

Measuring Participation at Drop-off Recycling Sites

A Coordinators Tool-Kit

I. Background

The Ohio EPA has designed and field-tested a method for measuring public participation at drop-off recycling centers. The following documents serve as a guide for anyone interested in replicating the study.

The study used face-to-face surveys of drop-off users as a key component to measure participation, and utilized a contractor experienced in survey research to conduct much of the work. A solid waste management district (SWMD) or political jurisdiction can replicate the study in its entirety. Some of the details, for example individual survey questions or criteria for site selection, may need to be modified slightly to meet the needs of a particular SWMD. Alternatively, SWMDs and municipalities may be able to partner with a consulting firm or a local college or university utilizing the same or a similar methodology. Because most of the research hours are spent in the field conducting the face to face intercept surveys, it is recommended that staff or volunteers be formally trained to administer the surveys, since the accuracy of the survey data is critical to achieving valid results.

Questions or comments concerning the study can be directed to Matthew Hittle at the Ohio EPA, (614)728-5369, matthew.hittle@epa.ohio.gov.

II. Objectives

The purpose of the study is to conduct an in-depth analysis of participation at drop-off recycling programs. "Drop-off" recycling programs refer 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. These sites are frequently established adjacent to a government building or at a business such as a grocery store, and are usually composed of one or more recycling trailers or dumpster-type drop-boxes. Drop-offs are generally a less expensive alternative than curbside collection of residential recyclables.

The methods, survey instrument and suggested data analysis techniques contained in this tool-kit are designed to address the following objectives:

- How many people utilize a typical drop-off site?
- How far do people travel to utilize a typical site?
- What variables influence how far someone is willing to travel to use a site?
- What percentage of people within a given radius utilizes a typical drop-off site?
- What variables influence higher vs. lower participation rates?

- What tonnage of material will a typical drop-off site collect?
- What is the annual tons recycled/per household?
- How frequently do people visit the drop-off site?
- Is there a measurable difference in participation at urban versus rural and part-time versus full-time sites?

The study and survey instrument can also be expanded to include the following research questions; the demographics of the local population, the size of the drop-off containers, how frequently the drop-offs are emptied, the overall cleanliness at the site, the existence of curbside service in the area, and how the site is promoted and by whom.

III. Methods

To a large extent the objectives will drive the methods. For example, the objectives outlined above are slanted heavily toward understanding participation. But if *how many* people are using a site is not as important to you as *why* they're using or not using the site, the methods described here may need to be modified somewhat to better achieve those ends.

The study described in this tool-kit combines the following methods; collection of tonnage data, face-to-face surveys at drop-off locations, ArcView GIS map analysis of survey respondent's drive time and distance, and data analysis of other survey parameters.

The Ohio EPA study targeted 17 sites broken down across the variables shown in the following table. The first step was to identify the drop-off sites in Ohio with accurate tonnage data (total tons collected per year based on weight). This is an important first step, because after all survey data is collected, the tonnage data is used to calculate an approximate participation rate (see Section VII). From the more than one hundred drop-off recycling locations in Ohio with tonnage data, the following breakdown of sites was selected:

Full-time/Part-time	Urban/Rural	Sample Size
Full-Time	Rural	5
Full-Time	Urban	5
Part-Time	Rural	5
Part-Time	Urban	2
	Total Sites for Survey	17

The next step was to run summary statistics for the tonnage data for each category, to identify the minimum, maximum and average tons collected for each category. With these statistics in hand, you can target your study on average, below average, or far above average sites, depending on the research objectives.

Once the sites are selected, the research team should gather more information about the sites. Please see Appendix B for a sample one page questionnaire that can be used to gather additional information on sites. The SWMD or political jurisdiction managing the site will be the best source of information. It is also recommended someone from the team to visit the site, to get a direct feel for whether or not the site is suitable for the study.

The completed survey also generated an address for each survey respondent which was mapped using ArcView GIS. Patterns of participation, including average distance traveled and participation clusters or voids, emerge from the maps. The maps serve as a powerful visual tool when comparing participation across multiple drop-off sites.

The sequence of events necessary for the study are as follows:

- 1) Identify contractor/partners (if applicable);
- 2) Finalize research objectives;
- 3) Finalize survey instrument;
- 4) Identify sites;
- 5) Determine best time to survey;
- 6) Field preparations;
- 7) Data entry/analysis; and
- 8) Compile results

IV. Survey Instrument

The survey instrument shown in Appendix A addresses the research questions outlined in Section I. The SWMD or municipality may wish modify the survey to suit their own needs and objectives. A summary of the results of the Ohio EPA study, for all survey questions, is included in Appendix C.

V. Site Selection

The drop-off sites selected for inclusion in this research must have reported accurate recycling tonnage data to OEPA for 2002. These data were critical, as they were used to guide the formation of a more empirically based access credit model. Additionally, efforts were made to ensure that the sites selected were representative of the various types of drop-off sites (e.g., full-time, part-time, rural, urban, companion, stand-alone) throughout the state of Ohio. A description of these site types is included below.

- Full-time sites were open at least 40 hours / week; part-time sites were open less than 40 hours / week.
- Urban sites were located in a municipality of at least 5,000 people; rural sites were located in a municipality of less than 5,000 people.
- Stand-alone sites were located in a place that did not have a “natural flow of traffic” (>50 people / day); companion sites had a “natural flow of traffic.”

VI. Practical Considerations for Field Work

Before interviewing begins, it is recommended to conduct training for all interviewers to ensure uniformity for all surveying conducted. The training should include the basics of personal interviewing and specific methodology to the research being conducted. Some considerations include:

- A determination for cancellation in the case of inclement weather (ie: greater than 70% chance of rain);
- A calibrated scale;
- Signage/T-shirts to identifying surveyors;
- Strategy to survey at high traffic sites;
- A script to introduce the interviewer and the project; and
- A checklist to ensure all materials are brought to the survey site.

Included with this toolkit in Appendix D is an example Process for Drop-off Site Interviews sheet as well as an example tick-mark sheet for high traffic sites. Also included in Appendix D is an example Materials Checklist for the interview team.

VII. Calculating a Participation Rate

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 users, 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 a "functional usage area" around a drop-off site (comprising 75 percent of interviewees). To do this, ArcView GIS was used to create maps showing the drop-off site location, the interviewees' home addresses (or closest intersections), and block level US Census data. Using this information, circles were drawn to capture two sets of drop-off site users (51 percent and 75 percent).

A sample ArcView map is presented below in Figure 1. To interpret the map:

- The red dot in the middle of the circles represents the drop-off site;
- The blue dots represent the home addresses of those interviewed at the site;

- The purple area reflects those census blocks within a circle that captures 51% of those using the site (i.e., inner circle on map); and
- The green area reflects additional census blocks within a circle that captures 75 percent of those using the site (i.e., outer circle on map).

Site G, Rootstown Township, Portage County (Urban, Full-time)

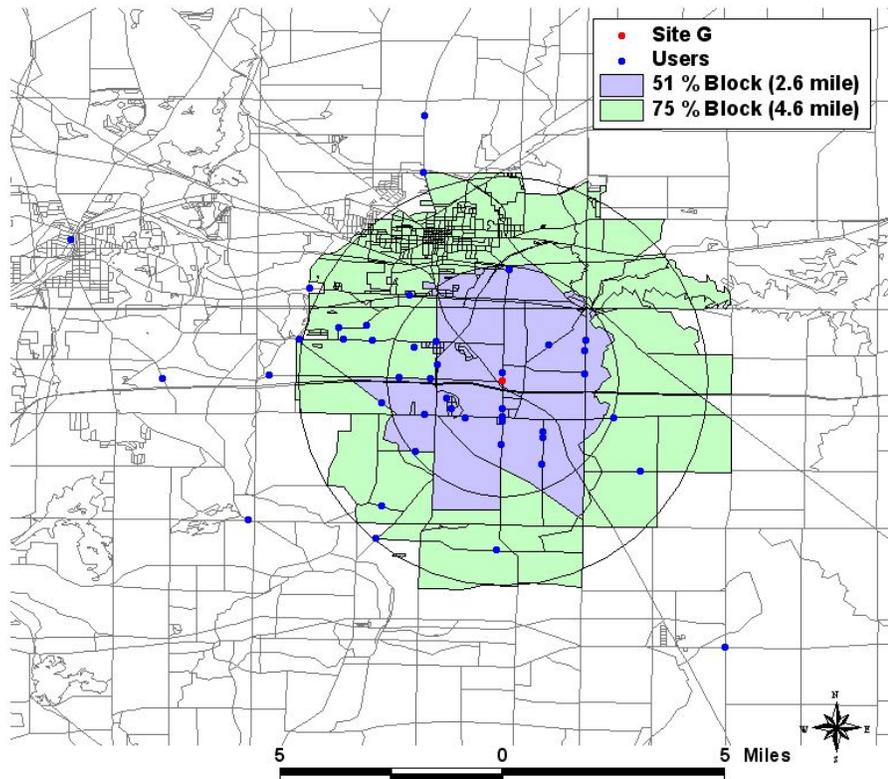


Figure 1: ArcView Map for Rootstown Township

Using the 75 percent 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 percent 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 using the formula below.

Pounds at each site: $A + B = C$

Where

- A = (# of lbs. recycled) x (# of visits), projected from interview data
- B = (remainder of lbs. recycled), converted into # of people recycling
- C = 75 percent of projected lbs. recycled, using recycling data

To estimate usage at each site, one must solve the equation above for B. To do this:

- Using recycling data, define C (75% of total pounds recycled at site) as equal to 75 percent of total pounds recycled at site for the reference year;
- Using intercept survey data, calculate A by summing the products that result from multiplying (# of pounds) x (# of trips, annual) among all those surveyed; and
- Using the calculations for C and A, subtract A from C to get B, which yields the remainder # of pounds recycled at the site.

One must now transform the remainder number of pounds recycled at each site into the number of unique households, which will be converted later into the number of unique people. To do this:

- Using intercept survey data, calculate geometric mean for pounds recycled and the geometric mean of trips to the site (annual);
- Multiply geometric mean for pounds recycled by geometric mean of trips to the site (annual);
- Divide this product into B (the remainder pounds within the 75 percent boundary area), which yields the remainder households that use the site;
- Add the remainder households that use the site to the number of people surveyed at the site; and
- Multiply this sum by the average number of people who live within each household (using intercept survey data), which yields the total number of people who are estimated to use each site.

The results of these calculations for the Ohio EPA study are shown below:

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

Appendix A: Intercept Survey Instrument

Appendix D: Additional Materials for Field Work

- **Materials checklist for drop-off site survey visits**
- **Process for drop-off site interviews**
- **Interviewer's tick-mark/comment sheet**

Materials checklist for OEPA / ODNR drop-off site survey visits

For EACH site visit you make, please verify that you and your interviewing partner have all equipment listed below.

Paperwork

- a. This checklist
- b. Survey copies
- c. 1 copy of fact sheet for site visit
- d. 1 copy of tickmark / comments sheet for site visit
- e. 1 manila envelope to place completed surveys from site visit
- f. Contact information for local solid waste management district, along with any promotional materials provided by SWMD / ODE
- g. Map to site
- h. Ohio map
- i. SAI / TST telephone numbers:
SAI (John Stevens' cell, 886-1283); TST (Orie Kristel's cell, 390-1101)
- j. Matt Hittle business cards

Surveying equipment

- k. Scale
- l. Collapsible card table
- m. 1 Rubbermaid container
- n. Spare batteries for scale (at least 6 Ds)
- o. Tarp
- p. Plastic trash bags / liner for Rubbermaid container
- q. Nametags, nametag holders
- r. 2 clipboards
- s. Box of pre-sharpened pencils
- t. 1 hand calculator
- u. Heavy duty work gloves
- v. 2 2x4s on which to place scale
- w. Latex gloves
- x. Bottle of hand sanitizer

Personal items

- y. Official OEPA / ODNR "Recycling Survey Team" shirts
- z. Watch / clock
- aa. Cell phone
- bb. Jug of water (if desired)
- cc. Sunblock (if desired)
- dd. 2 Folding chairs (if desired)
- ee. Banner
- ff. Tape
- gg. Binder clips
- hh. Allen wrench
- ii. Digital camera

Process for Drop-off site Interviews

Before interviewing begins...

- 1) Training for OEPA & SAI survey teams
 - a. Review basics of personal interviewing
 - b. Review specifics of this research project
 - c. Gather available dates and times
 - d. At OEPA, identify a "lead" person for this project
 - i. This person will receive additional interview training and serve as an additional resource for the OEPA teams
- 2) SAI / TST to provide schedule to OEPA & SAI survey teams
- 3) For each site visit, SAI / TST will provide manila envelopes (with drop-off site location name & date marked outside) containing fact sheet, relevant papers from survey

Day of interviewing...

- 1) Muster at common meeting point
- 2) Interviewing team leader checks weather at survey site. If chance of rain is greater than 70%, shift to different site.
- 3) Verify team has all necessary equipment (packed into bankers box)
 - a. ___ 75 copies of survey
 - b. ___ 1 copy of drop-off site assessment tool
 - c. ___ 2 clipboards
 - d. ___ Pencils
 - e. ___ Timesheets for SAI staff
 - f. ___ Nametags
 - g. ___ 1 manila envelope to place completed surveys
 - h. ___ Ohio map
 - i. ___ Map to site
 - j. ___ Official shirts
 - k. ___ Medium / large latex gloves
 - l. ___ Small bottle of hand sanitizer
 - m. ___ Scale
 - n. ___ Spare batteries for scale
 - o. ___ 1 hand calculator
 - p. ___ Collapsible card table
 - q. ___ Clear plastic cover (in case of rain shower)
 - r. ___ 2 Rubbermaid containers
 - s. ___ Paperweights
 - t. ___ SAI / TST telephone numbers
 - u. ___ Cell phone
 - v. ___ Bottled water
 - w. ___ Sunblock
 - x. ___ Watch / clock
- 4) Drive to drop-off site location
- 5) Upon arrival at drop-off site...
 - a. Set up card table, scale, and papers by drop-off bin (if site has more than 1 bin, set up by central bin)
 - b. Calibrate scale to 0 lbs
 - c. Complete drop-off site assessment tool

Board on which to place scale (to provide level ground)?

6) Survey process

- a. Flag down first car that parks at drop-off, tell very brief overview of project (still to be written), request driver's participation, guide car to where team has set up its equipment
- b. One team-member administers survey to driver, other weighs materials
- c. Place completed survey in manila envelope
- d. Depending on traffic to site, use the following sampling procedure:
 - i. Low traffic (< 4 visitors to site / hr), survey all users
 - ii. Moderate-High traffic (> 4 visitors to site / hr), survey every 2nd car that arrives. If driver declines to participate, survey next available car, then begin counting over at 1.

7) At end-of-day

- a. Pack up all materials listed in #2 & #4 above
- b. TST will collect manila folders from OEPA teams on a regular basis and deliver to SAI
- c. SAI will collect manila folders from SAI teams
- d. Begin data entry

Interviewers' Tick-mark / Comment Sheet

The person weighing the materials should keep this sheet out and ready to go during the day's event. Use it to provide answers to the following questions...

- 1) In total, how many cars arrived while you were at the drop-off site today? Include those whose drivers you interviewed.

Keep a running tally (tickmarks are encouraged).

- 2) Do you (interviewer) have any comments about the drop-off site you visited, the area around it, or anything else related to the project today?

Site code: _____ Date: _____ Time: _____ Interviewer initials: _____

1) What type(s) of recyclable materials did you bring today? (Circle all that apply)

1. Glass 2. Plastics 3. Aluminum 4. Steel 5. Paper 6. Cardboard 7. Newspaper 8. Other: _____

2) Weighing of the materials:

	Gross weight	Enter container weight (if used)	Enter interviewer weight (if necessary)	Net weight
Material weighing (1 st load):				
Material weighing (2 nd load):				
Material weighing (3 rd load): (If more loads, tally on back of form)				
Total (Tally "net weights"):				

3) On average, how often do you use this drop-off site over the course of a year?

1. Daily 2. Weekly 3. Biweekly 4. Monthly 5. Quarterly 6. 1x or 2x a year 7. First time at site 9. DK

4) Not counting today, how many times have you visited this drop-off site in the past 30 days? _____

5) Overall, for how long have you been using this site? _____ years _____ months

6) If answer to #5 is "Less than 1 year," How did you first find out about this particular drop-off site?

7) How does today's drop-off compare to your normal load at this site? Is it more than, similar to, or less than your average drop-off?

1. More than 2. Similar to 3. Less than 4. Not applicable, first time at site 9. DK

8) Are you out today just to recycle materials, or are you running other errands today?

1. Out to recycle 2. Running other errands also 3. Other: _____ 9. DK

9) Is this drop-off site closer to home, closer to work, closer to where you shop, or something else? (Circle all that apply)

1. Closer to home 2. Closer to work 3. Closer to where you shop 4. Other: _____ 9. DK

10) Do the materials you brought today come mostly from home, mostly from work, or an equal mix of the two?
 1. Mostly from home 2. Mostly from work 3. Equal mix of the two 9.DK

11) Is curbside pickup of recyclable materials available where you live? 1. Yes 2. No 9. DK

12) If answer to #11 is "Yes," Do you participate in curbside pickup of recyclable materials where you live? 1. Yes 2. No 9. DK

13) Do you use any other drop-off sites? 1. Yes 2. No 9. DK

I need to ask some additional questions for statistical purposes. If at any point you don't wish to answer a question, just say so and we'll move on.

14) In what year were you born? _____

15) What is the highest level of education you have completed?
 1. Grade school 2. High school or GED 3. Vo-tech / 2-year programs 4. Some college 5. College graduate 6. Graduate degree

16) How many people (including yourself) live in your household? _____

17) So we can calculate the average distance people travel to this drop-off site, may I have your home address and zip code?
 (If refuse 1x, ask for nearest street intersection. If refuse 2x, explain purpose of project again and attempt to get intersection)

	street #	street name	dr., rd., blvd.	zip code
18) Verify spelling of address (above)				

Thank you for helping us today!

19) Sex of interviewee (do not ask) 1. Male 2. Female

20) Record any additional comments from the interviewee in the space below.

Appendix B: Drop-Off Fact Sheet

Drop-off Fact Sheet

Each site visit will require 1 of these fact sheets. Information marked by a star is to be pre-filled ahead of time. If any pre-filled information is incorrect, write down correct information. Turn in this form with your collected surveys.

☆ Site code: _____ ☆ Drop off location: _____ ☆ County of site: _____

Day-of-the-week: _____ Date: _____ Time: _____

☆ 1) How many drop-off bins are present? _____

☆ 2) What type(s) of recyclable materials are collected at this site?

1.Glass 2.Plastics 3.Aluminum 4. Steel 5.Paper 6.Cardboard 7.Newspaper 8.Other: _____

☆ 3) How many years has this site been active? _____ ☆ 3b) Does site have A level tonnage data for 2003? 1.Yes 2.No

☆ 4) Is site urban or rural? 1.Urban 2.Rural ☆ 4b) Is site open full-time or part-time? 1.Full-time 2.Part-time

5) Is there signage directing you to the drop-off location? If yes, describe this signage. 1.Yes 2.No 9.DK

6) Is there signage at the site instructing citizens on what materials can be collected? 1.Yes 2.No 9.DK

7) Is there signage at the site instructing citizens on the site’s hours of operation? 1.Yes 2.No 9.DK

8) Do recycled materials have to be separated, or can they be commingled? 1.Separated 2.Commingled 9.DK

9) Would you classify this site as “companion” or “stand-alone?”

- Companion or Stand-alone (circle one)

- Companion = >50 people / day arrive near location – “natural visitor flow”
- Stand-alone = <50 people / day arrive near location

If companion site, what is the companion building? _____

10) Weather: What was the projected temperature during your time at the site (e.g., at 1:00pm)? _____

11) Weather: If you received any precipitation at the site, please describe intensity (e.g., drizzle, downpour) _____

12) Verify (with checkmarks) the accuracy of above information. If any changes to prefilled information are necessary, cross out prefilled information and write in new information.

Appendix C: Sample Survey Results

Site Information (from Drop-off Fact Sheet)

# of drop-off bins:	2
Types of recyclable materials collected at site:	Glass, plastics, aluminum, steel, newspaper, paper, cardboard
# of years site has been active:	10
2002 tonnage:	156.81
2003 tonnage:	143
Site's FT/PT, URB/RUR, COM/STA classification:	FT, RUR, STA
Is there signage that directs potential users to drop-off location?	Yes
Is there signage at site that tells what materials can be collected?	Yes
Is there signage at site that tells the site's hours of operation?	No
Does site require materials to be separated?	Yes

User Information (from completed surveys):

- 1) Total number of completed interviews: 19

- 2) Percentage of users who brought the following materials to site:
 - a. Plastics 63%
 - b. Newspaper 58%
 - c. Glass 47%
 - d. Aluminum 26%
 - e. Cardboard 53%
 - f. Paper 5%
 - g. Steel 5%

- 3) Average weight of materials (geometric mean): 19.1 lbs

- 4) On average, how often do users visit the drop-off site over course of year?
 - a. Monthly 16%
 - b. Biweekly 21%
 - c. Weekly 47%
 - d. First time at site 0%
 - e. 1-4 times a year 5%

- 5) Overall, for how long have you been using this site?
 - a. Less than one year 0%
 - b. Between 1 and 4 years 37%
 - c. More than 4 years 36%
 - d. Unknown 26%

- 6) Of those who used the site less than a year, how did they find out about the site?

- n/a

- 7) How does today's drop-off compare to user's normal load at site?
- a. More than 5%
 - b. Similar to 58%
 - c. Less than 37%
 - d. Other response 0%
- 8) Are you out today just to recycle materials, or are you running other errands?
- a. Out to recycle 53%
 - b. Running other errands also 47%
- 9) Is this drop-off site closer to home, closer to work, closer to where you shop, or something else?
- a. Closer to home 84%
 - b. Closer to work 5%
 - c. Closer to where you shop 0%
 - d. Other 11%
- 10) Do the materials you brought today come mostly from home, mostly from work, or an equal mix of the two?
- For 15 out of the 17 sites, 97% of those interviewed said the materials came mostly from home. Because of the limited variability in responses, specific percentages for each site are not included in these site reviews. However, it should be noted that the two Erie County sites (Huron Township and Perkins Township) were more likely to have users reporting that the materials came mostly from work, 11% and 13% respectively. This may indicate that these drop-off sites receive a higher-than-average amount of materials from commercial streams.
- 11) Is curbside pickup of recyclable materials available where you live?
- a. Yes 16%
 - b. No 74%
 - c. Don't know 11%
- 12) If yes to above, do you participate in curbside pickup of recyclable materials where you live?
- Too few cases were available for analysis and so these results are not reported here.
- 13) Do you use any other drop-off sites?
- a. Yes 32%
 - b. No 63%
 - c. Don't know 5%
- 14) Demographic information (see table below)

Age	%	Education	%
Average age	57	Grade school	0
		High school / GED	32
Sex	%	Vo-tech / 2-year programs	11
Male	63	Some college	16
Female	37	College graduate	21
		Graduate degree	16