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The Demographics of Travel in the Two Rivers-Ottauquechee Region

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1. Introduction

1.1 Project Summary & Goals

In March of 2008, the Two Rivers-Ottauquechee Regional Commission (TRORC) contracted with TranSystems, a consulting firm based in Montpelier, to conduct a regional transportation planning study for the region.

Called the Demographics of Transportation, the TRORC outlined two major goals for the project:

- To achieve a greater understanding of the demographic and employment factors that underlie transportation demand.
- To provide a portrait of commuting patterns and expand the inquiry into other travel purposes, to the extent that this analysis can be supported by reliable data.

TranSystems contracted with the Transportation Research Center at UVM to assist in the study. The TRC tasks included; 1) Collect town building permit data in the Two Rivers RPC region, 2) Collect enrollment data for schools in the Two Rivers-Ottaquechee region, and 3) Design and distribute a survey to capture travel patterns of households in the Two Rivers RPC region.

TRC researchers began gathering the housing data in March, 2008 and conducted the survey in September, 2008. Data and analysis was provided to TranSystems in December, 2008.

The Two Rivers Ottauquechee region is comprised of 31 towns, with a total population of approximately 56,185 (*see Figure 2.1*). The mission of the Two Rivers RPC includes advocating for the needs of its member towns, helping to bridge the opportunities and concerns that exist between towns and the State and coordinating local and regional planning and transportation studies. The Commission's staff also provides technical planning services to town officials, and acts as a resource to local government.[1] The RPC is one of the more active planning commissions in the state, taking an active role in examining regional transportation system impacts.[2]

The Transportation Research Center at the University of Vermont is a hub for interdisciplinary research, education and outreach programs that advance sustainable transportation systems. Since its inception in 2006, the TRC has brought together a multidisciplinary team of researchers, including scholars in engineering, environmental sciences, public health, psychology, public administration, sociology, and economics.

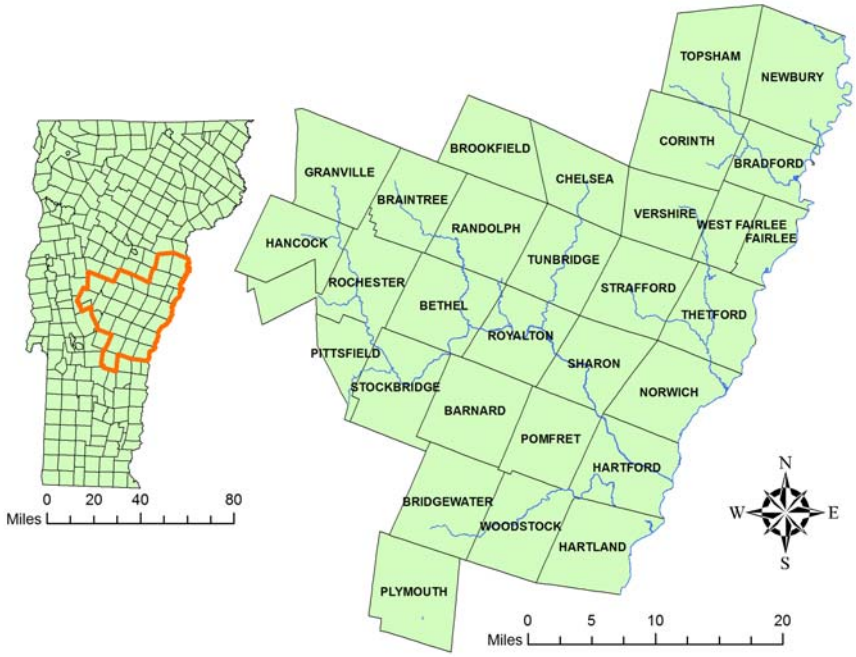

Figure 1-1. Map of Two Rivers-Ottauquechee region

Table 1-1. Population of the Two Rivers-Ottauquechee region by town

Town	Estimated Population	Town	Estimated Population
Barnard	961	Pittsfield	419
Bethel	1,940	Plymouth	572
Bradford	2,667	Pomfret	965
Braintree	1,235	Randolph	5,045
Bridgewater	926	Rochester	1,135
Brookfield	1,245	Royalton	2,465
Chelsea	1,234	Sharon	1,346
Corinth	1,458	Stockbridge	685
Fairlee	1,008	Strafford	1,084
Granville	287	Thetford	2,779
Hancock	363	Topsham	1,139
Hartford	10,700	Tunbridge	1,305
Hartland	3,059	Vershire	628
Newbury	2,158	West Fairlee	726
Norwich	3,508	Woodstock	3,143
		Region Total	**56,185**

2. Area Demographics

As community leaders develop strategies for growth and development in the 21st century, it is critical that they understand the movement of their citizens, particularly in rural areas where the ratio of infrastructure need to traffic volume is relatively high. In the coming years, rising fuel prices and large scale demographic shifts will place increasing pressure on public transportation systems and local economies, transforming both commuting patterns and the delivery of goods and services. Analyzing patterns of trip generation and mode choice on a regional basis can provide planners and policy-makers with the tools to meet these challenges, offering valuable insights into the appropriate distribution of limited transportation resources.

2.1 The Two Rivers-Ottauquechee Region

Population growth in the Two-Rivers Region has slowed over the past 10 years, growing by fewer than 1,000 people between 2000 and 2007 – about 1.7%. This offers a contrast to the previous decade, when the region's population grew by more than 8%. According to prior planning studies, the most salient factors influencing demographic shifts in the region include the presence of employment and housing opportunities, the stability of land values and reliable access to goods and services.[3] Like many areas of the country, the population of residents over 65 is growing at a higher rate than other age groups. The most recent figures estimate that seniors comprise 13.7% of the region's residents – a slightly higher rate than Vermont as a whole.[4] One of the goals of the Two Rivers-Ottauquechee Regional Commission (TRORC) is to assess the implications of these population shifts on the region's economy and transportation infrastructure, incorporating appropriate measures into their 2009 regional plan.

In addition to demographic changes, the TRORC was interested in the volume of residents traveling to economic and cultural centers in neighboring New Hampshire. The two biggest employers in the Two-Rivers region, Dartmouth Hitchcock Medical Center and Dartmouth College, are located just across the New Hampshire border.[5] Both Hanover and Lebanon offer large-scale shopping and entertainment centers as well as grocery stores, schools and restaurants. Area planners seek additional information regarding the purpose and frequency of these trips to help inform current and future policy and planning decisions.

3. Data Collection & Methods

3.1 Housing Data

TRC researchers collected data on new houses permitted in the Two Rivers region between 2000 and 2007 – in some cases by phone, but mostly in four trips to the region and visiting individual town record centers. Researchers found data collection from the smaller towns difficult because the information was not clearly organized; the offices kept limited hours or did not keep records at all. In the end, researchers were able to collect data from 21 of 30 towns, although staff examined records at 25 of the 30 towns. That information is attached in Appendix A.

Researchers examined each town's permitting log and grand list. In some cases, the number of new housing units was estimated by adding all taxable housing parcels for each year, then subtracting the 1999 total from 2000 to get the number of new homes in 2000. Towns with zoning regulations would typically have building permit logs, although some were better kept than others. When permit logs existed, researchers would tally up the number of new houses, camps, cabins, or apartments for each year (2000 – 2007) to determine the number of new housing units for that town over those seven years. There was one exception to these two methods of collecting this data, in the town of Tunbridge, where researchers used the master appraisal list, which very clearly laid out the number of new houses, cabins, etc. for each year.

The Town Data Excel Sheet (Appendix A) shows the estimated number of new housing units distinguishing for each year what type of unit it was for the 25 towns. For some towns only partial data is displayed and the notes explain why. Missing data usually indicates the town does not have zoning rules or the data was unobtainable. For this analysis, apartment buildings and multi-family dwellings, which comprised a small percent of the total, were counted as one new unit. Cabins and other possible seasonal dwelling were also counted as one unit.

3.2 Travel Survey

TRC researchers designed a six question survey aimed at collecting basic travel data from residents in the region, including household demographics, mode choice, trip purpose and trip frequency. (See Appendix B for the full list of survey questions). The sample, weighted by town size, included 964 households in the Two-Rivers-Ottauquechee region. To mitigate the low response rates typically associated with mail-back surveys, TRC researchers focused on providing community members with a more personal link to the planning efforts of TRORC, which survey research indicates can improve response rates.[6] The strategy centered on hand-delivering surveys to households in each of the thirty-one towns in the Two-Rivers region. Each survey, accompanied by a letter explaining the purpose of the larger project and the importance of individual input, was placed in a clear plastic sleeve and hung on the door knob of each residence in the sample. After completion, the respondent simply had to place the business-reply survey in the mail.

To increase the manageability of the project, researchers created the sample using the Vermont 9-1-1 GIS database to indentify 964 households on 100 randomly selected blocks in the region. The survey delivery team included a group of eight University of Vermont students who covered over 1400 miles in a series of six trips. In preparation for dissemination, the TRORC submitted a press release to area news sources, in the hopes of further informing residents of the importance of the project. Although this method of hand delivery required significant coordination and monetary resources, a response rate of 25% was reached, greatly exceeding the 10% response rate associated with many mail-back surveys.[7]

Researchers analyzed the data looking for patterns of mode choice and trip destination across several demographic factors. Many of the survey respondents left at least a small portion of the final origin-destination question blank. These occurrences were coded as missing data and excluded from tabulation because it was unclear whether a respondent failed to indicate a town and/or frequency because they had not made that trip in the past week or if they simply chose not to answer the question.

Survey Response Distribution

The sample size for each town was weighted by town population. The response rates among towns were fairly uniform, with the majority hovering between 25% and 20%. There were some anomalies however. Brookfield and Strafford topped the list with rates of return close to 50%. In contrast, Pittsfield and Sharon provided response rates of 8% and 6%, respectively. (See Appendix C for a complete breakdown of sample size and response rates).

4. DATA ANALYSIS

4.1 Housing Data

An examination of the housing data clearly shows slow growth in the region. About 1864 new residential buildings were added in the eight year period between 2000 and 2007. The Town of Hartford, which includes White River Junction, added about ¼ of those buildings, 579. Following Hartford, the next major growth town was Randolph that added 194, followed by Bradford with 110 and Tunbridge with 102. The remaining towns added less than 100 new residential housing over the eight year period or less than 12 new houses a year per town on average. One town, Granville, experienced a net loss of 2 in residences over the eight year period.

4.2 Travel Survey Data

In this section, this report provides the results of the analysis of the survey, including household demographics, mode choice and trip purpose and distribution.

Household Demographics

An analysis of survey responses yielded some unexpected demographic data. A surprisingly large number of households with seniors (35%) responded to the survey whereas very few responses (< 7%) were received from families with young children. Seventy-seven percent of households contained at least one member between the ages of 18 and 64. Figure 2.1 provides a breakdown of age demographics among respondent households. Seniors are defined in this case as older than 65.

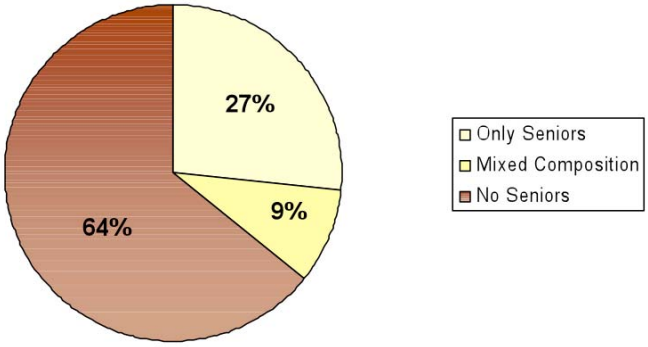

Figure 4-1. Percent of households containing members 65 years and older

The size of respondent households varied considerably. Although most contained two members, 17% of respondents were the sole residents of their home and 24% had three or more family members. The vast majority of families with children were two-parent households, with less than 9% appearing to be single parents.

Although most households included one or two full-time workers, more than one-third (35%) had no full time workers. Not surprisingly, sixty-five percent of these households were

composed solely of seniors. Only 16 households without workers contained neither seniors nor children under the age of 18.

Perhaps the clearest conclusion from this portion of the analysis is the reliance of respondent households on their personal vehicles. Seventy-five percent of those who responded live in a home with two or more drivable cars. Ninety-eight percent of households contained at least one member with a valid drivers' license. Only one household did not own a car and only four lacked a valid drivers' license.

Mode Choice

The survey responses regarding mode choice confirmed the reliance on personal vehicles observed from demographic data. Over 74% of those surveyed had driven a car in the past week. Walking received the second highest rating at 32%. It is unclear however, if respondents were walking for the purpose of reaching a particular destination or simply for recreational purposes. An examination of the characteristics of the 12% of respondents who carpool indicated most to be working families. Only seven households with seniors and nine without full-time workers reported carpooling/getting a ride in the past week. One-third of the nine households reported above were composed solely of seniors. Very few people reported using public transportation. Only 4.5% had ridden a bus in the past week and less than 1% reported utilizing senior/disabled transport. Figure 3.1 provides a complete overview of mode choice among respondent households.

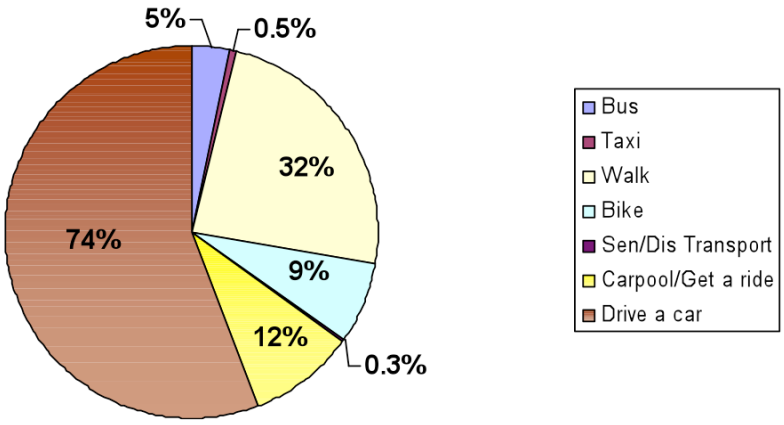

Figure 4-2. Household mode choice

Trip Purpose and Summary

Researchers analyzed survey data for respondent's trip destination, purpose and frequency. The survey indicated a large number of respondents who regularly travel to New Hampshire for shopping and recreation purposes. The most frequent trips were to West Lebanon and Hanover. *Table 2.1* shows the number of households that travel to destinations in their own town, a different town and New Hampshire for each trip purpose. *Figure 4.1* provides an overview of the number of household trips to New Hampshire for each trip purpose.

Table 4-1. Destination summary by town

Destination Summary* Trip Purpose	Same Town	Different Town	New Hampshire
Shopping_Grocery	24	228	146
Shopping_Non-Grocery	12	190	134
Gas	99	169	55
School	22	44	11
Bank	56	138	28
Medical	13	188	83
Religious Service	27	52	10
Friend Visit	50	113	24
Recreation	29	82	29
Out to Eat	21	162	74
Entertainment	8	105	68

** Destinations add up to more than 243 b/c some respondents entered more than 1 town*

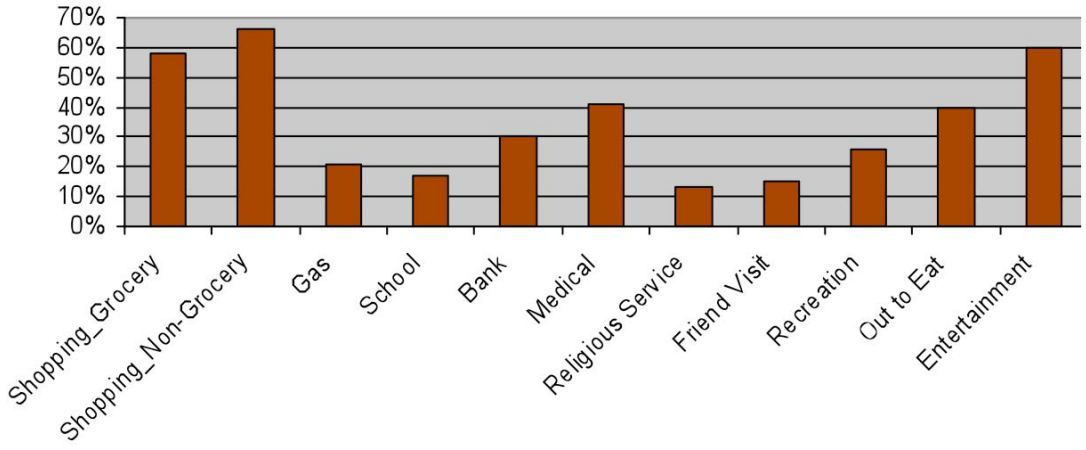

Figure 4-3. Percent of total trips destined for New Hampshire

5.0 Conclusions

New Hampshire is a major draw, not only for recreational purposes, but for other shopping and activities as well. There does not seem to be a large distinction between household composition and destination. Forty percent of senior households and 53% of non-senior households travel to New Hampshire to go grocery shopping. Less than 10% of survey respondents go grocery shopping in their own town, and less than 5% do their non-grocery shopping in their own town.

Although the survey sample size is not big enough to generalize travel patterns for the entire region, it does point to some phenomena documented by researchers in other case studies – the tendency of large retail sites in neighboring towns or, in this case, states, to draw business away from local vendors.

As policy-makers and others consider the ideas of "buying local" this survey indicates the difficulty in fostering that policy when many attractive shopping and recreational activities are located "elsewhere."

The high response rate (25%) also underscores the success of the unusual approach taken by the research team. Hand-delivering a survey to randomly selected houses in a large geographical region is time-consuming and travel-intensive but clearly effective in terms of generating a large response rate while meeting random sampling objectives.

Further Research

Researchers at the TRC are combining this dataset using Geographic Information Systems (GIS) with data describing grocery stores, medical offices and gas stations. An activity-based choice model will be developed to describe which town or household factors affect the probability of people undertaking different activities in their own town or at certain distances away from home. Researchers will also examine the consistency between location for different activities, in other words whether people undertake most of their activities in a single location or across dispersed geographies.

Appendix A: Town Housing Data

Year	Number of Permits Issued/Estimated New Dwelling Units	Notes	
	Barnard	No Data Available from 2000 to 2004	
2000			
2005	13		
2006	7		
2007	5	Includes 1 camp	
Total	25	Source: Town Clerks Office Permit Log	25
	Bethel		
2000	5		
2001	5		
2002	5		
2003	9		
2004	5		
2005	12		
2006	15		
2007	9		
Total	65	Source: Abbie Sherman Administrative Assistant Bethel Town Manager's Office (She gathered and emailed me this information from the town Permit Log)	65
	Bradford		
2000	14		
2001	6		
2002	13		
2003	15	Includes 1 Apt.	
2004	16		
2005	35		
2006	15	Includes 1 Apt.	
2007	11		
Total	110	Source: Town Clerks Office Permit Log	110
	Braintree	Not available	
	Bridgewater		
2000	6		
2001	3		
2002	5		
2003	6		
2004	4		
2005	2		
2006	6		
2007	4		
Total	36		36

	Brookfield	apartments camps and cabins included in total	
2000	15		
2001	4	1 apartment)	
2002	11		
2003	6		
2004	5	(1 seasonal cabin and 1 camp)	
2005	10	(1 camp, 1 cabin, 1 apartment)	
2006	6	1 camp & 4 listings were unclear and not tallied but could be new homes	
2007	3	1 camp and 1 cabin)	
Total	60	Source: Town Clerks Office Permit Log	60
	Chelsea	camps, cabins and apartments included in totals	
2000	8	1 camp	
2001	13	1 camp, 2 cabins	
2002	12	2 camps, 1 cabin	
2003	9	2 camps, 1 apt	
2004	11	1 cabin	
2005	10	1 camp, 1 cabin	
2006	5	2 cabins	
2007	6	2 cabins	
total	74	Source: Town Clerks Office Permit Log	74
	Corinth		
2000	1		
2001	5		
2002	24		
2003	0		
2004	8		
2005	6		
2006	-6		
2007	8		
Total	46	Source: Peter Keene totaled the numbers of taxable housing parcels on the Grandlist and sent them to me, I subtracted 1999 from 2000 etc.	46
	Fairlee		
2000	9	1 camp	
2001	7		
2002	10		
2003	11		
2004	4		
2005	6		
2006	2	1 camp	
2007	3		
Total	52	Source: Town Clerks Office Permit Log	52
	Granville		
2000	-1		

2001	4		
2002	2		
2003	-11		
2004	1		
2005	1		
2006	3		
2007	-1		
Total	-2	Source: Town Clerks Office Grandlists (I added the total taxable housing parcels and subtracted 1999 from 2000, etc.)	-2
	Hancock	No Zoning, I have scatttered information from the Grandlists but they were missing summaries for 99 2000 01 and 06	
	Hartford		
2000	24		
2001	43		
2002	138		
2003	78		
2004	120		
2005	94		
2006	41		
2007	41		
Total	579	Source: Town Clerks Office Permit Log (Pete Two Rivers)	579
	Hartland	No Data available	
	Newbury	Obtained a coded list that does not provide the needed data	
	Norwich		
2000	17		
2001	14		
2002	9		
2003	6		
2004	11		
2005	10		
2006	11		
2007	17	1 five unit multi-familyincluded in total	
Total	95	Source: Town Clerks Office Permit Log	95
	Pittsfield	No Zoning Grandlists Didn't Show Summary, Lister said I could dig through their files, but this would consume quite a bit of time	
	Plymouth		
2000		No Data from 2000 to 2002	
2003	5		
2004	18		
2005	16	1 was a condo building	
2006	14	1 cabin and 2 apts	
2007	8	1 cabin and 1 camp	

Total	61	Source: Town Clerks Office Permit Log	61
	Pomfret		
2000	3	1 apt	
2001	7	1 cabin	
2002	8	2 apts	
2003	7		
2004	9	2 apts	
2005	7	1 yurt	
2006	3	1 apt	
2007	5		
Total	49	Source: Town Clerks Office Permit Log	49
	Randolph	apartments and camps included in total. apartment often included conversions of houses	
2000	17	1 camp and 1 apt	
2001	31	8 apts,	
2002	17	1 apt, also included in total were 4 8 unit family (condos) as 4	
2003	25	2 apts also included in total was 1 8 unit townhouse	
2004	39	13 apts, also included 5 duplexes PRD - I am not sure what this means?	
2005	27	2 apts, also included in total a 9 unit apt. building and 3 4 duplexes PRD listings) - as 4	
2006	27	2 camps, 4 apts, also included in total 1 9 unit multi family as 1	
2007	11	3 apts, also not included in total 1 9 unit multi family	
Total	194	Source: Town Clerks Office Permit Log	194
	Rochester	camps cabins and apts included in totals	
2000	10	2 camps, 1 cabin	
2001	5	1 camp	
2002	7		
2003	7	1 cabin, a camp, 1 apt, and 1 (as 1) house changed into an 8 unit apt building	
2004	3		
2005	8	1 camp, and 1 multi family building	
2006	9	1 camp, 1 cabin	
2007	3		
Total	52	Source: Town Clerks Office Permit Log	52
	Royalton		
2000	19		
2001	10		
2002	9		
2003	10		
2004	11		
2005	3		
2006	5		

2007	11		
Total	78	Source: Town Clerks Office Grandlists (I added the total taxable housing parcels and subtracted 1999 from 2000, etc.)	78
	Sharon	Visited, Town Clerks had nothing to offer and listers were not in	
	Stockbridge		
2000	2		
2001	4		
2002	9		
2003	11		
2004	4		
2005	11		
2006	12		
2007	5		
total	58	Source: Town Clerks Office Permit Log	58
	Strafford		
2000	10	1 apt	
2001	8		
2002		permits don't show use	
2003	6		
2004		permits log missing	
2005		permits don’t show use for 2005-2007	
Total	24	Source: Town Clerks Office Permitting Log and Pete at Two Rivers Said he could fill in the rest	24
	Thetford	Obtained a coded list that does not provide the needed data	
	Topsham	No Data available	
	Tunbridge	camps cabins included in total count	
2000	14	1 camp	
2001	10	1 camp	
2002	6		
2003	14		
2004	19	2 camps	
2005	12		
2006	16		
2007	11	2 camps	
Total	102	Source: Mass Appraisel Spreadsheet showing new homes built since 2000 for each year	102
	Vershire		
2000	3		
2001	2		
2002	1		
2003	9		
2004	13		
2005	1		
2006	4		

2007		no info	
Total	33	Source: Town Clerks Office Grandlist (There was no permit log, thus I added up all the taxable housing parcels for each year and subtracted 1999 from 2000 to get the 2000 number of new homes, etc.)	33
	West Fairlee	Closed on both visits	
	Woodstock		
2000	7		
2001	10	1 cabin, 1 apt	
2002	8	1 cabin	
2003	8		
2004	12		
2005	8	1 apt	
2006	12		
2007	8		
Total	73	Source: Town Clerks Office Permit Log (Pete Two Rivers)	73
		Total All	1864
		Divided by 8 years (2000-2007)	233

Appendix B: Survey Questions

Two Rivers-Ottauquechee Regional Commission
Transportation Survey

1. How many people live in your household?
(The number of people living together and sharing household expenses)

Age	# of people
5 years or younger	
6 to 17 years	
18 to 64 years	
65 years or older	

2. How many members of your household, including yourself, work full-time outside the home? .

_____0 _____1 _____2 _____3 or more

3. How many *drivable* cars, vans and trucks are kept at home for use by members of your household?

_____0 _____1 _____2 _____3 or more

4. How many members of your household, including yourself, have a valid driver's license?

_____0 _____1 _____2 _____3 or more

5. Which household members, over the age of 18, have used the following forms of transportation in the *past week*? *Use check marks.*

Transportation Type	Yourself	Household Member 2	Household Member 3	Household Member 4
Bus				
Taxi				
Walk				
Bike				
Senior/Disabled Van				
Carpool/ Get a ride				
Drive a car				

6. Please tell us about your *most recent non-work trip* in each of the following categories.
Include trips in which you were giving a ride to someone doing these activities.

Trip type	What town did you travel to, to get to this place or activity? *If outside of Vermont, please include state.*	How many times do you make this type of trip? *Enter 0 if not applicable.*
Shopping (grocery)		___ # per week, *or* ___ # per month
Shopping (non-grocery)		___ # per week, *or* ___ # per month
Gas station		___ # per week, *or* ___ # per month
School (where you or household member are a student)		___ # per week, *or* ___ # per month
Bank or other financial service		___ # per week, *or* ___ # per month
Medical/dental appt.		___ # per week, *or* ___ # per month
Religious service		___ # per week, *or* ___ # per month
Visit a friend's home		___ # per week, *or* ___ # per month
Recreation (gym, park, hike, etc)		___ # per week, *or* ___ # per month
Going out to eat		___ # per week, *or* ___ # per month
Entertainment (movies, play, concert, etc)		___ # per week, *or* ___ # per month

Appendix C: Survey Response Rates

Response Distribution

Town	Frequency	Percent of Responses	Size of Sample	Population	% of Population Sampled
Barnard	7	2.9	37	961	3.8
Bethel	10	4.1	43	1,940	2.2
Bradford	12	4.9	49	2,667	1.8
Braintree	7	2.9	23	1,235	1.7
Bridgewater	3	1.2	16	926	1.7
Brookfield	9	3.7	19	1,245	1.5
Chelsea	8	3.3	21	1,234	1.7
Corinth	9	3.7	33	1,458	2.2
Fairlee	3	1.2	15	1,008	1.5
Granville	1	0.4	3	287	1.0
Hancock	4	1.6	12	363	3.3
Hartford	42	17.3	174	10,700	1.6
Hartland	11	4.5	64	3,059	2.0
Newbury	11	4.5	35	2,158	1.6
Norwich	18	7.4	62	3,508	2.6
Pittsfield	1	0.4	13	419	3.1
Plymouth	4	1.6	27	572	4.7
Pomfret	1	0.4	10	965	1.0
Randolph	12	4.9	40	5,045	0.8
Rochester	5	2.1	23	1,135	2.0
Royalton	5	2.1	20	2,465	0.8
Sharon	1	0.4	17	1,346	1.3
Stockbridge	8	3.3	25	685	3.6
Strafford	10	4.1	21	1,084	1.9
Thetford	15	6.2	47	2,779	1.7
Topsham	8	3.3	32	1,139	2.8
Tunbridge	3	1.2	15	1,305	1.1
Vershire	1	0.4	7	628	1.1
W Fairlee	2	0.8	7	726	1.0
Woodstock	12	4.9	54	3,143	
Total	**243**	**100**			

Based on July 2007 population estimates from Center for Rural Studies - Vermont state data center of U.S. Census Bureau

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