



## Drop-off Recycling in Ohio:

Measuring and Understanding Participation & Program Effectiveness



U.S. EPA Region 5

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Submitted by the  
Ohio Environmental Protection Agency  
in partnership with the  
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## **I. Introduction**

While a fair amount of research has been conducted on the effectiveness of curbside recycling programs, not much research or documentation has been published on the effectiveness of drop-off recycling programs<sup>1</sup>. In order to learn more about these types of programs, Ohio EPA conducted a study to determine such things as diversion amounts, participation rates, usage patterns, etc. at drop-off recycling sites in Ohio. This study involved three major components: analysis of tonnage data from more than 250 sites throughout the state; face-to-face surveys of drop-off users at 17 sites throughout the state; and a telephone survey of 600 people living in one county in Ohio.

## **II. Study Sponsors and Contributors**

This study was funded by a solid waste management assistant grant from the U.S. EPA Region 5, with significant financial contribution from the Ohio Department of Natural Resources. Ohio EPA was the lead agency developing and conducting the study. Input and assistance from Ohio's solid waste management districts<sup>2</sup> was received throughout the study.

The overall study design was developed with input from an Advisory Committee comprised of the following individuals:

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Patricia Raynak, Administrator, Research, Industry and Markets Section, Division of Recycling and Litter Prevention, Ohio Department of Natural Resources

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David Foltz, Ph.D., Associate Professor and MPA Coordinator, Department of Political Science, University of Tennessee

Elizabeth Biggins-Ramer, Principal Planner, Solid Waste Management, Cuyahoga County Planning Commission

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<sup>1</sup> By drop-off recycling programs, we are referring to trailers, roll-off containers, or other types of containers that are used as collection points for residential and sometimes commercial recyclables. Residents or businesses store their recyclables and then periodically drive to the drop-off site to deposit their recyclables into the container.

<sup>2</sup> In accordance with Ohio law, Ohio counties are organized into solid waste management districts (SWMDs). These SWMDs are required to implement programs to reach state recycling goals established by Ohio EPA with the input of the State Solid Waste Management Advisory Council.

Dan Wickerham, Coordinator, Brown County Solid Waste Authority; Program Director, Adams-Brown Recycling

Much of the survey work and data analysis and all of the GIS mapping was conducted by The Strategy Team, Ltd., located in Columbus, Ohio, with input from Michael Greenburg, GT Environmental, Westerville, Ohio.

The project leads at Ohio EPA were Michelle Kenton and Matthew Hittle.

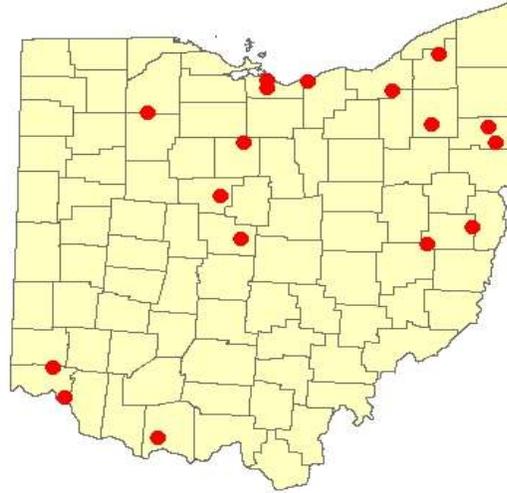
Kevin Shoemaker, Ernie Stall, Nick D'Amato, and Channon Cohen, of the Planning Unit, Division of Solid and Infectious Waste Management, Ohio EPA also contributed to the study.

### **III. Approach**

There were three primary components to the study:

1. Detailed analysis of the amount of material collected at drop-off sites throughout Ohio (tonnage data). This analysis included compiling 4 years (2000 – 2003) of tonnage data from hundreds of drop-off sites throughout Ohio. In 2002, the primary data year for this portion of the study, tonnage data was collected for 374 sites. Of this, data for 275 sites was considered to be high quality. Based on these sites, statistics were compiled regarding the amount of materials collected. The results of this analysis can be found in Section IV.B. Summary information on all of the data years can also be found in that section.

2. A face-to-face survey of users of drop-off sites was conducted at 17 sites throughout the state. The geographic distribution of these sites can be seen in Figure 1. In addition, the amount of material brought to the site by each user was weighed. This survey data was used to determine user characteristics, usage frequency, distance traveled, participation rates, etc. This data was also used to determine “functional usage areas” for the types of drop-off sites studied. Some of the most interesting results of this portion of the study are summarized in Sections IV.C. through IV. E. Detailed information on the methodology and detailed results can be found in The Strategy Team, Ltd. “Report to the Ohio Environmental Protection Agency: Determining an Empirically Based Access Credit Model” (TST Report), located in Appendix A.



**Figure 1: Drop-off Recycling Survey Locations**

3. A phone survey of 600 residents of Summit County was conducted regarding recycling issues. A number of questions related to drop-off recycling specifically. The results from the phone survey were one of several approaches used to establish estimate participation rates at drop-off sites. Information regarding this survey can be found in Section IV.E. and the TST Report, located in Appendix A.

## **IV. Study Results**

This document presents selected results from the face-to-face and phone surveys as well as results from the analysis of the tonnage data. A detailed description of the methodology and more detailed results of the face-to-face and phone surveys are presented in the TST Report, located in Appendix A.

Readers who are interested in generalizing the results of the study or are conducting a similar study are encouraged to read Section VI, “Limitations and Further Research Needs.” We believe the results of this study represent a good first attempt to quantify the effectiveness of drop-off programs in Ohio. Although a myriad of factors distinguish the different drop-off sites throughout the state, great effort was made to collect data at drop-off sites that were representative of the sites found throughout the state. While the issuance of this report represents the conclusion of a significant portion of the study, over time Ohio EPA will continue to analyze the data collected, gather additional data as resources allow, and continue to strive to better understand the effectiveness of drop-off recycling programs in the state.

### **A. Definition of Terms**

Throughout this document, drop-offs will frequently be defined as either full-time or part-time, and rural or urban. Those terms are defined below.

*Full-time or FT:* The drop-off site was available to residents at least 40 hours each week.

*Part-time or PT:* The drop-off site was available to residents less than 40 hours each week, and sometimes as little as one day per month.

*Urban:* The drop-off is located in a community (i.e. city, village, or township) of 5,000 people or more.

*Rural:* The drop-off is located in a community (i.e. city, village, or township) of less than 5,000 people.

## **B. Diversion Amounts**

In the first phase of this study, Ohio EPA compiled the amount of material collected annually at numerous drop-off sites throughout the state (beginning with data year 2000 and continuing through 2003). This data was evaluated for its accuracy. For example, some sites were originally measured by volume (cubic yards) of material, and then converted to tons using a conversion factor. Sites that were indirectly measured in this way or calculated in some other manner were not included in the statistical analysis. Only sites where materials were directly measured by weighing were included in the calculations.

While four years of tonnage data were compiled for the study, 2002 was identified as the primary data year for the tonnage information, since it was the most recent complete data set at the time. Of 811 sites originally identified, 374 had some data for the 2002 data year. Of these sites, 275 sites were identified as having high quality data.

Basic statistics were run on the data from the 275 sites. The average amount of material collected per site is presented in Figure 2. This information may be useful as a benchmarking tool for program managers or for planning purposes.

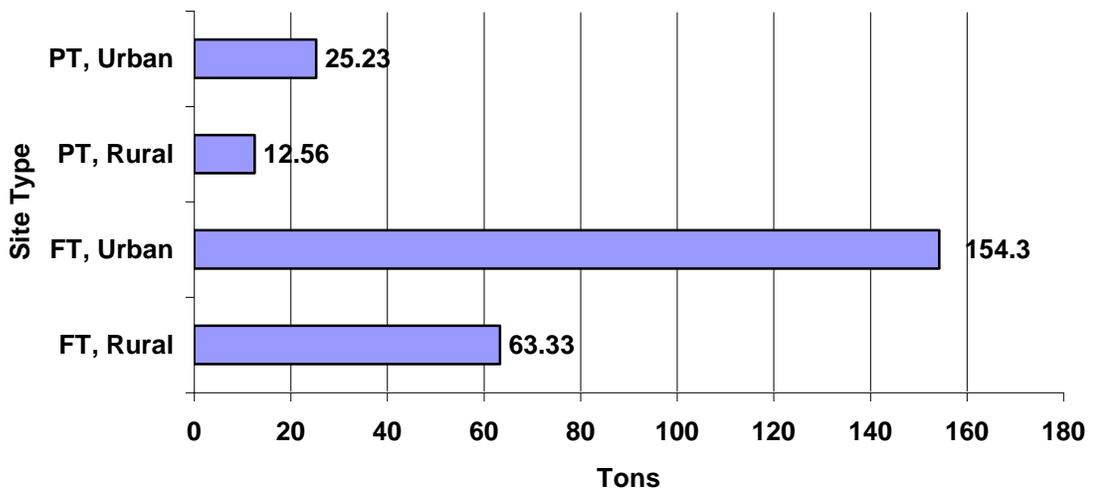


Figure 2: 2002 Average Tons per Year by Site Type

All four years of data are summarized in Table 1.

Drop-off Type	Year	Average Tons Collected	Standard Deviation	Number	Minimum	Maximum
FT RUR	2000	74.58	66.59	31	9	284
FT RUR	2001	66.82	75.29	104	0.98	498
FT RUR	2002	63.33	50.53	103	1.54	275.75
FT RUR	2003	85.46	50.25	77	1.93	252.58
FT URB	2000	137.37	121.94	18	9	459
FT URB	2001	185.27	207.36	94	2	941
FT URB	2002	154.3	168.91	69	0.14	868.69
FT URB	2003	217.82	247.06	55	22.67	1264.99
PT RUR	2000	16.66	12.64	36	2	66
PT RUR	2001	15.25	14.48	65	0.481	63
PT RUR	2002	12.56	11.28	67	1.25	52.9
PT RUR	2003	12.55	13.62	69	0.51	63.45
PT URB	2000	35	19.35	6	9	54
PT URB	2001	57.42	64.91	15	7	259
PT URB	2002	25.23	65.89	36	0.96	391
PT URB	2003	52.84	51.84	13	9.29	199

Table 1: Tonnage Data Summarization

Some may find it useful to examine the data in more detail than the simple averages presented above. Therefore, more detailed histograms of the tonnage data can be found in Appendix B.

### C. User Characteristics

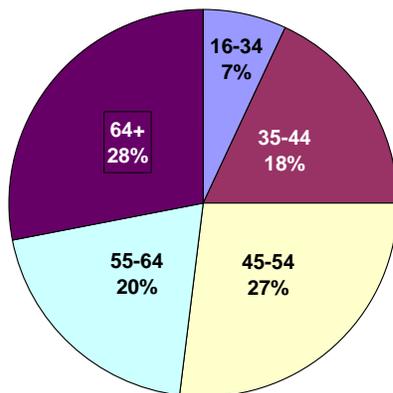
The second phase of the study involved the face-to-face surveying of drop-off users at 17 sites throughout the state. Users were asked a series of questions, and the material they brought to the site was weighed. A detailed description of the methods used in this phase of the study, as well as the survey instrument, can be found in the TST Report, located in Appendix A.

This section of the report summarizes some of the demographic information, or user characteristics, compiled from the surveys. We would encourage readers to read the entire TST Report contained in Appendix A for further details.

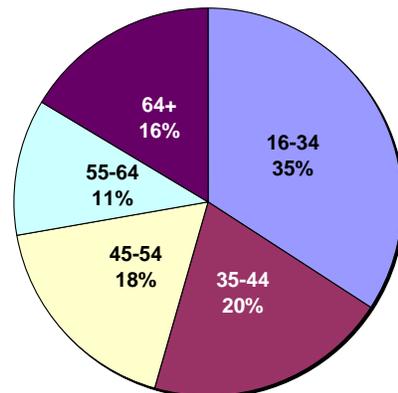
A word of explanation about the demographic results is warranted. Surveys were administered to the users of the drop-off sites as they arrived to drop off their materials. Frequently, the person delivering material to the drop-off was bringing material from a household of two or more people. Therefore, while the materials delivered to the site may have originated from a household of several people, the survey was answered by the person delivering the materials. So the demographic data represents the people delivering the material to the site, but does not necessarily represent the person(s) in the household who made the decision to recycle, or the person(s) responsible for generating the material being delivered. This distinction is important to keep in mind when considering the demographic results, such as age, sex, etc., although it is not important when considering other results of the study, such as distance traveled, etc.

Figure 3 depicts the age distribution of the users of the drop-offs, compared to the age distribution in Ohio overall.

**Respondent Demographics : Age**



**Ohio Demographics: Age**



**Figure 3: Respondent Age vs. Ohio Age Demographics**

The results show that the survey respondents tended to be older than the population of the state as whole, which is consistent with other research on recycling behavior. However, the fact that these results represent the people delivering the materials to the site may also explain why younger age groups are not represented as strongly.

Figure 4 depicts the education levels of survey respondents compared to the overall population in Ohio.

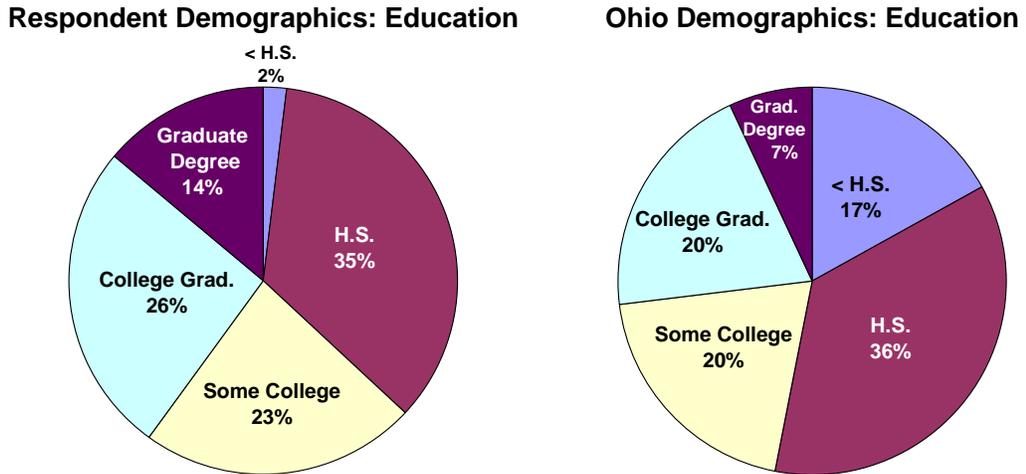


Figure 4: Respondent Education Levels vs. Ohio Education Levels

The results indicated that respondents were more likely to have some level of college education (63%) than the population of the State as a whole (47%).

Figure 5 indicates the gender of the survey respondents versus the overall population in Ohio.

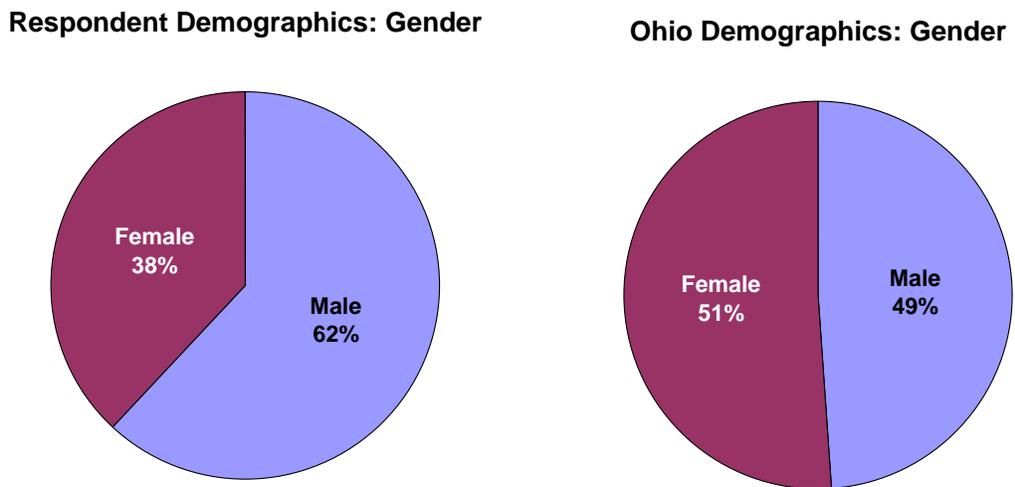


Figure 5: Respondent Gender vs. Ohio Gender Demographics

The results indicate that survey respondents were more likely to be male than the population in the state as a whole. Again, this does not necessarily indicate that men are more avid recyclers, but that they were more likely to be delivering the materials to the site and/or more likely to answer the survey (if more than one person was in the car delivering the materials).

#### D. Usage Patterns

Most of the face-to-face survey effort focused on usage patterns, such as frequency of use, amount of material brought per visit, distance traveled, etc. Again, a detailed description of the methods, as well as the survey instrument, can be found in the TST Report, located in Appendix A.

We will summarize some of the most interesting findings in this section, but would encourage readers to read that entire report for further details.

Users were asked:

**“Are you out today just to recycle materials, or are you running other errands today?”**

For all categories of drop-off sites, the majority of respondents were running other errands in addition to dropping-off their recyclables. This trend was particularly true for the full-time sites. Results are presented in Figure 6:

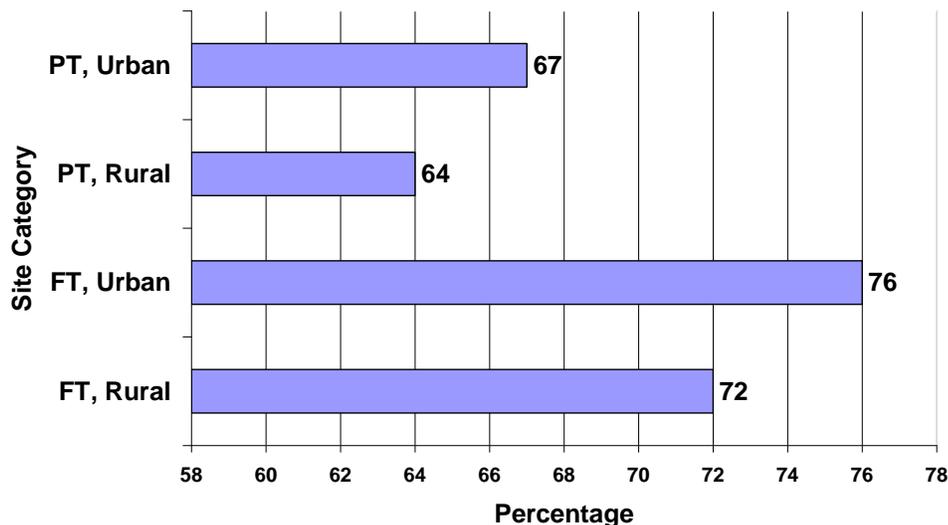


Figure 6: Purpose of Trip to Drop-off Site: Percentage of Respondents Running Other Errands Also

Respondents were also asked whether the drop-off site was closer to home, closer to work, closer to where they shop, or closer to something else. Respondents overwhelmingly indicated that the drop-off site was closer to home. Results are presented in Figure 7:

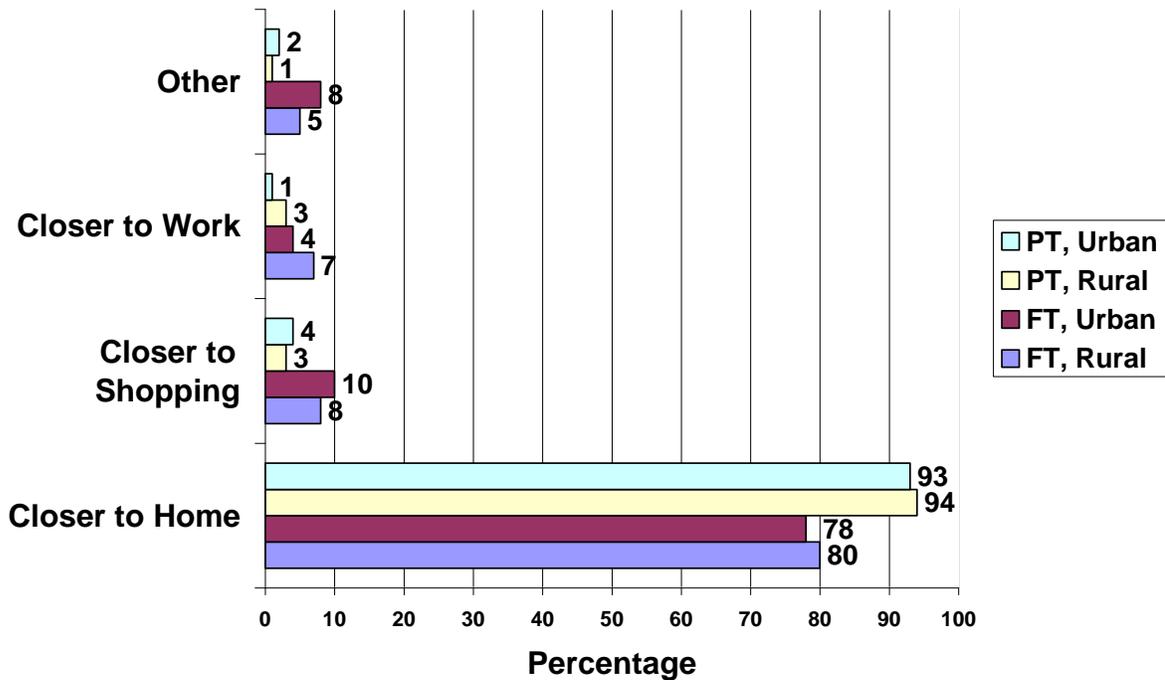


Figure 7: Location of Drop-off by Site Type

The results of these last two questions are interesting when considered together. Common sense might suggest that most people will drop off their recyclables while running other errands, and the survey responses confirm this idea. In fact, drop-off sites are frequently located with this in mind. For example, drop-off sites are often located adjacent to a business or building that receives a naturally high traffic flow, such as a grocery store, in an attempt to take advantage of the traffic and increase the convenience of using the site. Survey respondents, however, also overwhelmingly indicated that the drop-off site that they were using was closer to home than any other location identified, including where they shopped. These survey responses seem to indicate that while using drop-off recycling sites is combined with other daily errands, proximity to home plays a much more important role than its proximity to any other destination.

Respondents were also asked how often they utilized the drop-off sites. Figure 8 shows the frequency distribution of their responses for both urban and rural full-time sites. Part-time drop-off sites are not shown because visits to part-time sites greatly corresponded to the hours of operation for the site (i.e. if the site was only open one weekend a month, then the majority of interviewees visited the sites once a month).

It can be seen that the vast majority of the users of the full-time sites bring their recyclable material weekly or bi-weekly and almost all come at least monthly. The results are very similar for both rural and urban sites and are presented in Figure 8:

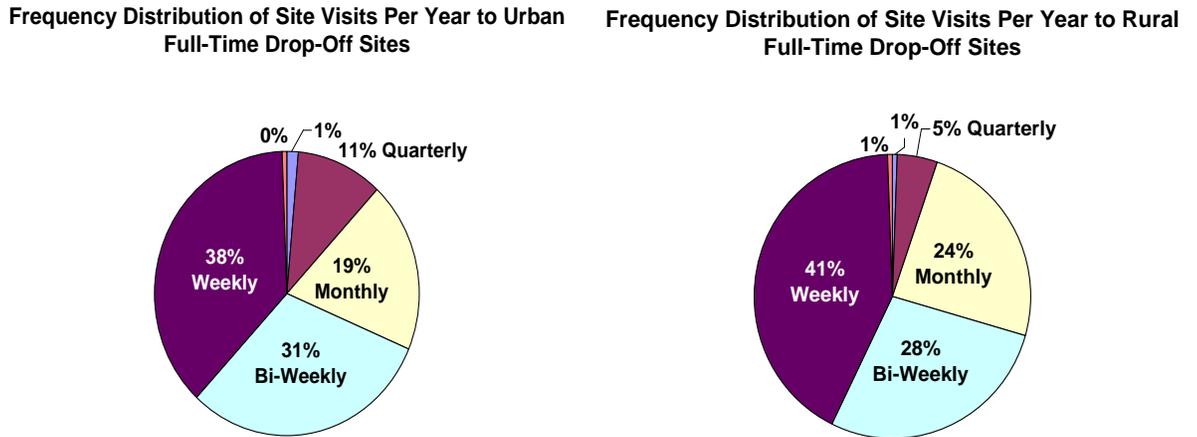


Figure 8: Number of Site Visits per Year: Urban Full-Time vs. Rural Full-Time

One of the primary goals of the study was to quantify the distances traveled to use the drop-off sites. Therefore, each survey respondent was asked to provide their address or nearest cross-street. Based on this information, software was used to calculate distances traveled. Figure 9 shows the median distance which people drove to drop their recyclables off at the recycling sites. The median distance was 2.4 miles for three of the four categories. The exception was part-time urban sites, which had a smaller median distance traveled. (Only two 2 of the 17 sites surveyed fell into this category. This category of site also represents a very small portion of the overall drop-off sites across Ohio).

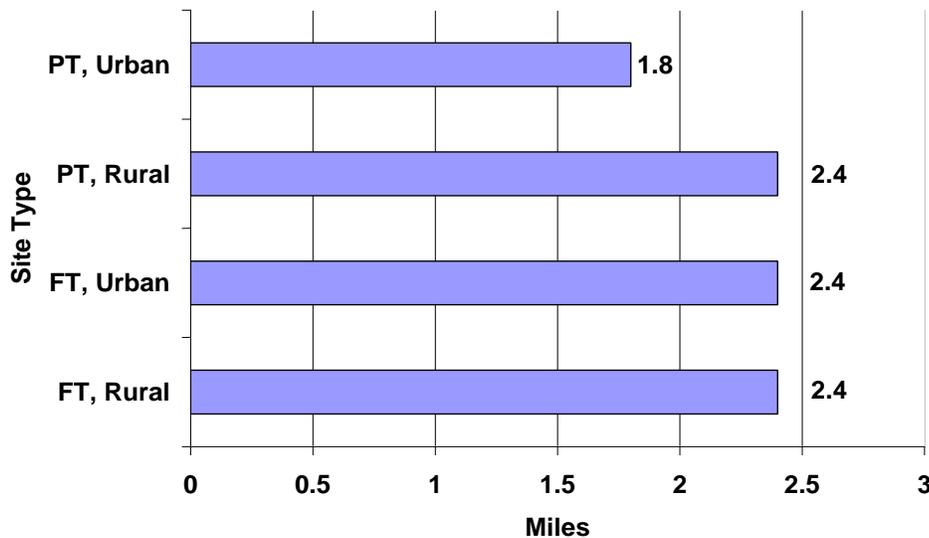
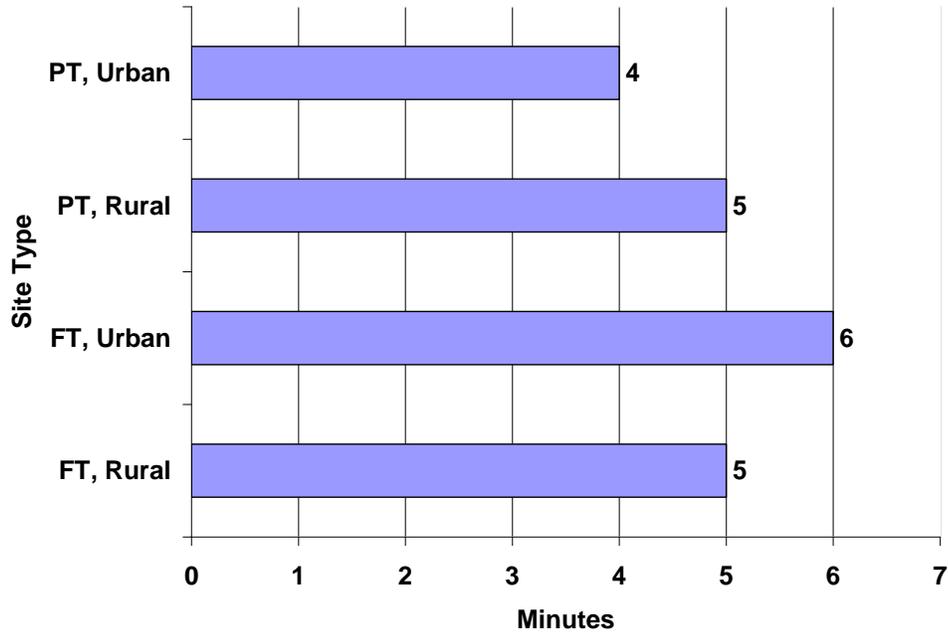


Figure 9: Median Distance Traveled to Site, by Site Type

We find it striking that the median distance traveled was exactly 2.4 miles for 3 out of the 4 categories. Figure 10 shows the median driving times for each of the site categories:



**Figure 10: Median Driving Times to Site, by Site Type**

Ignoring the part-time urban category, the results would indicate a typical user of a drop-off site in Ohio travels about 2½ miles, taking between 5 and 6 minutes to get to a drop-off site.

The median, as opposed to the mean, was chosen as a measure of central tendency for distance traveled due to the existence of large outliers in the data. For example, while the majority of drop-off users may have traveled less than three miles to use a site, a single user who traveled 25 miles could significantly influence the mean value. The median value is not influenced by large outlying values in this way.

For a more complete understanding of this information, histograms of the distance traveled to each type of drop-off site, with the median and mean indicated, are presented in Appendix C.

Addresses (or nearest cross-streets) of users were also used to produce maps depicting usage patterns. An example of one of the maps is shown below as Figure 11. Maps were created by plotting the interviewees' home addresses (or closest intersections) using ArcView GIS for each of the 17 sites surveyed.

### Site B, Hambden Township, Geauga County (Rural, Full-time)

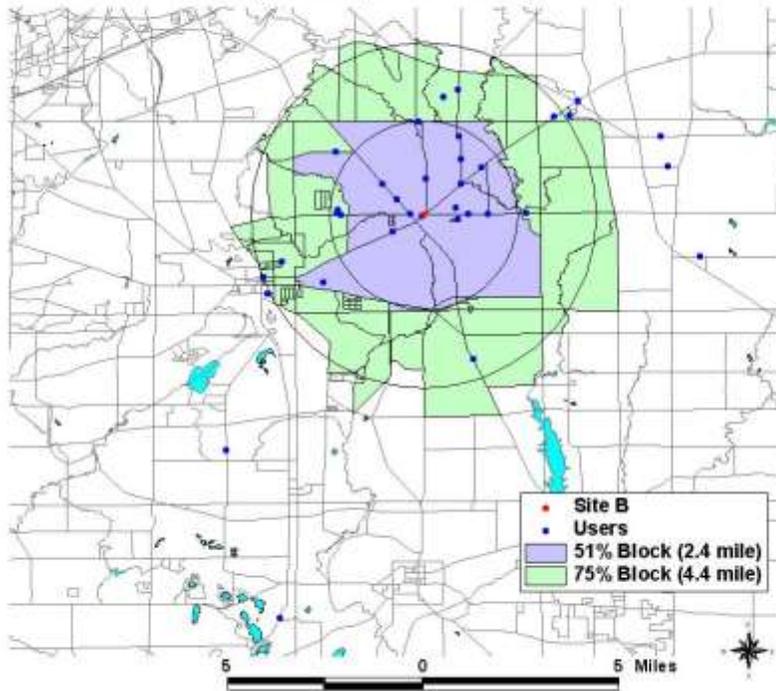


Figure 11: Example Usage Pattern Map

Using this information, circles were drawn to capture two sets of drop-off site users and by extension two areas on the map. The outer circle around the drop-off location, shown in the example map, contains 75% of the interviewees and the inner circle contains 51% of the interviewees' addresses. The radii of these circles are shown in the legend of the map in parentheses. The population within the outer circle is represented by all of the census blocks colored green or purple. The outer circle, while capturing a greater majority of drop-off site users, likely avoids including outliers that would be observed with a circle that captures 90-100% of those using the drop-off site.

This 75% circle could be considered the "functional usage area" around the drop-off site, meaning an area around the drop-off site where the significant majority of the users (75%) reside. Beyond this circle, it becomes much less likely that a resident will use the drop-off site.

In addition to calculating these distances for each individual site, this type of analysis was also conducted for the four categories of drop off sites. The results are illustrated in histograms contained in Appendix C, and also in Table 2:

Site Type	Median (50%) Distance Traveled in Miles	3 <sup>rd</sup> Quartile (75%) Distance Traveled in Miles
PT, Urban (n=2)	1.8	4.8
PT, Rural (n=5)	2.4	4.2
FT, Urban (n=5)	2.4	3.4
FT, Rural (n=5)	2.4	4.7

**Table 2: Median and 3<sup>rd</sup> Quartile Distances Traveled by Site Type**

As can be seen, while the PT Rural, FT Rural, and FT Urban all share a median distance traveled of 2.4 miles, the 3<sup>rd</sup> Quartile (75% of users coming from this distance) shows some variability. In particular, the distance for FT Urban sites is notably smaller than the other categories and over a mile smaller than the distance for FT Rural sites.

If we again ignore the PT Urban category (because the sample size was small, among other reasons), the results might be generalized in the following way:

- A typical user of drop-off site travels around 2½ miles
- The "functional usage area" of an urban site is about 3½ miles
- The "functional usage area" of a rural site probably extends to about 4½ miles (slightly less for PT sites, slightly more for FT sites)

### **E. Participation Rates**

A participation rate is a measure of the number of people using a recycling service versus the number of all potential users. This is a relatively easy calculation for a curbside program, which would be measured by the number of households participating in the program versus the number of household receiving curbside service. It is a much more difficult calculation for a drop-off site, since there is typically no definitive measure of the potential number of users. For example, if a few users of a drop-off site travel a very great distance to use a site, should every household within that distance to the site be counted as a potential user? This approach would very likely result in a very large number of potential user, which in turn would result in a very low calculated participation rate.

Therefore, in order to calculate a meaningful participation rate for a drop-off, it is necessary to define a reasonable boundary around the site and consider all of those

living within the boundary to be "potential users." For this study, we have utilized the 75% radii as the "functional usage area" around a drop-off site.

Using the 75% radii as the "functional usage area," the number of users and participation rates within the functional usage areas were calculated for each category of drop-off site. This calculation used the following variables: 75% of the total tons of material collected annually at each type of drop-off site; the average amount of material brought per user; the average number of visits per user per year; and the average number of people per household. Then, based on the population living within the functional usage area, participation rates were calculated. The results of these calculations are shown below in Table 3.

<b>Site Type</b>	<b>Average Population (within 75% buffer area)</b>	<b>Average # of Users (from tonnage data)</b>	<b>Average % of Population estimated to use site (within 75% buffer)</b>
<b>FT, Rural (n=5)</b>	<b>11,156</b>	<b>1,910</b>	<b>21%</b>
<b>FT, Urban (n=5)</b>	<b>33,956</b>	<b>4,007</b>	<b>13%</b>
<b>PT, Rural (n=5)</b>	<b>5,777</b>	<b>753</b>	<b>17%</b>
<b>PT, Urban (n=2)</b>	<b>9,208</b>	<b>401</b>	<b>13%</b>

**Table 3: Average Population, Average Number of Users, and Percent Population Using, by Site Type**

Additional explanation of this methodology can be found in the TST Report contained in Appendix A.

Finally, a phone survey was conducted in Summit County Ohio, located in the northeast part of Ohio. This county contains both rural and urban areas, and includes the City of Akron, with a population of 212,215. The phone survey asked a number of questions about recycling programs, including questions about drop-off recycling sites within the County. Results of this phone survey indicate that about 30% of residents are aware of the location of drop-off recycling sites within their communities, and about half of them use the drop-off sites. In other words, about 15% of the residents indicate that they use a drop-off site within their community. This result is consistent with the range of participation rates calculated above (13% - 21%), and would seem to support the validity of those calculations.

## **V. Other Study Outputs**

In addition to the results published in this report, which will be disseminated in a variety of ways, the drop-off research project will result in several other outputs as described below.

### **A. Survey Toolkit**

Ohio EPA is developing a "Drop-off Study Took-kit," for parties interested in replicating Ohio EPA's drop-off study, principally Ohio's Solid Waste Management Districts (SWMDs). The packet will include an in-depth description of the methodology, including the process of selecting sites, clarifying research objectives, a sample survey instrument, a protocol for conducting field surveys and directions on mapping/analyzing results. It will also contain sample documents that will show the user exactly how to move forward conducting a study of their own. The contractor used by Ohio EPA for this study, The Strategy Team, Ltd., has agreed to contract with SWMDs at a reduced cost, since the up-front work of designing the study has already been completed. An approximate per site cost estimate will be included in the tool-kit. In addition, the tool-kit will outline specific ways that the study can be modified and expanded to collect additional information about the use of drop-off sites in addition to the type of data collected in the Ohio EPA study.

### **B. Factors for Success**

One of the initial objectives of the study was not only to quantify usage patterns and participation rates at drop-off recycling sites, but to use more qualitative methods to determine what factors lead to the most successful sites in the State. This task has proved more difficult than expected do to the wide variability of sites that exist throughout the State (it's difficult to compare "apples to apples") and the myriad of variables that may influence success. The results of this study do, however, give us a more accurate measuring stick from which to begin to make these comparisons. Using some of the results of this study as a starting point, Ohio EPA will continue to explore this issue in the future.

### **C. Access Credit Models**

The Ohio Environmental Protection Agency requires each of Ohio's 52 SWMDs to meet one of two state recycling goals: a "Percentage Goal," in which a SWMD shows that 25% of the residential/commercial waste generated by households and businesses in its jurisdiction is diverted from landfills; or an "Access Goal," in which a SWMD shows that 90% of the population within its jurisdiction has access to a recycling opportunity. Most of Ohio's SWMDs choose to comply with the Access Goal. The two recycling opportunities that are most often used to meet this goal are curbside recycling and drop-off recycling. Each SWMD receives a population access credit (or "access credit") for each drop-off site and curbside recycling option in its

jurisdiction. When these credits sum to 90% of the jurisdiction's population, the access goal has been met. A drop-off site located in a rural area (i.e., a municipality with less than 2,500 people) receives an access credit of 2,500. A drop-off site located in an urban area (i.e., a municipality with more than 5,000 people) receives an access credit of 5,000. Unfortunately, these access credits are not rooted in well-documented empirical data.

One objective of study's research project was to help the Ohio EPA better understand participation and effectiveness of drop-off recycling sites to be able to design an empirically based, more accurate access credit. Four possible different access credit models were included in the report submitted to OEPA, found in Appendix A. These models will be evaluated by OEPA when redefining the access credits associated with drop-off recycling sites around Ohio. No one model will necessarily be implemented as defined in the attached report. It is more likely that a combination of one or more models will be used, and it is possible that the models will be modified as the data is further analyzed.

## **VI. Limitations and Further Research Needs**

As with any study, time and financial constraints influence the study approach and design. In this final section of the report, items are identified that may have the highest potential to impact the study results so that anyone considering conducting a similar study can learn from our experience.

The first possible limitation relates to sample size. The sample size for the face-to-face surveying was limited due to financial constraints. While we believe the sample size is significant enough to have a degree of confidence in the results, in an ideal world we would have expanded the number of sites for which we conducted face-to-face surveys. This is also true for the phone survey portion of the study. While the phone survey was utilized as a supplement to compare to our participation calculations, and not the primary method of calculating participation, ideally the phone survey would have encompassed more than just a single county in Ohio. Duplicating the phone survey portion of the study in additional regions of the state is currently under consideration by Ohio EPA.

A second possible limitation relates to the geographic distribution of the tonnage data. In order to calculate usage numbers and participation rates, we limited the face-to-face survey portion of the study to those drop-off sites that had tonnage data. As indicated earlier, of the 800 or so drop-off sites originally identified in the study, 275 had high quality tonnage data. While we consider this to be a fairly high percentage of the overall sites, virtually none of the known drop-off sites in southeast Ohio gathered tonnage data. Therefore none of them were eligible for inclusion into the face-to-face survey portion of the study. Of the sites that were eligible, 17 sites were purposefully selected to get an adequate representation of urban, rural, part-time, and full-time sites. Effort was also made to get as widespread a geographic

distribution as possible. Therefore, while we would have preferred to include some sites from the southeast portion of the state, we do not believe that this limitation negatively influenced the results in a significant way.

A third possible limitation relates to the sites that were selected. In order to increase our odds of being able to gather at least 40 surveys at these sites in a reasonable amount of time, most sites that were selected collected an above-average amount of material in a year (in many cases significantly above average). In other words, most sites selected for the face-to-face surveying were very high performing sites as measured by the amount of tonnage that they collected annually. The implication could be that the study results are skewed to the most effective sites in the state. As a result, the number of users per year, the average amount of material brought per visit, average distance traveled, etc. could be overstated. However, the amount of material collected at a site is only one measure of performance. Our calculations indicate that high tonnage amounts do not necessarily translate into high participation levels. In other words, while a site may collect a large amount of material in a year, if the population density surrounding the site is very high there still may be a relatively small percentage of people participating. As a result, high tonnage data alone may not be a valid measure of performance. Therefore, whether this issue unduly influenced the results remains an open question.

A final possible limitation relates to the timing of the face-to-face surveying. In order to gather at least 40 surveys at each site as efficiently as possible, surveys were usually gathered over one or more weekends (under the assumption that the sites would be used more often during the weekend hours). However, because most sites were only surveyed on the weekends, it could be that some bias was introduced in some of the survey responses (i.e. "Is this site closer to home, closer to where you work, closer to where you shop?"). While this issue was seriously considered during the development of the methodology, the need to efficiently gather a sufficient number of surveys outweighed any perceived downside to the approach. Therefore, while it would have been interesting to collect a greater portion of the surveys during a weekday in order to determine if there were any significant differences in their responses, we do not feel that this limitation is critical to the overall usefulness of the study.

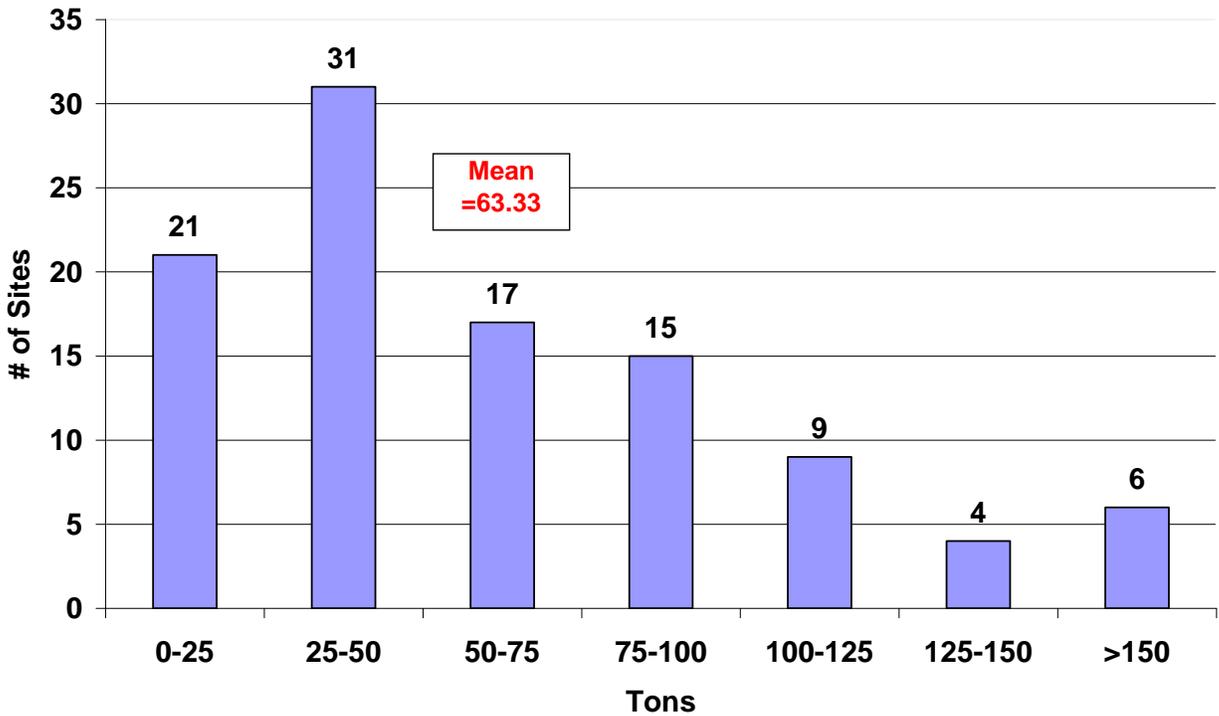
***Appendix A:***

**Report to the Ohio Environmental Protection Agency: Drop-off Recycling –  
Understanding Participation and Determining an Empirically Based Access  
Credit Model**

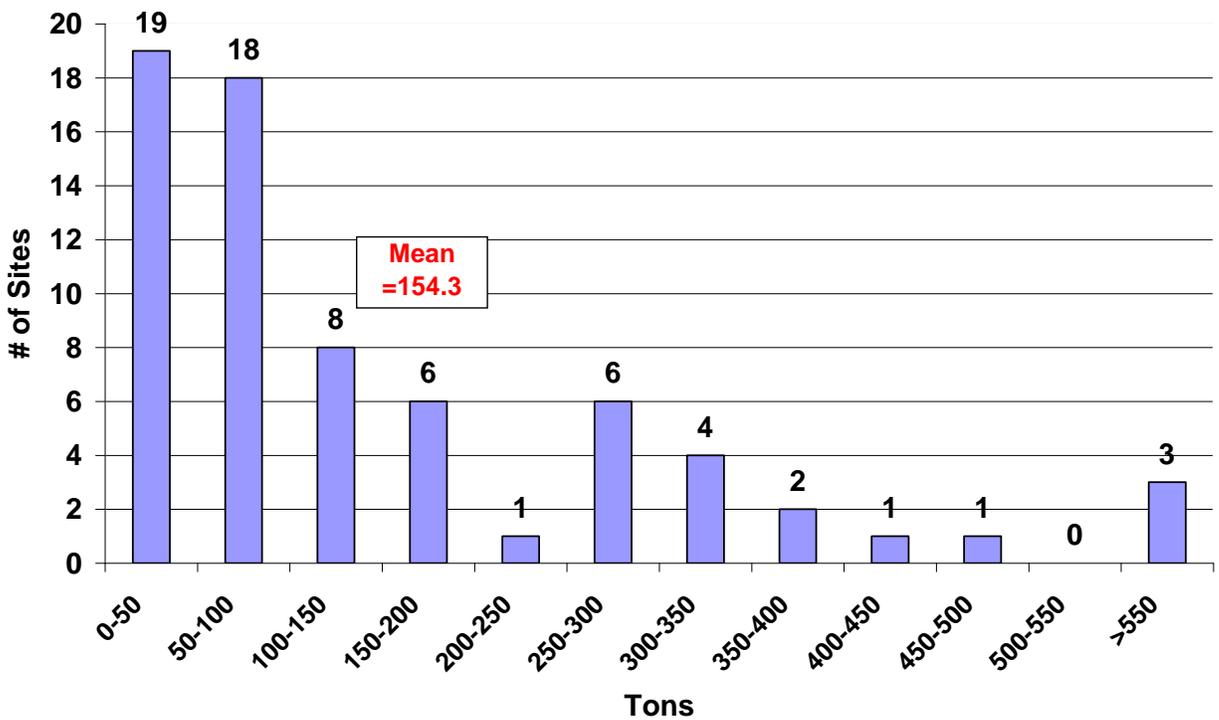
This report is enclosed electronically as a separate file.

## Appendix B: Tonnage Histograms

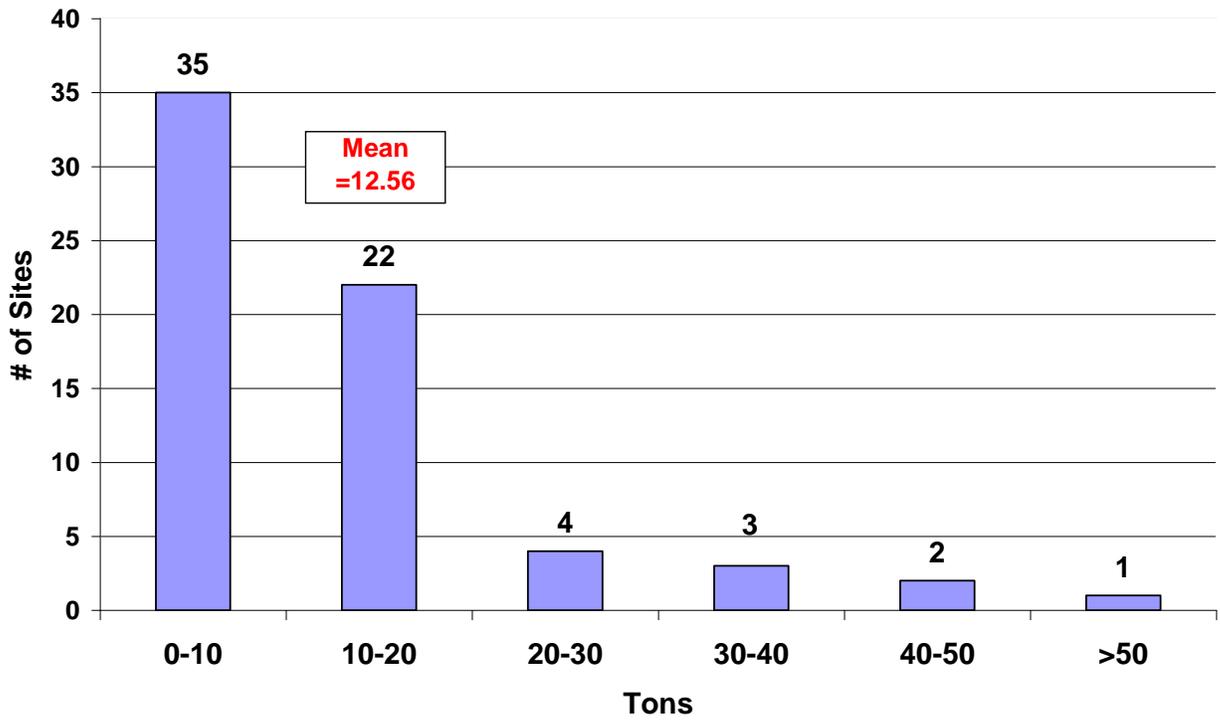
### Tons Collected at Full-Time/Rural Drop-off Recycling Sites - 2002



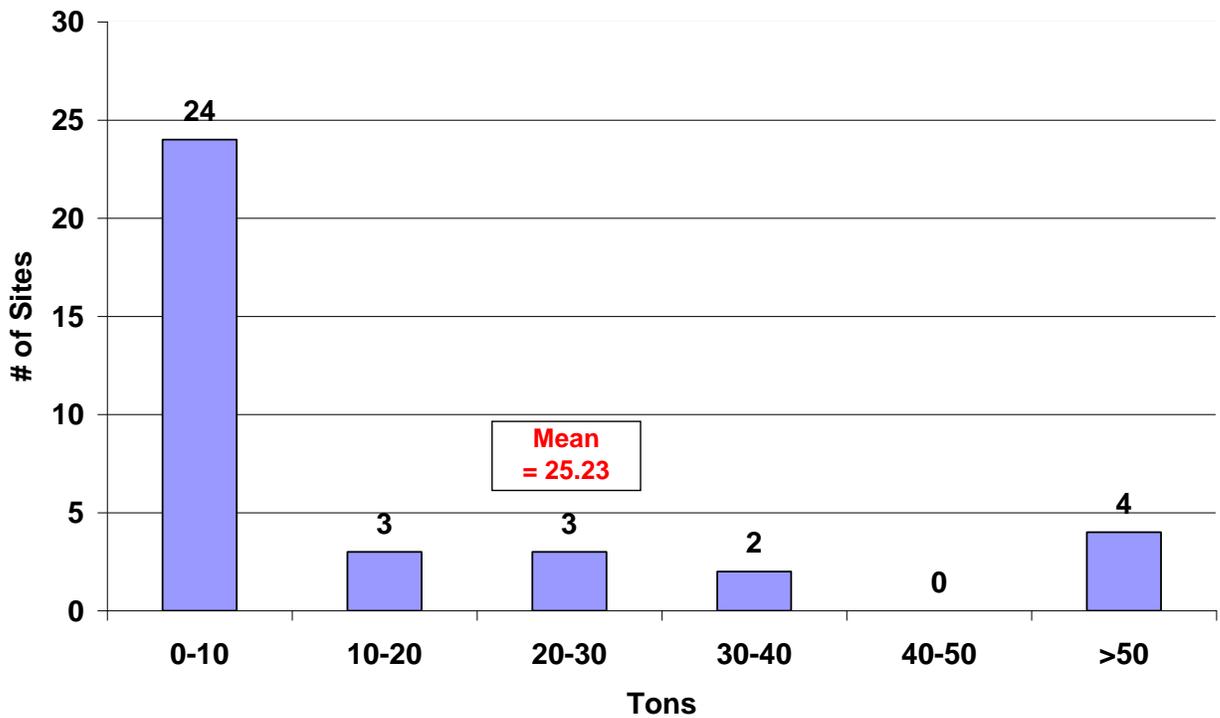
### Tons Collected at Full-Time/Urban Drop-off Recycling Sites - 2002



Tons Collected at Part-Time/Rural Drop-off Recycling Sites - 2002

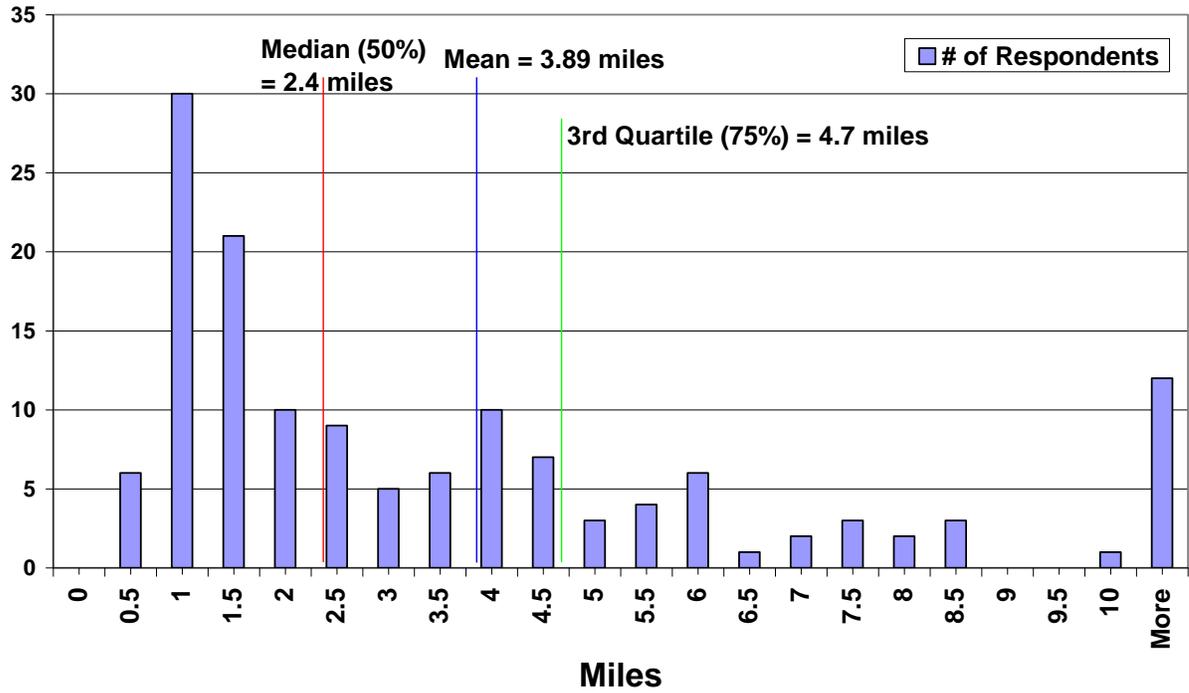


Tons Collected at Part-Time/Urban Drop-off Recycling Sites - 2002

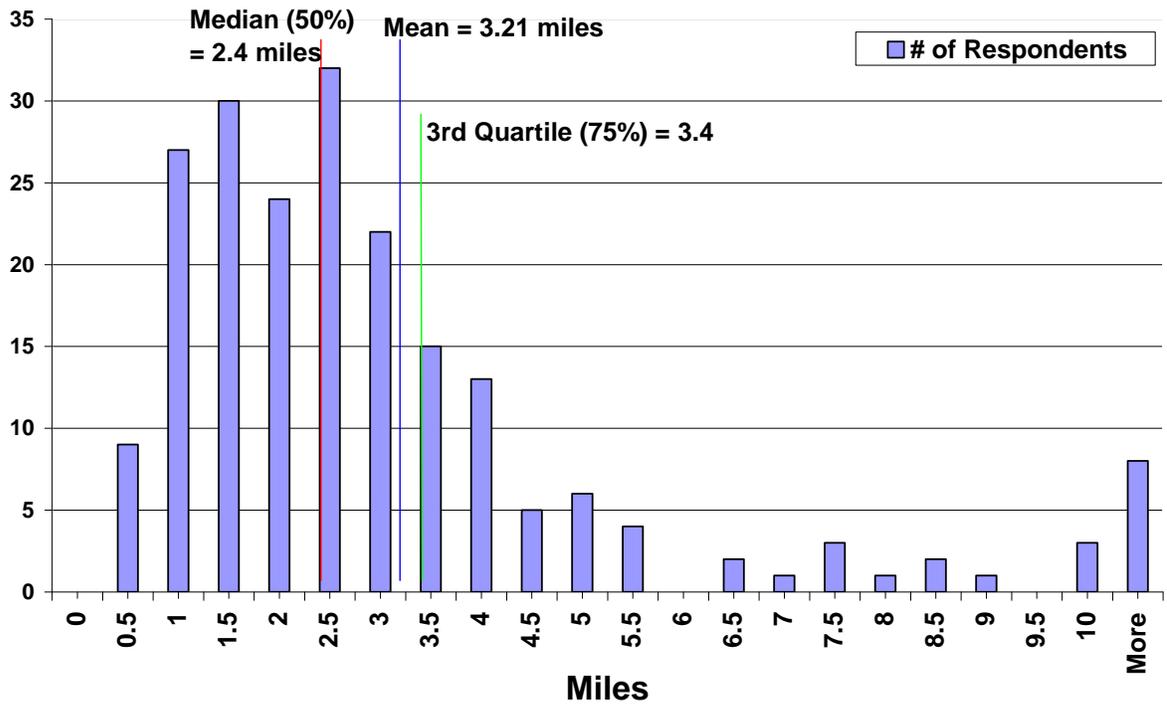


### Appendix C: Distance Traveled Histograms

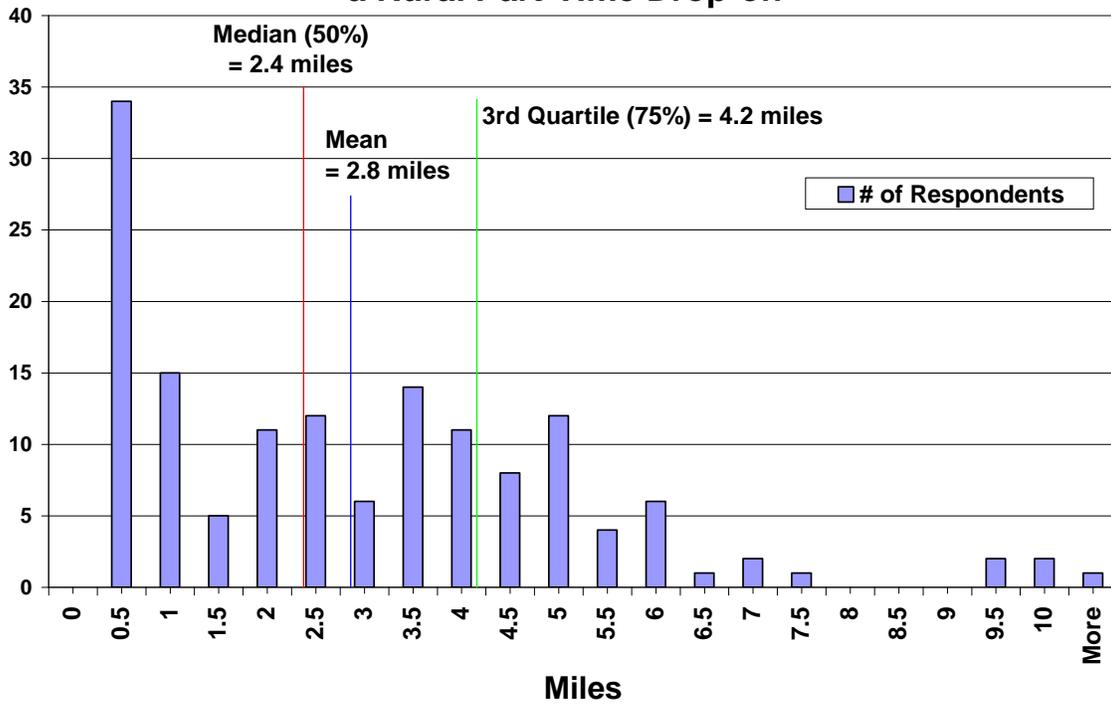
#### Frequency Distribution of Mileage Driven to Recycle at a Rural Full-Time Drop-off Site



#### Frequency Distribution of Distance Driven to Recycle at an Urban Full-Time Drop-off Site



### Frequency Distribution of Distance Driven to Recycle at a Rural Part-Time Drop-off



### Frequency Distribution of Distance Driven to Recycle at an Urban Part-Time Drop-off Site

