

**Exploring the 2011  
Massachusetts Travel Survey:  
MPO Travel Profiles**





# Exploring the 2011 Massachusetts Travel Survey

## *MPO Travel Profiles*

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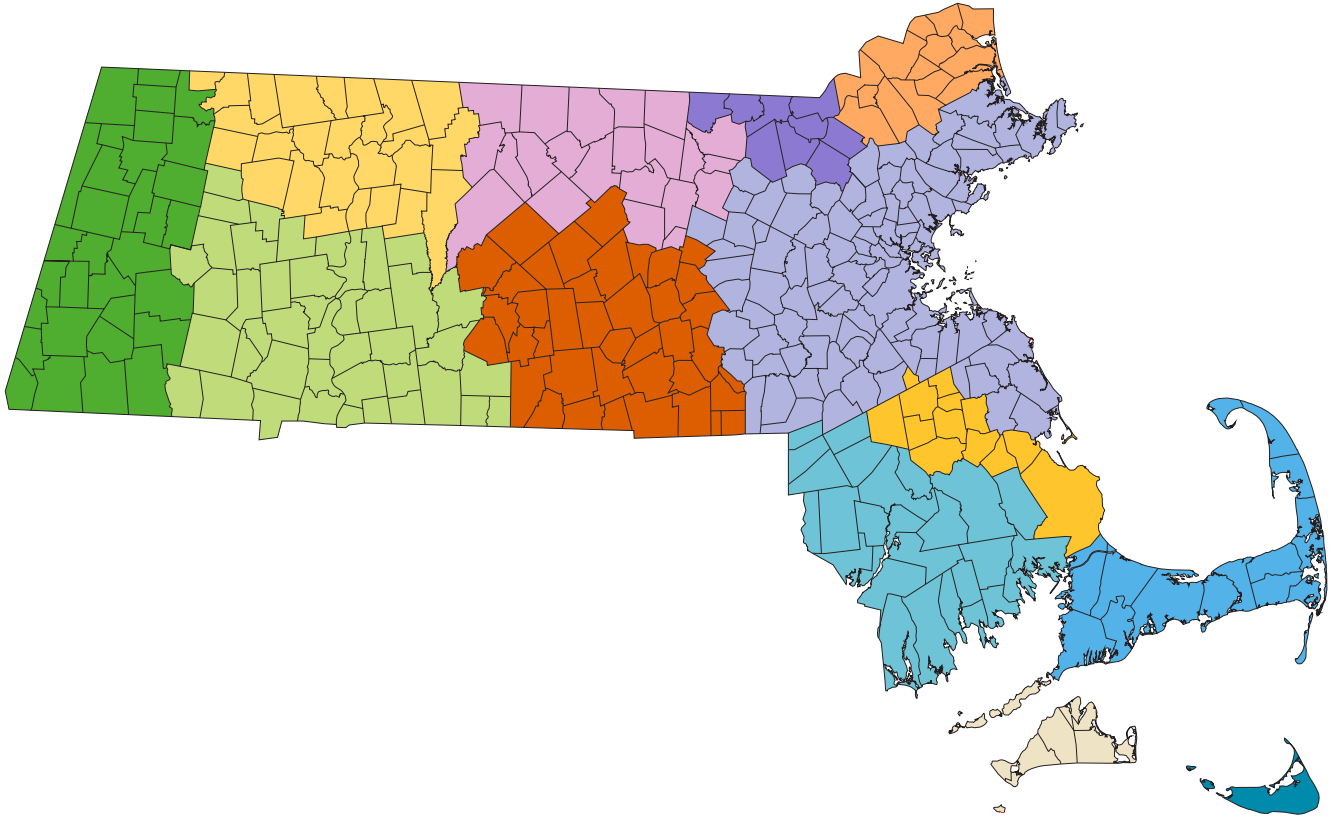
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## Metropolitan Planning Regions



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## ABSTRACT

The household travel survey is a basic tool for transportation planning. The information gathered about household characteristics and travel patterns provides the basis for travel demand model development, as well as for studies of aspects of regional travel of topical interest. The Massachusetts Travel Survey (MTS) was undertaken in 2011 and surveyed residents throughout Massachusetts. This survey superseded a survey done in 1991 that was limited to eastern Massachusetts.

The 2011-MTS survey was used by the staff of the Boston Region Metropolitan Planning Organization to develop a new regional travel demand model. The survey was also the source of travel data for a detailed analysis of work trips in eastern Massachusetts and an investigation into general strategies for increasing the use of transit. This study extended some of the analyses used in these earlier efforts to create travel profiles for all 13 Massachusetts planning regions.

The report begins by summarizing commuting patterns in the 13 planning regions by socioeconomic characteristics, including population and employment statistics, and providing estimates of commuting distance. A summary of all reported travel by residents in each planning region follows, which compares travel by workers and non-workers, and home-based and non-home-based travel. The report then describes an analysis that compared patterns of auto use in the planning regions.

The report concludes with an analysis of travel by non-auto modes. Several situations illustrating the opportunities and challenges of effecting a mode shift away from driving are presented.

TABLE OF CONTENTS	PAGE
ABSTRACT .....	3
1. INTRODUCTION .....	6
1.1 Background .....	6
1.2 Study Goals.....	7
1.3 2011-MTS Resources .....	7
2. TRAVEL PATTERNS ON A TYPICAL WEEKDAY .....	9
2.1 Commuting Defined .....	9
2.2 Planning Regions .....	10
2.3 Commuting by MPO Area Residents .....	13
3. TOTAL WEEKDAY TRAVEL BY TYPE OF TRIP CHAIN .....	17
3.1 Commute Travel Miles .....	17
3.2 Non-Commuting Travel by Commuters.....	19
3.3 Travel by Commuters and Survey-Day Non-Commuters .....	19
4. USE OF THE PERSONAL AUTO IN MASSACHUSETTS.....	20
4.1 Measuring Travel by Mode.....	20
4.2 Auto Dependence by Type of Trip Chain .....	23
4.3 Selected Mode-Shift Analyses .....	27
5. SUMMARY AND CONCLUSIONS.....	32
5.1 Review of the Analytical Process .....	32
5.2 Selected Findings.....	33
5.3 Ideas for Future Work .....	34

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TABLE 1	Commuting by MPO Area Residents .....	16
TABLE 2	Weekday Travel by MPO Area Residents.....	18
TABLE 3	Weekday Travel by Driving and Other Modes .....	22
TABLE 4	Percent of Miles Traveled by Mode .....	25
TABLE 5	Distribution of Driving Commute Distances.....	28

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FIGURE 1	Schematic of Typical Trip Chains .....	10
FIGURE 2	Massachusetts Metropolitan Planning Regions .....	11
FIGURE 3	164-Municipality Travel Demand Model Region .....	24

# 1 INTRODUCTION

## 1.1 Background

In June 2015, the Boston Region Metropolitan Planning Organization (MPO) approved a work program, *Household-Survey-Based Travel Profiles and Trends: Selected Policy Topics*, which authorized the MPO's staff to develop a set of commuter travel profiles for Massachusetts based on data gathered from the Massachusetts Travel Survey (MTS), which was completed in 2011. This report, *Exploring the 2011 Massachusetts Travel Survey: MPO Travel Profiles*, presents the key findings of this study.

The *MPO Travel Profiles* study measured and described travel volumes and patterns across the 13 planning regions in Massachusetts, which include ten urbanized regions designated as MPOs and three less-populous regions whose planning functions are carried out by their respective regional planning agencies (RPAs). Key planning implications of these patterns and volumes are identified and discussed in this report. Planning implications directly related to the Boston Region MPO are presented in a statewide context.

The 2011- MTS was the central resource for this study. The survey obtained responses about travel activities from all members of 15,040 Massachusetts households. A summary of survey results is available at: [www.mass.gov/massdot/travelsurvey](http://www.mass.gov/massdot/travelsurvey). Data from the 2011-MTS also was used to develop the Boston Region MPO's new travel demand model. Travel demand models are used to predict how regional transportation systems likely would function in the future under various transportation-investment or demographic-trend scenarios. Measurements and analyses derived from these models include transportation system usage and levels of service, types and quantities of vehicle emissions, and socioeconomic measurements, such as those that pertain to environmental-justice considerations.

The 2011-MTS also served as the basis for two studies related to this one. The first study, *Exploring the 2011 Massachusetts Travel Survey: Focus on Journeys to Work*, organized data from the 2011-MTS to provide a detailed analysis of which transportation modes are used to make journeys to work, including intermediate stops and changes of mode.<sup>1</sup> In a number of instances, that study made direct comparisons between the commuting patterns identified in 2011 and those identified from the prior household survey undertaken in 1991.

The second study, *Exploring the 2011 Massachusetts Travel Survey: Barriers and Opportunities Influencing Mode Shift*, used the 2011-MTS to develop

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<sup>1</sup> Boston Region MPO, *Exploring the 2011 Massachusetts Travel Survey: Focus on Journeys to Work*, April 2014.



geographical indices that predict the market share for transit services in competitive commuting markets.<sup>2</sup> Relationships between these geographical indices and mode-choice coefficients incorporated in the Boston Region MPO's travel demand model were also analyzed.

This third study in the series, *MPO Travel Profiles*, expands on the previous two studies by examining trip-taking across all of Massachusetts and summarizing all types of trips. Specifically, it builds on *Focus on Journeys to Work* by organizing survey data into both non-work and work trip chains, and it builds on *Barriers and Opportunities Influencing Mode Shift* by combining data from all 2011-MTS resources to make a more complete picture of residents' travel behavior. This study has a unifying theme: how do Massachusetts residents organize their travel on a typical weekday into one or more trip chains?

## 1.2 Study Goals

The goals of this study were as follows:

- 1) Compile consistent and comprehensive resident travel data from the 2011-MTS for the 13 planning regions in Massachusetts
- 2) Identify and discuss regional and statewide planning implications based on the 13 travel profiles and related 2011-MTS analyses

## 1.3 2011-MTS Resources

The responses of participants in the 2011-MTS were organized into several distinct tables:

- **Household Table**  
Information obtained for the 15,040 participating households included home address, household income, and vehicle ownership.
- **Person Table**  
The 37,023 individual members of the participating households reported whether they were employed or enrolled in school, the location of their job or school, their preferred commuting mode, and personal information, including age, educational attainment, and driver's license status.
- **Place Table**  
Each household was assigned a reporting day during which all household members would report their locations and activities throughout the day,

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<sup>2</sup> Boston Region MPO, *Exploring the 2011 Massachusetts Travel Survey: Barriers and Opportunities Influencing Mode Shift*, December 2016.

and the means by which they reached each location. This table contains 190,215 records and can be organized by trip segments, entire trips between activities, or journeys representing chains of trips.

In *Focus on Journeys to Work*, data from the Place Table was organized into chains of trips between primary residence and primary workplace. This allowed for detailed analysis of how these journeys were structured, reflecting changes of mode, the presence of passengers, or the incidence of intermediate activities on the way to work.

In *Barriers and Opportunities Influencing Mode Shift*, the Person Table was the primary resource. This table was augmented with key data from the Household Table, such as the number of household vehicles. Transit access and demographic data developed using geographical information systems (GIS) techniques were also incorporated into the table, notably the coordinates of the nearest rail transit stops to the respondents' homes, workplaces, and schools.

Survey respondents reported their preferred commuting mode regardless of whether they traveled to their primary workplace on their assigned reporting day. These data were included in an augmented version of the Person Table, referred to as the Stated Preference database. Whereas the Place Table only contains information on mode preference from respondents who reported traveling to their primary workplace or school on the survey day, the Stated Preference database provides a more comprehensive view of respondents' mode preferences. The difference between the number of residents in the Stated Preference database who claimed that they commute and the numbers of residents who actually reported a commute on the survey day is substantial and represents an important finding of this study.

Because the data used in *Focus on Journeys to Work* and the data in the Stated Preference database were obtained and analyzed in two completely different ways, metrics such as mode shares calculated from these two sources were not expected to be identical. Some comparisons calculated on an aggregate basis are reassuringly close, and the two efforts should be viewed as complementary analyses of the Boston regional commuting market.

Of the 15,040 households participating in the 2011-MTS, the 10,407 households within the Boston Region MPO's travel demand model region were the focus of the earlier studies, and only data from these households needed to be augmented. For *MPO Travel Profiles* it was necessary to extend the data preparation effort to include the entire state.

## 2. TRAVEL PATTERNS ON A TYPICAL WEEKDAY

### 2.1 Commuting Defined

Work trips serve as the starting point of this study because of their importance and the availability of useful data. Of the 6,548,000 Massachusetts residents in 2010, 37,023 agreed to participate in the 2011-MTS. These participants represented a sample of the entire population; each one represented 177 residents on average. While the figure 177 is the average expansion factor used in this study, other expansion factors were applied, depending on respondents' demographic subgroups and the number of survey participants from each subgroup.

Of the 37,023 total survey respondents, 19,177 respondents reported that they were employed. Applying expansion factors brought the total employed to about 3,157,000 residents, closely approximating published employment totals. Throughout this report any values derived from the 2011-MTS are expressed as expanded quantities.

Every employed respondent was asked the address of their primary workplace. Interestingly, almost ten percent of employed residents reported the address of their primary residence as the address of their primary workplace. Co-location of primary residence and workplace characterizes people who work mostly at home, but is also common in professions such as building trades where the home can serve as a base of operations.

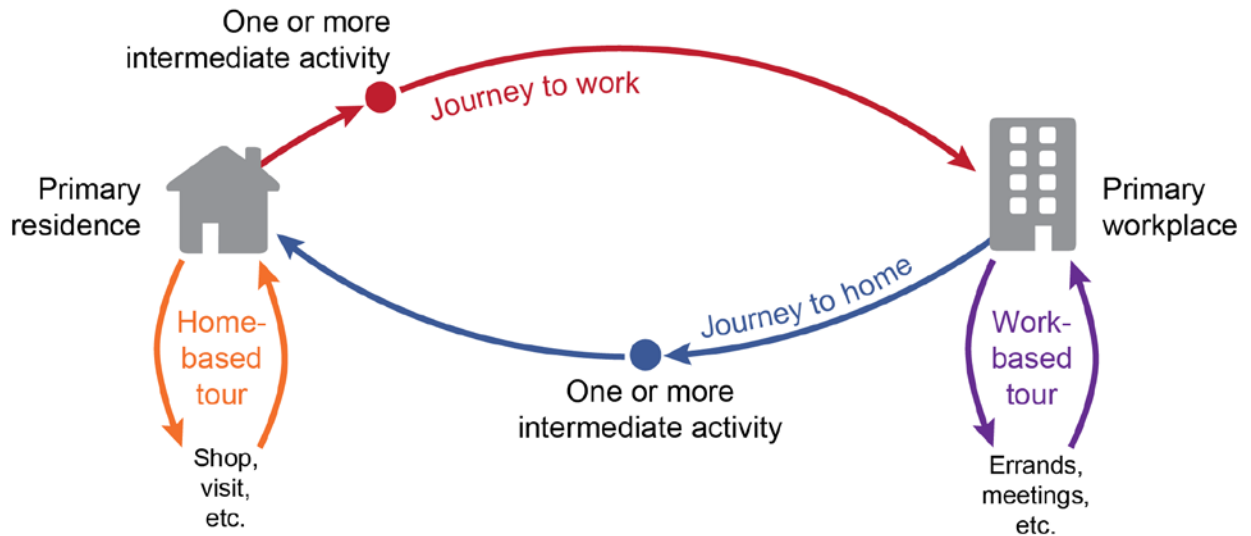
Employed residents who provided primary workplace addresses distinct from their home addresses were referred to as "commuters." If they also reported travelling between their primary residences and primary workplaces on their assigned survey day they were referred to as "survey-day commuters." These survey-day commuters are the focus of this analysis.

The travel patterns on a typical weekday are fundamentally different for survey-day commuters and non-commuters, as illustrated in Figure 1. Survey-day commuters would typically make a journey to work and the reciprocal journey to home, as well as other home- or work-based tours. In contrast, non-commuters would typically make home-based tours.

Residents who did not travel between their primary residences and primary workplaces on the survey day were considered "non-commuters" for this analysis. All travel reported by non-workers, residents who work at home, and commuters who did not travel between their primary residences and primary workplaces on the survey day was counted as "other" travel. Most, but not all, "other" travel consists of home-based tours. Some residents did not visit their primary residences on the survey day, so their travel was counted as "other"

travel, even if they reached their primary workplaces at some time during in the survey day.

**FIGURE 1.**  
**Schematic of Typical Trip Chains**



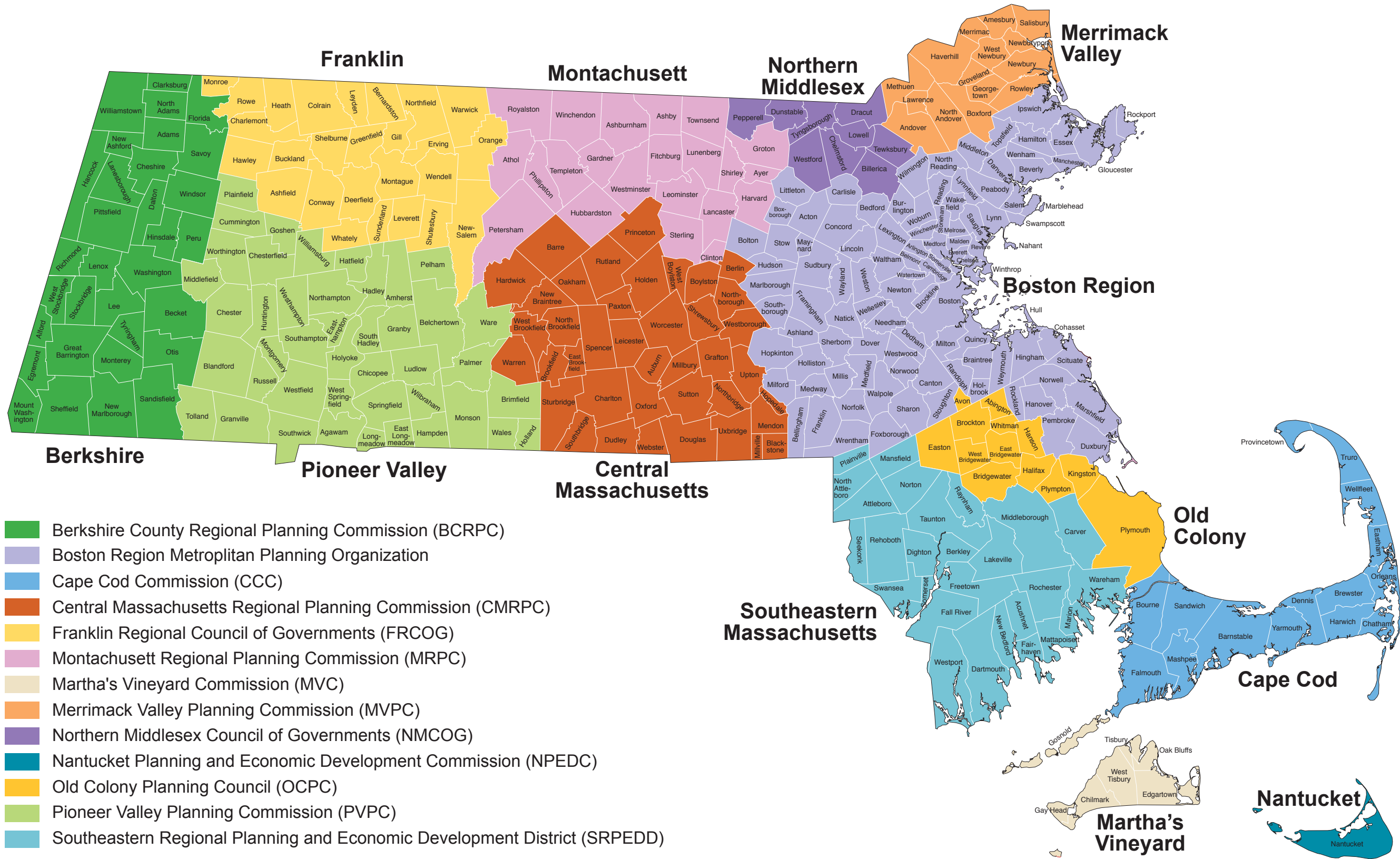
## 2.2 Planning Regions

The travel statistics compiled for this study were organized by planning region. The 13 planning regions in Massachusetts are shown in Figure 2. Ten of the planning regions have an MPO responsible for overseeing federally mandated transportation planning activities within the region. The Franklin, Martha's Vineyard, and Nantucket regions have too little population to qualify as MPOs, but there are still a number of federally required planning functions that occur in these regions; those functions are overseen by RPAs.

Each of the planning regions has an RPA that undertakes a number of planning and related activities. Some planning activities are mandated by federal or state regulations and others are undertaken at the RPA's own initiative; these activities can include land use and economic planning, and the development of demographic projections. In Massachusetts, 12 of the RPAs are also responsible for MPO transportation planning activities.

The Boston region is the exception. The RPA for this region, the Metropolitan Area Planning Council, is a member of the Boston Region MPO (along with state transportation agencies and municipal members), but the MPO's federally required transportation planning activities are administered by a separate organization, the Central Transportation Planning Staff (CTPS), which serves as the staff to the Boston Region MPO.

With the exception of the Boston Region MPO, the planning regions are denoted in tables in this report by the initials of the administering RPA.



BOSTON  
REGION  
MPO



**Figure 2**  
**Massachusetts Metropolitan Planning Regions**

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## 2.3 Commuting by MPO Area Residents

### *Commute Patterns*

The Stated Preference database includes commuting information from all surveyed Massachusetts residents, including those who did not commute on the survey day. The completeness of this database made it suitable for use in developing an overview of where residents of the 13 planning regions commute. A summary of commuting statistics derived from the Stated Preference database is shown in Table 1. In the table, the planning regions are listed, left to right, in descending order based on the amount of travel reported by each region's residents.

Table 1 provides, for each planning region, the total population reported in the 2010 Census. The table also shows an estimate of the number of employed residents and commuters in each planning region. The number of commuters in each planning region was calculated by subtracting the number of employed residents who reported primary workplaces identical to their primary residences from the total employed residents.

For each planning region, total commuting residents were divided into four subgroups based on their commute patterns. These patterns are characterized in Table 1 as follows:

- *Within same MPO:* The commuter travels between a primary residence and workplace, both of which are in the same MPO region.
- *To Boston Region MPO:* The commuter travels from a primary residence outside the Boston Region MPO area to a primary workplace within the Boston Region MPO area.
- *To other MA MPO:* The commuter travels between two MPO areas, neither of which are the Boston Region MPO area.
- *To different state:* The commuter travels from a primary residence in Massachusetts to a primary work place in a different state.

Data are also presented in this section, showing the total number of commuters who enter each planning region from another region. Together with the summary of commuting by MPO residents, this presents a picture of the total amount of commuting associated with each region.

Some primary workplaces are quite distant, implying a commute more like an occasional business trip than a traditional journey to work. For the purposes of this study, out-of-state commutes greater than 100 miles were classified as "working from home."

More than three times as many Massachusetts commuters commuted into the Boston Region MPO area than residents of this MPO commuted out. With the exception of the small Martha's Vineyard (MVC) sample, all other planning regions showed a significant net outflow of commuters. The 2011-MTS did not survey commuters from neighboring states, so those commuters who traveled into Massachusetts planning regions are not reflected in this study.

In most instances, commutes entirely within each planning region greatly outnumbered commutes to different planning regions. Only in Old Colony (OCPC) and Northern Middlesex (NMCOG) did a majority of commuters leave their MPO areas to reach their primary workplaces, a travel pattern characteristic of so-called "bedroom" communities. Significantly, for both of these planning regions, the number of commutes to the Boston Region MPO area exceeded intra-regional commutes.

### *Commute Distances*

The 2011-MTS obtained the latitude and longitude of each location reported in the Household, Person, and Place tables. The availability of these coordinates allowed the calculation of direct-line distances between primary residence and primary workplace, as well as the direct-line distances of other reported trip segments.

Actual travel distances will necessarily be somewhat longer than direct-line distances and, for some studies, model-based calculations can be used to estimate the lengths of likely travel paths. However, the Boston Region MPO's travel demand model only covers a portion of the state, so the calculation of direct-line distances only for the entire statewide sample was considered appropriate in this case. Despite differing from actual travel distances, direct-line distances can be useful for comparing the relative dispersion of workers from jobs across different planning regions.

Average direct-line distances of commutes, by commuting pattern and planning region, are shown in Table 1. Statewide averages are also shown. Commutes entirely within a planning region were generally between four and six miles long (though shorter in the island regions), and the statewide average was about six miles. Commutes that left the home planning region showed much more variation in average commute distances. Some of this variation can be explained by the planning region's location, such as NMCOG's proximity to the job-rich Route 128 corridor near the northern edge of the Boston Region MPO area.

Longer commutes were made by fewer commuters, and the average distance of commutes coming into the Boston Region MPO area was 21 miles. Significantly,



commutes from Massachusetts to other states averaged only 22 miles. Finally, the average commute between MPO areas outside of the Boston Region MPO area was 20 miles. While these broad averages are similar, commute distances varied widely among individual respondents, as will be discussed in a later section of this report.

Average direct-line distances also were calculated for residents and workers of each planning region, as distinct groups; the worker groups included workers who commuted in from different MPOs. Many commuters both lived and worked in the same planning region, but the average commute distances for residents and workers differed based on the relative numbers and commute distances of commuters who traveled into or out of the planning region.

Only in the Boston Region MPO area was the average commute distance of resident workers shorter than the average commute distance of the MPO's workers as a whole. For all other planning regions, the regions' employers drew workers residing relatively close to the workplace; the commutes of those workers were shorter than the average commute of the planning regions' residents, many of whom made a lengthy commute to the Boston Region MPO area.

### *Survey-Day Commuters*

As mentioned above, a substantial number of survey participants met the definition of "commuter" but did not report traveling from their primary residences to their primary workplaces on their assigned survey day. The total number and percentage of commuting residents who reported a journey to work on their survey day are shown in Table 1. In all mainland MPOs, between 70 and 80 percent of commuters reported a journey to work. The island regions, MVC and NPEDC, had small samples, and combining their samples placed their commuting rate in the same range with the mainland MPOs.

The 2011-MTS explains only a small part of the difference between the total number of commuters and survey-day commuters. Respondents were asked how many days a week they worked, revealing a statewide average of 4.7 days. The rest of the difference would result from a combination of factors. Work schedules may require work on weekends with days off taken on weekdays. Workers also take days off (both planned and unplanned), occasionally work at home, or do work-related travel on the survey day that does not involve travel to the primary workplace.

All data presented in this report about survey-day commuters were obtained from the Place Table. The 2011-MTS respondents recorded all locations that they

**TABLE 1**  
**Commuting by MPO Area Residents**

	Boston Region MPO	SRPEDD	CMRPC	PVPC	MVPC	OCPC	NMCOG	MRPC	CCC	BCRPC	FRCOG	MVC	NPEDC	MA
<b>Total population</b>	3,161,712	616,670	556,698	621,570	333,748	288,669	286,901	236,475	215,888	131,219	71,372	16,535	10,172	
<b>Employed residents</b>	1,572,754	292,060	262,890	266,920	155,677	139,552	142,755	115,433	99,046	61,419	35,290	8,451	4,908	
<b>Commuting residents</b>	1,408,935	266,495	244,308	241,142	139,421	130,547	129,922	103,949	84,375	53,505	30,776	6,532	3,190	
<b><u>Commute patterns</u></b>														
Within same MPO	1,311,170	165,823	163,637	208,825	74,335	58,365	48,711	55,836	69,497	49,180	19,141	6,446	3,161	
To Boston Region MPO	na	54,928	61,642	2,716	42,906	61,225	60,261	26,447	8,409	278	93	86	29	
To other MA MPO	82,999	27,476	11,855	13,746	11,906	9,497	13,680	19,696	6,159	1,860	10,473			
To different state	14,766	18,268	7,174	15,855	10,274	1,460	7,270	1,970	310	2,187	1,069			
From other MA MPOs	319,020	21,498	38,778	14,799	27,800	40,523	32,755	14,305	8,164	2,058	8,346	321		
<b><u>Average direct distances</u></b>														
Within same MPO	6	6	6	6	4	4	4	5	6	6	5	3	1	6
To Boston Region MPO	na	26	20	70	21	17	15	24	54	90	65	71	82	21
To other MA MPO	20	21	25	28	19	18	14	19	23	48	17			20
To different state	36	14	24	24	13	32	16	19	39	36	29			22
From other MA MPOs	21	22	24	30	18	16	16	19	33	35	20	16		21
<b><u>MPO average distances</u></b>														
Commuters living in MPO	8	12	11	9	11	11	11	13	12	9	10	4	2	9
Commuters working in MPO	9	8	9	7	7	9	9	8	8	7	10	4	1	9
<b>Expanded survey day commutes</b>	1,072,462	195,920	190,108	185,988	106,325	93,574	95,943	77,368	62,296	42,273	21,418	6,098	1,601	
<b>Percent of commuters commuting on survey day</b>	76%	74%	78%	77%	76%	72%	74%	74%	74%	79%	70%	93%	50%	76%
<b>Average indirect distance</b>	8.8	12.8	12.7	9.1	12.3	12.3	12.6	14.6	11.3	8.5	11.6	4.0	2.3	10.3

visited during the survey day, their activities at those locations, and the modes used to reach those locations. A journey to work and the reciprocal journey to home are frequently punctuated with one or more intermediate stops. These stops might involve activities such as picking up or dropping someone off, shopping, a medical appointment, or other personal business. Stops to change travel mode, including parking or returning to an auto, were also reported.

Table 1 includes a figure referred to as the “average indirect distance” for each planning region. These numbers were calculated by adding the straight-line distances of all the trip segments between the primary residences and primary workplaces. These numbers are an approximation of total travel. Even with this added detail, however, the true travel paths would still be longer than the sum of direct-line distances of all reported trip segments. It should also be noted that if a respondent went directly from home to work, the distance calculated from the Stated Preference database would be the same as the distance calculated from the Place Table.

Unless stated otherwise, travel distances presented in the rest of this report are sums of the straight-line distances of individual trip segments reported in the Place Table.

### **3. TOTAL WEEKDAY TRAVEL BY TYPE OF TRIP CHAIN**

#### **3.1 Commute Travel Miles**

Table 2 presents data on miles traveled by surveyed commuters and all other residents by planning region. The table provides sums of the distances of all reported trip segments in the 2011-MTS Place Table by the four types of trip chains that were shown schematically in Figure 1: journeys to work; journeys to home; work-based tours; and home-based tours.

The average miles traveled per commuter or resident were derived by dividing the total miles traveled by the subgroup (i.e. survey-day commuters or all other residents of the planning region), by the population of the subgroup. For instance, 1,072,462 Boston Region MPO commuters reported trips segments totaling 9,237,000 miles as they traveled from their primary residences to their primary workplaces, 9,740,000 miles returning home, 1,434,000 additional miles in work-based tours, and 3,176,000 miles in home-based tours, for a grand total of 23,587,000 miles. Dividing the grand total miles by 1,072,462 survey-day commuters gave an average of 22.0 miles traveled per person.

The total distance of journeys to home was greater than journeys to work in every Massachusetts MPO area. Statewide, journeys to home are on average almost eight percent longer than journeys to work. This difference can be

**TABLE 2  
Weekday Travel by MPO Area Residents**

	Boston Region MPO	SRPEDD	CMRPC	PVPC	MVPC	OCPC	NMCOG	MRPC	CCC	BCRPC	FRCOG	MVC	NPEDC	MA
<b>Total population</b>	3,161,712	616,670	556,698	621,570	333,748	288,669	286,901	236,475	215,888	131,219	71,372	16,535	10,172	
<b>Survey-day commuters</b>	1,072,462	195,920	190,108	185,988	106,325	93,574	95,943	77,368	62,296	42,273	21,418	6,098	1,601	
<b>All other residents</b>	2,089,250	420,750	366,590	435,582	227,423	195,095	190,958	159,107	153,592	88,946	49,954	10,437	8,571	
<b>Total weekday travel (thousands of miles)</b>														
<b><u>Survey-day commuters</u></b>														
Journeys-to-work	9,237	2,410	2,275	1,623	1,262	1,123	1,164	1,061	665	349	226	21	2	
Journeys-to-home	9,740	2,586	2,561	1,760	1,356	1,180	1,262	1,201	740	366	270	27	5	
Work-based tours	1,434	194	363	279	227	162	186	226	124	63	31	5	4	
Home-based tours	3,176	765	591	996	464	353	442	255	288	293	91	11	14	
<b><u>Travel mileage summaries</u></b>														
Survey-day commuters	23,587	5,955	5,790	4,658	3,309	2,818	3,054	2,743	1,817	1,071	618	64	25	
All other residents	24,769	6,410	5,892	5,873	3,159	3,111	2,605	2,896	3,129	1,494	855	101	43	
Total	48,356	12,365	11,682	10,531	6,468	5,929	5,659	5,636	4,946	2,565	1,473	165	68	
Commuting	18,977	4,996	4,836	3,383	2,618	2,303	2,426	2,262	1,405	715	496	48	7	
All other travel	29,379	7,369	6,846	7,148	3,850	3,626	3,233	3,374	3,541	1,850	977	117	61	
Total	48,356	12,365	11,682	10,531	6,468	5,929	5,659	5,636	4,946	2,565	1,473	165	68	
<b><u>Average miles per resident</u></b>														
Survey-day commuters	22.0	30.4	30.5	25.0	31.1	30.1	31.8	35.5	29.2	25.3	28.9	10.6	15.6	25.8
All other residents	11.9	15.2	16.1	13.5	13.9	15.9	13.6	18.2	20.4	16.8	17.1	9.6	5.0	13.7
Combined	15.3	20.1	21.0	16.9	19.4	20.5	19.7	23.8	22.9	19.5	20.6	10.0	6.7	17.7

attributed to the greater number of intermediate activities reported on journeys to home.

In the case of Boston Region MPO commuters, the 1,072,462 survey-day commuters reported a number of intermediate activities during their journeys to work and home. About 18 percent of journey-to-work commutes and 37 percent of journey-to-home commutes involved at least one intermediate activity. So the percent of direct home-to-work commutes exceeded 82 percent, while only about 63 percent of commuters traveled directly from work to home.

### 3.2 Non-Commuting Travel by Commuters

In addition to journeys to work and the reciprocal journeys home, many survey-day commuters reported making one or more home- or work-based tour. All segment distances for trip chains that began and ended at a primary workplace were summed, and the total miles of work-based tours are shown in Table 2. It should be noted that these miles traveled may have been outside the planning region in which the traveler resided, though they are recorded under the person's home region in Table 2.

Survey-day commuters also reported a large amount of travel as part of home-based tours. Survey-day commuters in each planning region reported more mileage from home-based tours than from work-based tours. Few of these home-based tours were work-related, and most represented personal travel in addition to any personal activities at intermediate stops on commutes.

### 3.3 Travel by Commuters and Survey-Day Non-Commuters

Table 2 summarizes all travel by residents, both commuters and non-commuters, by planning region. The 23,588,000 miles traveled by commuters in the Boston Region MPO area represented 49 percent of the 48,356,000 total miles traveled by region residents. For Massachusetts as a whole, travel by survey-day commuters represented 48 percent of total reported miles.

Table 2 also presents data for each planning region showing the split between miles traveled for commuting only and for all other travel. The 18,977,000 commuting miles by Boston Region MPO survey-day commuters represent 39 percent of the of the MPO's 48,356,000 total miles traveled, as compared to 38 percent statewide.

The percentage of travel miles that were part of commute chains varied between planning regions depending on the percentage of residents who commuted and the average commute distance. For example, commuting accounted for only 32 percent of travel miles by Pioneer Valley (PVPC) residents because of the

smaller than average percentage of residents who commuted and the shorter than average commute distances. Conversely, Northern Middlesex (NMCOG) had an above average percentage of residents who commuted and longer than average commute distances; 43 percent of travel miles by NMCOG residents represented commuting.

The average survey-day distance traveled is shown in Table 2 for survey-day commuters and survey-day non-commuters. The average Massachusetts resident covers a lot of ground on a typical weekday, and commuters travel, on average, significantly farther than other residents.

## 4. USE OF THE PERSONAL AUTO IN MASSACHUSETTS

### 4.1 Measuring Travel by Mode

#### *Defining Modes in Earlier Efforts*

The characterization of travel by mode depends on analytical needs and available data. For the purposes of developing a travel demand model, travel using more than one transportation mode can be defined as a distinct composite mode, such as drive-access transit (i.e. the traveler drives an auto to a transit station and then boards a transit vehicle). Mode variants can also be defined; for example, the auto mode can be refined based on the number of people in a private auto. The 2011-MTS survey respondents were asked to provide detailed data that could accommodate all relevant mode definitions, and these data were compiled in the Place Table, which in turn served as the primary data source for *Focus on Journeys to Work*.

For gathering data for the 2011-MTS Person Table, respondents were asked some much simpler questions: Are you employed? Where do you work? How do you usually get there? If someone worked at a location other than home and reported that transit is his usual mode of commuting, all we know is that he used transit for some portion of his commute. While, admittedly, a minimal level of mode detail, all survey participants provided this type of information, including those who did not commute to their primary workplaces on the survey day.

#### *Measuring Mode Use by Miles Traveled*

This study took a third approach to measuring travel by mode. Total weekday travel is summarized in Table 2. These figures were derived by adding the straight-line distances of all reported travel segments regardless of mode, and expressed as total miles traveled by type of trip chain. Adding just the segment distances where respondents reported driving gave the total driving miles, including miles driven to connect with transit.

This approach is illustrated by comparing Tables 2 and 3. Table 2 characterizes the Boston Region MPO as having 1,072,462 survey-day commuters who traveled a total of 23,588,000 miles on the survey day. Table 3 shows that 764,150 of these survey-day commuters drove some distance as part of their commute. Over the course of the survey day, these residents drove a total of 18,284,000 miles, which could have included travel segments connecting with transit services. Subtracting the 18,284,000 miles of survey-day driving from their total miles traveled gave a remainder of 5,304,000 miles, which were covered by all other modes.

Travel miles by residents who did not commute on the survey day are shown in Table 3. Boston Region MPO residents who did not commute drove a total of 22,070,000 miles on the survey day. Subtracting the miles driven by non-commuters from the 24,768,000 total travel miles, shown in Table 2, gave a total of 2,698,000 miles traveled by other modes by non-commuters. Adding the miles driven by commuters and non-commuters results in a total of 40,354,000 miles driven by residents of the Boston Region MPO area. The distance traveled by other modes by both commuters and non-commuters sum to 8,002,000 miles.

As in Table 2, the figures in Table 3 show total miles traveled split according to whether the miles were traveled as part of a commute chain or other travel. This split was done for both the driving and non-driving mode groups. Commuters from the Boston Region MPO area covered 14,138,000 commuting miles by driving as compared with 4,839,000 miles by all other modes combined. For other travel, 26,216,000 miles were traveled by driving and 3,163,000 miles by other modes.

Table 3 also shows the percent of miles traveled using modes other than driving. Other modes survey respondents reported using included transit, walking, bicycling, school buses, taxis, private shuttle buses, and paratransit services such as the MBTA's service, THE RIDE. In many instances respondents reported being given a ride by someone, and these responses were classified as "driving" or "other modes" depending on the type of trip chain; this topic is discussed further in the following section.

The average driving miles for commuting, shown in Table 3, were calculated by dividing the sum of the commuting miles by the number of commuting drivers. The average miles driving for all other travel were calculated by dividing miles of all other travel by the total number of respondents reporting that they drove on the survey day. Commuters who drove on the survey day were included in both these calculations. For instance, a total of 2,065,118 Boston Region MPO residents reported driving on the survey day, and they drove a total of 26,216,000 miles that are not part of a commute chain for an average of 12.7

**TABLE 3**  
**Weekday Travel by Driving and Other Modes**

	Boston Region MPO	SRPEDD	CMRPC	PVPC	MVPC	OCPC	NMCOG	MRPC	CCC	BCRPC	FRCOG	MVC	NPEDC	MA
<b>Total survey-day drivers</b>	2,065,118	427,848	406,940	430,952	218,243	234,973	215,855	179,551	164,295	90,949	50,122	12,021	8,097	
<b>Commuters driving</b>	764,150	177,383	176,172	161,176	82,723	91,740	89,502	72,388	56,281	38,493	19,109	6,098	1,601	
<b><u>Driving miles (thousands)</u></b>														
Survey-day commuters	18,284	5,270	5,408	4,288	2,883	2,508	2,731	2,559	1,655	1,028	558	64	22	
All other residents	22,070	5,721	5,454	5,414	2,993	3,042	2,502	2,700	2,986	1,379	818	88	36	
<b>Total</b>	40,354	10,991	10,862	9,702	5,876	5,550	5,233	5,259	4,641	2,407	1,376	152	58	
Commuting	14,138	4,334	4,491	3,053	2,226	2,042	2,154	2,095	1,281	690	457	49	5	
All other travel	26,216	6,657	6,371	6,649	3,650	3,508	3,079	3,164	3,360	1,717	919	103	53	
<b>Total</b>	40,354	10,991	10,862	9,702	5,876	5,550	5,233	5,259	4,641	2,407	1,376	152	58	
<b><u>Other modes miles (thousands)</u></b>														
Survey-day commuters	5,304	685	382	370	427	311	323	183	162	43	61	1	3	
All other residents	2,698	689	438	459	165	68	103	195	142	115	36	12	7	
<b>Total</b>	8,002	1,374	820	829	592	379	426	378	304	158	97	13	10	
Commuting	4,839	663	346	330	392	261	271	167	125	25	39	0	2	
All other travel	3,163	711	474	499	200	118	155	211	179	133	58	13	8	
<b>Total</b>	8,002	1,374	820	829	592	379	426	378	304	158	97	13	10	
<b><u>Other modes percent of miles</u></b>														
Commuting	25%	13%	7%	10%	15%	11%	11%	7%	9%	4%	8%	0%	27%	10%
All other travel	11%	10%	7%	7%	5%	3%	5%	6%	5%	7%	6%	11%	13%	7%
<b><u>Average driving miles per auto user</u></b>														
Commuting	18.5	24.4	25.5	18.9	26.9	22.3	24.1	28.9	22.8	17.9	23.9	8.0	3.3	23.5
All other travel	12.7	15.6	15.7	15.4	16.7	14.9	14.3	17.6	20.5	18.9	18.3	8.6	6.5	16.1



non-commuting miles per driver. Inspecting Table 3 it is apparent that most of the driving by driving commuters is part of their commute.

## 4.2 Auto Dependence by Type of Trip Chain

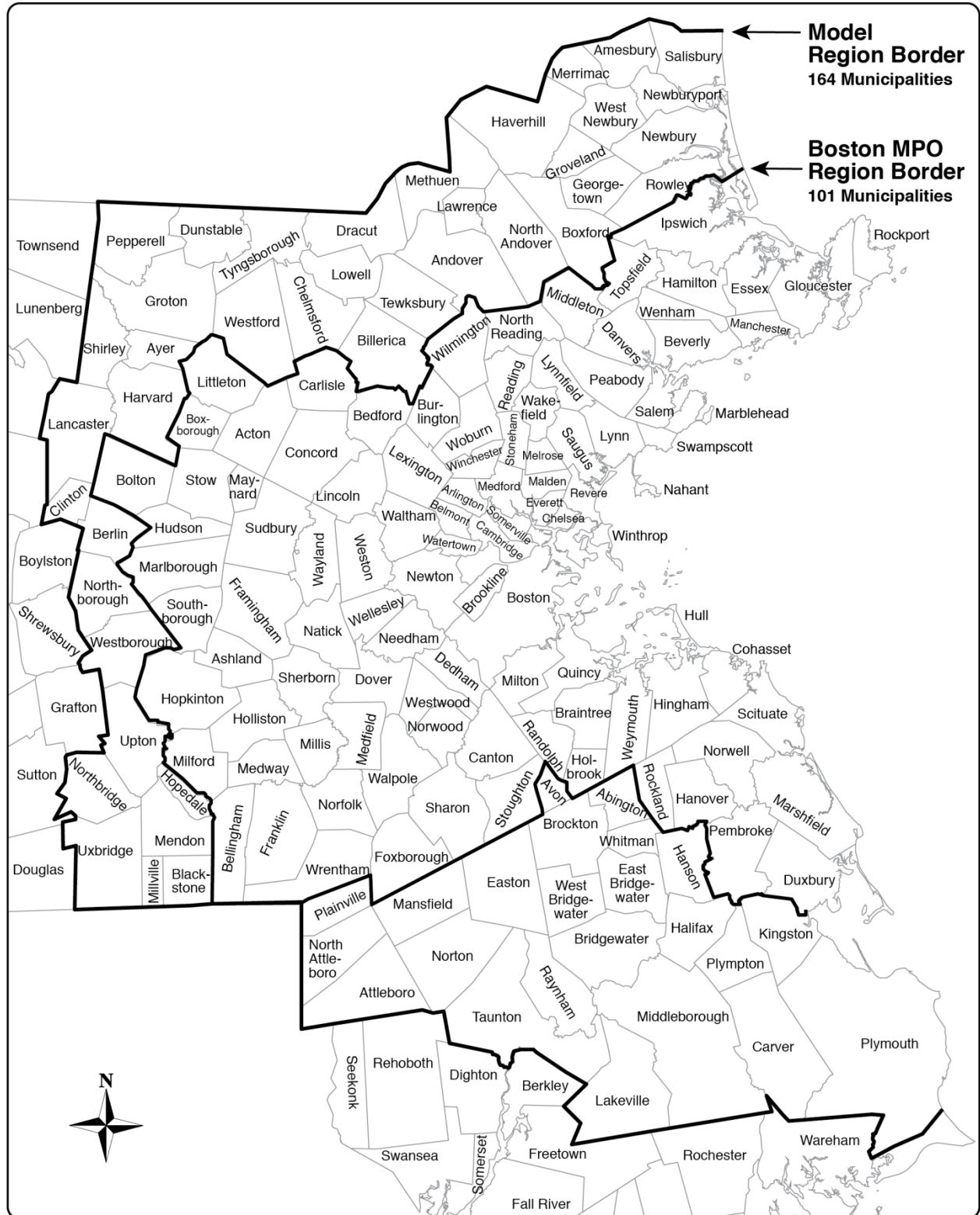
### *The Boston MPO Travel Demand Model Region*

As the percentages of non-driving miles, shown in Table 3, make clear, the preponderance of distance traveled by Massachusetts residents was covered by auto. Even with the extensive transit services available in the Boston Region MPO area and the compact urban fabric of many of its communities, the non-driving modes were only utilized for a quarter of commuting travel miles. This section more carefully examines the definition of driving used in this study and the roles of the various other modes.

To better analyze the lesser-used modes, the statewide sample of survey respondents was divided in two groups: those living in the 164-municipality area that makes up the Boston travel demand model region, and respondents living elsewhere in Massachusetts. The model region, shown in Figure 3, includes the 101 municipalities in the Boston Region MPO area plus 63 municipalities bordering that area. It contains about one-third of the state's land area, two-thirds of the population, and three-fourths of the jobs. Also, 131 of the MBTA's 138 commuter rail stations are located in the model region.

The model region reflects, to a large degree, the commuting patterns of the Boston region. Many residents of the 63 outer municipalities of the model region work in the Boston region's large job market. The data in Table 1 can be used to calculate that 1,630,000 Massachusetts residents commuted to jobs in the Boston Region MPO area, 319,000 of whom commuted from a different planning region. Of the workers who commuted from a different planning region, all but 82,000 traveled from one of the 63 outer municipalities, and these commuters made up only five percent of the Boston MPO region's workforce.

The percentages of survey respondents' miles traveled by mode are summarized in Table 4. Three sets of mode shares are presented by type of trip chain (commuting, work-based tours, and home-based tours), and organized by the geographic area of the respondents' residence (residing within in the model region, outside the model region in Massachusetts, and a combined statewide total).



**BOSTON  
REGION  
MPO**

**Figure 3**  
**164-Municipality Travel Demand Model Region**  
**101-Municipality Boston Region MPO**

*Exploring the 2011  
Massachusetts Travel  
Survey: MPO  
Travel Profiles*

**TABLE 4**  
**Percent of Miles Traveled by Mode**

Types of Trips	Modes Reported in Place Table						Composite Modes Used in Table 3		
	Drive	Ride	Transit	Walk	Bike	Other*	Drive	Other	Other
<b>Survey-day Commuters:</b>									
<u>Commuting Chains</u>									
Model region	78.7	3.9	15.0	1.4	.6	.4	78.7	21.3	
Statewide	82.8	4.2	11.1	1.0	.5	.4	82.8	17.2	
Rest of MA	91.5	4.8	2.9	.3	.2	.3	91.5	8.5	
<u>Work-based Tours</u>									
Model Region	81.5	10.3	3.9	2.2	.4	1.6	81.5	18.5	
Statewide	84.5	9.6	2.7	1.6	.4	1.2	84.5	15.5	
Rest of MA	90.2	8.2	.3	.5	.2	.6	90.2	9.8	
<u>Home-based Tours</u>									
Model Region	82.5	13.3	2.3	1.2	.4	.3	82.5	4.2	
Statewide	82.0	14.7	1.6	.9	.4	.4	82.0	3.3	
Rest of MA	81.0	17.4	.4	.4	.4	.4	81.0	1.6	
<b>Other Residents:</b>									
Model Region	58.9	32.1	5.7	1.7	.4	1.2	58.9	9.0	
Statewide	57.7	33.8	4.1	1.3	.3	2.8	57.7	8.5	
Rest of MA	55.9	36.3	1.8	.6	.2	5.2	55.9	7.8	
<b>All MA Residents:</b>									
Model Region	69.3	18.7	9.2	1.5	.5	.8	69.3		
Statewide	69.8	20.4	6.6	1.2	.4	1.6	69.8		
Rest of MA	70.7	23.5	2.0	.5	.2	3.1	70.7		

\* Other modes represented in this column include: school bus, taxi, private shuttle bus, and the "Ride" or similar paratransit services.

### *Commuting Trip Chains*

While the auto was clearly the most heavily used mode, there was, as shown in Table 4, some significant mode share variations in Massachusetts and the Boston model region. Transit represented 15 percent of the commuting miles by residents of the model region, but less than three percent by other Massachusetts residents. The 11 percent statewide transit share reflects the large number of Massachusetts residents who live in the model region.

Table 3 grouped all modes other than driving into a composite “other modes” group. For the model region, 21.3 percent of commuting miles were traveled by these other modes, and this composite value is shown in Table 3. This mode share is lower than the Boston Region MPO’s (25 percent) because it contains many surrounding communities where more commuters drive.

Commuters who reported being given a ride accounted for only four or five percent of the commuting miles across all geographic groups. For commuting chains, being given a ride was considered an “other mode” and only commuting distances reported as driving were counted as “driving” in Table 3. All other commuting mileage, including being given a ride or very minor modes, such as taxi, was combined into the “other modes” category.

### *Work-Based Tours by Commuters*

The next mode shares examined were the work-based tours that began and ended at the primary workplace. For these tours, the percent of miles covered by transit were much lower in each geographic area than for commuting trips. In contrast, the percent of miles covered while being given a ride, presumably in many instances by a colleague, was significantly greater than for commuting in all three geographic areas. As in the case with commuting, for the composite modes shown in Table 3, being given a ride was grouped with “other modes” rather than being counted as “driving.”

### *Home-Based Tours by Commuters*

Many survey-day commuters reported making one home-based tour or more in addition to their commuting trip chains. The mileage shares, by mode, for these tours are summarized in Table 4. For these tours, the shares of miles covered while being given a ride were significantly greater than for the other trip chains by commuters, and outside the model region the share exceeded 17 percent.

For travel that begins and ends at home, there is a high likelihood that a couple or more household members are traveling together. For these home-based tours, both driving and being given a ride were included in the definition of driving used in Table 3. The grouping in Table 3 was based on a working assumption that the vehicle used was available and could be utilized for the convenience of all

household members. Using this definition of driving, the share of other mode miles dropped to the low single digits, as shown in Table 4.

### *Travel by Non-commuting Residents*

Almost all travel by residents who did not commute on the survey day was home-based trip chains. Sometimes the survey-day travel began or ended at someplace other than home, but they never reported travel to their primary workplace. These residents reported that about one-third of survey-day travel distance was covered by being given a ride. The percent of miles traveled driving and being given a ride were similar across the three geographic areas and the two percentage amounts totaled to just over 90 percent of travel miles in all three areas. As with the home-based tours by commuters, both driving and being given a ride were included in the definition of driving used in Table 3.

The percentages of travel miles by the non-driving modes, while small, varied significantly by area. Transit was used for 5.7 percent of travel miles in the model region compared with only 1.8 percent in the rest of the state. In contrast, outside the model region, the other minor modes were used for 5.2 percent of the travel miles, many of which involved lengthy rural school bus trips.

## 4.3 Selected Mode-Shift Analyses

### *Commute Distances Driving*

The potential for other modes to replace a meaningful amount of auto travel is an increasingly important planning and policy concern. The relative attractiveness of a competing travel mode to a commuter depends in many instances on the travel distance. In this section, driving commutes are analyzed based on distances between primary residence and primary workplace.

Information from the Stated Preference database, used to build Table 1, was used in this analysis, the results of which are summarized in Table 5. Table 5 shows the number of commuters who drove to work in each planning region and groups those commutes by commute distance. The table also shows the total straight-line distances between home and work for each grouping. For example, in the Boston Region MPO, 325,528 commuters who drove lived between one and five miles from their primary workplace. The total straight-line distances between home and work for these 325,528 commuters was about 932,000 miles.

There were a total of 2,132,000 commuters in Massachusetts who drove to work, and these commuters collectively lived a total of 21,321,000 miles from work, therefore the statewide average distance from work was almost exactly ten miles. The percent distribution of commuters by distance and commuting miles by distance across the five distance ranges are also shown in Table 5.

**TABLE 5  
Distribution of Driving Commute Distances**

	Boston Region MPO	SRPEDD	CMRPC	PVPC	MVPC	OCPC	NMCOG	MRPC	CCC	BCRPC	FRCOG	MVC	NPEDC	Percent of State Total
<b>Commuters driving</b>														
< 1 mile	63,310	17,085	12,615	10,871	7,857	6,289	3,965	6,343	6,610	5,009	1,840	1,345	962	7%
1 < 5 miles	325,528	74,859	71,495	81,073	40,595	33,777	30,457	26,069	24,652	20,551	7,310	3,956	1,148	35%
5 < 10 miles	213,366	40,918	44,996	52,432	17,927	22,325	31,176	16,086	18,734	11,558	6,730	526		22%
10 < 20 miles	214,798	51,590	54,213	34,225	25,506	27,721	33,406	23,231	9,737	7,465	7,960	506		23%
20 < miles	77,522	47,359	37,408	19,048	20,132	20,033	17,737	22,537	10,213	4,041	3,481	86	29	13%
<b>Total commuters</b>	894,524	231,811	220,727	197,649	112,017	110,145	116,741	94,266	69,946	48,624	27,321	6,419	2,139	100%
<b>Total direct distances (thousands of miles)</b>														
< 1 mile	38	10	8	7	5	4	3	4	4	3	1	1	1	0%
1 < 5 miles	932	221	206	230	108	98	88	72	73	56	18	11	2	10%
5 < 10 miles	1,533	303	324	384	133	157	224	117	134	85	49	3		16%
10 < 20 miles	3,016	742	772	478	374	387	467	327	137	110	121	6		33%
20 < miles	2,332	1,508	1,139	702	594	570	460	663	454	198	106	6	2	41%
<b>Total miles</b>	7,852	2,784	2,449	1,801	1,214	1,216	1,242	1,183	802	452	295	27	5	100%
<b>Average distance</b>	8.8	12.0	11.1	9.1	10.8	11.0	10.6	12.5	11.5	9.3	10.8	4.1	2.3	

Seven percent of Massachusetts commuters who drove to work lived within a mile of work, but these commuters only accounted for four-tenths of a percent of commuter driving, a value which has been rounded to zero in Table 5. The commute distance range with the greatest number of commuters was between one and five miles, accounting for 35 percent of the total number of commuters, but only ten percent of the miles traveled. While only 13 percent of commuters lived over 20 miles from work, these commuters accounted for 41 percent of the miles driven.

Table 5 shows the total number of commuters who drove by the planning region in which they resided. These values can be compared with the figures in Table 1, which show the total number of commuters by all modes. The total number of commuters who drove in each planning region represent between 80 and 90 percent of total commuters, with the exception of the Boston Region MPO where only 63 percent of commuters reported driving. While this percentage is often used as a measurement of mode share, this study analyzes mode preferences primarily by considering distance traveled.

### *Estimating the Potential Size of Bicycle Commuting Markets*

The numbers presented in Table 5 can have practical applications. The data for the Old Colony Planning Council (OCPC) presents a good example because of its comparatively small geographical size.

As shown in Table 5, 33,777 commuters from OCPC who drove lived between one and five miles from their primary workplace. In many analyses bicycling is considered to be a viable travel mode for distances less than five miles. A comprehensive and sustained effort by the OCPC communities could set an objective of converting a significant portion of these 33,777 commuters from traveling by driving to bicycling.

The data in Table 5 allows the extent and impact of such policies to be quickly evaluated. If bicycle-friendly policies and programs were to attract 17,000 new commuters (about one-half of 33,777) to bicycling, we could expect a reduction of about 49,000 auto miles, one-half of the 98,000 miles that OCPC commuters drove in the one to five mile range, as shown in Table 5. A 49,000 mile reduction would represent four percent of OCPC's 1,216,000 mile commuting total and about one-half of one percent of the 21,321,000 mile statewide total. Clearly, a mode shift of this magnitude would be difficult to achieve, and this example is presented solely to illustrate calculations.

Some new bicycle commuters would live closer than one mile and some would live farther than five miles from their workplaces, but it is reasonable to consider

commuters who travel within this distance range as the potential market for commuter bicycling. Also, as shown in Table 3, on the survey day only 2,042,000 of the total 5,550,000 driving miles by OCPC residents were commuting. Presumably, the bicycle-friendly programs would attract people to the bicycle mode for non-commuting trips as well. While the total number of non-commuting miles has been estimated, the lengths of individual trips chains were not. A comprehensive bicycle program would likely lead to new bicycle riders modifying their trip chains. In contrast, the locations of the primary workplaces would be considered relatively stable when planning a bicycle program.

### *Very Short Commutes and Walking*

As mentioned above, seven percent of commuters drove to workplaces less than one mile from their residences, but taken altogether these commutes accounted for only four-tenths of driving commuting miles. One mile is often used as an upper limit for walking trip distance, so shifting a large number of these drivers to walking or bicycling could be a planning objective. The reductions in overall traffic would be small, however. Perhaps of greater importance for planning a mode shift to walking would be a reduction in the amount of parking required at the work end of the commute.

The importance of walking is more apparent when looking at the share of commuting miles compiled from the individual travel segments. As shown in Table 4, fully one percent of the statewide commuting miles were by walking. This distance included walk segments between home or work and nearby transit stops, as well as entire home-to-work commutes. While there were still somewhat more auto than walking commutes under one mile, shifting these short commutes to walking would probably have more benefit for public health than for traffic reduction given the relatively short commute distances.

### *Commuter Rail Case Study*

Driving, bicycling, and walking are similar in that if a commuter is ready to use one of these modes, that mode can be used to reach any destination within the mode's range. Even driving can be considered as having a certain range in terms of commuting; this study used a limit of 100 miles for commutes to different states. The ability to use transit depends on practical access to transit both at the primary residence and the primary workplace, as well as access to some type of service between the two transit access points.

Some of the more recent efforts to expand transit service in Massachusetts have involved establishing, extending, or improving commuter rail service. These services are all anchored in downtown Boston, and the bulk of the ridership uses the downtown terminals. Even the growing reverse commuting markets carry



most of their passengers from the downtown stations to jobs outside Boston. These characteristics and the long typical commuter rail travel distance make this an appropriate mode to be analyzed using the distance-based driving profiles outlined in Table 5.

The proposed South Coast Rail commuter rail system expansion presents several examples of how data developed in Tables 1 and 5 can illustrate the potential size of the regional commuting markets that could benefit from the commuter rail. As shown in Table 1, 54,928 Southeastern Regional Planning and Economic Development District (SRPEDD) residents commute to the Boston Region MPO area. This figure includes commutes by all modes to workplaces throughout the extensive Boston Region MPO area. If 4,000 commuters shift from driving to using new South Coast Rail services, this would represent about seven percent of the total SRPEDD to Boston Region MPO commutes. Clearly, the expected commuter rail mode share into the Boston core would exceed seven percent. A more precise size of this travel market could be estimated using the Stated Preference database, to the extent that the sample size allows.

Table 5 places these hypothetical 4,000 commuters in a slightly different context. While Table 5 shows that only 13 percent of commuters who drove statewide worked more than 20 miles from home, for SRPEDD this number was 20 percent. Similarly, the 1,508,000 miles driven by these SRPEDD commuters accounted for 54 percent of the total driving commute distance compared with only 41 percent statewide.

Given the distances between the population centers that South Coast Rail would serve and downtown Boston, and the expectation that many commuters would drive to one of the new commuter rail stations, an average reduction of 25 driving miles each way for driving commuters who shift to commuter rail can serve as a working estimate. Each of the 4,000 commuters in this example would be expected to reduce SRPEDD's commute driving distance an average of 25 miles for a total reduction of about 100,000 miles.

This 100,000 mile reduction is, coincidentally, about seven percent of the 1,508,000 miles of driving commutes longer than 20 miles. These lengthy drives to work by SRPEDD residents were to locations throughout Massachusetts and Rhode Island. Even with South Coast Rail, some SRPEDD commuters would still drive to the Boston core. As with the data in Table 1, the Stated Preference database can provide additional detail as the sample permits. The data in Table 5 allows programs that reduce driving commutes to be considered in the context of regional and statewide commuting markets as their impacts are assessed.

## 5. SUMMARY AND CONCLUSIONS

### 5.1 Review of the Analytical Process

#### *Augmenting the 2011-MTS Databases*

This study utilized almost all the survey resources developed in undertaking the 2011-MTS. Every survey response in the Place Table, which is the basis for defining trips and trip segments, was characterized as part of one of four types of trip chains:

1. Journey from home to work
2. Journey from work to home
3. Home-based tour
4. Work-based tour

This chaining process built upon the work undertaken earlier in the *Focus on Journeys to Work* study in which journey to work trip chains in the Boston Region MPO travel demand model area were identified. This study extended that process to include the entire state and other types of trip chains.

The 2011-MTS also was used to develop the Person Table, and this table was expanded with data from a third survey product, the Household Table. CTPS staff had incorporated additional information, much of which was derived by using GIS techniques. This augmented version of the Person Table is referred to as the Stated Preference database. An earlier version of this database was developed for eastern Massachusetts and was the principal tool used in the earlier study, *Barriers and Opportunities Influencing Mode Shift*. For this study, the Stated Preference database was expanded to include all respondents throughout Massachusetts.

#### *Using the Databases*

The chained trips and the Stated Preference database were complementary data sources. The differences between these two sources were described in this report and then the sources were utilized where they would be most effective. In general, the Stated Preference database had data from more survey responses and was most useful in looking at geographic patterns of commuting. The data source on chained trips gave detailed information on mode utilization for both commuting and non-commuting trip chains.

Five tables were built from these two data sources. Table 1 used data from the Stated Preference database. It showed the total numbers of commuters who lived in each planning region and presented summary data about work location and commute distance.

Table 2 organized the trips chains by planning region and showed the number of residents and miles traveled for each type of trip chain. Table 3 further divided the miles traveled within each type of trip chain by mode, either driving or some other mode.

Table 4 divided travel distances in the four types of trip chains by six modes—drive, given a ride, transit, walk, bicycle, and other. For analysis at this level of detail, the geographic areas analyzed were the Boston Region MPO travel demand model area and the rest of Massachusetts.

The Stated Preference database was used to develop the last table, Table 5. This table reported only commute distances of commuters who drove to work. The data was organized by planning region.

## 5.2 Selected Findings

A few of the study findings that stand out include the following:

- **Many commuters did not commute on the survey day.**  
Only between 70 and 80 percent of survey respondents who reported that they commuted to work (as documented in the Stated Preference database) actually did so on the survey day. This was observed in all planning regions and relates to the variety and changeability of people's work schedules.
- **The Boston region has the strongest regional job market.**  
While this conclusion may seem self-evident, the 2011-MTS shows that Boston is the only planning region where significantly more workers commute into the region than commute out.
- **The average commute distance for Boston region residents is three miles shorter than for other Massachusetts residents.**  
The average Boston region commute is 8.8 miles compared with 11.8 miles for other Massachusetts residents. The large net flow of daily commuters into the Boston region explains the higher average commute distance for residents of other planning regions.
- **Non-commuting travel exceeds commuting travel in all planning regions.**  
For Massachusetts as a whole, commute chains make up only 38 percent of travel miles. The rest is represented by either non-commute trip chains or travel by non-commuters.

- **Driving is by far the dominant mode in Massachusetts.**  
Seventy-five percent of the travel miles in the Boston region and 90 percent elsewhere in Massachusetts are logged by commuters who drive. For all other travel, driving is the mode used for 89 percent of the miles in the Boston region and 93 percent in the rest of the state.
- **Non-commuters are given rides for one-third of their travel miles.**  
Anyone who was not going from home to work on the survey day was classified as a non-commuter, and all their travel was considered home-based tours. Throughout Massachusetts, for about one-third of the travel distance reported by these people, the mode listed was “given a ride.”
- **Mode preferences expressed as travel distances have practical applications.**  
The survey tools used in this study allow the size of travel markets and the impacts of mode shifts to be expressed as miles traveled by mode. The commuting distances and patterns also have implications related to demographic trends and land-use planning.
- **Average travel distances of residents vary little between planning regions, but distances vary tremendously between individuals within each planning region.**  
The numbers of residents commuting in a defined distance range in a region or town can represent a travel market when considering options for improving specific travel modes.

### 5.3 Ideas for Future Work

The augmented survey tools described in this study have been used to evaluate potential travel markets for several projects both within and outside the Boston Region MPO area. The task of preparing these survey tools for the entire 2011-MTS sample is now complete, and these tools can be utilized for a wide range of topical studies.

The organization of reported travel segments into chains by type of journey or tour provides a resource that will be useful in developing a new generation of travel demand models. The types of chains developed for this study were envisioned to support activity-based modeling techniques being evaluated by the Boston Region MPO for possible implementation.

Finally, the focus of this study has been primarily on geographical factors. This has allowed commuting patterns, distances, non-commuting travel, and major modes to be quantified across the entire state. It would be relatively straightforward to use the Stated Preference database to analyze statewide commuting patterns from socioeconomic perspectives.