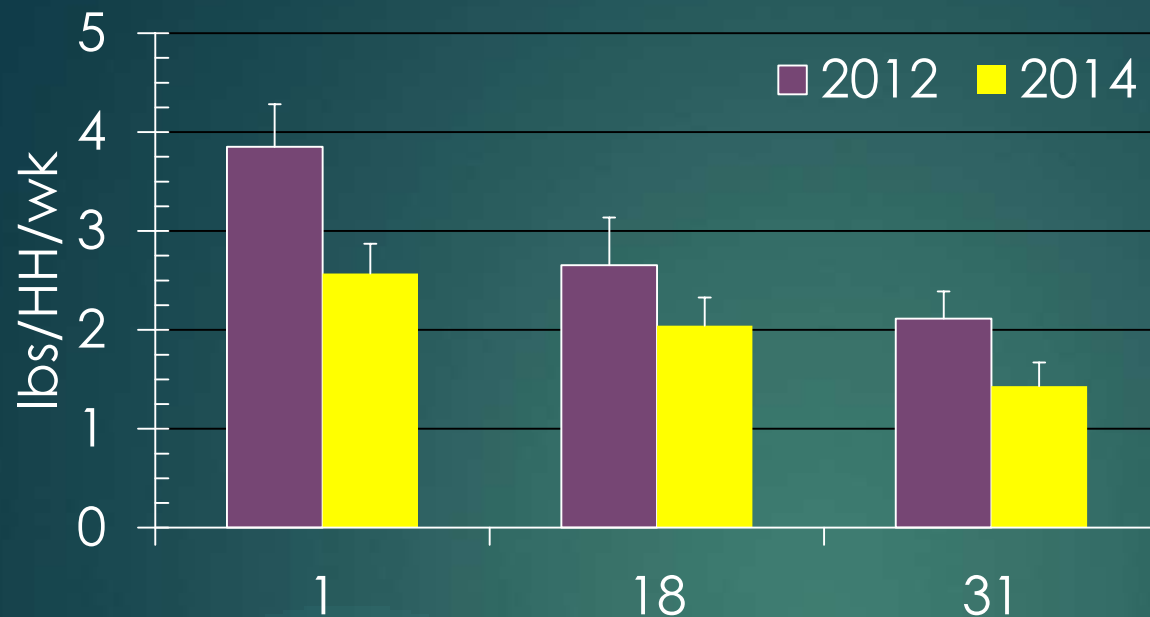
Difference in  
source  
separation  
percentages  
during waste  
sampling



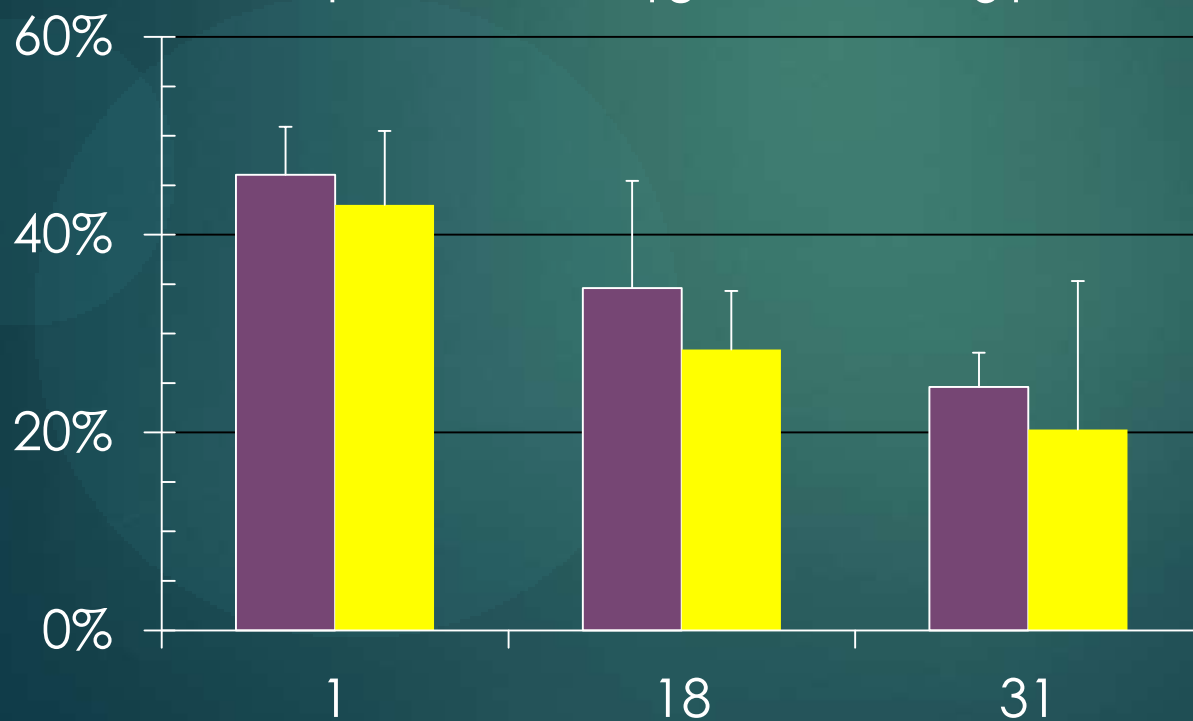
Paper source  
separation rates



Paper source  
separation  
efficiency



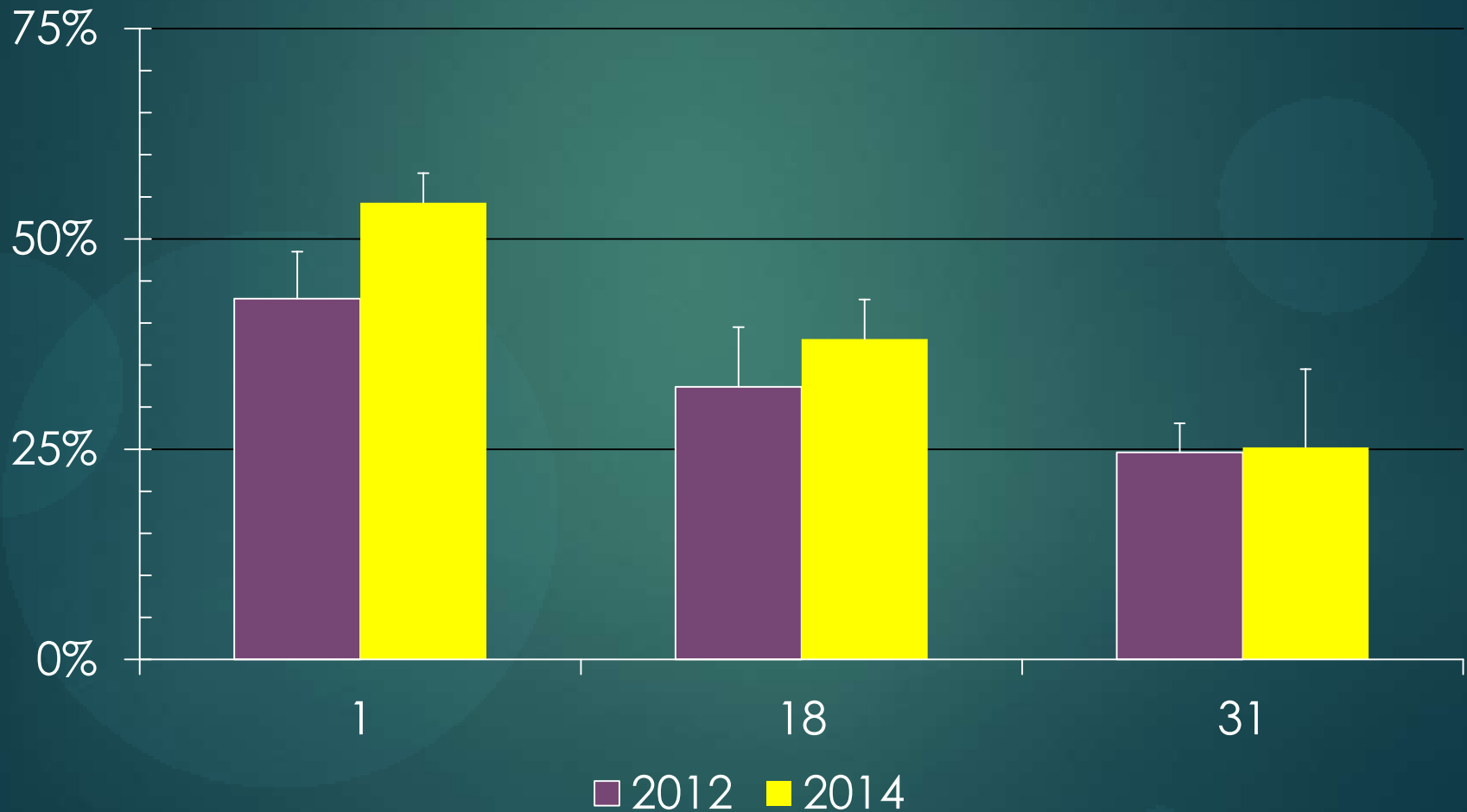
Container source separation rates

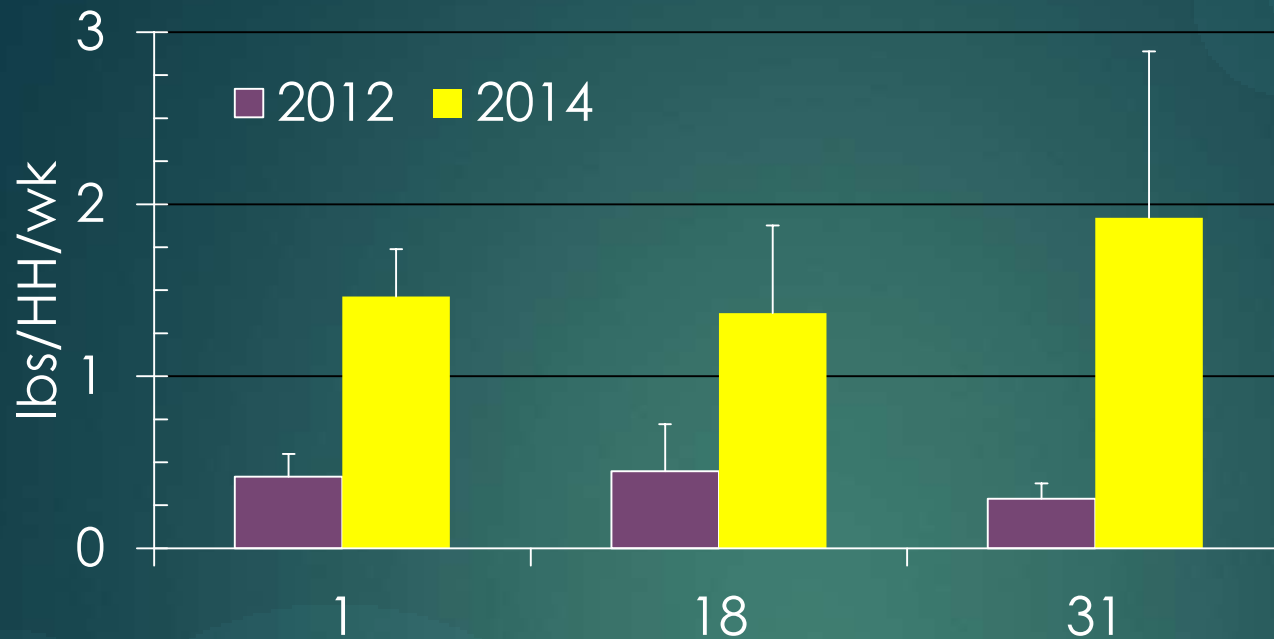


Container source separation efficiency

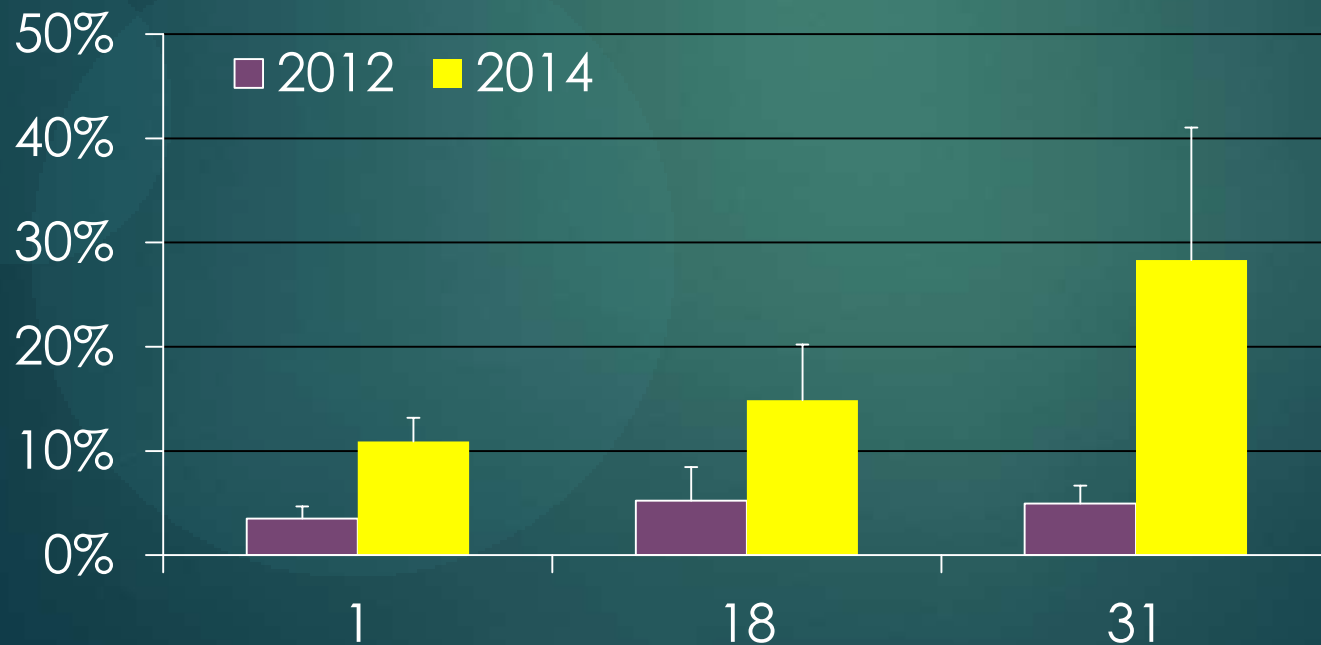
# Source separation efficiency, all recyclables

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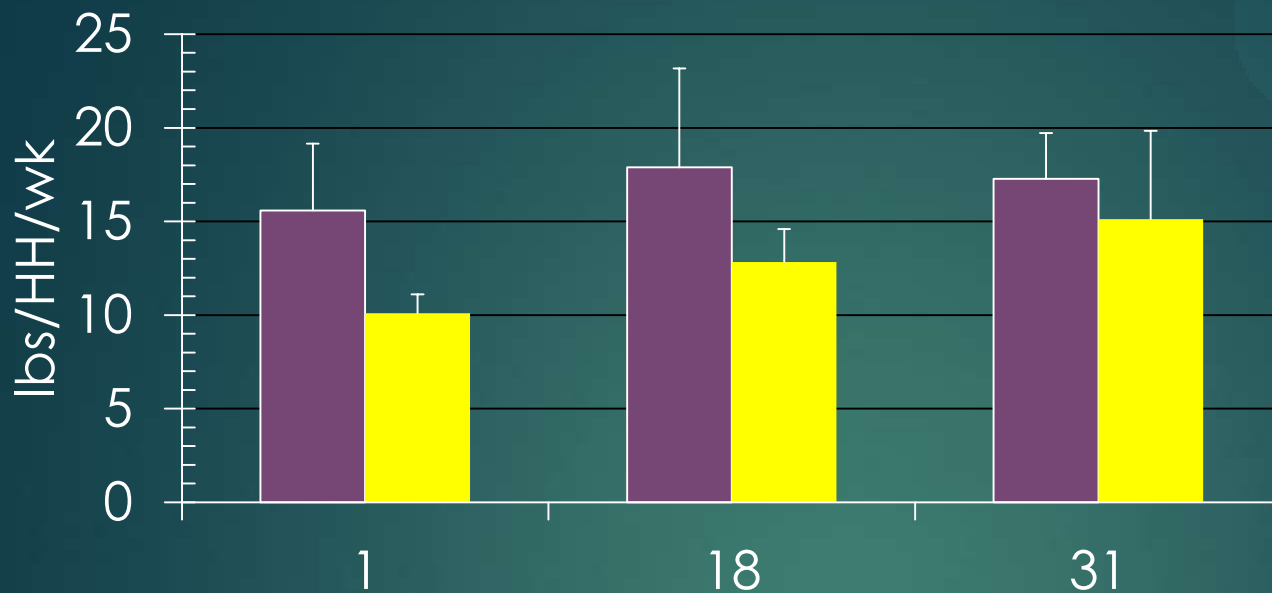




Rate of non-recyclable material collected with recyclables

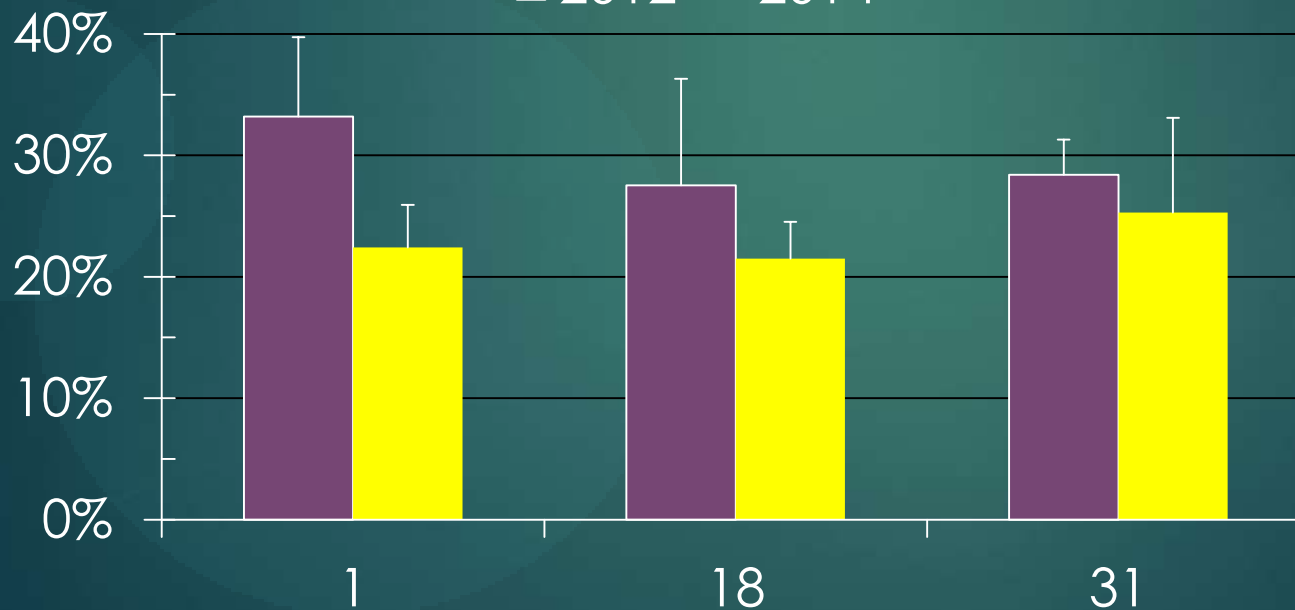


Percent of recyclables collection that was not Town recyclable materials



■ 2012 ■ 2014

Recyclables  
discard rate

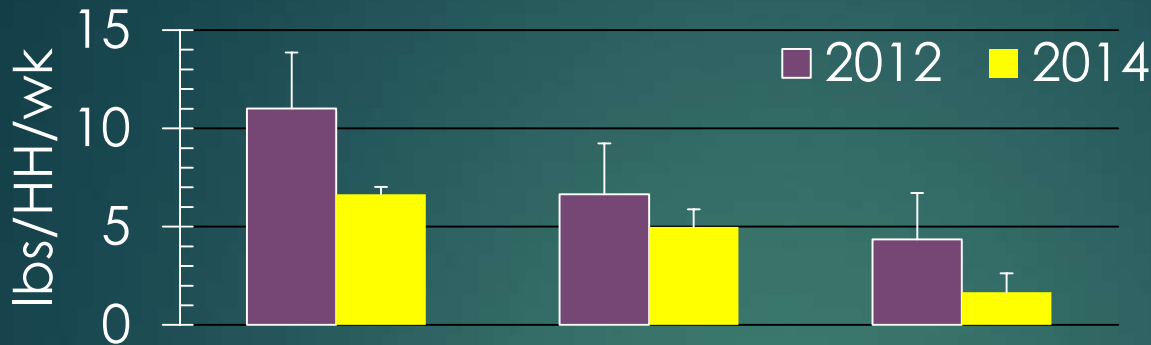


■ 2012 ■ 2014

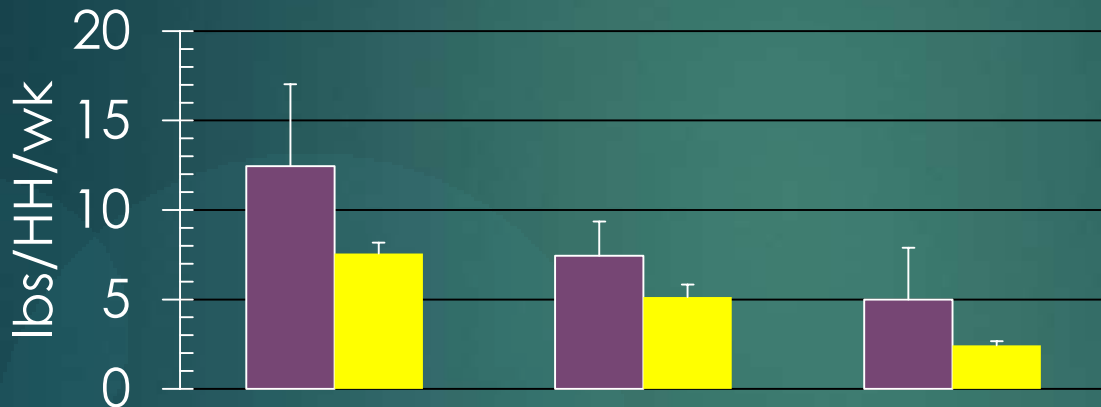
Percent  
recyclables  
in discards

# Paper recyclables discard rate

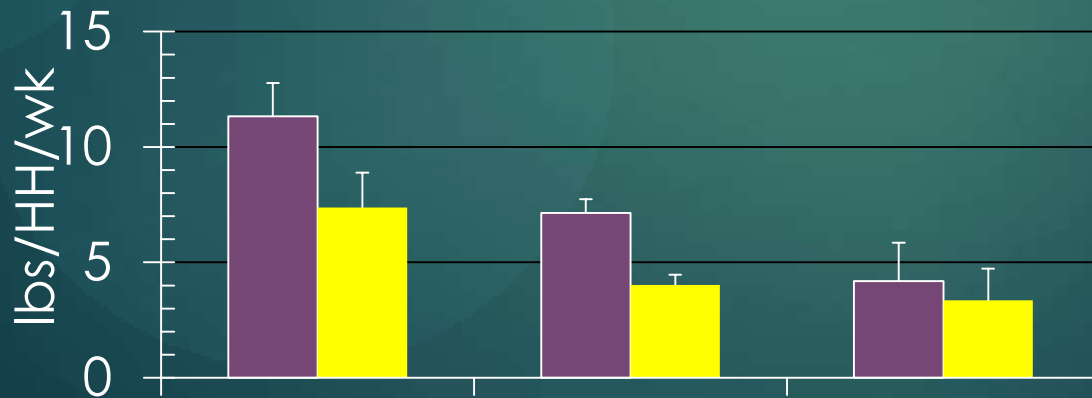
24



District 1



District 18



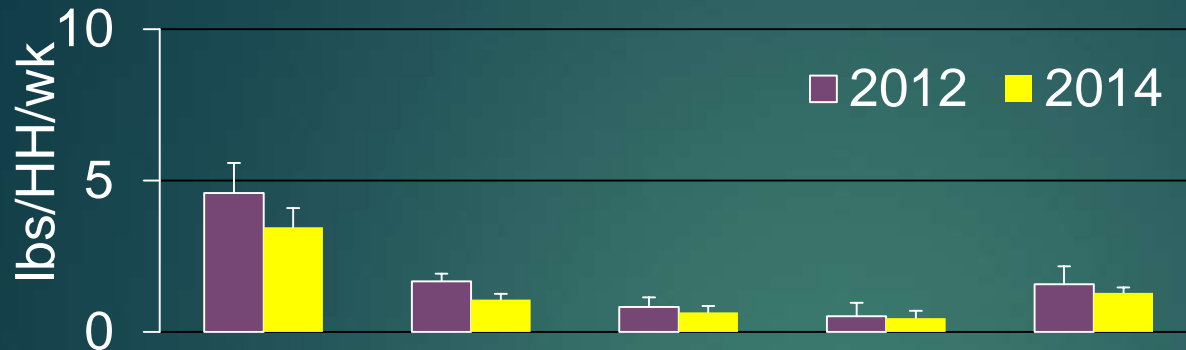
District 31



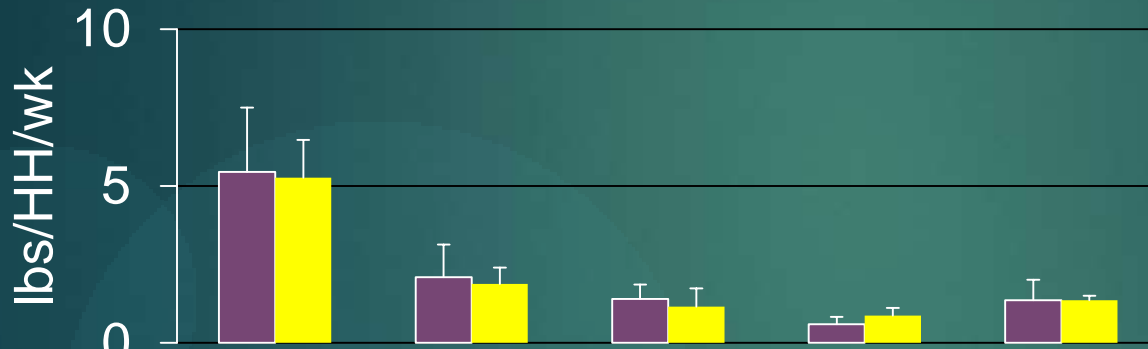
# Containers recyclables discard rate

25

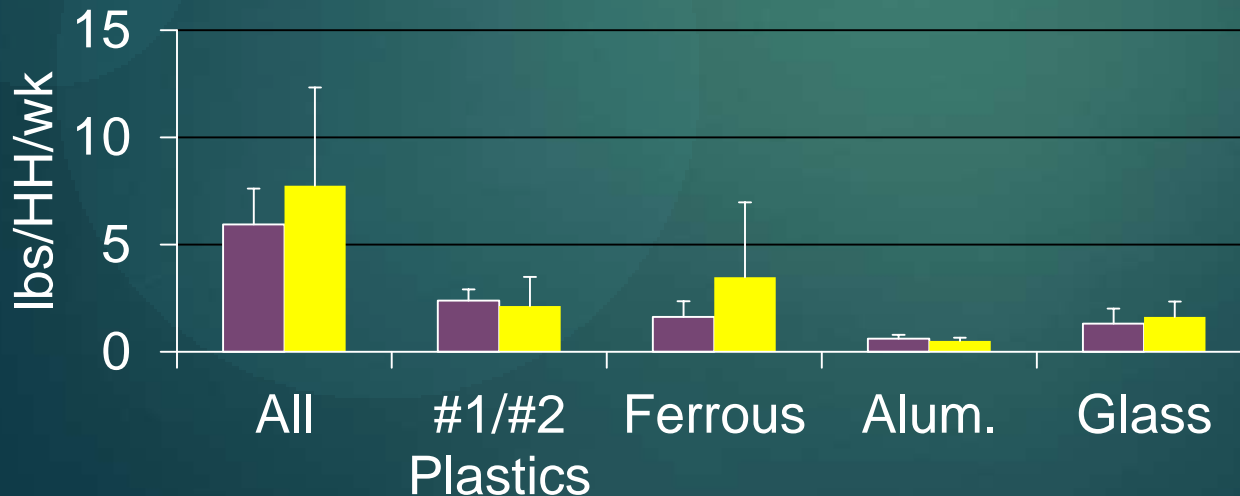
District 1



District 18

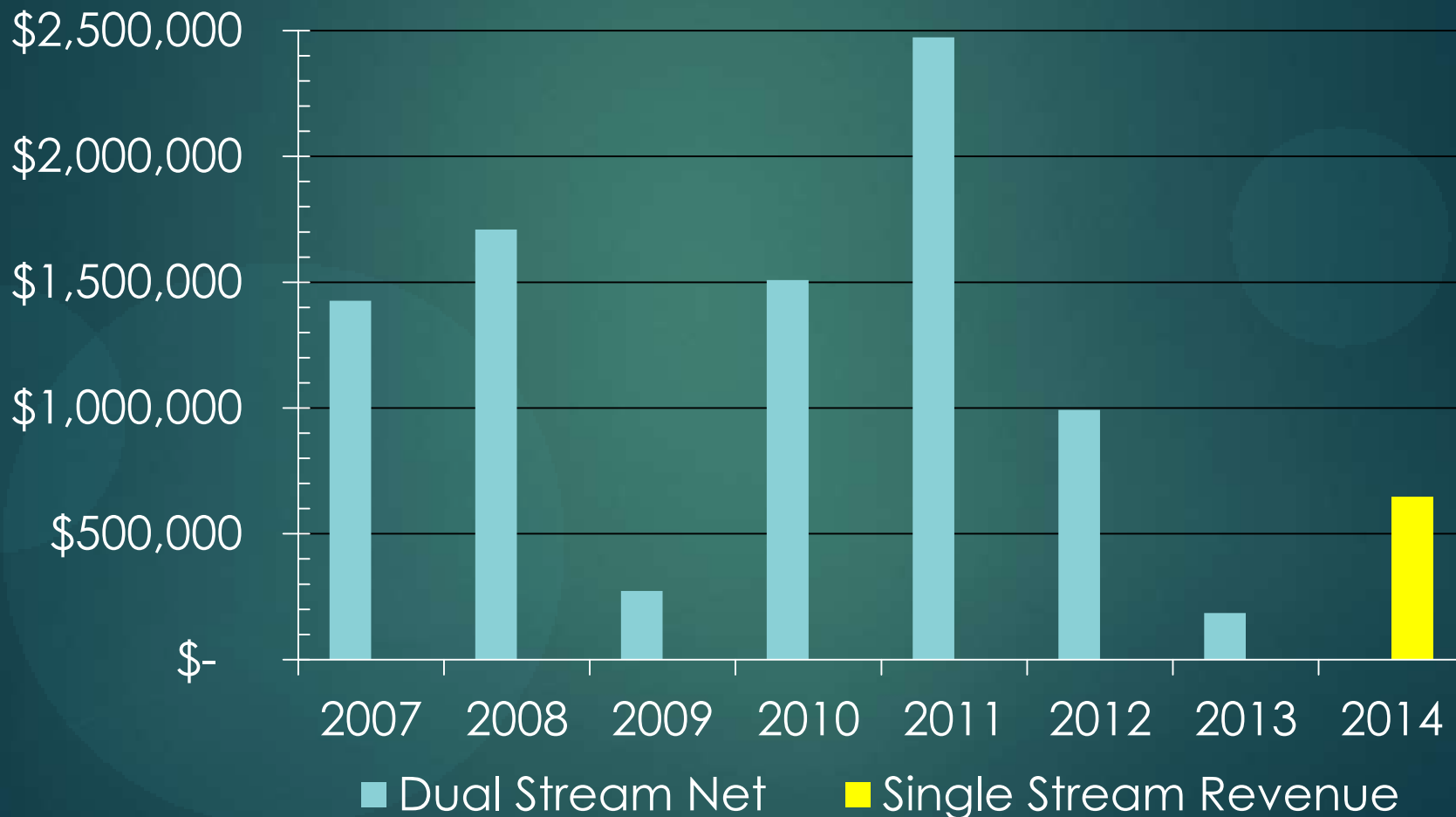


District 31

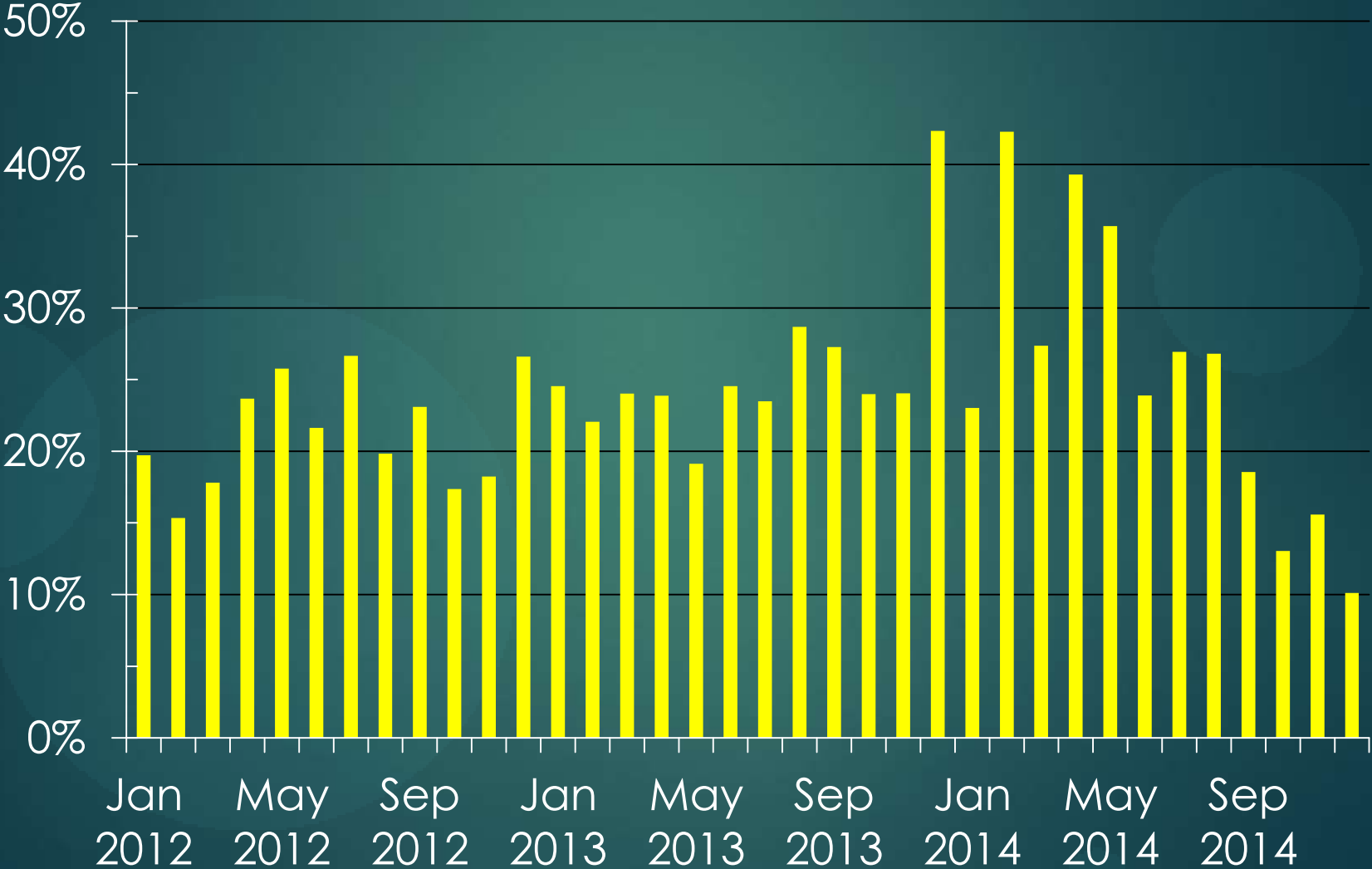


# Net revenues to the Town from MRF operators

26






# Monthly reject-residue at the MRF






# Summary: Town-wide trend

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- Disposal tonnages slowly declined
- recycling set out in Town  ~ 6,000 tons
- curbside source separation rate  from 10.3% (2013) to 12.6% (2014)
- Per household separation rates  25%.

# Summary: 2012-2014 waste sort

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- **Single stream recycling** may have increased separation efficiency for paper.
- Residents of WD1 show increased participation and better compliance
- The results are more mixed for containers (collection  WD 1  WD 18  WD31)
- Separation of plastic and Al remains poor

# Summary: 2012-2014 waste sort

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- **Mis-sorted set out** for recovery **↑** for all 3 WDs (~ all increase in WD31 due to mis-sort)
- **20%-25%** of discards are recyclables  
**40K ± 5K tons** in 2014 (~10K tons < in 2012)
- Reduction could be due to better set outs & waste composition changes

# Conclusion

- The amount and percentages of recyclables in the waste stream has been declining.
- Paper is sharply shrinking, containers too.
- Waste stream has more non-recyclables (in terms of fraction and mass)
- Given changing material composition, keeping recyclable levels high is a challenge

# Please Recycle

Tonjes, D.J., O. Aphale, L. Clark, and K.L. Thyberg. 2015. **Analysis of the Change from Dual Stream to Single Stream Recycling for the Town of Brookhaven (Long Island, NY)**. Waste Reduction and Management Institute, School of Marine and Atmospheric Sciences, Stony Brook University. 64 pp.



# Comparisons across the three sampled districts, 2012-2014

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Waste generation	WD 1	WD 18	WD 31	Town-wide
2012 rate (lbs/HH/d)	9.88	12.69	10.93	11.08
2014 rate (lbs/HH/d)	9.64	12.26	10.86	10.76
difference	-2.4%	-3.4%	-0.6%	-2.9%
2012 sampling period rate (lbs/HH/wk)	58.65 ± 3.41	74.02 ± 3.86	66.47 ± 2.64	
2014 sampling period rate (lbs/HH/wk)	58.78 ± 3.11	68.87 ± 1.59	66.46 ± 0.44	
difference	0.2%	-7.0%	0.0%	

# Comparisons across the three sampled districts, 2012-2014

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Recycling	WD 1	WD 18	WD 31	Town-wide
2012 rate (lbs/HH/d)	1.65	1.24	0.87	1.15
2014 rate (lbs/HH/d)	1.96	1.45	1.04	1.35
difference	18.7%	16.8%	19.3%	17.7%
2012 sampling period rate (lbs/HH/wk)	11.90 ± 0.55	8.63 ± 0.32	5.87 ± 0.36	
2014 sampling period rate (lbs/HH/wk)	13.44 ± 0.32	9.19 ± 0.33	6.68 ± 0.44	
difference	12.9%	6.5%	13.8%	

# Tons/mo delivered to the MRF, with associated reject-residue

35

