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COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK

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in partnership with

**The City of New York Department of Sanitation
Bureau of Waste Prevention, Reuse and Recycling
DSNY-BWPRR**

residentialprogramanalysis2014
MPA ENVIRONMENTAL SCIENCE AND POLICY

SPRING 2014: APPLIED WORKSHOP IN EARTH SYSTEMS MANAGEMENT AND POLICY ANALYSIS

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Purpose of the Report

This report was developed as part of the Applied Workshop in Earth Systems Management and Policy Analysis for the MPA in Environmental Science and Policy program at Columbia University. It will assess four voluntary recycling programs implemented by the New York City Department of Sanitation's Bureau of Waste Prevention, Reuse, and Recycling (DSNY BWPRR) and will conduct a statistical and geographical analysis of current trends in enrollment, interest and operations for each program, as well as identify suitable areas for outreach and expansion.

Report Structure

Section 1 begins with an introduction of DSNY BWPRR and a discussion about the issue of waste in New York City and its associated economic and environmental costs. It will detail the four voluntary programs BWPRR has implemented to help resolve these problems, as well as benefits the City will reap from their expansion. Section 2 will provide an overview and discussion of the status of the four voluntary residential recycling programs and the challenges they face to increasing enrollment. The section will then outline the methodology and the analyses conducted to identify interest and enrollment trends for each program. Finally, Section 3 will offer suggested community districts for targeted outreach, in addition to marketing and operational recommendations for program expansion.

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Overview

[HIGHLIGHTS]

This section begins with an introduction of the Department of Sanitation's Bureau of Waste Prevention, Reuse and Recycling, and will provide insight to the current status of residential recycling habits in New York City and the externalities associated with waste mismanagement. It will discuss the potential fiscal and environmental benefits of recycling program expansion.

1.1 EXECUTIVE SUMMARY

Each year, New York City generates approximately 14 million tons of waste, of which over 50% is recyclable material. Local Law 19 mandates recycling by residents, agencies, and businesses; however, 2013 data showed that New York City residents recycle only an average of about 15% of their total waste stream. Unfortunately, New York City faces a unique challenge to residential recycling: over 60% of its housing stock is comprised of multi-family apartment buildings, which makes it difficult to enforce individual household recycling habits. Therefore, to facilitate residential recycling, the New York City Department of Sanitation Bureau of Waste Prevention Reuse and Recycling (DSNY BWPRR) implemented four residential recycling programs specifically designed for multi-family buildings: the Apartment Building Recycling Initiative (ABRI), re-fashioNYC, e-cycleNYC, and Organics Collection. To enhance residential recycling in New York City, this project will thereby analyze opportunities to expand enrollments in these four programs.

In general, approximately 30,000 New York City residences are eligible for enrollment; however, as of January 2014, only 726 residences are enrolled in at least one of the four programs. Representing less than 3% of the total eligible population, there is clear opportunity for DSNY BWPRR to expand enrollment in any one program. Although DSNY BWPRR intends to reach all 30,000 residences in the future, in the short-term, DSNY BWPRR aims to increase individual enrollment by 100 by the end of 2014. However, current trends indicate that of the four programs, re-fashioNYC is the only program closest to achieving this goal. With patterns indicating an enrollment rate of approximately 93 residences enrolling in the program each year, further analysis for the remaining three programs indicates that current strategies will also perform below target enrollment goals. As a consequence of low performance, to facilitate expansion strategies for each of the four programs, a spatial-temporal analysis of current trends in both interest and enrollment were conducted for each of the four programs, in addition to an assessment of program efficacies, in order to form strategic outreach recommendations that enhance enrollment and improve individual program operations.

Overall, the results of our analysis indicate that ABRI has exhibited relatively steady growth after its establishment in 2007. On the other hand, re-fashioNYC has grown more rapidly since it began in 2011, and, in fact, exceeded the number of buildings enrolled in ABRI by 2012. Considering e-cycleNYC and Organics Collection are still in their pilot stages, they have not shown significant trends in enrollment. In general, the spatial analysis indicates that enrollment trends by borough were similar, with Manhattan and Brooklyn representing the largest portion of enrolled sites. As for enrollment by residence type, all four programs demonstrate strong representation by co-ops. Other trends analysis indicate that buildings already enrolled in one program should be encouraged to enroll in additional programs. In general, the results of the analysis are further summarized in Tables 1-7.

The respective barriers to enrollment for each program, such as insufficient program outreach or the inconvenience of ABRI trainings, must be addressed. Other outlets for increasing awareness, such as community boards or volunteer groups should be considered and operationally, establishing specific program enrollment and waste diversion targets, and regular assessment of these will clarify BWPRR's performance. Rectifying the current lack of follow-up with interested and enrolled parties is critical to understanding any other program issues, as well as ensuring sustained participation.

Challenges and Barriers to Enrollment			
ABRI	**re-fashioNYC**	**e-cycleNYC**	**Organics**
Trainings (location and scheduling)	Bin size	Bin size	Pilot Program
Minimum of 4 units in building	Minimum of 10 units in building	Minimum of 10 units in building	Limited to school collection routes
Residents can attend training but cannot complete enrollment	Newest program		
Marketing and outreach to those who can affect change (i.e. building managers and superintendents)			
Recycling area is outside and in easy reach of unidentifiable passerby			
Potential added workload to building staff			

Table 1. Observed challenges to program enrollment.

Building Type			
	ABRI	**re-fashioNYC**	**e-cycleNYC**	**Organics**
Co-op % Enrolled	29%	51%	56%	74%
Rental % Enrolled	24%	24%	24%	11%
Condo % Enrolled	8%	15%	16%	11%
Other % Enrolled	39%	10%	4%	4%

Table 2. Percent distribution of types of residences enrolled in ABRI, re-fashioNYC, e-cycleNYC, and Organics Collection.

Enrolled			
	ABRI	**re-fashioNYC**	**e-cycleNYC**	**Organics**
Manhattan % Enrolled	67%	59%	52%	33%
Brooklyn % Enrolled	16%	17%	12%	67%
Bronx % Enrolled	8%	9%	12%	0%
Queens % Enrolled	9%	15%	24%	0%
Staten Island % Enrolled	1%	0%	0%	0%

Table 3. Spread of enrollment in percent for ABRI, re-fashioNYC, e-cycleNYC, and Organics Collection by borough.

Interested				
	ABRI	**re-fashioNYC**	**e-cycleNYC**	**Organics**
Manhattan % Interested	58%	60%	41%	51%
Brooklyn % Interested	21%	20%	12%	45%
Bronx % Interested	9%	8%	29%	2%
Queens % Interested	11%	11%	18%	2%
Staten Island % Interested	1%	1%	0%	0%

Table 4. Spread of residences in percent expressing interest in ABRI, re-fashioNYC, e-cycle, and Organics Collection by borough.

Bin Installation and Collection		
	re-fashioNYC	**e-cycleNYC**
Average Bin Installation Time	14 days	4.4 days
Average Bin Collection Time	3.3 days	N/A
Collection Requests Exceeding 5 day Limit	5.1%	N/A
Average Collections per Month	143.26	11.25

Table 5. Bin installation and collection data for re-fashioNYC and e-cycleNYC

Multi Program Enrollment				
	ABRI	**re-fashioNYC**	**e-cycleNYC**	**Organics**
ABRI	262	23	6	1
re-fashioNYC	23	255	92	1
e-cycleNYC	6	92	50	0
Organics	1	1	0	23

Table 6. Number of residences enrolled in one or two of the four programs.

Most Recommended Districts for Program Outreach			
ABRI	**re-fashioNYC**	**e-cycleNYC**	**Organics**
Manhattan 2	Manhattan 2	Manhattan 2	Manhattan 2
Manhattan 4	Manhattan 4	Manhattan 4	Manhattan 4
Manhattan 6	Manhattan 6	Manhattan 6	Manhattan 6
Manhattan 7		Manhattan 7	Manhattan 7
Manhattan 8		Manhattan 8	

Table 7. Most recommended districts for ABRI, re-fashioNYC, e-cycleNYC, and Organics Collection outreach.

1.2 INTRODUCTION

DSNY Bureau of Waste Prevention, Reuse, and Recycling

The New York City Department of Sanitation (DSNY) is the largest sanitation department in the world. Collecting almost 11,000 tons of waste per day, DSNY has spearheaded the City's waste management and prevention efforts since its founding in 1881. Under DSNY, the Bureau of Waste Prevention, Reuse and Recycling (BWPRR) plans, implements, and evaluates the City's recycling, composting and waste prevention programs.[i] Considering the high volume of waste that New York City generates per day, BWPRR's ultimate goal is to reduce the New York City waste stream through the development of recycling initiatives and programs such as the four this report will examine: the Apartment Building Recycling Initiative (ABRI), re-fashioNYC, e-cycleNYC, and Organics Collection.

NYC Waste Background, Characterization, and Management

PlaNYC estimates that New York City generates a total of 14 million tons of waste and recyclables annually, equating to 11,000 tons of waste disposed of by DSNY per day.[1,ii] Following the closure of Staten Island's Fresh Kills Landfill in 2001, the City no longer processed its own waste. New York City's waste is now processed in outer borough transfer stations before being shipped out of state,[iii] primarily to Pennsylvania, Ohio and West Virginia.[iv] This long distance exportation of waste costs the City between $127 and $208 per ton,[v] totaling over $300 million per year.[vi,vii]
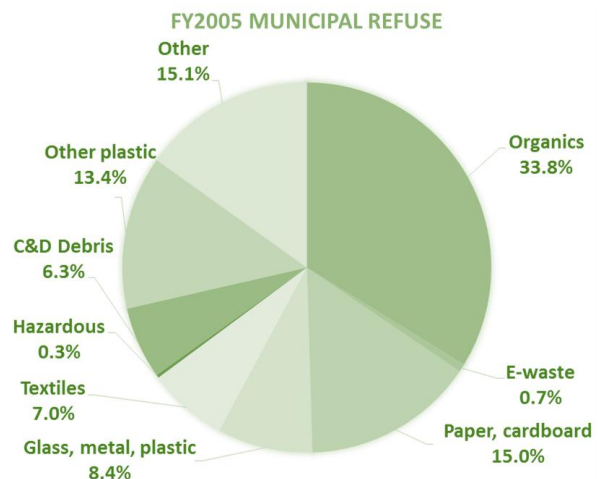

Figure 1. 2005 NYC municipal solid waste classification.

Along with the City's significant financial expenditure on waste management are serious public health and environmental impacts. The collection, transport, and disposal of waste are the source of noxious fumes, contamination of groundwater from landfill leachate, and greenhouse gas emissions. PlaNYC estimated that the City's entire solid waste system releases 1.66 million metric tons of greenhouse gas (GHG) emissions annually, representing 3% of the City's total GHG

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[1] At the time of the 2005-06 waste characterization study, the only recyclable plastics were plastic bottles and jugs. As of April 2013, however, all rigid plastics are being accepted as a result of the opening of the new, state-of-the-art Sims Municipal Recycling Facility, which can handle broader types of plastics processing.

emissions.[viii] GHG emissions contribute to global climate change, as well as associated public health issues, such as extreme weather events and increased infectious diseases.

To combat the high costs and negative environmental effects of waste mismanagement, the New York City government has consistently set ambitious goals for waste reduction citywide. In the past, former Mayor Bloomberg pushed for an ambitious 75% solid waste diversion rate by 2015, while current Mayor de Blasio has expressed interest in a zero waste goal for the city. This 75% waste diversion goal applies to residential, commercial and institutional waste. Waste from residential buildings, public agencies, and institutions constitute approximately 28% of the City's total waste stream. While New York City as a whole currently recycles about 50% of its waste,[ix] as of 2013, the City's average residential waste diversion rate is 15.1%. As a significant fraction of the total waste stream, residential recycling has the potential to bring the City closer to its waste reduction goals.

Essentially, over 50% of what New York City residents discard is actually recyclable. The average composition of the City's residential waste stream includes recyclable or compostable materials including 33.8% organics; 15.0% paper and cardboard; 8.4% glass, metal and plastic; 7.0% textiles; and 0.7% electronic waste. The remaining 35.1% includes miscellaneous plastics, construction and demolition waste, and hazardous materials for which there are no alternative disposal routes.

Together, organics and recyclables constitute a large portion of New York City's total waste volume at 64.9% and thus are the focus of BWPRR's four voluntary residential recycling programs: the Apartment Building Recycling Initiative, re-fashioNYC, e-cycleNYC, and the Organics Collection Program, which will be detailed in the next section of this report. Each of these programs has the capacity to reduce the New York City waste stream by addressing a particular frontier of waste. These programs divert textile, electronic, and organic wastes while simultaneously educating residents on best practices to integrate recycling into their buildings. Considering the comprehensive approach these programs take toward waste reduction, expanding each of them has the potential to not only bring New York City closer to its waste reduction goals, but also to reduce the City's expenditure on waste management on four fronts.[x]

Objectives of DSNY Residential Enrollment Programs

The Apartment Building Recycling Initiative (ABRI), e-cycleNYC, re-fashioNYC, and the Organics Collection Program (OCP) improve recycling by means of education and expansion of opportunities to recycle. ABRI improves regular curbside recycling rates from New York City apartment buildings by educating tenants, superintendents, and building managers. Through e-cycleNYC and re-fashioNYC, BWPRR provides bins to residential buildings in order to facilitate the reuse, recycling, and proper disposal of electronics and textiles, respectively. Finally, through strategically selected residential buildings, OCP improves upon existing organic waste diversion programs.

In essence, these programs promote the environmental sustainability of the City. While ABRI, re-fashioNYC and OCP divert waste bulk, e-cycleNYC ensures the proper disposal of toxic chemicals that leach into the environment. These programs also offer significant potential monetary savings as the long distance transport that is required by New York City's current waste practices is very expensive, totaling about $1.1 million a day. For example, in the span of four months, over 38,000 electronics (approximately 19.3 tons) were diverted from the waste stream through e-cycleNYC, equating to a saving of at least $2,451, or an average of $7,353 if extended over one year.

Furthermore, in 2013, the re-fashioNYC program collected approximately 422 tons of textiles, equating to a savings of at least $160,782. Yet, OCP, which is still in pilot phase, may pose the greatest opportunity for overall waste reduction as compostable material accounts for over 30% of waste in New York City. Simply put, with just over 700 buildings enrolled in all of the four programs to date, out of the 30,000 eligible residential buildings, increasing residential recycling participation stands to provide substantial fiscal and environmental benefits for New York City.

2 Background Analysis

[HIGHLIGHTS]

Divided into three main parts, the chapters found within *Section 2: Background Analysis* will provide a historical assessment of each of the four programs to briefly discuss both the current status of these programs and the potential challenges these programs face in expanding individual enrollment. These initial findings informed the analysis each of the programs' interest and enrollment trends on both a temporal and spatial scale. The section will conclude with patterns and opportunities for expansion.

2.1

RESIDENTIAL PROGRAM ENROLLMENT OVERVIEW

[About the Section]

Section 2.1 provides an overview of each of the four voluntary recycling initiatives. Each program summary will briefly describe the program, its enrollment process and its current operational status, in addition to the known barriers, strategies or impediments to program adoption.

Ultimately, the background research conducted in this section will inform the methodologies used to assess potential opportunities for expanding the individual programs. The approach used to analyze the trends in these programs and their results are then further detailed in Sections 2.2 and 2.3, respectively.

2.1.1 Apartment Building Recycling Initiative

Program Description and Enrollment Process

The Apartment Building Recycling Initiative (ABRI) is a voluntary program that was established in 2007. It trains interested residents and residential building managers to set up recycling areas and support an ongoing recycling system in their buildings. ABRI participants must be at least 18 years of age and must live in or manage a building with four or more units. The purpose of this program is to ensure proper and accessible apartment building recycling infrastructure for glass, paper, metals, and plastics in apartment buildings with curbside recycling collection by DSNY.

The program's registration process differs somewhat from the other BWPRR programs in that it requires the completion of a two-hour training session besides the submission of the initial registration form. These training sessions are hosted monthly at the BWPRR office in Lower Manhattan, but for groups of 10 or more participants, a BWPRR staff member will travel to conduct the training onsite for the group. Following this training session a BWPRR staff member conducts a site visit to assist the building in setting up its recycling area with the proper bins and signage. After that point, a site is considered fully enrolled in the ABRI program.

Status of the Program

To date, there are 311 residences participating in ABRI. Enrollment has steadily increased across all boroughs except Staten Island, where enrollment has been zero since the program's inception.

Barriers to Enrollment and Impediments to Expansion

According to BWPRR data on ABRI enrollment, there is a significant gap between the number of individuals who have expressed interest in participating in the program by completing an initial sign-up form and the number of people who ultimately complete the enrollment process. At times enrollment has surpassed interest although most often it is the other way around.[2]

Conversations with BWPRR staff suggest that the drop-off rate is attributed to the amount of time and follow-up required to schedule and attend the training session. Because ABRI participants are primarily building managers, superintendents, or property managers with various demands that prevent them from leaving their buildings during the day, DSNY has not had reliable turnout for ABRI trainings despite efforts to poll prospective participants about scheduling preferences. Another challenge is the question of how to effectively reach more of the eligible parties, namely building managers and superintendents.

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[2] Data provided by DSNY BWPRR and illustrated in Section 2.3.2 Suitability Analysis for ABRI, *Figure 14*.

2.1.2 re-fashioNYC

Program Description and Enrollment Process

re-fashioNYC is BWPRR's clothing and fabric recycling bin collection program, established in 2010. The program is a partnership between the City and Housing Works, a non-profit charity organization that operates a bookstore café, twelve thrift stores, and several health clinics throughout the city. It also provides supportive services and housing assistance to the homeless and those who suffer from HIV/AIDS. Housing Works contracts with the City to collect recyclable textiles, which are then sorted at Housing Works and either re-purposed or re-sold in their thrift stores, or one of their affiliate sites.[xi]

The process of enrollment begins with the completion of the online enrollment program inquiry form by a building manager or owner. After receiving a completed inquiry form, BWPRR schedules a site visit to assess whether the site is suitable for a bin. Bin deliveries are scheduled based on the availability of bins and can take up to three months to deliver; however, most installations occur within 6-10 business days.[3] Housing Works will collect the textiles within five business days. If it is a large building, there is an option of scheduled pick-ups. Per contract terms, Housing Works is responsible for meeting a minimum of 500 tons of material per month at a minimum of $500/ton, and to service a minimum of 50 distribution bins per borough. Thus, in addition to avoided costs of disposal of this material, BWPRR generates revenue from the sale of donated textiles. In return, the re-sale of clothing at thrift stores supports Housing Works' operations. Individual buildings with 10 or more residences or public and community sheltered spaces are able to enroll and receive a collection bin, making re-fashioNYC distinct from the other four voluntary programs in that enrollment can occur in non-residential buildings.

Status of the Program[4]

Since re-fashioNYC's inception in 2010, enrollment has steadily increased from 120 sites in 2011 to approximately 375 sites in February 2014. Enrollment is highest in Manhattan, followed by Brooklyn. There is negligible enrollment in Queens and the Bronx and no enrollment in Staten Island. In 2013, Housing Works collected 548 tons of textiles through the re-fashioNYC program. Since BWPRR established the program in 2011, re-fashioNYC has collected almost 950 tons of textiles.

Barriers to Enrollment and Impediments to Expansion

According to BWPRR staff, the primary challenge to enrollment in re-fashioNYC is insufficient space for bins in the recycling areas of interested buildings. However, according to an analysis conducted by BWPRR and Housing Works, the bin sizes cannot be decreased because the two existing bin size options were found to be the most economically efficient in terms of pick-up frequency. Additional factors such as the fact that bins have already been purchased and fabricated would mean an unjustifiable expense for BWPRR to offer a smaller size.

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[3] Determined by data further discussed in Section 2.3.3 Operations Analysis for re-fashioNYC.
[4] Based on results illustrated and discussed in Section 2.3.2 Site Suitability Analysis for re-fashioNYC.

2.1.3 e-cycleNYC

Program Description and Enrollment Process

The e-cycleNYC program began in 2013 to provide a convenient way for apartment building residents to safely dispose of their electronic equipment. e-cycleNYC partners with Electronic Recyclers International Inc. (ERI) to collect, handle, and recycle or sell electronic equipment from apartment buildings with more than 10 units. The contract with ERI runs for 10 years with the potential for up to an additional 15 years through renewal. To enroll in e-cycleNYC, a building must first fill out the enrollment form on the DSNY website, after which BWPRR conducts a site visit. If a site is deemed qualified, both ERI and building management must sign a service agreement. When the agreement is jointly approved, ERI delivers the bin and collection begins upon request. As of 2015, it will be illegal for residents to dispose of e-waste with their regular trash; e-cycleNYC aims to collect 100% of electronic waste through their storage bins system, room cleanouts, and building events.

Status of the Program

There are currently 161 buildings enrolled in Manhattan, the Bronx, Brooklyn, and Queens, with the majority of enrollment in Manhattan, followed by Queens.[5] At this time, no Staten Island buildings are enrolled. Locations with e-cycleNYC bins include condominiums, co-ops, rentals, and student housing.[6] Rentals are the residence type with highest enrollment. DSNY is targeting to increase room cleanouts (buildings with ≥10 units), storage bin installation (buildings with ≥50 units), and building events (buildings with ≥250 units) in coming years.

Barriers to Enrollment and Impediments to Expansion

Similar to re-fashioNYC, the current e-cycleNYC bin sizes are a problem for buildings that lack sufficient space. Additionally, BWPRR should take measures to prepare for the increased volume of electronic waste disposal through the program if the policy outlined above does indeed become effective in 2015.

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[5] See Section 2.3.1 Enrollment Overview, *Table 1 & 2* for more information.
[6] See Section 2.3.2 Site Suitability Analysis, *Figures 47, 48, 49* for more information.

2.1.4 Organics Collection

Program Description and Enrollment Process

In the fall of 2012, the Department of Sanitation (DSNY) began offering curbside collection of organic waste -- including food scraps, food-soiled paper, and yard waste to select NYC schools, residences and institutions. Local Law 77 of 2013 called for DSNY to implement an organic waste collection pilot program between October 2013 and July 1, 2015. It is voluntary for residents in pilot areas and mandatory for selected schools to set out organic material during the pilot program. During the 2012-13 school year, DSNY serviced 90 public schools in Brooklyn, Manhattan, and Staten Island in partnership with the Department of Education, and three independent private schools. During the 2013-14 school year, the number of schools participating in organics collection is projected to exceed 300.[xii] This report only analyzes the large residences expansion program, which includes residences and large institutions with 10 units or more.

In 2013, DSNY began collecting organics from single-family homes and small residential buildings, reaching over 30,000 households in the Bronx, Brooklyn, and Staten Island. In 2014, DSNY will expand the program to reach 100,000 households. DSNY is also recruiting multi-unit residential buildings, agencies and institutions, and eligible private schools to participate in organics collection.[xiii] This report will focus only on these sites.

The Organics Collection Program is featured on the BWPRR website, which allows apartment buildings with 10 or more residents, city agencies and non-profit institutions, and eligible private schools to submit an online inquiry form to apply for organics collection. Buildings located in existing pilot areas receive first priority.

Status of the Program

To date, the program services 27 large residential buildings, three private schools, and 11 city agency locations. The enrolled residential buildings are primarily located in the Kensington and Park Slope neighborhoods in Brooklyn and the Upper West Side in Manhattan.[7] There are 80 more candidate sites (sites being considered for enrollment) located in Brooklyn and Manhattan.

As Organics Collection is a new pilot program constrained by operational barriers, BWPRR staff are not heavily focused on program expansion to areas outside of the pilot areas.

Barriers to Enrollment and Impediments to Expansion

The expansion of the Organics Collection Program is constrained by New York City's current organic waste collection and processing capacity. Unlike BWPRR's three other programs, the enrollment of sites is a selective process based on the practicality and efficiency of collecting from additional sites. According to BWPRR, most sites have been selected due to their proximity to existing collection routes for schools and their large organic waste volume that makes collection from the building worthwhile.

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[7] Refer to Section 2.3.2 Site Suitability Analysis, Figure 17 & 18 and Table 8 for more information.

2.2 METHODOLOGY

expand

map & graph

analyze

research

plan

clean data
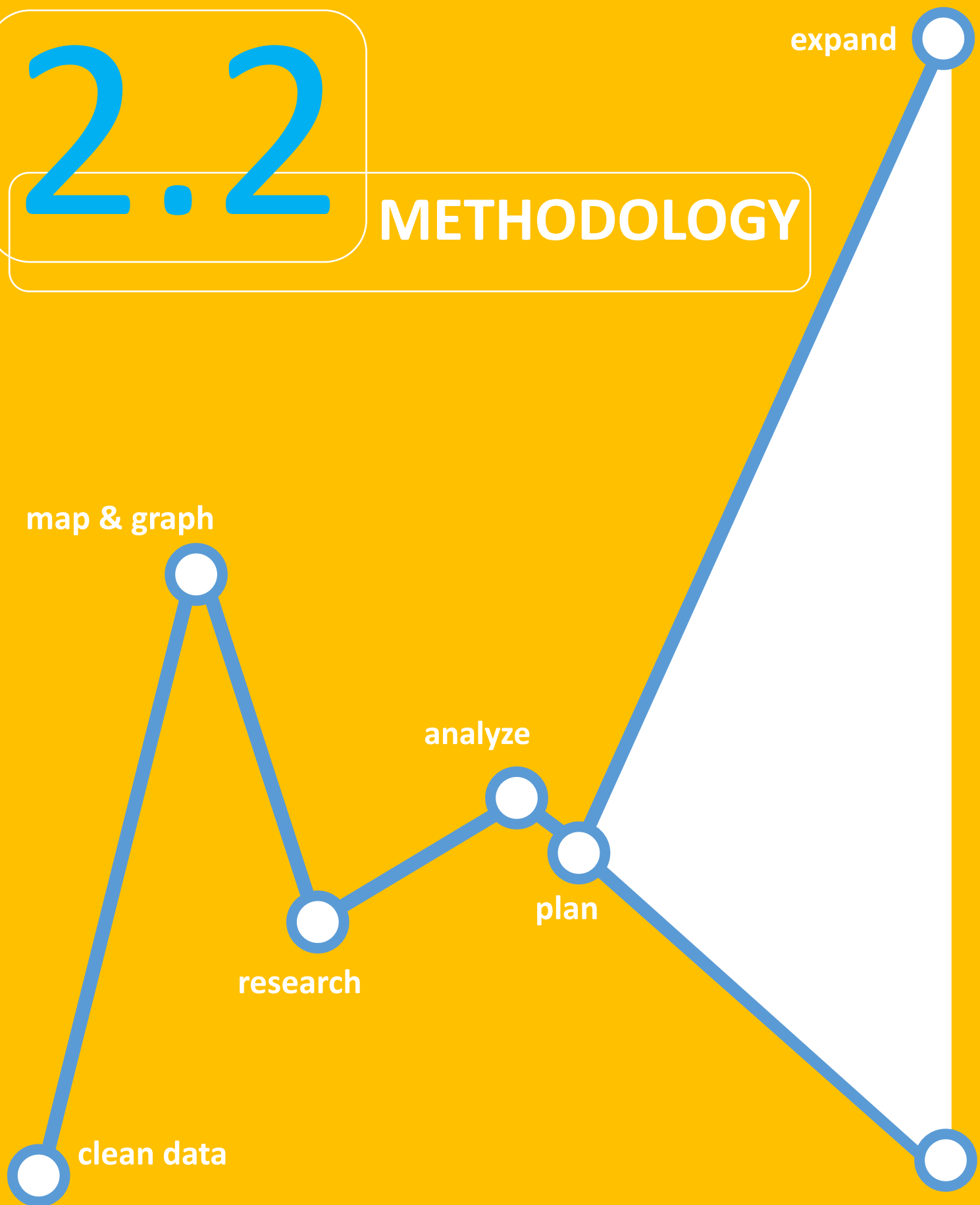
2.2.1 The Status:Enrollment Overview Analysis

Using data provided by BWPRR, total enrollment and interest in each of the four programs were graphically divided by borough. The purpose of this analysis was to garner an understanding of the geographic spread of enrollment. The total enrollment for all four programs was then examined for overlaps to determine residences with multi-program enrollment in one, two, or three of the four programs. Note that currently no residence is enrolled in all four programs. Using ArcGIS version 10.1, the corresponding maps for multi-program enrollment were then displayed using LION base file (version 13D), which was obtained from the Department of City Planning. Finally, the spread of enrollment by residence type was then assessed for all four programs to determine how enrollment related to residence type in each program.

2.2.2 Site Suitability Analysis

Enrollment Status: Time Series and Geographic Analysis

In order to observe initial trends in each of the four programs, interest and enrollment within the five boroughs were analyzed to visualize geographic and temporal trends of program reach, primarily using Excel and ArcGIS version 10.1. Sites were classified as "Interested" if the site submitted a program application through BWPRR's website and took preliminary steps to become enrolled, but never completed the process; and sites were classified as "Enrolled" if the site completed the entire application procedure and is currently participating. Data were then assessed by borough and residence type, using counts of non-numerical data, to show the proportional distribution of interested and enrolled buildings by borough.

Enrollment by Residence Type

To observe the types of residential buildings that represented in the BWPRR enrollment database, enrolled building types were categorized into co-ops, condos, rental buildings, or other residence types (including affordable housing, student housing, and private residences). Providing a breakdown of enrollment by residence types identified patterns of interest and enrollment among different types of buildings. ArcGIS version 10.1 was then used to create a geographic visualization of sites participating in each program, with the LION base file (version 13D) available from the Department of City Planning.[8] This information was used to observe the density distribution of enrolled sites by community district.

Using the Department of City Planning's Primary Land Use Tax Lot Output (PLUTO) dataset, the potential for program growth based on BWPRR enrollment requirements and existing residence type trends was assessed. The total proportion of three building types in New York City community districts (co-ops, multi-family residential buildings, and single or two family residential buildings) were grouped in ArcGIS 10.1 according to the residence types described by BWPRR datasets and compared to the current distribution of residence types in BWPRR's programs on a community-

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[8] Note that addresses from the DSNY database that were not identified by geocoding tool were compared with Google Maps and manually entered.

district level.[9] This visualization illustrated locations with high volumes of residence types that had previously demonstrated success in the four programs, specifically co-ops, condos, and rental apartments.

Site Suitability

NOTE: More information regarding the variables used in this analysis is included in Appendix A.

Data describing existing enrollment, as described above, and demographic trends associated with high levels of recycling activity allowed identification of community districts that would be most suitable for further outreach by BWPRR to encourage participation in each of the four programs. The Weighted Overlay tool in ArcGIS 10.1 was used to conduct the site suitability analysis for each of the four programs. The variables used in the analysis include *Residence Type*, *Enrollment in Identified BWPRR Program*, *Enrollment in other BWPRR Programs*, *Income Level*, *Education Level*, *Unemployment*, and *Language Spoken at Home*. All factors were evaluated on the community district level. Average annual capture and diversion rate data were also included in the suitability analysis for the ABRI and Organics Collection programs. The analysis of the programmatic trends and existing socio-demographic variables affecting recycling rates are further discussed in Appendix A.

Data relating to demographic factors and current waste management trends were obtained from the Department of City Planning and BWPRR and sorted by community district. Specifically, the economic and social demographic data were obtained from the U.S. Census 2010-2012 American Community Survey 3 Year Estimates and accessed through the Department of City Planning Population Division. Average annual capture and diversion rates for fiscal years 2010 through 2013 were gathered from the DSNY's annual New York City Curbside and Containerized Municipal Refuse and Recycling Statistics reports for those years. These rates were used to calculate four-year average capture and diversion rates for each community district and these four-year averages were used in the suitability analysis. Because these curbside collection datasets include information on organics, metal, glass, plastic, and paper recyclables, but not textiles or e-waste, they were not included in the suitability analysis for re-fashioNYC or e-cycleNYC. Each variable was reclassified according to its selection preference and weighted according to its relative importance and are listed in Appendix A.

Weighting of variables was informed by a linear mixed-effects model relating capture and diversion rates to demographic trends by community district to observe the correlation between various socio-demographic factors and existing recycling trends. This model defined demographic variables that likely have the greatest impact on capture and diversion rate, which will further allow BWPRR to target marketing efforts to increase residential recycling program participation. Correlations were also graphed and calculated for each demographic variable to determine the current recycling habits of various communities. Layer classification was informed by these correlations, with community districts correlated with higher capture and recycling rates receiving a higher weighting. The proceeding analysis prioritized program expansion in community districts whose demographic variables made them more likely to recycle, hypothesizing that these were areas in which outreach

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[9] Note that multi-family residential buildings and co-ops were eligible for enrollment in all four of DSNY's programs, while smaller single- and two-family buildings were not.

could yield results without further political or financial incentives. Similarly, the reverse analysis was conducted, prioritizing targeting in areas with currently low recycling rates. In both analyses, areas with high percentages of multi-family residences were favored, as these programs are intended for multi-family apartment buildings, rather than other residence types.

2.2.3 Operations Analysis

Length of Service

Datasets provided by BWPRR described the bins installed and bin service requests for two programs – e-cycleNYC and re-fashioNYC. The length of time between the service request and service completion for re-fashioNYC was assessed, as was the length of time between the service request and service completion only in terms of bin installation for e-cycleNYC. This discrepancy was due to the lack of availability of data measuring the time elapsed between bin pickup requests and pickup completion for the e-cycleNYC program.

Additionally, the frequency of pickup requests, in terms of pickups per month, was mapped using ArcGIS to identify areas in which pickups occurred with high or low frequency. These monthly pickup requests for re-fashioNYC were plotted against the number of units in each building to examine the relationship between a residence's size and its frequency of collections, allowing BWPRR to estimate the expected number of pickups per month from future buildings interested in re-fashioNYC based on existing trends. A similar correlation was not feasible for e-cycleNYC at this point in time due to the small number of pickups that have occurred during the four months of the program's existence.

Efficacy of Programs (re-fashioNYC and e-cycleNYC)

In order to observe the total diversion achieved by the pickup-based re-fashioNYC and e-cycleNYC, data describing the total weight of collected material were examined. BWPRR and its re-fashioNYC partner, Housing Works, provided data measuring the weight of textiles collected from June 2011 to January 2014. This data was graphed to show monthly trends and analyzed to observe overall monthly and yearly averages. Data describing the weight of e-waste collected through e-cycleNYC was only available for four months, due to the program's recent inception. This data was analyzed to observe the total weight of e-waste collected in these four months, as well as the types of electronics making up these collections. Further, a literature review was conducted to estimate the overall environmental impacts of these programs in terms of DSNY's goals of reducing waste.

2.2.4 Interest Analysis

Interest Trends: Time Series and Geographic Analysis

Using data provided by BWPRR, interest trends over time were depicted for each of the four programs in order to identify patterns in the growth or reduction of interest in any of the programs. The total interest for ABRI and re-fashioNYC were then mapped using ArcGIS version 10.1, with LION Base file (version 13D) from the Department of City Planning to assess the geographic spread of interest over time. Note that maps of interest over time were not included for either e-cycle or Organics Collection because these two programs have shorter running periods, having only been in existence for less than one year, making data analysis inconsistent to the interest analysis conducted for ABRI and re-fashioNYC. However, also considering that BWPRR staff indicate that city mailing is their primary vehicle for promoting e-cycle, while selection of residences for Organics Collection is limited to truck pick-up routes, significant geographic trends are not expected for both of the programs; therefore the absence of maps of interest over time for these programs is not an unreasonable exclusion.

Expert Interviews

To determine recommendations for future outreach and marketing, the team conducted literature review and interviews with field experts. Conversations with former Mayor Dinkins, a former DSNY Deputy Director, and current DSNY Resident Anthropologist provided insight into the political background and history of recycling in New York City. These interviews informed the statistical analysis of enrollment, interest and operational trends and provided a foundation for recommendations for targeted outreach. An interview with a representative from Recology, San Francisco's private partner in waste management, yielded insight into the dynamics of public-private partnerships oriented around recycling. Conversations with building associations and building management companies revealed the challenges of instituting these programs. Finally, team members attended ABRI trainings to experience the training process.

2.3

RESULTS & DISCUSSION

[About the Section]

This section is divided into four parts: the enrollment overview, the site suitability analysis, the operations analysis, and the interest analysis. Together, these sections will examine for patterns in both enrollment and interest for each of the four programs.

Section 2.3.1 Enrollment Overview will begin the discussion with a general assessment of all four programs and will attempt to examine relationships or trends between them.

Section 2.3.2 Site Suitability Analysis then continues with a detailed assessment of enrollment and interest trends for each of the programs to identify community districts for further targeting that either have (1) a tendency to have low rates of recycling or (2) have a tendency to enroll in each of the four programs.

Section 2.3.3 Operations Analysis then examines the re-fashioNYC and e-cycleNYC programs in terms of service length and bin sizes.

Finally, Section 2.3.4 Interest Analysis will attempt to identify patterns of interest in the four programs and how they may compare to actions taken by BWPRR, but also to our recommended sites for targeting from 2.3.2.

2.3.1
enrollment overview

Section Summary: Enrollment Overview

Purpose of Analysis: In general, this section will include three points of analyses with the goal of comparing the relationship between each of the four programs. Section 2.3.1 provides a general assessment of the current enrollment and interest frequencies in each of the four programs and their general geographic and residential spread in order to compare enrollment from program to program. Then, the section examines enrollment overlap between the four programs in order to identify patterns of residences enrolling in combinations of programs. And finally, the section analysis ends with an overview of enrollment by residence type. The following sections (2.3.2, 2.3.3, 2.3.4) then describe the specifics of each program.

Highlights: There were a total of 877 enrollments analyzed in this section. Broken down further, of this total enrollment, it results that only 726 buildings of the 30,000 New York City residences eligible for enrollment are enrolled in any combination of the four programs. The initial analysis indicates that the majority of buildings were only enrolled in one program, while 17% of the total 723 buildings participate in two programs. Lastly, only 1.8% enrolled in three programs. To date, no residence is enrolled in all four programs. Among those buildings participating in two programs, there was most often an overlap of re-fashioNYC and e-cycleNYC, while other combinations of enrollment are less frequent.
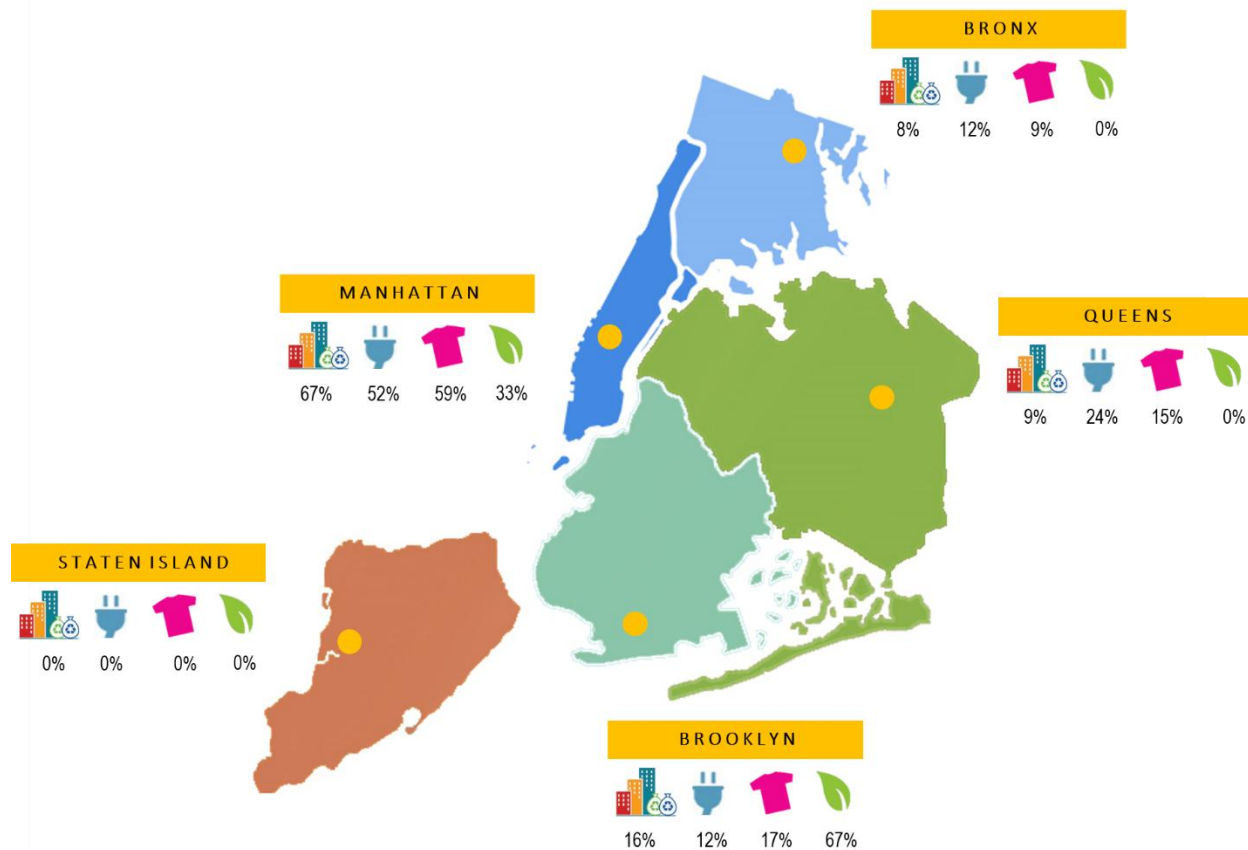
Figure 2. Program enrollment by borough, as a percent of program enrollment.

The spread of ABRI, e-cycleNYC, and re-fashioNYC are most visible in the boroughs of Manhattan, the Bronx, and Queens, while Organics Collection is represented in only two of the five boroughs - Brooklyn and Manhattan. In general, each of the programs has the highest enrollment in Manhattan and at least 50% of enrolled sites in ABRI, e-cycleNYC, and re-fashioNYC are located in this borough. Unlike other programs, however, Organics Collection has been most prevalent in Brooklyn, and more significantly, at time of writing, Staten Island has no enrollment for any of the programs (*Figure 2*).
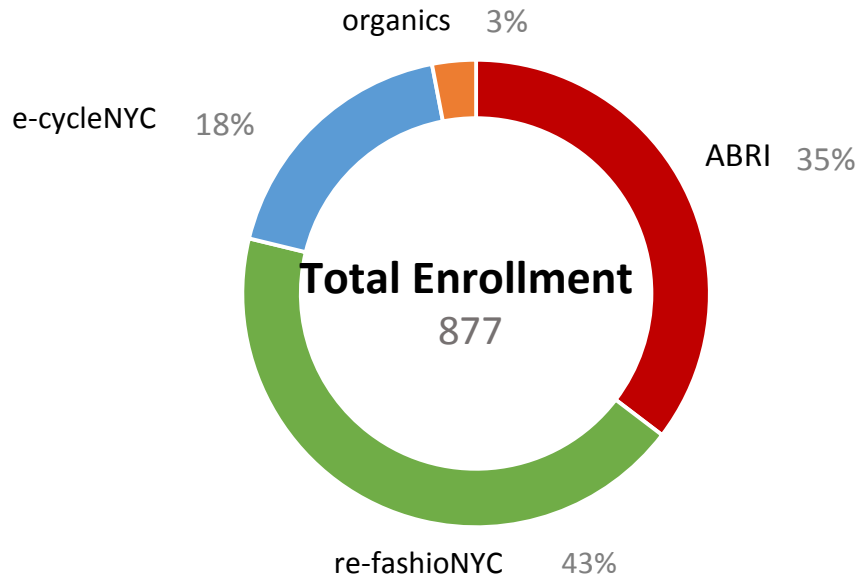
Figure 3. Cumulative program enrollment as a percent of total enrollment.

borough	ABRI	e-cycle	re-fashioNYC	organics
Manhattan	397	135	735	78
Bronx	63	93	96	3
Queens	75	59	134	3
Brooklyn	145	39	244	73
Staten Island	5	0	11	0
TOTAL	311	326	1220	157

Table 1 Cumulative program interest by borough

borough	ABRI	e-cycle	re-fashioNYC	organics
Manhattan	208	83	224	9
Bronx	49	20	64	18
Queens	26	19	34	0
Brooklyn	28	39	56	0
Staten Island	0	0	0	0
TOTAL	311	161	378	27

Table 2. Cumulative program enrollment by borough.

Although ABRI is the oldest program, the most enrollment overall is found in re-fashioNYC. The 378 re-fashioNYC sites comprise 43% of the total enrolled sites, while ABRI makes up 35%, e-cycleNYC 18%, and Organics Collection just 3%. Over the years, total interest has accumulated to over 1600 building inquiries, the majority of which was interest in re-fashioNYC. Yet of this total, only a little more than half have enrolled in at least one of the four voluntary programs. In fact, no more than 50% of those who have expressed interest in each of the four programs are ultimately enrolled (*Tables 1 and 2*).
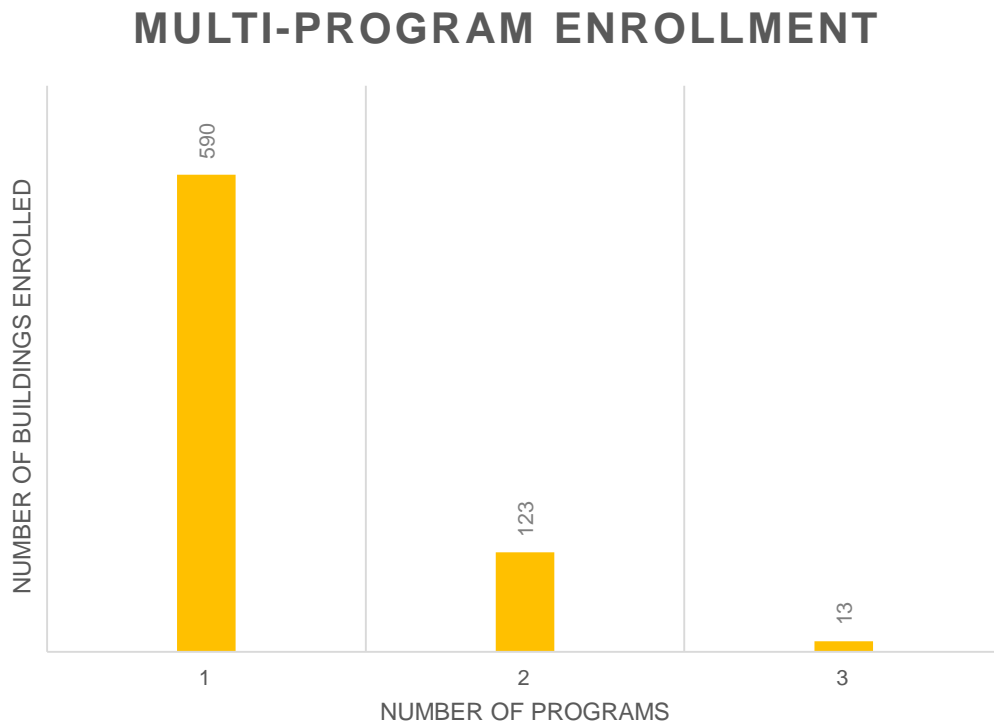
MULTI-PROGRAM ENROLLMENT

Figure 4. Multi-program enrollment illustrates the number of buildings in either 1, 2 or 3 programs with none enrolled in all 4.

Although a cumulative 877 sites are enrolled for all four programs, after accounting for enrollment overlaps in the four programs, it results that a total of 726 buildings are enrolled to date. The enrollments are as follows: 590 buildings are enrolled in only one program, 123 buildings are enrolled in two programs, and 13 buildings are enrolled in three programs (*Figure 4)*. However, as of February 2014, no buildings were enrolled in all four voluntary programs.

Data suggest that single program enrollments constitute 81% of the total buildings enrolled, while enrollment in two programs comprises of significantly less (17%). Enrollment in three programs remains even less common at 2% and enrollment in all four programs is zero. That being said, it is important to recognize that this trend may be due to the fact that e-cycleNYC is less than one year old and the Organics Collection Program is still in its pilot phase. As a consequence, program adoption may be limited.

ENROLLMENT IN ONE PROGRAM
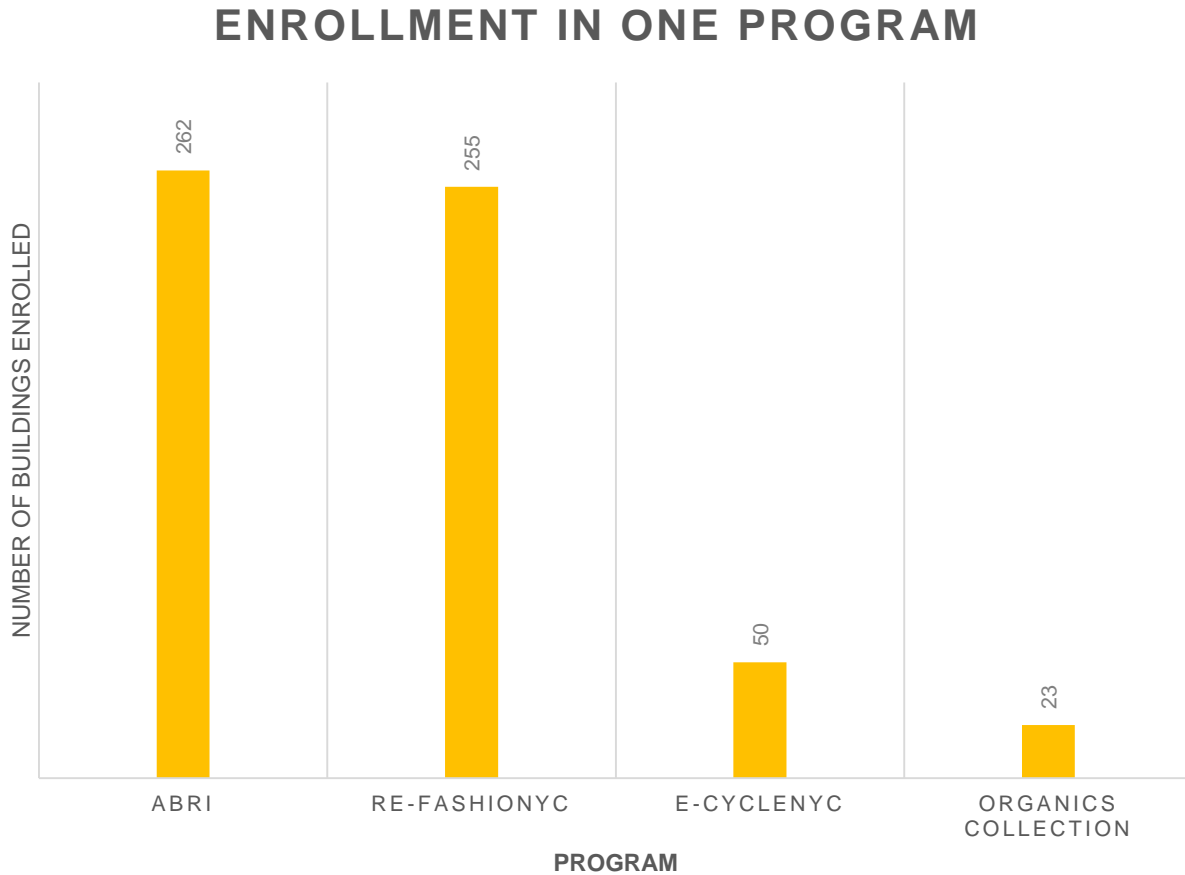
Figure 5. Number of buildings enrolled in only one program.

Of the buildings enrolled in a single BWPRR program, approximately equal amounts were enrolled in ABRI and re-fashioNYC (262 and 255, respectively). However, significantly fewer were enrolled in e-cycleNYC and Organics Collection. e-cycleNYC comprises approximately 8.5% of total one-program enrollment and Organics Collection makes up 3.9%. Considering that e-cycleNYC was first implemented in 2013 and Organics Collection is still in its pilot phase, these small fractions are likely due to the shorter program duration. The spread of single program enrollment is illustrated in *Figure 5* and characterized in *Table 6.*

Enrollment Density for Sites Enrolled in One Program

Figure 6. Density of enrollment in one program by community district.

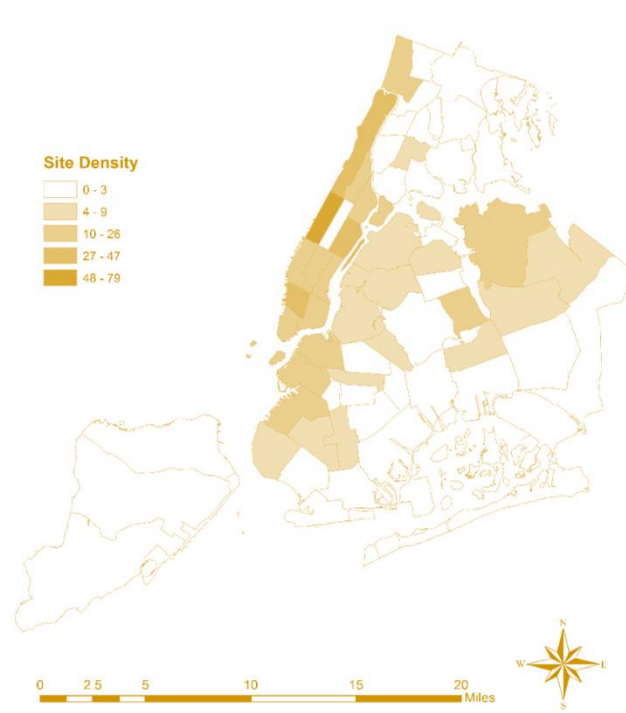| Borough	District	Neighborhoods
Bronx	8	Fieldston, Kingsbridge, Marble Hill, North Riverdale, Riverdale, Spuyten
Brooklyn	2	Boerum Hill, Brooklyn Heights, Clinton Hill, Downtown Brooklyn, DUMBO
Brooklyn	6	Carroll Gardens, Cobble Hill, Gowanus, Park Slope, Red Hook
Brooklyn	7	Industry City, Sunset Park, Windsor Terrace
Manhattan	1	Battery Park City, Civic Center, Ellis Island, Financial District, Governors Island
Manhattan	2	Greenwich Village, Hudson Square, Little Italy, NoHo, SoHo, South Village
Manhattan	3	Chinatown, East Village, Lower East Side, Two Bridges, NoHo
Manhattan	4	Chelsea, Clinton, Hudson Yards
Manhattan	5	Flatiron, Gramercy Park, Midtown, Midtown South, Murray Hill, Times Square
Manhattan	6	Beekman Place, Gramercy Park, Murray Hill, Peter Cooper Village, Turtle Bay
Manhattan	7	Lincoln Square, Manhattan Valley, Upper West Side
Manhattan	8	Carnegie Hill, Lenox Hill, Roosevelt Island, Upper East Side, Yorkville
Manhattan	9	Hamilton Heights, Manhattanville, Morningside Heights, West Harlem
Manhattan	10	Central Harlem
Manhattan	11	East Harlem, Randalls Island, Wards Island
Manhattan	12	Washington Heights, Inwood
Queens	6	Forest Hills, Forest Hills Gardens, Rego Park
Queens	7	Auburndale, Bay Terrace, Beechhurst, Clearview, College Point, Flushing

(Left vertical label: Enrollment (>9 sites))

Table 3. Summary of community districts with high densities of enrollment in a single program (more than nine sites).

ENROLLMENT IN TWO PROGRAMS

NUMBER OF BUILDINGS ENROLLED

23
6
1
92
1
0

ABRI/RE-FASHIONYC
ABRI/E-CYCLENYC
ABRI/ORGANICS COLLECTION
RE-FASHIONYC/E-CYCLENYC
RE-FASHIONYC/ORGANICS COLLECTION
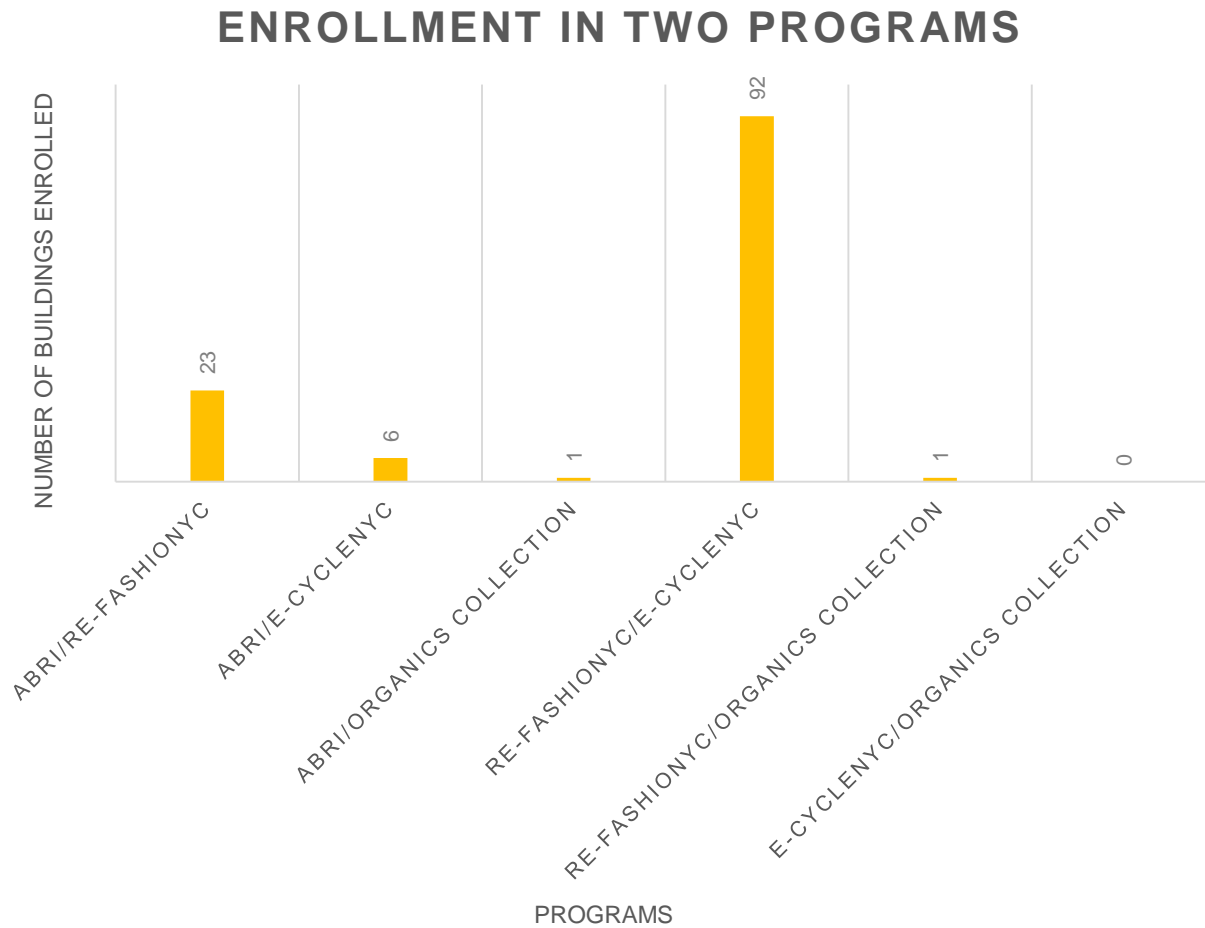E-CYCLENYC/ORGANICS COLLECTION

PROGRAMS

Figure 7. Number of buildings enrolled in two programs.

Of the 726 sites enrolled in at least one of the four voluntary programs, 17% were enrolled in two. Of these 123 buildings, 92 buildings (75%) were enrolled in re-fashioNYC and e-cycleNYC. The combination of ABRI/re-fashioNYC trails in second at a substantially smaller 19% and the combination of ABRI/e-cycleNYC falls in third at 5%. It is rare to find buildings that enroll in one or more programs, but if they do, they have been likely to enroll in re-fashioNYC and e-cycleNYC. In general, *Figure 7* suggests that a building enrolled in either re-fashioNYC or e-cycleNYC may have the tendency to enroll in the other. Though representing a smaller percent of the dataset, a similar tendency may exist for the combination of ABRI/re-fashioNYC. The geographic spread of the residences enrolled in two programs is illustrated in *Figure* 8 and characterized in *Table 4.*

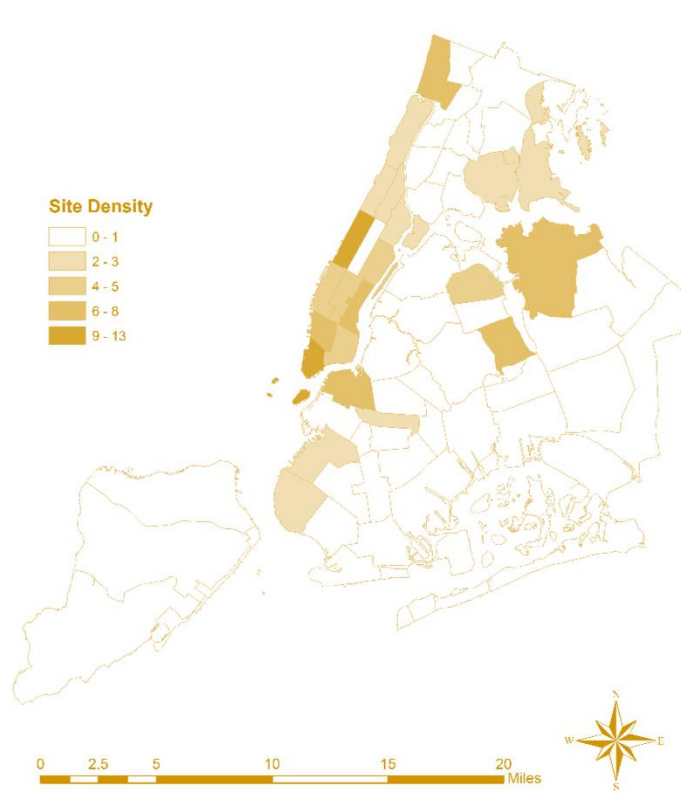## Enrollment Density for Sites Enrolled in Two Programs

Figure 8. Density of enrollment for sites enrolled in two programs by community district.

	Borough	District	Neighborhoods
	Bronx	8	Fieldston, Kingsbridge, Marble Hill, North Riverdale, Riverdale, Spuyten
	Brooklyn	2	Boerum Hill, Brooklyn Heights, Clinton Hill, Downtown Brooklyn, DUMBO
	Manhattan	1	Battery Park City, Civic Center, Ellis Island, Financial District, Governors Island
	Manhattan	2	Greenwich Village, Hudson Square, Little Italy, NoHo, SoHo, South Village
	Manhattan	3	Chinatown, East Village, Lower East Side, Two Bridges, NoHo
	Manhattan	4	Chelsea, Clinton, Hudson Yards
	Manhattan	5	Flatiron, Gramercy Park, Midtown, Midtown South, Murray Hill, Times Square
	Manhattan	6	Beekman Place, Gramercy Park, Murray Hill, Peter Cooper Village, Turtle Bay
	Manhattan	7	Lincoln Square, Manhattan Valley, Upper West Side
	Manhattan	8	Carnegie Hill, Lenox Hill, Roosevelt Island, Upper East Side, Yorkville
	Queens	3	East Elmhurst, Jackson Heights, North Corona
	Queens	6	Forest Hills, Forest Hills Gardens, Rego Park
	Queens	7	Auburndale, Bay Terrace, Beechhurst, Clearview, College Point, Flushing

Enrollment (>10 sites)

Table 4. Summary of community districts with high densities of buildings enrolled in two programs.
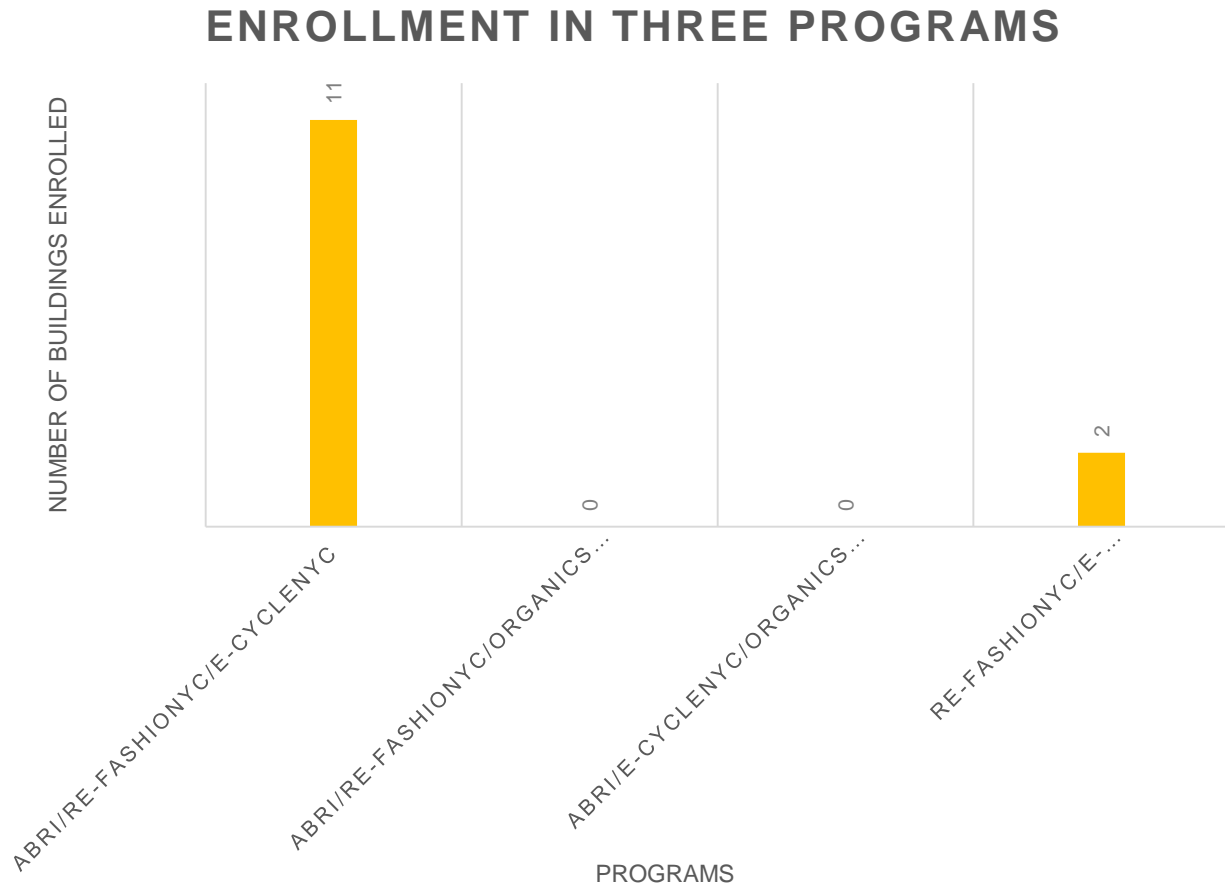
28

ENROLLMENT IN THREE PROGRAMS

Figure 9. Number of buildings enrolled in three programs.

Constituting a mere 2% of total enrollment, the frequency of buildings enrolling in more than two programs is very limited. In fact, the greatest combination of enrollment in three programs was in the mixture of ABRI, re-fashioNYC, and e-cycleNYC at about 1.5% of total enrollment. The only other existing combination of enrollment in three programs was in re-fashioNYC, e-cycleNYC, and Organics Collection and represented 0.2% of the total 726 buildings enrolled in any of the four voluntary programs. Clearly enrollment in three or more programs per residence is not popular, but based on the frequency of overlaps observed between enrollment in two programs (*Figure 8*) and its similarity to buildings with three enrollments (*Figure 10*), it is evident that more buildings could be targeted for enrollment in three or even all four programs.

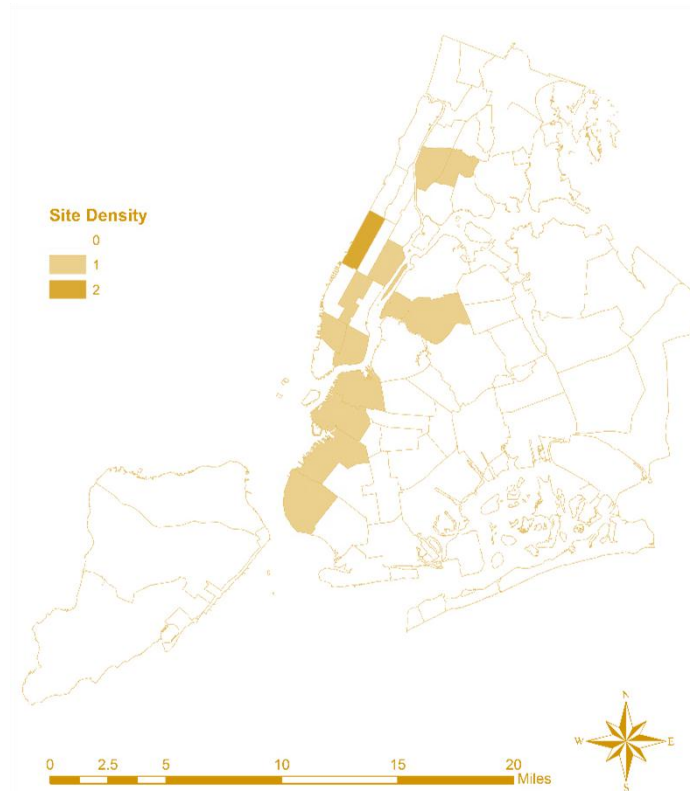# Enrollment Density for Sites Enrolled in Three Programs

Figure 10. Density of sites enrolled in three programs by community district.

	Borough	District	Neighborhoods
Enrollment (>1 site)	Bronx	3	Claremont, Crotona Park East, Melrose, Morrisania
	Bronx	4	Concourse, Concourse Village, East Concourse, Highbridge, Mount Eden
	Brooklyn	2	Boerum Hill, Brooklyn Heights, Clinton Hill, Downtown Brooklyn, DUMBO
	Brooklyn	6	Carroll Gardens, Cobble Hill, Gowanus, Park Slope, Red Hook
	Brooklyn	7	Industry City, Sunset Park, Windsor Terrace
	Brooklyn	10	Bay Ridge, Dyker Heights, Fort Hamilton
	Manhattan	2	Greenwich Village, Hudson Square, Little Italy, NoHo, SoHo, South Village
	Manhattan	3	Chinatown, East Village, Lower East Side, Two Bridges, NoHo
	Manhattan	5	Flatiron, Gramercy Park, Midtown, Midtown South, Murray Hill, Times Square
	Manhattan	7	Lincoln Square, Manhattan Valley, Upper West Side
	Manhattan	8	Carnegie Hill, Lenox Hill, Roosevelt Island, Upper East Side, Yorkville
	Queens	2	Blissville, Hunters Point, Long Island City, Sunnyside, Sunnyside Gardens

Table 5. Summary of community districts with high densities of buildings enrolled in two programs.

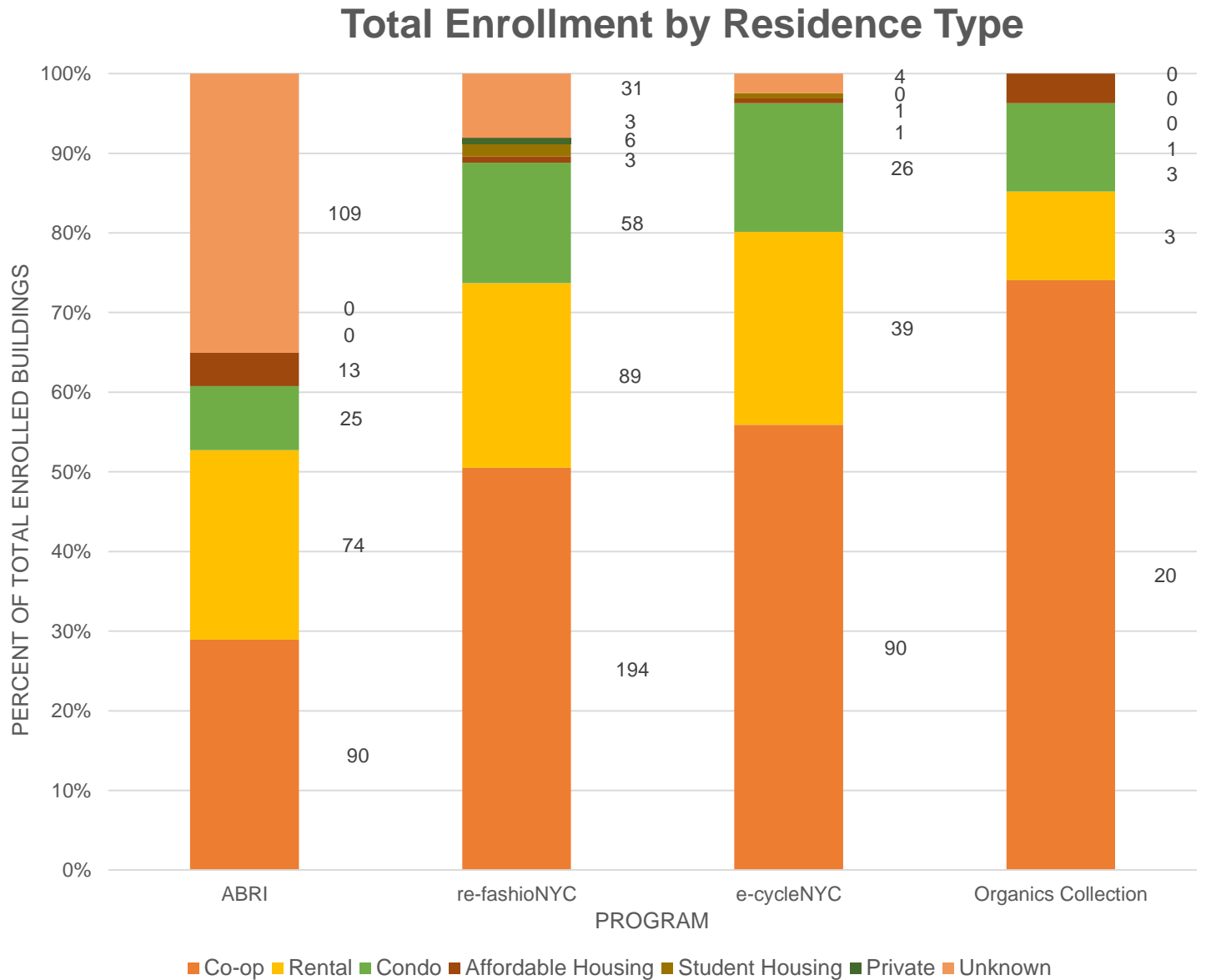# Total Enrollment by Residence Type

Figure 11. Residence type analysis for enrolled buildings in each program. Numeric labels indicate the number of buildings of each residence type enrolled in the programs, while the y-axis denotes the percentage of that residence type among total program enrollment.

2.3.2
site suitability analysis

Section Summary: Site Suitability Analysis

Purpose of Analysis: This section provides a model for BWPRR's future program outreach efforts. It begins with an overview of the current state of enrollment and interest in each program, followed by an assessment of these trends and how they have changed over time. Building off these spatial-temporal analyses, the discussion will then move into the specifics of who is enrolling in these programs, specifically in terms of the types of residences that are enrolling and the socio-economic characteristics of those districts with highest densities of enrollment. The section will then end with an identification of community districts for further targeting that either (1) have low rates of recycling or (2) have a greater likelihood of enrolling in the respective program.

Highlights: Analysis of spatial distribution of cumulative enrollment and interest suggests that community districts with high percentages of co-ops and multi-family rentals, high percentages of current enrollment in one or more of the programs, as well as a higher or lower rate of recycling at present were correlated to relatively high enrollment or interest. A handful of economic and social factors that affect recycling behavior were also considered. Since the same factors were weighted differently for each of the four programs, the results indicate slightly different trends. Detailed analysis of the site suitability methodology can be found in Appendix B.

ABRI

2.3.2 site suitability analysis

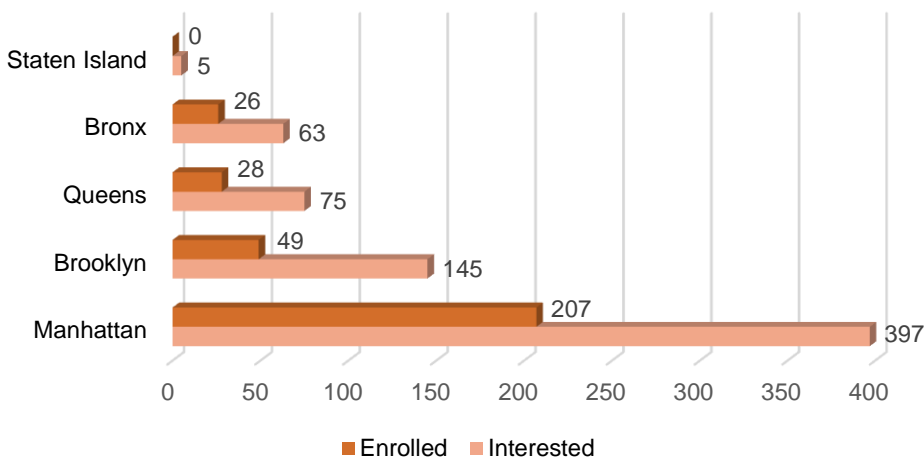## ABRI CUMULATIVE ENROLLMENT AND INTEREST

Figure 12. Cumulative interest and enrollment in ABRI by borough.
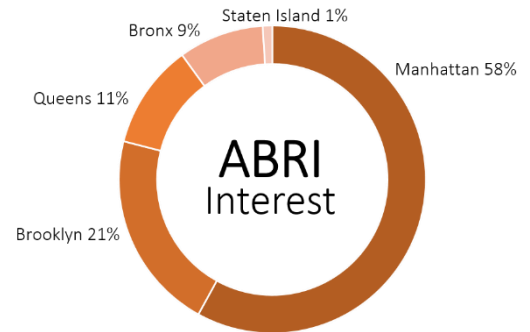
Figure 13. Cumulative interest in ABRI by borough.
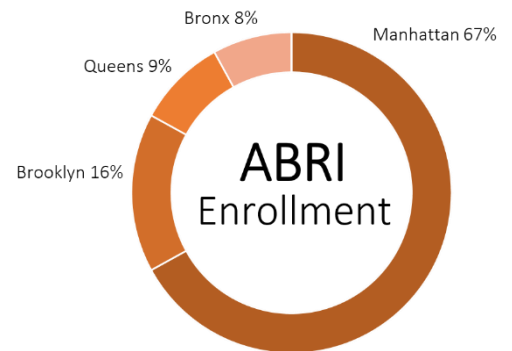
Figure 14. Cumulative enrollment in ABRI by borough.

Current Enrollment Status

[program highlights]

Since the program's inception in 2007, a total of 685 buildings have demonstrated interest in ABRI (*Figure 12*). However, only 311 of those sites participated in the training and site visit that are required for enrollment (*Figure 12, Table 6*).

Representing over half the program's enrollment (67%) and interest (58%) distribution, ABRI's spread in Manhattan represents nearly three times the interest in Brooklyn, the second highest distribution and more than four times its enrollment (*Figures 13 & 14*). Clearly, ABRI is most popular in the borough of Manhattan; but interestingly enough, ABRI is the only program that has achieved any level of interest from Staten Island, although none of the five buildings from Staten Island that were interested in ABRI enrolled in the program (*Figure 14*).

ABRI: CUMULATIVE INTEREST AND ENROLLMENT

Figure 15. Cumulative interest and enrollment in ABRI over time.

ABRI

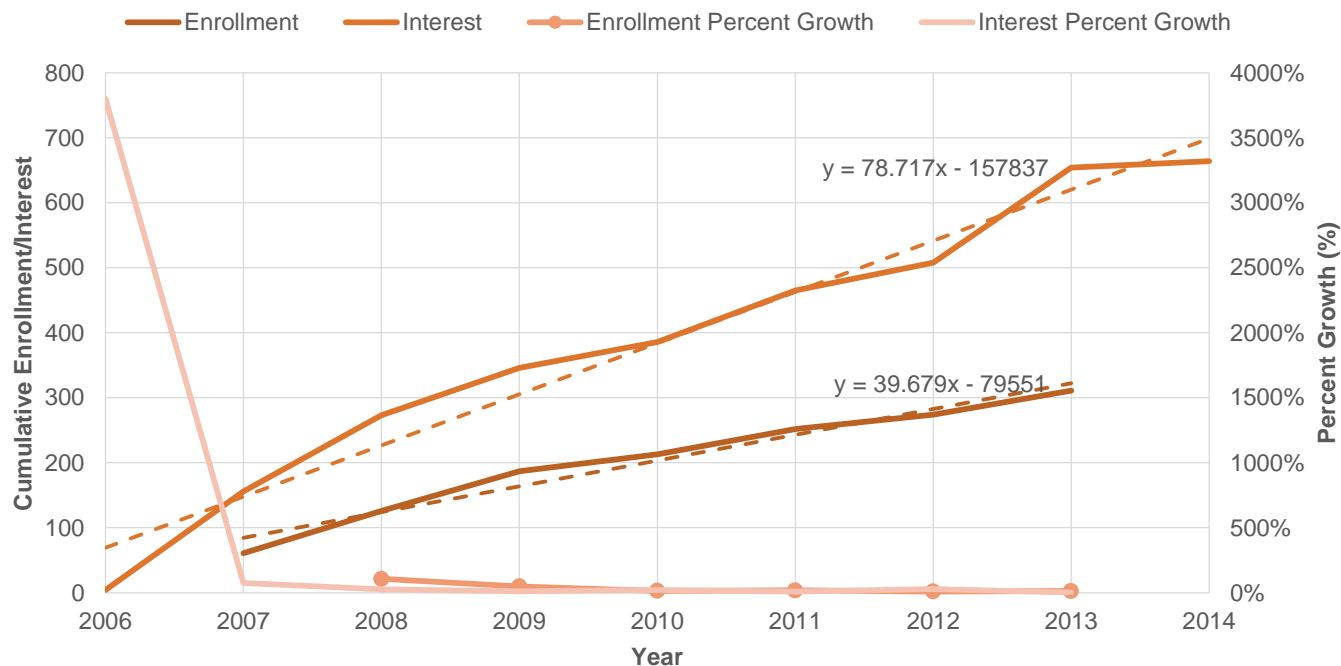| Year	Residence Enrollment	% Change
2007	61	-
2008	126	107
2009	187	48
2010	213	14
2011	252	18
2012	274	9
2013	311	14

Table 6. Percent change in ABRI Enrollment (2007-2013).

ABRI

Year	Interest	% Growth
2006	4	-
2007	156	3800.0
2008	273	75.0
2009	346	26.7
2010	386	11.6
2011	465	20.5
2012	508	9.2
2013	654	28.7
2014	664	1.5

Table 7. Percent change in ABRI Interest (2007-2014.)

Overall, interest and enrollment in ABRI have seen a general rate of increase throughout the years. Since 2007, enrollment has increased at a rate of approximately 40 residences per year, while the rate of interest is slightly higher with about 79 residences showing interest each year (*Figure 15*). That is to say that based on this pattern, both the trends in interest and enrollment show that current strategies for program expansion perform below DSNY BWPRR's goal of expanding into 100 residences in 2014. Thus, current marketing and outreach strategies must be greatly enhanced to meet client goals. In general, the highest percent increase in interest and enrollment was most significant in 2007 and 2008, respectively. In these years enrollment increased 107% from 2007 to 2008, while interest peaked at a 3800% change from 2006 to 2007. However, immediately thereafter, the increase in enrollment and interest drops by 59% and 3725%, respectively. In the following years it becomes much more explicit that the increases in enrollment and interest have been on the decline (*Table 6 and 7*). Still, it is important to note that the outstanding increases in interest and enrollment between 2006 and 2008 may be attributable to the introduction of the program, when marketing strategies and outreach were likely most significant in order to facilitate implementation. A further discussion of this marketing scheme will be discussed in *Section 2.3.4 Interest Analysis*.
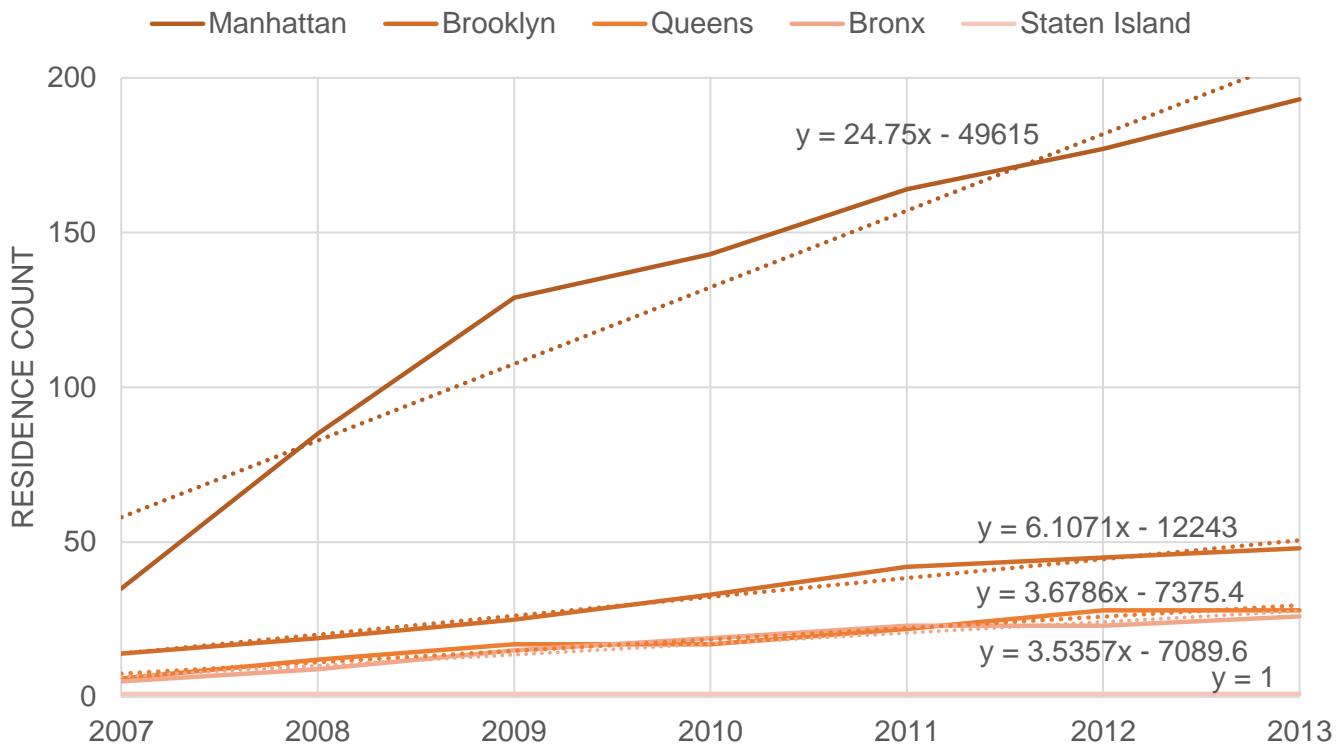
ABRI: CUMULATIVE ENROLLMENT BY BOROUGH

Figure 16. Cumulative borough-wide enrollment in ABRI over time.

Further analysis indicates that the increases seen in enrollment from 2007 to 2013 are most attributable to the increase in enrollment in Manhattan. Representing 67% of cumulative enrollment over the last seven years (*Figure 16*), specifically, the rate of enrollment in Manhattan is nearly 25 residences per year (*Figure 16*). Comparatively, this represents four times the rate of enrollment in Brooklyn (six residences per year), the borough with the second highest level of enrollment over the seven year span. While Queens and the Bronx have demonstrated small, but similar rates of increase across all years, with Staten Island lagging furthest behind, it is clear that enrollment has been highest in Manhattan. Having said that, *Table 6* illustrates a 410% increase in enrollment from 2007 to 2013. Due to the magnitude of the rate of increase in Manhattan (*Figure 16*), data suggests that much of the enrollment can be attributed to Manhattan and therefore the general decline in the percent increase over time may be due to the increase of enrolling buildings mainly in Manhattan. Essentially, as the program enrolls more buildings in this borough, the returns to enrollment will eventually decline as the percent increases in enrollment in *Figure 15* and *Table 6* suggest. Thus, while the average rate of enrollment for the four remaining boroughs is approximately four residences per year, with a residence population of 30,000 buildings, this small rate of increase means a significant opportunity for expansion lies in these boroughs. That being said, though efforts to expand in Manhattan have been successful in comparison to the other boroughs over the years, greater efforts should be focused in these regions. Otherwise, trends may continue to demonstrate a decrease in percent growth for program enrollment (*Table 6*) in the long term. A geographic summary of cumulative enrollment and interest in ABRI by community district are further illustrated in *Figures 17 and 18*, and a summary of the districts and their neighborhoods with the highest density of interest and enrollment are listed in *Table 8*.
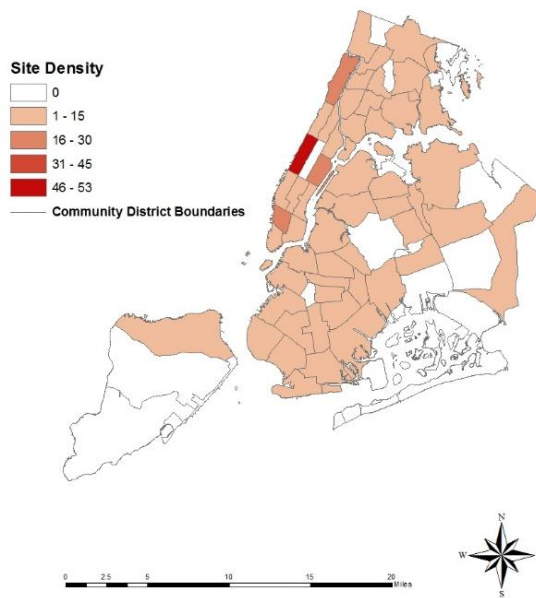
ABRI: Cumulative Enrollment

Figure 17. Density of ABRI enrollment by community district.

ABRI: Cumulative Interest
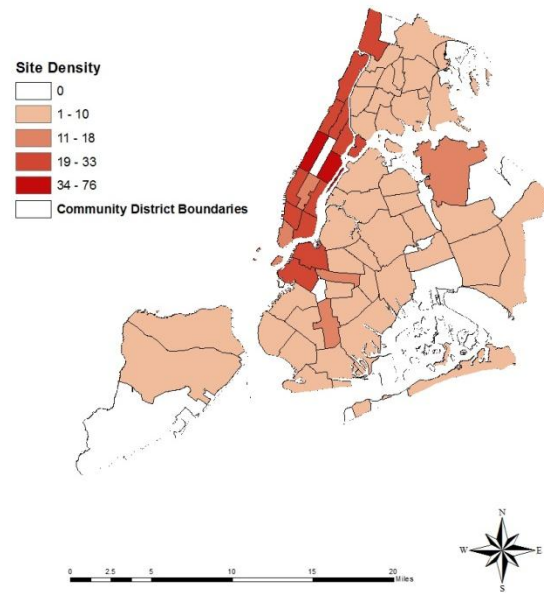
Figure 18. Density of ABRI interest by community district.

	Borough	District	Neighborhoods
	Manhattan	2	Greenwich Village, Little Italy, SoHo, West Village
	Manhattan	3	Lower East Side, Chinatown, Two Bridges
	Manhattan	4	Chelsea, Clinton, Hudson Yards
	Manhattan	6	Murray Hill, Stuyvesant Town, and Turtle Bay
	Manhattan	7	Manhattan Valley and the Upper West Side
Interest (>20)	Manhattan	8	Lenox Hill, Yorkville, Roosevelt Island, and the Upper East Side
	Manhattan	9	Manhattanville and Hamilton Heights
	Manhattan	10	Central Harlem and Harlem
	Manhattan	11	East Harlem, Harlem, Randall's Island and Ward's Island
	Manhattan	12	Washington Heights and Inwood
	Bronx	8	Fieldston, Riverdale, North Riverdale, Spuyten Duyvel, Marble Hill and Kingsbridge
	Brooklyn	6	Red Hook, Gowanus, Park Slope, Carroll Gardens, Cobble Hill
	Borough	**District**	**Neighborhoods**
	Manhattan	2	Greenwich Village, Little Italy, SoHo, West Village
Enrollment (>15)	Manhattan	7	Manhattan Valley, Upper West Side
	Manhattan	8	Lenox Hill, Yorkville, Roosevelt Island, Upper East Side
	Manhattan	12	Washington Heights and Inwood

Table 8. Community districts with highest densities of interest (>20 buildings) and enrollment (>15 buildings).

ABRI: ENROLLMENT GROWTH

■2007 ■2008 ■2009 ■2010 ■2011 ■2012 ■2013
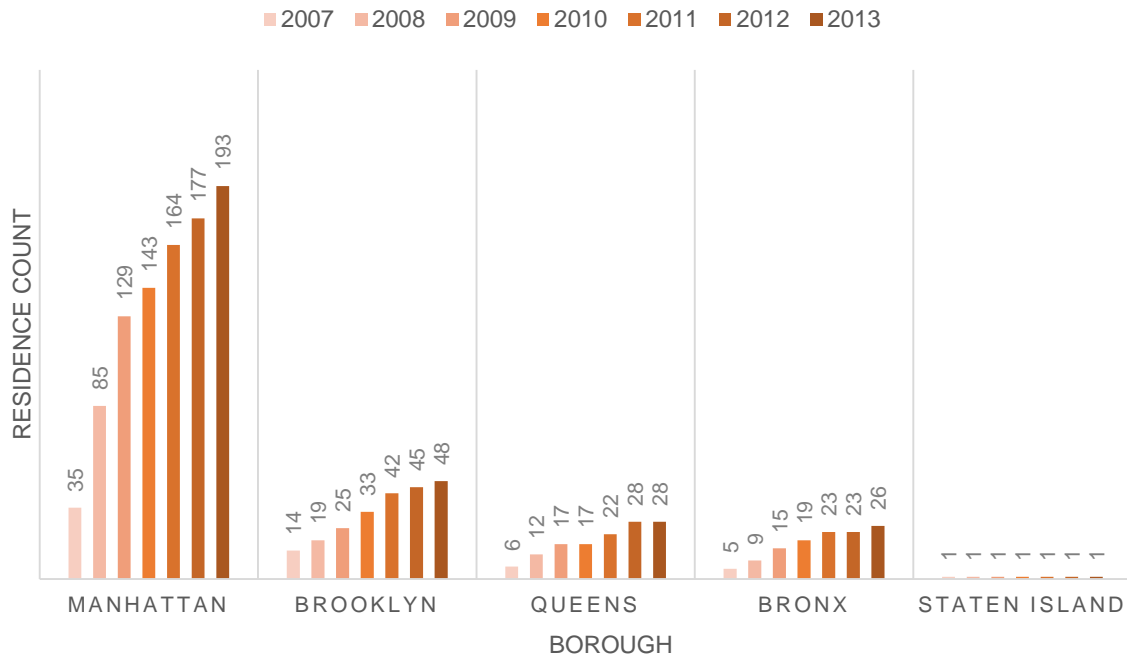
Figure 19. Growth in borough-wide ABRI enrollment: 2007 to 2013.

Enrollment and interest in Manhattan far outweighs other New York City boroughs; most notably, the 12 districts with the highest levels of interest (>20 residences per district, *Figure 18*) are primarily concentrated in 10 Manhattan districts, while the remaining two districts are located in the Bronx and in Brooklyn (*Table 8*). However, despite the breadth of districts that have expressed interest in ABRI, a comparison of *Figures 15, 17* and *Table 6* demonstrate that there is a clear drop off in those districts that do remain interested and enroll in the program. Note that of those districts with the highest density of interest that ultimately enrolled comprised of only four of the twelve sites, all of which were located in Manhattan, whose total enrollment equaled 193 in 2013 (*Figure 19*).

Essentially, while enrollment and interest is widespread, with no more than 15 buildings having expressed interest in Staten Island, highest levels of enrollment are clustered in mainly four Manhattan districts and these populations are characterized in *Table 9*, which generally conclude that, with the exception of Manhattan 12, the community districts with the highest levels of enrollment had at least 68% of the population defined as middle-class or above, had generally similar education levels and capture and diversion rates.

District	Housing Type	Unemployment Rate	Income Levels	Education Level	Language at Home	Capture Rate	Diversion Rate	Current Enrollment
Manhattan 2	7.32% co-ops 38.6% multi-family 16.33% single-family	5.3%	23.4% low-income 49.2% middle-income 27.4% upper-income	95.5% HS graduate 80.2% Bachelor's degree	73.4% English only 26.6% non-English	49.3%	25.5%	16-30 sites
Manhattan 7	16.39% co-ops 56.25% multi-family 10.11% single-family	6.3%	31.9% low-income 44.8% middle-income 23.3% upper-income	94.3% HS graduates 75% Bachelor's degree	71.9% English only 28.1% non-English	47.4%	24.6%	16-30 sites
Manhattan 8	14.45% co-ops 45.10% multi-family 20.75% single-family	6%	24% low-income 49.4% middle-income 26.6% upper-income	96.7% HS graduates 77.7% Bachelor's degree	74.5% English only 25.5% non-English	47.1%	24.4%	46-53 sites
Manhattan 12	5.72% co-ops 61.22% multi-family 6.88% single-family	15.6%	59% low-income 38.1% middle-income 2.9% upper-income	68.5% HS graduate 29.4% Bachelor's degree	26% English only 74% non-English	42.2%	13%	46-53 sites

Table 9. Socio-demographic characteristics of community districts with the highest density of enrollment in ABRI (>15 buildings enrolled).

While substantial analysis indicates that enrollment is most dense in Manhattan populations, enrollment in ABRI is still widespread. Though enrollment in Staten Island is limited in its scope, an analysis of the residences that enroll in ABRI indicate that in totality, student, affordable, and private housing, defined as "other" in *Figures 20, 21, 22*, comprise of the majority of ABRI residential enrollment (122 residences). Considering "other" comprises of three residence types, the statement is less robust and, in fact, affordable housing represents only a little more than about a tenth of co-op enrollment – which has the second highest level of enrollment. That being said, this small proportion of enrollment in "affordable housing" is consistent with studies showing a negative correlation between low-income households and recycling rates in New York City.

Still, co-ops and rentals rank nearly on par with each other and have the greatest frequency of enrollment (90 and 74 respectively). However, the proportion of co-ops enrolled is slightly higher, with condos representing the smallest portion (25 buildings) for all five NYC boroughs. The high co-op participation can be explained by conversations with DSNY's former Deputy Director and Resident Anthropologist. Speculating that the reason for high co-op involvement is due to the ownership attribute, the former Deputy Director states that long-term tenants are more concerned about the care and community aspect of their buildings and for such reasons, are more likely to recycle. This differs from condos in that the ownership attribute is there, but perhaps not the community aspect-- co-op boards work towards consensus among residents on building practices whereas condos do not have this intrinsic attribute.

Figure 20. ABRI enrollment by residence type. Note that "Other" includes student housing and affordable housing.

Figure 21. ABRI enrollment by borough and residence type.

ABRI Residence Enrollment
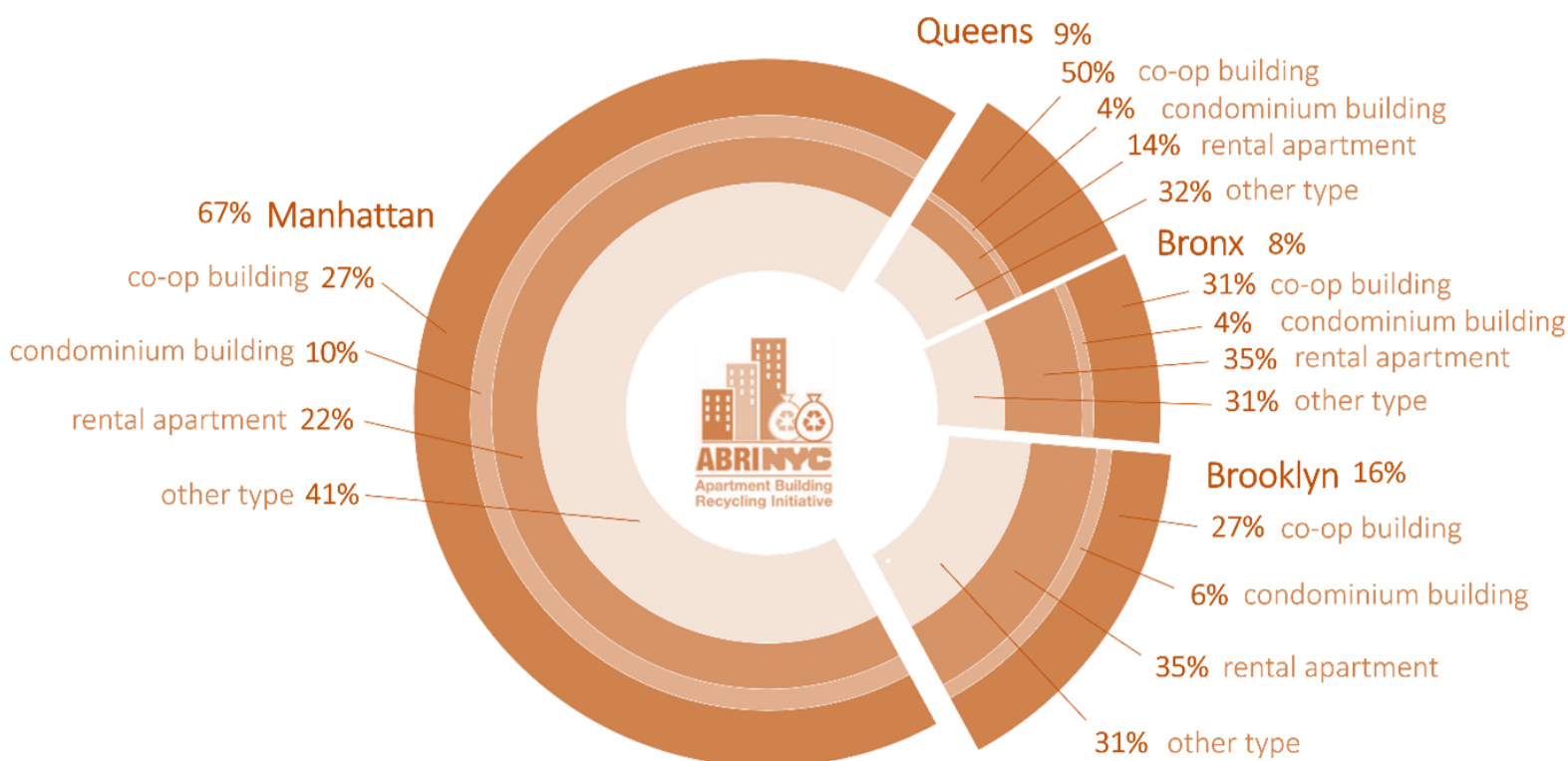
Figure 22. ABRI enrollment by borough and residence type.

In general, *Figures 20, 21, 22* suggest that enrollment in ABRI is greatest in Manhattan (67%) and the spread of enrollment by residences is generally highest in co-ops for the boroughs of Manhattan and Queens. While the greatest frequencies in enrollment for Brooklyn and the Bronx can be attributed to rental apartments, co-op buildings still rank second in enrollment. Essentially, co-ops and rental apartments constitute the majority of enrollment in ABRI for each borough.

This data analysis is further confirmed in interviews with BWPRR Outreach Specialists and building management association representatives: in boroughs that are experiencing higher rates of development (such as Manhattan) newer buildings like co-ops are particularly active in the recycling programs because they have a designated resident manager (similar to a super), whose job includes creating a positive experience for the tenants. From their collective experience, the demographic profile of tenants in newer buildings is a factor as well: they are young, upwardly mobile occupants who are familiar with recycling practices.

ABRI: Density of Enrollment by Community District

Average Annual Capture Rate FY 2010- 2013

Note: Capture rate data tracks organics, metal, glass, plastic, and paper recycling, but not textiles or electronic waste

Data Source: New York City Department of Sanitation -
Bureau of Waste Prevention, Reuse and Recycling;
FY 2010-2013 Annual Reports:
New York City Curbside Municipal Refuse and Recycling Statistics
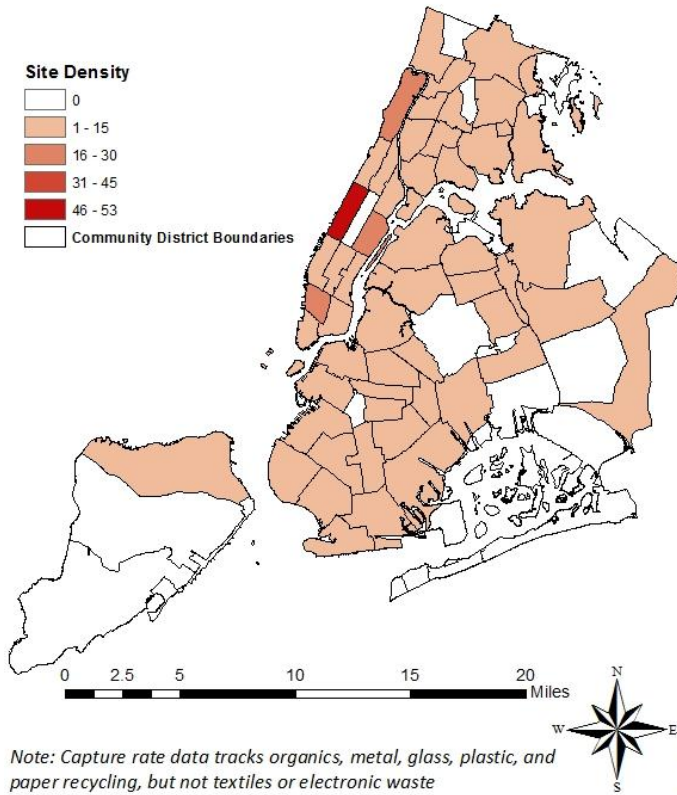
Figure 23. A comparison of current cumulative enrollment in ABRI by community district with the capture rate characterized by community district.

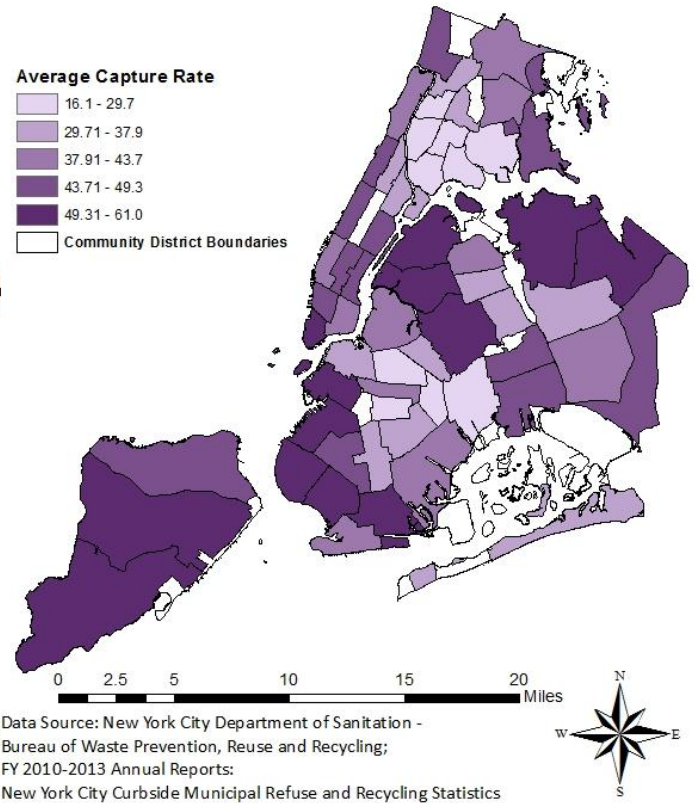| Borough	District	Site Density	Capture Rate
Manhattan	7	46-53	43.71%-49.3%
Manhattan	2	16-30	43.71%-49.3%
Manhattan	8	16-30	43.71%-49.3%
Manhattan	12	16-30	37.91%-43.7%

Table 10. Community districts with highest enrollment in ABRI (>15) and their corresponding capture rates.

Having examined the populations that enroll, it would be interesting to examine their capture rates. A side by side comparison of the cumulative enrollment density by community district for ABRI and the average annual capture rate (2010-2013) illustrates that there are areas with high recycling rates in which ABRI has low enrollment (*Figure 24*). A summary of the districts with the highest levels of enrollment and highest capture rates are summarized in *Table 11 and Appendix A*, respectively. In general, ABRI enrollment is most densely concentrated in community district Manhattan 7, which has a relatively high capture rate (43.71%-49.3%). However, there are low levels of enrollment throughout the five boroughs and the program has not developed a strong presence in many community districts with even higher annual recycling capture rates, such as Manhattan 1 and several community districts in the outer boroughs including Queens 1, 2 and 5; Staten Island 2 and 3; and Brooklyn 6, 10, 11 and 15. These districts may be targeted for ABRI enrollment to build on already existing recycling trends.

Optimal Areas for ABRI Outreach
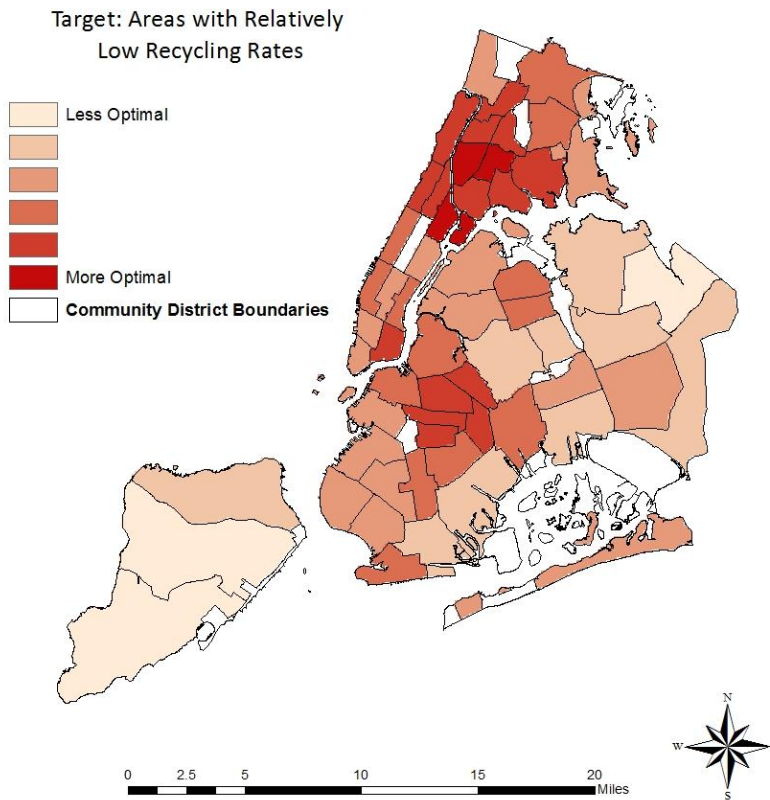
Figure 24. Optimal areas for ABRI outreach for areas with relatively low current recycling rates.

Using residence type as a primary variable, the site suitability analysis for ABRI shows that targeting the following community districts would be most effective for targeting community districts with *low recycling rates*:

1. Bronx 2 (includes Hunts Point, Longwood)
2. Bronx 3 (includes Claremont, Crotona Park East, Melrose, Morrisania)
3. Bronx 4 (includes Concourse, Concourse Village, East Concourse, Highbridge, Mount Eden, and West Concourse)
4. Bronx 6 (includes Bathgate, Belmont, Bronx Park South, East Tremont, and West Farms)
5. Brooklyn 8 (includes Crown Heights, Prospect Heights, Weeksville)
6. Brooklyn 9 (includes Crown Heights South, Prospect Lefferts, Prospect Lefferts Gardens, Wingate)
7. Manhattan 3 (includes Chinatown, East Village, Lower East Side, NoHo, Two Bridges)
8. Manhattan 9 (includes Hamilton Heights, Harlem, Manhattanville, Morningside Heights, West Harlem)
9. Manhattan 10 (includes Central Harlem, Harlem)
10. Manhattan 11 (includes East Harlem, Harlem, Randalls Island, Wards Island)
11. Manhattan 12 (includes Inwood, Washington Heights)

Characterizations of these populations are described in *Table 12*.

District	Housing Type	Unemployment Rate	Income Levels	Education Level	Language at Home	Capture Rate	Diversion Rate	Current Enrollment
Bronx 2	1.24% co-ops 27.03% multi-family 27.97% single-family	17.9%	80.8% low-income 18.9% middle-income 0.40% upper-income	54.7% HS graduate 8.2% Bachelor's degree	73.4% English	27.7%	8.6%	1-15 sites
Bronx 3	0.66% co-ops 29.01% multi-family 32.71% single-family	19.5%	80.5% lower income 19.4% middle-income 0.10% upper-income	59.2% HS graduate 9.7% Bachelor's degree	36.1% English	19.9%	6.1%	1-15 sites
Bronx 4	1.44% co-ops 34.98% multi-family 21.64% single-family	17.7%	75.9% lower-income 23.9% middle-income 0.20% upper-income	60.8% HS graduates 11.6% Bachelor's degree	31.0% English	24.0%	7.3%	1-15 sites
Bronx 6	1.20% co-ops 33.17% multi-family 31.80% single-family	19.5%	80.5% low-income 19.4% middle-income 0.10% upper-income	59.2% HS graduates 9.7% Bachelor's degree	36.1% English	31.2%	9.6%	1-15 sites
Brooklyn 8	1.70% co-ops 42.40% multi-family 40.13% single-family	12.4%	57.4% low-income 39.2% middle-income 3.4% upper-income	80.9% HS graduates 33.8% Bachelor's diploma	78.6% English	41.4%	13.1%	1-15 sites
Brooklyn 16	0.13% co-ops 31.16% multi-family 48.91% single-family	15.4%	71.6% low-income 27.5% middle-income 0.9% upper-income	72.6% HS graduates 10.4% Bachelor's diploma	76.2% English	24.9%	7.9%	1-15 sites
Manhattan 3	5.28% co-ops 57.98% multi-family 3.04% single-family	8.5%	54.1% low-income 39.4% middle-income 6.5% upper-income	72.9% HS graduates 40.8% Bachelor's diploma	45.8% English	40.8%	12.6%	1-15 sites
Manhattan 9	6.41% co-ops 56.27% multi-family 15.35% single-family	10.7%	58.0% low-income 35.5% middle-income 6.6% upper-income	79.1% HS graduates 42.9% Bachelor's diploma	49.5% English	44.8%	13.8%	1-15 sites
Manhattan 10	2.38% co-ops 62.52% multi-family 12.95% single-family	15.0%	61.6% low-income 34.2% middle-income 4.2% upper-income	79.2% HS graduates 32.8% Bachelor's diploma	68.0% English	33.6%	10.4%	1-15 sites
Manhattan 11	2.28% co-ops 54.96% multi-family 3.94% single-family	12.2%	66.0% low-income 30.6% middle-income 3.4% upper-income	72.1% HS graduates 28.5% Bachelor's diploma	46.1% English	30.3%	9.3%	1-15 sites
Manhattan 12	5.72% co-ops 61.22% multi-family 6.88% single-family	15.6%	59.0% low-income 38.1% middle-income 2.9% upper-income	68.5% HS graduates 29.4% Bachelor's diploma	26.0% English	42.2%	13.0%	16-30 sites

Table 11. Socio-demographic characterization of the community districts targeted for outreach based on low current recycling rates.

Optimal Areas for ABRI Outreach
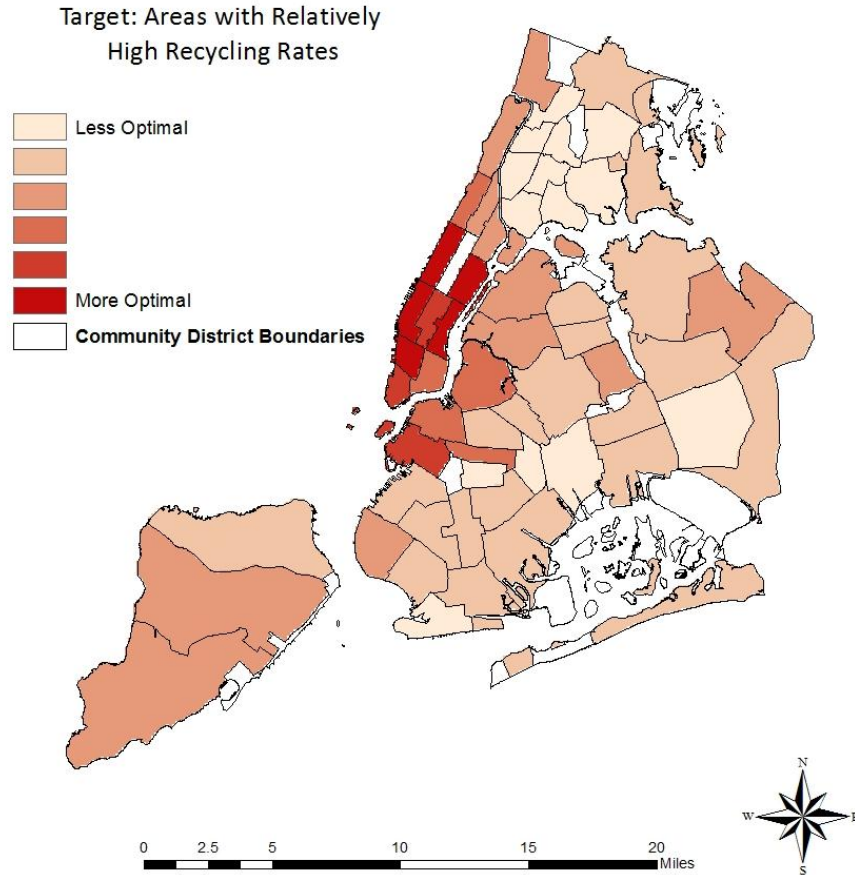
Figure 25. Optimal areas for ABRI outreach for areas with relatively high current recycling rates.

Based on the results of all of the previous analysis, in addition to the weighted factors that guided our site assessments (*Appendix A*), the analysis finds that the five most suitable community districts to target for immediate ABRI program expansion in the short term are primarily located in the borough of Manhattan. The following five community districts would be most effective at increasing interest in the program:

1. Manhattan 2 (includes Greenwich Village, Little Italy, SoHo, and the West Village)
2. Manhattan 4 (includes Chelsea, Clinton, and the Hudson Yards)
3. Manhattan 6 (includes Murray Hill, Stuyvesant Town, and Turtle Bay)
4. Manhattan 7 (includes Manhattan Valley and the Upper West Side)
5. Manhattan 8 (includes Lenox Hill, Yorkville, Roosevelt Island, and the Upper East Side)

Characterizations of these populations are described in *Table 12*.

District	Housing Type	Unemployment Rate	Income Levels	Education Level	Language at Home	Capture Rate	Diversion Rate	Current Enrollment
Manhattan 2	7.32% co-ops 3806% multi-family 16.33% single-family	5.3%	23.4% low-income 49.2% middle-income 27.4% upper-income	95.5% HS graduate 80.2% Bachelor's degree	73.4% English	49.3%	25.5%	16-30 sites
Manhattan 4	8.67% co-ops 44.65% multi-family 5.37% single-family	7.9%	35.3% lower income 42.7% middle-income 21.9% upper-income	93.65 HS graduate 70.9% Bachelor's degree	69% English	43.8%	22.6%	1-15 sites
Manhattan 6	10.83% co-ops 43.65% multi-family 11.53% single-family	6.3%	26.5% lower-income 52.2% middle-income 21.3% upper-income	96.3% HS graduates 78.9% Bachelor's degree	73.2% English	44.7%	23.1%	15 sites
Manhattan 7	16.39% co-ops 56.25% multi-family 10.11% single-family	6.3%	31.9% low-income 44.8% middle-income 23.3% upper-income	94.3% HS graduates 75% Bachelor's degree	71.9% English	47.4%	24.6%	16-30 sites
Manhattan 8	14.45% co-ops 45.10% multi-family 20.75% single-family	6%	24% low-income 49.4% middle-income 26.6% upper-income	96.7% HS graduates 77.7% Bachelor's diploma	74.5% English	47.1%	24.4%	46-53 sites

Table 12. Socio-demographic characterization of the community districts targeted for outreach based on high current recycling rates.

re-fashioNYC

2.3.2 site suitability analysis

re-fashioNYC: ENROLLMENT AND INTEREST BY BOROUGH

■ Interested ■ Enrolled

Staten Island: 0, 11
Queens: 56, 134
Bronx: 34, 96
Brooklyn: 64, 244
Manhattan: 224, 735
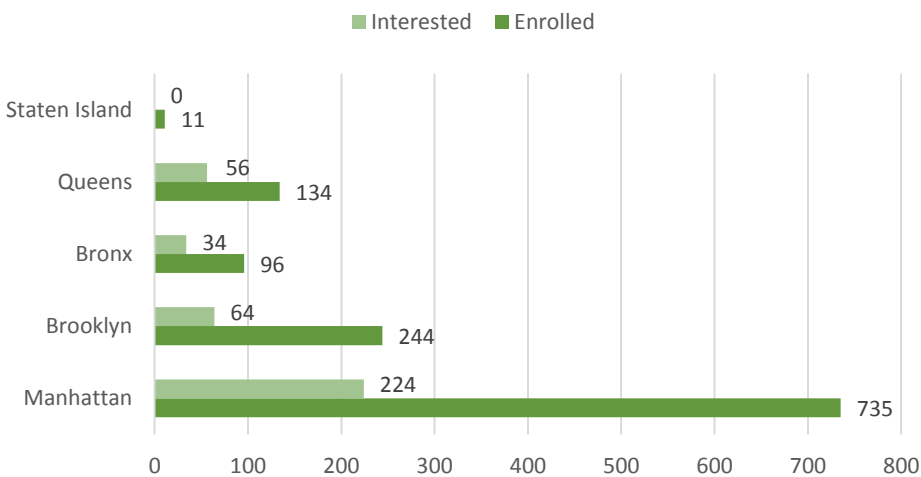
Figure 26. Cumulative interest and enrollment in re-fashioNYC by borough.

re-fashioNYC Interest

Staten Island 1%
Bronx 8%
Queens 11%
Brooklyn 20%
Manhattan 60%

Figure 27. Cumulative interest and enrollment in re-fashioNYC by borough.

re-fashioNYC Enrollment

Bronx 9%
Queens 15%
Brooklyn 17%
Manhattan 59%
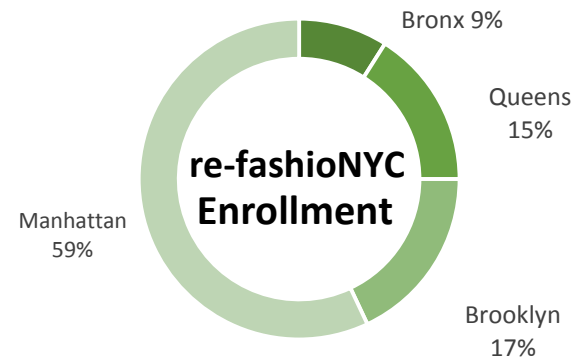
Figure 28. Cumulative enrollment in re-fashioNYC by borough.

Current Enrollment Status
[program highlights]

From May 2011 through December 2013, re-fashioNYC received 1207 interest inquiries in the program (1220 including partial 2014 data). Of these, a total of 370 enrolled. Interest was by far greatest in Manhattan at 60%, a percentage three times greater than the borough expressing second highest cumulative interest (Brooklyn, 20%). Subsequently, enrollment followed a similar trend with highest enrollment in Manhattan (57%) and the second highest enrollment total (3.5 times lower) in Brooklyn (18%). Queens and the Bronx were third and fourth highest for both interest and enrollment respectively. Interest in re-fashioNYC in Staten Island (11 sites in three years) never culminated in enrollment. (*Figure 26, 27, 28*)

re-fashioNYC: CUMULATIVE INTEREST AND ENROLLMENT

Figure 29. Cumulative interest and enrollment in re-fashioNYC over time.

re-fashioNYC

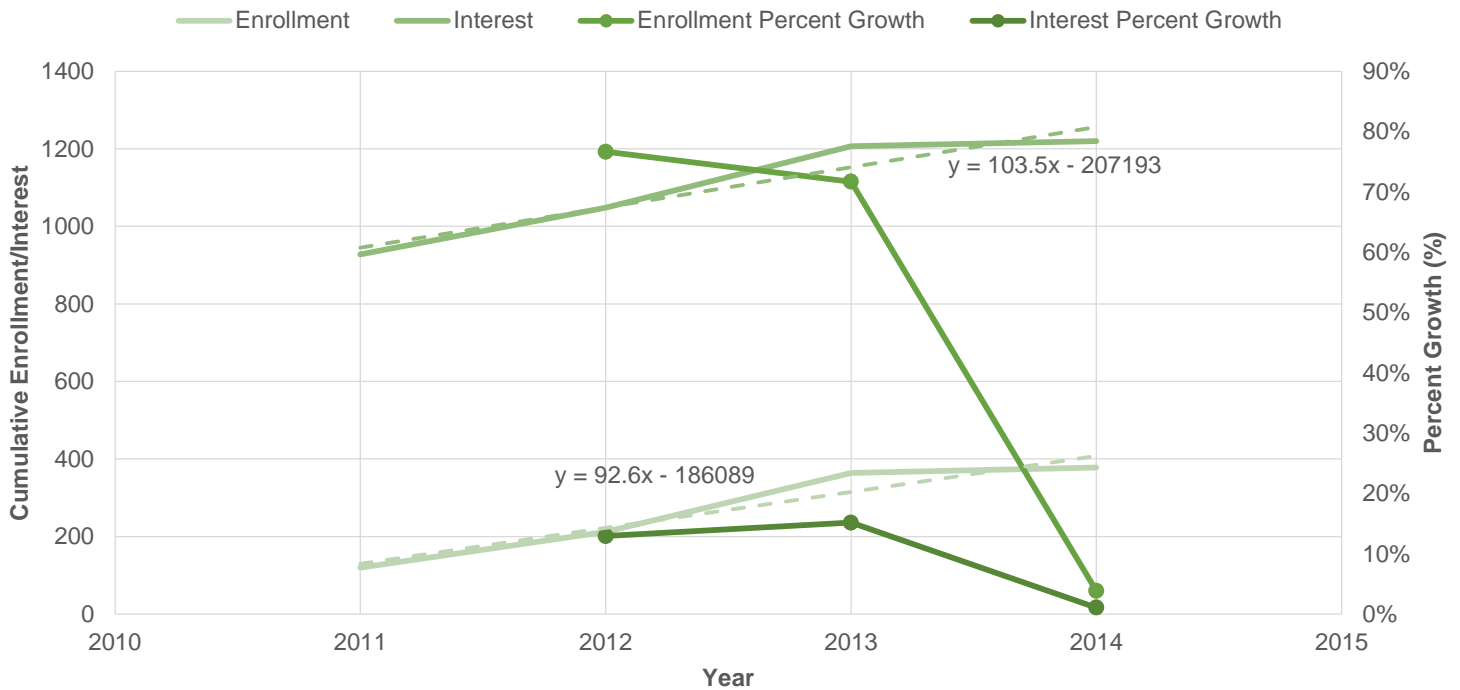| Year	Enrollment	% Growth
2011	126	-
2012	218	73.02
2013	370	69.72

Table 14. Percent change in re-fashioNYC enrollment (2011-2013).

re-fashioNYC

Year	Interest	% Growth
2011	928	-
2012	1048	11.45
2013	1207	13.17
2014	1220	0.01

Table 13. Percent change in re-fashioNYC interest (2011-2014).

re-fashioNYC's first year, 2011, saw a 13.5% conversion rate (126 enrolled of 929 interested parties). The conversion rate increased to 20.8% the following year (218 enrolled of 1046 interested parties). In this time, enrollment increased by about 73% with a concurrent 12.6% increase in interest. The following year, conversion increased again to 30.7% (370 enrolled of 1207 interested). Enrollment continued to grow by 69.7% and interest by 15.4%. Year over year, enrollment and interest have increased, but enrollment growth has slowed in pace over the past year. Since its inception, re-fashioNYC has averaged 238 new sites each year (*Figure 29, Table 13, 14*).
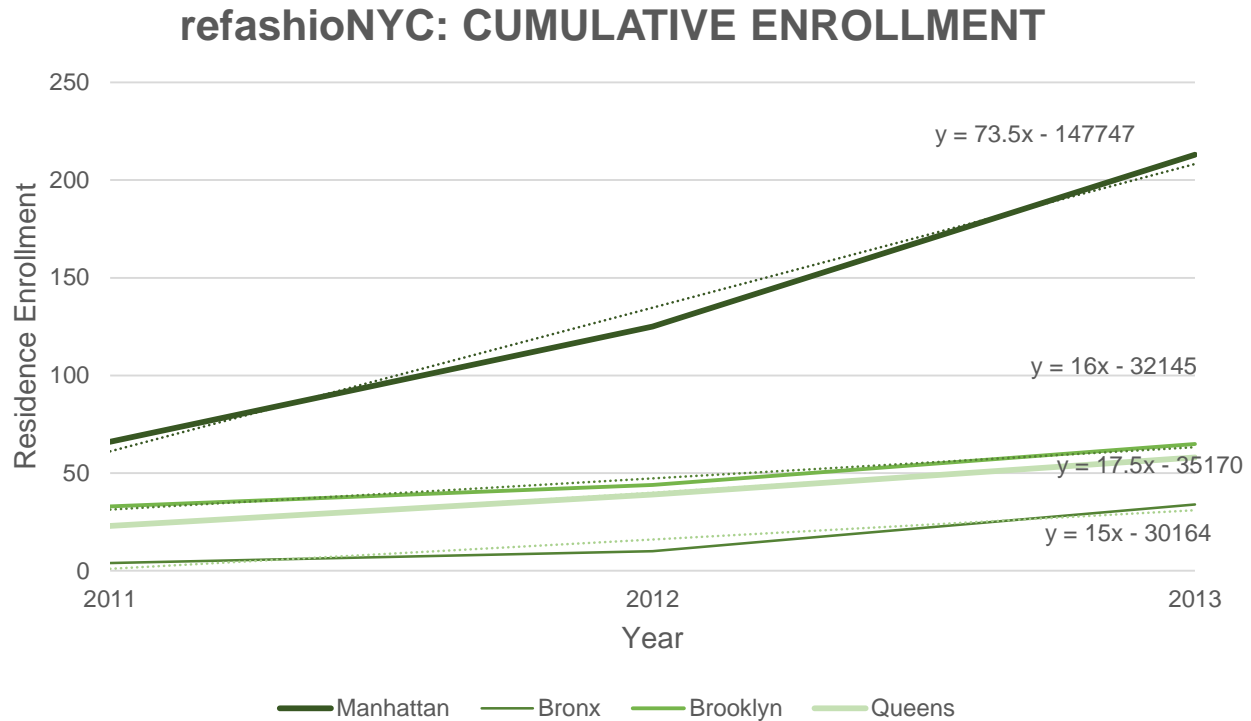
refashioNYC: CUMULATIVE ENROLLMENT

Figure 30. Cumulative borough-wide enrollment in re-fashioNYC over time.

Further analysis indicates that the increases seen in enrollment from 2011 to 2013 are most attributable to the increase in enrollment in Manhattan. Manhattan enrollment accounts for 57.6% of total enrollment for the three years, which is consistent with the 60.3% cumulative interest accrued by the borough. Comparatively, Manhattan enrollment is over three times higher than Brooklyn, the borough with the second highest enrollment over the three-year span. Brooklyn accounts for 17.6% of cumulative enrollment and 19.8% of cumulative interest. This corresponds to an average increase of 21.7 sites per year in Brooklyn versus 71 sites in Manhattan. The Bronx contributes least to cumulative enrollment (9.2%) but like Queens, has low but steady increase from 2011-2013. These results are given with the exception of Staten Island, which currently has zero enrolled sites. The average rate of enrollment for the remaining four boroughs is 30.8 residences per year. Clearly since Brooklyn, Queens, and the Bronx have average yearly site enrollment increases below this average, Manhattan is the strongest contributor to enrollment. Marketing efforts should increase in all boroughs, but particularly those with lower cumulative enrollment than Manhattan (*Figure 30*).
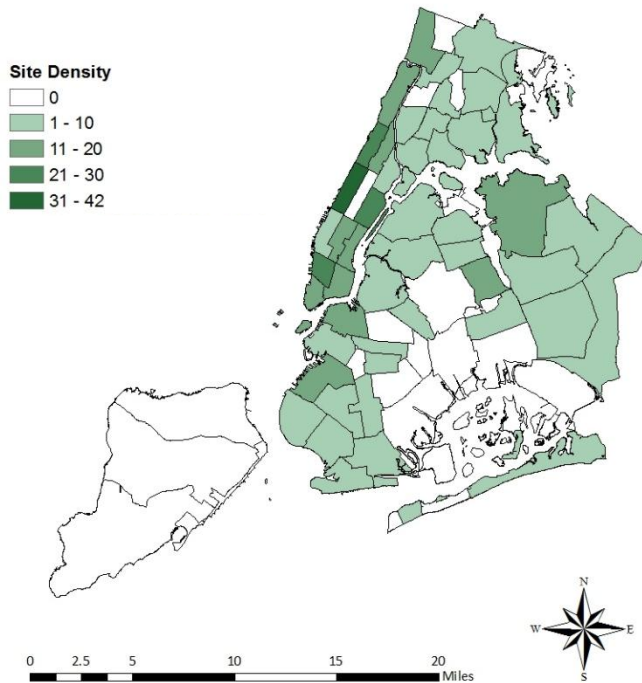
re-fashioNYC: Cumulative Enrollment

Figure 31. Density of re-fashioNYC enrollment by community district

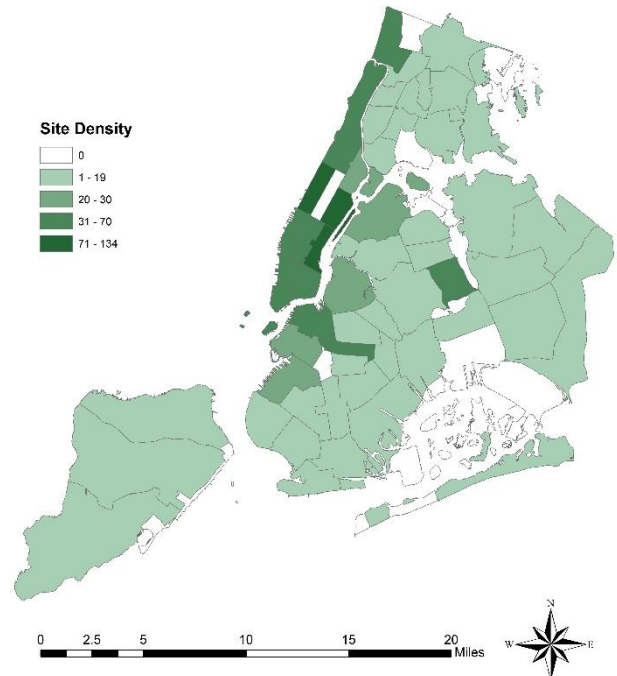## re-fashioNYC: Cumulative Interest

Figure 32. Density of re-fashioNYC interest by community district

	Borough	District	Neighborhoods
Enrollment (>20)	Manhattan	1	Battery Park City, Civic Center, Ellis Island, Financial District, Governors Island, Liberty Island
	Manhattan	2	Greenwich Village, Hudson Square, Little Italy, NoHo, SoHo, South Village, West Village
	Manhattan	3	Chinatown, East Village, Lower East Side, Two Bridges, NoHo
	Manhattan	5	Flatiron, Gramercy Park, Midtown, Midtown South, Murray Hill, Times Square, Union Square
	Manhattan	6	Beekman Place, Gramercy Park, Murray Hill, Peter Cooper Village, Stuyvesant Town
	Manhattan	7	Lincoln Square, Manhattan Valley, Upper West Side
	Manhattan	8	Carnegie Hill, Lenox Hill, Roosevelt Island, Upper East Side, Yorkville
	Manhattan	9	Hamilton Heights, Manhattanville, Morningside Heights, West Harlem
	Manhattan	10	Central Harlem
	Manhattan	12	Inwood, Washington Heights
	Bronx	8	Fieldston, Kingsbridge, Marble Hill, North Riverdale, Riverdale, Spuyten Duyvil
	Brooklyn	2	Boerum Hill, Brooklyn Heights, Clinton Hill, Downtown Brooklyn, DUMBO, Farragut Houses
	Brooklyn	7	Industry City, Sunset Park, Windsor Terrace
	Queens	6	Forest Hills, Forest Hills Gardens, Rego Park
	Queens	7	Auburndale, Bay Terrace, Beechhurst, Clearview, College Point, Downtown Flushing, Flushing
	Borough	District	Neighborhoods
Interest (>70)	Manhattan	6	Beekman Place, Gramercy Park, Murray Hill, Peter Cooper Village, Stuyvesant Town
	Manhattan	7	Lincoln Square, Manhattan Valley, Upper West Side
	Manhattan	8	Carnegie Hill, Lenox Hill, Roosevelt Island, Upper East Side, Yorkville

Table 15. Community districts with highest density of cumulative enrollment (>11 sites) and interest (>30)

re-fashioNYC: ENROLLMENT GROWTH
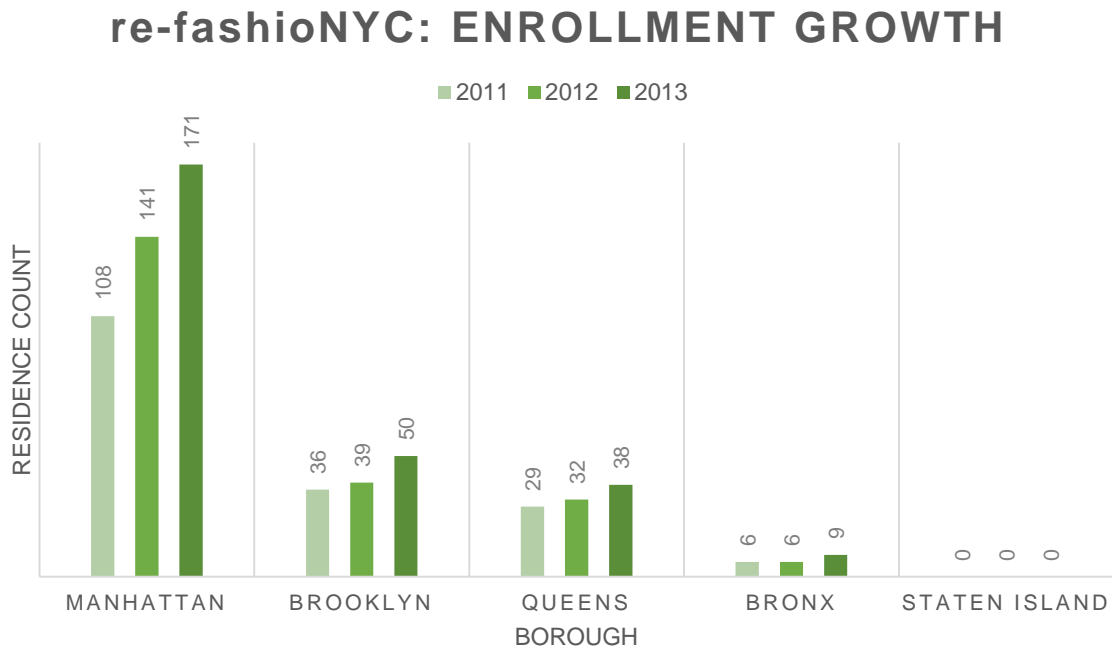
Figure 33. Growth in borough-wide re-fashioNYC enrollment: 2011-2013

Enrollment in Manhattan outweighs that in other boroughs for all three years of re-fashioNYC's existence (*Figure 33*). Of the 15 community districts with high-density enrollment (>11 sites), Manhattan has 10 (66.7%). The remaining five high-density enrollment community districts are in Bronx (1 district), Brooklyn (2 districts), and Queens (2 districts). The four community districts with high-density interest (>41 sites) in re-fashioNYC are all in Manhattan and also all overlap with districts that already have high-density enrollment. Interest becomes more widespread (13 additional sites) when districts with moderate interest (21-40 sites) are considered. This subset still places 46% of interest in Manhattan, followed closely by Brooklyn with about 31%. The number of sites that expressed interest in 2013 exceeded that of 2012 in all boroughs with the exception of Manhattan.

District	Housing Type	Unemployment Rate	Income Levels	Education Level	Language at Home	Capture Rate	Diversion Rate	Current Enrollment
Manhattan 2	7.32% co-ops 38.66% multi-family 16.33% single-family	5.3%	23.4% low-income 49.2% middle-income 27.4% high-income	95.5% HS graduate 80.2% Bachelor's degree	73.4% English only 26.6 non-English	49.3%	25.5%	21-30
Manhattan 7	16.39% co-ops 56.25% multi-family 10.11% single-family	6.8%	31.9% low-income 44.8% middle-income 23.3% high-income	94.3% HS graduate 75.0% Bachelor's degree	71.9% English only 28.1% non-English	47.4%	24.6%	31-42
Manhattan 8	14.45% co-ops 45.0% multi-family 20.75% single-family	6.0%	24.0% low-income 49.4% middle-income 26.6% high-income	96.7% HS graduate 77.7% Bachelor's degree	74.5% English only 25.5% non-English	47.1%	24.4%	21-30
Manhattan 9	6.41% co-ops 56.27% multi-family 15.35% single-family	10.7%	58.0% low-income 35.5% middle-income 6.6% high-income	79.1% HS graduate 42.9% Bachelor's degree	49.5% English only 50.5% non-English	44.8%	13.8%	21-30

Table 16. Socio-demographic characterization of community districts with the highest density of enrollment in re-fashioNYC (>11 buildings).

Looking at re-fashioNYC enrollment including the 2014 data, we still find enrollment highest in Manhattan (59%, increased 2% in 2014). Enrollment is highest in co-op style housing (45%-68%, 194 total sites) in all four enrolled boroughs. Enrollment is second most common in condominium buildings and rental apartments in Manhattan and Brooklyn (roughly 20% for each housing type). These percentages differ in consideration of all four boroughs, particularly because Queens only has 2 enrolled condominiums and the Bronx has 0. In this scenario, rental apartments have 8% higher enrollment than condominiums (*Figures 34 and 35*).
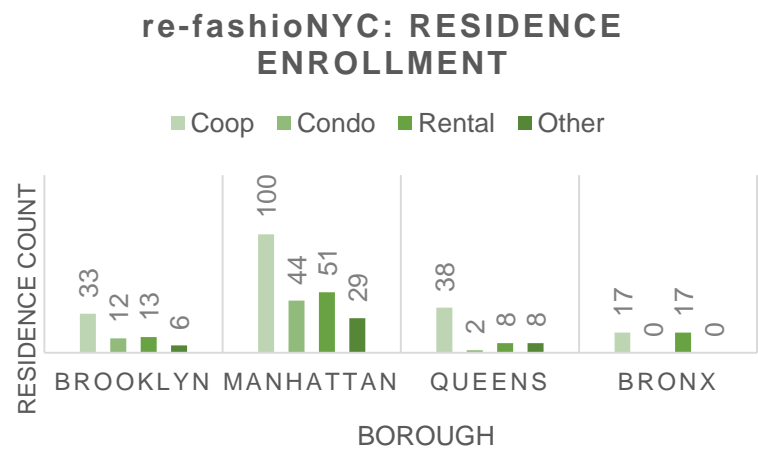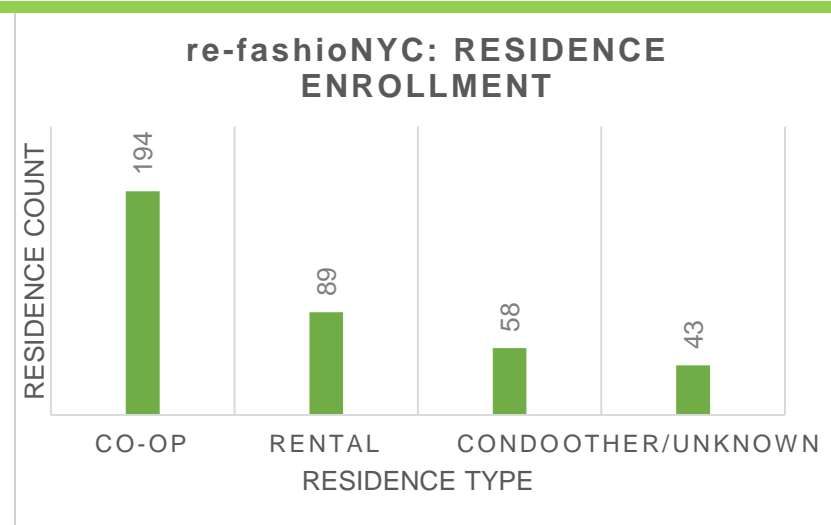
Figure 34. re-fashioNYC enrollment by residence type. Note that "other" includes student housing, affordable housing, private residences, and commercial spaces.

Figure 35. re-fashioNYC enrollment by borough and residence type.

re-fashioNYC Program Enrollment Distribution as of 2014

Queens 24%
68% co-op building
4% condominium building
14% rental apartment
14% other type

59% Manhattan
co-op building 45%
condominium building 20%
rental apartment 23%
other type 13%

Bronx 12%
50% co-op building
50% rental apartment

Brooklyn 12%
52% co-op building
19% condominium building
20% rental apartment
9% other type

re-fashioNYC

Figure 36. re-fashioNYC enrollment by borough and residence type.

Non-residential types of enrollment such as schools, churches, hospitals, gyms, hotels or other types of businesses could increase in the future because these entities are eligible to participate as long as they provide a regular source of textile waste and have secure, sheltered areas for the bins.

re-fashioNYC: Density of Enrollment by Community District

Average Annual Capture Rate FY2010-2013

how much recyclable material
is actually collected as recycling.

Note: Capture rate data tracks organics, metal, glass, plastic, and paper recycling, but not textiles or electronic waste

Data Source: New York City Department of Sanitation -
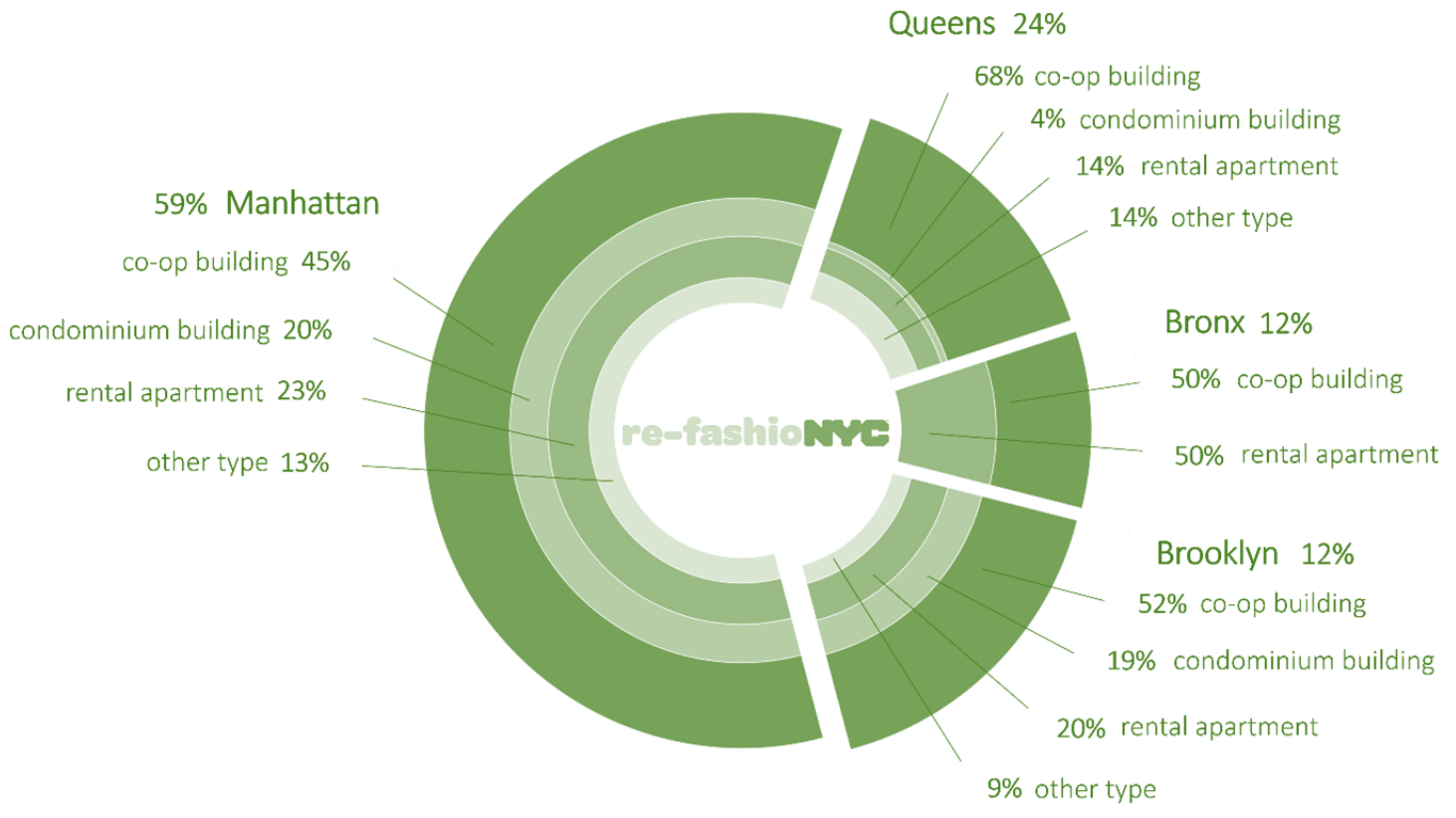Bureau of Waste Prevention, Reuse and Recycling;
FY 2010-2013 Annual Reports:
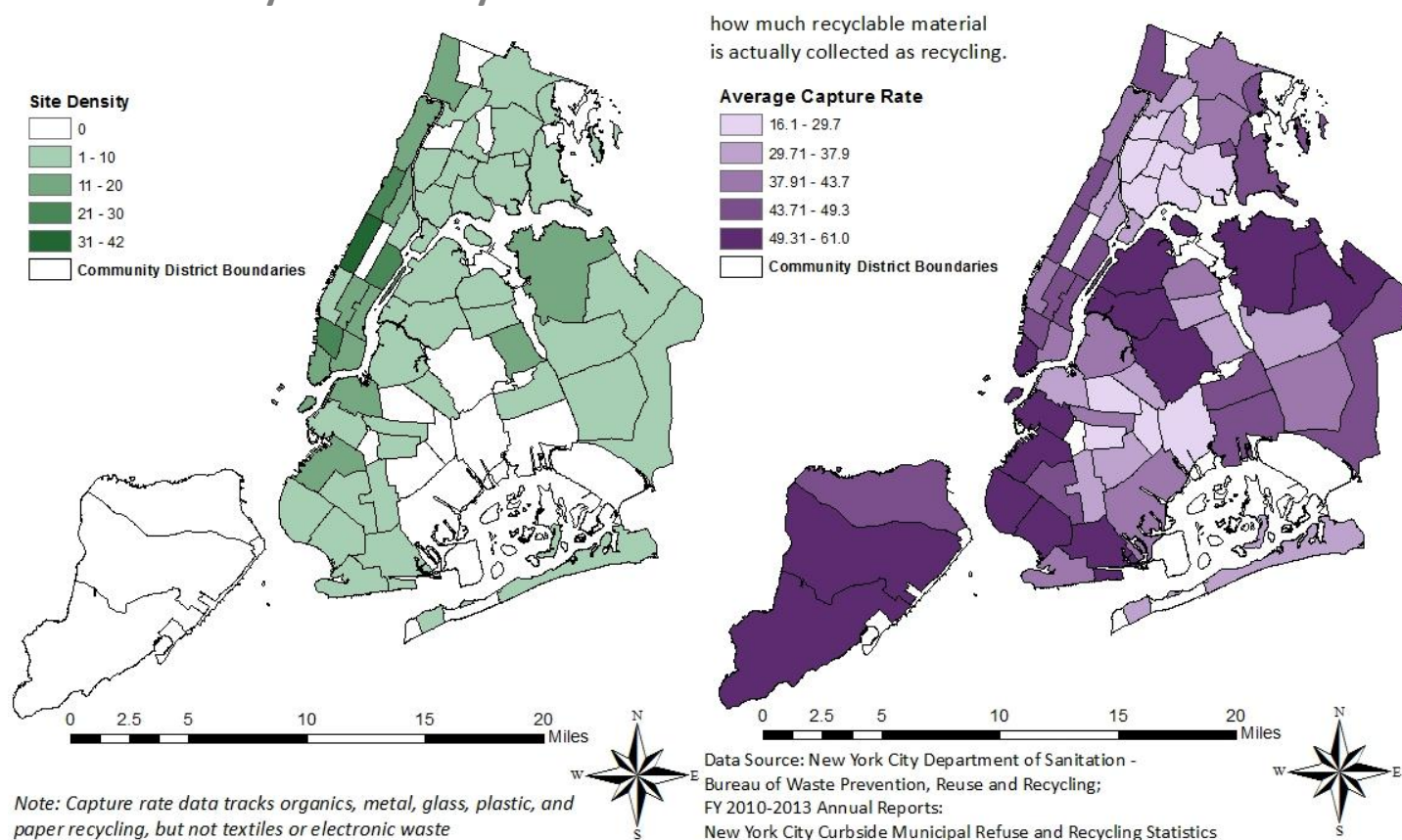New York City Curbside Municipal Refuse and Recycling Statistics

Figure 37. A comparison of cumulative enrollment in re-fashioNYC by community district with the capture rate characterized by community district.

Borough	District	Site Density	Capture Rate
Manhattan	2	21-30	43.71%-49.3%
Manhattan	7	21-30	43.71%-49.3%
Manhattan	8	31-42	43.71%-49.3%
Manhattan	9	21-30	43.71%-49.3%

Table 17. Community districts with highest enrollment in re-fashioNYC (>20) and their corresponding capture rates.

Similar to ABRI, a side by side comparison of the enrollment density for re-fashioNYC and the average annual NYC capture rates (2010-2013) illustrates that there are areas with high recycling rates that ABRI has low enrollment in; but unlike ABRI, re-fashioNYC does find a relationship with districts of high enrollment and relatively high capture rates. A summary of the districts with the highest levels of enrollment for re-fashioNYC (>20) and the highest capture rates (>43.70) are summarized in *Table 17 and Appendix A*, respectively. In general, the districts in which re-fashioNYC has the greatest enrollment all have a relatively high capture rate (43.71%-49.3%), though there are low levels of enrollment throughout the 5 boroughs, the program has not developed a strong presence in many community districts with even higher annual recycling capture rates (>49.30), such as Bronx 10 and several other community districts in the outer boroughs including Queens 1, 2, 5, and 7; Staten Island 2 and 3; and Brooklyn 10, 11 and 15.

Optimal Areas for re-fashioNYC Outreach

Target: Areas with Relatively
Low Recycling Rates

Less Optimal

More Optimal

Community District Boundaries

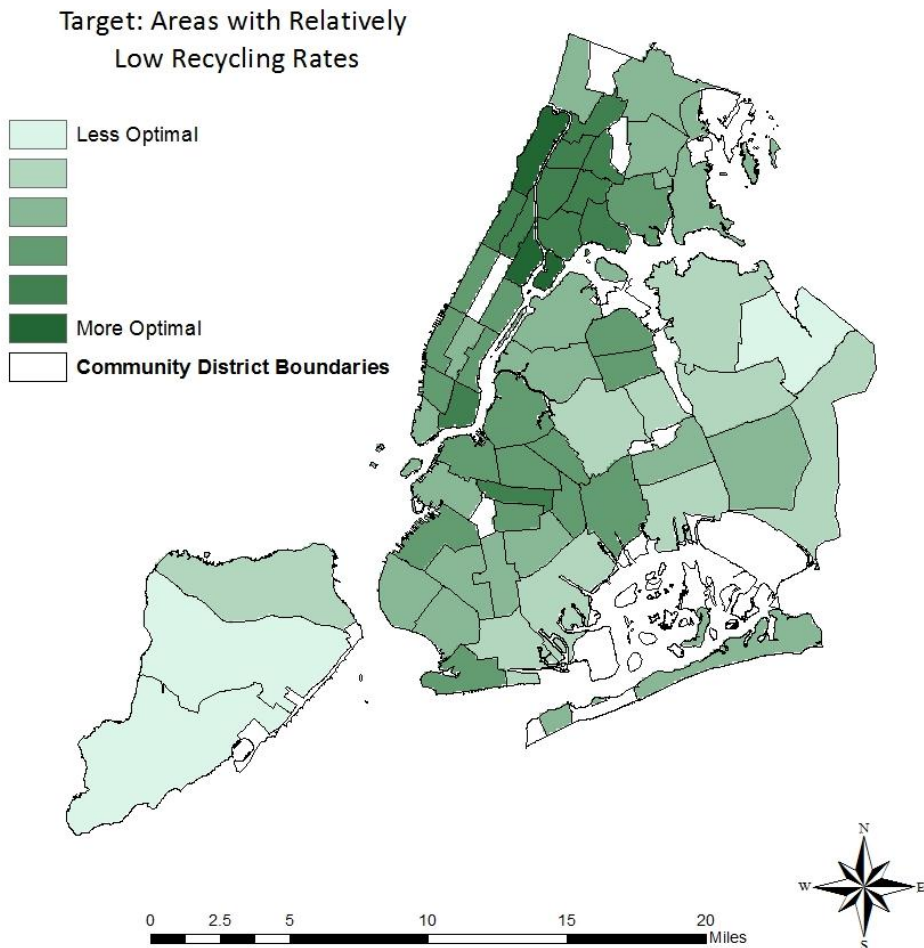0   2.5   5   10   15   20
Miles

Figure 38. Optimal areas for re-fashioNYC outreach for areas with relatively low current recycling rates.

Using residence type as a primary variable, the site suitability analysis for re-fashioNYC shows that targeting the following community districts would be most effective for targeting community districts with *low recycling rates*:

1. Bronx 4 (includes Concourse, Concourse Village, East Concourse, Highbridge, Mount Eden, West Concourse)
2. Bronx 6 (includes Bathgate, Belmont, Bronx Park South, East Tremont, West Farms)
3. Brooklyn 8 (includes Crown Heights, Prospect Heights, Weeksville)
4. Manhattan 3 (includes Chinatown, East Village, Lower East Side, NoHo, Two Bridges)
5. Manhattan 4 (includes Chelsea, Clinton, and the Hudson Yards)
6. Manhattan 9 (includes Hamilton Heights, Harlem, Manhattanville, Morningside Heights, West Harlem)
7. Manhattan 10 (includes Central Harlem, Harlem)
8. Manhattan 11 (includes East Harlem, Harlem, Randalls Island, Wards Island)
9. Manhattan 12 (includes Inwood, Washington Heights)

Characterizations of these populations are described in *Table 18*.

District	Housing Type	Unemployment Rate	Income Levels	Education Level	Language at Home	Capture Rate	Diversion Rate	Current Enrollment
Bronx 4	1.44% co-ops 34.98% multi-family 21.64% single-family	17.7%	75.9% lower-income 23.9% middle-income 0.20% upper-income	60.8% HS graduates 11.6% Bachelor's degree	31.0% English	24.0%	7.3%	1-5 sites
Bronx 6	1.20% co-ops 33.17% multi-family 31.80% single-family	19.5%	80.5% low-income 19.4% middle-income 0.10% upper-income	59.2% HS graduates 9.7% Bachelor's degree	36.1% English	31.2%	9.6%	0 sites
Brooklyn 8	1.70% co-ops 42.40% multi-family 40.13% single-family	12.4%	57.4% low-income 39.2% middle-income 3.4% upper-income	80.9% HS graduates 33.8% Bachelor's diploma	78.6% English	41.4%	13.1%	1-5 sites
Manhattan 3	5.28% co-ops 57.98% multi-family 3.04% single-family	8.5%	54.1% low-income 39.4% middle-income 6.5% upper-income	72.9% HS graduates 40.8% Bachelor's diploma	45.8% English	40.8%	12.6%	6-10 sites
Manhattan 4	8.67% co-ops 56.27% multi-family 15.35% single-family	7.9%	35.3% low-income 42.7% middle-income 21.9% upper-income	93.6% HS graduates 70.9% Bachelor's diploma	69.0% English	43.8%	22.6%	1-5 sites
Manhattan 9	6.41% co-ops 44.65% multi-family 5.37% single-family	10.7%	58.0% low-income 35.5% middle-income 6.6% upper-income	79.1% HS graduates 42.9% Bachelor's diploma	49.5% English	44.8%	13.8%	1-5 sites
Manhattan 10	2.38% co-ops 62.52% multi-family 12.95% single-family	15.0%	61.6% low-income 34.2% middle-income 4.2% upper-income	79.2% HS graduates 32.8% Bachelor's diploma	68.0% English	33.6%	10.4%	1-5 sites
Manhattan 11	2.28% co-ops 54.96% multi-family 3.94% single-family	12.2%	66.0% low-income 30.6% middle-income 3.4% upper-income	72.1% HS graduates 28.5% Bachelor's diploma	46.1% English	30.3%	9.3%	1-5 sites
Manhattan 12	5.72% co-ops 61.22% multi-family 6.88% single-family	15.6%	59.0% low-income 38.1% middle-income 2.9% upper-income	68.5% HS graduates 29.4% Bachelor's diploma	26.0% English	42.2%	13.0%	1-5 sites

Table 18. Socio-demographic characterization of the community districts targeted for re-fashioNYC outreach based on relatively low current recycling rates.

Optimal Areas for re-fashioNYC Outreach

Target: Areas with Relatively
High Recycling Rates

Less Optimal

More Optimal

Community District Boundaries

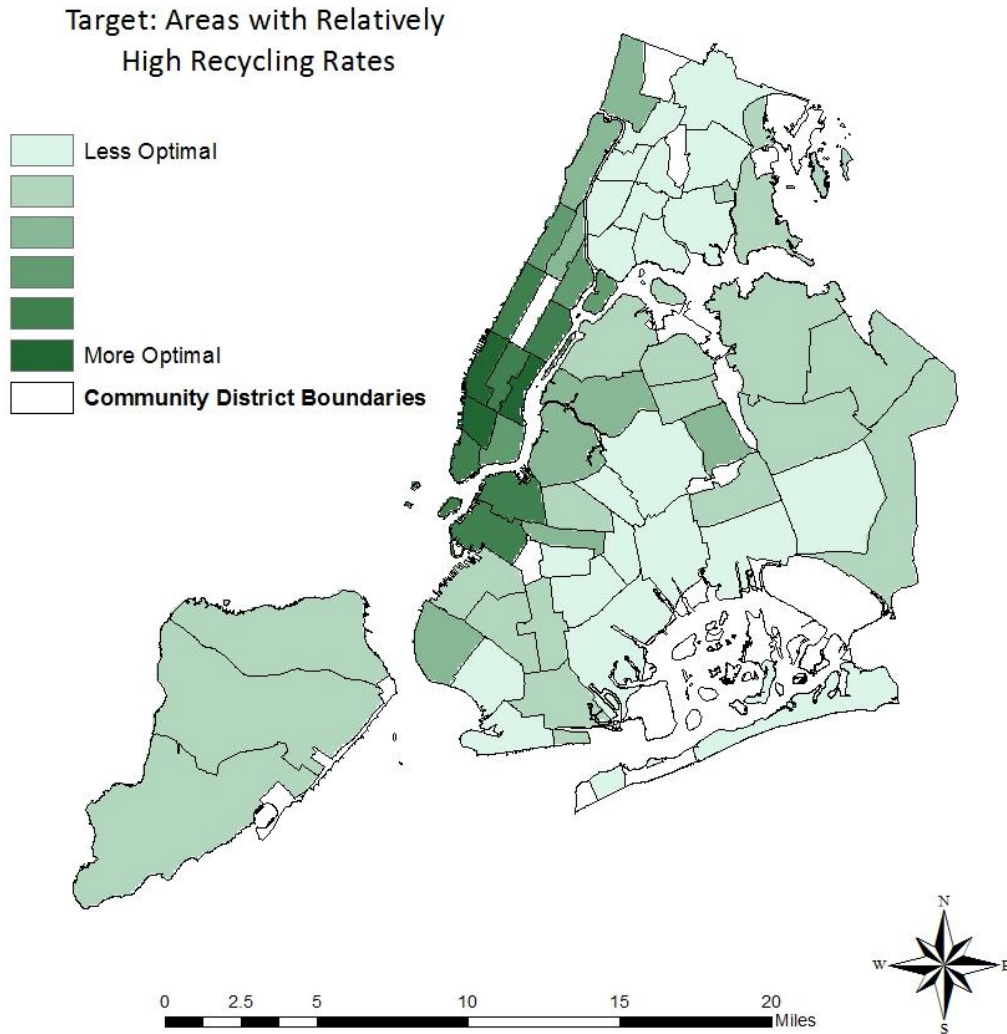0   2.5   5   10   15   20
Miles

N
W   E
S

Figure 38. Optimal areas for re-fashioNYC outreach for areas with relatively high current recycling rates.

Based on the results of all of the previous analysis, in addition to the weighted factors that guided our site assessments (*Appendix A*), the analysis finds that the three most suitable community districts to target for immediate re-fashioNYC program expansion in the short term are primarily located in the borough of Manhattan. The following three community districts would be most effective at increasing interest in the program:

1. Manhattan 2 (includes Greenwich Village, Little Italy, SoHo, and the West Village)
2. Manhattan 4 (includes Chelsea, Clinton, and the Hudson Yards)
3. Manhattan 6 (includes Murray Hill, Stuyvesant Town, and Turtle Bay)

Characterizations of these populations are described in *Table 19.*

District	Housing Type	Unemployment Rate	Income Levels	Education Level	Language at Home	Capture Rate	Diversion Rate	Current Enrollment
Manhattan 2	7.32% co-ops 38.66% multi-family 16.33% single-family	5.3%	23.4% low-income 49.2% middle-income 27.4% high-income	95.5% HS graduate 80.2% Bachelor's degree	73.4% English only 26.6 non-English	49.3%	25.5%	21-30
Manhattan 4	8.67% co-ops 44.65% multi-family 5.37% single-family	7.9%	35.3% low-income 42.7% middle-income 21.9% high-income	93.6% HS graduate 70.9% Bachelor's degree	69.0% English only 31.0% non-English	43.8%	22.6%	1-10
Manhattan 6	10.83% co-ops 43.65% multi-family 11.53% single-family	6.3%	26.5% low-income 52.2% middle-income 21.3% high-income	96.8% HS graduate 78.9% Bachelor's degree	73.2% English only 26.8% non-English	44.7%	23.1%	11-20

Table 19. Socio-demographic characterization of the community districts targeted for re-fashioNYC outreach based on high current recycling rates.

e-cycleNYC
2.3.2 site suitability analysis

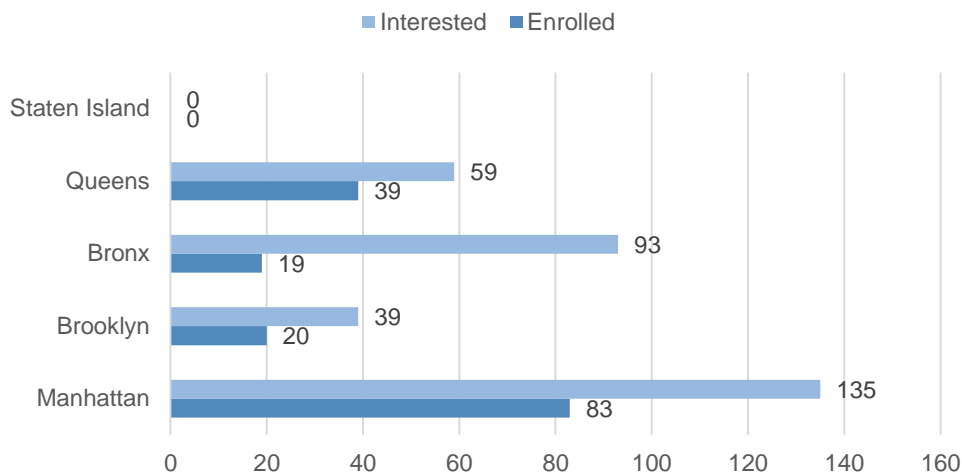## e-cycleNYC: INTEREST AND ENROLLMENT BY BOROUGH

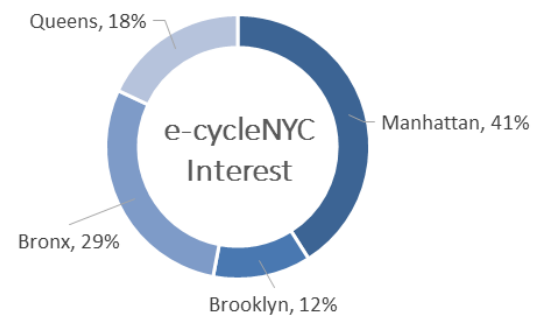*Figure 40. Cumulative interest and enrollment in e-cycleNYC by borough.*

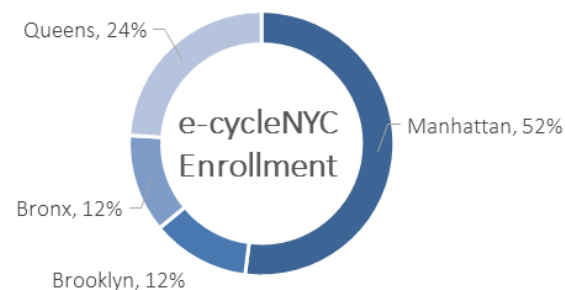*Figure 41. Cumulative interest in e-cycleNYC by borough.*

Figure 42. Cumulative enrollment in e-cycleNYC by borough.

Current Enrollment Status
[program highlights]

The e-cycleNYC partnership between the City of New York and Electronics Recyclers International began in 2013 and the first residential pickup occurred in November 2013 in Queens. Since this time, a total of 326 sites have shown interest in the program and 161 have officially enrolled. Both total interest (135 sites) and enrollment (93 sites) are highest in Manhattan representing 41% and 52% of e-cycleNYC activity respectively. Cumulative interest is second highest in the Bronx (93 sites) and cumulative enrollment is second highest in Queens (39 sites). Cumulative interest is lowest in Brooklyn (39 sites) and cumulative enrollment is lowest in the Bronx (19 sites). The discrepancy between the number of interested sites and enrolled sites in the Bronx, 74 sites, is largely due to a high rate of declined applications. Staten Island has yet to express any interest in e-cycleNYC.
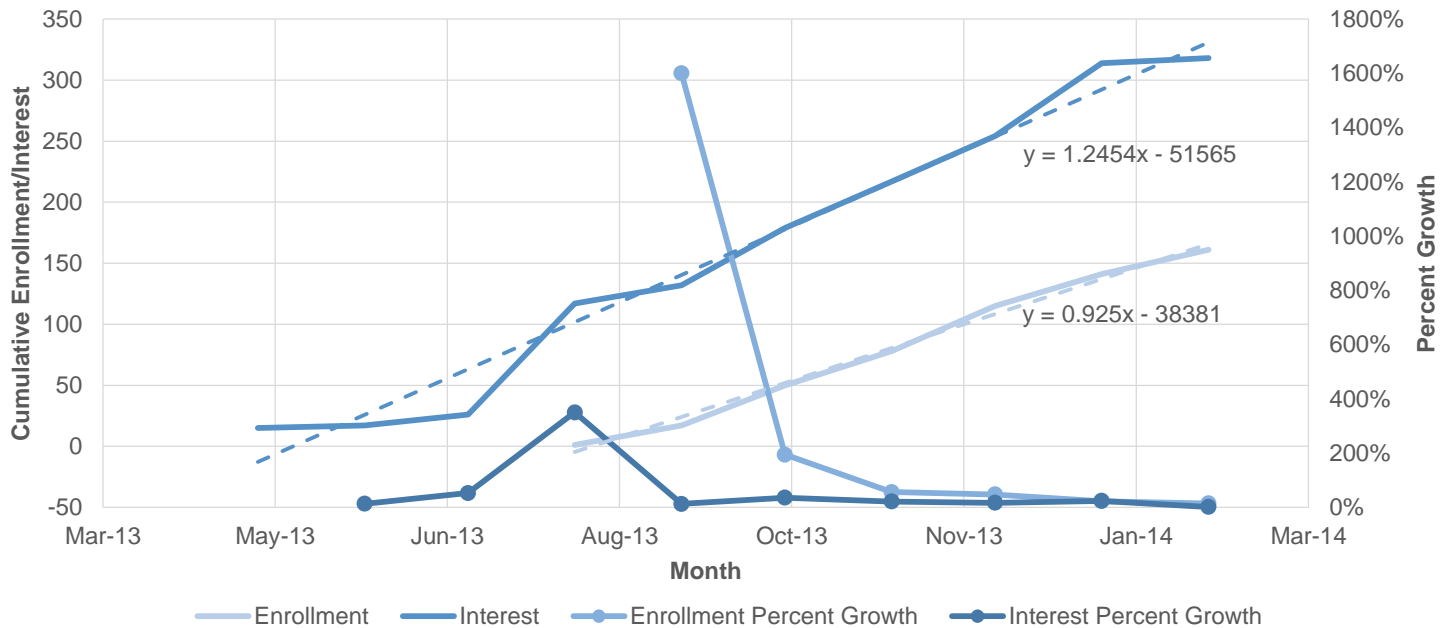
e-cycleNYC: CUMULATIVE ENROLLMENT AND INTEREST

Figure 43. Cumulative interest and enrollment in e-cycleNYC over time.

e-cycleNYC

Month	Enrollment	% Growth
Aug-13	117	-
Sep-13	132	1600%
Oct-13	179	194.12%
Nov-13	217	5.60%
Dec-13	254	47.44%
Jan-14	314	22.61%
Feb-14	318	14.18%

Table 18. Percent change in e-cycleNYC enrollment (Aug. 2013 - Feb. 2014).

e-cycleNYC

Month	Interest	% Growth
May-13	15	-
Jun-13	17	13%
Jul-13	26	53%
Aug-13	117	350%
Sep-13	132	13%
Oct-13	179	36%
Nov-13	217	21%
Dec-13	254	17%
Jan-14	314	24%
Feb-14	318	1%

Table 19. Percent change in e-cycleNYC interest (May 2013 - Feb. 2014)

Interest and enrollment have increased over time since the program's 2013 inception. An average of 26.7 new sites enrolled each month from August 2013 through February 2014, and an average of 26.3 new sites expressed interest each month from May 2013 through February 2014. The program saw a fairly appreciable jump in enrollment from October 2013 to December 2013, from 50 to 78 buildings (47.4%). However, the rate of increase in enrollment has slowed since then, dropping from to 22.61% in January 2013 and then 14.8% in February 2014. On the whole, the trend shows positive growth. Interest saw its greatest increase from July 2013 to August 2013, growing from 2 to 57 (2750%) sites. From August 2013 to September 2013 the rate of growth dipped to 10.5%, went up again to 30.2% from September 2013 to October 2013, but then decreased to 8.5% in November 2013. After that, it rebounded to 20.2% in December 2013, and again to 43% in January 2014. From January 2014 to February 2014 it decreased significantly to 2.6% (*Figure 43*).

e-cycleNYC: Cumulative Enrollment

$y = 0.4887x - 20278$

$y = 0.2193x - 9100$
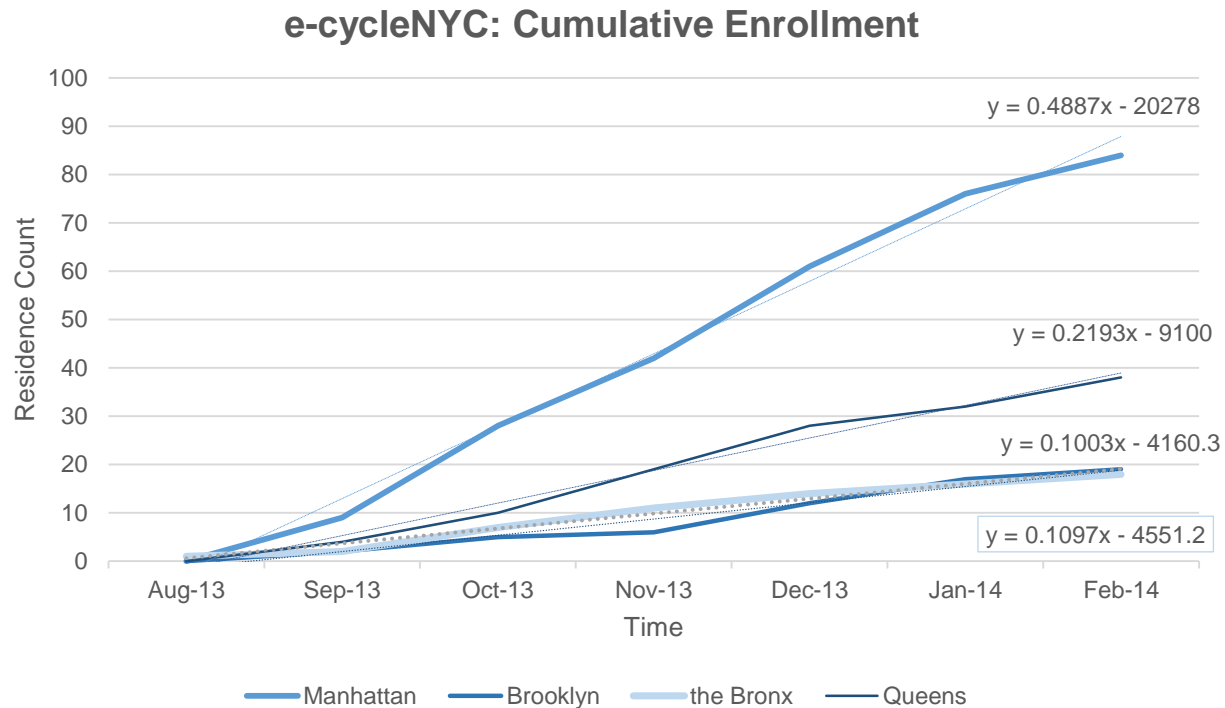
$y = 0.1003x - 4160.3$

$y = 0.1097x - 4551.2$

Figure44. e-cycleNYC Cumulative Enrollment by borough for 2013-2014.

Further analysis shows that Manhattan has consistently led cumulative enrollment in e-cycleNYC August 2013 through February 2014. Enrollment in Manhattan accounts for 52.8% of total enrollment, followed by Queens with 25%, Brooklyn with 12.5%, and the Bronx with 11.8%. Again, there is no current enrollment in Staten Island. In the seven months of compiled data for the program (August 2013-February 2014), Manhattan added an average of 12 sites each month – more than twice that of Queens which added an average of five sites each month. Both Brooklyn and the Bronx added about two sites each month. Inclusive of all four boroughs with current enrollment, an average of about five sites has been added each month since the launch of the program. Enrollment has clearly been most successful in Manhattan (84 sites) and all five boroughs leave significant room for further expansion. The trend lines of the four boroughs currently enrolled suggest enrollment totals will continue to climb, even though February 2014 produced lower than average enrollment in Manhattan, Brooklyn, and the Bronx.
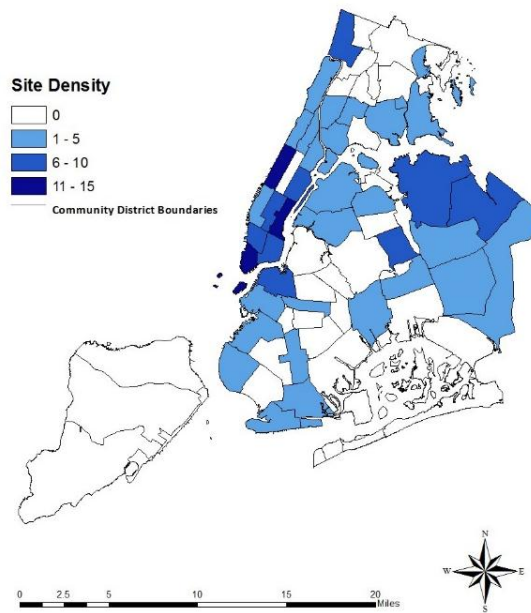
e-cycleNYC: Cumulative Enrollment

e-cycleNYC: Cumulative Interest

Figure 45. Density of e-cycleNYC enrollment by community district.
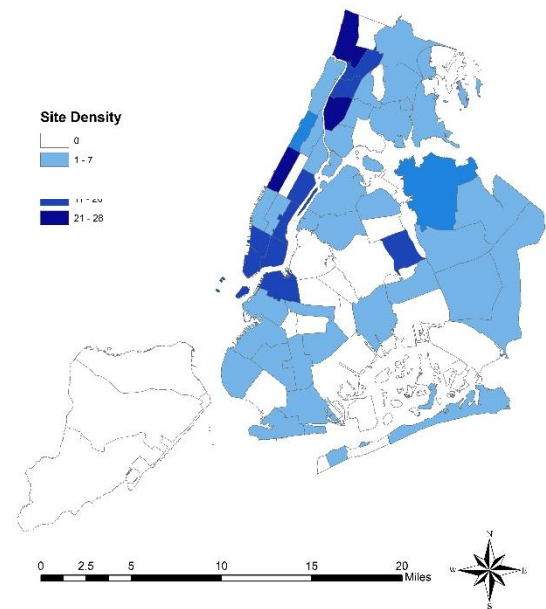
Figure 46. Density of e-cycleNYC interest by community district.

	Borough	District	Neighborhoods
	Bronx	8	Fieldston, Kingsbridge, Marble Hill, North Riverdale, Riverdale, Spuyten Duyvil
	Brooklyn	2	Boerum Hill, Brooklyn Heights, Clinton Hill, Downtown Brooklyn, DUMBO, Farragut Houses
	Manhattan	1	Battery Park City, Civic Center, Ellis Island, Financial District, Governors Island, Liberty Island
	Manhattan	2	Greenwich Village, Hudson Square, Little Italy, NoHo, SoHo, South Village, West Village
Enrollment (>5)	Manhattan	3	Chinatown, East Village, Lower East Side, Two Bridges, NoHo
	Manhattan	5	Flatiron, Gramercy Park, Midtown, Midtown South, Murray Hill, Times Square, Union Square
	Manhattan	6	Beekman Place, Gramercy Park, Murray Hill, Peter Cooper Village, Stuyvesant Town, Sutton Place
	Manhattan	7	Lincoln Square, Manhattan Valley, Upper West Side
	Manhattan	8	Carnegie Hill, Lenox Hill, Roosevelt Island, Upper East Side, Yorkville
	Queens	6	Forest Hills, Forest Hills Gardens, Rego Park
	Queens	7	Auburndale, Bay Terrace, Beechhurst, Clearview, College Point, Downtown Flushing, Flushing
	Queens	11	Auburndale, Bayside, Douglaston, Hollis Hills, Little Neck, Oakland Gardens
	Borough	**District**	**Neighborhoods**
Interest (>20)	Bronx	4	Concourse, Concourse Village, East Concourse, Highbridge, Mount Eden, West Concourse
	Bronx	8	Fieldston, Kingsbridge, Marble Hill (MN), North Riverdale, Riverdale, Spuyten Duyvil
	Manhattan	7	Lincoln Square, Manhattan Valley, Upper West Side

Table 19. Community districts with highest density of cumulative enrollment (>6 sites) and interest (>20 sites).

E-CYCLENYC ENROLLMENT GROWTH

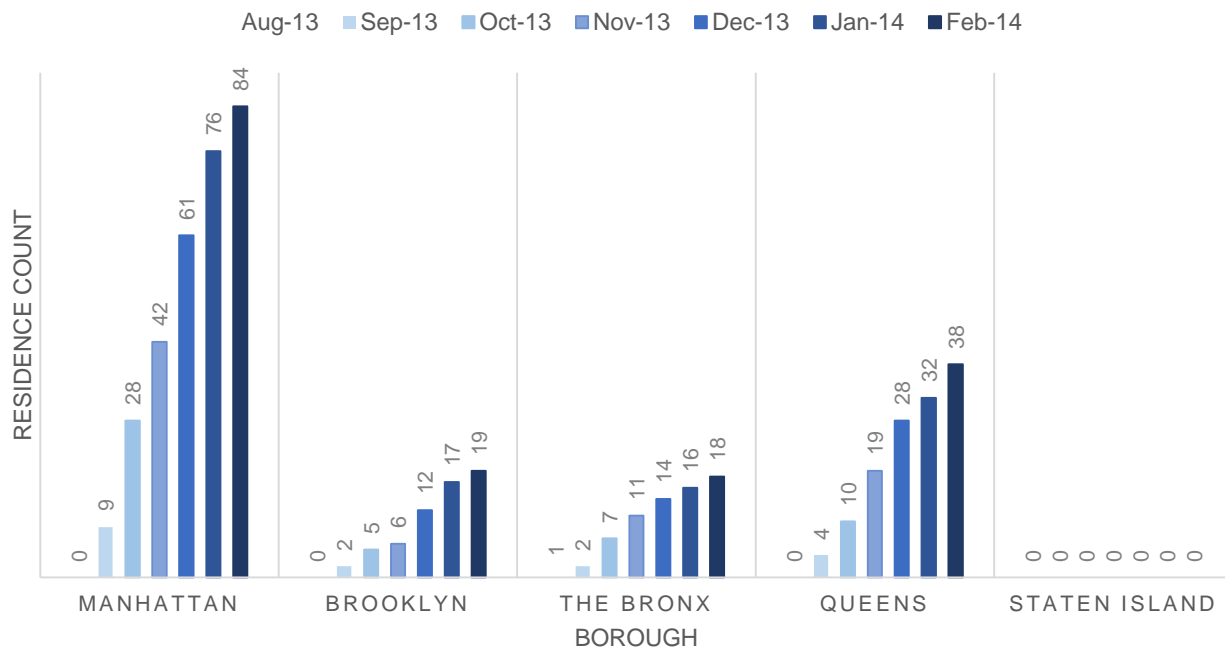Aug-13 ■ Sep-13 ■ Oct-13 ■ Nov-13 ■ Dec-13 ■ Jan-14 ■ Feb-14

Figure 47. Growth in borough-wide e-cycleNYC enrollment: August 2013 - February 2014

Figures 46, 47, and 48 show that enrollment and interest in Manhattan outweighs that of other New York City boroughs; but most notably seven community districts of the twelve enrolled in e-cycleNYC have high density enrollment (more than six sites), while the remaining five districts are in Queens (three sites), Brooklyn (one site), and the Bronx (one site) in lower densities. 41% of interest currently lies in Manhattan, although interest in the Bronx (29%) is likewise noteworthy. In the geographic representation of density of interest in e-cycleNYC, the two of the three districts with highest interest (>20 sites) are in the Bronx. While enrollment has trended upwards in the seven analyzed months, it has tapered since the initial burst of activity. Districts with highest enrollment density (more than six) are consistent with the high-density interest districts (>20). Interest continues to be widespread with no borough with fewer than 39 sites that have expressed interest, with the exception of Staten Island. Generally, interest is growing in a slightly faster rate than enrollment steadily during the seven months analyzed.

District	Housing Type	Unemployment Rate	Income Levels	Education Level	Language at Home	Capture Rate	Diversion Rate	Current Enrollment
Bronx 8	2.83% co-ops 11.13% multi-family 59.32% single-family	12.2%	46.7% low-income 47.2% middle-income 6.1% high-income	82.2% HS graduate 37.1% Bachelor's degree	46.7% English only 53.3% non-English	46.2%	16.6%	6-10 sites
Brooklyn 2	3.97% co-ops 39.33% multi-family 32.51% single-family	9.8%	39.1% low-income 48.3% middle-income 12.7% high-income	87.7% HS graduate 57.3% Bachelor's degree	70.0% English only 30.0% non-English	37.8%	17.0%	6-10 sites
Manhattan 1	3.84% co-ops 16.90% multi-family 3.64% single-family	5.3%	23.4% low-income 49.2% middle-income 27.4% upper-income	95.5% HS graduate 80.2% Bachelor's degree	73.4% English only 26.6% non-English	55.1%	28.4%	11-15 sites
Manhattan 2	7.32% co-ops 38.6% multi-family 16.33% single-family	5.3%	23.4% low-income 49.2% middle-income 27.4% upper-income	95.5% HS graduate 80.2% Bachelor's degree	73.4% English only 26.6% non-English	49.3%	25.5%	6-10 sites
Manhattan 3	5.28% co-ops 57.98% multi-family 3.04% single-family	8.5%	54.1% low-income 39.4% middle-income 6.5% upper-income	72.9% HS graduate 40.8% Bachelor's degree	45.8% English only 54.2% non-English	40.8%	12.6%	6-10 sites
Manhattan 5	2.39% co-ops 13.41% multi-family 0.95% single-family	7.9%	35.3% low-income 42.7% middle-income 21.9% upper-income	93.6% HS graduate 70.9% Bachelor's degree	69.0% English only 31.0% non-English	45.5%	23.5%	6-10 sites
Manhattan 6	10.83% co-ops 43.65% multi-family 11.53% single-family	6.3%	26.5% lower-income 52.2% middle-income 21.3% upper-income	96.3% HS graduates 78.9% Bachelor's degree	73.2% English	44.7%	23.1%	11-15 sites
Manhattan 7	16.39% co-ops 56.25% multi-family 10.11% single-family	6.3%	31.9% low-income 44.8% middle-income 23.3% upper-income	94.3% HS graduates 75% Bachelor's degree	71.9% English only 28.1% non-English	47.4%	24.6%	11-15 sites
Manhattan 8	14.45% co-ops 45.10% multi-family 20.75% single-family	6%	24% low-income 49.4% middle-income 26.6% upper-income	96.7% HS graduates 77.7% Bachelor's degree	74.5% English only 25.5% non-English	47.1%	24.4%	6-10 sites
Queens 6	1.91% co-ops 4.98% multi-family 82.54% single-family	7.0%	40.1% low-income 54.3% middle-income 5.6% high-income	92.2% HS graduate 53.4% Bachelor's degree	37.5% English only 62.5% non-English	38.0%	19.6%	6-10 sites
Queens 7	0.51% co-ops 8.32% multi-family 77.17% single-family	10.5%	47.3% low-income 48.5% middle-income 4.2% high-income	79.1% HS graduate 31.2% Bachelor's degree	27.5% English only 72.5% non-English	52.1%	17.7%	6-10 sites
Queens 11	0.31% co-ops 3.27% multi-family 89.18% single-family	8.7%	34.1% low-income 59.4% middle-income 6.5% high-income	88.6% HS graduate 44.6% Bachelor's degree	39.9% English only 60.1% non-English	59.9%	20.6%	6-10 sites

Table 21. Socio-demographic characterization of community districts with the highest density of enrollment in e-cycleNYC (>6 buildings).

Buildings must have a minimum of 10 units to enroll in e-cycleNYC, eliminating many condominium, single-family, and some privately-owned residences from eligibility (*Figure 48*). Current participants are most commonly in co-op style residences (90 sites) in all four enrolled boroughs, followed by rental housing (39 sites). Again, data limitations due to low and recent enrollment restrict the clarity of trends in residence type. For example, condominiums are the second-most common residence type enrolled in the program in Manhattan, but condominiums and other housing types make up <20% of total enrollment. After co-op housing, rentals are most commonly enrolled in Brooklyn (12 co-ops versus five rentals), Queens (25 co-ops versus nine rentals), and the Bronx (10 co-ops versus eight rentals).
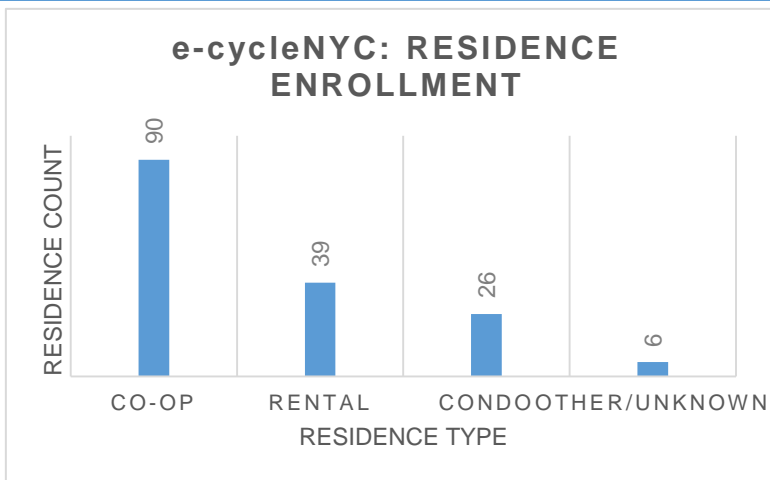

Figure 48. e-cycleNYC enrollment by residence type. Note that "other" includes student housing and affordable housing.
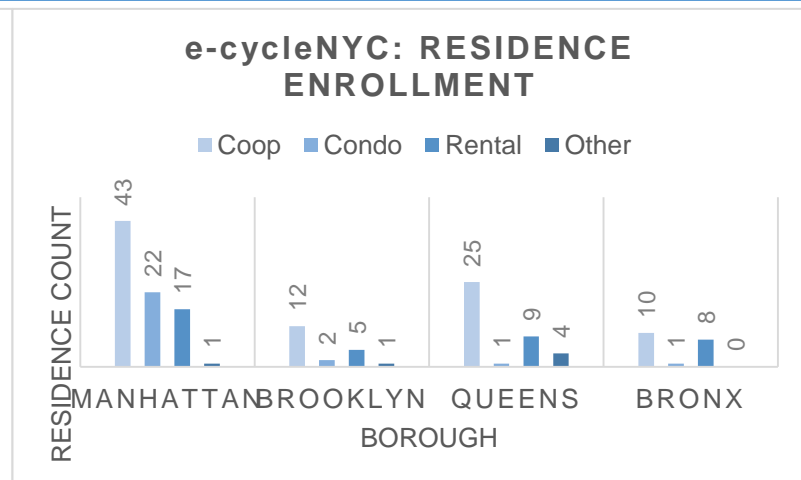

Figure 49. e-cycleNYC enrollment by borough and residence type.

e-cycleNYC Program Enrollment Distribution

Queens 24%

64% co-op building

3% condominium building

23% rental apartment

10% other type

52% Manhattan

co-op building 52%

condominium building 27%

rental apartment 20%

other type 1%

Bronx 12%

53% co-op building

5% condominium building

42% rental apartment

Brooklyn 12%

60% co-op building

10% condominium building
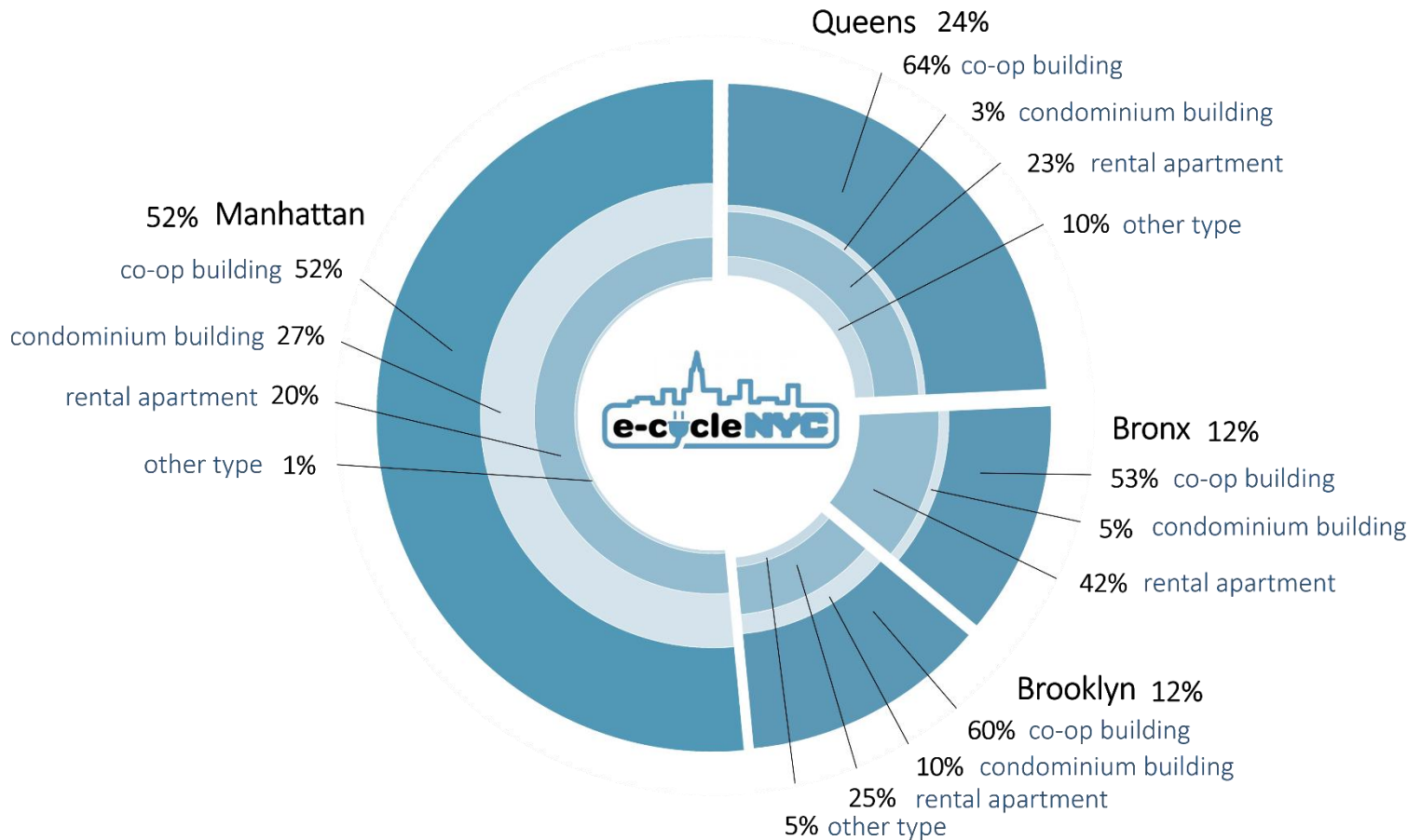
25% rental apartment

5% other type

Figure 50. e-cycleNYC enrollment by borough and residence type.

Figure 50 shows e-cycleNYC percent enrollment by borough and residence type. Manhattan, which encompasses 52% of total enrollment, also has 52% of registered sites in co-op buildings. Enrollment in Queens, the Bronx, and Brooklyn are comprised of 64%, 53%, and 60% co-op buildings respectively. Rental housing also shows significant enrollment in Manhattan (20%), Queens (23%), the Bronx (42%) and Brooklyn (25%). With only 161 total sites, it is challenging to assert enrollment trends by residence type, but the current distribution does appear to be following trends observed in the more established ABRI and re-fashioNYC programs.

e-cycleNYC: Density of Enrolled Sites by Community District

Average Annual Capture Rate FY 2010-2013

Note: Capture rate data tracks organics, metal, glass, plastic, and paper recycling, but not textiles or electronic waste

Data Source: New York City Department of Sanitation - Bureau of Waste Prevention, Reuse and Recycling; FY 2010-2013 Annual Reports: New York City Curbside Municipal Refuse and Recycling Statistics
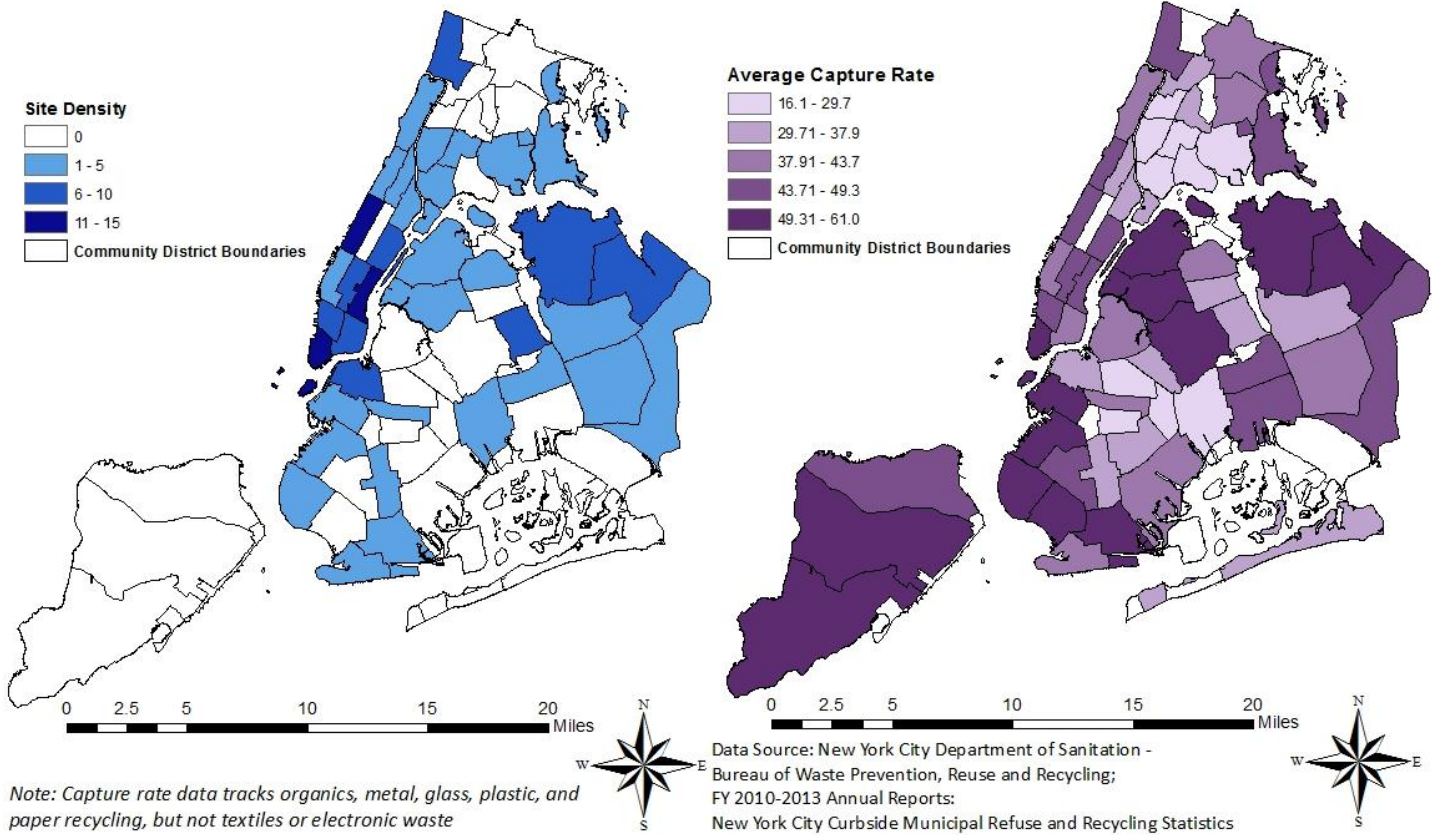
Figure 51. A comparison of cumulative enrollment in e-cycleNYC by community district with the capture rate characterized by community district

Borough	District	Site Density	Capture Rate (%)
Manhattan	1	11-15	49.31-61.0
Manhattan	2	6-10	43.71-49.3
Manhattan	3	6-10	37.91-43.7
Manhattan	5	6-10	43.71-49.3
Manhattan	6	11-15	43.71-49.3
Manhattan	7	11-15	43.71-49.3
Manhattan	8	6-10	43.71-49.3
Brooklyn	2	6-10	29.71-37.9
Bronx	8	6-10	43.71-49.3
Queens	6	6-10	29.71-37.9
Queens	7	6-10	49.31-61.0
Queens	11	6-10	49.31-61.0

Table 22. Community districts with highest enrollment in e-cycleNYC (>6) and their corresponding capture rates.

Comparing areas with highest density of enrollment and highest annual capture rates, the e-cycle program has not yet expanded to many community districts with high capture rates. e-cycleNYC enrollment is most dense in Manhattan, especially community districts 1, 6 and 7, where there are also high capture rates. However, there is little or no presence in the outer-boroughs with similarly high capture rates including community districts Staten Island 2 and 3; Queens 1, 2, and 5; Bronx 10, and Brooklyn 6, 7, 10, 11, 12, and 15. Interestingly, there is enrollment in areas of relatively lower capture rates, such as in Queens 6 and Brooklyn 2.
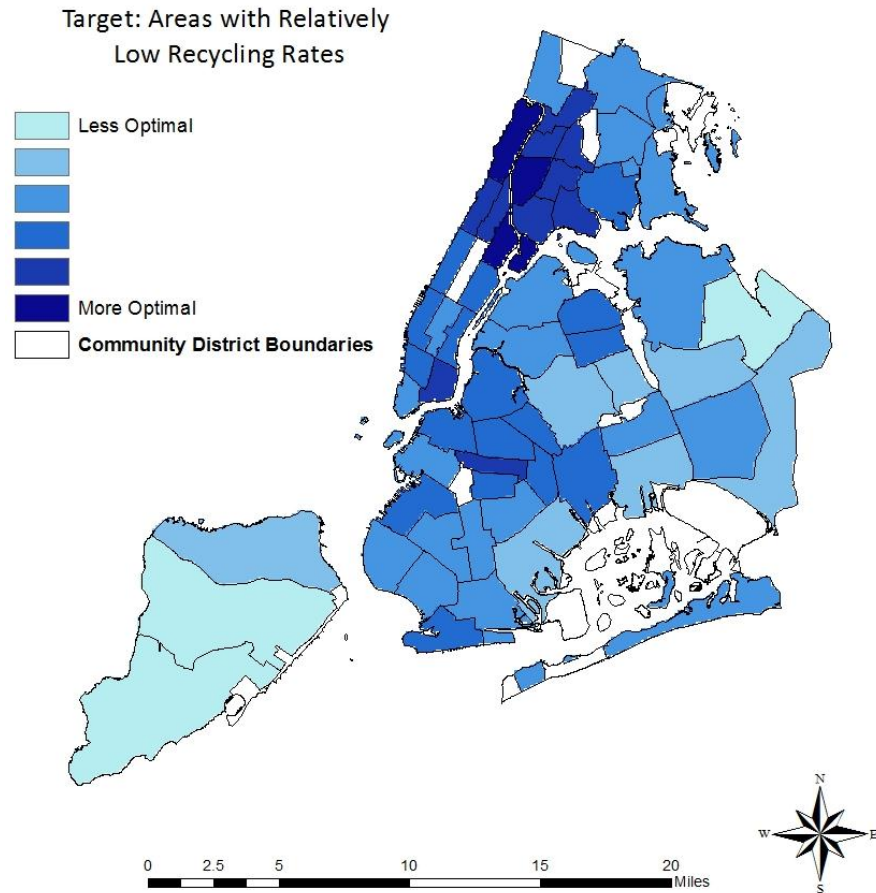
Optimal Areas for e-cycleNYC Outreach

Figure 52. Optimal areas for e-cycleNYC outreach for areas with relatively low current recycling rates.

Using residence type as a primary variable, the site suitability analysis for e-cycleNYC shows that targeting the following community districts would be most effective for targeting community districts with *low recycling rates*:

1. Bronx 2 (includes Hunts Point, Longwood)
2. Bronx 3 (Claremont, Crotona Park East, Melrose, Morrisania)
3. Bronx 4 (includes Concourse, Concourse Village, East Concourse, Highbridge, Mount Eden, West Concourse)
4. Bronx 6 (includes Bathgate, Belmont, Bronx Park South, East Tremont, West Farms)
5. Brooklyn 8 (includes Crown Heights, Prospect Heights, Weeksville)
6. Manhattan 3 (includes Chinatown, East Village, Lower East Side, NoHo, Two Bridges)
7. Manhattan 4 (includes Chelsea, Clinton, and the Hudson Yards)
8. Manhattan 9 (includes Hamilton Heights, Harlem, Manhattanville, Morningside Heights, West Harlem)
9. Manhattan 10 (includes Central Harlem, Harlem)
10. Manhattan 11 (includes East Harlem, Harlem, Randalls Island, Wards Island)
11. Manhattan 12 (includes Inwood, Washington Heights)

Characterizations of these populations are described in *Table 23.*

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District	Housing Type	Unemployment Rate	Income Levels	Education Level	Language at Home	Capture Rate	Diversion Rate	Current Enrollment
Bronx 2	1.24% co-ops 27.03% multi-family 27.97% single-family	17.9%	80.8% low-income 18.9% middle-income 0.40% upper-income	54.7% HS graduate 8.2% Bachelor's degree	73.4% English	27.7%	8.6%	0 sites
Bronx 3	0.66% co-ops 29.01% multi-family 32.71% single-family	19.5%	80.5% lower income 19.4% middle-income 0.10% upper-income	59.2% HS graduate 9.7% Bachelor's degree	36.1% English	19.9%	6.1%	1-5 sites
Bronx 4	1.44% co-ops 34.98% multi-family 21.64% single-family	17.7%	75.9% lower-income 23.9% middle-income 0.20% upper-income	60.8% HS graduates 11.6% Bachelor's degree	31.0% English	24.0%	7.3%	1-5 sites
Bronx 6	1.20% co-ops 33.17% multi-family 31.80% single-family	19.5%	80.5% low-income 19.4% middle-income 0.10% upper-income	59.2% HS graduates 9.7% Bachelor's degree	36.1% English	31.2%	9.6%	0 sites
Brooklyn 8	1.70% co-ops 42.40% multi-family 40.13% single-family	12.4%	57.4% low-income 39.2% middle-income 3.4% upper-income	80.9% HS graduates 33.8% Bachelor's diploma	78.6% English	41.4%	13.1%	1-5 sites
Manhattan 3	5.28% co-ops 57.98% multi-family 3.04% single-family	8.5%	54.1% low-income 39.4% middle-income 6.5% upper-income	72.9% HS graduates 40.8% Bachelor's diploma	45.8% English	40.8%	12.6%	6-10 sites
Manhattan 4	8.67% co-ops 56.27% multi-family 15.35% single-family	7.9%	35.3% low-income 42.7% middle-income 21.9% upper-income	93.6% HS graduates 70.9% Bachelor's diploma	69.0% English	43.8%	22.6%	1-5 sites
Manhattan 9	6.41% co-ops 44.65% multi-family 5.37% single-family	10.7%	58.0% low-income 35.5% middle-income 6.6% upper-income	79.1% HS graduates 42.9% Bachelor's diploma	49.5% English	44.8%	13.8%	1-5 sites
Manhattan 10	2.38% co-ops 62.52% multi-family 12.95% single-family	15.0%	61.6% low-income 34.2% middle-income 4.2% upper-income	79.2% HS graduates 32.8% Bachelor's diploma	68.0% English	33.6%	10.4%	1-5 sites
Manhattan 11	2.28% co-ops 54.96% multi-family 3.94% single-family	12.2%	66.0% low-income 30.6% middle-income 3.4% upper-income	72.1% HS graduates 28.5% Bachelor's diploma	46.1% English	30.3%	9.3%	1-5 sites
Manhattan 12	5.72% co-ops 61.22% multi-family 6.88% single-family	15.6%	59.0% low-income 38.1% middle-income 2.9% upper-income	68.5% HS graduates 29.4% Bachelor's diploma	26.0% English	42.2%	13.0%	1-5 sites

Table 23. Socio-demographic characterization of the community districts targeted for e-cycleNYC outreach based on relatively low current recycling rates.
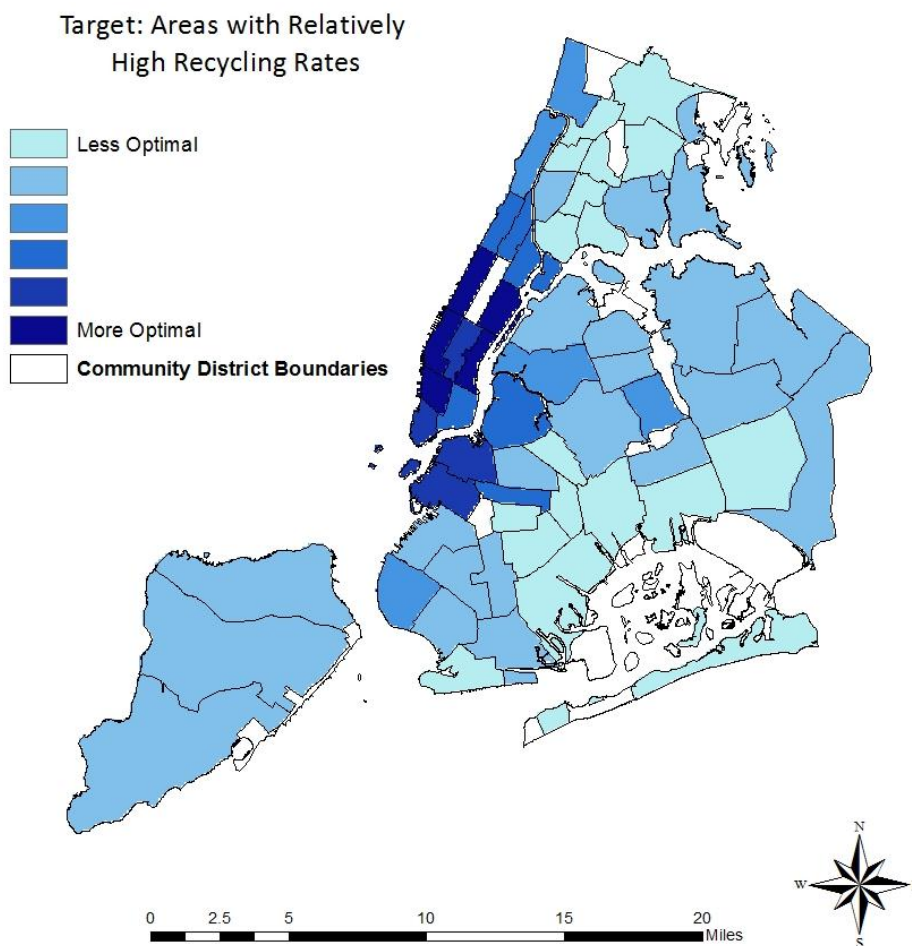
Optimal Areas for e-cycleNYC Outreach

Figure 53. Optimal areas for e-cycleNYC outreach for areas with relatively high current recycling rates.

Based on the results of all of the previous analysis, in addition to the weighted factors that guided our site assessments (*Appendix C*), the analysis finds that the five most suitable community districts to target for immediate e-cycleNYC program expansion in the short term are primarily located in the borough of Manhattan. The following three community districts would be most effective at increasing interest in the program:

1. Manhattan 2 (includes Greenwich Village, Little Italy, SoHo, and the West Village)
2. Manhattan 4 (includes Chelsea, Clinton, and the Hudson Yards)
3. Manhattan 6 (includes Murray Hill, Stuyvesant Town, and Turtle Bay)
4. Manhattan 7 (includes Manhattan Valley and the Upper West Side)
5. Manhattan 8 (includes Lenox Hill, Roosevelt Island, and the Upper East Side)

Characterizations of these populations are described in *Table 24.*

District	Housing Type	Unemployment Rate	Income Levels	Education Level	Language at Home	Capture Rate	Diversion Rate	Current Enrollment
Manhattan 2	7.32% co-ops 3806% multi-family 16.33% single-family	5.3%	23.4% low-income 49.2% middle-income 27.4% upper-income	95.5% HS graduate 80.2% Bachelor's degree	73.4% English	49.3%	25.5%	16-30 sites
Manhattan 4	8.67% co-ops 44.65% multi-family 5.37% single-family	7.9%	35.3% lower income 42.7% middle-income 21.9% upper-income	93.65 HS graduate 70.9% Bachelor's degree	69% English	43.8%	22.6%	1-15 sites
Manhattan 6	10.83% co-ops 43.65% multi-family 11.53% single-family	6.3%	26.5% lower-income 52.2% middle-income 21.3% upper-income	96.3% HS graduates 78.9% Bachelor's degree	73.2% English	44.7%	23.1%	15 sites
Manhattan 7	16.39% co-ops 56.25% multi-family 10.11% single-family	6.3%	31.9% low-income 44.8% middle-income 23.3% upper-income	94.3% HS graduates 75% Bachelor's degree	71.9% English	47.4%	24.6%	16-30 sites
Manhattan 8	14.45% co-ops 45.10% multi-family 20.75% single-family	6%	24% low-income 49.4% middle-income 26.6% upper-income	96.7% HS graduates 77.7% Bachelor's diploma	74.5% English	47.1%	24.4%	46-53 sites

Table 24. Socio-demographic characterization of the community districts targeted for e-cycleNYC outreach based on relatively high current recycling rates.

organics
2.3.2 site suitability analysis

Organics Collection: INTEREST AND ENROLLMENT BY BOROUGH
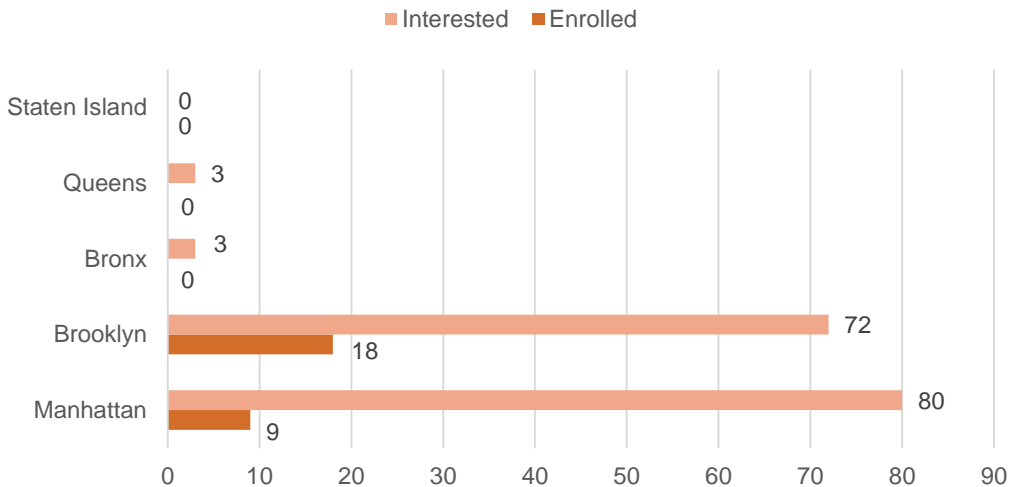

Figure 54. Cumulative interest and enrollment for Organics Collection by borough
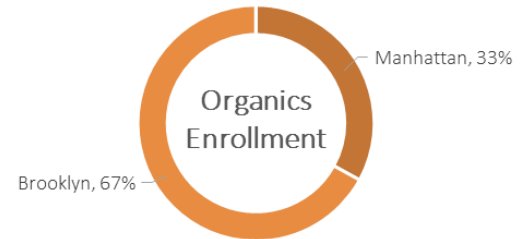

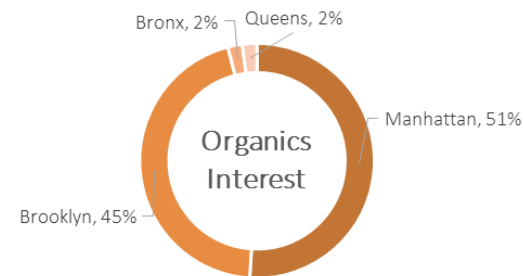Figure 55. Cumulative interest in Organics Collection by borough.

Figure 56. Cumulative enrollment in Organics Collections by borough.

Current Enrollment Status
[program highlights]

This analysis looks at the Organics Collection Pilot program for large multi-family residences, large institutions, and private schools, which began in March of 2013. DSNY instituted composting for public schools in the fall of 2012, and composting for single-family homes in 2013. Currently, the pilot program for large multi-family residences has 27 enrolled sites, with 18 in Brooklyn representing 67% of enrollment, and 9 in Manhattan, representing 33% of enrollment (*Figure 56*). At the time of this report there are none in The Bronx, Queens or Staten Island. Interested sites are highest in Manhattan, with 80 sites or 51% of interest, followed closely by Brooklyn with 45% of interested sites, or 72 sites (*Figures 55 and 56*). The Bronx and Queens are far behind at only 3 interested sites, or 2% of interest each, and Staten Island has shown no interest. Interest currently far surpasses enrollment because the program is in its pilot phase and is applicants are only chosen by BWPRR. However, its inception, the pilot program was expected to expand, and to become compulsory in New York City. While that may take some time given logistics, current Mayor de Blasio is committed to expanding the organics collection in the coming years.

Organics Collection: CUMULATIVE INTEREST AND ENROLLMENT

Figure 57. Cumulative interest and enrollment in Organics Collection over time.

Organics Collection
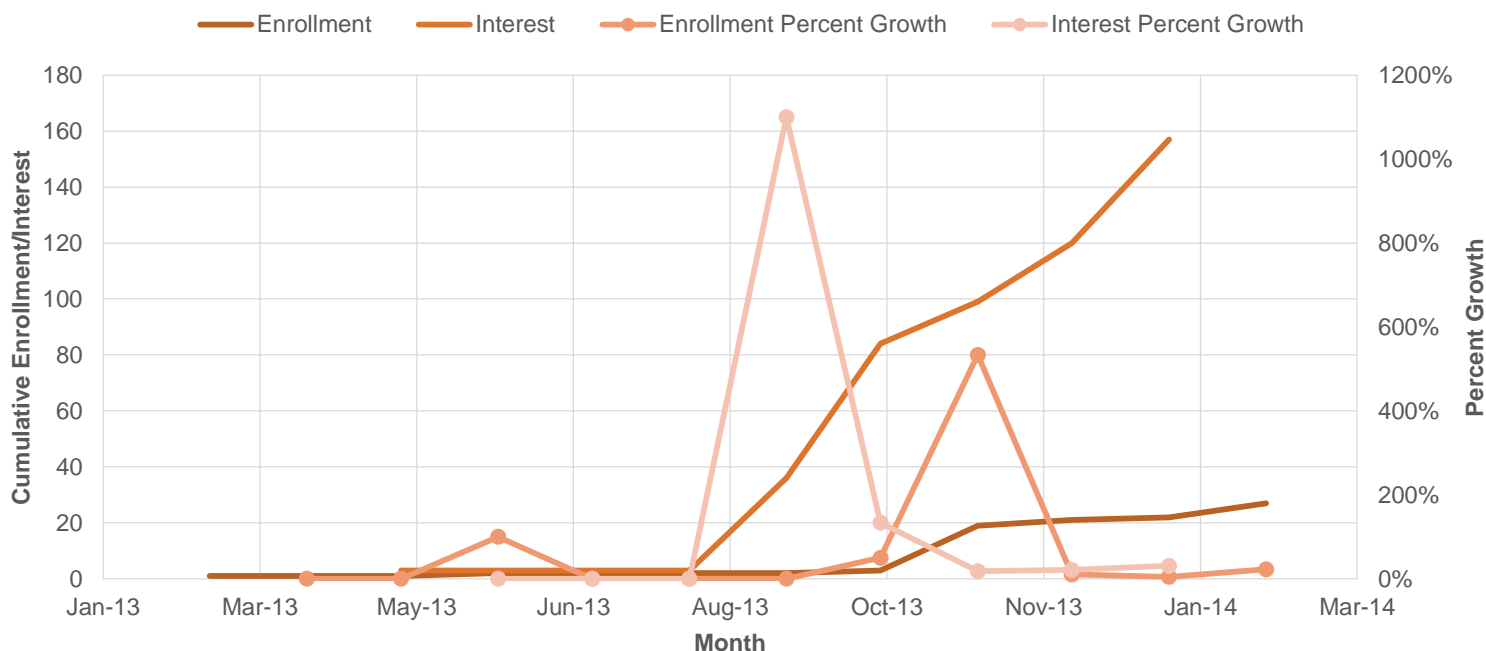
Month	Enrollment	% Change
Mar-13	1	-
Apr-13	1	0%
May-13	1	0%
Jun-13	2	100%
Jul-13	2	0%
Aug-13	2	0%
Sep-13	2	0%
Oct-13	3	50%
Nov-13	19	533%
Dec-13	21	11%
Jan-14	22	5%
Feb-14	27	23%

Table 25. Percent change in Organics Collection enrollment.

Organics Collection

Month	Interest	% Growth
May-13	3	
Jun-13	3	0%
Jul-13	3	0%
Aug-13	3	0%
Sep-13	36	1100%
Oct-13	84	133%
Nov-13	99	18%
Dec-13	120	21%
Jan-14	157	31%

Table 26. Percent change in Organics Collection interest.

Interest and enrollment have increased over time since the program started in 2013. An average of 8.58 sites enrolled each month from March 2013 through February 2014, and an average of 42.7 sites expressed interest each month from May 2013 thought January 2014. Interest peaked in September 2013 (36 sites, 1100% change) six months after the pilot program launch. Interest significantly tapered after September with the highest subsequent interest in October 2013 (84 sites, 133% change). Despite the decrease in interest, it has still significantly exceeded enrollment. This is attributable to the selective enrollment process of the pilot phase; as seen in the enrollment table, there are many months where enrollment is zero because buildings are selectively introduced to the program. There is a lag between months of high interest and months of high enrollment. The average percent change in enrollment is 65.6% and average change in interest in 339.5%.

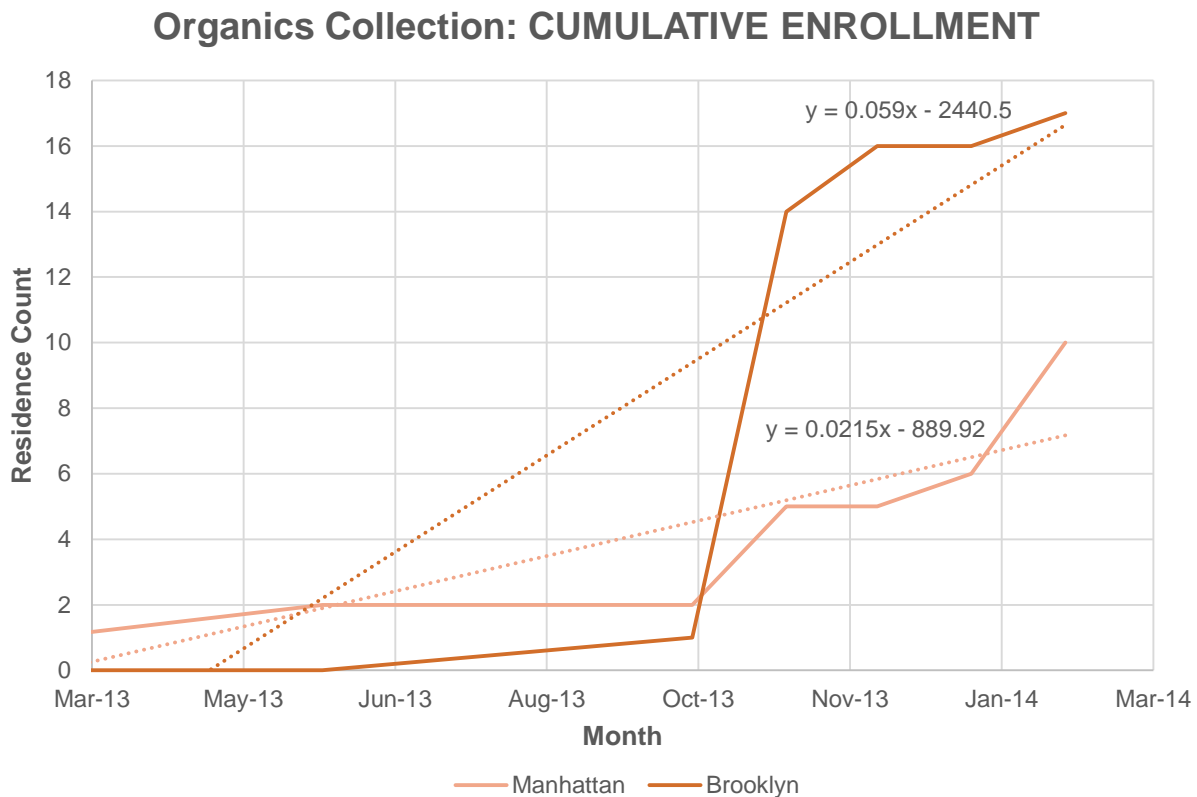## Organics Collection: CUMULATIVE ENROLLMENT

Figure 58. Cumulative interest and enrollment in Organics Collection over time.

Further analysis shows that enrollment began in Manhattan, but Brooklyn led cumulative enrollment in Organics Collection from October 2013 to February 2014. Enrollment in Brooklyn accounts for 66.6% of total enrollment, and Manhattan accounts for 33.3% of total enrollment. There is currently no enrollment in the other three boroughs. The trend lines suggests that the rate of enrollment will increase faster in Brooklyn than in Manhattan by a factor of 3 (*Figure 58*), though this spike in the rate of enrollment is most attributable to enrollment post October 2013 period. However, due to the limited data and selective nature of this pilot program, these analyses do not provide reliable forecasts for future enrollment.

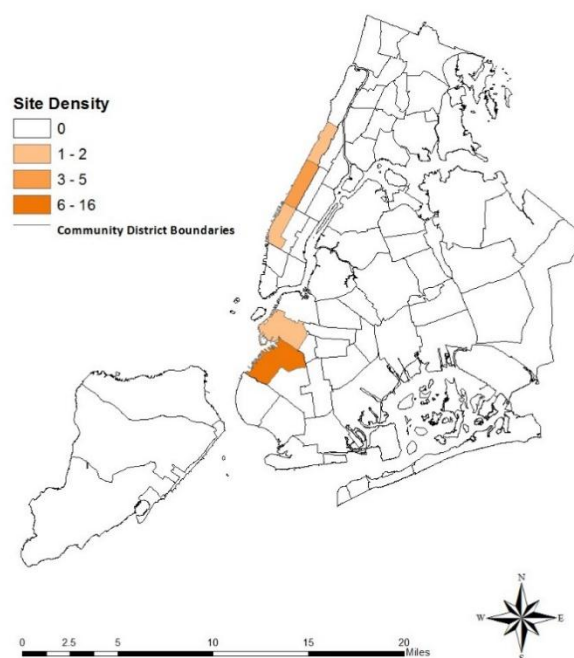## Organics Collection: Cumulative Enrollment

Figure 59. Density of Organics Collection enrollment by community district.
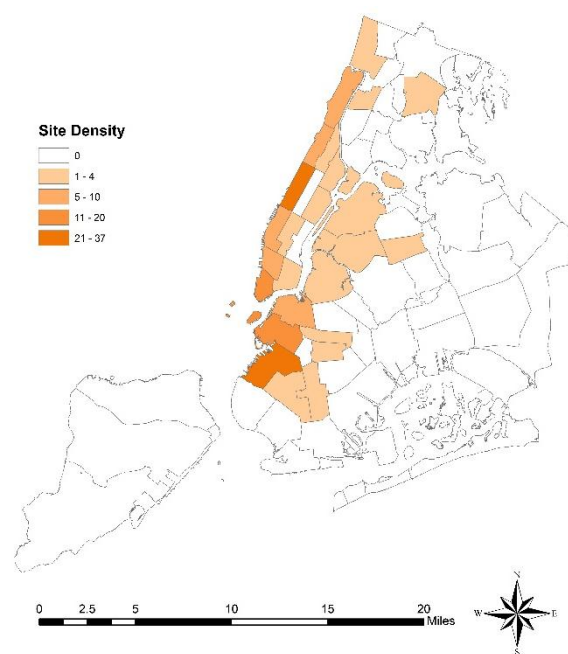
Organics Collection: Cumulative Interest

Figure 60. Density of Organics Collection interest by community district.

	Borough	District	Neighborhoods
Interest (>10)	Manhattan	1	Battery Park City, Civic Center, Ellis Island, Financial District, Governors Island
	Manhattan	7	Manhattan Valley and the Upper West Side
	Brooklyn	6	Red Hook, Gowanus, Park Slope, Carroll Gardens, Cobble Hill
	Brooklyn	7	Industry Park, Sunset Park, Windsor Terrace
	Borough	**District**	**Neighborhoods**
Enrollment (>2)	Brooklyn	7	Industry Park, Sunset Park, Windsor Terrace
	Manhattan	7	Manhattan Valley, Upper West Side

Table 27. Community districts with highest density of cumulative enrollment (>2 sites) and interest (>10 sites).

Organics Collection: ENROLLMENT GROWTH

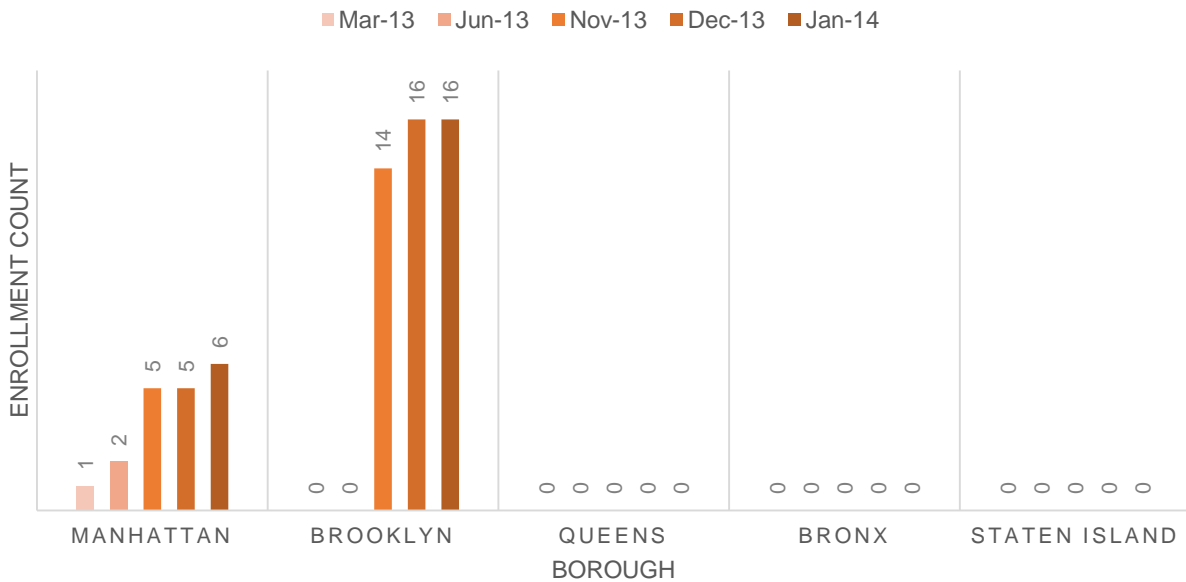■Mar-13 ■Jun-13 ■Nov-13 ■Dec-13 ■Jan-14

Figure 61. Growth in borough-wide Organics Collection enrollment: March 2013 - January 2014.

Currently, only community districts in Manhattan and Brooklyn are enrolled in the organics collection pilot program for large residences (*Figure 61*). Those with the highest enrollment are in Brooklyn 7 and Manhattan 7 (*Table 27*). These are also the districts with the highest interest (*Figure 60*). Other community districts with high interest (>10 sites) include Brooklyn 6, and Manhattan 1 (*Table 27*). Community districts with high interest tend to share borders. The true cause is unclear, but interest may spread by word of mouth, or because residents see the bins appearing in their neighborhoods. Enrollment counts have increased dramatically in Manhattan and Brooklyn but remain stagnant in Queens, the Bronx and Staten Island.

District	Housing Type	Unemployment Rate	Income Levels	Education Level	Language at Home	Capture Rate	Diversion Rate	Current Enrollment
Manhattan 7	16.39% co-ops 56.25% multi-family 10.11% single-family	6.3%	31.9% low-income 44.8% middle-income 23.3% upper-income	94.3% HS graduates 75% Bachelor's degree	71.9% English only 28.1% non-English	47.4%	24.6%	3-5 sites
Brooklyn 7	0.63% co-ops 30.74% multi-family 54.04% single-family	10.7%	56.6% low-income 40% middle-income 3.4% upper-income	58.1% HS graduates 24.3% Bachelor's degree	24.9% English only 75.1% non-English	53.4%	18.1%	6-16 sites

Table 28. Socio-demographic characterization of community districts with the highest density of enrollment in Organics Collection (>3 buildings).

Large residential buildings must have a minimum of 10 units to enroll in organics collection, eliminating many condominium, single-family, and some privately-owned residences from eligibility in this iteration of the pilot program. Current participants are primarily in co-op style residences (20 sites) in all four enrolled boroughs, secondarily followed by condos (30) and rentals (3). Interestingly, the community district with the highest enrollment, Brooklyn 7, has a low percentage of co-ops at only 0.63%.

According to the most recent data, the organics collection program serves a total of 27 co-ops (20), condos (3), rentals (3), and single room occupancy units (SROs) (1). Co-ops also represented a majority of enrolled buildings in the Organics Collection Program, although the small number of enrolled sites made it difficult to ensure the significance of this trend. These sites are part of the pilot program largely located in the Windsor Terrace and South Park Slope neighborhoods in Brooklyn (community district Brooklyn 7), and the Upper West Side in Manhattan (community district Manhattan 7). The socio-demographic data is varied across the two community districts, but the capture rates (47.4% for Manhattan 7 and 53.4% for Brooklyn 7) and diversion rates (24.6% for Manhattan 7 and 18.1% for Brooklyn 7) are similar in both community districts.
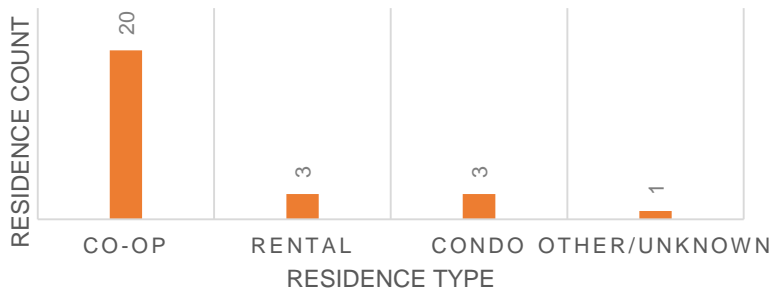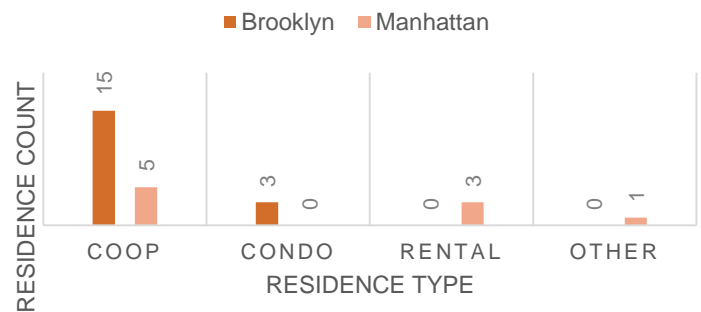
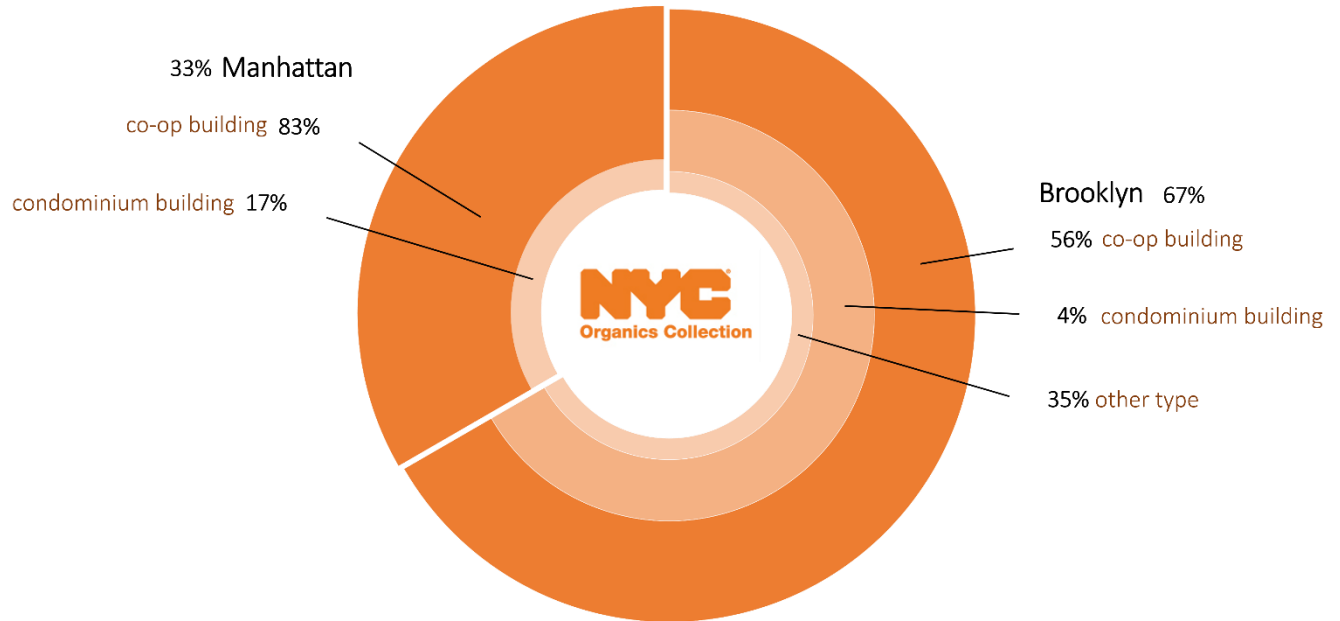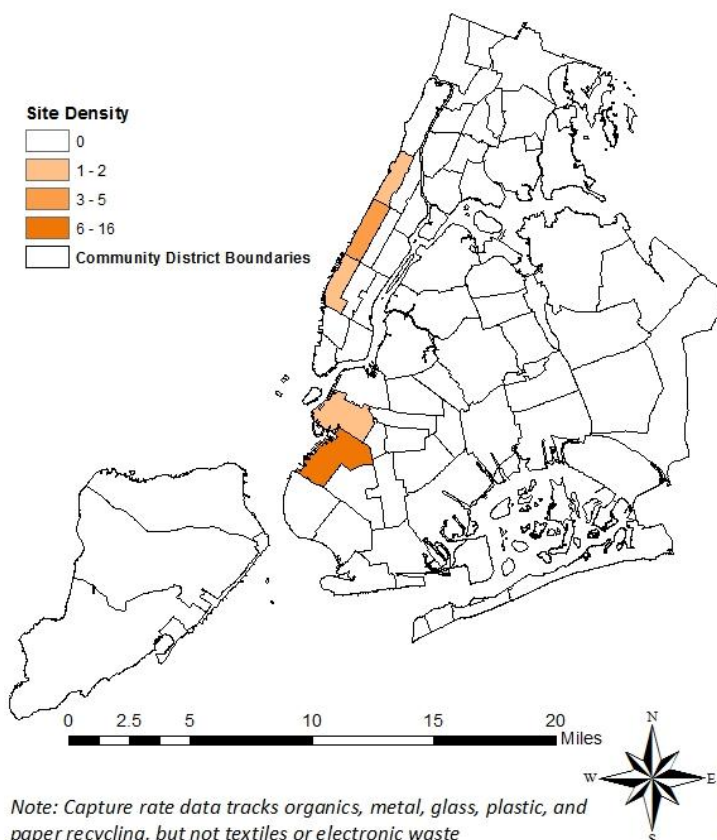## Organics Collection Program Enrollment Distribution

Figure 64. Organics Collection program enrollment by borough and residence type.

Figure 64 shows Organics collection percent enrollment by borough and residence type. Brooklyn, which encompasses 67% of enrollment, also has 56% of registered sites in co-op buildings. However, as seen from the enrolled community district data this does not play a role in the chosen community district as Brooklyn 7 only has a 0.63% co-op rate. Manhattan, which encompasses 33% of total enrollment, also has 83% of registered sites in co-op buildings. In general, enrollment is too low to indicate any significant trends, but the data suggests co-ops are the most likely candidates for program enrollment given reported interest.

Density of Enrolled Organics Collection Sites by Community

Site Density

- 0
- 1 - 2
- 3 - 5
- 6 - 16

Community District Boundaries

0 2.5 5 10 15 20 Miles

Note: Capture rate data tracks organics, metal, glass, plastic, and paper recycling, but not textiles or electronic waste

Average Annual Capture Rates FY2010-2013

how much recyclable material is actually collected as recycling.

Average Capture Rate

- 16.1 - 29.7
- 29.71 - 37.9
- 37.91 - 43.7
- 43.71 - 49.3
- 49.31 - 61.0

Community District Boundaries

0 2.5 5 10 15 20 Miles

Data Source: New York City Department of Sanitation - Bureau of Waste Prevention, Reuse and Recycling; FY 2010-2013 Annual Reports: New York City Curbside Municipal Refuse and Recycling Statistics
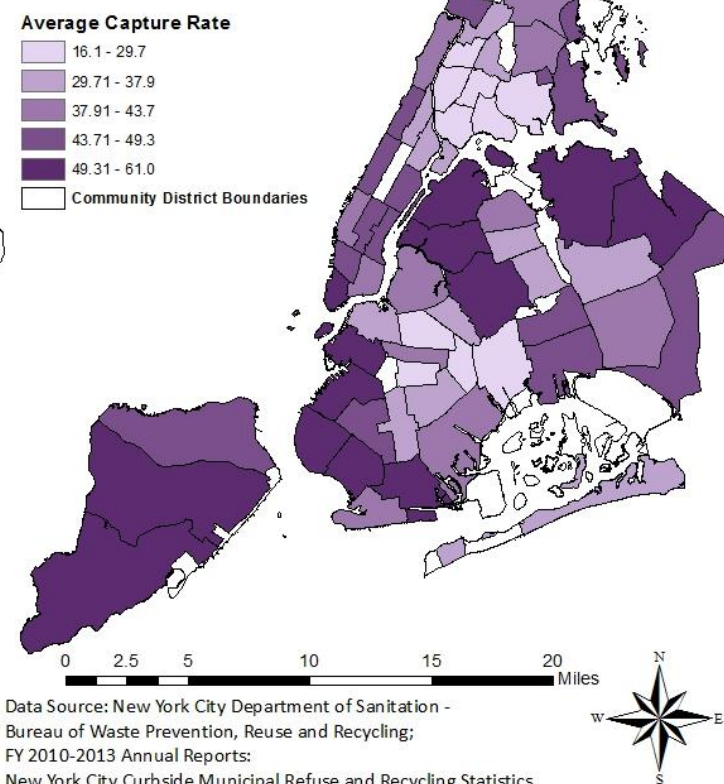
Figure 65. Side by side comparison of current enrollment in Organics Collection with the capture rate for each community district.

Borough	District	Site Density	Capture Rate
Manhattan	4	1-2	37.91-43.7
Manhattan	7	3-5	43.71-49.3
Manhattan	9	1-2	43.71-49.3
Brooklyn	6	1-2	29.71-37.9
Brooklyn	7	6-16	49.31-61.0

Table 29. Community districts with enrollment in Organics Collection and their corresponding capture rates.

Organics Collection is limited to western Manhattan and Brooklyn, with highest site density in Brooklyn 7. Brooklyn 7 also has a high annual average capture rate (53.4%). The program has not expanded to other areas with high recycling capture rates, which may also have potential for high organic waste diversion rates if organics collection services were available. Areas with highest capture rates (49.31-61.0 tons per day) but no organics collection enrollment are primarily in the outer boroughs, including community districts Staten Island 2 and 3; Brooklyn 1 and 5; and Queens 7 and 11.

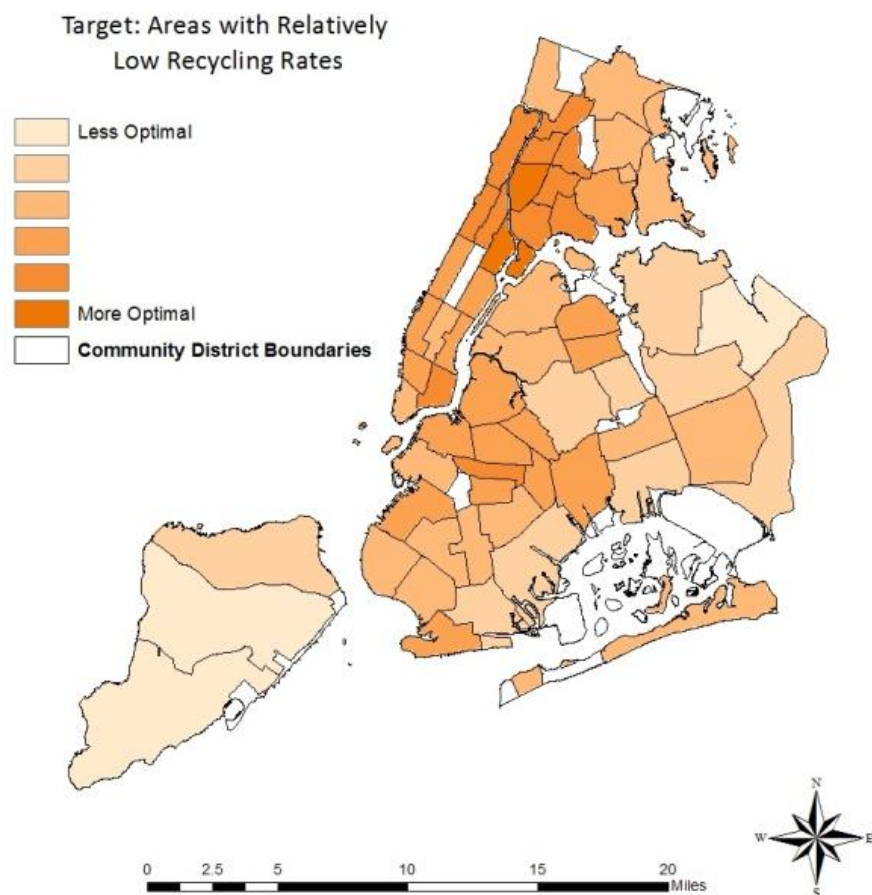## Optimal Areas for Organics Collection Outreach

Figure 66.Optimal areas for Organics Collection outreach for areas with relatively high current recycling rates.

Using residence type as a primary variable, the site suitability analysis for Organics Collection shows that targeting the following community districts would be most effective for targeting community districts with *low recycling rates*:

1. Bronx 2 (includes Hunts Point, Longwood)
2. Bronx 4 (includes Concourse, Concourse Village, East Concourse, Highbridge, Mount Eden, West Concourse)
3. Manhattan 3 (includes Chinatown, East Village, Lower East Side, NoHo, Two Bridges)
4. Manhattan 9 (includes Hamilton Heights, Harlem, Manhattanville, Morningside Heights, West Harlem)
5. Manhattan 10 (includes Central Harlem, Harlem)
6. Manhattan 11 (includes East Harlem, Harlem, Randalls Island, Wards Island)
7. Manhattan 12 (includes Inwood, Washington Heights)

Characterizations of these populations are described in *Table 30*.

District	Housing Type	Unemployment Rate	Income Levels	Education Level	Language at Home	Capture Rate	Diversion Rate	Current Enrollment
Bronx 2	1.24% co-ops 27.03% multi-family 27.97% single-family	17.9%	80.8% low-income 18.9% middle-income 0.40% upper-income	54.7% HS graduate 8.2% Bachelor's degree	73.4% English	27.7%	8.6%	0 sites
Bronx 4	1.44% co-ops 34.98% multi-family 21.64% single-family	17.7%	75.9% lower-income 23.9% middle-income 0.20% upper-income	60.8% HS graduates 11.6% Bachelor's degree	31.0% English	24.0%	7.3%	1-5 sites
Manhattan 3	5.28% co-ops 57.98% multi-family 3.04% single-family	8.5%	54.1% low-income 39.4% middle-income 6.5% upper-income	72.9% HS graduates 40.8% Bachelor's diploma	45.8% English	40.8%	12.6%	6-10 sites
Manhattan 9	6.41% co-ops 44.65% multi-family 5.37% single-family	10.7%	58.0% low-income 35.5% middle-income 6.6% upper-income	79.1% HS graduates 42.9% Bachelor's diploma	49.5% English	44.8%	13.8%	1-5 sites
Manhattan 11	2.28% co-ops 54.96% multi-family 3.94% single-family	12.2%	66.0% low-income 30.6% middle-income 3.4% upper-income	72.1% HS graduates 28.5% Bachelor's diploma	46.1% English	30.3%	9.3%	1-5 sites
Manhattan 12	5.72% co-ops 61.22% multi-family 6.88% single-family	15.6%	59.0% low-income 38.1% middle-income 2.9% upper-income	68.5% HS graduates 29.4% Bachelor's diploma	26.0% English	42.2%	13.0%	1-5 sites

Table 30. Socio-demographic characterization of the community districts targeted for Organics Collection outreach based on relatively high current recycling rates.

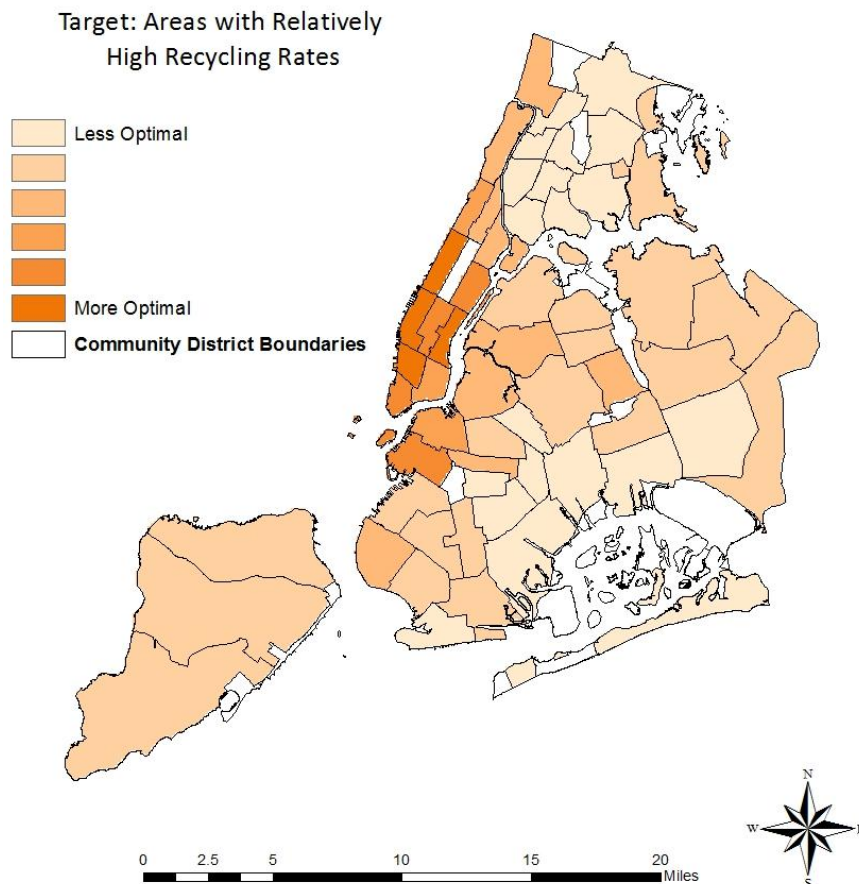# Optimal Areas for Organics Collection Outreach

Figure 67. Optimal areas for Organics Collection outreach for areas with relatively high current recycling rates.

Based on the results of all previous analysis, in addition to the weighted factors that guided site assessments (*Appendix C*), the analysis finds that the four most suitable community districts to target for immediate Organics Collection program expansion in the short term are primarily located in Manhattan. The following four community districts would most effectively increase interest in the program:

1. Manhattan 2 (includes Greenwich Village, Little Italy, SoHo, and the West Village)
2. Manhattan 4 (includes Chelsea, Clinton, and the Hudson Yards)
3. Manhattan 6 (includes Murray Hill, Stuyvesant Town, and Turtle Bay)
4. Manhattan 7 (includes Manhattan Valley and the Upper West Side)

Characterizations of these populations are described in *Table 31*.

However, as previously noted, the program's pilot status makes any assumptions based on current programmatic trends highly arbitrary. While expansion should be focused in these highlighted areas if the program advances past its pilot stage, similar analysis should be undertaken after a period of open enrollment to test these modeled trends against supplementary data and to revise any assumptions proven unfounded.

District	Housing Type	Unemployment Rate	Income Levels	Education Level	Language at Home	Capture Rate	Diversion Rate	Current Enrollment
Manhattan 2	7.32% co-ops 3806% multi-family 16.33% single-family	5.3%	23.4% low-income 49.2% middle-income 27.4% upper-income	95.5% HS graduate 80.2% Bachelor's degree	73.4% English	49.3%	25.5%	0 sites
Manhattan 4	8.67% co-ops 44.65% multi-family 5.37% single-family	7.9%	35.3% lower income 42.7% middle-income 21.9% upper-income	93.65 HS graduate 70.9% Bachelor's degree	69% English	43.8%	22.6%	1-3 sites
Manhattan 6	10.83% co-ops 43.65% multi-family 11.53% single-family	6.3%	26.5% lower-income 52.2% middle-income 21.3% upper-income	96.3% HS graduates 78.9% Bachelor's degree	73.2% English	44.7%	23.1%	0 sites
Manhattan 7	16.39% co-ops 56.25% multi-family 10.11% single-family	6.3%	31.9% low-income 44.8% middle-income 23.3% upper-income	94.3% HS graduates 75% Bachelor's degree	71.9% English	47.4%	24.6%	3-5 sites
Manhattan 8	14.45% co-ops 45.10% multi-family 20.75% single-family	6%	24% low-income 49.4% middle-income 26.6% upper-income	96.7% HS graduates 77.7% Bachelor's diploma	74.5% English	47.1%	24.4%	0 sites

Table 31. Socio-demographic characterization of the community districts targeted for Organics Collection outreach based on relatively high current recycling rates.

2.3.3
operations analysis

Section Summary: Operations & Efficacy

Purpose of Analysis: This section describes current operations for re-fashioNYC and e-cycleNYC to determine if inefficiencies exist in either of the program's services. This includes an analysis of the length of service requests and the time it takes to install and deliver bins, as well as the response time and frequency for waste pick-up and collection for both programs. For re-fashioNYC only, it includes the time lapse for tax receipt. For e-cycleNYC only, this section identifies the composition of waste collected since the program's introduction in early 2013, in addition to the weight of recycled materials. These analyses will help to estimate program benefits and efficacy.

Highlights: Based on an observation of trends relating collection bins, building size, and pickup frequency, for re-fashioNYC, Manhattan sites have more frequent pickups, while outer boroughs have larger buildings and larger bins, but less frequent pickups. e-cycleNYC sites in Manhattan reveal similar trends that bins are more often larger-sized, located in larger buildings, but with infrequent (less than 1 per month) pick-ups. However, in outer Queens, there are areas with large bins in large buildings with more frequent pick-ups.

This section also provides an analysis of applicant profiles for re-fashioNYC and e-cycleNYC. Generally, the majority of applications for both programs came from building managers, while residents comprise only a few of the applicants. Specifically, re-fashioNYC had a more varied applicant profile, with a large proportion of applicants serving on a co-op board.

re-fashioNYC
2.3.3 Operations Analysis

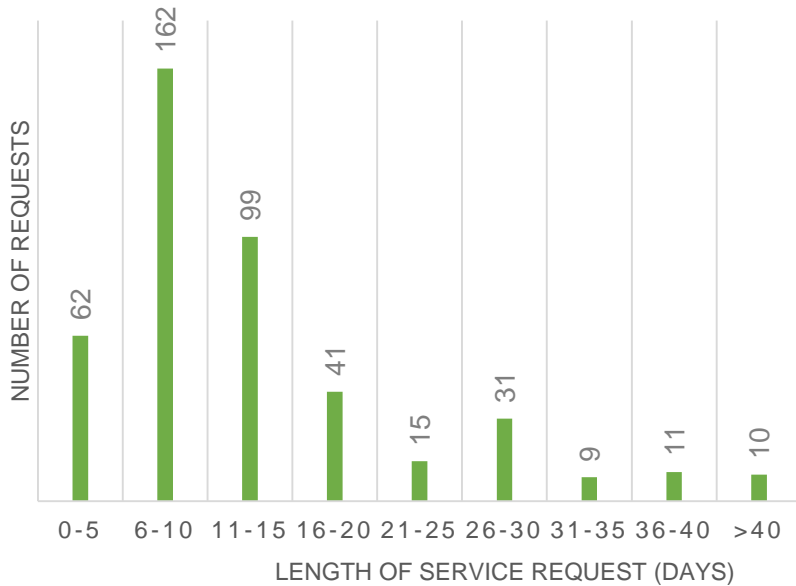## SERVICE LENGTH: BIN INSTALLATION

Figure68. Length of time from request of bin installation to completion of bin installation for re-fashioNYC.
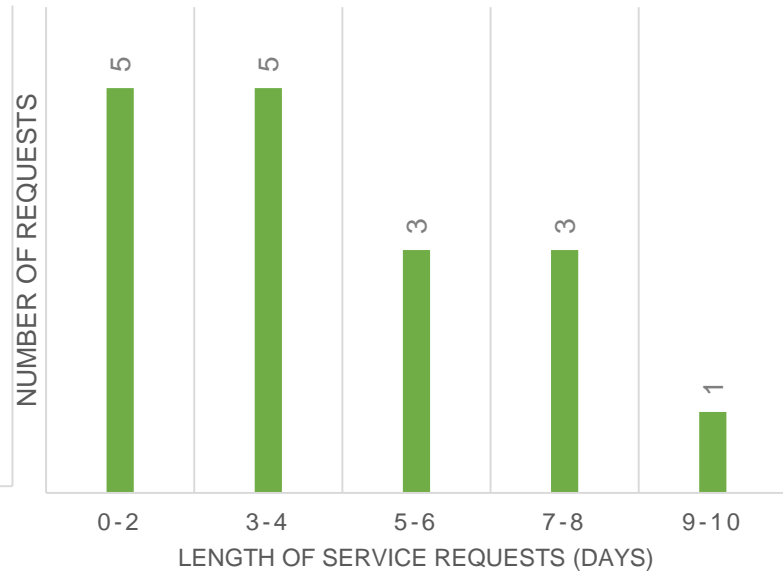
SERVICE LENGTH: BIN REMOVAL

Figure69. Length of time from request of bin removal to completion of bin removal for re-fashioNYC.

SERVICE LENGTH: BIN COLLECTION

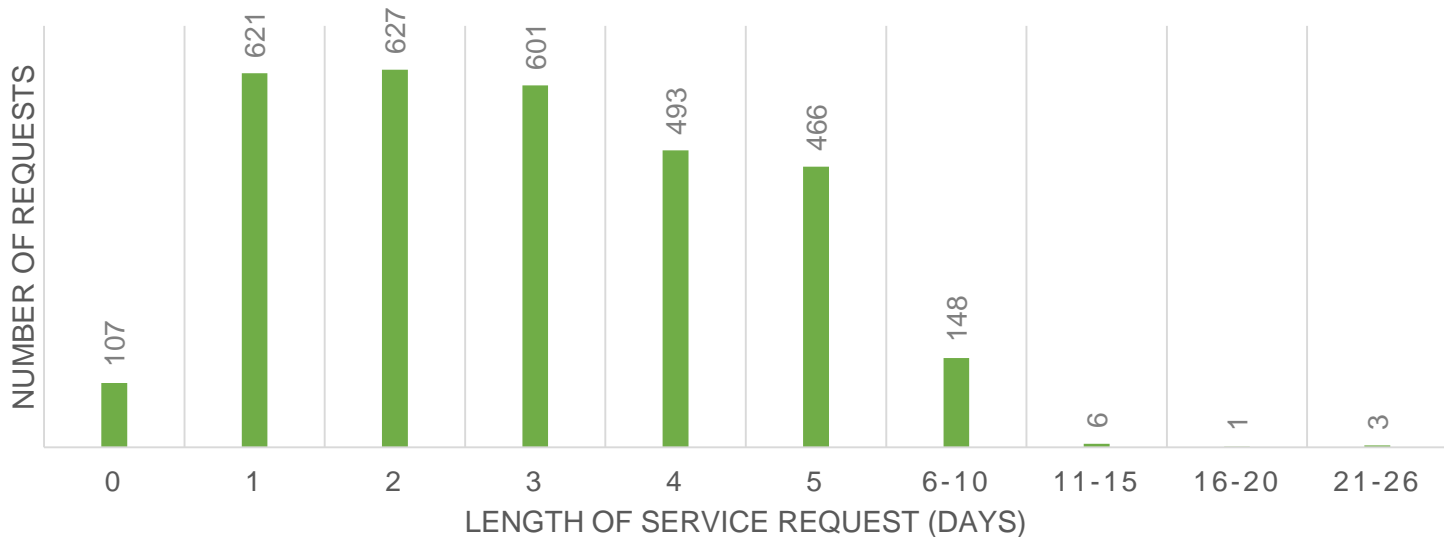
Figure 70. Length of time from request of bin content collection to completion of bin content collection for re-fashioNYC.

The average length of time for a bin installation for re-fashioNYC, determined by calculating the mean length of time taken to install all existing bins, is 14 days. Installation most frequently took nine days between request and completion, determined by taking the mode length of time taken to install all existing bins. 14% of installations took five days or fewer. Bin removal has a much shorter response time, with a mean length of four days, and mode value of three days. However, it is worth noting that only 17 bin removal requests have been logged in the DSNY dataset, while 440 bins have been installed, potentially affecting the comparability of the two activities. Bin removal took one week or longer 28.6% of the time. Bin collection was the most frequently requested service, with 3073 completed requests of either full or partial collections, excluding buildings enrolled in the automatic collection option. On average, collection requests took three days to be completed and only 5.1% of collection requests exceeded the five-day limit defined by the re-fashioNYC contract. 44.1% of bin collections took two days or fewer.

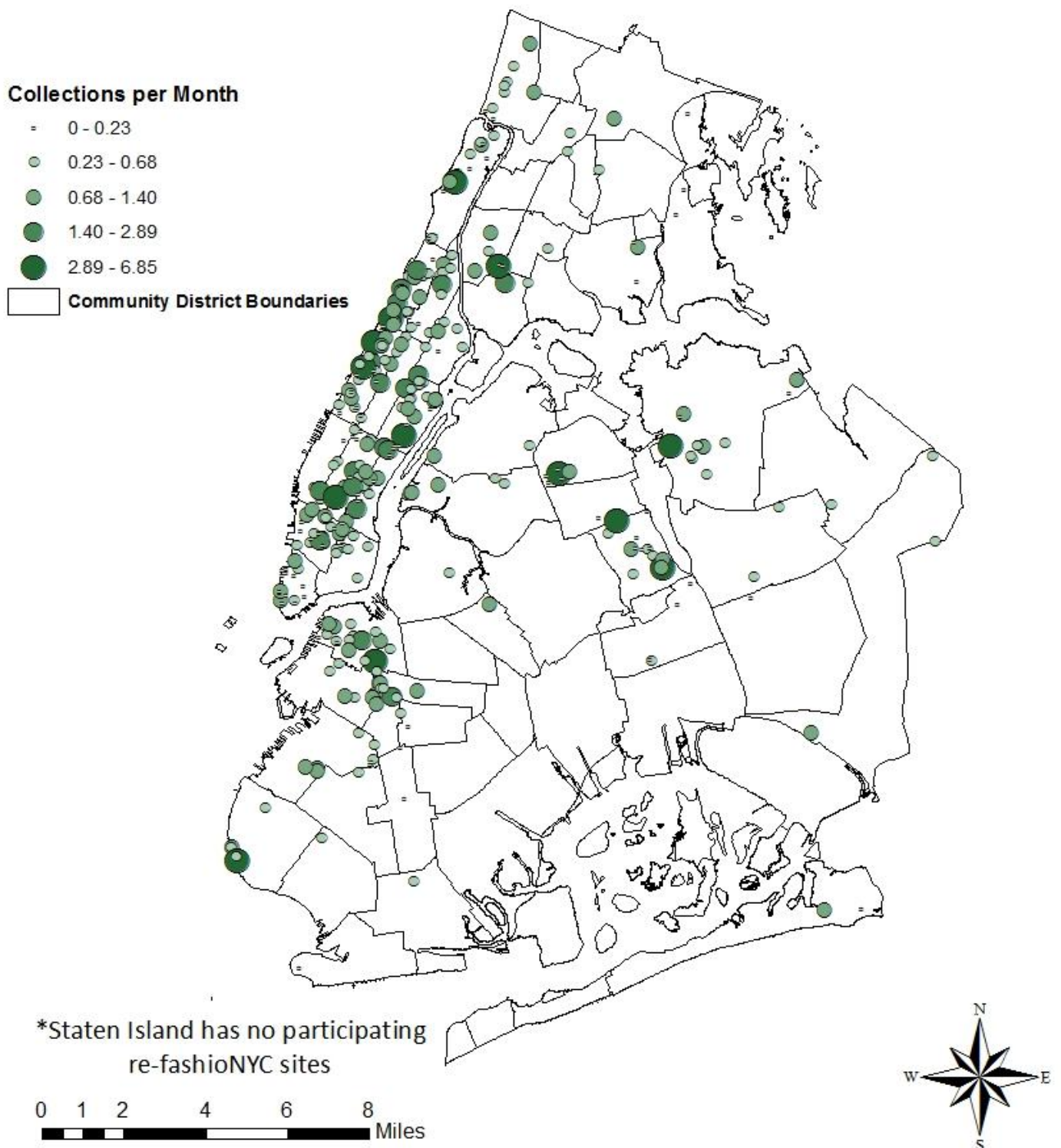# Frequency of re-fashioNYC Collections at Participating Sites

Collections per Month

- 0 - 0.23
- 0.23 - 0.68
- 0.68 - 1.40
- 1.40 - 2.89
- 2.89 - 6.85

☐ **Community District Boundaries**

*Staten Island has no participating re-fashioNYC sites

0 1 2   4   6   8
                          Miles

N
W   E
S

Figure71. Frequency of re-fashioNYC collections at all participating sites.

COLLECTION FREQUENCY BY BUILDING SIZE
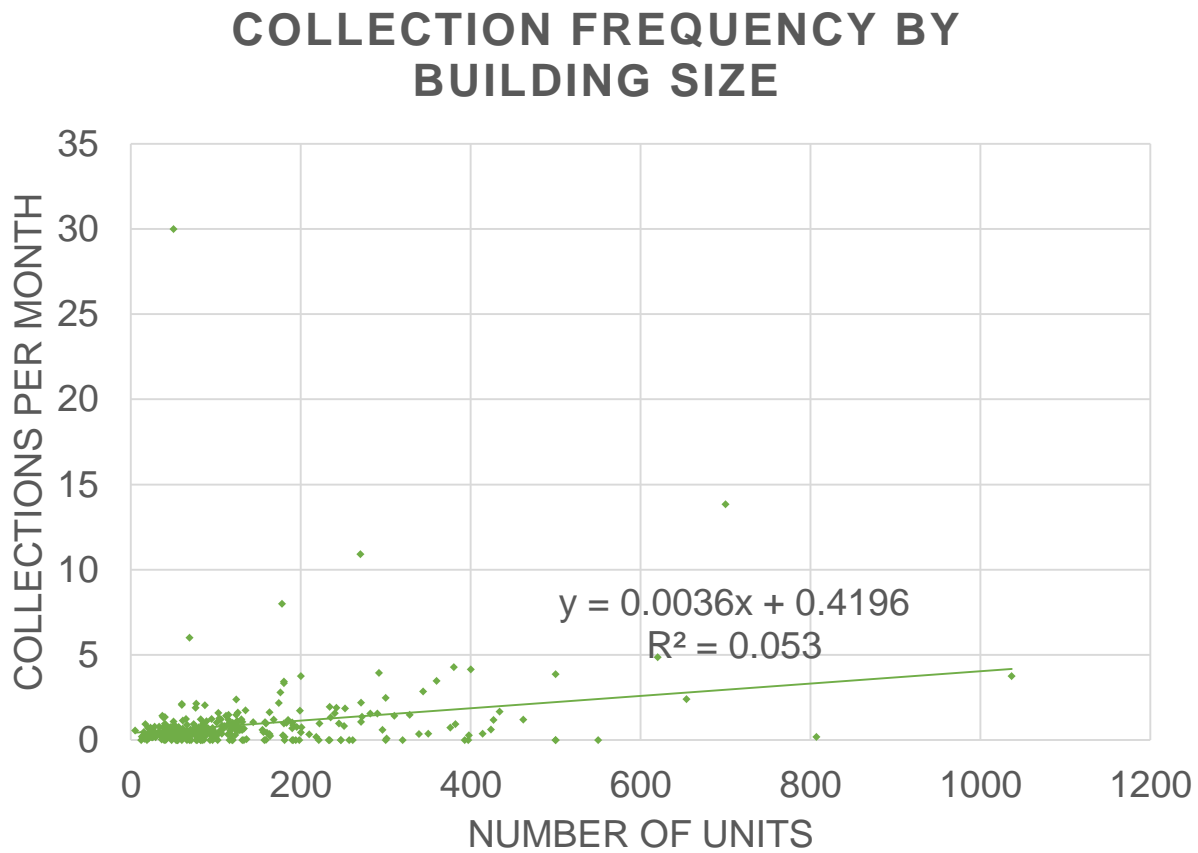

$$y = 0.0036x + 0.4196$$
$$R^2 = 0.053$$

Figure 72. Regression analysis of number of units and collection frequency for re-fashioNYC.

re-fashioNYC collections occurred most frequently (2.9-6.8 times per month) in the following community districts: Manhattan 4, 5, 6, 7, 8, 9, 10, 12; Bronx 4; Brooklyn 2, 10; Queens 3, 4, 7 (*Figure 71 & 72*). Instances of frequent collections are most prevalent in Manhattan and primarily consistent with community districts with high interest and enrollment.

Note that further analysis shows that with a small *R-value* of 0.22 and R^2 value of 0.053, there is a low correlation between collection frequencies per month and the size of a building (*Figure 72*).
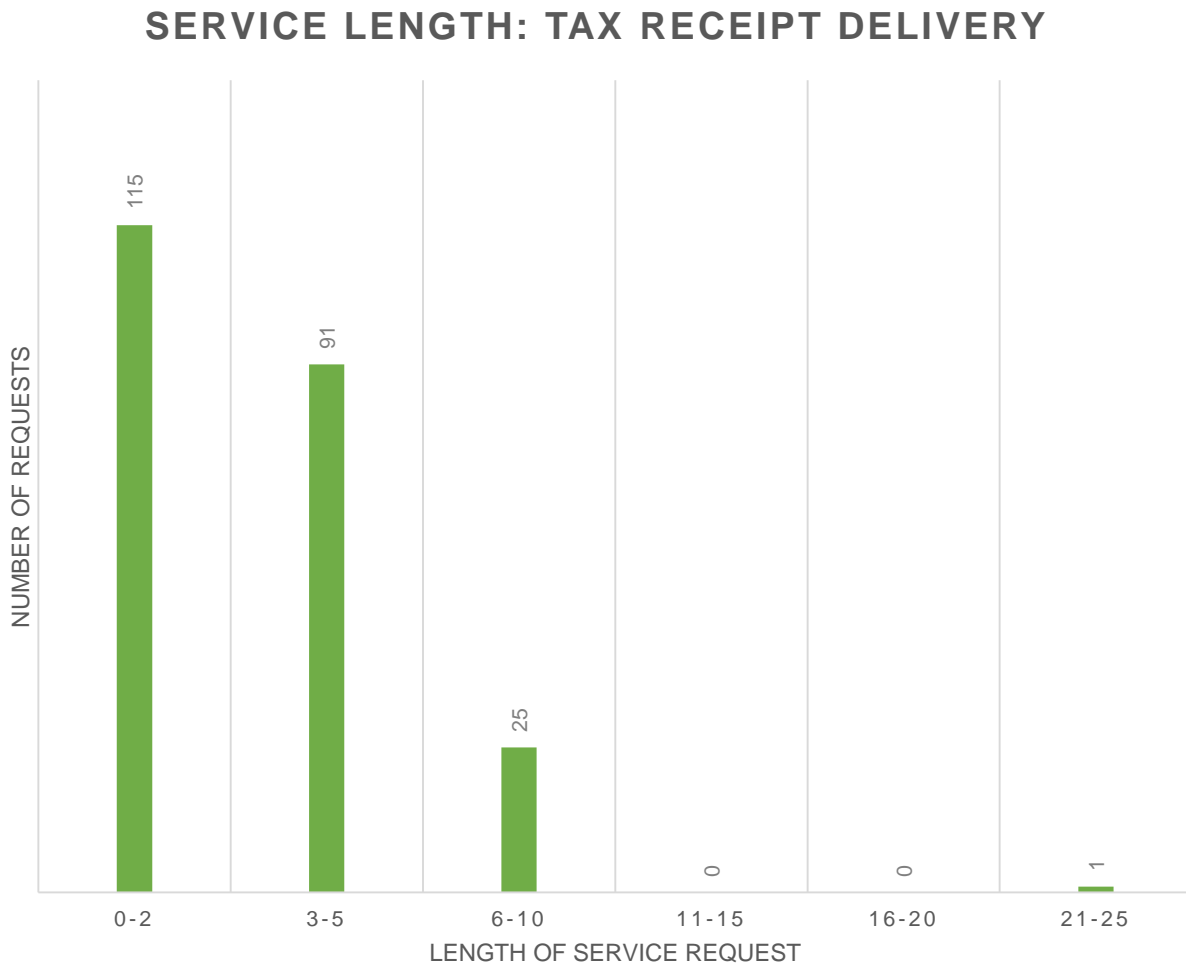
SERVICE LENGTH: TAX RECEIPT DELIVERY

Figure 73. Length of time from request of tax receipt to delivery of tax receipt for re-fashioNYC.

Other completed service requests included the delivery of tax receipts for the collected textiles (mean: three days), retrieval of a single item (mean: two days), and bin maintenance (mean: 3 days).

Figure 74. Weight of re-fashioNYC monthly collections, in tons.

In FY 2013, 108 bins were installed throughout the City, bringing the total number of buildings enrolled in re-fashioNYC to 370. Over 1,000 tons of clothing has been diverted from the waste stream through re-fashioNYC since the program's launch in 2011 (*Figure 74*).

e-cycleNYC

2.3.3 Operations Analysis
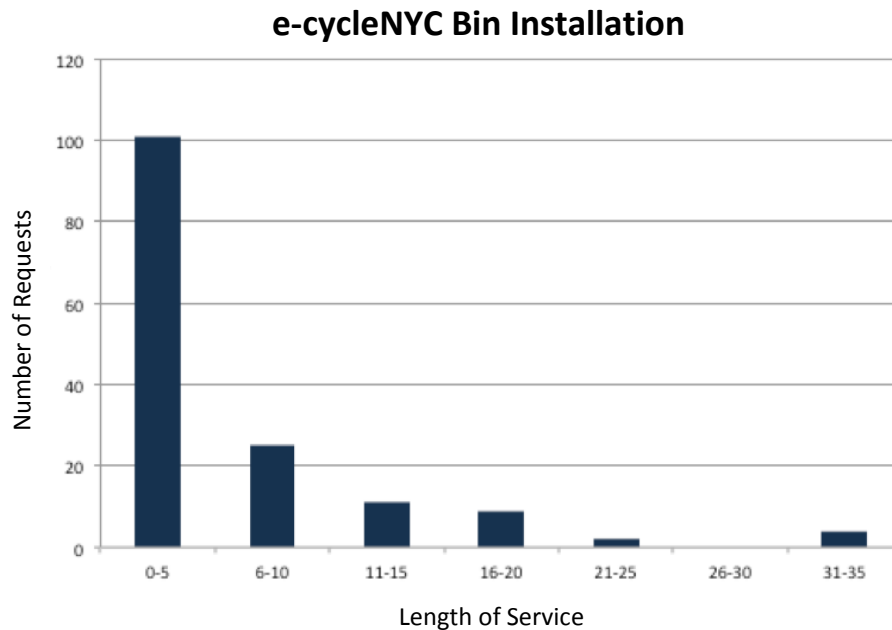
e-cycleNYC Bin Installation

Figure 75. Length of time from request for bin installation to completion of bin installation for e-cycleNYC.

Bin installation was completed more rapidly in e-cycleNYC than in re-fashioNYC, with a mean length of 4.4 days between the service request and the bin installation. Bin removal was only conducted twice for e-cycleNYC, with lengths of zero and two days between request and removal date.

Of the enrolled sites, collection was most frequent in Manhattan. Queens 2 and 7 also have notable pickup frequency by comparison. The highest number of collections per month (0.59-0.94 collections) is observed in Manhattan 10. This community district ranked in the middle of the suitability analysis scale which may indicate high potential for e-cycleNYC at this location.

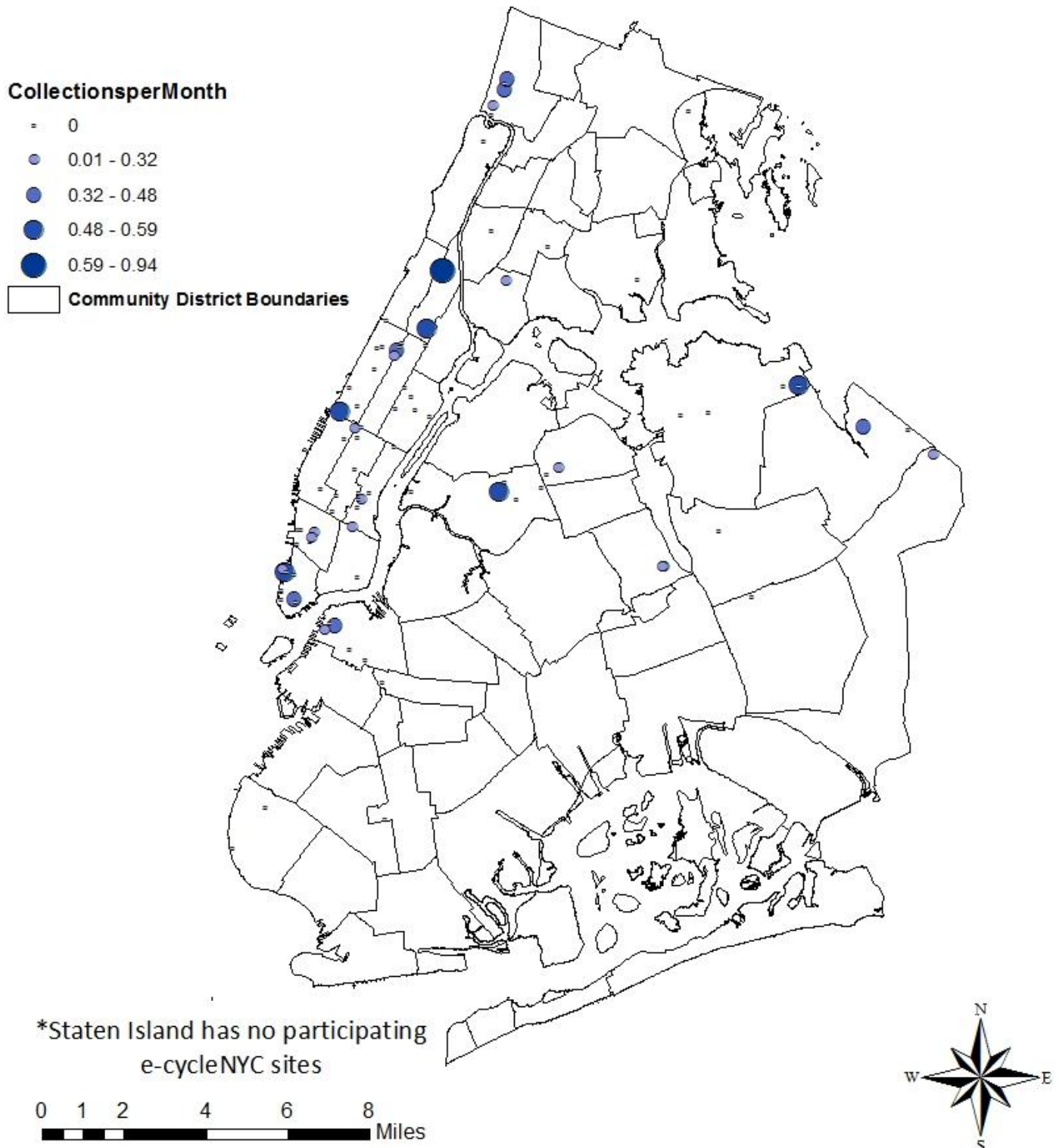# Frequency of e-cycleNYC Collections at Participating Sites

Figure76. Frequency of e-cycleNYC collections at all participating sites.

POUNDS OF WASTE COLLECTED

Figure77. Monthly bin collection for e-cycleNYC from November 2013-February 2014

Improperly recycled electronics, or e-waste disposed of with regular trash, is extremely harmful to environment. E-waste contains lead, mercury, cadmium, hexavalent chromium, polyvinyl chloride plastic (PVC), brominated flame-retardants, and other elements. ERI, contracted under e-cycleNYC, is R2 Certified and is an e-Stewards Certified Recycling Facility, ensuring that collected e-waste is recycled responsibly and that residuals are not shipped internationally to developing countries.[xiv] Total collection weight has continuously risen in the e-cycleNYC program since it began in 2013 (*See Figure 77*). January and February 2014 had the highest collection total to date (March and April 2014 data not available at the time of this report) with nearly 12,000 pounds and over 14,000 pounds respectively. Televisions account for over 40% of this weight, followed closely by computers. These results are not surprising as televisions are frequently replaced to be able to accept the latest components, like gaming consoles and applications that serve as alternatives to cable subscriptions.[10] Likewise, computers are increasingly upgraded or replaced by laptops and tablets.[11]

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[10] Lawler, Ryan. "The Incredible Shrinking TV Replacement Cycle." *Gigaom* 5 Jan. 2012: Web. 19 Apr. 2014.

[11] Smith, Matt. "Can a Tablet Replace Your Laptop? We Used an IPad for Three Months to Find out." *Computing*. Digital Trends, 15 June 2013. Web. 19 Apr. 2014.
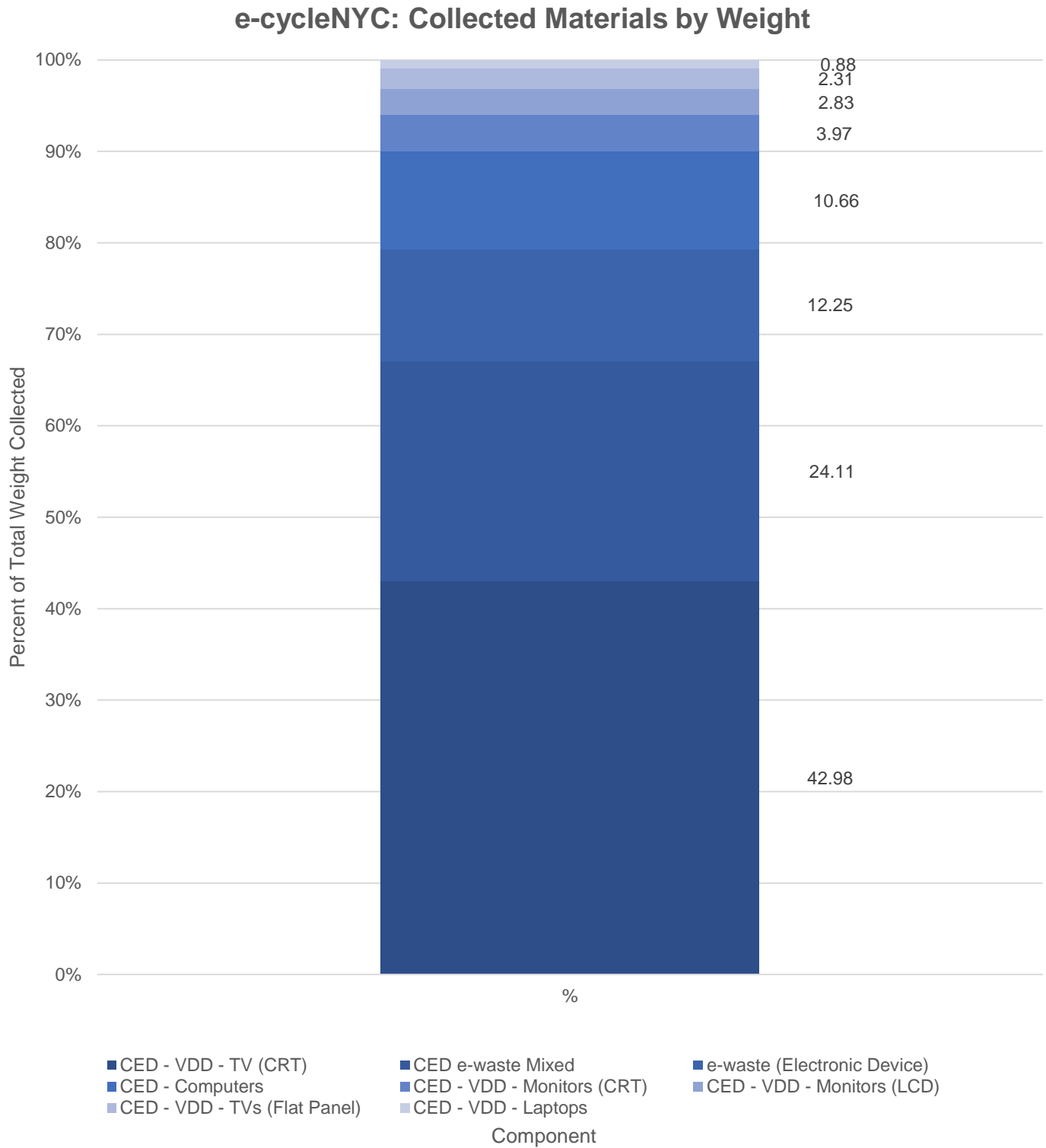
e-cycleNYC: Collected Materials by Weight

Figure 78. e-cycleNYC collected materials by weight (shown on the right, in tons) and percent of total collection content.

2.3.4
interest analysis

Section Summary: Interest Analysis

Purpose of Section Analysis: In this section interest trends for each of the four programs are analyzed both geographically and over time in order to infer relationships between current marketing and outreach techniques, and overall program interest trends. Specifically for re-fashioNYC and e-cycleNYC, frequencies of program applicants are also assessed in order to identify individuals who tended to apply for each program and are therefore likely to be targeted in further outreach.

Highlights: Community districts in Manhattan expressed greater interest in enrollment than those in the outer boroughs. The rate of increase in expressed interest was much more significant in Manhattan for all four programs, suggesting that interest in any of the four programs spreads fastest in this borough. However, for e-cycleNYC and Organics Collection, Brooklyn does still exhibit a comparable growth rate in expressed interest when compared to Manhattan. In general, the spatial distributions of the interested sites over time are consistent with the recommendations provided in the suitability analysis and therefore reinforce the potential outreach opportunities.

Summary of DSNY BWPRR General Outreach: The Bureau of Waste Prevention, Reuse, and Recycling distributed a total of 1,071,160 pieces of information on recycling and other waste diversion programs in 2013. There were a total of 298 outreach events that were conducted in 2013, including 228 site visits and participation at 70 community events.[xv]

Since BWPRR does not have a designated marketing professional, marketing strategy for the programs is developed on an ad-hoc basis by a full-time staff of four, in addition to two full-time Outreach Specialists who actively engage with prospective participants in the field. DSNY has a promotional proposal that details the department's annual marketing plan given a budget of approximately $35,000 a year. The department executed citywide mailing campaigns for the first three years of ABRI and occasionally for each of the other programs thereafter. BWPRR has invested in a number of paid online advertising campaigns through websites with local focus such as Habitat.com and TheCooperator.com. Other online advertising includes social media messaging through BWPRR's YouTube channel and Facebook page, NYC Recycles, which is updated several times daily. Presently, over 1,700 people have "liked" the Facebook page and therefore receive regular updates. BWPRR also maintains a presence via expos and tabling events such as at the 2014 Co-op and Condo Expo. Lastly, BWPRR displays posters and promotional material in Housing Works thrift shops, and plans to offer more promotional items and incentives for program enrollees.

ABRI
2.3.4 interest analysis

ABRI CUMULATIVE INTEREST

y = 42.071x - 84332

y = 16.214x - 32507

y = 8.9286x - 17903

y = 6.6786x - 13392
y = 0.5x - 1001.4
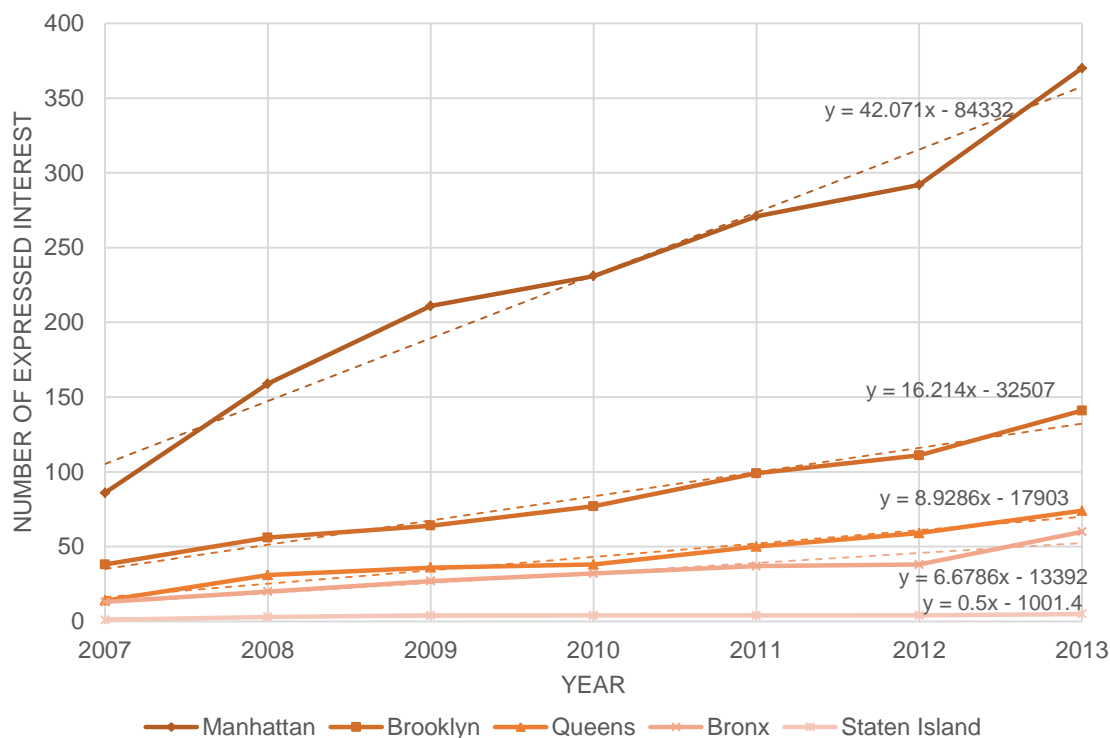
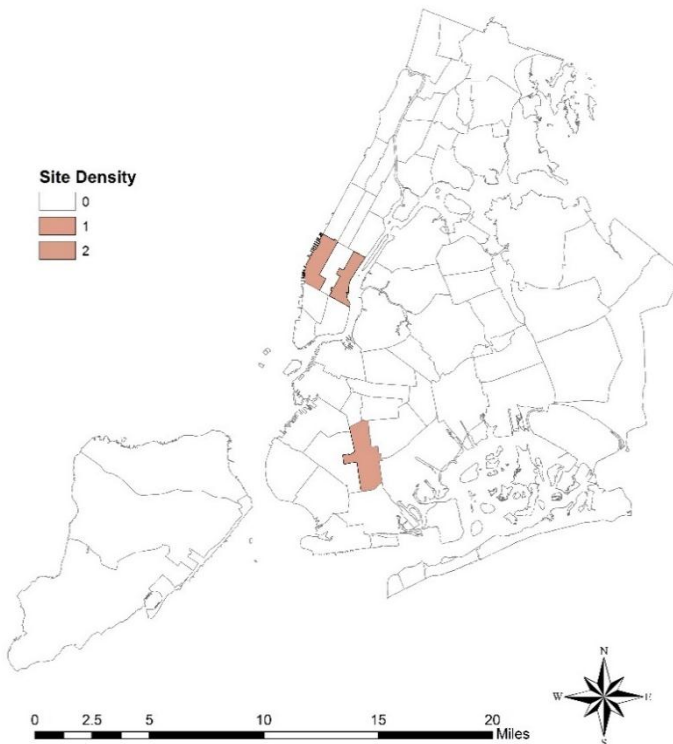| ABRI		
Year	**Interest**	**% Change**
2007	152	-
2008	269	76.97
2009	342	27.14
2010	382	11.70
2011	461	20.68
2012	504	9.33
2013	650	28.97

Figure 79. Cumulative interest in ABRI by borough (2007-2013).

Interest in ABRI has increased since the program started in 2006. The early years from 2006-8 saw the largest jumps in interest (2275% from 2006-7, from 4 to 94 interested sites and 55% from 2007-8, from 95 to 147 interested sites). Post-2007, the average percent change or increase in interest is 23%, with the number of interested parties per year climbing steadily, each year exceeding the year prior. Post-2009, the percent change dipped back down to 8% increase from 2008-9, and 9% from 2009-10. It climbed up to 23% from 2011-12, then 10 from 2012-13, and experienced the highest recent jump in interest since the inception years at 53% increase from 2012-14.

Overall interest has been increasing over time in all five boroughs, with the exception of Staten Island, which has had little to no interest throughout the program's history. Manhattan's rate of growth is highest by a significant margin, at least twice of the next fastest growing borough-- Brooklyn, then followed by Queens and the Bronx.

Past marketing efforts to promote ABRI may help to explain some of these of these spikes in interest. In the early years, the city conducted a number of mailing campaigns. In 2006, the Department sent a citywide "Movers Mailer," which was basically an information packet that included an ABRI brochure and registration form. In September 2007, DSNY sent an informational letter to the managers and owners of every building, and in June 2008, DSNY sent a letter to all residents of buildings over 100 units. While these mailers could have been partly the reason for increased spikes in the interest during those respective years displayed in Figure 75, there is a lack of sufficient historical marketing data to construct a reliable correlation for this interest analysis.
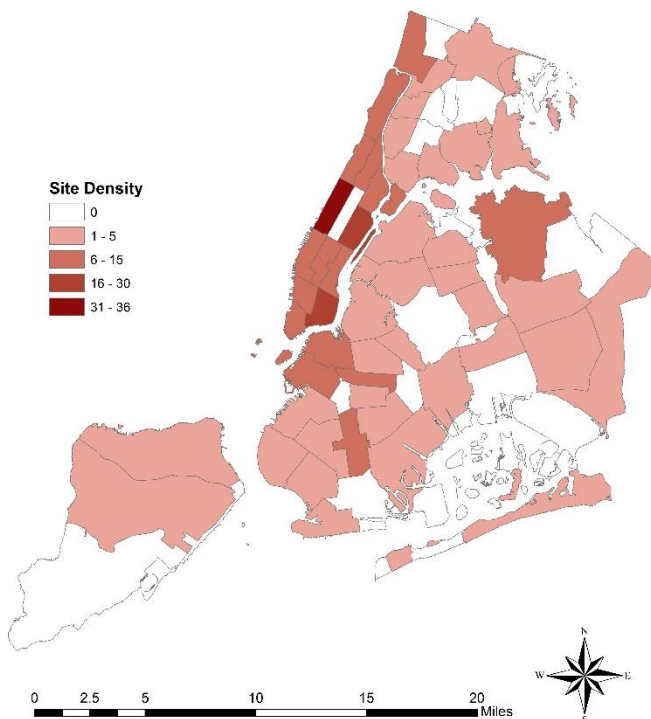
Density of Interest in ABRI 2006

Density of Interest in ABRI 2007
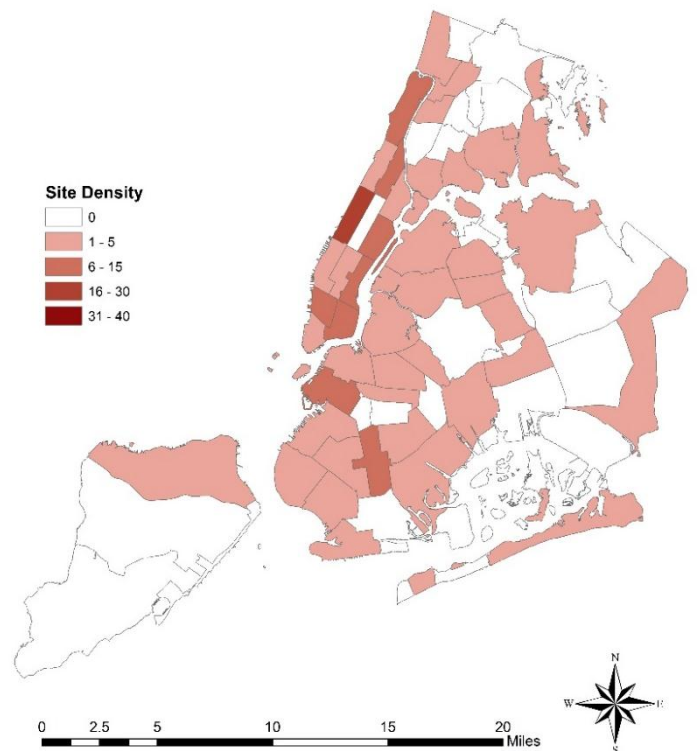
Density of Interest in ABRI 2008

Density of Interest in ABRI 2009

Figure 80. Geographic display of interest in ABRI by district over time (2006-2009).

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Density of Interest in ABRI 2010
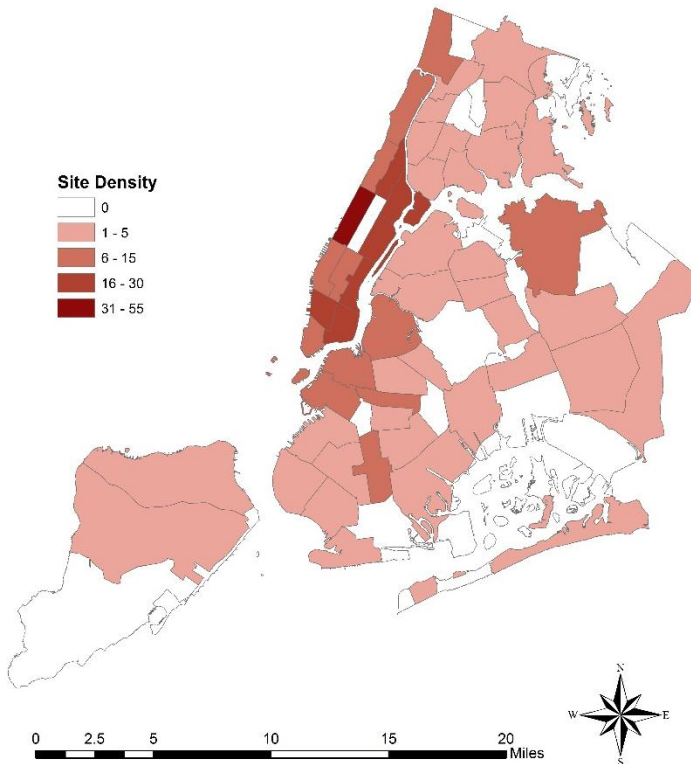
Site Density
- 0
- 1 - 5
- 6 - 15
- 16 - 30
- 31 - 55

0 2.5 5 10 15 20 Miles

Density of Interest in ABRI 2011

Site Density
- 0
- 1 - 5
- 6 - 15
- 16 - 30
- 31 - 60

0 2.5 5 10 15 20 Miles

Density of Interest in ABRI 2012

Site Density
- 0
- 1 - 5
- 6 - 15
- 16 - 30
- 31 - 65

0 2.5 5 10 15 20 Miles

Density of Interest in ABRI 2013

Site Density
- 0
- 1 - 5
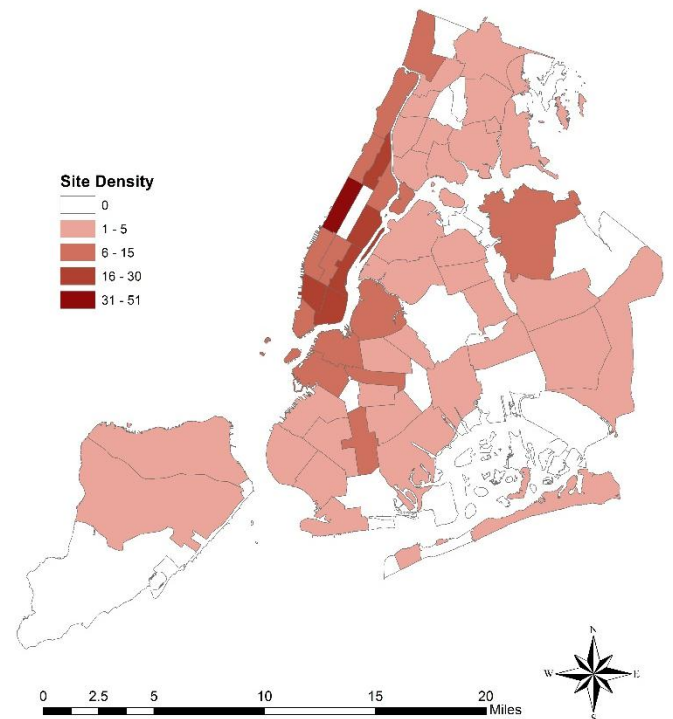- 6 - 15
- 16 - 30
- 31 - 76

0 2.5 5 10 15 20 Miles
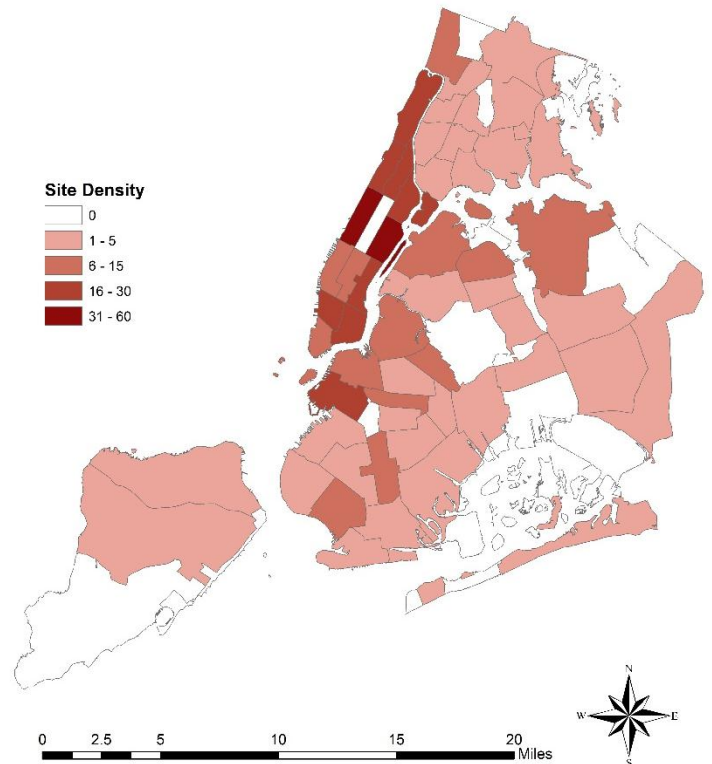
Figure 81. Geographic display of interest in ABRI by district over time (2010-2013).

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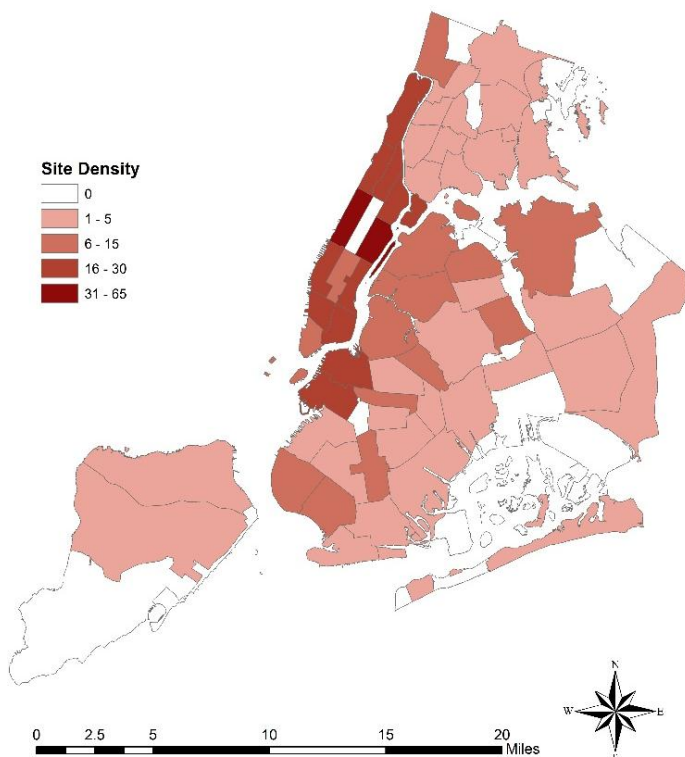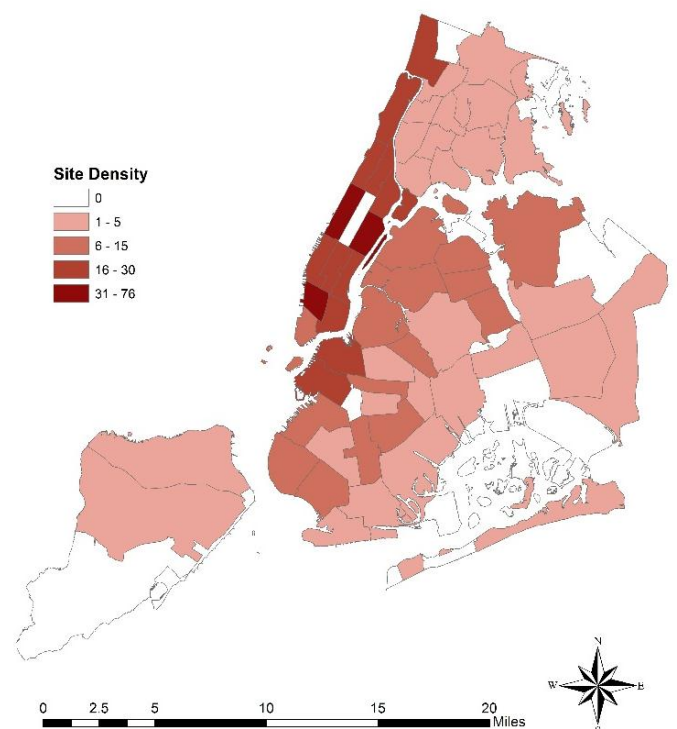Interest in ABRI was initially concentrated in the neighborhoods of the Upper West Side and Upper East Side (Manhattan 8 and 7, respectively). The program saw a marked increase in cumulative interest in its first year from 2006 to 2007, which is illustrated in Figure 76. From 2007 on, interest spreads outwards to neighboring districts in Queens and Brooklyn and intensifies in Manhattan 2, 4, 7, 8, 9, 11, 12 as well as Brooklyn 5 and 6. Interest remains fairly stagnant in the Bronx and Staten Island.

This pattern of interest is consistent with the Site Suitability Analysis, especially in Manhattan 2, 7 and 8, each of which had the highest cumulative interest to date at 31-76 sites per district. Lower levels of interest (1-5 sites) occur mostly in the outermost districts of Queens and Brooklyn as well as most of the Bronx where there are higher proportions of single-family residences (ranging from 27.9% to 40.1%). Primary language spoken at home may also be an especially significant demographic factor for ABRI because the training is conducted in English. Some of the least suitable sites for ABRI outreach, such as Bronx 2, 4 and 6, average only 34% of households that use English as their primary language. The lack of eligible housing stock may explain stagnant interest in Staten Island, where the majority of residences are single-family homes.

re-fashioNYC

2.3.4 interest analysis

re-fashioNYC Cumulative Interest

$y = 65x + 553$

$y = 70x + 158.67$

$y = 20.5x + 104$

$y = 14x + 55.667$

$y = 1.5x + 6.6667$

NUMBER OF EXPRESSED INTEREST

YEAR

Manhattan — Brooklyn — Queens — Bronx — Staten Island
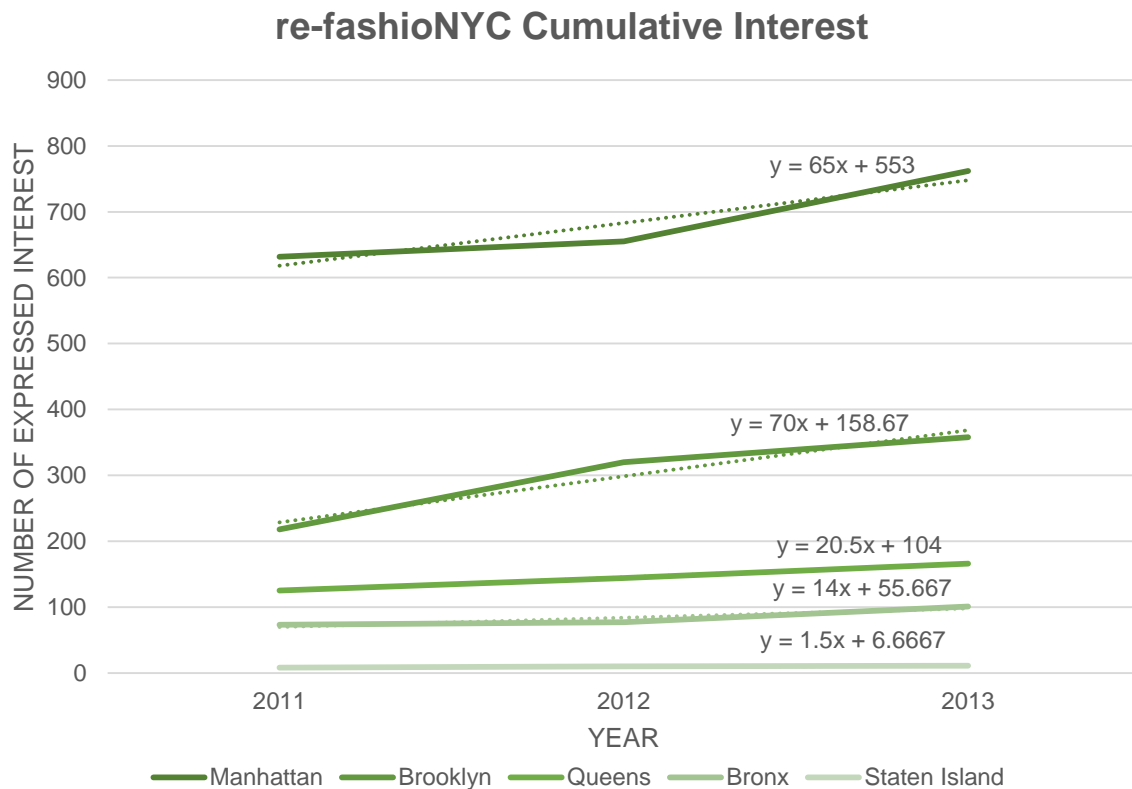
Figure 82. Cumulative interest in re-fashioNYC by borough over time (2011-2013).

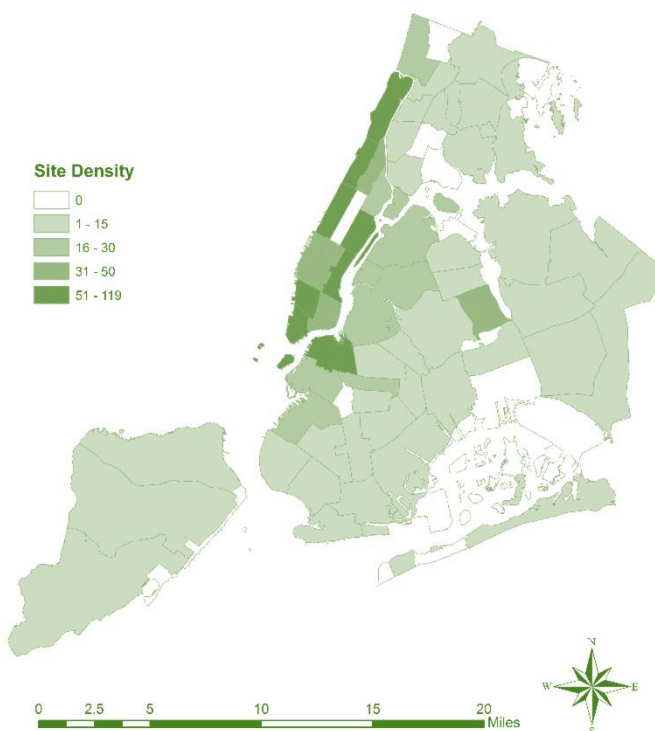| re-fashioNYC		
Year	Interest	%Change
2011	928	-
2012	1048	11.45
2013	1207	13.17

Table 33. Counts and percent change of cumulative interest of re-fashioNYC by year.

Since its launch in 2011, re-fashioNYC has garnered a large amount of interest. The program began with over 600 inquiries in Manhattan alone. Overall interest continued to rise in subsequent years, though figure (*Figure 82*) shows that this increasing trend is not very significant. The initial increase in 2011 may be partially attributable to the DSNY Citywide informational mailer highlighting re-fashioNYC and other recycling programs. The percent increase in the program has not been significant in later years. 2012 accumulated only 12.59% change in interest and 2013 had 15.39% change. On a borough specific level, Manhattan has continued to show a large volume of interest, followed closely by Brooklyn. This is in part due to the larger concentration of eligible housing stock in interested areas, as seen in *Figure 91*. Both of Brooklyn and Manhattan have other factors that contribute to the amount of interest, for example Housing Works has several retail locations in both boroughs. Since they have a direct partnership with re-fashioNYC, this may encourage enrollment in the program because of familiarity. The community districts with ongoing increases in interest since 2011 have Housing Works retail stores (e.g. Manhattan 2, 4, 7, and Brooklyn 2 (*Figure 83*). The borough with the least amount of interest is Staten Island which has contributed on 100 interest inquiries since the program began. This may have a direct correlation to the low eligible house stock on the island.

Interest in re-fashioNYC 2011
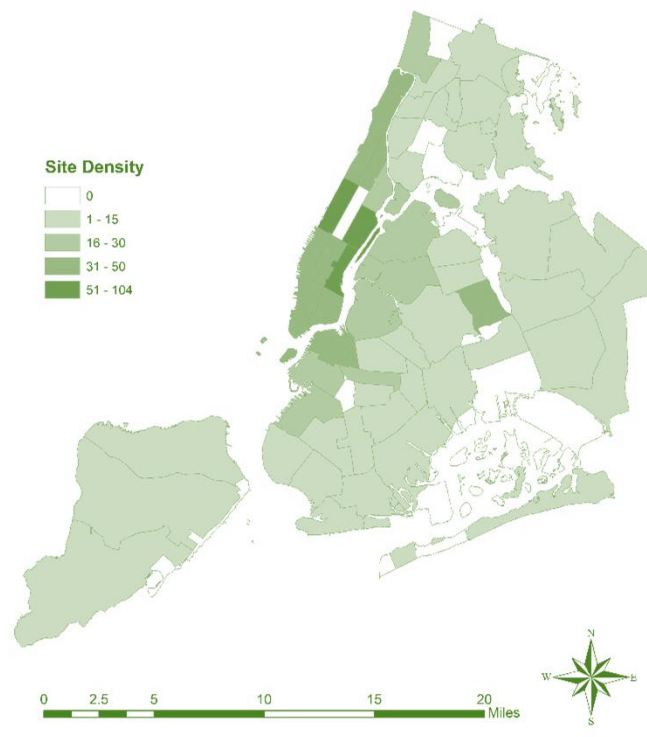
Interest in re-fashioNYC 2012

Interest in re-fashioNYC 2013
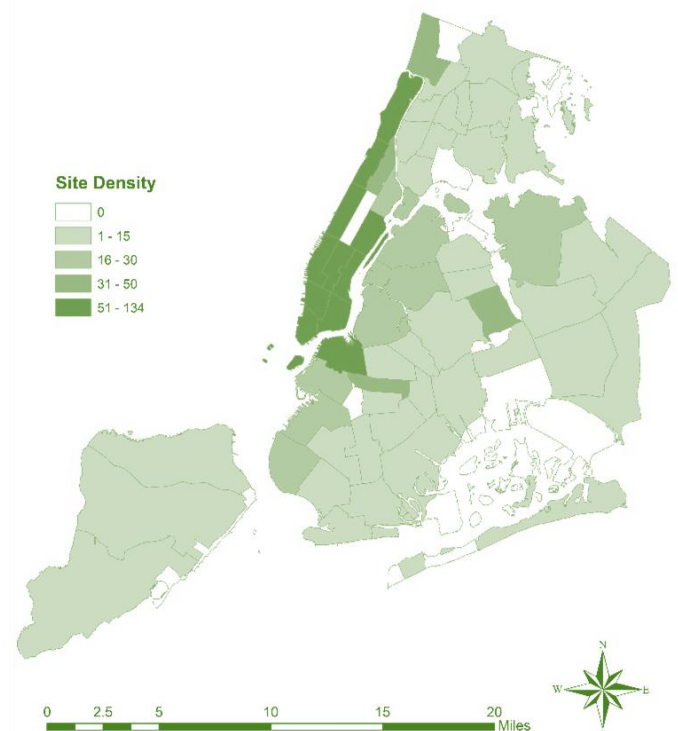
Figure 83. Geographic visualization of interest in re-fashioNYC 2011-2013.

In 2011, the initial distribution of interest for re-fashioNYC is fairly uniform throughout the boroughs. The initial community districts with the highest interest were Manhattan 6, 7, and 8. This reinforces the findings in figure 25, as these areas of high interest correlate with multi-family dwellings, higher income, high rates of English spoken at home, and high educational attainment. As the program progressed into 2012, interest increased to 51-134 inquires in the surrounding areas. This trend continues into 2013 where interest expanded throughout Manhattan and into the Bronx and Brooklyn. It is an ongoing, Citywide trend that areas with high interest transition into areas with high enrollment, as seen with Manhattan 7 and 8, as well as Brooklyn 2 (*Figure 17*). The distribution of interest spreads outward with a decreasing gradient from community districts with the highest interest to community districts with lower ones. This trend implies that interest was spurred by word of mouth. This may be indicative of the re-fashioNYC marketing strategies such as ground recruitment and directly contacting management companies.

re-fashioNYC Applicant Profile
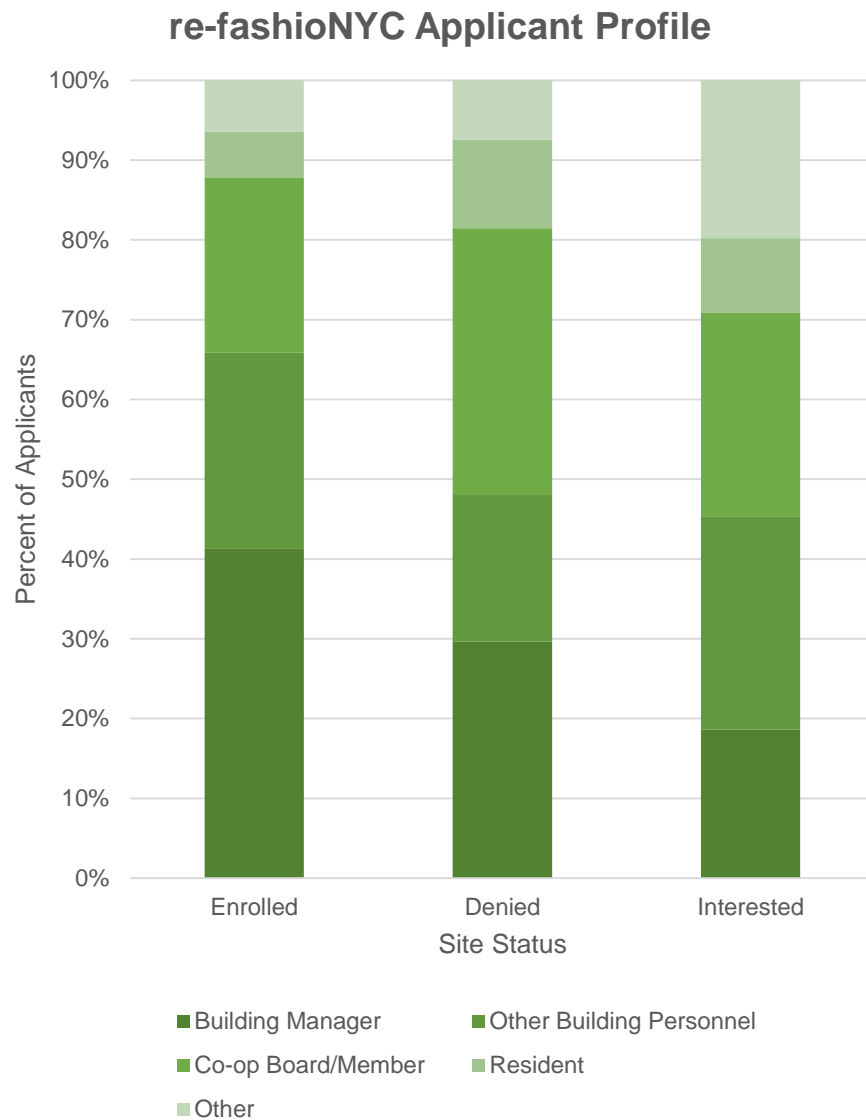
Figure 84. re-fashioNYC profile of applicants expressing interest.

Interest and enrollment in re-fashioNYC can initiate from building management, other building personnel, co-op boards or members, or other parties (City agency personnel, Green Committee members, store managers, etc.). Interest was most frequently expressed by other building personnel (26.7%) followed closely by co-op boards or co-op members (25.6%). Building management expressed interest 7.5% less frequently (totaling 18.6% of interest) than the average of these parties. Residents expressed interest only 9.3% of the time – 17.4% less frequently other building personnel. Building managers served as the enrollment representatives 41.3% of the time. This is 16.7% more frequent than other building personnel (enrolled on 24.6% of instances). Enrollment in re-fashioNYC requires consent from the building managers, so it is not surprising that residents enrolled on only 5.7% of occasions. Co-op boards or co-op members were the most frequently denied party (9 out of 27 instances or 33.3%) of those that unsuccessfully attempted enrollment, followed closely by building managers who received denial 29.6% of occasions (8 out of 27 instances). Overall, building managers were the most common party to attempt enrollment, but also the most commonly denied.

e-cycleNYC

2.3.4 interest analysis

E-CYCLENYC CUMULATIVE INTEREST
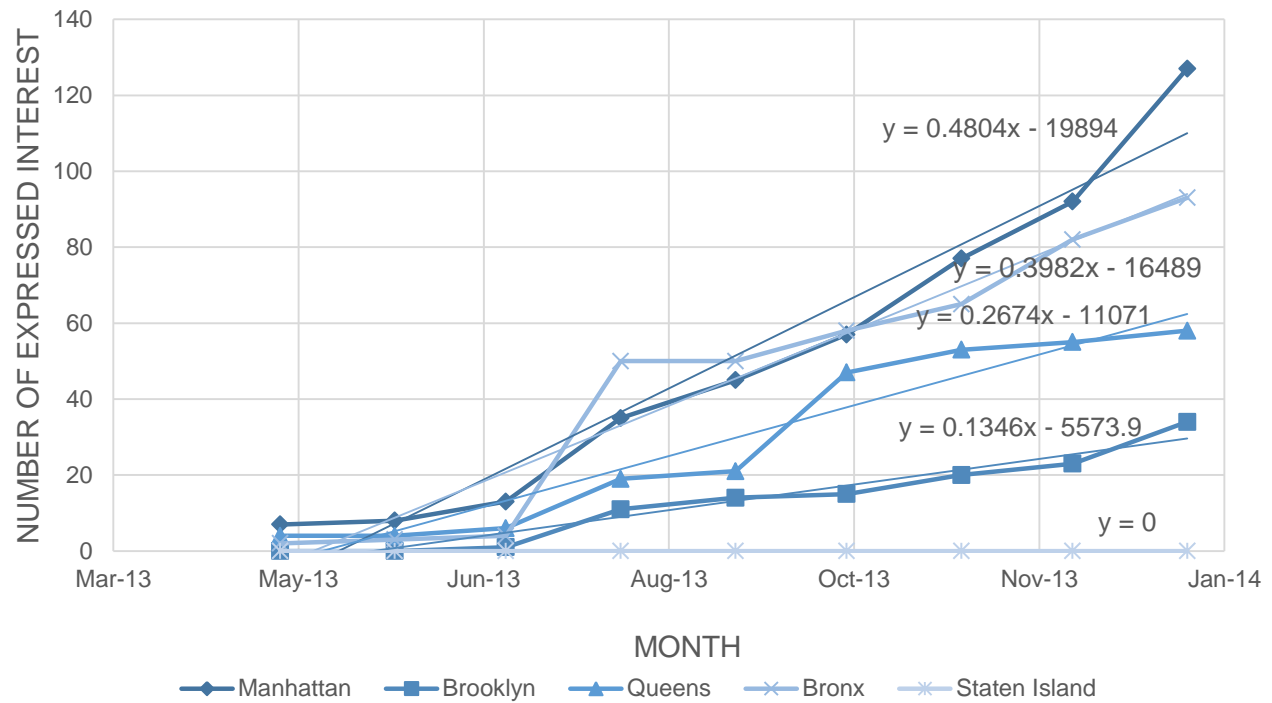
Figure85. Interest in e-cycleNYC by borough

e-cycle

Month	Interest	%Change
May-13	13	-
Jun-13	15	15.4
Jul-13	24	60.0
Aug-13	115	379.2
Sep-13	130	13.0
Oct-13	177	36.2
Nov-13	215	21.5
Dec-13	252	17.2
Jan-14	312	23.8

Table 35. e-cycleNYC total interest and percent change by month from May 2013 to January 2014.

Since record-keeping began between April and May 2013, interest in e-cycleNYC has increased over time. In May 2013 through June 2013, interest was minimal in all boroughs; it then peaked in August 2013 with an astounding 397.2% change in interest. While interest has cumulatively grown since this point, percent change in interest has decreased. Since August 2014, the next highest percent change in interest was nearly 90% less (36.2%), occurring from September to October 2013. From September 2013 through January 2014, e-cycleNYC generated an average of 38.8 newly interested sites per month.

With the exception of Staten Island which has expressed nearly 0% interest, Brooklyn has the lowest overall cumulative interest and growth in interest, followed by Queens. Brooklyn ranks in the top two most interested boroughs for the other recycling programs, so it is curious why interest is low in electronics recycling. Multi-family housing, which is arguably most suitable for e-cycleNYC, is almost equally common in the Brooklyn as in the Bronx (mean 28.54% and 24.19% of housing respectively) so it is even less clear as to why the Bronx has far surpassed Brooklyn for interest.

Manhattan has the highest overall cumulative interest and growth in interest, followed closely by the Bronx, which in fact surpassed interest in Manhattan roughly around July 2013. The cause of this spike is inexplicable (perhaps simply word of mouth), but may have contributed to a subsequent enrollment peak in the Bronx in October 2013. Likewise, interest in Queens increased by more than 20 sites throughout September 2013 resulting in a particularly high period of enrollment in October 2013 through December 2013. These findings suggest that interest does prompt enrollment in e-cycleNYC. It is important that DSNY continues to spur interest by raising awareness of the program if enrollment is to continue increasing.

With the exception of Staten Island, interest in e-cycleNYC has a range of 93 sites among the remaining four boroughs with the lowest total interested sites in Brooklyn (34 sites) and the highest total interested sites in Manhattan (127 sites). While this spread seems substantial, geographical visualization of interest shows relatively consistent interest throughout New York City.
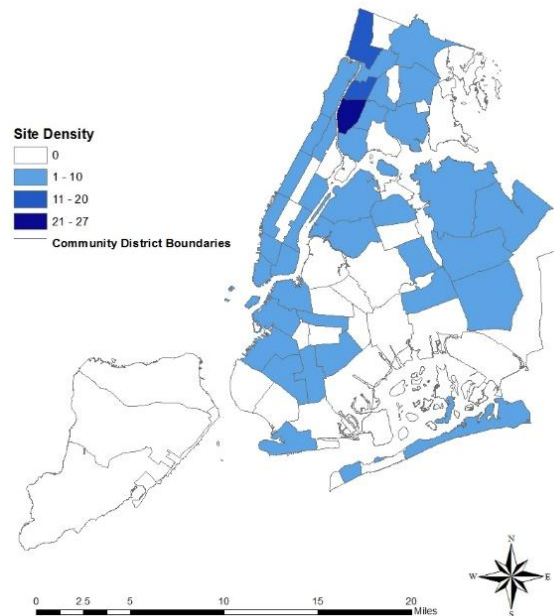
e-cycleNYC Interest by Community District

Figure 86. Interest in e-cycleNYC by community district.

Interest in e-cycleNYC is fairly consistent throughout New York City given the most recently available data (May 2013-January 2014). This uniformity is likely the result of citywide mailers that distribute the same information to all resident New Yorkers. Such mailers have been sent since e-cycleNYC was established in 2013. While these mailers are received by Staten Island residents, they have spurred no interest. Staten Island's housing stock is only 1.41% multi-family homes in comparison to its 80.9% single-family homes. In consideration of the eligibility requirements for the program which mandate that buildings have a minimum of 10 units, this renders roughly 80% of Staten Island ineligible to participate.

Cumulative interest is between 1-10 sites in all community districts in the four remaining boroughs with the exception of three community districts in the Bronx. Bronx 5 and Bronx 8 have 11-20 sites of cumulative interest, and Bronx 4 has had a total of 21-27 interested sites. All three of these districts are adjacent to districts in Manhattan and are on the far western border of the Bronx. It is unclear what has caused unusually high interest in the Bronx and it is possible that this intense interest is happenstance, for the program has only been functioning for about one year. It is also possible that these community districts have strong neighborhood connectivity and word-of-mouth has prompted interest in buildings that would have otherwise not responded to the citywide mailer.

While interest is particularly high in Bronx 4, 5, and 8, these districts were shown to have low suitability for the program in our previous analysis in Section 2.3.2 relative to New York City as a whole. The districts did not rank in the absolute least suitable category, but are less optimal than districts in Manhattan, which average 45.95% multi-family residences. On average, Manhattan districts also have 6.28% more coop-style housing than the Bronx (average 7.16% versus 0.88%). It would be best for DSNY to act on districts with 1-10 interested sites that also have high likelihood of enrollment, specifically those in Manhattan and northwestern Brooklyn.

e-cycleNYC Applicant Profile
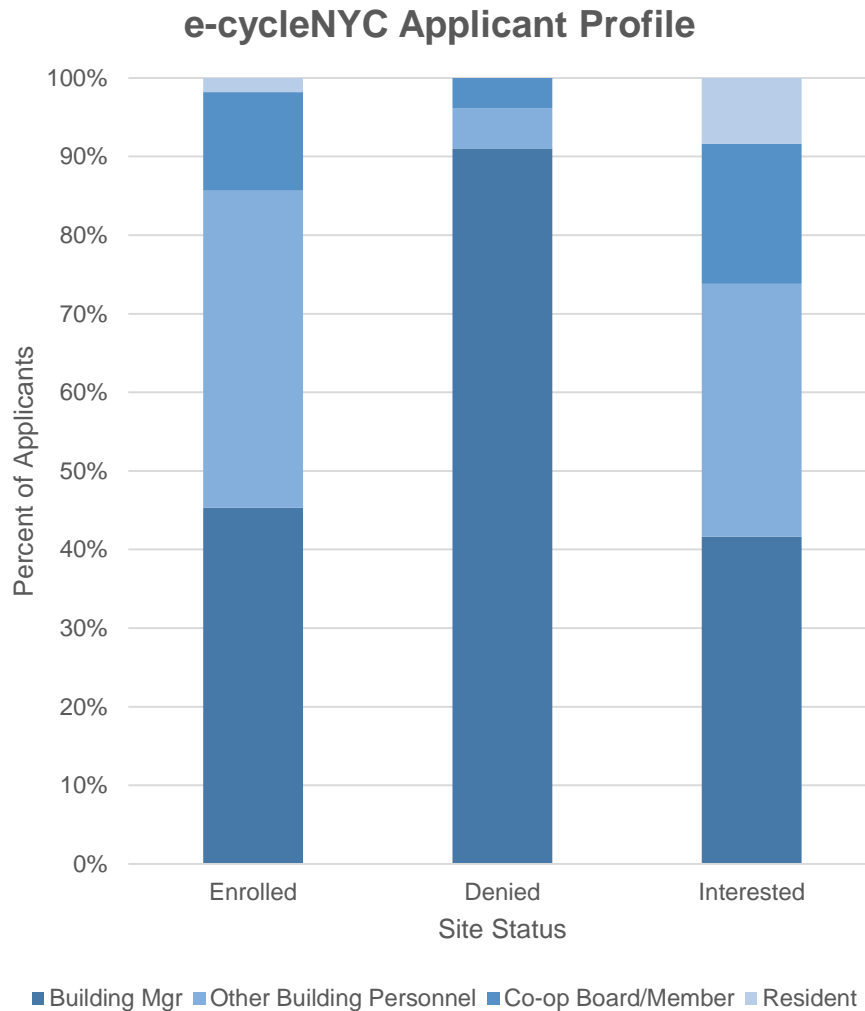
Figure 87. e-cycleNYC applicant profile.

Interest and enrollment in e-cycleNYC can initiate from building management, other building personnel, co-op boards and members, or residents. Interest, enrollment, and enrollment denial most frequently originated from buildings managers (41.7%, 45.3%, and 91.0% respectively). If buildings are enrolled in more than one program, it is most commonly e-cycleNYC and re-fashioNYC. It is not uncommon that building managers are actively interested and attempt to enroll in both programs. Enrollment in e-cycleNYC requires building manager consent as well as agreement from ERI. Thus, it is equally predictable that building managers would be the most frequently denied party. Interest in e-cycleNYC was second most commonly expressed by other building personnel (32.1% of occasions) and relatively infrequently expressed by residents (8.3% of occasions). In keeping with the enrollment requirements explained above, residents were never denied and only enrolled on 1.8% of instances. Further, enrollment was notably common among other building personnel (40.4%) of occasions – only 4.9% less frequent than enrollment by building managers. Interestingly, other building personnel were only denied enrollment 5.1% of the time.

organics
2.3.4 interest analysis

ORGANICS COLLECTION CUMULATIVE INTEREST
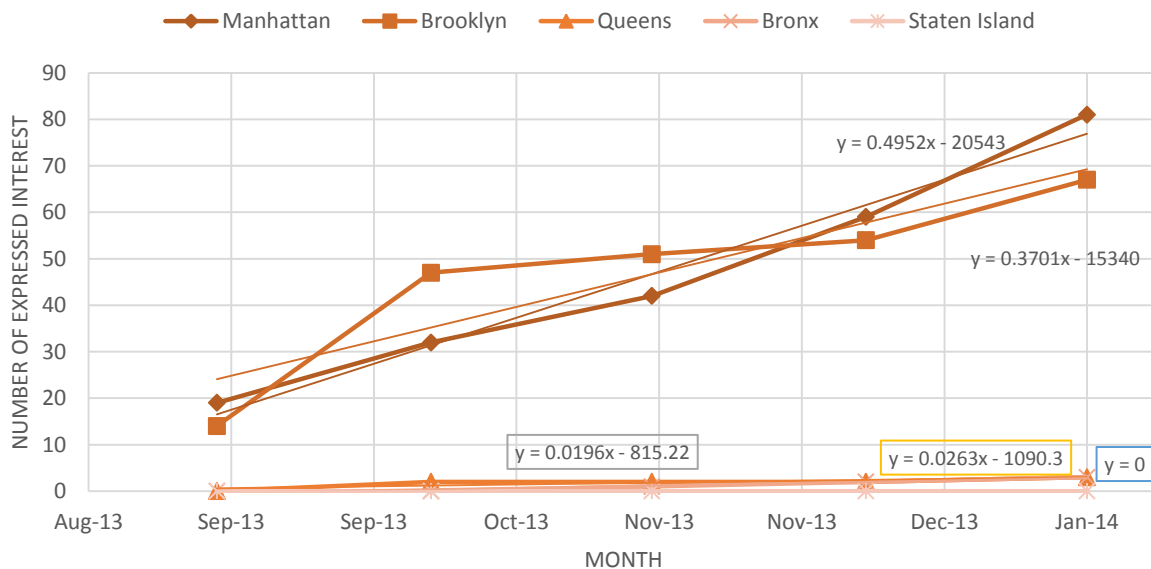
Figure 88. Cumulative interest in Organics Collection by borough.

Organics		
Month	**Interest**	**%Change**
Sep-13	33	-
Oct-13	81	145.5
Nov-13	96	18.5
Dec-13	117	21.9
Jan-14	154	31.6

Table 36. Organics Collection total interest and percent change by month from September 2013 – January 2014.

Initial percent increase in interest in Organics Collection was very high at 145.5% from September to October 2013, but decreased dramatically after its introduction from October to November 2013 to 18.5%. This is most likely due to a drop off in advertisement after the introduction, since the Organics Program is a pilot program and cannot currently handle rapid increases in enrollment.

Interest is increasing in both Brooklyn and Manhattan, although it is more steadily increasing in Manhattan. Interest in Brooklyn increased more rapidly initially, but has not returned to this rate since the decline in November 2013. Interest continues to steadily increase in Manhattan. Increased implementation of the program may have been more successful in Manhattan where interest has not lagged. Interest in Queens and the Bronx is stagnant and Staten Island has displayed zero interest. This could be a geographical void in advertising or may be a lack of advertising directed at Staten Island and other outer boroughs.

Organics Collection Interest by Community District
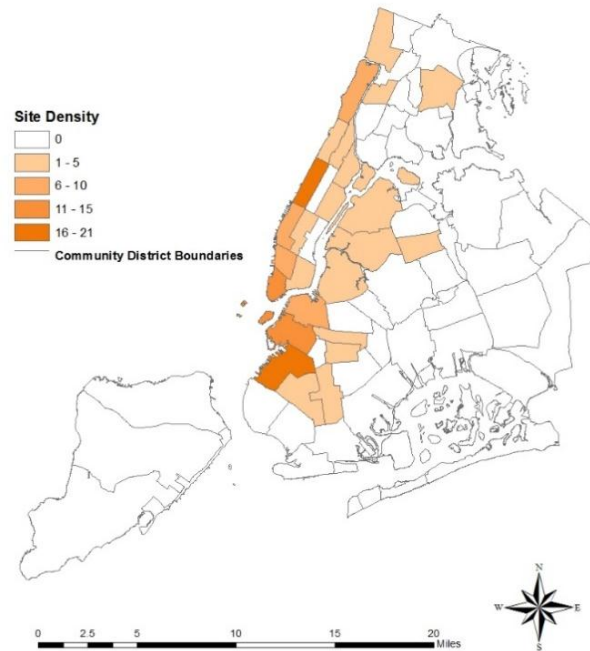
Figure 89. Interest in Organics Collection by community district.

Figure 89 displays interest to date in the Organics Collection program by community district. Interest is highest in Manhattan and western Brooklyn. There is also mild interest in the Bronx and western Queens, and no interest in Staten Island. The higher density of single-family homes in Staten Island means there are fewer buildings eligible for enrollment in Organics collection which requires multi-family residences.

The districts with the highest density of interest are Manhattan 7, Manhattan 1, Brooklyn 6 and Brooklyn 7. Manhattan 7 also displayed high interest in re-fashioNYC and ABRI; Manhattan 1 displayed high interest in re-fashioNYC; Brooklyn 6 displayed high interest in ABRI; and Brooklyn 7 displayed only moderate interest in re-fashioNYC and no high interest in other programs. Interest in other programs may not be indicative of interest in Organics Collection.

Over the past year, interest has expanded outside of Manhattan. It is possible that the stronger presence of farmers markets and GrowNYC food scrap drop-off programs in these areas prompted interest in the Organics Collection Program. Additionally, word of mouth and the increasing presence of the collection bins in pilot areas may be stimulating more interest among nearby residents.

3 Program Expansion

[HIGHLIGHTS]

Based on analysis of current trends and patterns visible in the data, specific community districts and particular buildings types for further focus efforts have been identified for each program, as well as how best to target outreach. Possible improvements to the structure of the programs have also been identified.

3.1

PROGRAM RECOMMENDATIONS

[About the Section]

Expanding program enrollment is a key goal of BWPRR and DSNY. Utilizing analysis of current program enrollment, the following recommendations focus on how DSNY should target future efforts. For each program, the most viable building types, community districts, and marketing and outreach strategies are identified. Operational recommendations have also been provided. There was noticeable overlap between each program in regards to future target locations, predominantly Manhattan 2, 4, and 6, and target building types, namely co-ops. It has also been found that utilizing outreach volunteers and varied marketing strategies can bolster total completed enrollments, especially in less suitable neighborhoods. It is also recommended to reach out to enrolled buildings, both to check in, and to introduce the other programs.

ABRI
3.1.1 program recommendations

ABRI SITE SUITABILITY RECOMMENDATIONS

The results of the site suitability analysis for ABRI show that targeting the following community districts would be most effective at increasing interest in the program:

1. **Manhattan 2**
(includes Greenwich Village, Little Italy, SoHo, and the West Village)
2. **Manhattan 4**
(includes Chelsea, Clinton, and the Hudson Yards)
3. **Manhattan 6**
(includes Murray Hill, Stuyvesant Town, and Turtle Bay)
4. **Manhattan 7**
(includes Manhattan Valley and the Upper West Side)
5. **Manhattan 8**
(includes Lenox Hill, Roosevelt Island, and the Upper East Side)

These community districts have some of the highest current enrollment and interest in ABRI as previously discussed in Section 2.3.2. Similarly, the results of the analysis also indicate that the following districts should be targeted for further outreach in communities with low recycling:

1. **Bronx 2**
   (includes Hunts Point, Longwood)
2. **Bronx 3**
   (includes Claremont, Crotona Park East, Melrose, Morrisania)
3. **Bronx 4**
   (includes Concourse, Concourse Village, East Concourse, Highbridge, Mount Eden, West Concourse)
4. **Bronx 6**
   (includes Bathgate, Belmont, Bronx Park South, East Tremont, West Farms)
5. **Brooklyn 8**
   (includes Crown Heights, Prospect Heights, Weeksville)
6. **Brooklyn 9**
   (includes Crown Heights South, Prospect Lefferts, Prospect Lefferts Gardens, Wingate)
7. **Manhattan 3**
   (includes Chinatown, East Village, Lower East Side, NoHo, Two Bridges)
8. **Manhattan 9**
   (includes Hamilton Heights, Harlem, Manhattanville, Morningside Heights, West Harlem)
9. **Manhattan 10**
   (includes Central Harlem, Harlem)
10. **Manhattan 11**
    (includes East Harlem, Harlem, Randalls Island, Wards Island)
11. **Manhattan 12**
    (includes Inwood, Washington Heights)

ABRI OPERATIONS RECOMMENDATIONS

Since DSNY has expressed that it is difficult to guarantee attendance for the mandatory training sessions held at its offices for enrollment in the ABRI program, DSNY should consider more flexible training strategies, such as a virtual training platform. Using free, web-based sites such as YouTube.com, DSNY could record the training and post the videos online. Prospective ABRI participants would then be able to verify that they have completed the online training with a short online survey or exam. Tutorials in additional languages could also optimize participation rates, as the Census Data from Section 2.3.2 Site Suitability Analysis yields several areas in the City where English is not the primary language spoken at home, and these locations do include areas of eligible housing stock that are not currently being reached.

Another limitation in higher enrollment rates is the required site visit. Each interested site must set up a visit with BWPRR, where a representative from the office inspects the space and evaluates the building's current recycling and trash set up. This visit is required for every location that wishes to complete enrollment. Due to limited personnel availability, expansion could be limited, due to the constraints on the time of current employees to make these assessments. If BWPRR felt that their personnel limitations limited the opportunity for greater enrollment, the office could work to create a trainee program in which volunteers or interns learned to do a site assessment. This would enable BWPRR to increase enrollment more rapidly, particularly as interest increases.

ABRI OUTREACH RECOMMENDATIONS

According to a DSNY Outreach Specialist, participation in the ABRI program improves through word-of-mouth; oftentimes a building manager will encourage the managers of neighboring buildings to join. The city has relied heavily on mailing campaigns, which are fruitful since online marketing campaigns tend to do poorly with the elderly. He emphasizes the need to use a variety of outreach tactics since many people in the boroughs that have the lowest rates of participation-- the Bronx and Staten Island-- do not use, or do not often use, email or a computer. Some additional word-of-mouth strategy options include:

- **Partnerships with Trade Associations.** Connecting with building manager associations and managing agent associations could utilize existing frameworks of communication. From conversations with the Vice President of the Emerald Guild, a prominent New York City building managers association, it is apparent that building managers in New York City see recycling practices as an important part of their duties to their buildings and residents. Furthermore, he shared that these associations form a close network of professionals who enjoy staying informed through communication with one another. Below is a list of additional building manager associations that could provide valuable outreach opportunities:

Association Name	Contact Information
Building Owners and Managers Association – NYC Chapter (BOMA/NY)	Phone: 212-239-3662
The Emerald Guild Society	Phone: 212-528-2200
International Facility Management Association – NYC Chapter (IFMA)	Phone: 212-986-1609
New York Association of Realty Managers (NYARM)	Phone: 212-216-0654
New York Building Manager's Association (NYBMA)	Phone: 646-302-5080
Real Estate Board of New York (REBNY)	Phone: 212-616-5200

- **Industry Marketing Specialist.** In order to enhance communication with trade specific groups, DSNY could employ an individual with demonstrated experience and connections in the New York City real estate industry to conduct outreach specifically with managing agencies and building management companies. In conversations with several recycling experts, the impersonal aspect of reaching out to large corporate property management companies is sometimes a challenge to achieving effective outreach. Since ABRI participation is contingent upon the consent of building managers and owners, this individual would be a valuable resource in navigating corporate bureaucracy and connecting with the proper decision makers.
- **Partnerships with Community District Leadership**. DSNY could utilize another existing community-based communication network by reaching out to Community Board leaders and asking them to promote the programs and their benefits to residents. Community Boards are most familiar with challenges specific to their district, and have standing influence with their constituents. The department could rely on this localized expertise for the best way to persuade residents to enroll in ABRI.

re-fashioNYC

3.1.2 program recommendations

re-fashioNYC SITE SUITABILITY RECOMMENDATIONS

The results of the suitability analysis for re-fashioNYC show that targeting the following community districts would be most effective at increasing interest in the program:

1. **Manhattan 2**
   (includes Greenwich Village, Little Italy, SoHo, and the West Village)
2. **Manhattan 4**
   (includes Chelsea, Clinton, and the Hudson Yards)
3. **Manhattan 6**
   (includes Murray Hill, Stuyvesant Town, and Turtle Bay)

These three districts have a very high proportion of multi-family and co-op residences with nearly 46% in Manhattan 2, 53.32% in Manhattan 4, and 54.5% in Manhattan 6. These areas also have high capture and diversion rates, and Manhattan 2 and 6 have a high density of currently enrolled sites (density between 11 and 30 sites). These areas also fit the socio-economic trends of frequent recyclers. These districts have also had consistently high interest in re-fashioNYC as represented by the interest over time graphs, making them likely to be receptive to outreach. The following districts currently have lower recycling rates compared to other districts in the city, but there is a significant proportion of multi-family residences, making outreach efficient:

1. **Bronx 4**
   (includes Concourse, Concourse Village, East Concourse, Highbridge, Mount Eden, West Concourse)
2. **Bronx 6**
   (includes Bathgate, Belmont, Bronx Park South, East Tremont, West Farms)
3. **Brooklyn 8**
   (includes Crown Heights, Prospect Heights, Weeksville)
4. **Manhattan 3**
   (includes Chinatown, East Village, Lower East Side, NoHo, Two Bridges)
5. **Manhattan 4**
   (includes Chelsea, Clinton, and the Hudson Yards)
6. **Manhattan 9**
   (includes Hamilton Heights, Harlem, Manhattanville, Morningside Heights, West Harlem)
7. **Manhattan 10**
   (includes Central Harlem, Harlem)
8. **Manhattan 11**
   (includes East Harlem, Harlem, Randalls Island, Wards Island)
9. **Manhattan 12**
   (includes Inwood, Washington Heights)

re-fashioNYC OPERATIONS RECOMMENDATIONS

After the initial contact is made with DSNY, contracts are sent to the building management company before a site visit and bin installation are performed. Of the 384 sites enrolled in the program, less than 100 sites required more than 20 days for bin installation. The majority of installations at other sites took an average of 14 days.

The major operational function of this program is the collection of donated textiles. Collections take place upon request of the facility housing the bin. The majority (89.3%) of the pick-ups are made within 0-5 days of the request, and only 10.7% (328 requests) took between 6-15 days. Notes that explain service delays include errors by BWPRR or Housing Works. Explanations for delays are absent for most sites. Delayed responses may have been the result of external events that affected the ability of collection services such as weather, truck scheduling, and human error.

Collection for the 328 requests averaged 8.4 days for completion. 13 of the 328 were caused due to BWPRR delayed contact of the contractor for pick-up.

While some extraneous factors that impede service are uncontrollable, communication improvements and an organized follow-up system between enrollees, Housing Works, and BWPRR could reduce lag times between enrollment, service requests, and service fulfillment. In conversations with a representative from San Francisco's Recology, the regularity of communication between the two parties was cited as a critical component to the success of its public-private partnership. Recology and San Francisco's Department of Environment meet on a weekly basis to perform ongoing measurement and verification of the contracted recycling services, as well as to develop new strategies for continuous improvement. DSNY could adopt a more aggressive measurement and verification system with Housing Works to work on minimizing delays.

While DSNY has carefully considered the bin sizes, if a large enough demand arises among buildings with modest space, a smaller bin could be developed to service more buildings. Coordinating pickups in a tight vicinity of enrolled buildings could compensate for the economic inefficiencies of the smaller size of individual bins and donations.

One limitation in greater expansion rates is the required site visit. Each interested site must set up a visit with BWPRR, where a representative from the office inspects the space and ensures that the re-fashioNYC bin will fit in to the designated space. This visit is required for every location that wishes to complete enrollment. This limits the capacity for expansion, as there are currently a limited number of staff members who can make these visits and assess the site's potential for enrollment. Potentially, if BWPRR felt that their personnel limitations limited the opportunity for greater enrollment, the office could work to create a trainee program in which volunteers or interns learned to do a site assessment. This would enable BWPRR to increase enrollment more rapidly, particularly as interest increases.

re-fashioNYC OUTREACH RECOMMENDATIONS

Sites interested in enrolling in re-fashioNYC span all boroughs. It is an easy program to enroll in because it only requires the placement of a bin. Minimal sorting is required and people often do not realize they unused clothing until given the opportunity for textiles recycling. Re-fashioNYC enrollment should continue to expand using effective marketing to ensure awareness.

- Expanding the current use of social media could be advantageous to expanding re-fashioNYC enrollment. Targeting mailers to specific communities (identified in the site suitability analysis) will have greater likelihood of enrollment, while avoiding the expense of citywide mailers.

- re-fashioNYC's partner, Housing Works, is a charitable non-profit that advocates on behalf of the homeless and those suffering from HIV/AIDS. It operates a bookstore and several thrift stores around the City. It also provides free medical care and housing services free to those in need. Housing Works offers valuable opportunities for outreach for re-fashioNYC as it has strong ties to the local community. Since Housing Works would gain from increased enrollment in re-fashioNYC, it may be willing to promote the program to engage its community.

- Our analysis found that buildings enrolled in other programs, namely e-cycleNYC and ABRI, are likely enrolled in re-fashioNYC as well. This suggests that marketing efforts for these programs should be coupled with marketing for re-fashioNYC. e-cycleNYC and re-fashioNYC are similar in that they both require bin placements; all three programs require proper recycling and sorting by participants. Of the 123 buildings that are enrolled in two programs, 92 of them, or 75%, are enrolled in e-cycleNYC and re-fashioNYC, thus showing there is a significant correlation and cross marketing could greatly increase enrollment across both programs.

e -cycleNYC

3.1.3 program recommendations

e-cycleNYC SITE SUITABILITY RECOMMENDATIONS

The results of the suitability analysis for e-cycleNYC show that targeting the following community districts would be most effective at increasing interest in the program:

1. **Manhattan 2**
   (includes Greenwich Village, Little Italy, SoHo, and the West Village)
2. **Manhattan 4**
   (includes Chelsea, Clinton, and the Hudson Yards)
3. **Manhattan 6**
   (includes Murray Hill, Stuyvesant Town, and Turtle Bay)
4. **Manhattan 7**
   (includes Manhattan Valley and the Upper West Side)
5. **Manhattan 8**
   (includes Lenox Hill, Roosevelt Island, and the Upper East Side)

These community districts have some of the highest current enrollment and interest in e-cycle as previously discussed in Section 2.3.2. Similarly, the results of the analysis also indicate that the following districts with low recycling rates should be targeted for further outreach:

1. **Bronx 2**
   (includes Hunts Point, Longwood)
2. **Bronx 3**
   (Claremont, Crotona Park East, Melrose, Morrisania)
3. **Bronx 4**
   (includes Concourse, Concourse Village, East Concourse, Highbridge, Mount Eden, West Concourse)
4. **Bronx 6**
   (includes Bathgate, Belmont, Bronx Park South, East Tremont, West Farms)
5. **Brooklyn 8**
   (includes Crown Heights, Prospect Heights, Weeksville)
6. **Manhattan 3**
   (includes Chinatown, East Village, Lower East Side, NoHo, Two Bridges)
7. **Manhattan 4**
   (includes Chelsea, Clinton, and the Hudson Yards)
8. **Manhattan 9**
   (includes Hamilton Heights, Harlem, Manhattanville, Morningside Heights, West Harlem)
9. **Manhattan 10**
   (includes Central Harlem, Harlem)
10. **Manhattan 11**
    (includes East Harlem, Harlem, Randalls Island, Wards Island)
11. **Manhattan 12**
    (includes Inwood, Washington Heights)

Generation of e-waste is expected to reach 93.5 million tons per year in 2016 – double the amount generated in 2011[xvi]. This increase is a result of ever more frequent electronics innovations that reduce product life expectancy[xvii]. These trends, in combination with the ban of e-waste from New York City garbage in 2015, means there is great potential for increased enrollment in e-cycleNYC throughout the entire City. Unwanted electronics can be bulky and heavy, and less than 50% of New Yorkers have access to a personal vehicle, so nearby disposal options are particularly important.

- Of the 326 sites that have expressed interest in e-cycleNYC, only 161 have enrolled. There are currently nine locations awaiting a site visit; four sites expressed interest in 2013 and five expressed interest in 2014. To increase enrollment, DSNY should be extremely prompt in replying to interested buildings. Expectations for program efficacy will immediately be lowered if the first interactions with DSNY are delayed.
- 48 sites have a pending enrollment status due to forthcoming paperwork from the site sponsor or the vendor. Due to the multi-step process for e-cycleNYC enrollment (interest, approval from the building manager, site visit, and approval of ERI) DSNY should seek to begin clearance with ERI as soon as building management agrees to participate and the site visit takes place.
- 41 sites expressed interest in the program but did not continue pursuing signup. DSNY should have a more thorough follow-up process with sites that discontinue enrollment. Identifying barriers or dissatisfaction with e-cycleNYC services will inform DSNY on future improvements.
- Sites that have a 'declined' enrollment status were rejected for a variety of reasons including no space for the bin, lack of approval from site sponsor, and withdrawal of site sponsor after discussion. A total of 28 sites were declined without record of reason. Again, it is crucial that DSNY improve information management in order to compile complete data of e-cycleNYC enrollment progression. In regards to bin size, site visits should tour whole buildings to consider bin location options such as basements, laundry rooms, utility closets, lobbies, and generally empty floor space. If the size of e-cycleNYC bins continues to be a problem, DSNY should consider smaller bins and higher collection frequency.

e-cycleNYC OPERATIONS RECOMMENDATIONS

Operations are challenging to analyze due to the recent establishment of e-cycleNYC in 2013. With 161 buildings currently enrolled, DSNY should check-in with buildings to evaluate the efficacy of its operations. Participating buildings with high-volume collection will help identify which electronics types are recycled most frequently, where storage bins are set up that results in heavy use, and how educational signage is displayed that informs residents of bin existence and accepted materials. Participating buildings with low-volume collection should institute tactics that were successful in high-volume locations. Check-ins by DSNY would also identify if storage bins are improperly used, if they are blocked by large furniture, or if residents are unaware of the new installation.

One limitation is the site visit required for each interested site, in which a representative from BWPRR must visit every location that goes through the enrollment process. This limits the capacity for expansion, as there are currently a limited number of staff members who can make these visits and assess the sites. Potentially, if BWPRR felt that their personnel limitations limited the opportunity for greater enrollment, the office could work to create a trainee program in which volunteers or interns learned to do a site assessment. This would enable BWPRR to increase enrollment more rapidly as interest increases.

Another factor to consider as enrollment and interest increases is bin size. As TV's frequently do not fit into the bins, even the large bins, it is possible that bin dimensions may want to be reconsidered. As previously discussed in Section 2.3.3, CRT TV's compose the greatest weight of collected materials (nearly 43%) followed by mixed e-waste (approximately 24%), electronic devices (about 12%), and computers (about 10%), it is these items that must be most considered in regards to bin dimensions. With the high proportion of TV's that are left outside the bins, perhaps in future designs of the bins the opening could be designed to accommodate larger TVs. The other materials are not cited as being left out of the bin. If there is a great enough interest to have smaller e-waste bins available to residences that cannot accommodate the larger bins which could be installed in a close enough proximity to make collections efficient, enrollment could increase based on the availability of more options.

Electronics Recyclers International is the largest electronics waste recycler in the United States, with eight facilities that service every zip code in the country. ERI partners with numerous other local and state governments across the country in partnerships similar, if not identical to its partnership with DSNY. As such, ERI could offer valuable institutional knowledge of methodologies and strategies that were successful elsewhere. DSNY could create a more robust measurement and verification system for e-cycleNYC by increasing communication with ERI.

An examination of e-waste recycling tonnage nationwide shows increases in collection totals – 3.32 million tons in 2010 climbing to 3.41 million tons in 2011. An EPA report cautions that this increase is due primarily to better data, rather than a sudden growth in recycling.[xviii] For the good of DSNY's ability to measure success the success of e-cycleNYC, it is important that data collection and management are prioritized.   Finally, since it will become illegal to dispose of

electronics with regular waste beginning on 2015, DSNY and ERI must be prepared to potentially collect higher-than-usual volume from enrolled buildings because residents will need to utilize alternative disposal options.

e-cycleNYC OUTREACH RECOMMENDATIONS

There are few articles about e-cycleNYC produced by local news outlets. Relevant articles were all from 2013 and have no public comments. Thus, satisfaction with the program is unclear. The 2013 DSNY annual report mentioned e-cycleNYC one time, only to note the contract with ERI and that the program offers disposal bins for apartment buildings. The report also notes 299,101 pounds of electronics were collected at SAFE disposal events, down from 387,763 pounds in 2012. These events were reinstated in 2012 after a previous 20-year lull.

- DSNY should increase e-cycleNYC outreach to raise awareness about the program. E-cycleNYC was most recently marketed in a spring 2014, trifold mailer titled, "NYC Safe Disposal Events". The e-cycleNYC program was advertised using only two sentences in part of a half-page back panel titled "Year-Round Safe Disposal Options". This was a missed opportunity for DSNY to draw attention to the program.
- Due to the high correlation of dual program enrollment between e-cycleNYC and re-fashioNYC, these two programs should be marketed together. Of the 123 buildings that are enrolled in two programs, 92 of them, or 75%, are enrolled in e-cycleNYC and re-fashioNYC. Current e-cycleNYC participants should be informed about recycling opportunities with re-fashioNYC. Conversely, BWPRR might find it beneficial to their expansion goals to inform current re-fashioNYC participants about e-cycleNYC if those participants had not already expressed interest in e-cycleNYC.
- Of the 1787 tweets on the NYC Recycles Twitter account, 140 were about electronics waste recycling. This is a smart media outlet to exploit, however DSNY should tweet using a consistent hashtag, e.g. #ecycleNYC, to improve recognition.
- DSNY should look to advertise e-cycleNYC with local electronics retailers or repair shops, for example, technical support desks at City universities and retailers like Best Buy and Staples. Advertisement through the New York Public Library may also be considered as an outlet to raise awareness through visitation and word of mouth.
- Electronics waste recycling is a notoriously opaque process. New Yorkers may be more willing to participate in e-cycleNYC if the end elements and location of their unwanted electronics is disclosed in program marketing materials. ERI's data management, tracking system, processing protocol, and certifications add value to e-cycleNYC and should be advertised.
- As of 2015, NYS Electronic Equipment Recycling and Reuse Act prohibits covered electronic equipment (computers, televisions, small scale servers, computer peripherals, television peripherals, and portable devices) from disposal with regular waste. E-cyleNYC should aim to establish and education as widely as possible before 2015 to ready New Yorkers for the shift in e-waste disposal.

organics
3.1.4 program recommendations

ORGANICS SITE SUITABILITY RECOMMENDATIONS

Expansion in the pilot organics program is dependent upon the success of the pilot project. Existing compost collection routes are based on school placement as the original citywide composting pickup was only at public schools. Currently, expansion opportunities are highly dependent on traffic patterns of existing pick up routes, especially in Manhattan where road congestion is a major consideration.   Nevertheless, the site suitability analysis conducted for current trends in enrollment for Organics Collection indicate that the following community districts should be further targeted for further outreach:

1. **Manhattan 2**
    (includes Greenwich Village, Little Italy, SoHo, and the West Village)
2. **Manhattan 4**
    (includes Chelsea, Clinton, and the Hudson Yards)
3. **Manhattan 6**
    (includes Murray Hill, Stuyvesant Town, and Turtle Bay)
4. **Manhattan 7**
    (includes Manhattan Valley and the Upper West Side)

These community districts have some of the highest current enrollment and interest in Organics Collection as previously discussed in Section 2.3.2. Similarly, the results of the analysis also indicate that the following districts with low recycling rates should be targeted for further outreach:

1. **Bronx 2**
    (includes Hunts Point, Longwood)
2. **Bronx 4**
    (includes Concourse, Concourse Village, East Concourse, Highbridge, Mount Eden, West Concourse)
3. **Manhattan 3**
    (includes Chinatown, East Village, Lower East Side, NoHo, Two Bridges)
4. **Manhattan 9**
    (includes Hamilton Heights, Harlem, Manhattanville, Morningside Heights, West Harlem)
5. **Manhattan 10**
    (includes Central Harlem, Harlem)
6. **Manhattan 11**
    (includes East Harlem, Harlem, Randalls Island, Wards Island)
7. **Manhattan 12**
    (includes Inwood, Washington Heights)

ORGANICS OUTREACH RECOMMENDATIONS

There have been numerous news articles about the organics collection program, especially when the program first started in 2013. Additionally, DSNY utilizes its NYC Recycles Facebook and Twitter pages to publicize the program. Continuing internet-based efforts as well as using more direct outreach approaches can help increase interest and enrollment within pilot areas and optimal community districts.

- DSNY should distribute printed materials, such as brochures or pamphlets, for the organics collection program to certain buildings or building management companies within pilot areas. These can be the same as the current brochures used for DSNY's single family home / small residential building curbside collection program, or they can be altered to address potential challenges or program nuances faced by apartment-dwellers.
- Current tabling efforts and existing GrowNYC partnerships at farmers markets could be utilized to distribute brochures and provide outreach to locals that already participate in the food waste drop off programs.
- Targeted mailers to specific buildings or communities could generate areas of concentrated interest, and denser areas of enrollment would make collection more efficient operationally.
- DSNY can utilize press releases to solicit enrollment applications from pilot areas and communities in optimal areas as identified in the site suitability analysis.

3.2

PROGRAM PRECEDENTS

[About the Section]

In order to better understand the current status of recycling programs in New York City and expansion strategies that remain to be explored, this section provides a comparison to recycling programs in several metropolitan cities across the country. Each of these cities exemplifies varying rates of progress with the same waste streams: e-waste, textiles, and organic material. Like New York City, the strategies deployed by each city to attain these diversion rates range from ordinances and fines to grassroots efforts and voluntary programs. Some policy strategies, such as source reduction and pay-as-you-throw, have been particularly successful elsewhere and should be considered by DSNY in the future.

3.2.1 Program Precedents

San Francisco, CA

Curbside Collection: San Francisco has a goal of zero waste by 2020[xix]. City ordinances to support this goal include producer responsibility measures, such as requirements for recyclable and compostable food service ware (takeout containers, utensils, etc.) and banning of plastic grocery bags, as well as requirements on the consumer side. Currently, the city diverts 80% of its waste from landfills through the Mandatory Recycling and Composting Ordinance, which requires residents and businesses to properly recycle and compost eligible materials, and levies fines for non-compliance. The city offers weekly single stream curbside pickup of these materials through partner company Recology[xx]. Recology charges a flat rate to residential customers for waste management that totals $34.08 per month: $5 base charge, $25.08 for a 32-gallon landfill bin, $2.00 for a recycling bin and $2.00 for a composting bin[xxi].

E-waste: The city offers free bins to collect e-waste and free scheduled pickups of these and other toxic products.[xxii]

Textiles: In January 2014, San Francisco announced a public-private partnership with Los Angeles-based textiles collection company, I:CO, to help the city divert more of its 39 million pounds per year textile waste stream, in hope of conquering the city's ultimate goal of 100% diversion[xxiii].

Los Angeles, CA

Curbside Collection: In Los Angeles, the Residential Recycling Program began in 1990 and offers free recycling and compost services to residents of the unincorporated Los Angeles County using a single stream method for PMG and a separate bin for compost. The Los Angeles Bureau of Sanitation estimates that the city collects 979 tons of recyclable materials and 1783 tons of organic waste each day through its recycling program. This amounts to a diversion of 45% of residential waste through the recycling program, and a total of 65% of the entire city's waste[xxiv].

E-waste: The city categorizes materials containing mercury, lead, cadmium, and other hazardous materials as universal waste (u-waste)[xxv] which must be brought to a collection center or event for safe disposal[xxvi].

Textiles: The city does not currently offer textiles collection services.

Seattle, WA

Curbside collection: Seattle offers a free, single stream recycling program for residents. City ordinances ban residents from sending PMG to landfills, and repeated violation of this ordinance will halt the pickup of the offending resident's garbage. The city's free curbside recycling service occurs on a bi-weekly basis.

E-waste: The city runs several Household Hazardous Waste Facilities in which toxic household waste such as motor oil, paint thinner, batteries, and light bulbs can be dropped off by residents for free disposal. However, the city does not accept all e- waste, and items such as computers and TVs must be recycled through other organizations.

Textiles: The city does not currently offer textiles collection services.

Washington, D.C.

Curbside Collection: The Washington, D.C. Department of Public Works (DPW) runs a weekly curbside recycling pickup service for residents of single-family homes or apartments with less than three units[xxvii]. For larger multi-family residences, a separate trash collection service must be utilized. The DPW recycling service utilizes a single stream system and pay-as-you-throw policies. Recycling bins cost $62.50 for a "Supercan," in which recycling is collected weekly, and $45 for a 32-gallon recycling bin, which is collected bi-weekly. Up to five bags of yard waste are also collected on weekly and bi-weekly schedules, although no comprehensive residential organics collection appear to be available at this time.

E-waste: DPW offers a weekly Household Hazardous Waste drop-off site, which gives residents a chance to dispose of toxic household waste and e-waste once a week.

Textiles: DPW does not currently offer textiles collection services.

Dallas, TX

Curbside Collection: Dallas operates a recycling program called "Too Good to Throw Away" in which PMG is collected via a single stream process. A recycling bin is provided freely to residents upon request and recycling collection occurs on a weekly basis along with regular trash collection[xxviii]. The city does not offer any organics collection services at this time.

E-waste: The city operates four e-waste collection sites where residents can drop off used electronics at no cost.

Textiles: The city of Dallas works with the textile recycling company World Wear Project to recycle used athletic shoes which can be dropped off in a number of bins around the city.

Chicago, IL

Curbside Collection: Chicago operates a single stream recycling program called the Blue Cart Residential Recycling Program which offers bi-weekly recycling services to residents of single-family or multi-family homes with 4 units or fewer[xxix]. In addition to the curbside recycling program, the city operates Residential Recycling Drop-Off Centers throughout the city. Additionally, the city accepts yard waste for compost, but does not accept food scraps or other organics.

E-waste: The city operates a single Household Chemicals and Computer Recycling Facility that accepts toxic household materials as well as e-waste. The facility is open two to three times per week for free drop-offs.

Textiles: The city does not currently offer textiles collection services.

Detroit, MI

Curbside Collection: The city of Detroit currently operates a single-stream recycling program in a limited number of neighborhoods, including five additional drop-off centers for PMG across the city. Efforts to expand the program are under way, with the goal of providing curbside service to over 34,000 households once complete.[xxx] The city also funds a separate recycling program to supplement its municipal services through the Greater Detroit Resource Authority (GDRRA). The program, Recycle Here!, originally began as a grassroots, self-organized neighborhood recycling event and is now run as a mobile collection service each Saturday. Neither the city of Detroit, nor RecycleHere! currently collect organics.

E-waste: The city operates one hazardous waste drop-off facility. Recycle Here! offers e-waste disposal to Detroit city residents only.

Textiles: The city does not currently offer textile collections services.

3.1.2 Lessons Learned

Single Stream

All of the seven metropolitan areas outlined in the previous section offer single stream recycling for plastics, glass, metal and paper. In a conversation with San Francisco-based Recology's public relations representative, the company identifies single stream as the easiest way of getting resident compliance because requires minimal effort on part of the resident. DSNY's curbside collection is not single stream; currently the process requires residents to separate plastics, metal and glass from paper. However, in order for DSNY to convert to single stream, it would take considerable restructuring of the current residential curbside collections system, as all residential bins, trucks, and sorting facilities are set up to collect paper separately from PMG. If New York City does end up building a new in-state landfill, setting the site up for single stream recycling and waste management would be ideal.

Source Reduction

Under its Zero Waste mandate, San Francisco has been able to pass ordinances that target source reduction, such as a plastic bag ban. At the time of writing, New York City Council has proposed its own plastic bag ban, introducing legislation levying a 10 cent per bag fee for the customer at most City stores. This is not the first time the ban has come up for a vote; in August of 2013, a bag fee was proposed but did not make it to vote because the proceeds would go back to the City. The current legislation proposes that the store owners would keep the proceeds, thereby making the fee a source of revenue, rather than a tax[xxxi]. These types of policy changes that encourage source reduction strategies would offer great impact towards reducing the overall volume of waste addressed by DSNY.

Pay-As-You-Throw (PAYT)

Pay-as-you-throw programs ultimately shift the cost of waste disposal to residents[xxxii] by charging them for the amount of solid waste that they discard[xxxiii]. Despite this increased cost, a number of communities across the United States have adopted PAYT programs. Typically, the fee is charged based on number of bags collected or the weight of waste discarded[xxxiv]. Regardless of how the fee is instituted, it has the potential to reduce the total amount of waste by incentivizing residents to divert more recyclables from their household waste, provided that sufficient recycling programs exist. Additionally, it can result in municipal savings as waste collection is minimized and supplement city revenues. When San Francisco moved to a pay as you throw program, property taxes did not increase to pay for it since the costs of waste management were now borne on an incremental basis by the resident. In San Francisco, residents are charged a monthly collection fee, averaging $25 to $30, based solely on the size of their landfill waste container. Therefore, the more residents recycle and compost, the more their sanitation bills go down. It the same pay system for businesses. According to San Francisco officials, residents pay about the same amount using this method as they would on their tax bill

for trash disposal in other cities. This could be implemented to improve recycling participation in New York, but it may be met with backlash from residents who are unaware that they already pay for sanitation in their taxes.
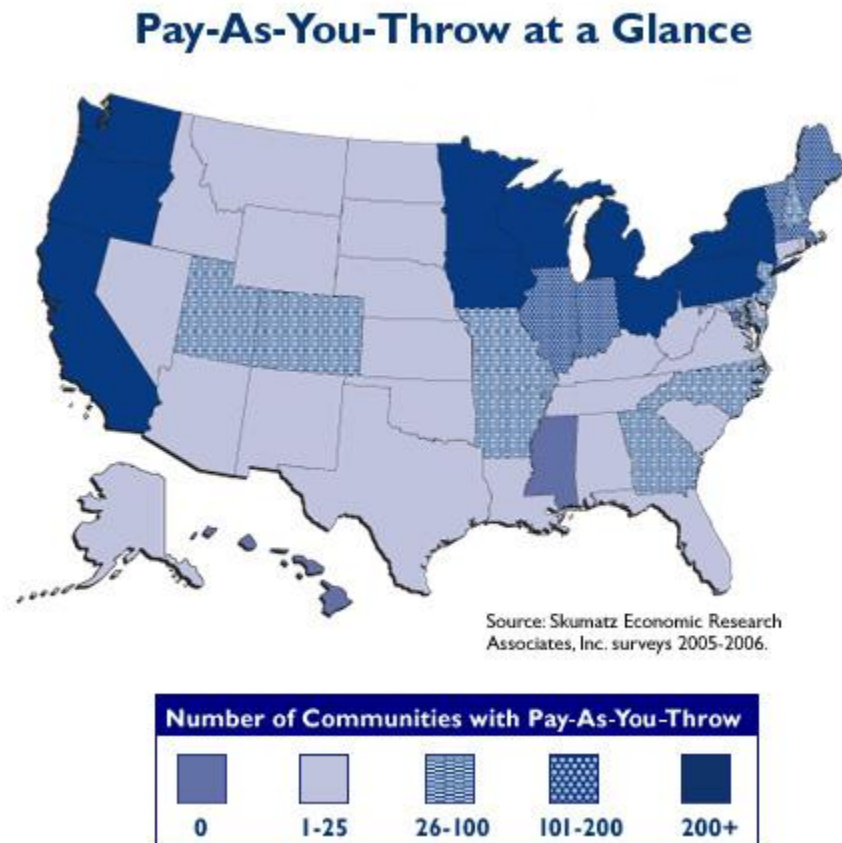

Figure 90. Nationwide distribution of existing Pay-As-You-Throw programs. Source: EPA

Public-Private Partnerships

Partnerships with private companies allow municipal recycling programs to incentivize participation. Many cities have established such partnerships with the company RecycleBank, which offers a point system based on the amount of material recycled, which can be redeemed for monetary rewards and coupons. In Philadelphia, a pilot program with two communities resulted in an increase in the average diversion rate from 10.6% to 38%[xxxv]. This partnership won the Outstanding Award in Public/Private Partnerships in 2013[xxxvi], proving the potential success of such a partnership. However similar partnerships between cities and RecycleBank have been discontinued with cities such as Cincinnati, OH[xxxvii] and Ann Arbor, MI[xxxviii] due to inadequate results, proving that such partnerships might not improve recycling participation.

3.3 CONCLUSION

While each program has specific features and requirements that necessitate individual strategies, a number of fundamental recommendations exist for all four programs that we believe would contribute to program expansion. Analysis of current enrollment trends indicates that co-op buildings have been the most successful in enrolling in each of the four programs, and could be a source of expansion in the future, with condo and rental buildings also feasible, but with lower levels of proven success in current enrollment. Individual buildings and management companies that are currently involved in selected programs could be more receptive to expanding their participation into other programs, with re-fashioNYC and e-cycleNYC showing high overlap among currently enrolled buildings. A number of buildings that are enrolled in these BWPRR programs are owned by the same management company, which shows that once a company has agreed to participate in a recycling program, it might be easier to enroll other buildings owned by that same company.

Most of the programs showed the same community districts as attractive sites for increased enrollment. In Manhattan, it was Manhattan 7, while in Brooklyn, Brooklyn 7 showed high suitability. Queens and the Bronx both had lower enrollment and interest across programs, although most interest trends showed increasing enrollment in both boroughs. This shows that outreach in the Bronx and Queens could be fruitful. Staten Island showed low enrollment, low interest, and low site suitability across all programs. However, this is predominantly due the housing stock and current enrollment in programs. Programs centered on larger buildings may not be effective there, but other waste diversion programs meant for single-family homes could prove constructive.

Many program implemented in other cities would require wider structural changes that BWPRR could not manage itself were they to be implemented. New York City is also a special case in comparison to these other cities, which have only 10% of the population of New York. Therefore, BWPRR should continue to focus on the goals at hand. One final recommendation is as the programs expand, BWPRR should set concrete expansion targets for each program. This would not only help institute metrics for BWPRR, but may serve as encouragement for residents to enroll. If they are aware that they are working towards a goal and these programs are helping to move New York City towards that target, they may be more likely to participate to help New York meet its goal. These programs are innovative, cost effective and a good investment in our environment. Expansion will benefit all New Yorkers.

End Contents

[About the Section]

End content includes any graphs or tables previously listed as appendix figures, as well as supporting information for the report.

4.1 APPENDIX A
NYC Districts

<u>Geographic Scale</u>

Datasets on building stock from the New York City Department of City Planning as well as demographic information from the U.S. Census Bureau are organized by Community Districts. Thus, all of the analysis that follows is organized by Community District.

Figure 91. New York City Community Districts

4.2 APPENDIX B
methodology

<u>Socio-demographic Correlations</u>

A number of socio-demographic variables were analyzed on the community district level in order to observe current trends in recycling participation and include these trends in analysis regarding program expansion. A linear mixed-effects model was used to identify those variables that had statistical significance in terms of <u>capture rate</u>[12] and <u>diversion rate</u>[13]. Statistical significance was classified as a p-value < 0.05. Additionally, correlations between these variables were calculated to determine their effects on recycling and the strength of these trends.

The five socio-demographic variables that were modeled in this analysis were the percentage of unemployed individuals, median household income, percent of population with a high school education or higher, the percent of population with a bachelor's degree or higher, and the percent of population speaking English at home, all on the community district level. As is described in the table below, all five variables were statistically significant in terms of capture rate. Median household income, percent of the population with a bachelor's degree or higher, and percent of households speaking English at home were statistically significant in terms of diversion rate.

X-value	Y-value	Correlation	p-value	Code
Capture Rate	Unemployed Percentage	-0.57	0.04	*
	Median Household Income	0.43	0.03	*
	Education: High School +	0.42	0.03	*
	Education: Bachelor +	0.25	3.76E-04	***
	English Spoken at Home	-0.03	0.03	*
Total Diversion	Unemployed Percentage	-0.80	0.13	
	Median Household Income	0.85	2.88E-07	***
	Education: High School +	0.74	0.05	
	Education: Bachelor +	0.71	0.02	*
	English Spoken at Home	-0.29	4.72E-03	**

Table 37. Correlation of capture rate and socioeconomic factors; correlation of diversion rate and socioeconomic factors.

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[12] capture rate is a measurement of how much recyclable material is successfully recycled
[13] diversion rate is a measurement of the amount of material diverted from trash disposal to recycling

Suitability Analysis

After careful analysis of the programmatic trends and existing socio-demographic variables affecting recycling rates, we performed a suitability analysis using the following variables to identify the community districts that would be most likely to show interest in the four recycling programs:

Variable	ABRI Weight	Re-fashioNYC Weight	e-cycleNYC Weight	Organics Collection Weight
% Coops	12	18	20	20
% One- or Two-Family Homes	11	15	15	15
% Multi-Family Homes	12	10	11	8
% Unemployed	10	10	10	10
% Low-income Households	8	8	8	8
% Middle-income Households	2	2	2	2
% Upper-income Households	8	10	10	8
% High school diploma or higher	5	5	5	5
% Bachelors Degree or higher	2	2	2	2
% English Spoken at home	10	5	5	5
Current ABRI enrollment	5	5	2	0
Current Re-fashioNYC enrollment	5	5	5	4
Current e-cycleNYC enrollment	0	5	5	4
Current Organics Collection enrollment	0	0	0	5
Four Year Average Capture Rate	5	0	0	2
Four Year Average Diversion Rate	5	0	0	2
TOTAL	100	100	100	100

Table 38. Weighted factors for suitability analysis for four programs.

These variables reflected trends in the existing enrollment data, such as the statistical significance of residence type and enrollment in other programs in the likelihood of a site to be successfully enrolled in the program in question. Considering residences do express interest in enrolling in at least one program (*Figures 11 & 12)*, multi-program enrollment was a factor included to guide the site suitability analysis and it was assumed that current enrollment levels will contribute positively to the overall likelihood of enrollment in each community district. Notably, enrollment in Organics Collection was not considered a factor because it is still in pilot

phase. The absence of overlap data including this program does not indicate that it appeals to the different buildings from the other three programs. Simply, not enough data exists yet to draw firm conclusions regarding this pilot program.

Additionally, socio-demographic variables were proven to be statistically significant in relation to current recycling habits in NYC community districts, indicating that certain demographics might have a higher likelihood of responding to recycling opportunities such as those described by the four DSNY programs.

4.3 APPENDIX C
NYC RESIDENCES

Residence Type Distribution

One/Two-Family Residences

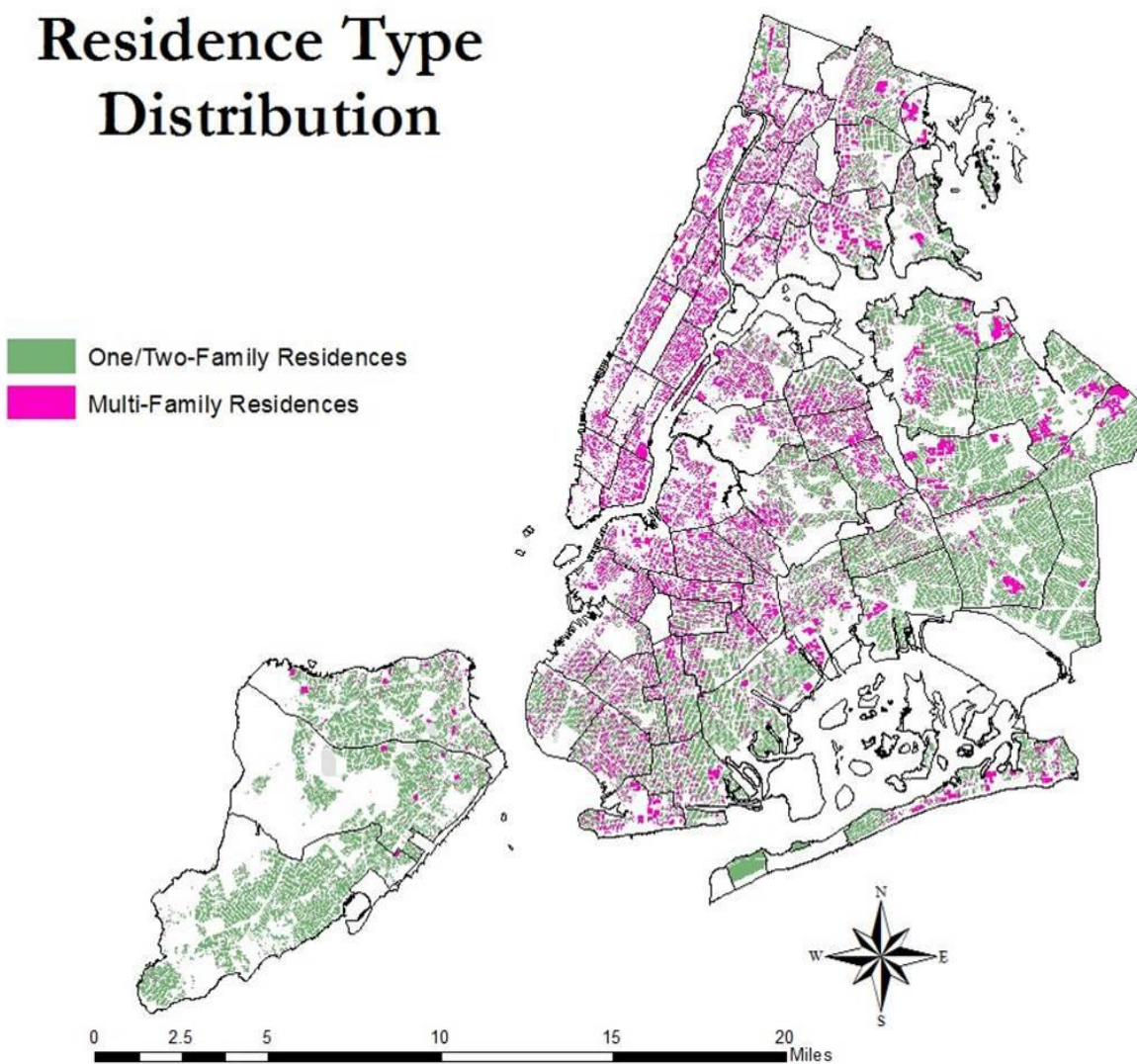Multi-Family Residences

Figure 92. Distribution of residence types in New York City.

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