

TECHNICAL REPORT

SHORT-TERM RENTALS IN NEW HAMPSHIRE:

AN ANALYSIS OF DATA FROM 2014 - 2023

OCTOBER 2023



NEW HAMPSHIRE HOUSING TECHNICAL REPORT

SHORT-TERM RENTALS IN NEW HAMPSHIRE: AN ANALYSIS OF DATA FROM 2014 - 2023

OCTOBER 2023

TABLE OF CONTENTS

Executive Summary	iii
Background	1
Data Sources	2
Methodologies	3
Analysis and Results	8
Snapshot of Short-Term Rentals	8
By Property Location.....	8
By Host Location.....	16
Regression Analysis.....	30
Appendices	
Appendix I: Property and Host Location Visualizations	35
Appendix II: County-Level Regression Analysis.....	57
Bibliography	62

PREPARED BY NEW HAMPSHIRE HOUSING

ELIJAH CZYSZ—Principal Researcher & Writer

HEATHER MCCANN—Senior Director,
Research, Engagement, and Policy

BEN FROST—Deputy Executive Director
& Chief Legal Officer

BOARD OF DIRECTORS

CHRIS NORWOOD—Portsmouth, Chair
SARAH MARCHANT—Brookline, Vice Chair
DEREK FERLAND—Claremont
DONNA MARSH—Stratham
TRICIA MORIN—Hopkinton
ANTHONY POORE—Manchester
MICHAEL SCALA—Rochester
MICHAEL SKELTON—Bedford
EVELYN WHELTON—Madison
ROB DAPICE—Executive Director/CEO



PO Box 5087, Manchester, NH 03108
603.472.8623 · info@nhhfa.org
NHHousing.org

EXECUTIVE SUMMARY

With the growth in popularity of short-term rentals (STRs) offered online by companies such as Airbnb and Vrbo, community concerns about their impact also have grown over the past 10 years. These concerns include their effect on the availability of long-term rentals, disruptions to neighborhoods by those staying in STRs, and long-distance or absentee hosts. To better understand these issues, NH Housing used AirDNA data from 2014 - 2023 to examine the relative proximity of hosts to their properties and the impact of short-term rentals on housing availability in New Hampshire communities.

DATA AND METHODS

The study referenced three sources of data to examine both the short-term rental market and its impact on the overall housing market. In April 2022, NH Housing acquired the use of data from AirDNA, a provider of data and analytics from Vrbo and Airbnb. This diverse set of metrics provided a comprehensive picture of the short-term rental market. The second data source used in this study is NH Housing's annual Residential Rental Cost Survey. The rent survey reports provided high-quality data on the state's rental market. The third source of data was the U.S. Census Bureau's American Community Survey, which provided insight into every aspect of the analysis, from the STR market to the overall housing market.

This study focused on data from 2014, 2021 and 2023. Any metric using demographic data referenced only the time frames of 2014 and 2021. This is because the most recent release of American Community Survey five-year estimates was in 2021. The year 2014 was used because it is the first year of the acquired AirDNA data.

Regression analysis was used as a way of mathematically evaluating the relationship between the prevalence of short term rentals in a given area and various indicators of the housing market in that same area.

LIMITATIONS

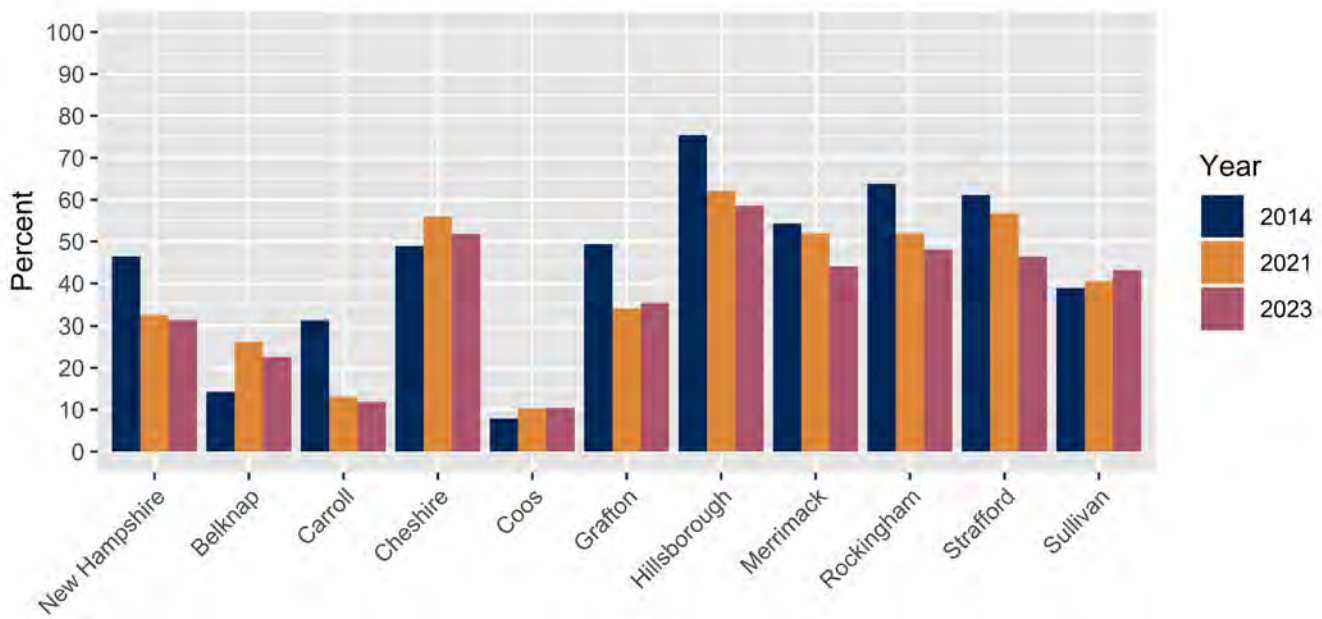
There are three major sources of uncertainty in this study. Firstly, some municipalities are not large enough to have reliable statistics from the ACS. When one variable is missing, the whole municipality is excluded from the regression calculation and visualizations.

The second limitation comes from the primary residence location of hosts. A significant minority of hosts do not list where they are from. Thus, this study assumes that the unknown locations of hosts follow the same distribution of known locations and that the percentage of hosts listing inaccurate primary residences is negligible.

The third limitation is found in the differentiation between investment properties and secondary residences. Two factors could result in misclassification: (1) a host could list one property under multiple listings and (2) some hosts may not accurately block off all the time they are spending at their property by manually accepting or declining requests, instead of pre-blocking dates. These two practices would interfere with the study's method of categorizing properties. Therefore, it is possible that the share of properties that are investments, rather than secondary residences, could be lower than these data indicate. Determining the degree to which this is true was not possible within the scope of this analysis.

The study is primarily useful for making policy at the state or regional levels. On the local level, the short-term rental market ranges substantially from community to community.

FIGURE 1 • Percent of STR Units Owned by Hosts Living in the Same Municipality



HOW LOCAL ARE STR HOSTS?

From loud gatherings to improper trash disposal, community members have expressed concern that hosts aren't local enough to respond to problems on STR properties. The study found that it is rare for hosts to live on the same premises as the guest. Whether the guest is staying in a guest room or elsewhere on the same property, only 1.4% of hosts live on premises. However, it is common for hosts to live in the same municipality as their STR property. Almost one-third (31.3%) of STRs statewide are owned by hosts who live in the same municipality as the property. This percentage is far lower in Belknap (22.6%), Carroll (11.9%), and Coos (10.4%) counties (*Figure 1*).

Forty-six percent of STR properties in New Hampshire are owned by hosts who live in the same county as their property. In this case, only Carroll (31.6%) and Coos (21.5%) counties are well below the statewide average.

Expanding on this, 56.4% of STRs in New Hampshire are owned by NH-based hosts and 78.3% are owned by New England-based hosts (*Figure 2, Figure 3*).

ARE INTERNATIONAL INVESTORS BUYING UP LARGE NUMBERS OF STRS?

Related to concerns about the “localness” of hosts and absentee owners, *Figure 4* shows that there are few international investors in New Hampshire STRs.

Among New Hampshire STRs, 96.3% are owned by U.S.-based hosts (*Figure 4*). Furthermore, 98.7% of the revenue generated by New Hampshire STRs went to U.S.-based hosts.

FIGURE 2 • Percent of STR Units Owned by Hosts Living in New Hampshire

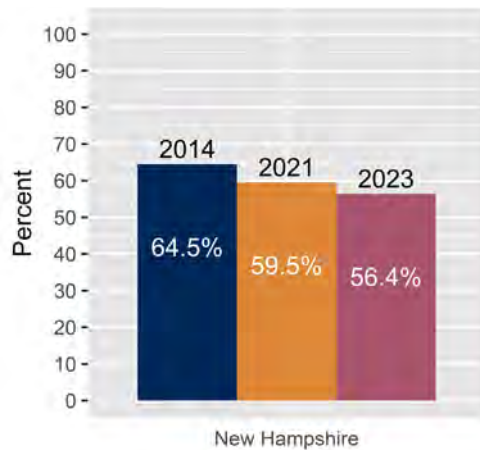


FIGURE 3 • Percent of STR Units Owned by Hosts Living in New England

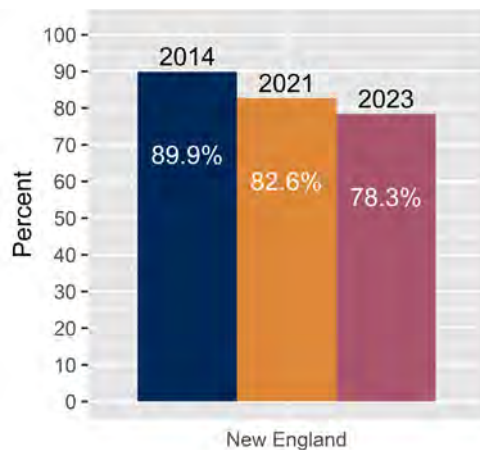
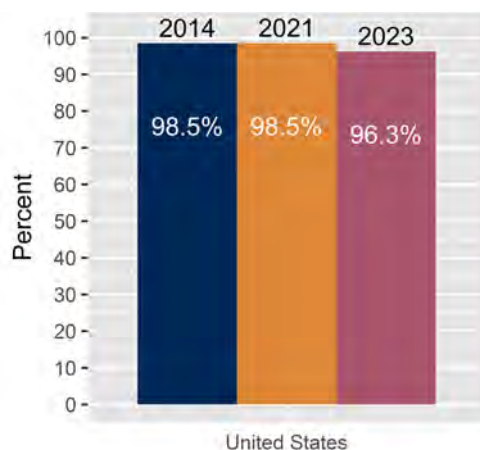


FIGURE 4 • Percent of STR Units Owned by U.S.-based Hosts



MEASURING THE IMPACT OF STRS

The most important claims to evaluate were that the rise of online short-term rentals has caused rents to increase and vacancy rates to decrease.

To test these claims, regression analysis was used to compare the increase in STRs to changes in median rents and vacancy rates between 2014 and 2021. Conclusions are limited to the time period indicated and may not predict future changes.

Impact on Median Rents. The study found that it was highly unlikely that changes in short-term rentals were related to the rise in median rents seen from 2014 to 2021. This was the case for two different sources of median rent data – both New Hampshire Housing’s Residential Rental Cost Survey and the American Community Survey.

Using regression analysis, no relationship was found between an increase in short-term rentals and median rent. Further, the analysis was performed for the state overall and in each county individually, and no relationship was found in any case.

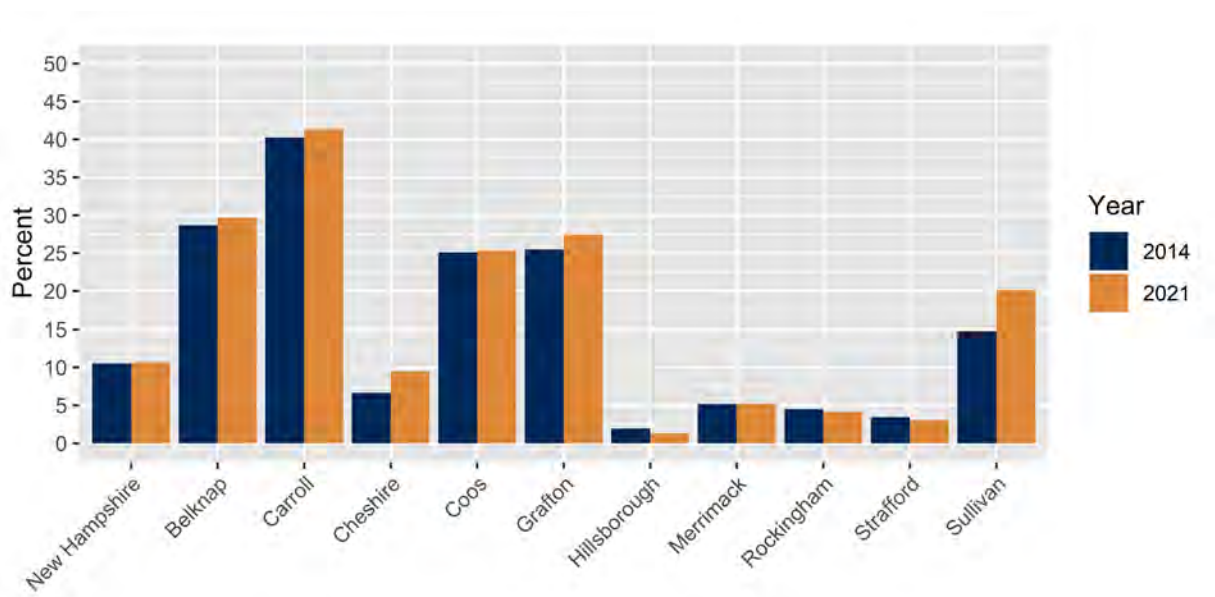
Impact on Vacancy Rates. The analysis found that short-term rentals did influence vacancy rates. Roughly 14% to 23% of the decrease in rental vacancy rates from 2014 to 2021 can be attributed to an increase in STRs over that period.

That range comes from R-squared scores from two regression analyses. Both used the same dependent variable – the percent change in vacancy rate – but two different independent variables that both represent the increase in STRs. The first was the change in STRs as a share of total housing units. The second was the change in STRs per 1,000 people.

Put in context, that means that according to one metric, STRs explained 14% of the decrease in vacancy rates, and according to the other, STRs explained 23% of the change in vacancy rates.

Therefore, it is reasonable to conclude that the increase in online STRs resulted in a decrease in vacancy rates between 2014 and 2021.

FIGURE 5 • Share of Housing Units for Recreational or Seasonal Use



WHAT'S THE SOURCE OF NEW STRS?

The question of where new STRs come from relates strongly to their purported impact on long-term housing inventory. Some claim that the increase of online STRs on platforms like Airbnb or Vrbo is simply the result of existing short-term rentals and seasonal second homes being listed on a consolidated platform. This claim suggests that short-term rentals already constituted a significant portion of New Hampshire's housing market and people are taking greater notice now that they are marketed through easily accessible online platforms.

A different claim is that the increase in online STRs comes from the conversion of long-term rental housing. Given the results of regression analysis of rental vacancy rates, one might assume that this is, in fact, the case.

However, from 2014 to 2021, the share of all housing units in the state classified as seasonal, recreational or occasional use (SROs) by the U.S. Census Bureau has remained roughly the same. Other than Sullivan County, no New Hampshire county has seen more than a 2% increase in the share of units that are SROs (*Figure 5*).

In summary, the majority of properties listed on Airbnb, Vrbo, and similar sites were already short-term rentals or seasonal units. However, a small number of STRs statewide come from the long-term rental stock, and this may impact some communities more than others.

CONCLUSIONS

This study makes the following findings:

- Almost half of STRs statewide were owned by hosts who lived in the same county as the property and one-third lived in the same town, though this varied widely from place to place.
- There have been no widespread acquisitions and conversions of properties to STRs by foreign investors.
- The increase in STRs was not found to have had a statistically significant effect on statewide median rent levels.
- STRs have had a minor but statistically significant impact on the statewide rental vacancy rate.
- The majority of properties listed on Airbnb, Vrbo, and similar sites were already short-term rentals or seasonal units.

Because these findings are based on an analysis of data collected over the past decade, they may not be predictive of the impact of STRs on New Hampshire's housing market in the coming years.

Background

Tourism is a vital part of New Hampshire's economy. Over the past decade, websites that allow tourists to easily book a stay at a short-term rental (STR) have brought increased visibility to this segment of the housing market. The two most-cited concerns about STRs are (1) their impact on long-term housing availability, and (2) their impact on communities and quality of life, as well as the proximity of property hosts.

Regarding the first concern, a housing crisis has been building in New Hampshire for more than a decade. According to NH Housing's *2023 Residential Rental Cost Survey Report*, the statewide 2-bedroom vacancy rate is 0.6%, significantly below the 5% considered to be a healthy rental market.¹ In the *2023 Statewide Housing Needs Assessment*, it is estimated that the state needs 23,500 additional units to stabilize the current housing market, and nearly 60,000 units of rental and for-sale homes between 2020 and 2030.²

It has been claimed that online STRs have "a serious impact on the availability of long-term rentals in a community."³ The premise is that long-term rental properties are bought by investors and converted into short-term rentals, which would deflate vacancy rates and, potentially, increase rent in the remaining long-term rentals. Therefore, along with a variety of supplemental metrics, this study analyzes the degree to which short-term rentals affect both median rent and vacancy rates.

The counterargument to this is the suggestion that most short-term rentals we see on sites like Airbnb and Vrbo were already being used seasonally or as a privately marketed short-term rental and were not long-term rentals. In opposition to the 2022 Senate Bill 249, a group of officials from seven NH municipalities published a letter to the editor of the NH Business Review claiming that recent investments in short-term rentals influence the affordable housing stock in their communities. In their letter they said STR supporters claim that "short-term rental properties and residential housing exist in 'two different markets.' But in popular tourist destinations like ours, we have seen properties that once housed residents become, not surprisingly, more attractive as income-generating businesses."⁴ In response to these kinds of concerns, this study also aims to answer the following question: does the increase in online STRs pull from the pre-existing seasonal, recreational, and occasional use stock, or from previously long-term rental stock?

Related to the second concern about STRs, at a 2020 state legislative hearing, a senator noted that an influx of visitors staying at STRs could change the atmosphere of a neighborhood and another acknowledged questions around the "peace and quiet" of neighborhoods.⁵ At the same hearing, a local elected official expressed unease about STR tenants disposing of garbage properly. Rules proposed in Gilford in 2023 addressed similar problems, cracking down on large

¹ "New Hampshire 2023 Residential Rental Cost Survey Report." New Hampshire Housing Finance Authority. <https://www.nhhfa.org/wp-content/uploads/2023/07/NHH-2023-Res-Rental-Survey-Report.pdf>

² "2023 New Hampshire Statewide Housing Needs Assessment." New Hampshire Housing Finance Authority. <https://www.nhhfa.org/wp-content/uploads/2023/04/2023-NH-Statewide-Housing-Needs-Assessment.pdf>.

³ "Legislative Committee Minutes SB458." The General Court of New Hampshire. January 30, 2020. https://gencourt.state.nh.us/BillHistory/SofS_Archives/2020/senate/SB458S.pdf.

⁴ Officials of several municipalities in New Hampshire. "Opinion: Proposed State Mandate on Short-term Rentals Is Not Right for New Hampshire." New Hampshire Business Review, February 13, 2022.

⁵ "Legislative Committee Minutes SB458." The General Court of New Hampshire. January 30, 2020. https://gencourt.state.nh.us/BillHistory/SofS_Archives/2020/senate/SB458S.pdf.

groups of guests and setting a curfew. According to the *Laconia Daily Sun*, Gilford’s planning director said, “We don’t have a problem with every short-term rental, mostly with absentee landlords.”⁶ In an effort to look at the impact of these issues, this study looked at where hosts live, to determine the degree to which landlords could be absent and potentially unaware of the condition or disruptive use of their property.

Data Sources

This report uses three sources of data to understand both the short-term rental market and the overall housing market. In April 2022, NH Housing acquired data from AirDNA. This diverse set of metrics provides a comprehensive picture of the short-term rental market. The second data source used in this study is collected, compiled and distributed by NH Housing itself – the annual Residential Rental Cost Survey (Rental Survey). The Rental Survey provided quality data regarding New Hampshire’s rental market. The third source of data was the U.S. Census Bureau’s American Community Survey, which provided insight into every aspect of this study, from the STR market to the overall housing market.

AirDNA

AirDNA is a company that compiles data and conducts analysis on the short-term rental market. Typically, it markets itself to “hosts, investors and businesses” so they can make data-based choices on price, location, and marketing. New Hampshire Housing purchased and adapted AirDNA’s product to provide information on the STR market for the purposes of both understanding details of the industry previously unavailable to the public and analyzing its effects on our communities. AirDNA acquires this data by “scraping” publicly available information from Airbnb and Vrbo.⁷

Two separate datasets from AirDNA are used in this study: one on property performance and one on hosts. The first set, on Airbnb and Vrbo properties, offer a plethora of information on each property in New Hampshire. From that, this study used property location, Host ID, Property ID, property type, the first month the property was listed, the last month it was listed, the revenue accrued, the number of days the property is available for booking, the number of days blocked off from booking, and whether or not the property is currently active online. The second set provides the data on each individual host of Airbnb and Vrbo properties. From this, the study uses the host’s ID, the location of their primary residence, and the number of their listings. The common variable of Host ID enables the matching of Host information to each of their properties.

New Hampshire Housing Rental Survey

New Hampshire Housing has conducted an annual Residential Rental Cost Survey since 1980. NH Housing, through its partners at the University of New Hampshire and K. Kirkwood Consulting, each year collects data on about 20,000 market-rate rental housing units across the state.⁸ This study uses the survey’s median rent and vacancy rate for municipalities, counties, and the state.

⁶ McLaughlin, Catherine. "Short-term Rentals: Towns Take up Regulation, for a Variety of Reasons." *The Laconia Daily Sun*, February 10, 2023. https://www.laconiadailysun.com/news/local/short-term-rentals-towns-take-up-regulation-for-a-variety-of-reasons/article_63178656-a8b6-11ed-8432-0b0a2c837098.html.

⁷ “About.” AirDNA. <https://www.airdna.co/about>.

⁸ "New Hampshire 2022 Residential Rental Cost Survey Report." New Hampshire Housing Finance Authority. <https://www.nhhfa.org/wp-content/uploads/2022/08/NHHousing-2022-Rental-Cost-Report.pdf>.

American Community Survey

The American Community Survey (ACS) has been administered by the U.S. Census Bureau since 2005.⁹ This study uses ACS 5-year estimates from 2014 and 2021 to measure median rent, vacancy rates, population, the number of housing units, and the number of those units that were classified as seasonal, recreational or occasional use.

Methodologies

Cleaning Data

The first step in this study was to clean each data set. ACS and NH Housing Rental Survey data required little to no cleaning. Cleaning the AirDNA data was far more complicated. The main source of problems was in the host file and its information on the host's primary residence. The first step was to summarize the 'State' variable to see a list of the unique state names, which was the best way to identify errors in the data. Often a country or municipality name was in the 'State' column by accident. The same process was repeated on the 'Country' and 'City' variables. Additional manual cleaning was done on the major players in the STR market. To fill in the most missing data in the most efficient way, the hosts with the most listings were manually searched for to fill in missing information on the location of their primary residence or corporate headquarters.

Calculations of Metrics

Data from three years were studied – 2014, 2021 and 2023. Any metric using demographic data only used the data from 2014 and 2021. The cause of this limitation is the American Community Survey. The most recent release of 5-year estimates from the ACS was in 2021. The year 2014 was used because it is the first year of the acquired AirDNA data. Airbnb was founded in 2007,¹⁰ Vrbo was founded in 1995,¹¹ and HomeAway was founded in 2005¹² (it purchased Vrbo in 2006 and rebranded as Vrbo).¹³ However, an analysis of properties per capita shows that, compared to today, 2014's online STR market was still small. The method to determine if a property should be included in the snapshot of the 2014 data is based on the 'FirstMonth' and 'LastMonth' variables. The range from the first month the property was listed on a site to the last month provides the window of activity for the property. Therefore, if a property's first month was in or before 2014 and its last month was in or after 2014, this study considered it to be 'active' in 2014. The same process applied to 2021. The data from 2023 operated somewhat differently. Instead of looking at properties active at any point in 2023, this study only includes properties that were listed as 'Active' as of the last scrape of the data. In this case, that was in April 2023. This means that the 2023 data are more of a 'present day' snapshot. All the following calculations of metrics are performed iteratively for each year.

⁹ "History: American Community Survey." U.S. Census Bureau.

https://www.census.gov/history/www/programs/demographic/american_community_survey.html.

¹⁰ "About Us." Airbnb. <https://news.Airbnb.com/about-us/#:~:text=Airbnb%20was%20born%20in%202007,every%20country%20across%20the%20globe>.

¹¹ Minor, Nathaniel. "Short-Term Vacation Rentals, A Colorado Invention, Are Under The Gun In Denver." Colorado Public Radio, May 16, 2016. <https://www.cpr.org/2016/05/16/short-term-vacation-rentals-a-colorado-invention-are-under-the-gun-in-denver/>

¹² Garnick, Coral. "Expedia buys HomeAway for \$3.9 billion." The Seattle Times, November 4, 2015. <https://www.seattletimes.com/business/expedia-buys-homeaway-for-39-billion/>.

¹³ Hawkins, Lori. "Goodbye HomeAway, hello Vrbo." Austin American Statesman, May 3, 2019. <https://www.statesman.com/story/business/technology/2019/05/03/homeaway-worlds-largest-vacation-rental-site-is-rebranding-itself-as-Vrbo/5262745007/>.

In terms of metrics based solely on the combined property and host data, this study sums the count of properties and sub-counts based on property types. The percent of properties belonging to each property type is calculated based on these counts. These types are broken down as traditional bed and breakfasts, hotels or resorts, properties with the host living on premises, investment properties and second homes. The classification of a property as an 'investment' is based on the IRS definition of an investment property (occupied by the owner for less than ten percent of the year).¹⁴ AirDNA does not provide data on how much the owner of the property occupies their property. However, it provides information on how many days of the month, and therefore of the year, are blocked off from booking. This study assumes that only 75% of those blocked off days are days in which the host is occupying their own property. Furthermore, properties owned by hosts who own more than one property are automatically classified as investments. Therefore, for a property to qualify as a second home, the host must own only one property and they must occupy it for at least 10% of the year. All other properties that are not bed and breakfasts, hotels, resorts, second homes or on the host's own premises are classified as 'investments.' In addition to tabulating counts and percentages based on the property type, this study also measures the percentage of STR revenue that is attributable to each type.

The next set of variables based solely on the property and host files compared the location of properties in relation to the location of the hosts' primary residence or corporate headquarters. This study tabulated the count and percentage of units owned by North American hosts, international hosts, U.S.-based hosts, New England hosts, New Hampshire hosts, hosts from the same county, and hosts from the same municipality. Just like the summaries based on property type, this study also measures the percent of STR revenue that went to each geography. Percentages in this case are based on the set of properties for which there was geographic data. To understand the extent of unknown geographic information, this study also calculates the percentage of units with unknown country, state, and municipality data. Continuing the same process used on the previous tabulations, the percentage of revenue attributable to these properties with unknown geographic data was found.

The host file itself provided its own set of unique metrics. Grouping by country, state, county, and municipality, this study finds the count of hosts in each geography as well as total revenue, average revenue per host, median revenue per host, maximum revenue per host, average monthly revenue per host, median monthly revenue per host, and average and maximum number of months active on Airbnb or Vrbo per host. Additionally, this study calculated the median, average, and maximum number of properties owned by hosts in each geography. Finally, the percentage of units falling under each property type were found by the geography of the properties' owners.

Most of the metrics used in regression analysis are a combination of AirDNA data and demographic data from the ACS or the NH Housing Rental Survey. Per capita variables were the first to be calculated for both total properties and by each property type. To give a more accessible statistic, per capita variables are measured as properties per one thousand people, which gives single to double digit numbers. However, the next set of per capita metrics, based on revenue, is set to dollars per single resident. These revenue statistics are based on the geographic relational data, including revenue attributable to properties owned by hosts living in

¹⁴ Alt, Asher. "Questions you're asking: What is considered a second home for tax purposes?" Wells Fargo, January 13, 2023. <https://lifescapes.wellsfargoadvisors.com/questions-tax-definition-second-home/>

the same municipality, same county, New Hampshire, or New England, respectively. Using data on the count of total housing units by geography from the ACS, this study looks at the percentage of housing units that are online STRs by dividing the number of STR properties from AirDNA by the total number of housing units from the ACS. The next derivation was to find the share of units defined by the ACS as Seasonal, Recreational or Occasional Use (SRO) that are online STRs.

The last set of metrics required very little calculation and were typically pulled directly from the ACS or NH Housing Rental Survey. The ACS metrics that required no additional manipulation were the count of total housing units, count of total SROs, and median rent. The first set of ACS metrics that required calculations was vacancy rates. The overall vacancy rate was formed by adding the count of units for sale and units for rent divided by the sum of all units for sale, for rent and occupied. Rental vacancy rate was calculated as total units for rent divided by the sum of all units for rent and all units occupied by renters. Similarly, for owner vacancy rate, total units for sale was divided by the sum of total units for sale and total units occupied by owners. The percentage of units for SRO was a simple division of total SROs divided by total housing units. For regression analysis, the percent change from 2014 to 2021 was found, which normalized the data for the comparison of a diverse set of counties and municipalities. This study only used two metrics from the NH Housing Rental Survey: median rent and rental vacancy rates. These two metrics were pulled directly and without modification. Then, the percent change from 2014 to 2021 was found for both.

Limitations

There are three major sources of uncertainty in this study. Firstly, some municipalities are not large enough to have reliable statistics from the ACS. When one variable is missing, the whole municipality is excluded from the regression calculation and visualizations. The second limitation comes from the primary residence location of hosts. A significant minority of hosts do not list where they are from. Thus, this study assumes that the unknown locations of hosts follow the same distribution of known locations and that the percentage of hosts listing inaccurate primary residences is negligible.

The third limitation is found in the differentiation between investment properties and secondary residences. Two factors could result in misclassification: (1) a host could list one property under multiple listings and (2) some hosts may not accurately block off all the time they are spending at their property by manually accepting or declining requests, instead of pre-blocking dates. These two practices would interfere with the study's method of categorizing properties. Therefore, it is possible that the share of properties that are investments, rather than secondary residences, could be inflated. However, it is impossible to know if this is the case, let alone the scale of the impact.

Information about the primary residence location of host comes from scraping the AirDNA 'Lives in' section of a host's user profile. This method runs into problems because the act of listing where they live (or, in the case of corporations, where they are headquartered) is purely voluntary. Therefore, a significant minority of hosts do not list where they are from. Additionally, there is very little that AirDNA can do to verify the accuracy of the 'Lives in' section in the same way they can verify the location of a property. Thus, this study must assume that the unknown locations of hosts follow the same distribution of known locations and that the percentage of hosts listing inaccurate primary residences is negligible.

There also is a challenge in differentiating between investment properties and secondary residences. The first area that could potentially introduce error into the data is the listing of one

property under multiple listings. For example, someone may rent out a room in their apartment year-round, but also list their entire apartment a few weeks out of the year, when they are away. In this case, the first listing, the single room, would be categorized as being 'on the host's premises.' However, the second listing would be classified as an 'investment property' because the host has more than one listing to their name. The second area that could introduce misclassification is the use of the 'blocking days' feature of a listing. This study uses the number of days 'blocked,' meaning that the property is unavailable for booking, to estimate the amount of time that the host spends at their own property. However, some hosts may not accurately block off all the time they are spending at their property. It is possible to, instead of pre-blocking dates, manually accept or decline requests to stay at a property. Therefore, properties that appear to be unoccupied by their hosts for the entire year may actually be secondary or even primary residences. Consequently, it is possible that the share of properties that are investments, rather than secondary residences, could be erroneously inflated. However, it is impossible to know if this is the case, let alone the scale of the impact.

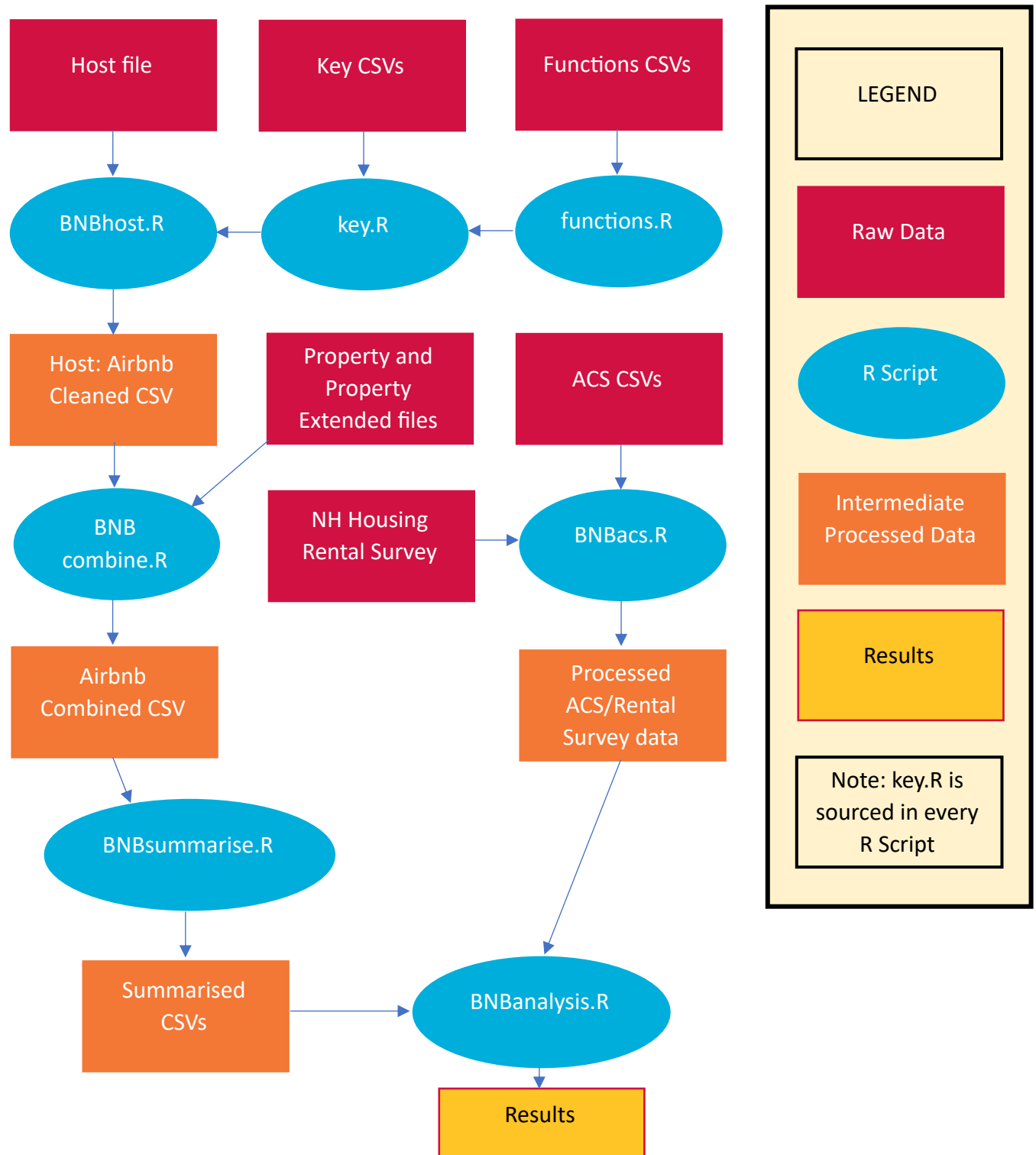
Regression Analysis

This study's regression analysis uses municipal-level data to measure the effect of STRs on communities in NH. Municipal-level data is used because it is the most granular unit of measurement that can be considered reliable. The greatest source of limitation was AirDNA data. AirDNA's data provided information on the properties' state (New Hampshire), municipality, and coordinates. However, the coordinate data was unreliable and inaccurate, so the properties' municipality was the most granular geography level available.

Three different ways of measuring the increase in the presence of online STRs were used as independent variables. Each independent variable was tested against seven housing indicators (dependent variables) to investigate whether the increase in online STRs correlated with a change in a housing market indicator. Two of these dependent variables came from the NH Housing Rental Survey: median rent and vacancy rates. The remaining five came from the ACS: median rent, rental vacancy rate, owner-occupied vacancy rate, overall vacancy rate and the share of housing units classified as SROs. The first independent variable was the change in STRs as a share of total housing units. The second was the change in STRs as a share of SROs. The final independent variable was the number of STRs per one thousand residents.

Workflow Chart

This study was conducted using the statistical programming language, R. The basic workflow was to write an R script, input raw data and export processed data. This formula was repeated multiple times until there were results to export as visualizations, R-squared scores, and p-scores. Below is a visual representation of this workflow:



Analysis and Results

This analysis is divided into two parts: a snapshot of the short-term rental market and a regression analysis. The snapshot of the market consists of descriptive data visualizations. They are not meant to prove a statistical relationship between variables. Instead, they are simply measuring the state of an understudied portion of the housing market. The second half, regression analysis, evaluates claims of causation between the rise of online STRs and conditions in the overall NH housing market.

Snapshot of Short-Term Rentals

The AirDNA data, joined with NH Housing and ACS data, was grouped by two different kinds of geographies for this section. The first was by the properties' counties and municipalities. The second was by the location of the host's primary residence or corporate headquarters. This grouping was done on three geographic levels: country, state, and county.

By Property Location

Scope and Economic Footprint of STRs

Figure 1 shows that the counties most affected by short-term rentals are Belknap, Carroll, Coos, and Grafton. Similarly, Figure 2 shows that while Airbnb or Vrbo properties are a relatively minor percentage of total housing units in most NH counties, amounting to between 2% and 3% of units, they are a larger portion of housing units in Belknap, Carroll, Coos, and Grafton Counties: between 8% and 13%. The popularity of Airbnb and Vrbo has increased substantially since 2014. Yet across most of New Hampshire, while the number of STR properties has increased since 2021, Figure 3 shows that revenue per property has decreased. As seen in Figure 4, the portion of units that are STRs can vary greatly from community to community. Short-term rentals account for 64.5% of housing units in the Town of Lincoln and 50% in the Town of Carroll, meaning tourist-dependent communities in the North Country have a very different relationship with STRs compared to, say, communities in Hillsborough County, where STRs only account for 0.9% of housing units. To see the portion of units that are STRs in all New Hampshire municipalities, not just the communities with a percentage of 10% or higher, see Figure i in Appendix I.

The majority of STR properties are investments, not secondary homes, as shown in Figures 5 and 6. Very few properties are actually bed and breakfasts, rooms in hotels or resorts, or on the premises of the host's own residence (Figures 7, 8 and 9). Figure 10 shows that the proportion of all housing units that are for Seasonal, Rental or Occasional (SRO) use has remained fairly consistent from 2014 to 2021. This implies most units listed on Airbnb or HomeAway were already short-term rentals, vacation homes, or pied-à-terres. However, there are some municipalities where this trend does not hold true. Figure 11 highlights the municipalities that have seen the greatest increase in the share of housing units classified as SROs. For a more detailed bar plot with all NH municipalities listed, see Figure ii in Appendix I.

Figure 1

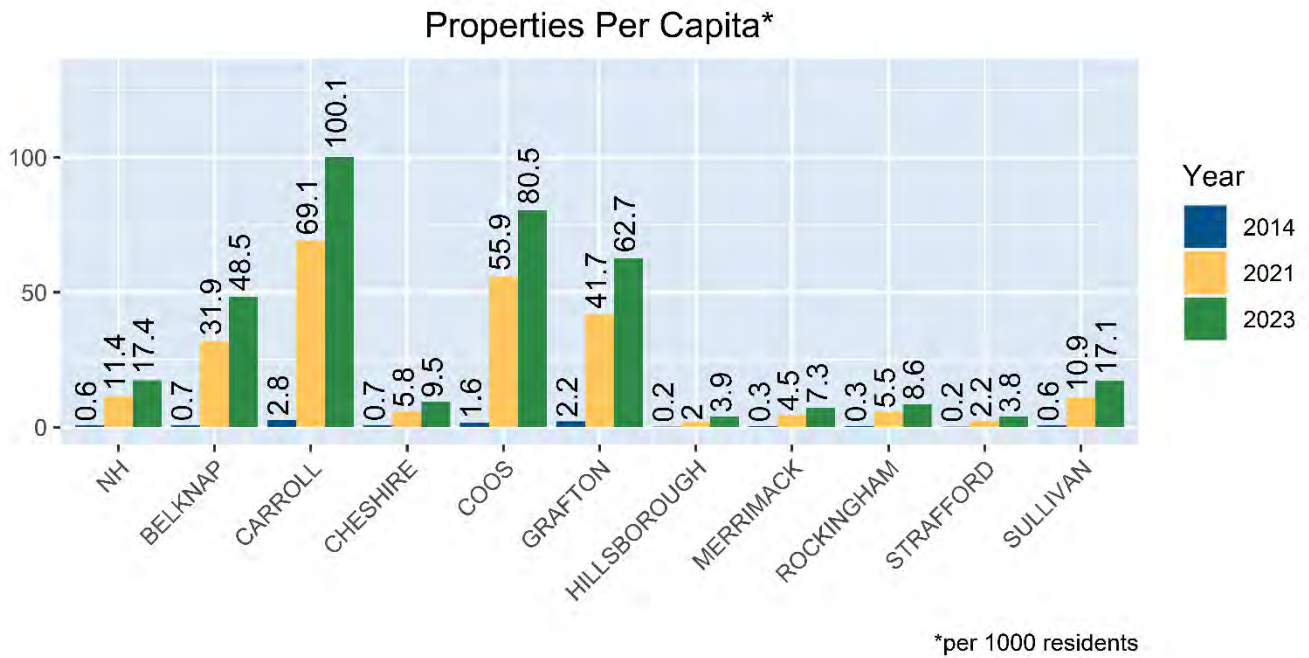


Figure 2

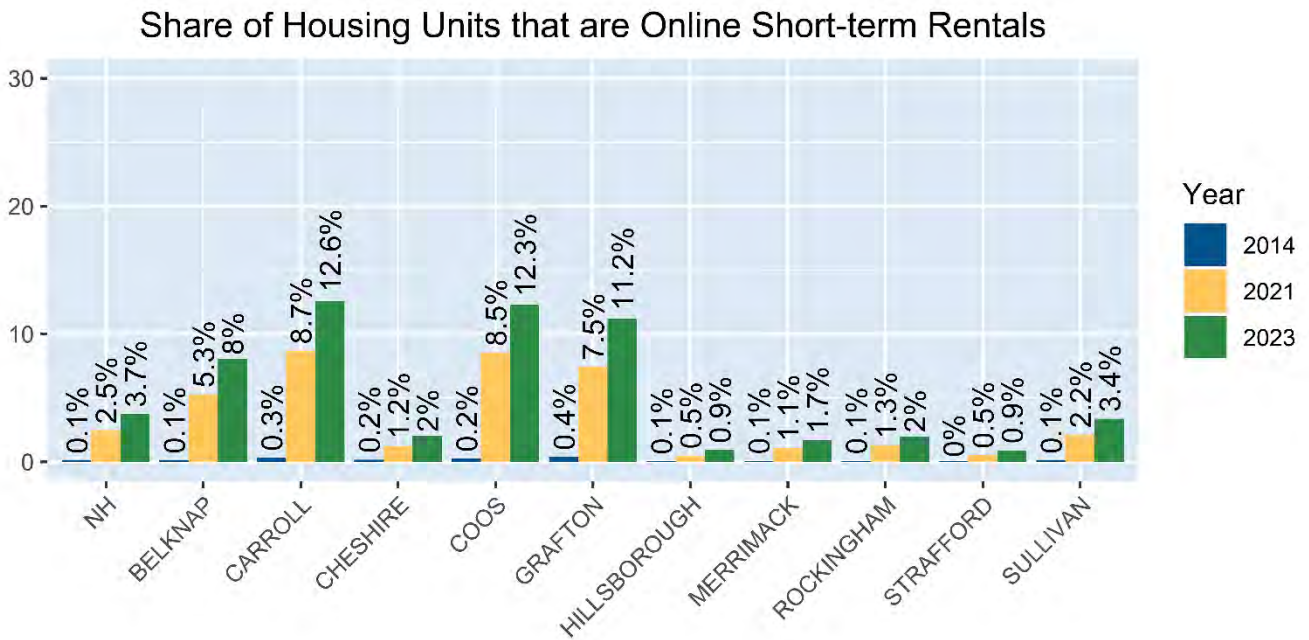


Figure 3

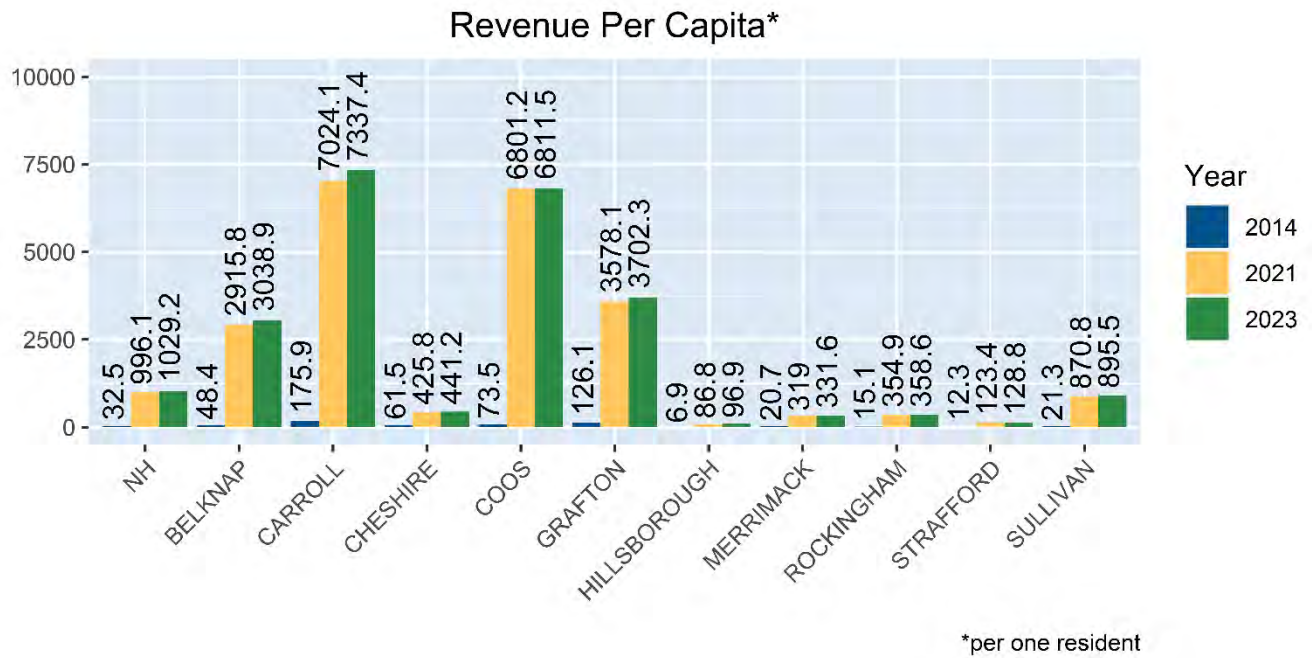
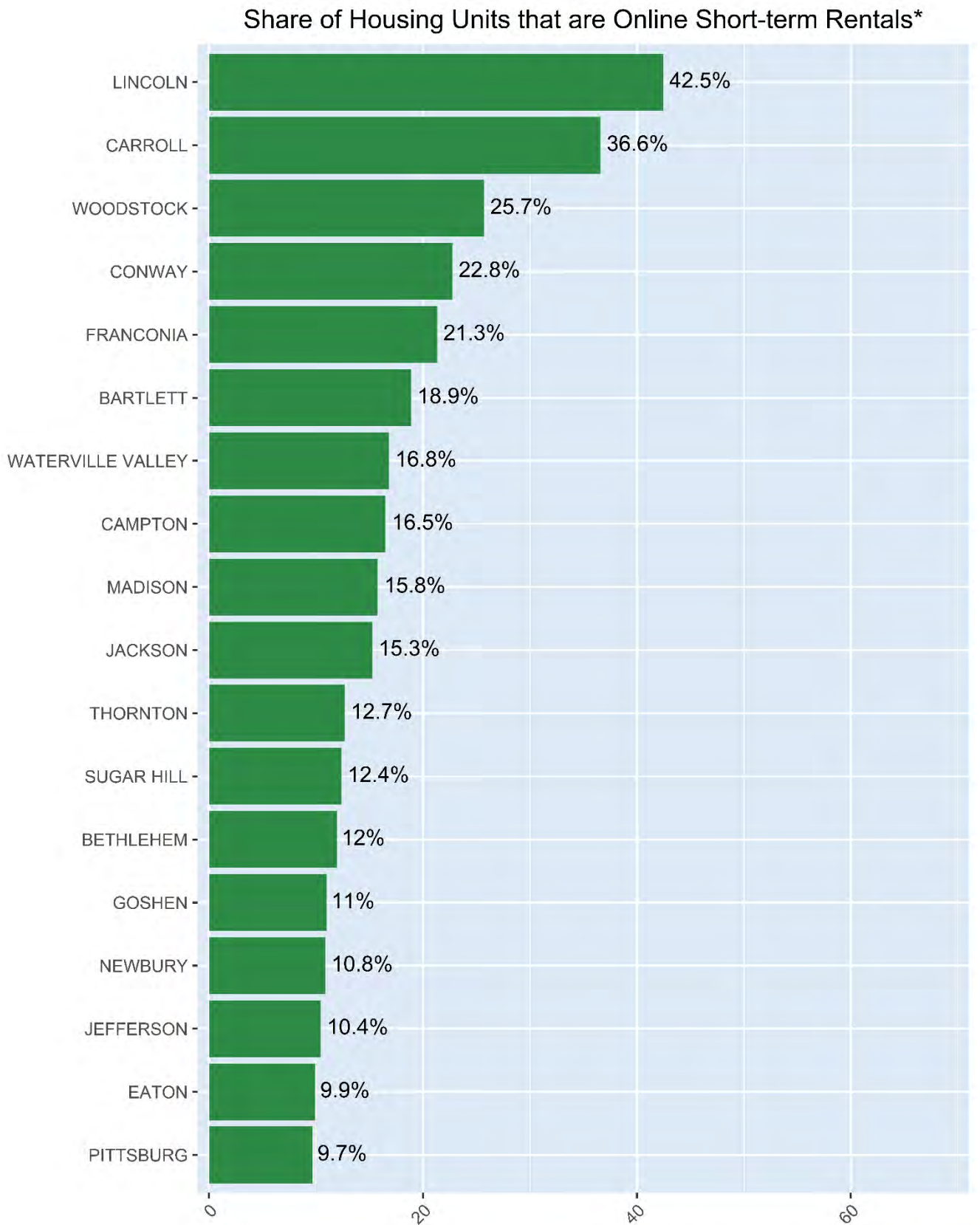
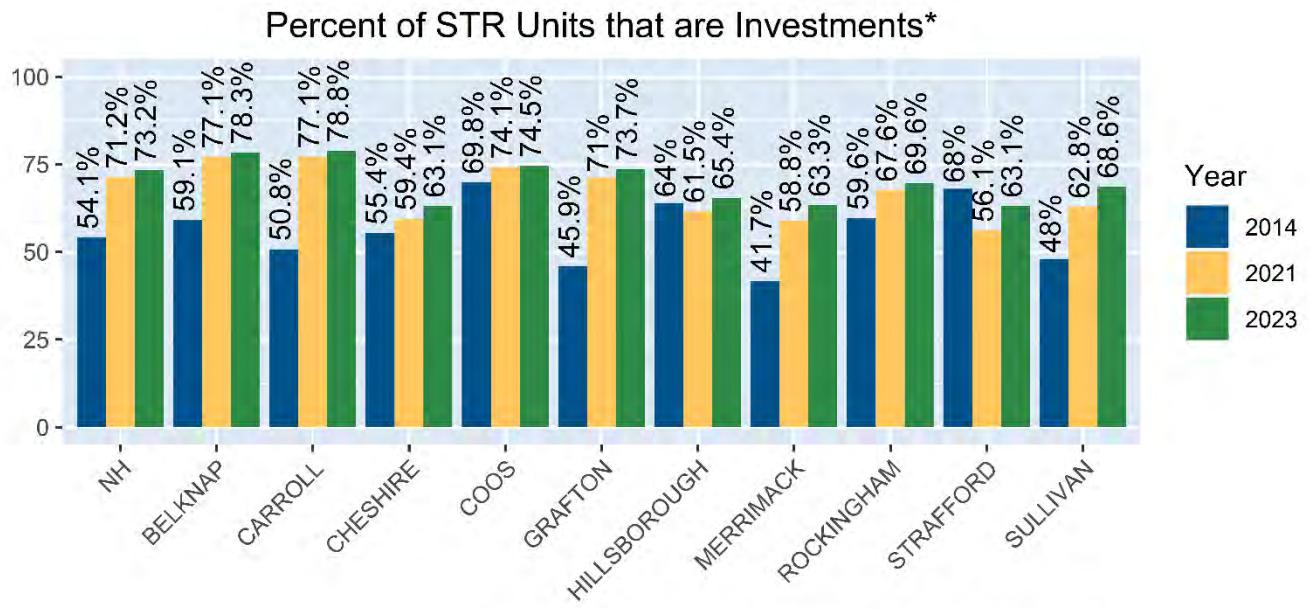


Figure 4 (Data is from 2021)



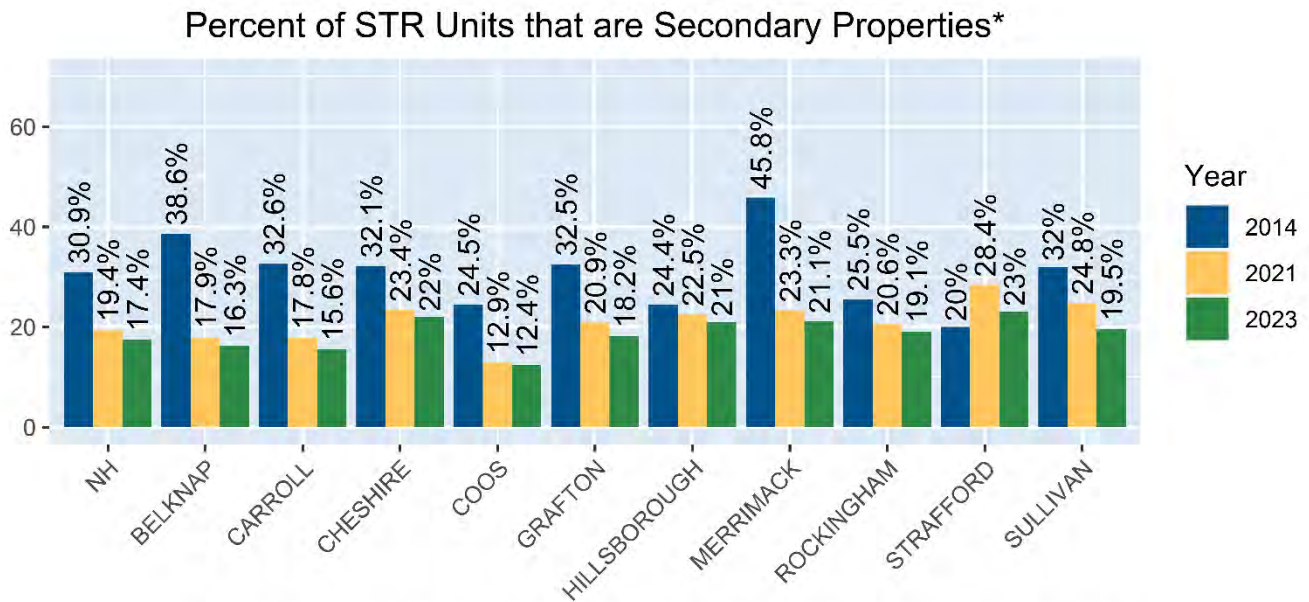
*depicts municipalities with shares above 9%

Figure 5



*Property is occupied by the owner less than 10% of the year

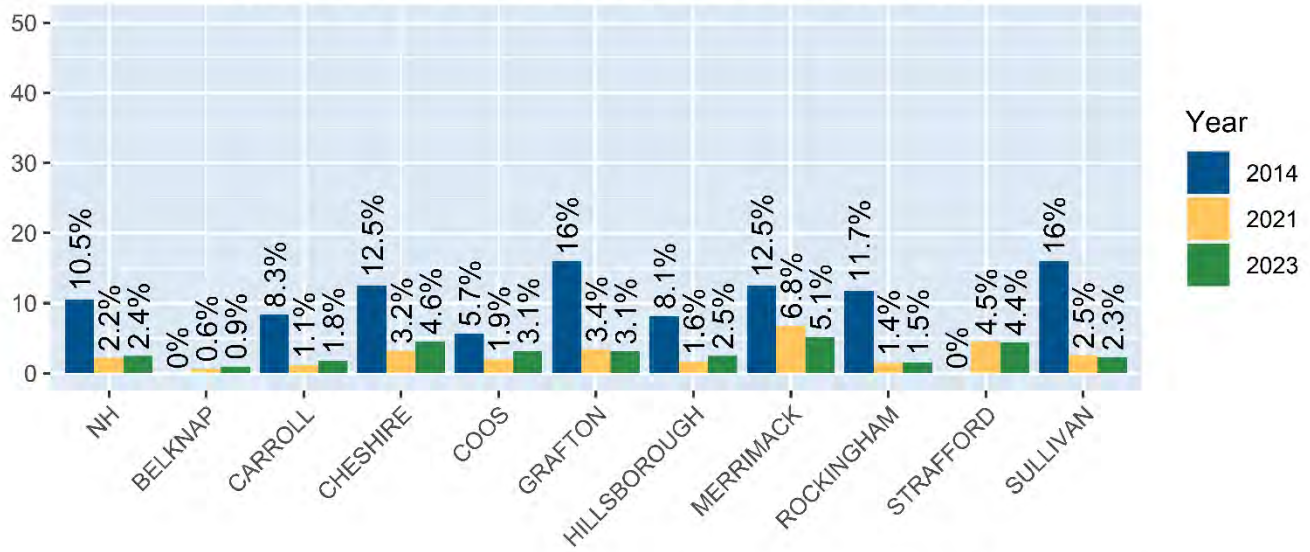
Figure 6



*Property is occupied by the host more than 10% of the year, and the host owns only one STR

Figure 7

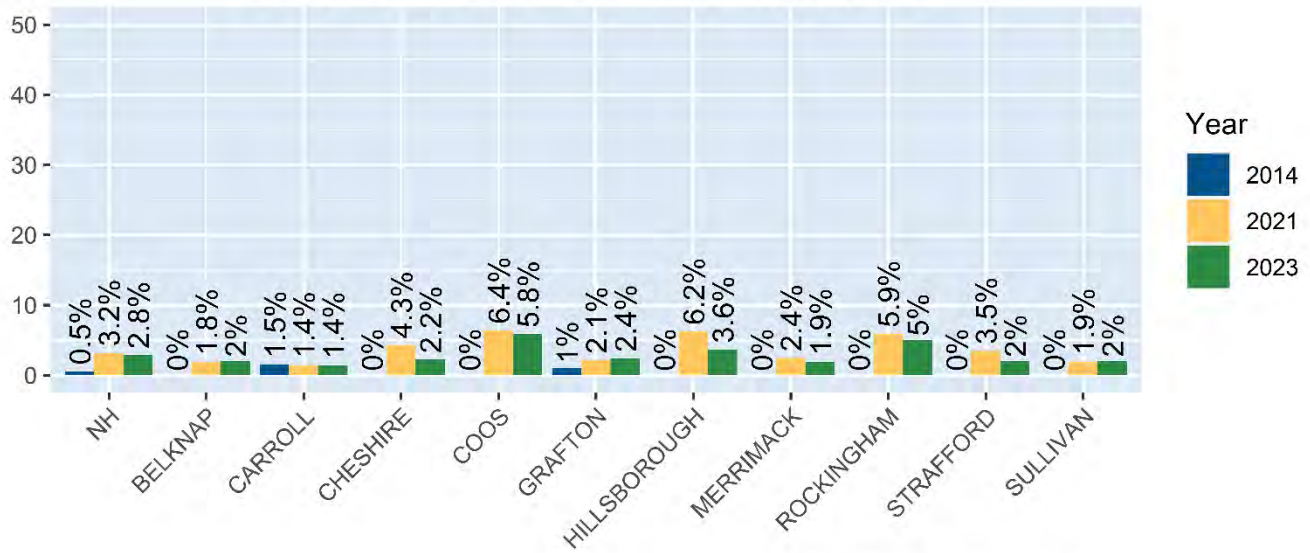
Percent of STR Units that are Bed and Breakfasts*



*Property is listed as a Bed and Breakfast

Figure 8

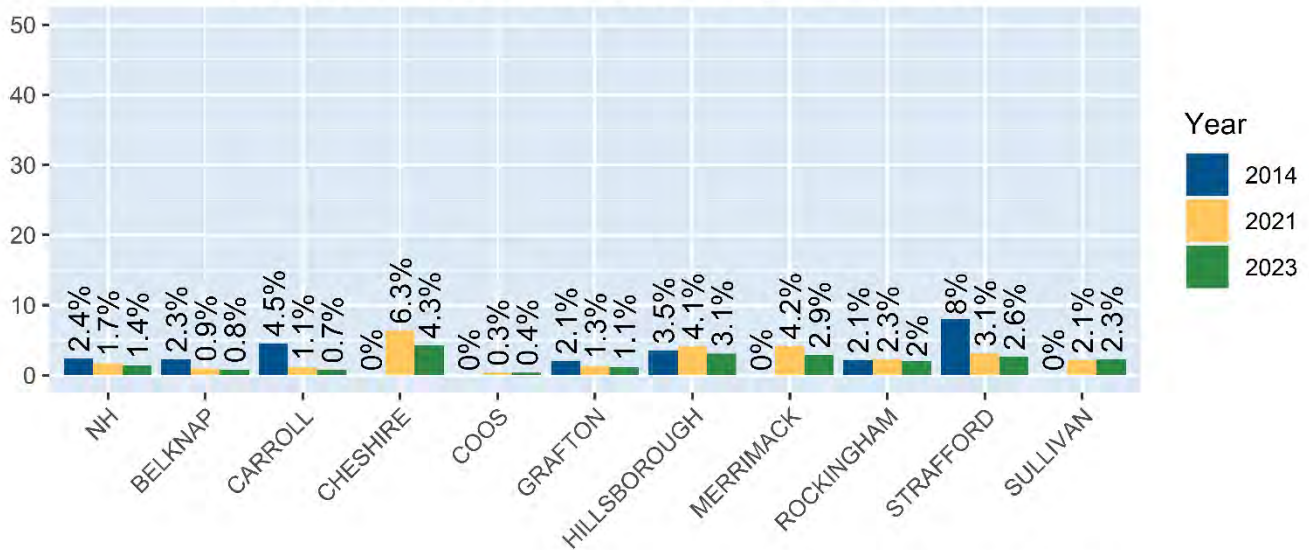
Percent of STR Units that are Hotel Rooms*



*Hotel rooms, dorms and rooms in resorts

Figure 9

Percent of STRs with the Host Living on Premises*



*Either an ADU, private room or private floor

Figure 10

Share of Housing Units that are Seasonal, Recreational or Occasional Use

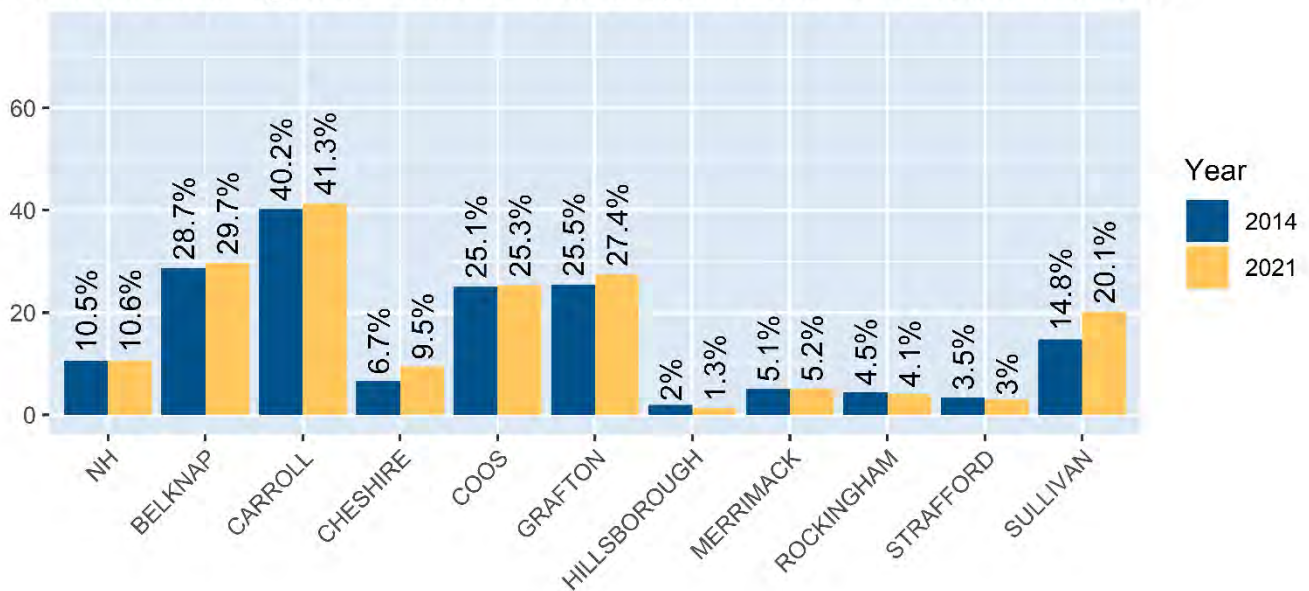
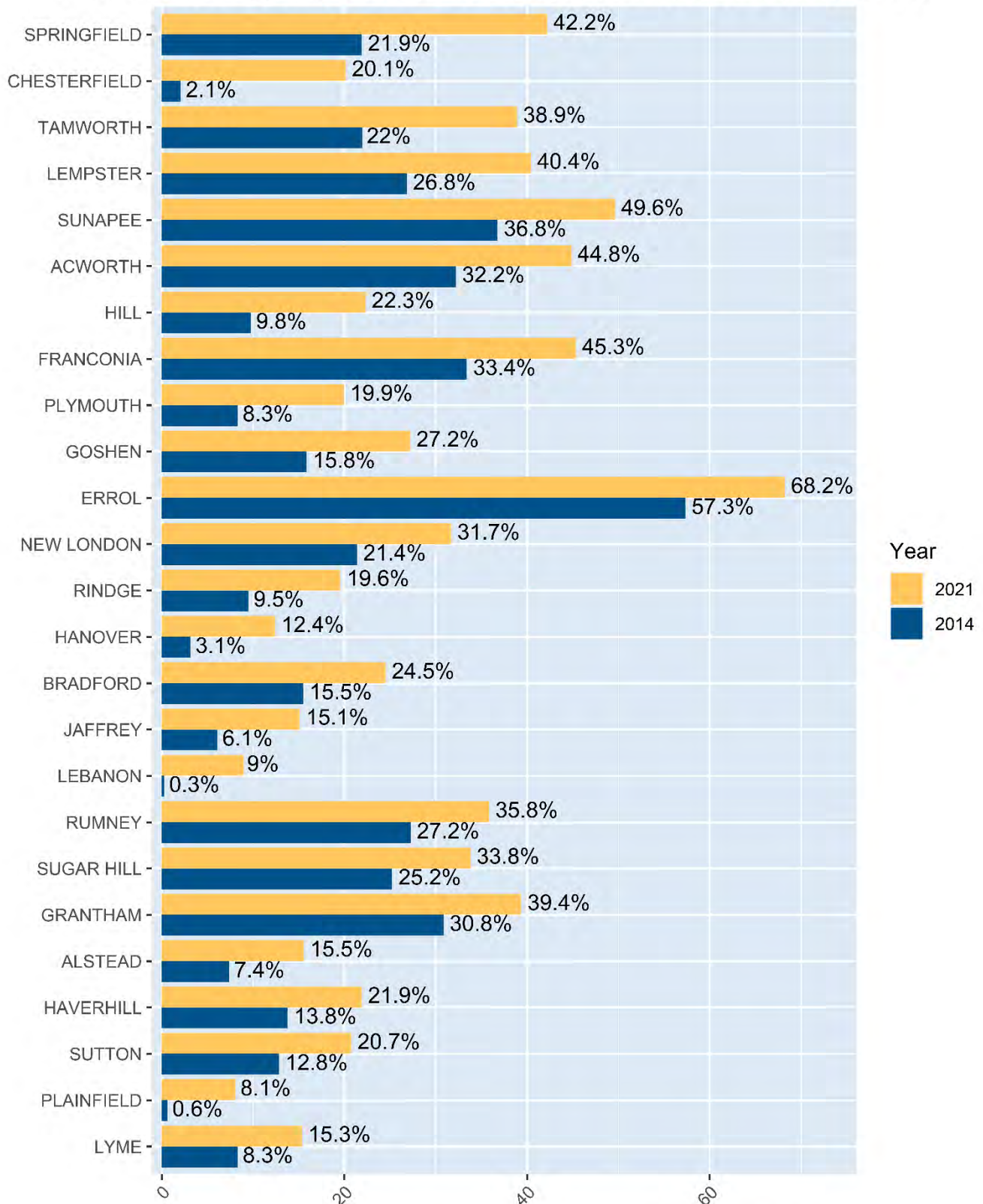


Figure 11

Share of Housing Units that are Seasonal, Recreational or Occasional Use*



*towns are sorted by the greatest change from 2014 to 2021

How Local are Hosts?

In NH overall, roughly a third of properties are owned by locals who live in the same municipality as their property (Figure 12). About half are owned by hosts living in the same county (Figure 13). Roughly two-thirds of properties are owned by hosts living in NH (Figure 14) and almost 90% of properties are owned by New England residents (Figure 15). Concerns about foreign investors buying up properties in NH seem to be unfounded, as 96% of properties are owned by U.S.-based hosts (Figure 16).

Figures 17 through 21 track the percentage of revenue generated in the state and each county that goes to hosts living in the same municipality, county, state, region, and country as their property, respectively. These percentages largely follow the same patterns and trends as the distributions seen in Figures 12 through 16. However, in Figures 17 through 19, the percentage of revenue that goes to hosts living in the same geographic unit is lower than the percentage of properties that are owned by hosts living in the same geographic unit. This is because New Hampshire-based hosts make, on average, less revenue per unit compared to hosts based in other New England states.

For information on the proportion of properties owned by hosts for whom no location information was provided, see Figures iii through v in Appendix I. For information on the proportion of revenue that goes to unknown municipalities, counties, states, and countries, see Figures vi through ix in Appendix I. It is reasonable to assume that the geographic breakdown of the unknown data follows the same pattern as the known data, but Figures 12 through 21 only calculate percentages of the known data.

Figure 12

Percent of STR Units Owned by Hosts Living in the Same Town or City

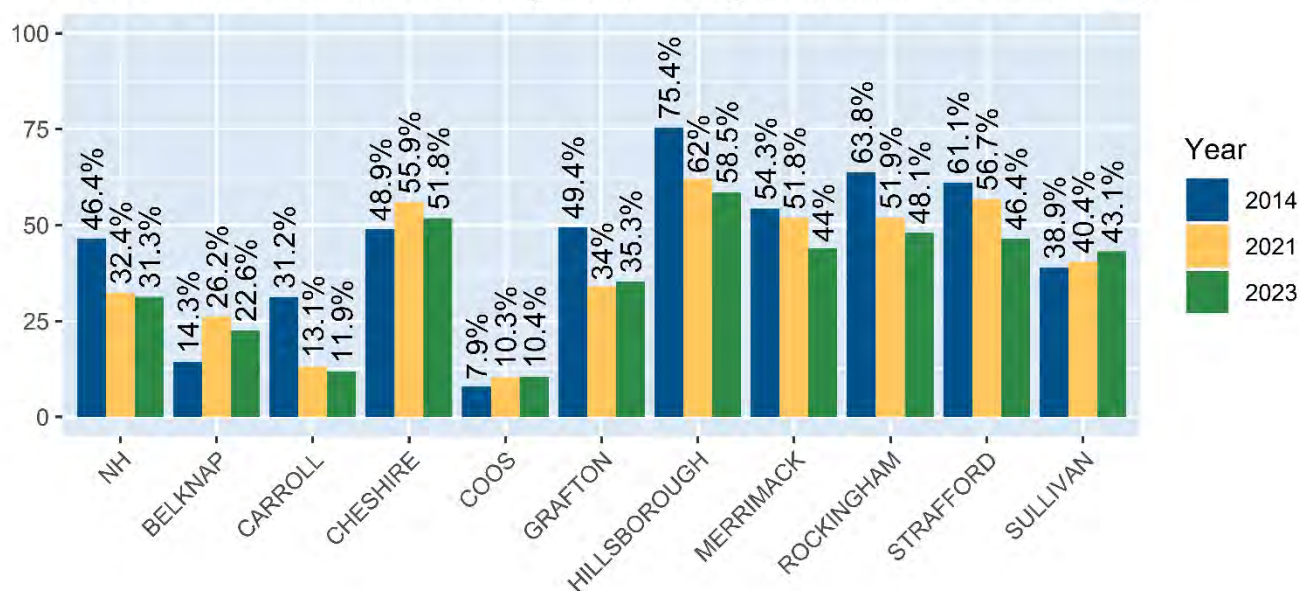


Figure 13

Percent of STR Units Owned by Hosts Living in the Same County

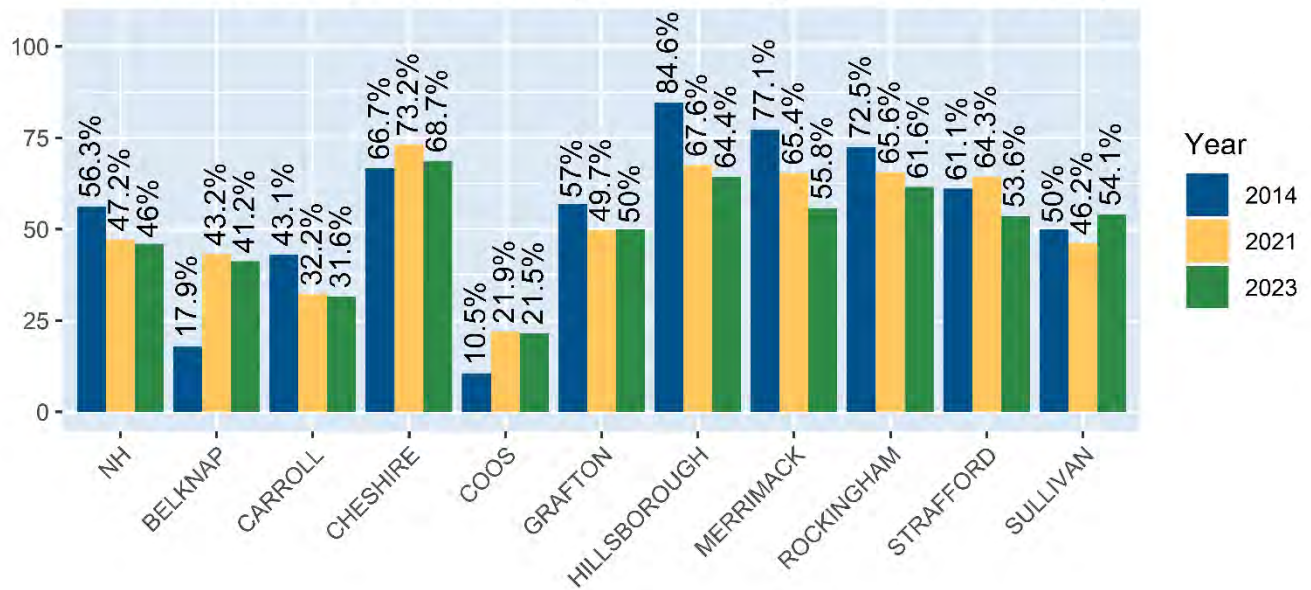


Figure 14

Percent of STR Units Owned by Hosts Living in NH

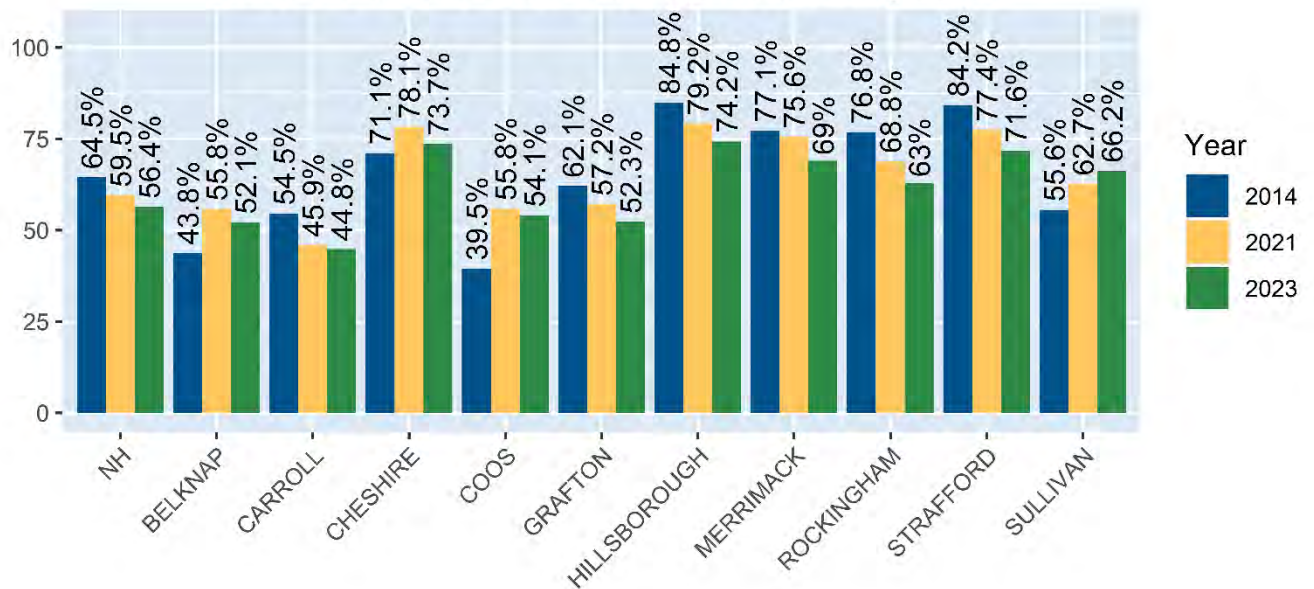


Figure 15

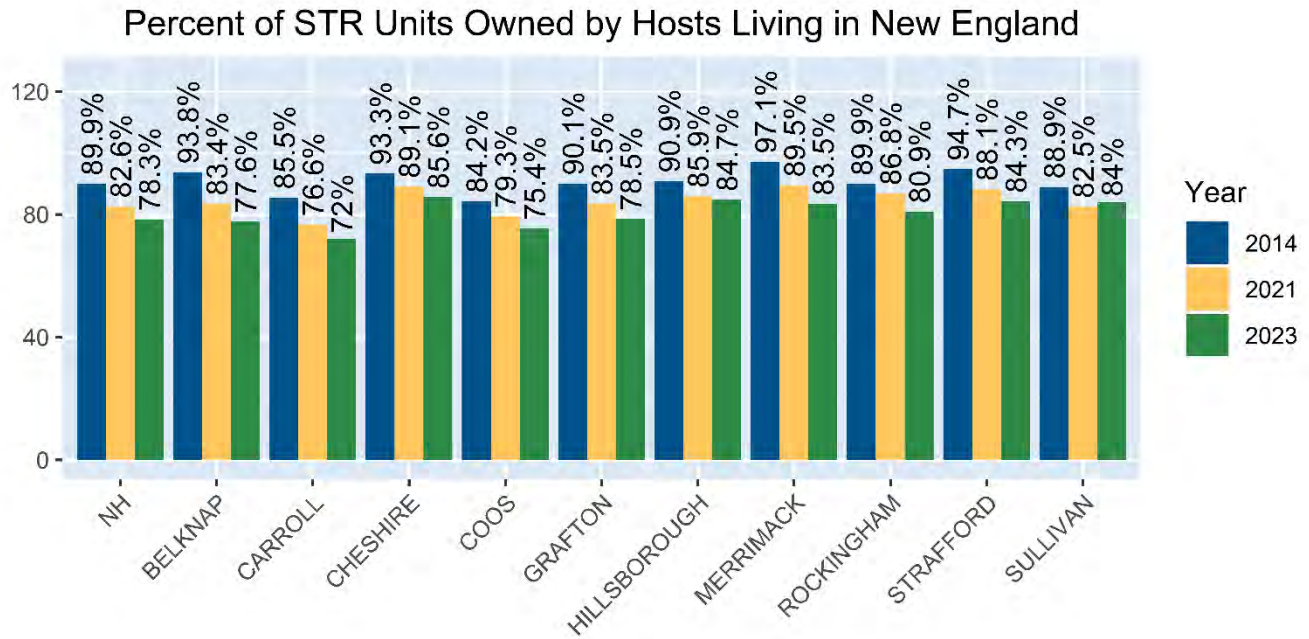


Figure 16

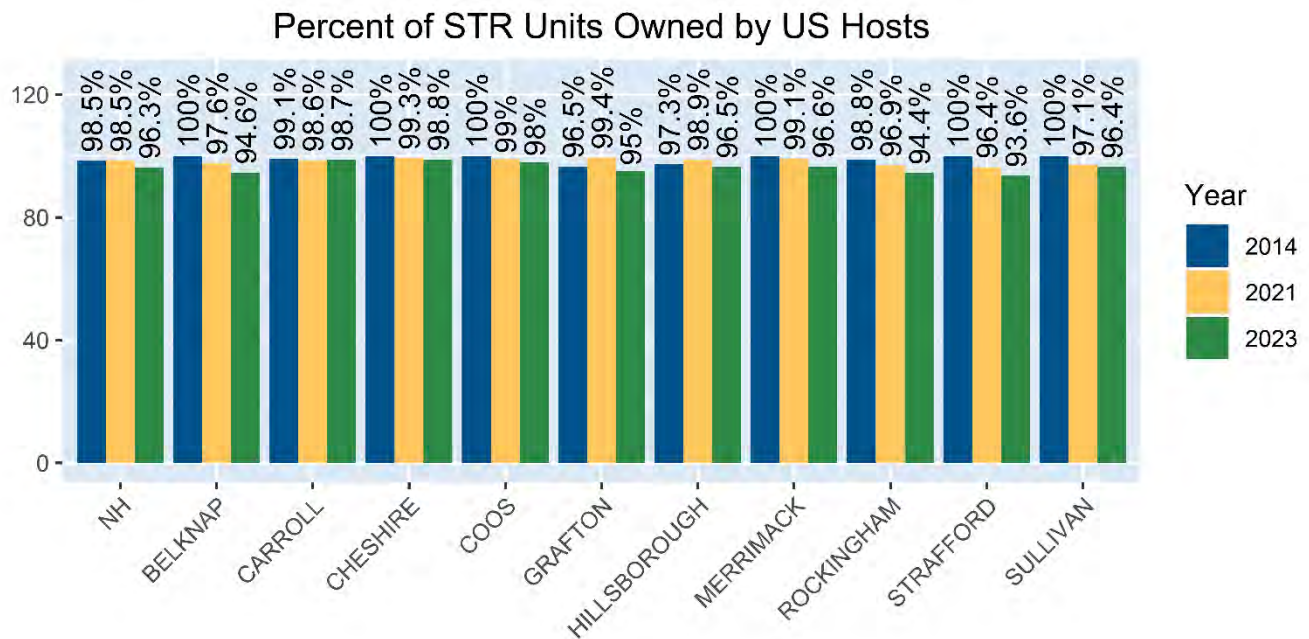
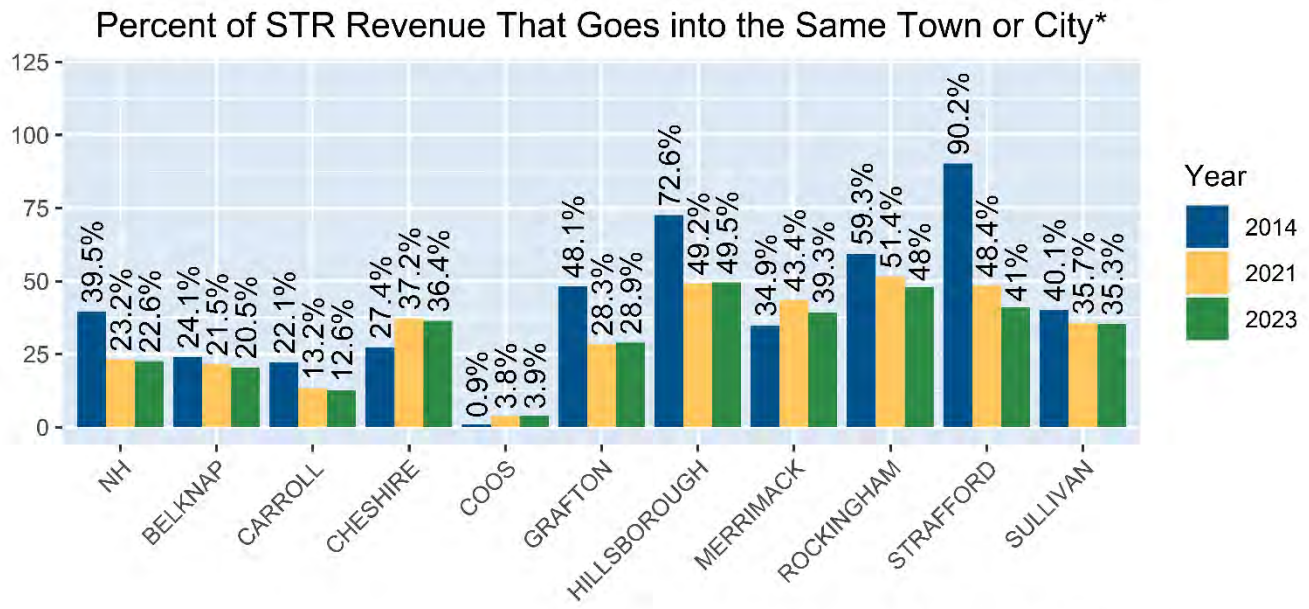
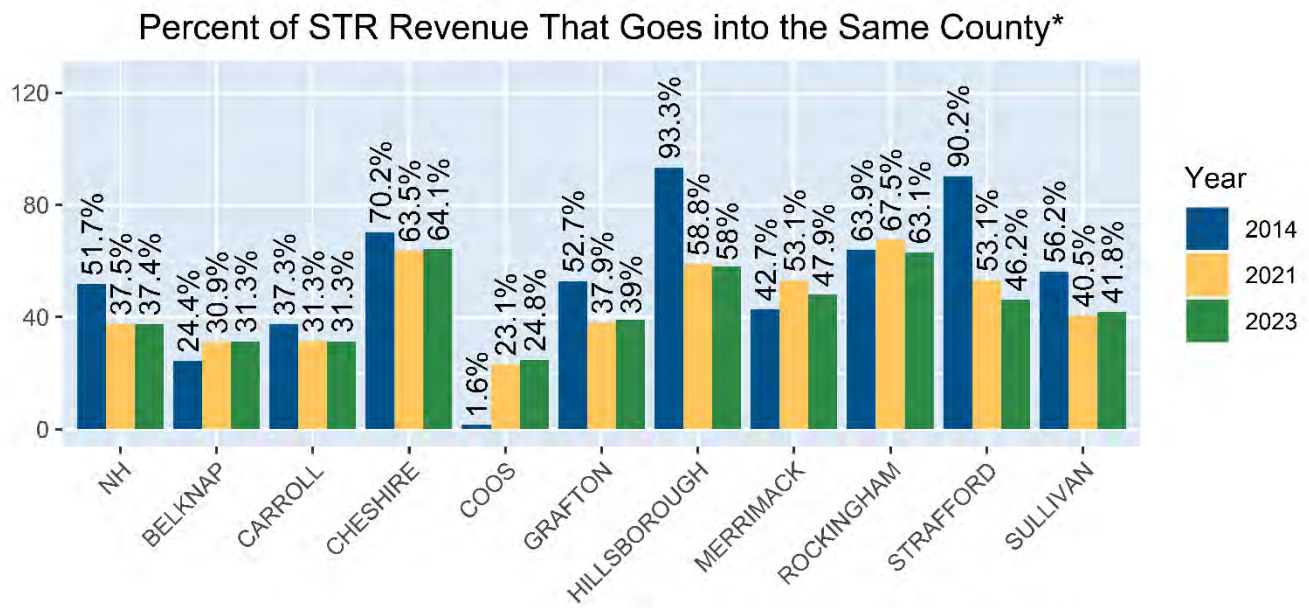


Figure 17



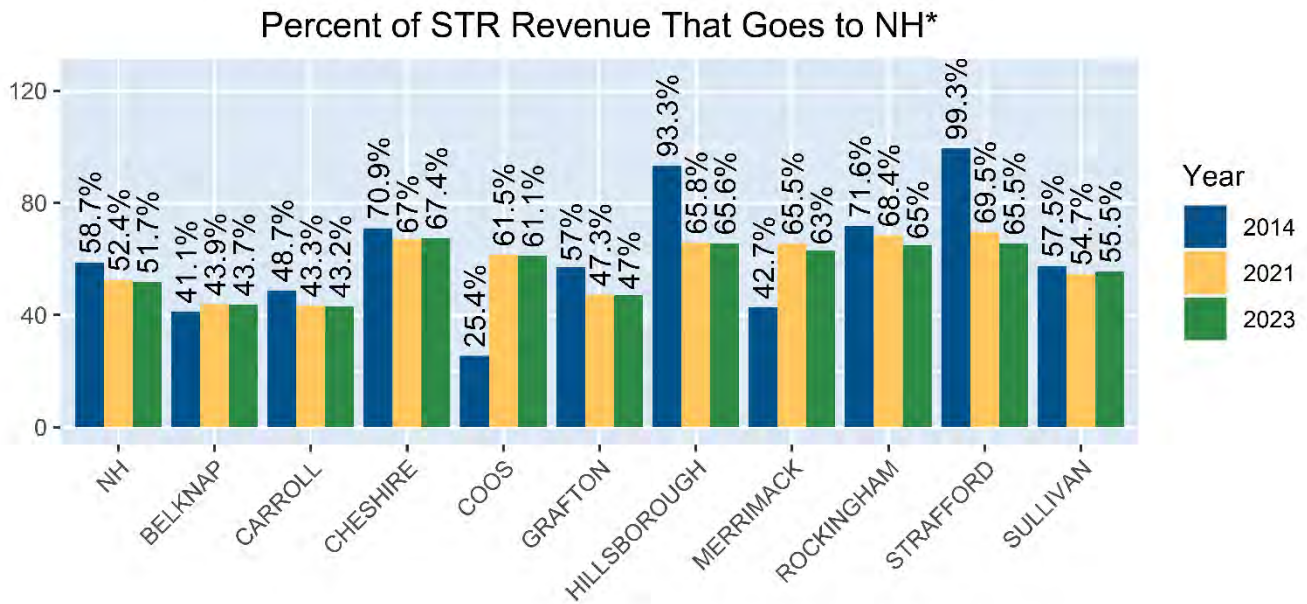
*Estimated after removing unknowns

Figure 18



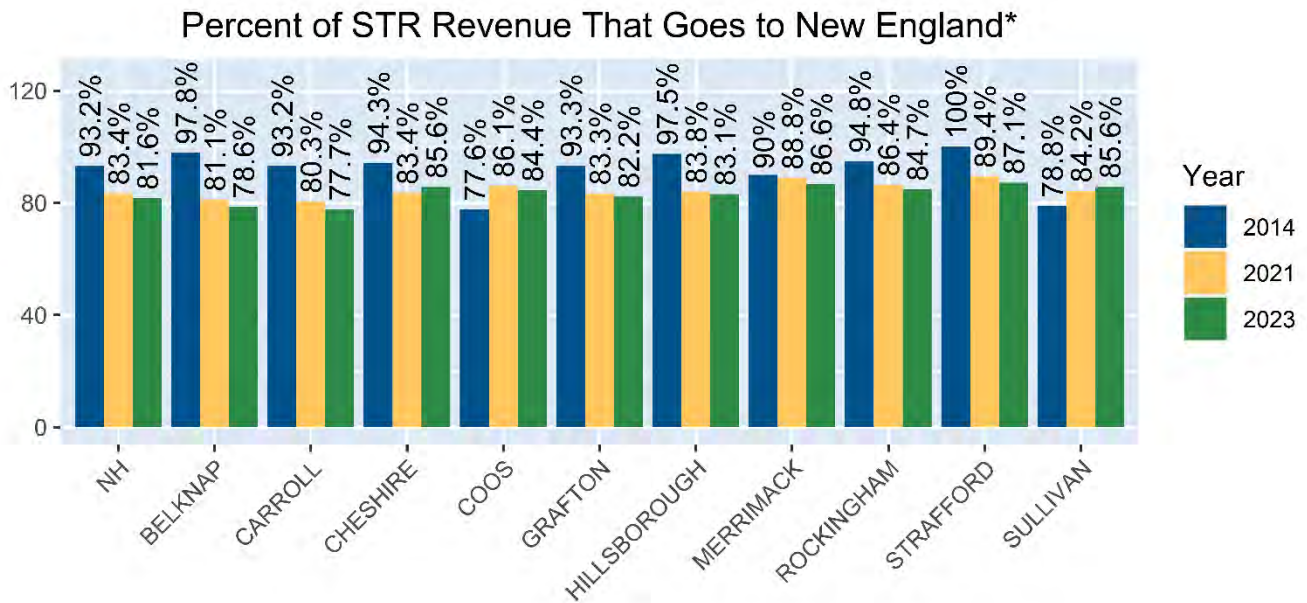
*Estimated after removing unknowns

Figure 19



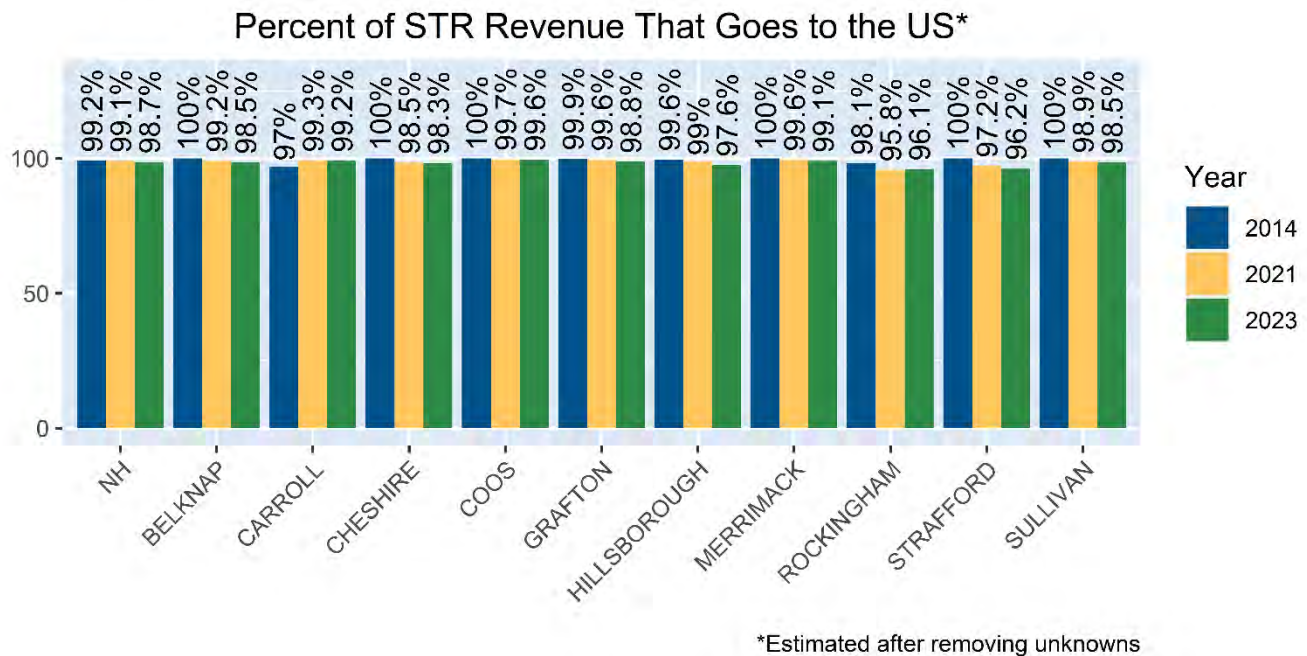
*Estimated after removing unknowns

Figure 20



*Estimated after removing unknowns

Figure 21



By Host Location

To get a picture of who these online STRs hosts are, this study looks at where they reside. Airbnb and Vrbo hosts come from all across the country and the world. In grouping by their locations, stakeholders can get a sense of who benefits the most from NH STRs and where hosts come from.

Statewide, it is rare for hosts to live on the same premises as the guest. Whether the guest is staying in a guest room or elsewhere on the same property, only 1.4% of hosts live on premises. This is even rarer in the counties with the most online STRs – Belknap, Carroll, Coos, and Grafton – where the percentage ranges from 0.4% to 1.1% (Figure 9).

However, it is fairly common for hosts to live in the same municipality as their STR property. Almost one third (31.3%) of STRs are owned by hosts who live in the same municipality as the property. This percentage is far lower in Belknap (22.6%), Carroll (11.9%), and Coos (10.4%) counties (Figure 12).

Hosts are significantly more local when the definition of 'local' is expanded somewhat. Forty-six percent of STR properties in NH are owned by hosts who live in the same county (Figure 13). In this case, only Carroll (31.6%) and Coos (21.5%) counties are significantly lower. Following this line of analysis, 56.4% of STRs are owned by NH-based hosts and an overwhelming 78.3% are owned by New England-based hosts (Figures 14 and 15). Thus, the vast majority of properties are owned by NH hosts or hosts in nearby states. Furthermore, there is little basis for concern about foreign investors owning large numbers of STRs in NH. Among all NH STRs, 96.3% are owned by U.S.-based hosts (Figure 16) and 98.7% of STR revenue goes to U.S.-based hosts (Figure 21).

Amongst NH-based hosts, the counties with the most hosts are Grafton, Hillsborough, and Rockingham, which contrasts with where the most properties are Belknap, Carroll, Coos and Grafton counties (Figure 22). The vast majority of hosts, 79.7% in 2023, are from Massachusetts or New Hampshire (Figure 23). Compared to the number of U.S.-based hosts, the number of foreign hosts is negligible (Figure 24). The raw number of hosts per geographic area does not offer a fully comprehensive view of who hosts are. For that, the revenue and number of properties per host need to be understood.

Hosts from New Hampshire make the least revenue from their properties here in comparison to NH-property hosts from other New England states (Figure 25). The first hypothesis to explain this is that the less local a host is, the less time they personally would be spending at the property. However, as will be shown later in this subsection, NH hosts are less likely to own secondary homes and more likely to own investments than out-of-state hosts (Figures 28 – 29).

The second hypothesis explored was that properties more likely to be labeled as being “locally” hosted – hotels, resorts, bed and breakfasts, and properties on the host’s own premises – produce less revenue per unit. To evaluate this, properties were grouped by their ‘property type’ and two metrics were calculated: median monthly revenue and percentage of STRs owned by hosts who ‘Live in NH’ according to AirDNA. Hotels and resorts, bed and breakfasts, and properties on the host’s own premises were more likely to be labeled as being “locally” hosted compared to investment properties and secondary residences (Figure 26). Furthermore, those same properties were found to make less revenue per unit (Figure 27). These two findings validate this second hypothesis. Because hotels, resorts, bed and breakfasts, and properties on the host’s own premises produce less revenue per unit, they lower the average revenue produced by units owned by NH hosts.

For information on average monthly revenue per host by county and country, see Figures x and xi in Appendix I. Also, in Appendix I are Figures xii through xiv, which detail the median monthly revenue per host by county, state, and country. However, there was little difference between the average metric and the median metric.

This study also looks at the number of properties owned by hosts, sorted by their geographic area. Compared to other New England states, New Hampshire has the highest number of properties per host (Figure 28). Within New Hampshire, northern counties have higher numbers of properties per host (Figure 29). These two trends are probably the effect of inns and resorts, which are listed as New Hampshire hosts with multiple rooms, cottage, or campsites. For U.S.-based hosts, the average number of properties per host is on par with foreign hosts (Figure 30). The median and maximum number of properties per host were also calculated and are visualized in Figures xv – xx.

Compared to other New England states, NH-based hosts’ properties are more likely to be investments, rather than secondary homes. Nearly two-thirds of NH-based hosts’ properties are investments (Figure 31), while only 19.5% are second homes (Figure 32). The percentage of properties that are investments is even higher in areas with the most STRs: Belknap, Carroll, Coos, and Grafton counties (Figures 33 and 34). Again, the cause of this difference could be the prevalence of inns and resorts in northern counties. Figures xxi and xxii in Appendix I detail the percentage of properties that are investments and second homes by host country.

Of the major individual hosts in New Hampshire, four types were identified. The first, national property management companies, clean, manage and list properties on Airbnb and Vrbo, but do not own the STRs. Instead, they are hired by independent owners. However,

information is limited on who these independent owners are. Evolve, headquartered in Washington DC, and Vacasa, based in Portland, Oregon, are the two biggest players in this sector. The second type of host is local property management companies headquartered in New Hampshire that specialize in NH or New England properties. Some of these are being acquired by Vacasa, giving the appearance of a local company when, in reality, the profits are returned to the Oregon-based company. The third category is comprised of resorts, inns, campsites, and hotels. These typically existed before Airbnb or Vrbo and are now simply marketed online. The last category of hosts is independent owner/operators – they are perceived as the most typical host. However, no individual independent host owns hundreds of properties, as some may think. The maximum number of properties own by a single host is 54, with the median between one and two, depending on where the host is from.

Figure 22

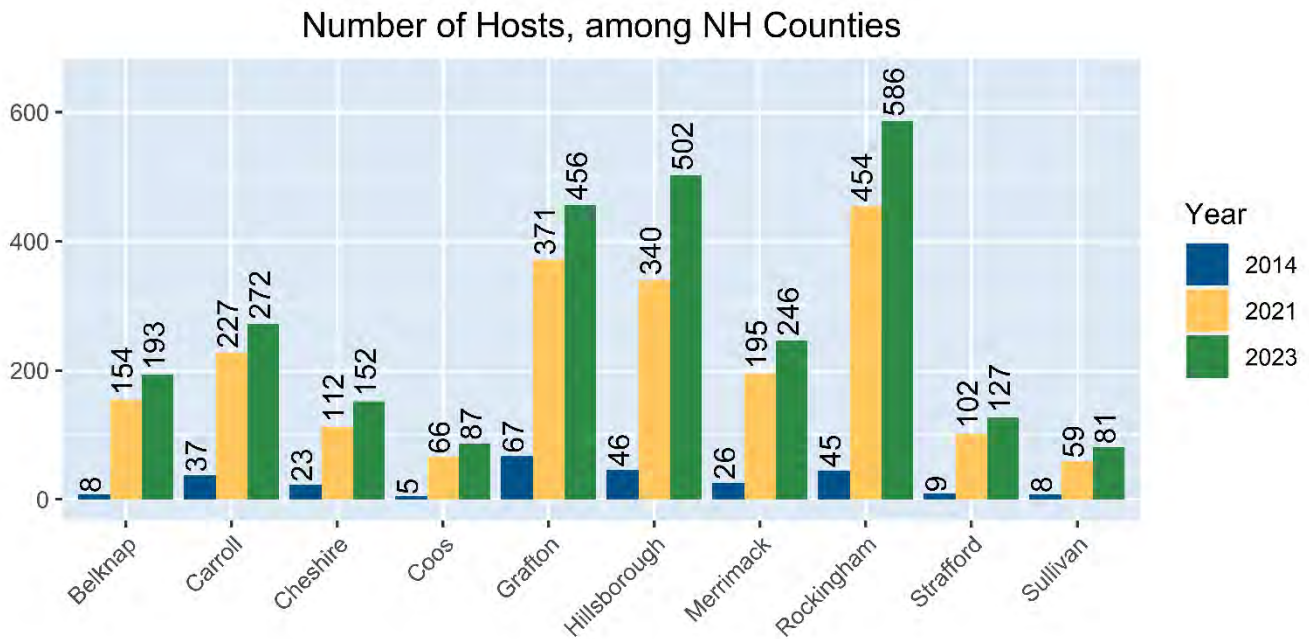


Figure 23

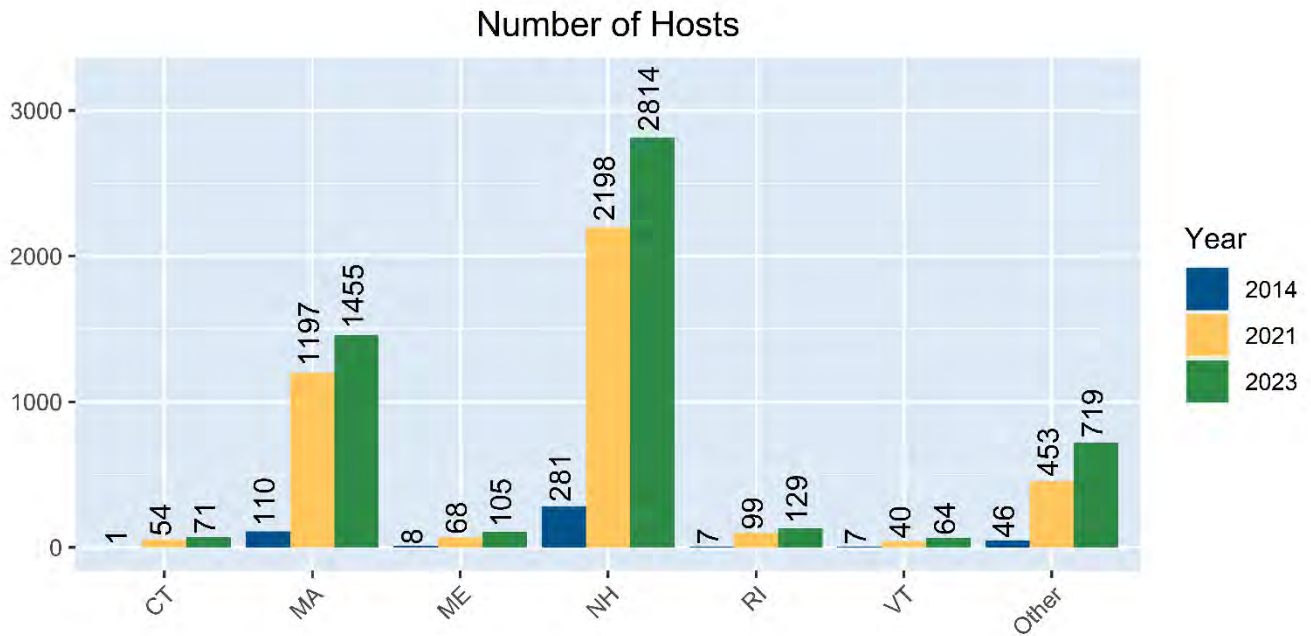
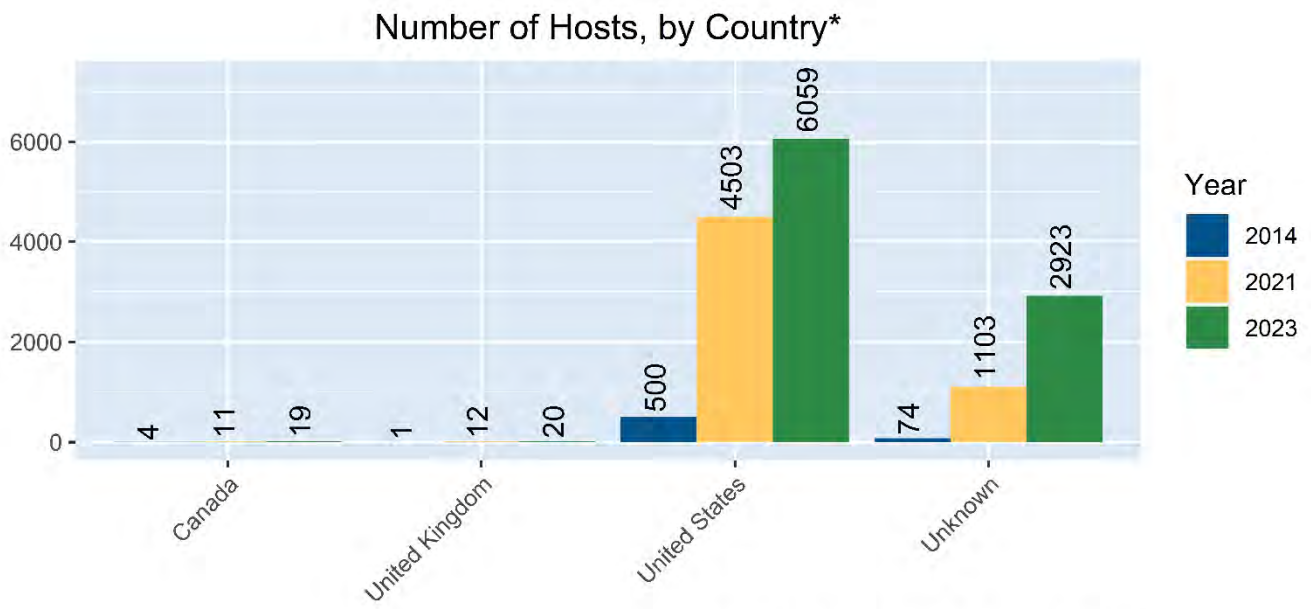


Figure 24



*among countries with at least 10 hosts by 2023

Figure 25

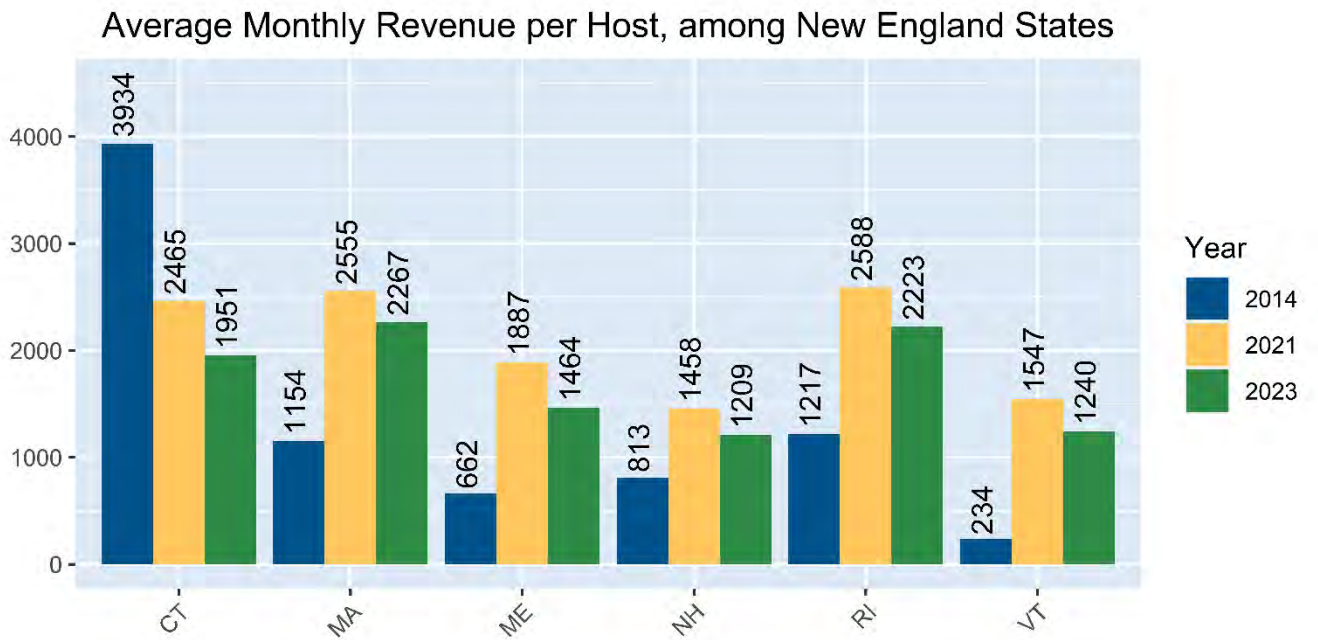
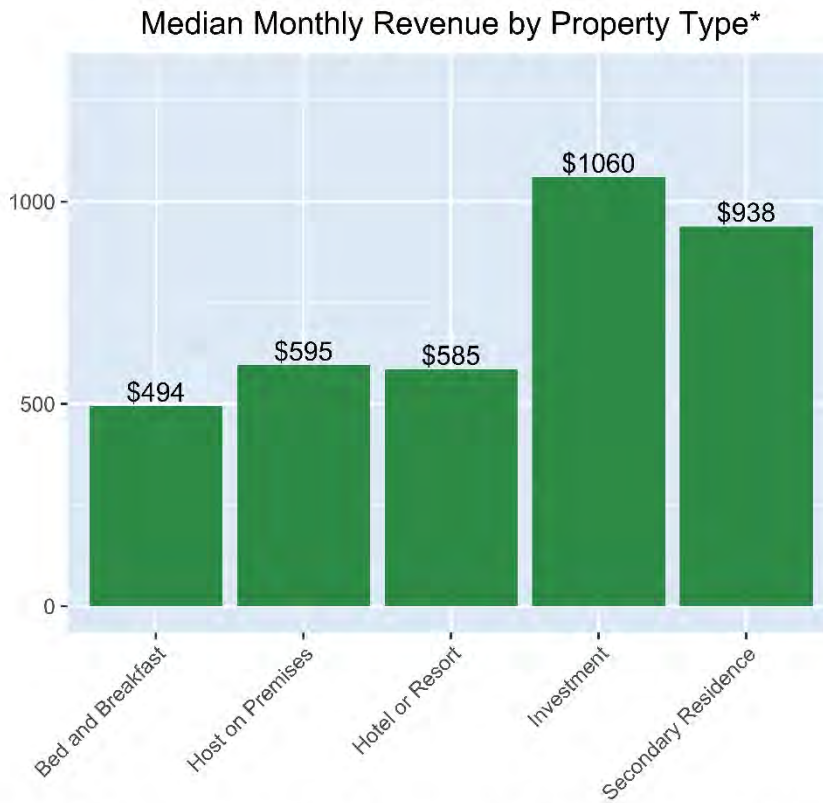


Figure 26



*Median is derived from the average monthly revenue of each property active as of 2023

Figure 27 (Data is from 2023)

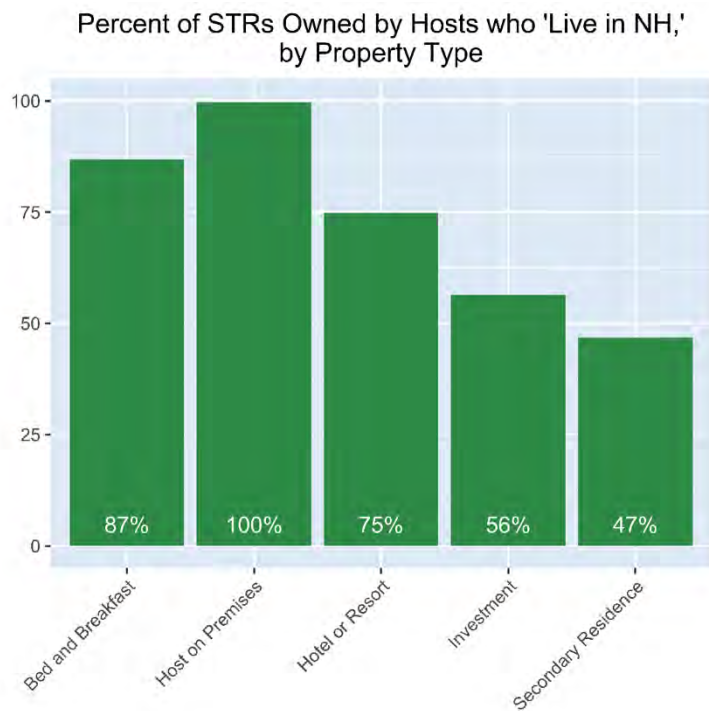
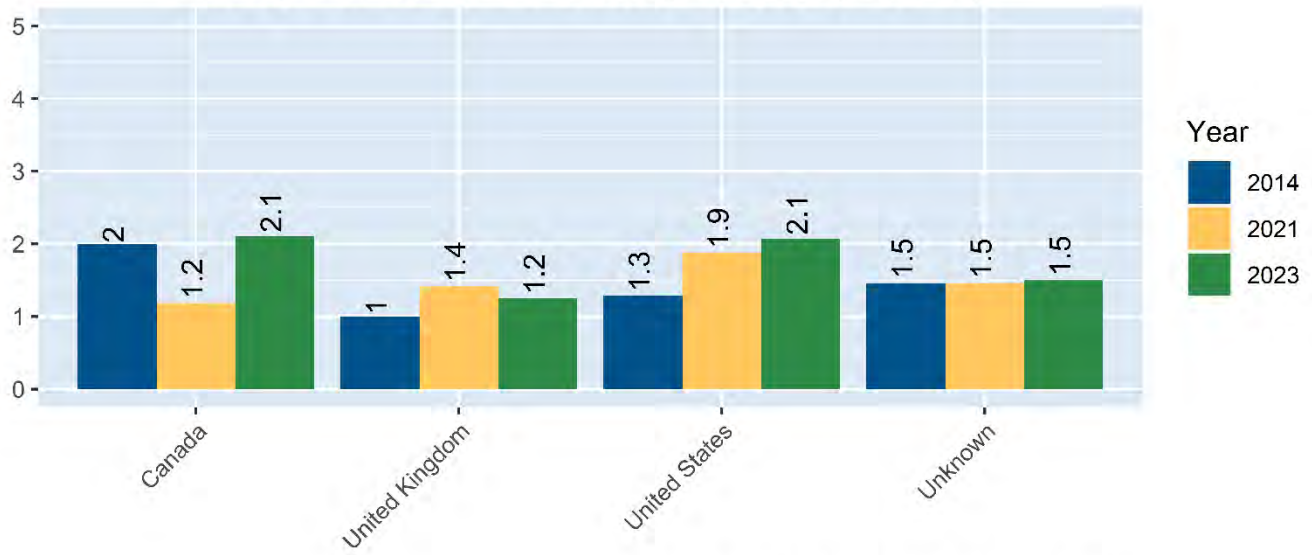


Figure 28

Average Number of Properties per Host, by Country*



*among countries with at least 10 hosts by 2023

Figure 29

Average Number of Properties per Host, by NH Counties

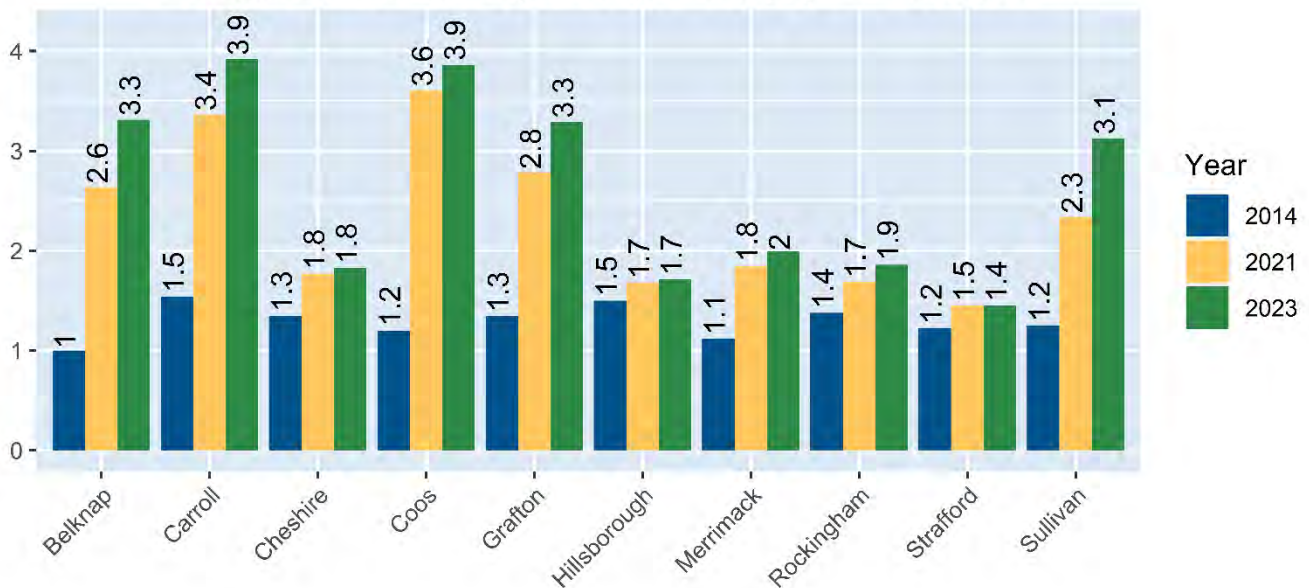


Figure 30

Average Number of Properties per Host, among New England States

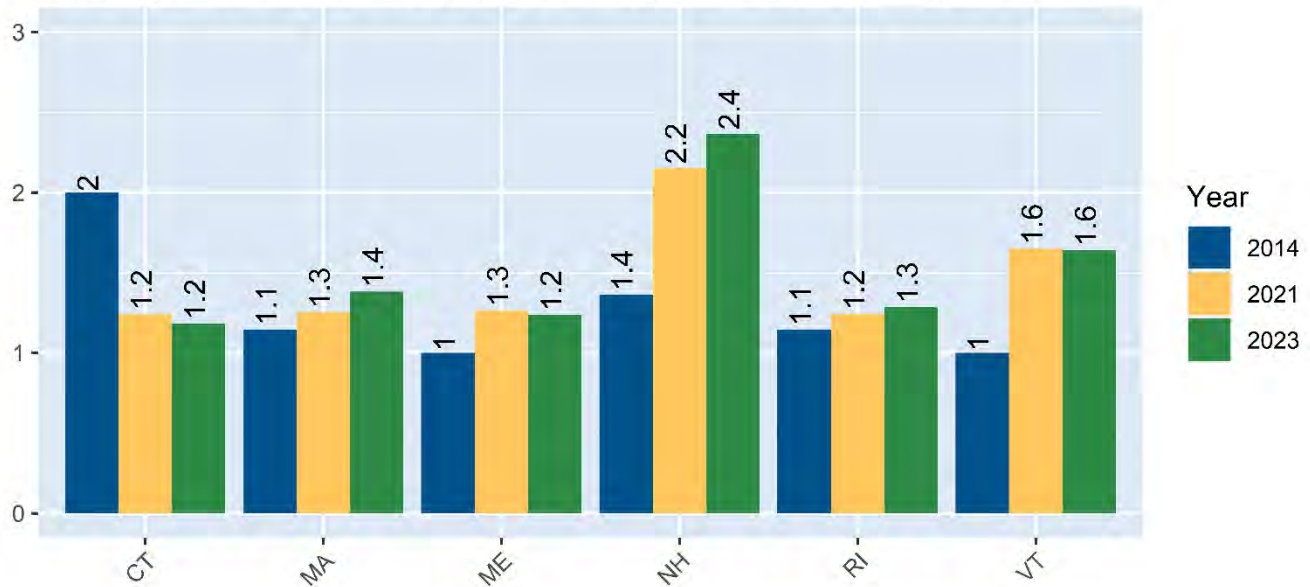
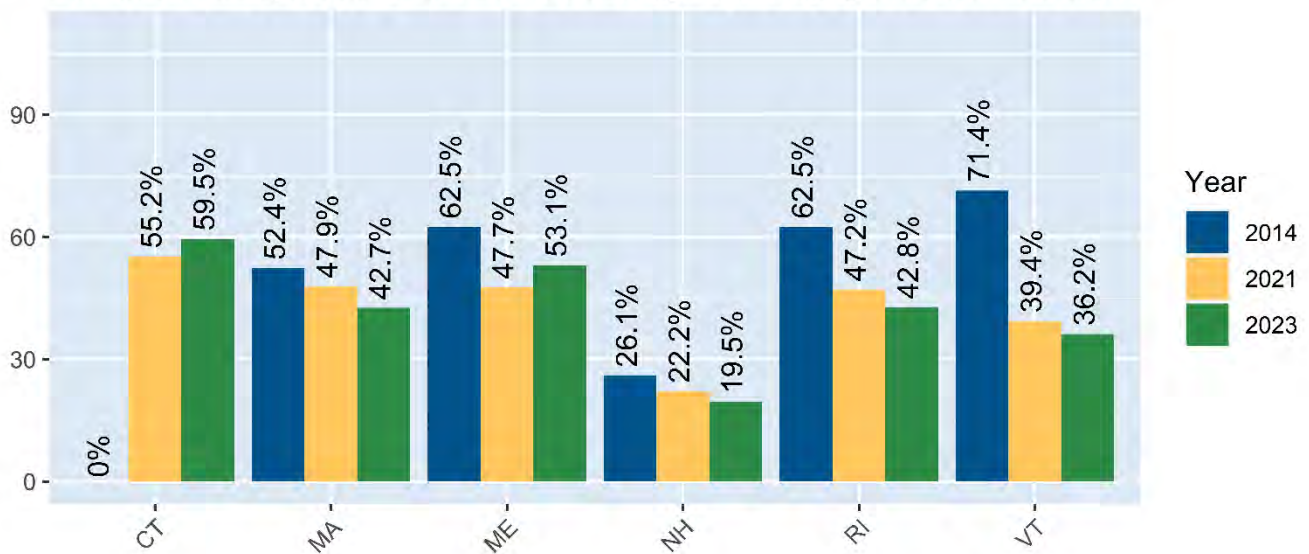


Figure 31

Percent of Properties that are Secondary Homes, by Location of Host*



*among New England states

Figure 32

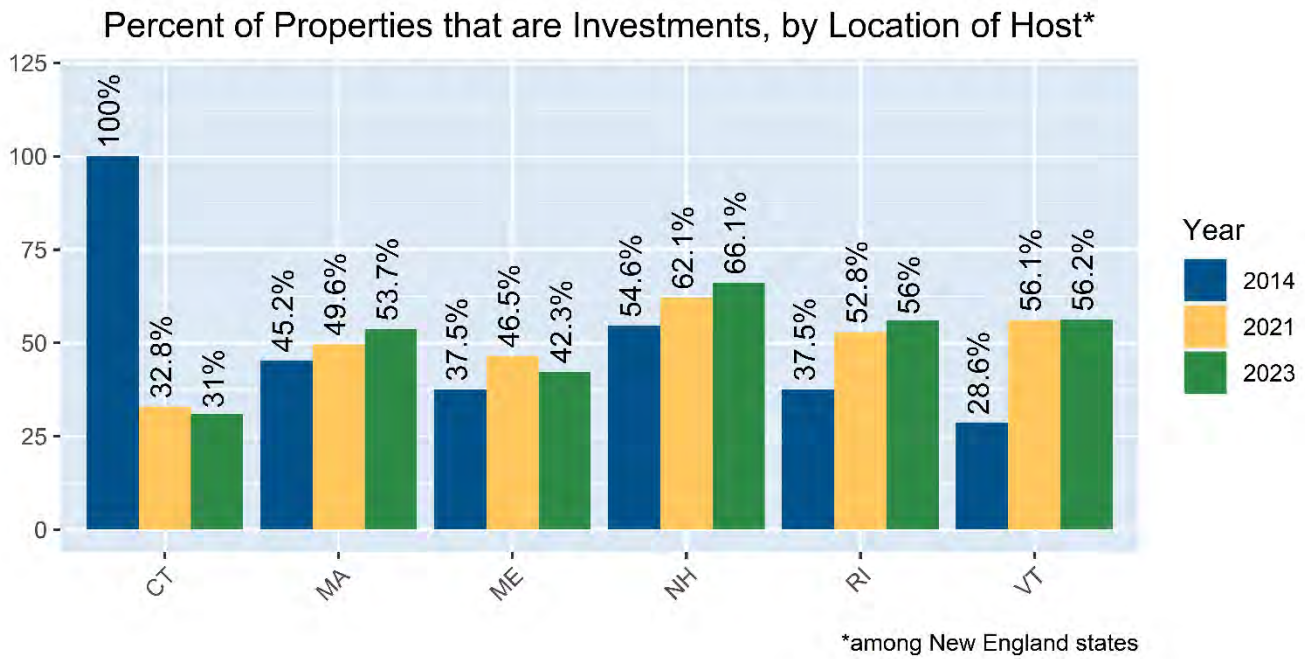


Figure 33

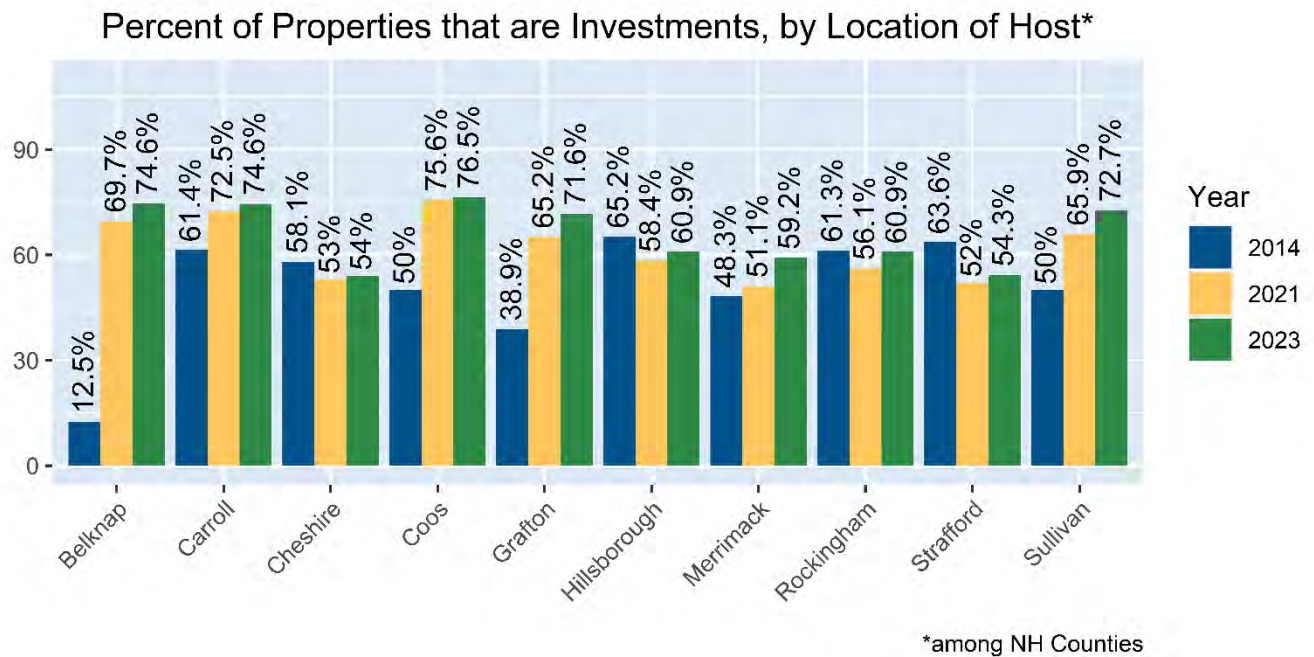
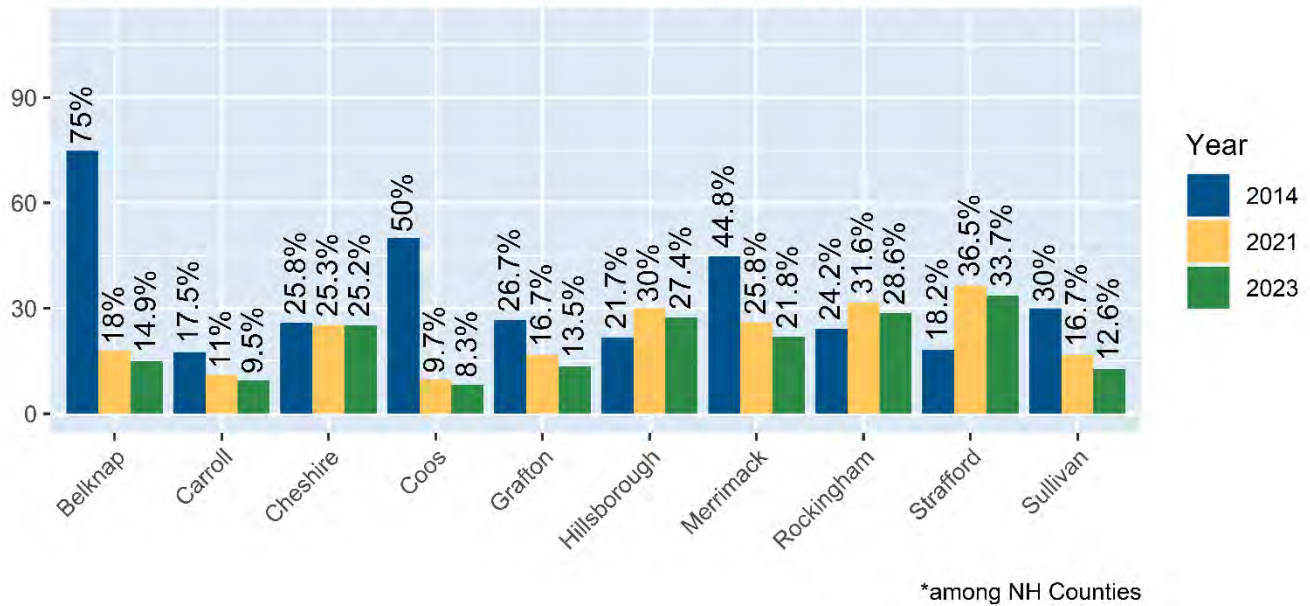


Figure 34

Percent of Properties that are Secondary Homes, by Location of Host*



Regression Analysis

The relationship between rental vacancy rate and STR prevalence was the strongest of all measured, especially for the first and third independent variables used: Change in STRs as a Share of Total Housing Units and Change in STRs Per 1000 People. This was true only for the NH Housing Rental Survey measure of vacancy rate, not the Census vacancy rates. However, since the NH Housing Rental Survey has a larger sample size, and therefore less uncertainty, the NH Housing data is more reliable than the Census data. As shown in Figure 35, the relationship between the change in STRs as a share of total housing units from 2014 to 2021 and rental vacancy rate yielded an R-squared score of 0.14. This means that 14% of the decrease in vacancy rates experienced in the NH market can be attributed to the increase in short-term rentals as a share of total housing units. This correlation's p-score of 0.00008869 indicates that this relationship is highly statistically significant. As seen in Figure 36, the relationship between Change in STRs Per 1000 People and Rental Vacancy rates resulted in an R-squared score of 0.23, meaning that the increase in STRs per capita is responsible for 23% of the decrease in rental vacancy rates. This regression's p-score of 0.0000002817 indicates an even higher degree of statistical significance.

This is an interesting counterpoint to the finding shown in Figure 10, that the proportion of housing units that are SROs has remained steady since 2014. Are online STRs eating into previous SRO stock or long-term rental stock? The regression analysis shows that an increase in STRs does not correlate to an increase in the proportion of units that are SROs. As can be seen in Figures 37 through 39, across all three measures of online STRs, there is no relationship between changes in STRs and SROs for the study period. If online STRs were drawing primarily on long-term rental stock, an increase in online STRs would correspond to an increase in the share of units classified as SROs, since long-term stock would have been converted to SRO status. However, the relationship between online STRs and rental vacancy

rates is too compelling to ignore. Therefore, this study's interpretation of this data is that the majority of STRs are converted from units that were already SROs; however, a small number of STRs statewide come from the long-term rental stock, and this relationship may impact some communities more than others.

Apart from the two relationships studied in Figures 35 and 36, no other significant relationships were found with online STRs and a variety of housing market metrics. There were no significant relationships between online STRs and any ACS metric: median rent, overall vacancy rate, rental vacancy rate, owner-occupied vacancy rate, or percent of housing units that are SROs. There was no relationship of significance found with the NH Housing Rental Survey's measure of median rent, except in comparison with the change in STRs as a share of SROs. However, other evidence indicates that change in STRs as a share of SROs might be an unreliable indicator. It was the only independent variable that did not correlate with rental vacancy rates and the p-score of 0.0137 in its relationship with median rent implies only a slight statistical significance. That, paired with the fairly low R-squared score of 0.06859, means that it cannot be concluded that online STRs have any noticeable effect on median rent.

As established earlier in this study, the short-term rental market varies from community to community. Therefore, a trend or causation that may not exist in one community may exist in another. Alternatively, a correlation present in the statewide data, such as the effect on rental vacancy rates, may have a greater or lesser effect on one community or another. Consequently, most of the regression analyses performed on statewide data was replicated in each county. After seeing that the second independent variable – change in STRs as a share of SROs – did not have a statistically significant relationship with STRs generally, it was excluded from county-level regression analysis. Additionally, after determining that ACS measurements of vacancy rates were less reliable than NH Housing Rental Survey vacancy rates, they were excluded as dependent variables from county-level regressions.

While the diversity of STR markets merits this county-level analysis, small sample sizes limit the confidence in conclusions. Only two counties saw notable patterns emerge in the data. Hillsborough County saw a similar pattern as the state overall in rental vacancy rates. The increase in short-term rentals in Hillsborough correlated with a decrease in rental vacancy rates. This pattern was found using both the first and third independent variables: the change in STRs as a share of total housing units and the change in STRs per one thousand people. Regression using the first independent variable (the change in STRs as a share of total housing units) yielded an R-squared score of 0.2813 and a p-value of 0.04195, indicating a significant relationship. Regression using the third independent variable (the change in STRs per one thousand people) yielded an R-squared score of 0.3874 and p-value of 0.01322 also indicates a significant relationship.

The second county with notable patterns was Coos. Again, they mirrored the same trend seen statewide in rental vacancy rates. Regression analysis of the first independent variable (the change in STRs as a share of total housing units) yielded a very high R-Squared score of 0.9571 with a very low p-value of 0.003827. Regression analysis of the third independent variable (the change in STRs as a share of total housing units) had an even higher R-squared score of 0.9817 and a lower p-value at 0.001056. However, note that only five Coos County municipalities had enough data to be included in this regression analysis. Therefore, it could not be said with a high degree of confidence that the increase in STRs accounts for 98% of all decrease in rental vacancy rates. That being said, the effect of STRs on Coos County rental vacancy rates is substantial.

No other trends of statistical significance were found in the county-by-county regression analysis. This was in large part due to small sample sizes. For a full account of R-squared scores and p-values for every county, see Appendix II, tables xxiii to xli. In Tables 37 through 39 and Appendix II, Tables xxiii to xli, the cells of dependent variables are colored according to their source. Cells colored blue are dependent variables sourced from the NH Housing Rental Cost Survey, and the cells colored yellow are sourced from the American Community Survey.

Figure 35

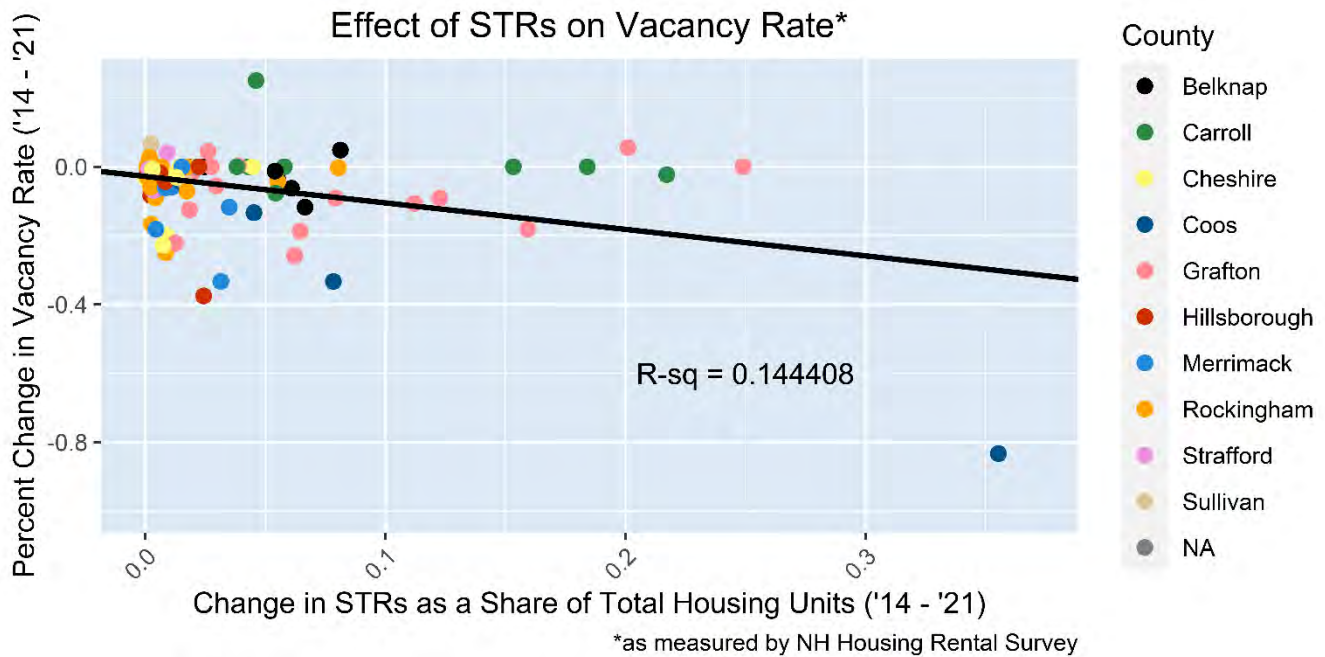
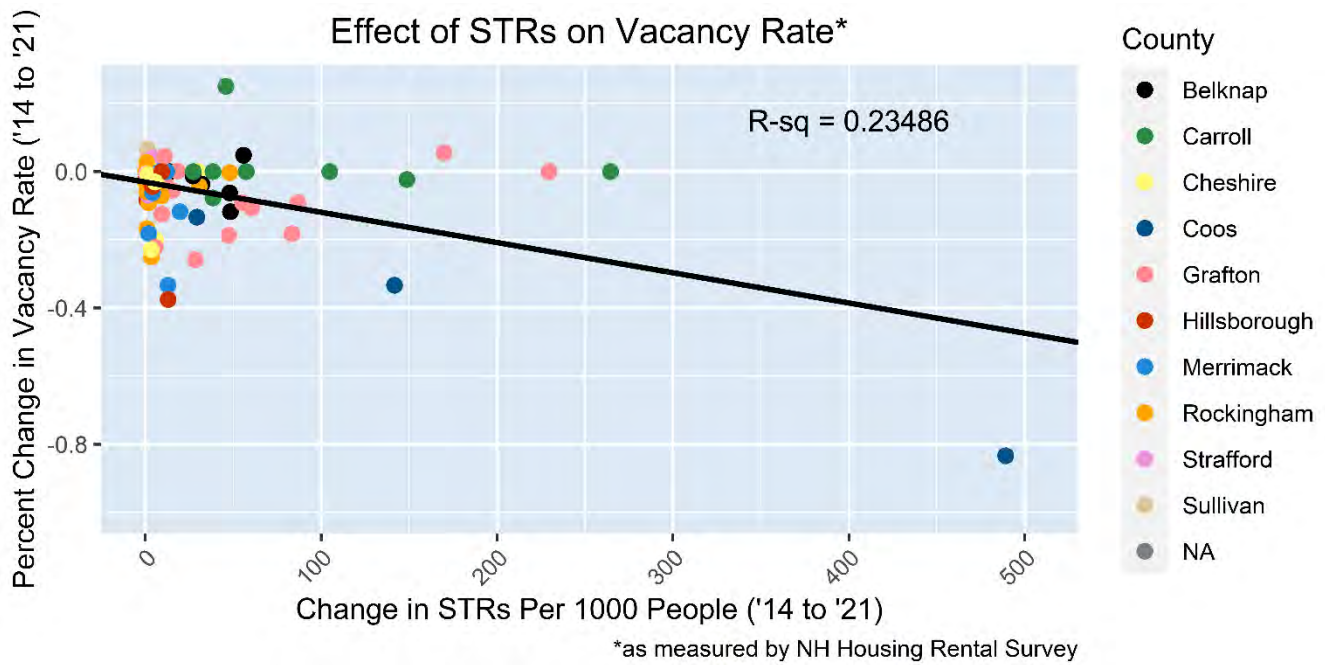


Figure 36



In the following figures, cells colored blue are dependent variables sourced from the NH Housing Rental Cost Survey, and the cells colored yellow are sourced from the American Community Survey.

Figure 37

Independent Variable: Change in STRs as a Share of Total Housing Units

Dependent Variable	R-Squared	p-value
Median Rent	0.007254	0.4019
Rental Vacancy Rates	0.1444	8.869E-05
Median Rent	0.01995	0.101
Overall Vacancy Rates	0.00519	0.3942
Rental Vacancy Rates	0.007845	0.2963
Owner Vacancy Rates	0.01379	0.164
Percent of Housing Units that are SROs	0.00198	0.599

Figure 38

Independent Variable: Change in STRs as a Share of SROs

Dependent Variable	R-Squared	p-value
Median Rent	0.06859	0.0137
Rental Vacancy Rates	0.001634	0.7052
Median Rent	0.006161	0.3843
Overall Vacancy Rates	0.0001537	0.8882
Rental Vacancy Rates	0.00008885	0.9152
Owner Vacancy Rates	0.00359	0.4966
Percent of Housing Units that are SROs	0.01803	0.1262

Figure 39

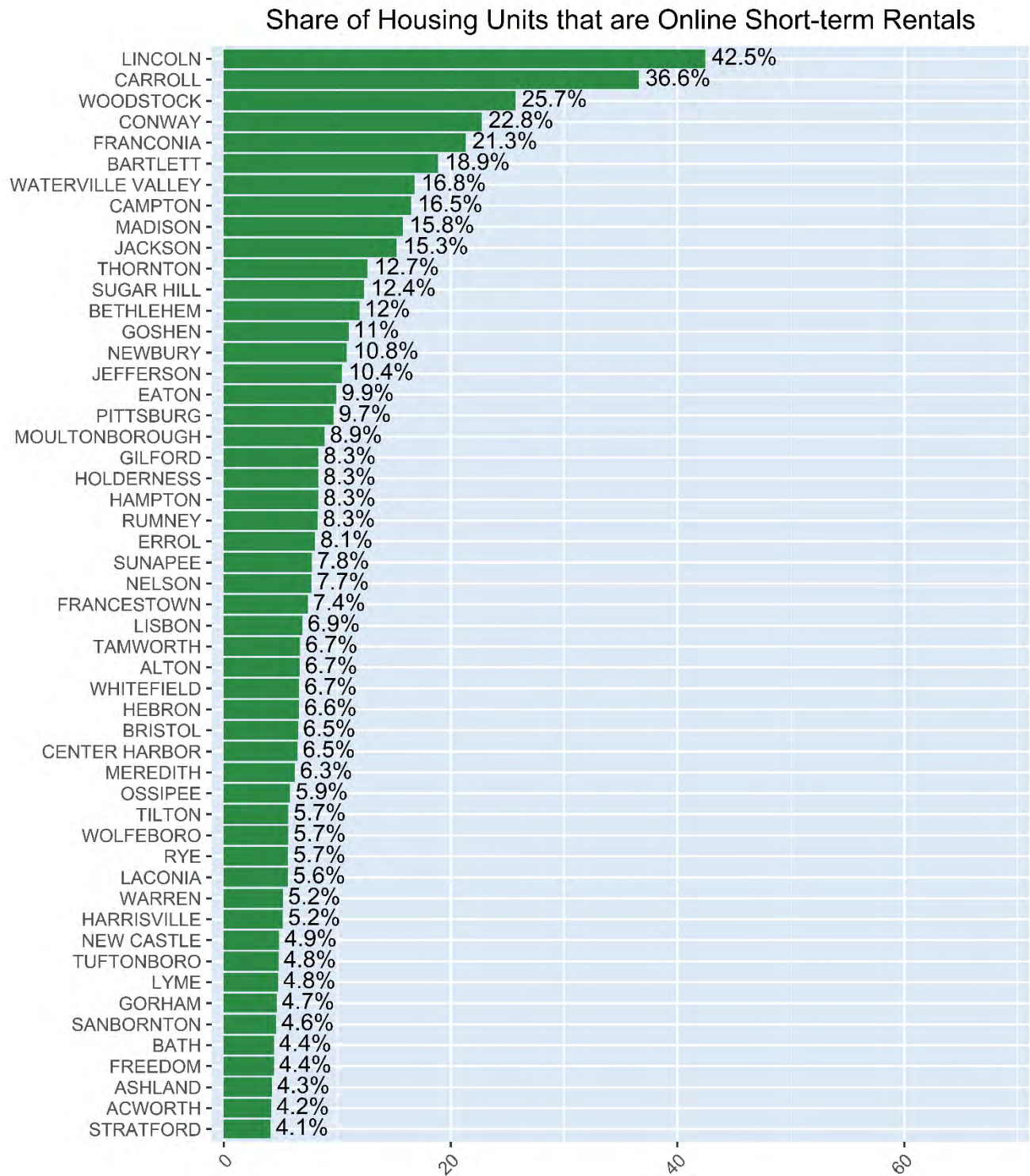
Independent Variable: Change in STRs Per 1000 People

Dependent Variable	R-Squared	p-value
Median Rent	0.005688	0.4581
Rental Vacancy Rates	0.2349	2.817E-07
Median Rent	0.003276	0.508
Overall Vacancy Rates	0.05882	0.003638
Rental Vacancy Rates	0.01135	0.2085
Owner Vacancy Rates	0.003491	0.4849
Percent of Housing Units that are SROs	0.0003122	0.8347

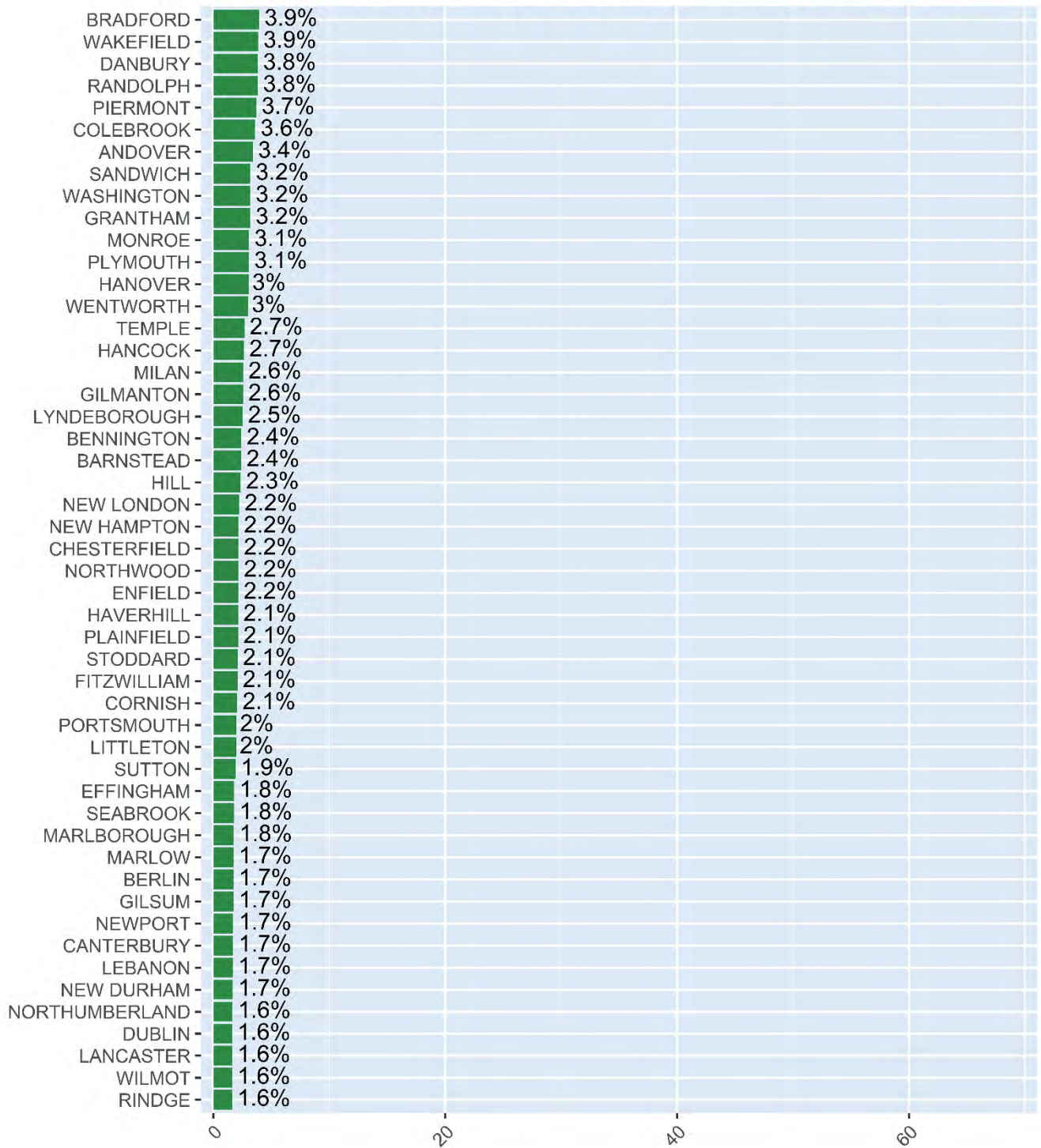
Appendices

Appendix I: Property and Host Location Visualizations

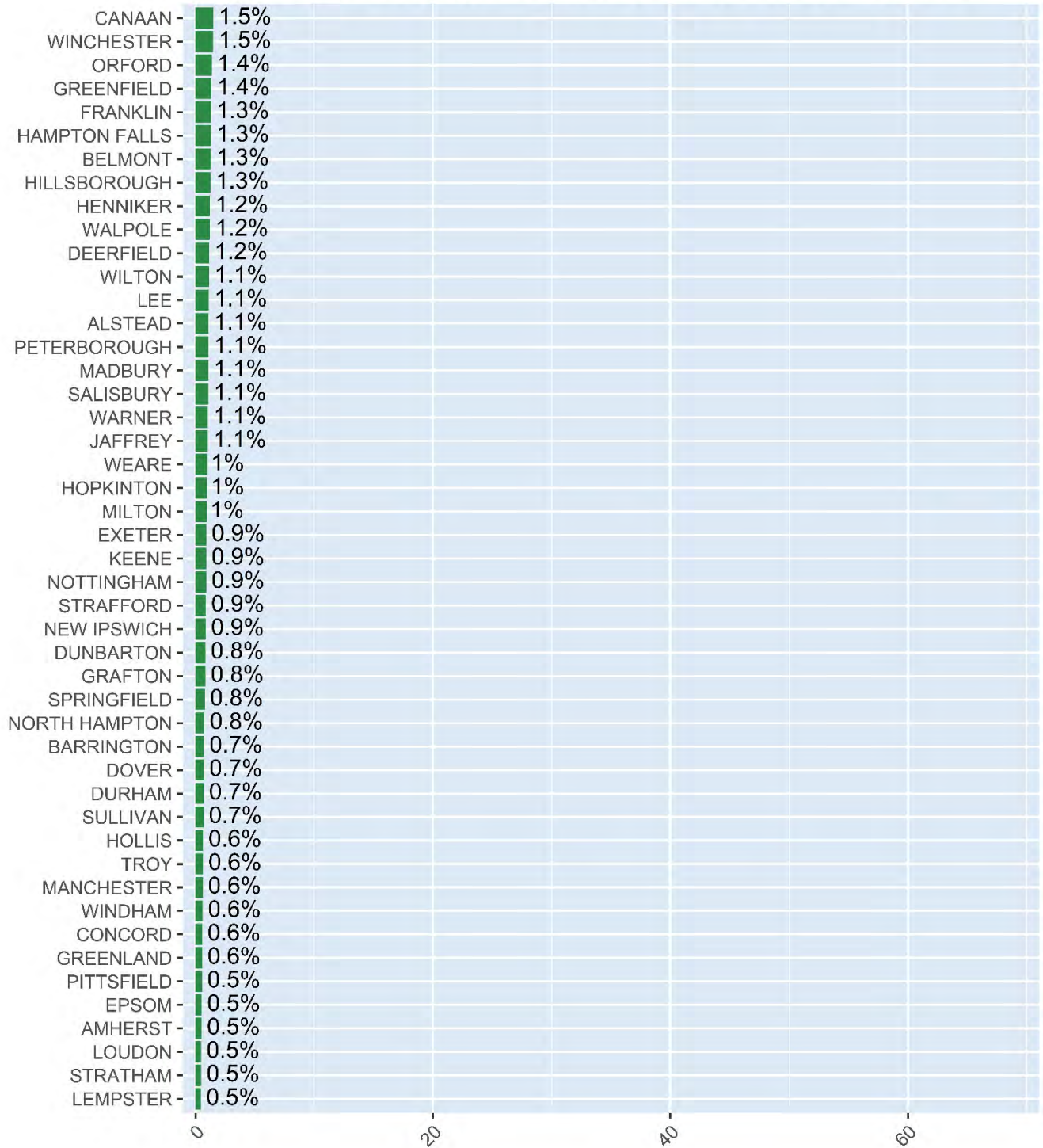
Figure i: Data is from 2021



Share of Housing Units that are Online Short-term Rentals



Share of Housing Units that are Online Short-term Rentals



Share of Housing Units that are Online Short-term Rentals

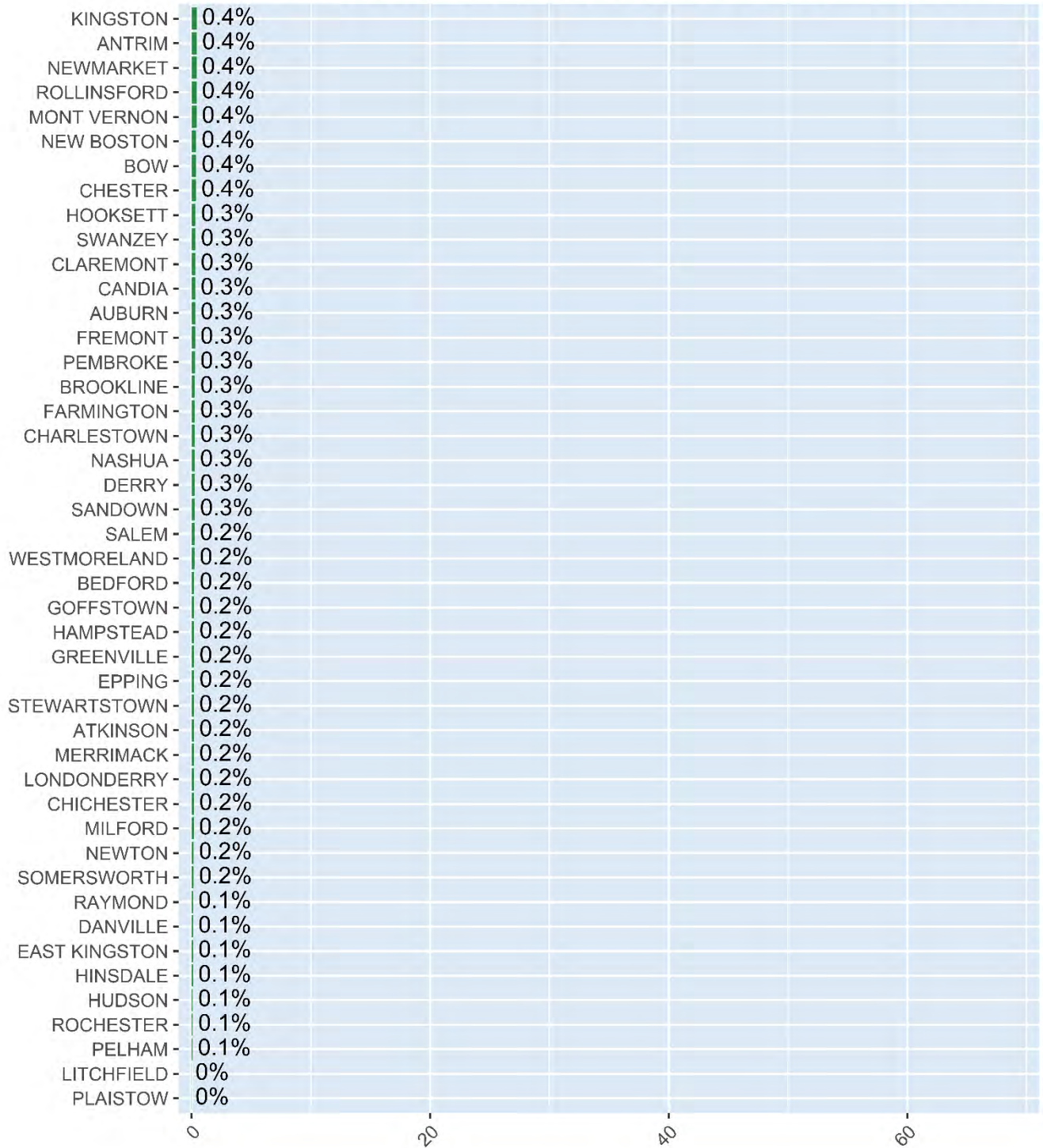
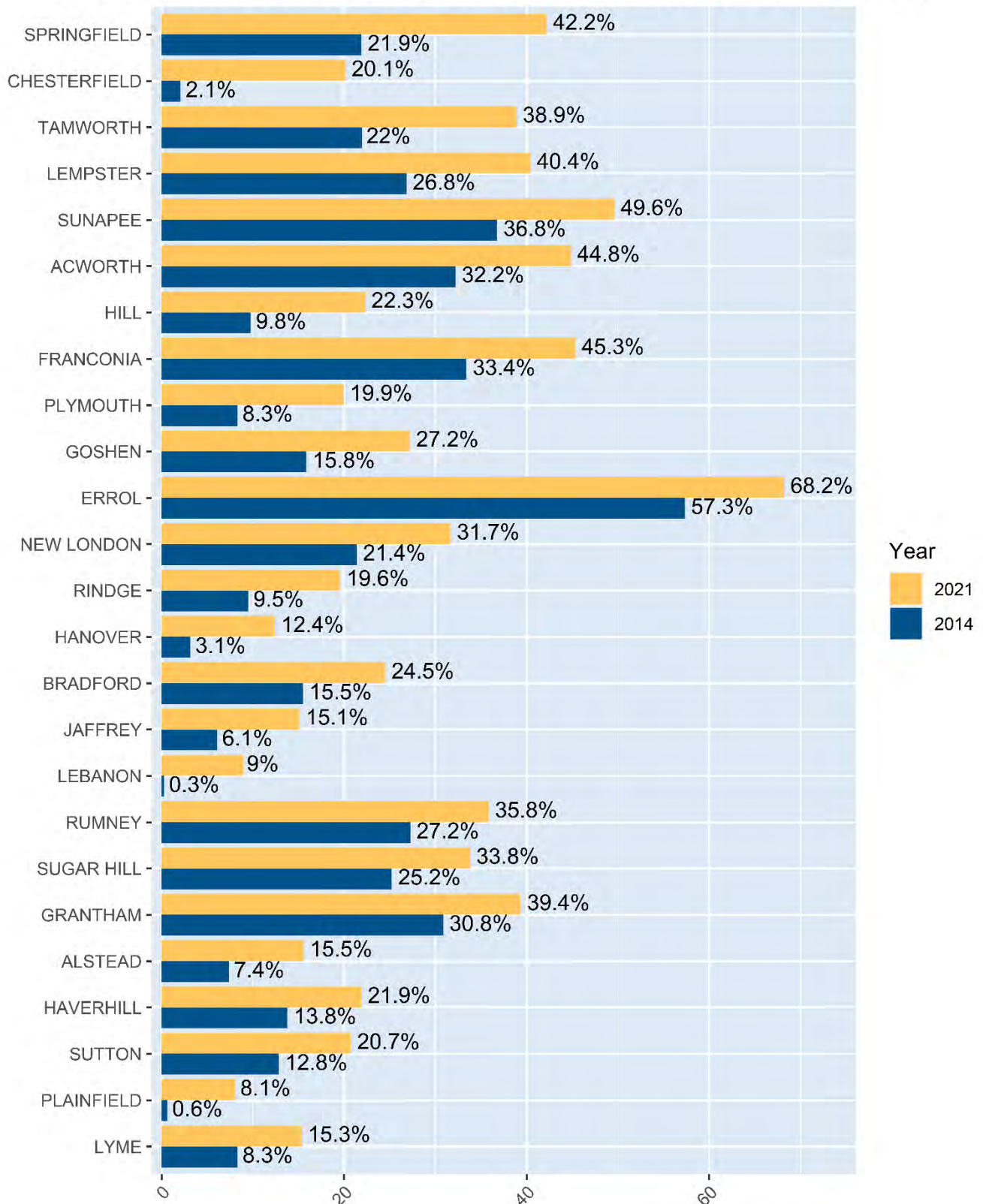


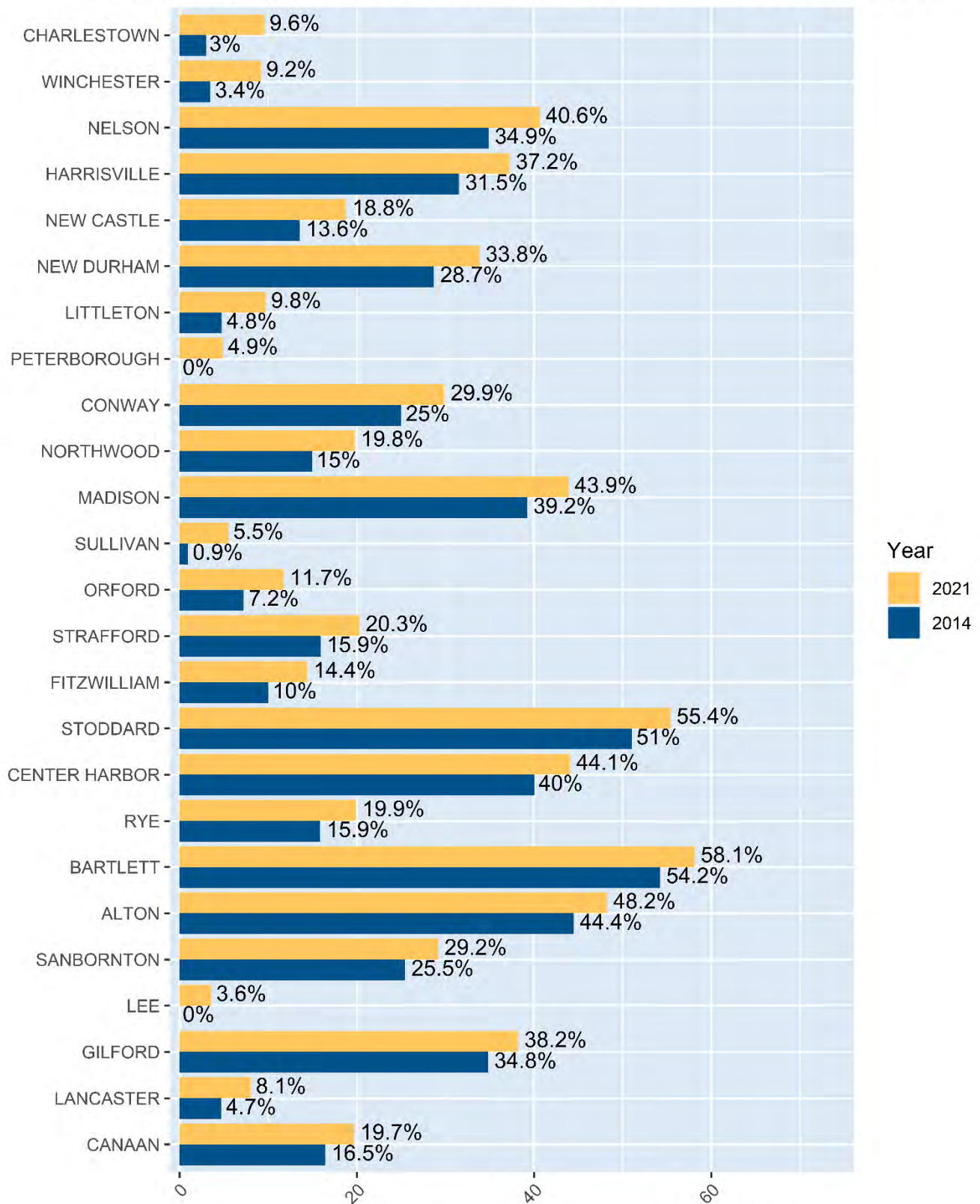
Figure ii

Share of Housing Units that are Seasonal, Recreational or Occasional Use*



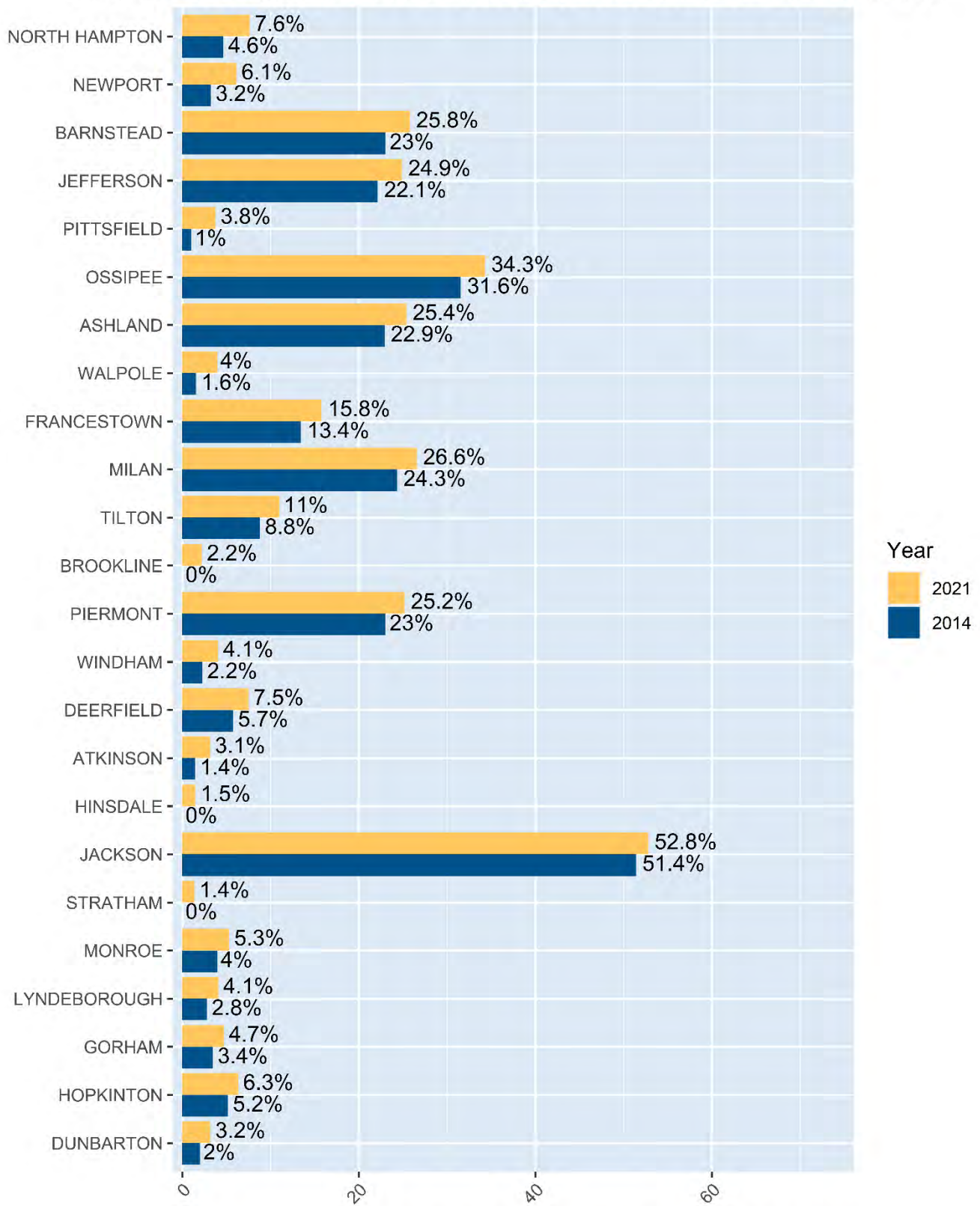
*towns are sorted by the greatest change from 2014 to 2021

Share of Housing Units that are Seasonal, Recreational or Occasional Use*



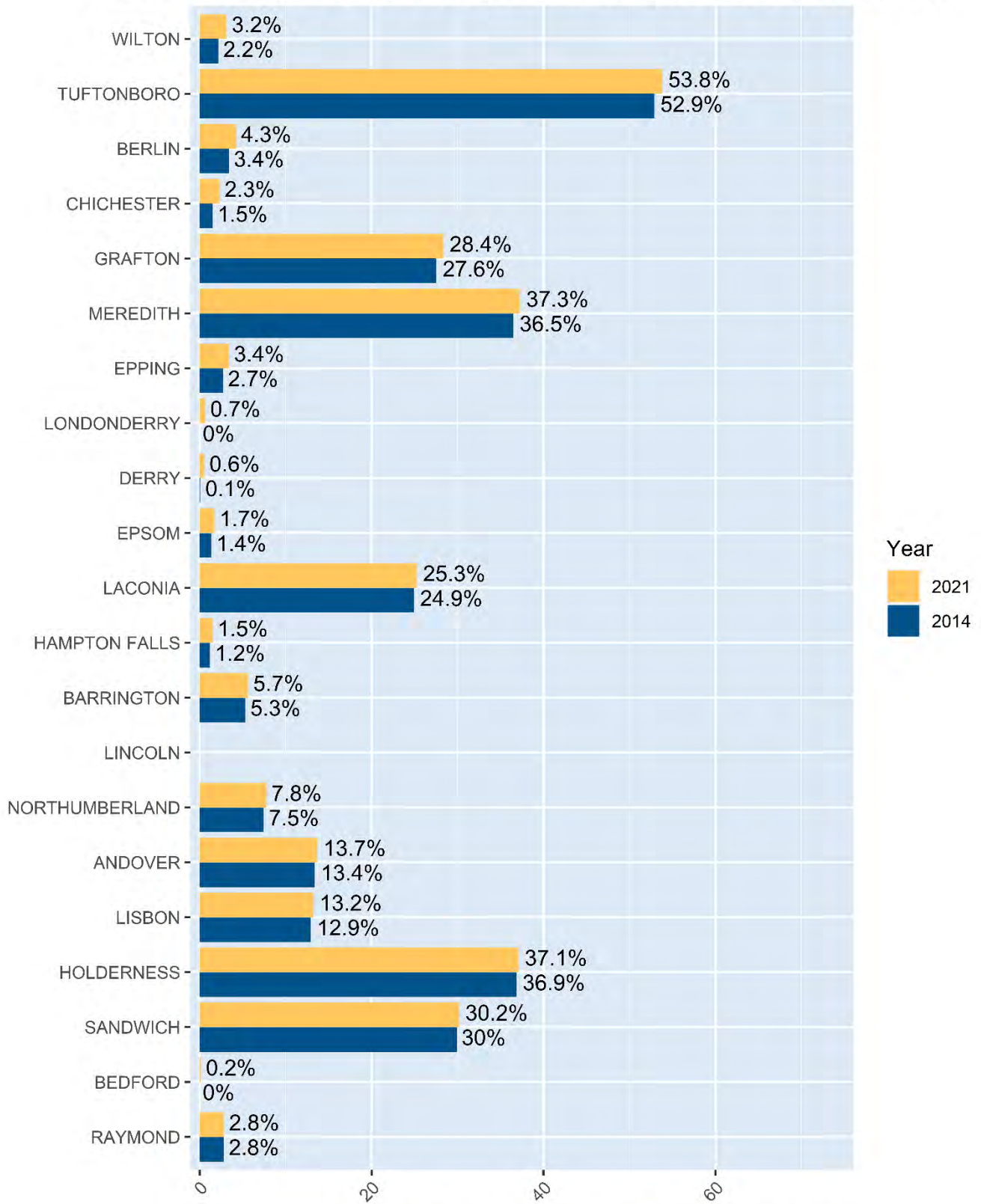
*towns are sorted by the greatest change from 2014 to 2021

Share of Housing Units that are Seasonal, Recreational or Occasional Use*



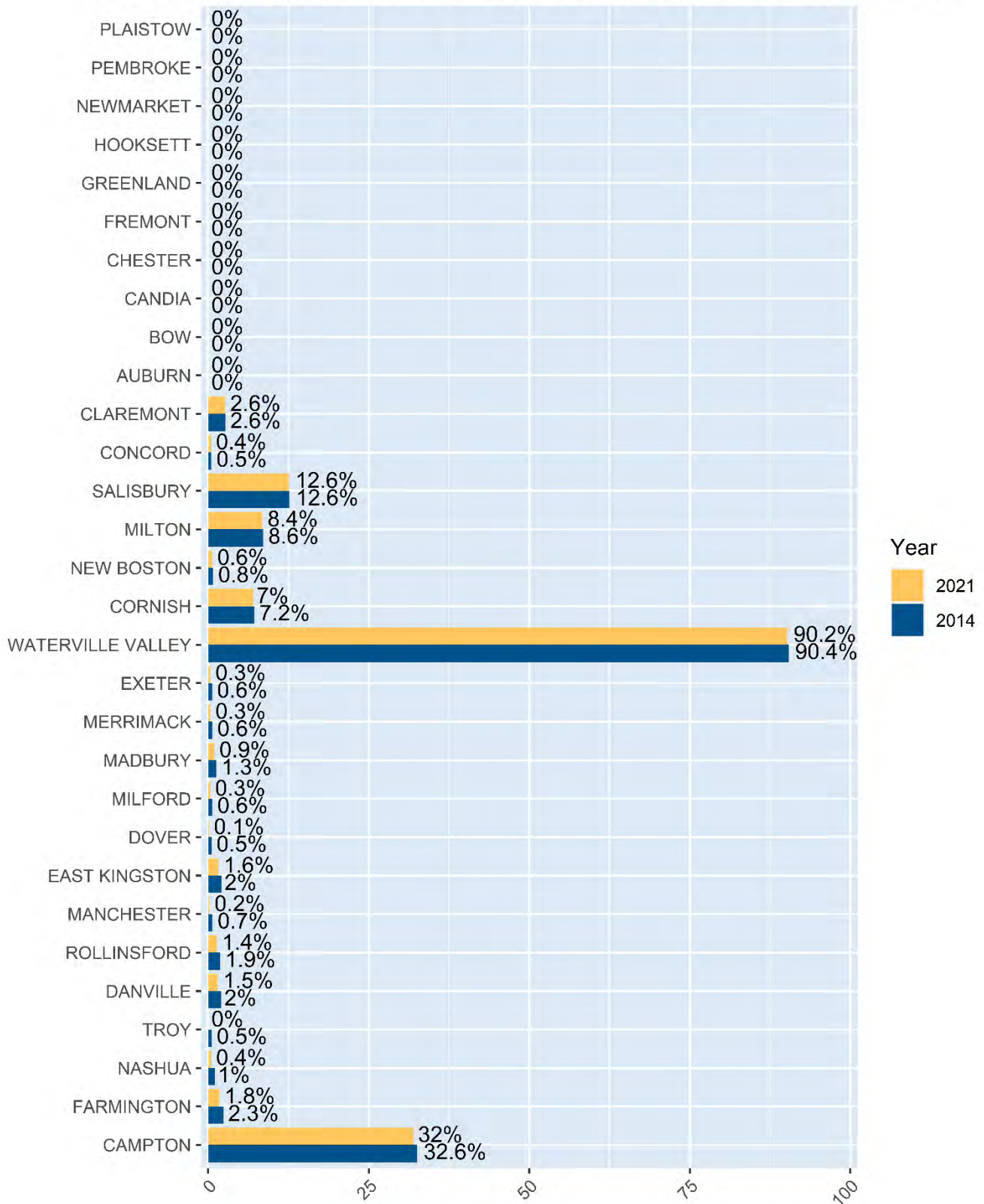
*towns are sorted by the greatest change from 2014 to 2021

Share of Housing Units that are Seasonal, Recreational or Occasional Use*



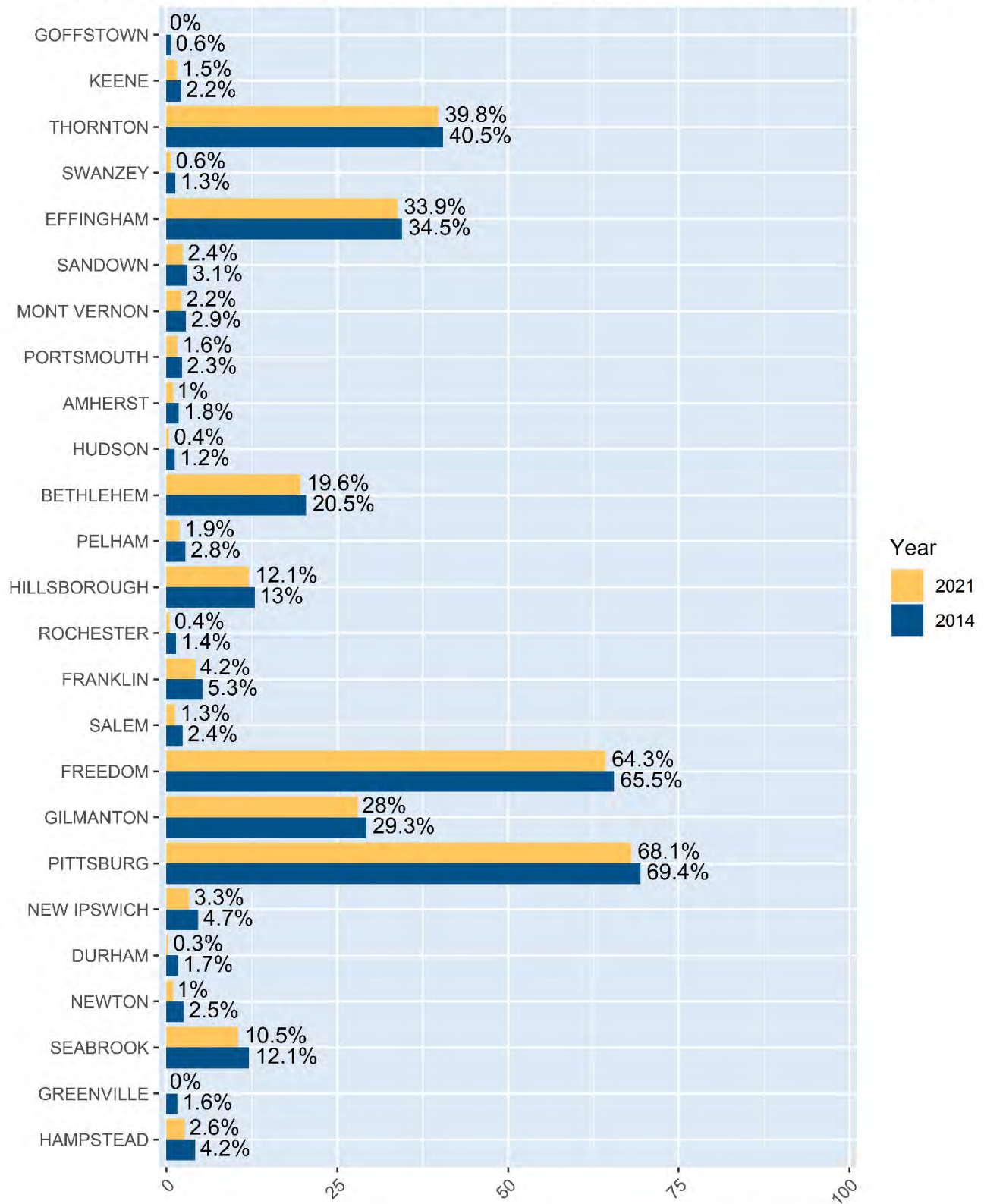
*towns are sorted by the greatest change from 2014 to 2021

Share of Housing Units that are Seasonal, Recreational or Occasional Use*



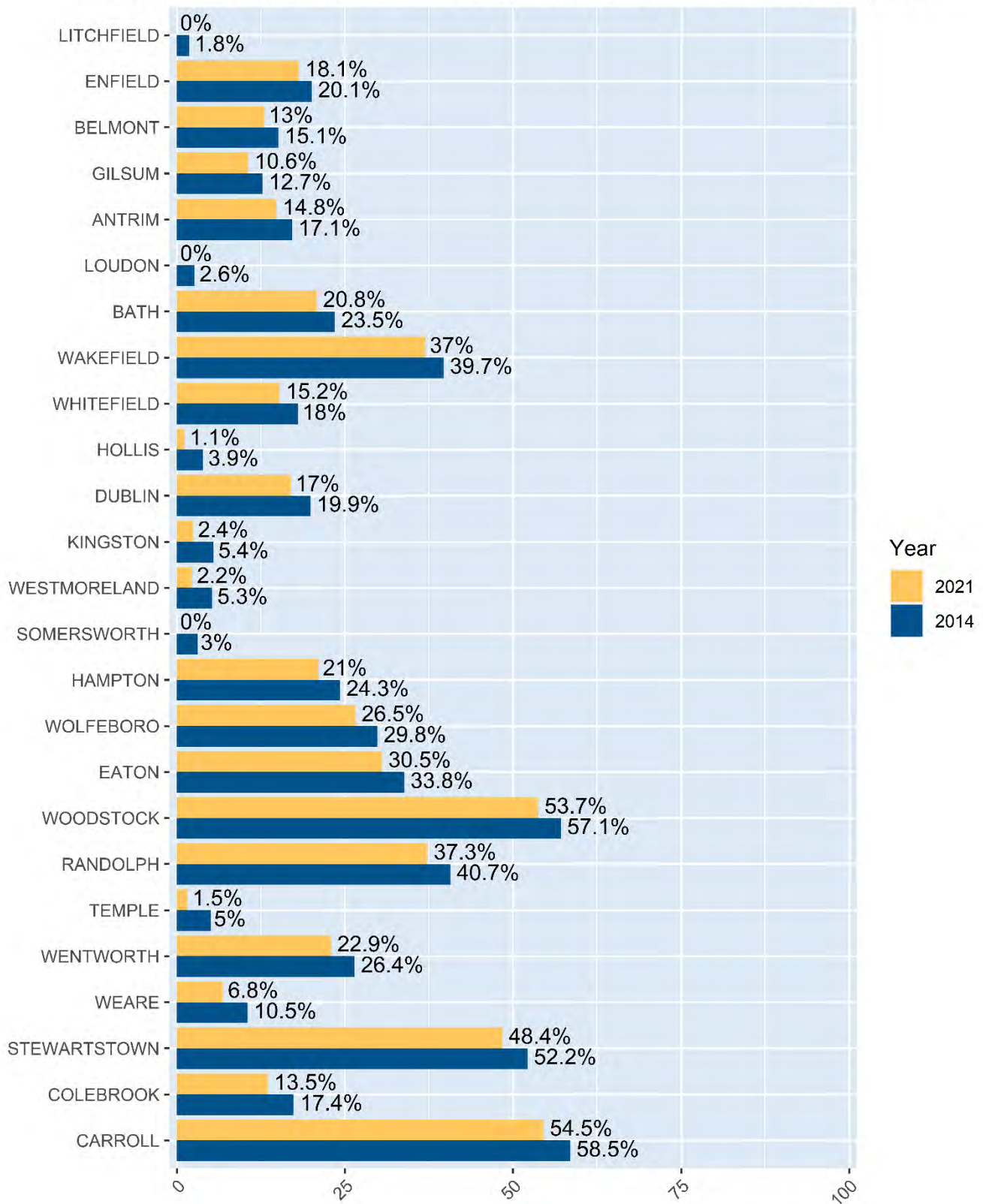
*towns are sorted by the greatest change from 2014 to 2021

Share of Housing Units that are Seasonal, Recreational or Occasional Use*



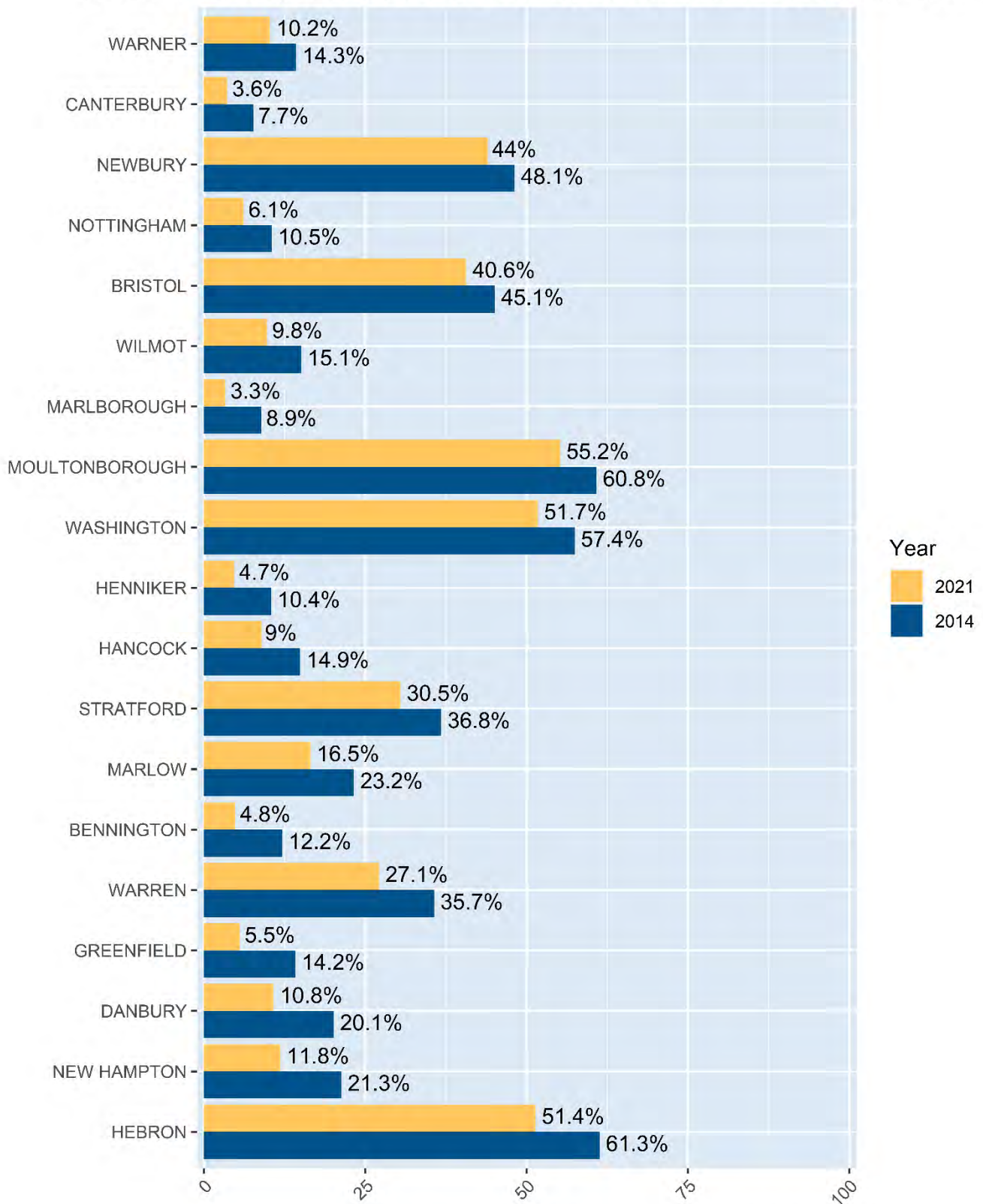
*towns are sorted by the greatest change from 2014 to 2021

Share of Housing Units that are Seasonal, Recreational or Occasional Use*



*towns are sorted by the greatest change from 2014 to 2021

Share of Housing Units that are Seasonal, Recreational or Occasional Use*



*towns are sorted by the greatest change from 2014 to 2021

Figure iii

Percent of STR Units Owned by Hosts Who Didn't List their Hometown

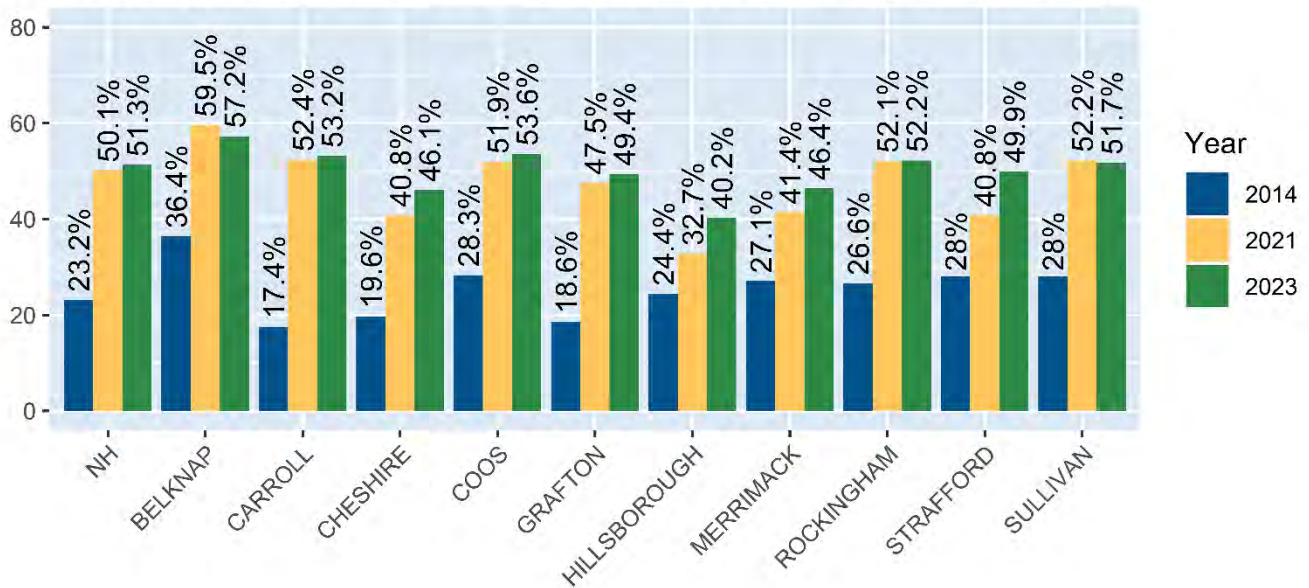


Figure iv

Percent of STR Units Owned by Hosts with no State Listed

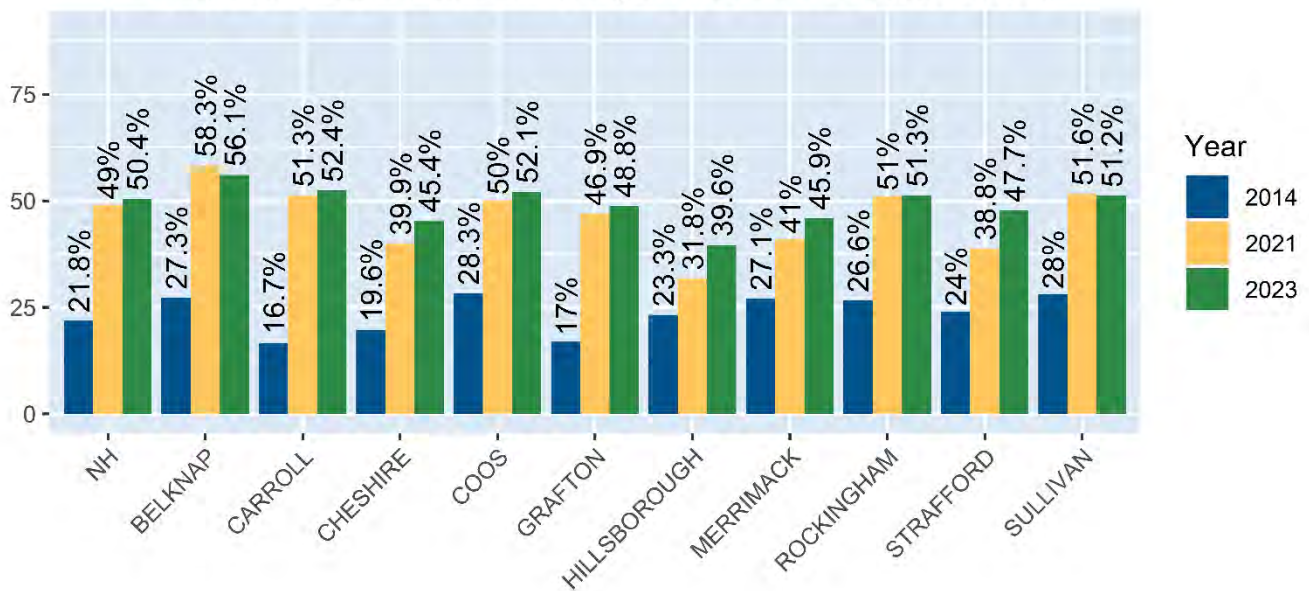


Figure v

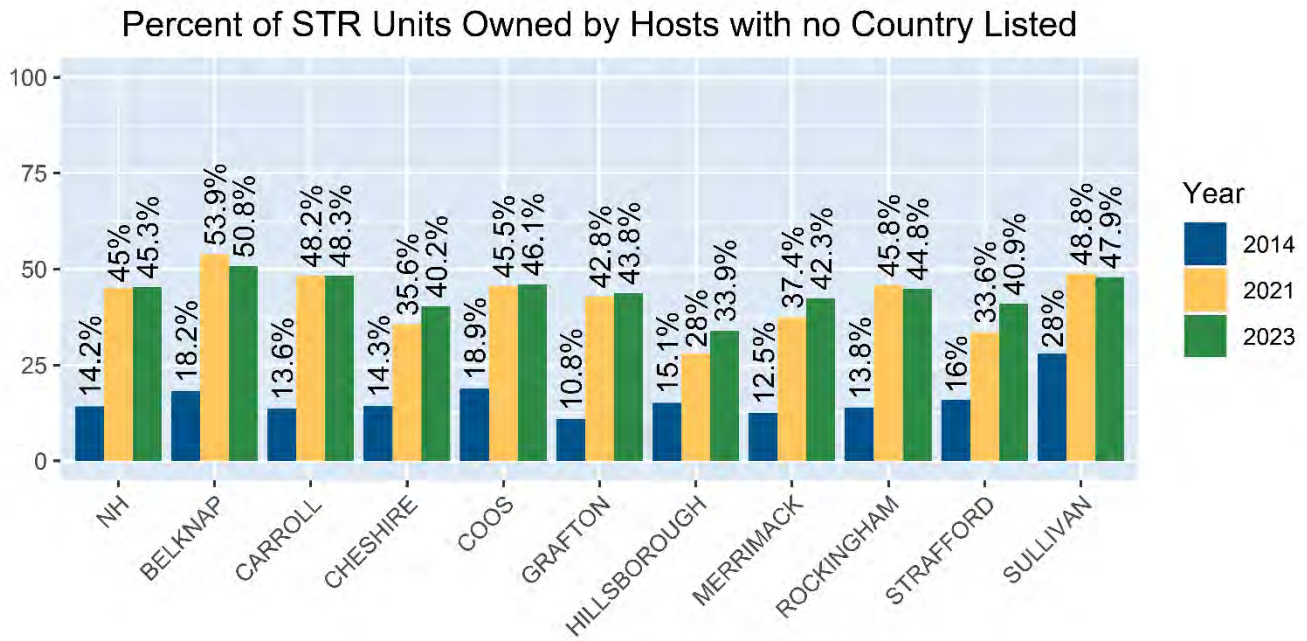


Figure vi

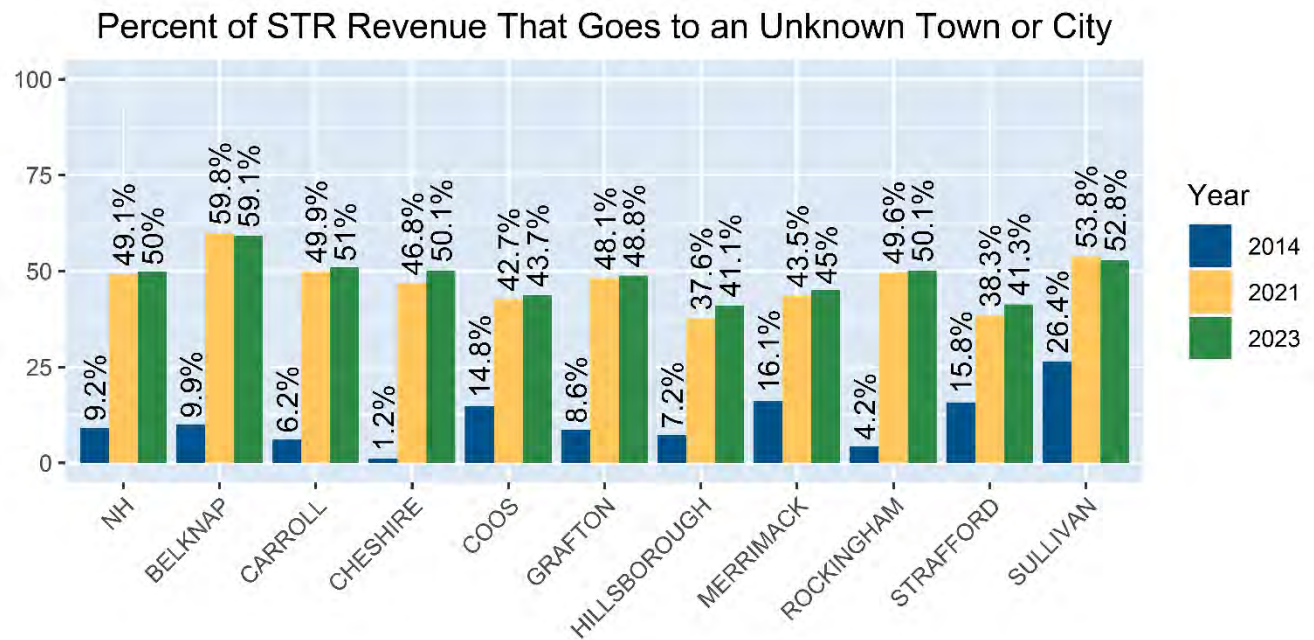


Figure vii

Percent of STR Revenue That Goes to Unknown Counties*

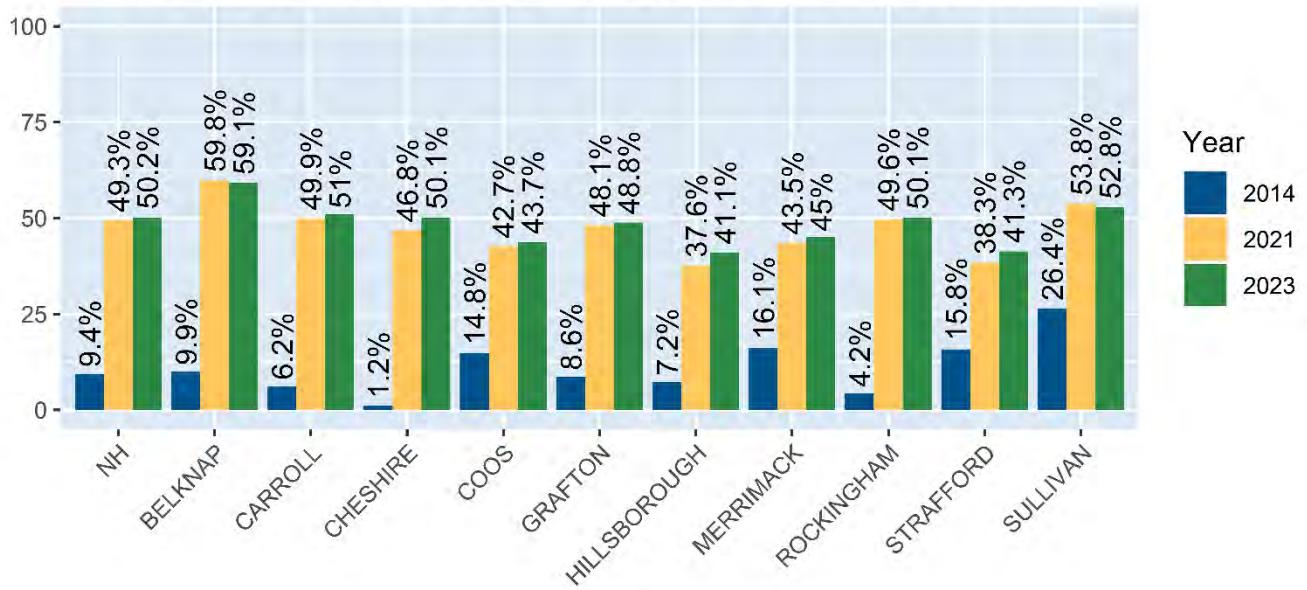


Figure viii

Percent of STR Revenue That Goes to an Unknown State

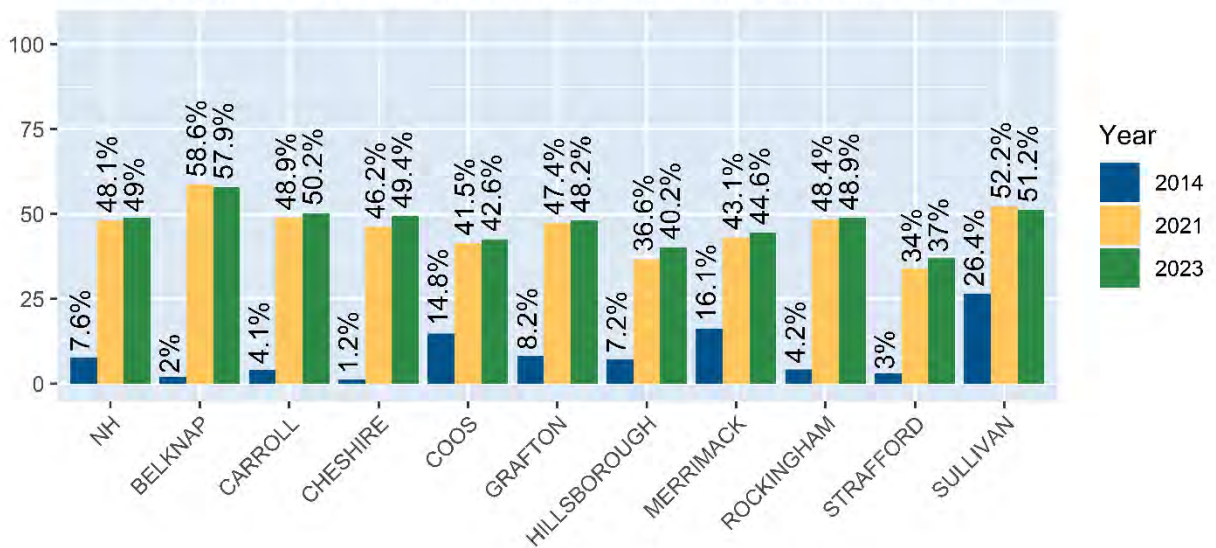


Figure ix

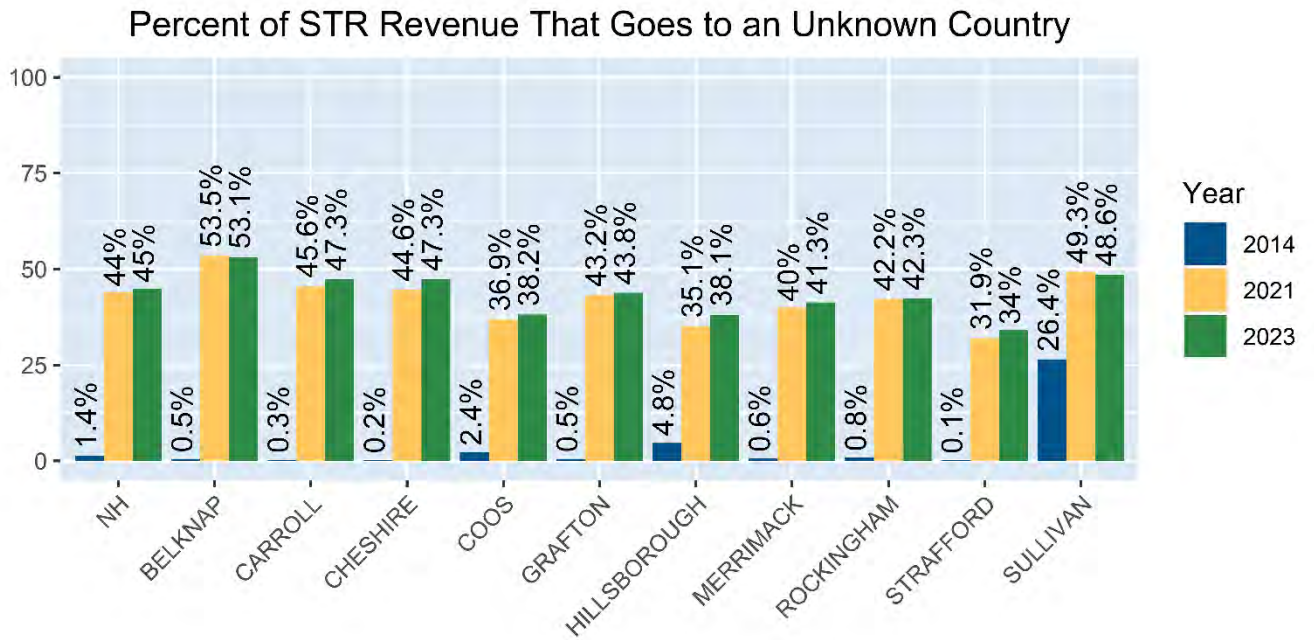


Figure x

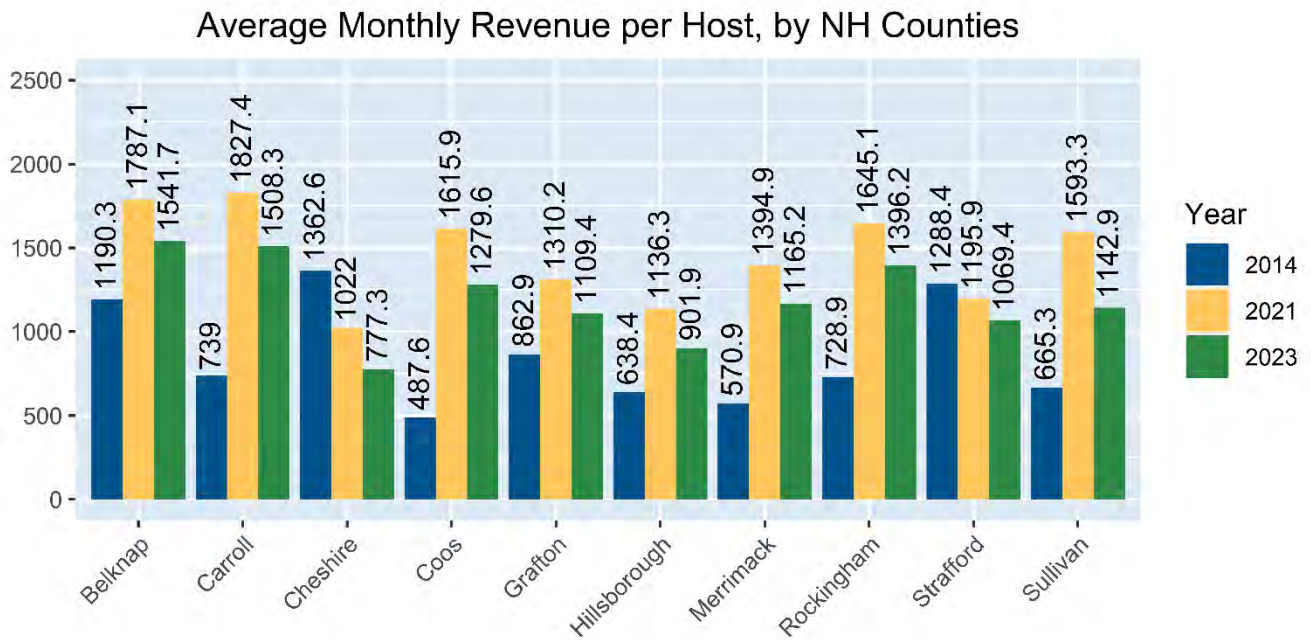
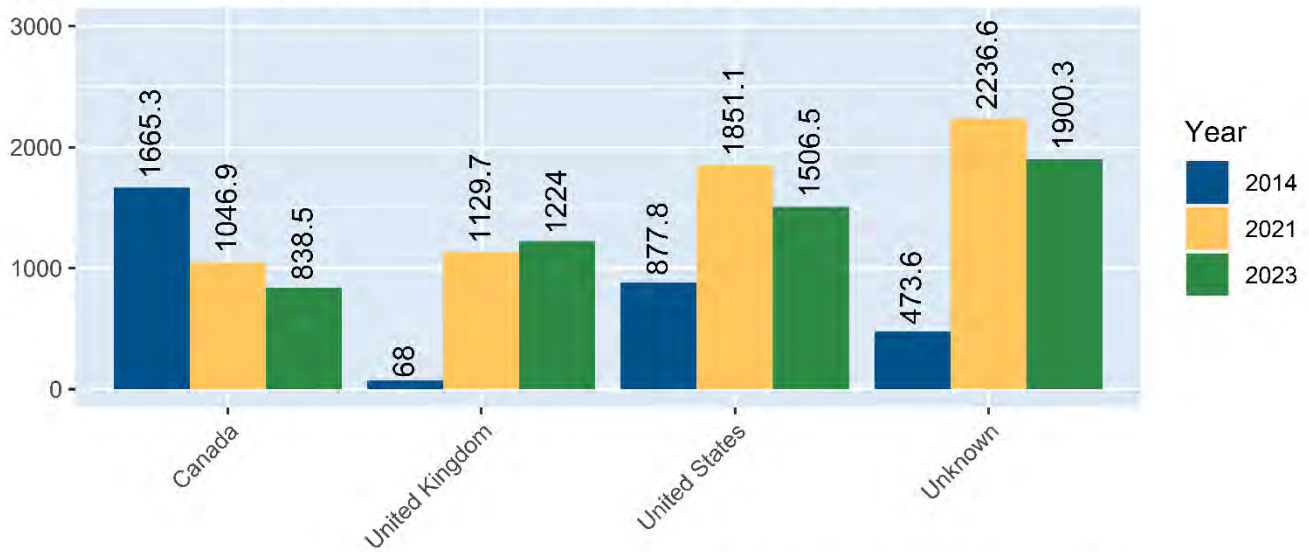


Figure xi

Average Monthly Revenue per Host, by Country



*among countries with at least 10 hosts by 2023

Figure xii

Median Monthly Revenue per Host, by NH Counties

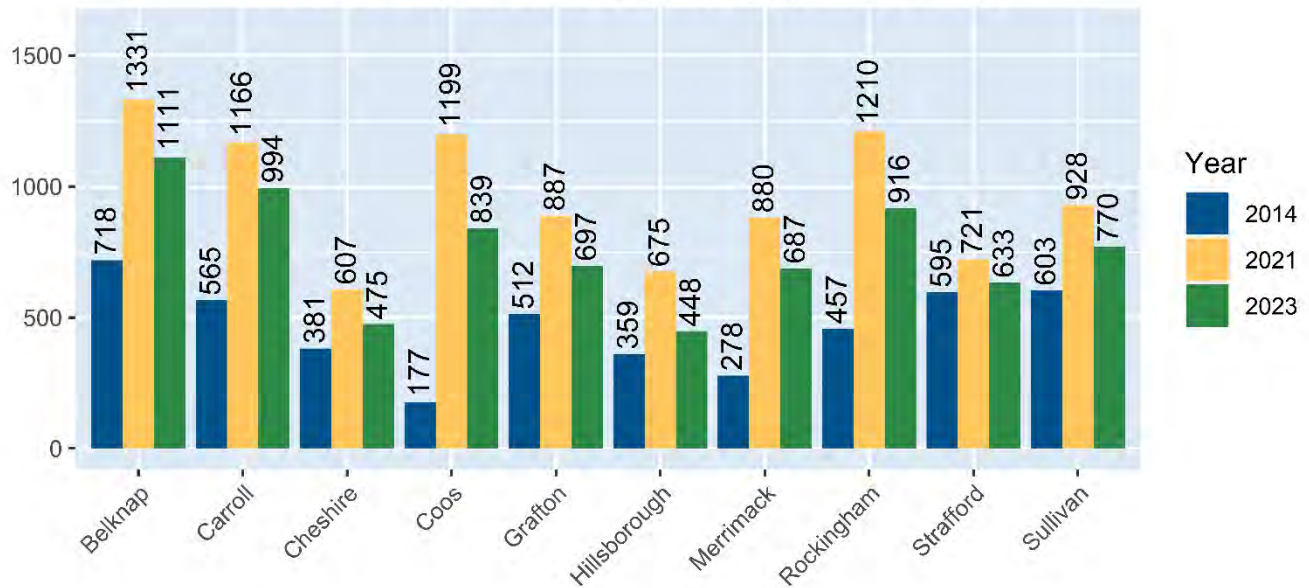


Figure xiii

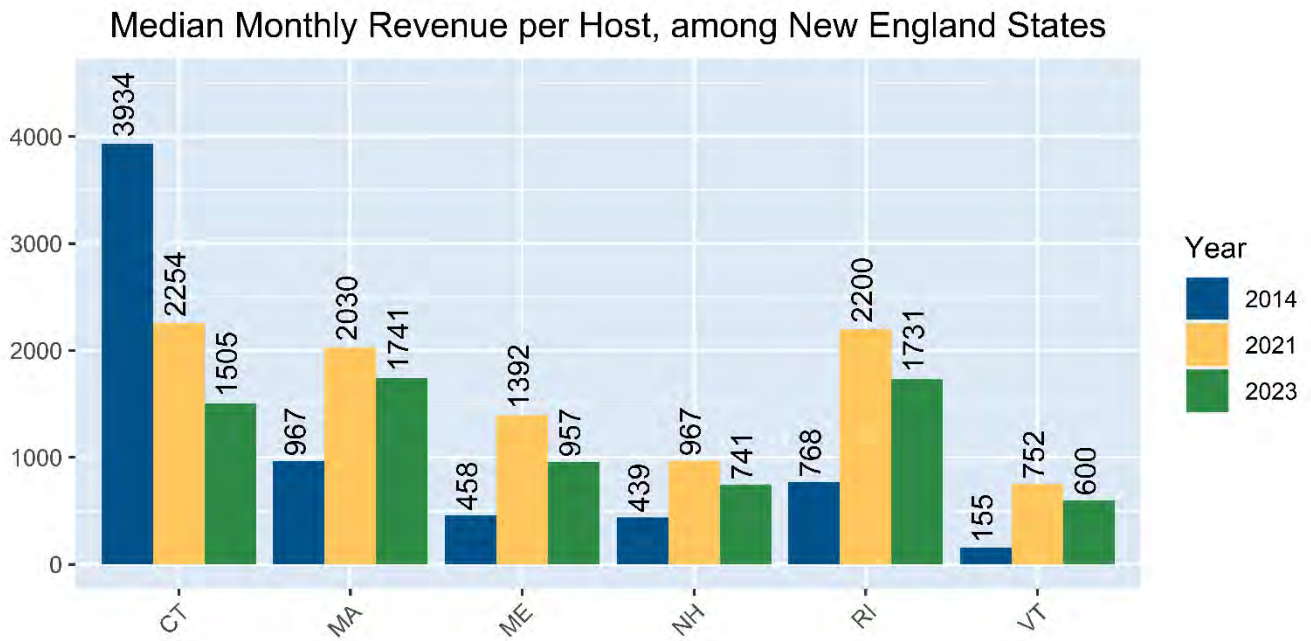
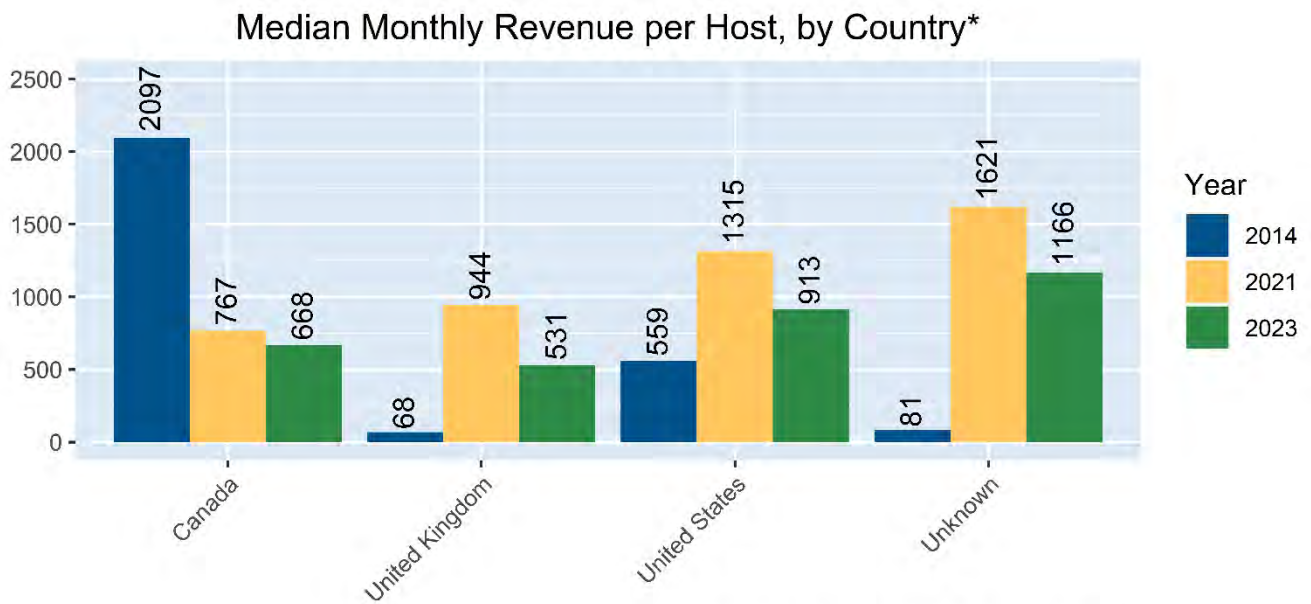


Figure xiv



*among countries with at least 10 hosts by 2023

Figure xv

Median Number of Properties per Host, by NH Counties

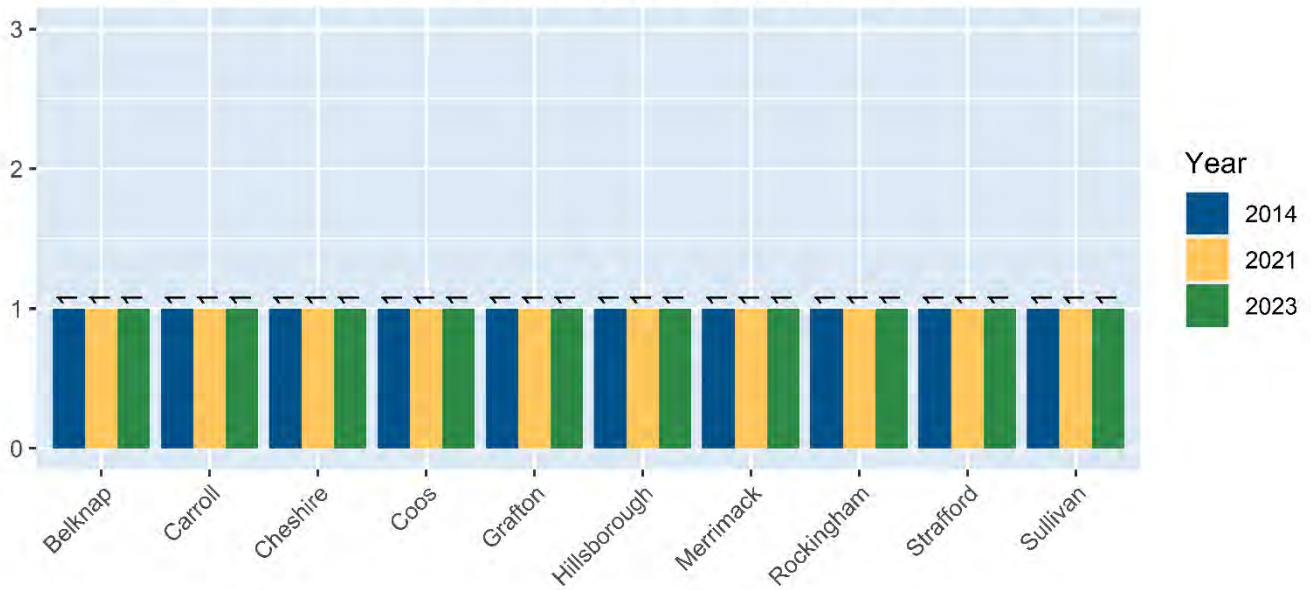


Figure xvi

Median Number of Properties per Host, among New England States

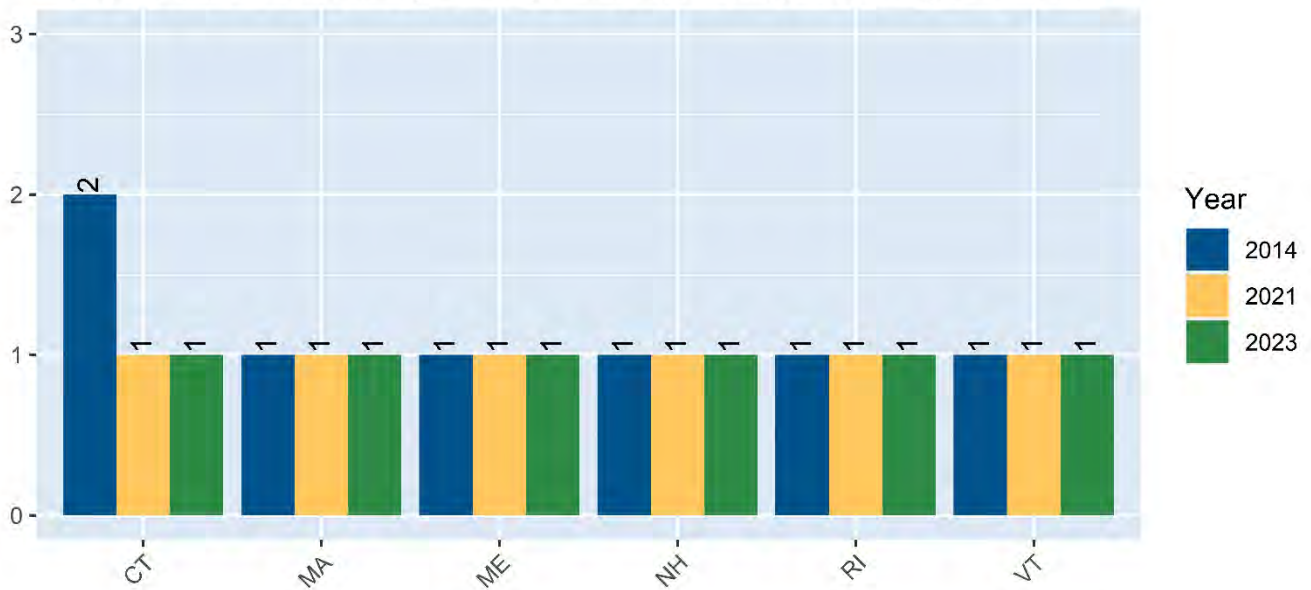
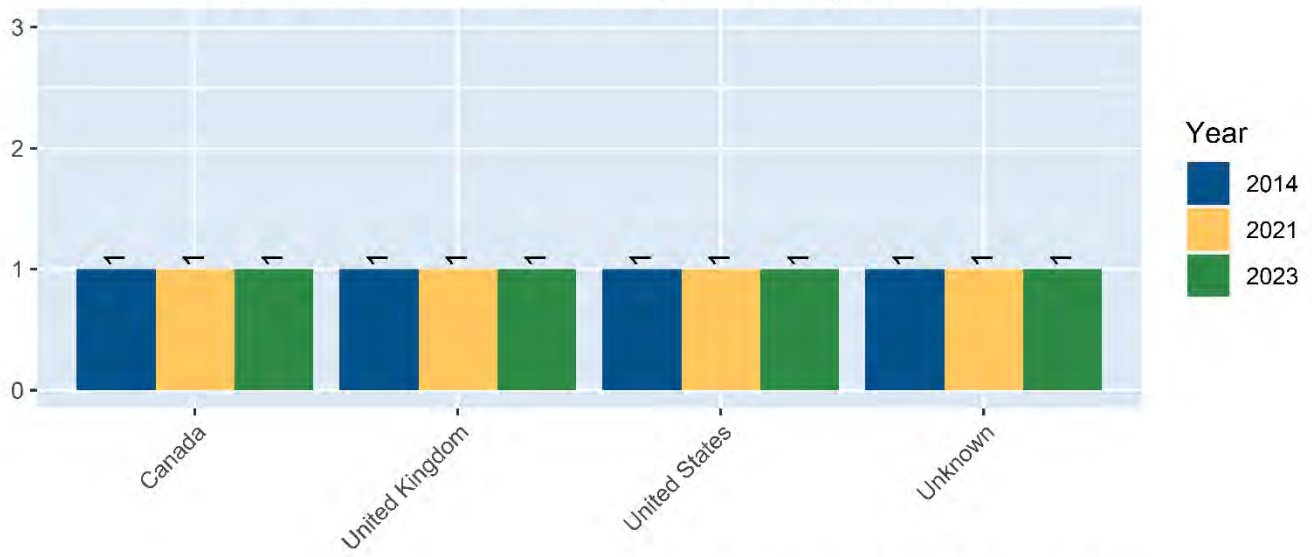


Figure xvii

Median Number of Properties per Host, by Country*



*among countries with at least 10 hosts by 2023

Figure xviii

Maximum Number of Properties per Host, by NH Counties

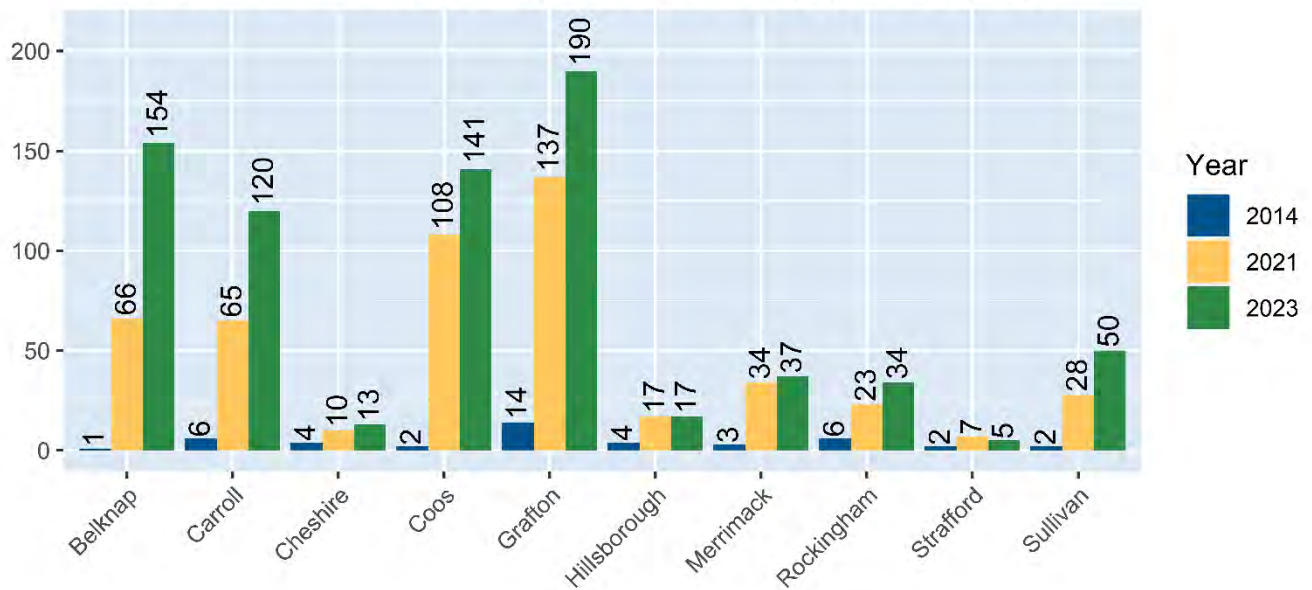


Figure xix

Maximum Number of Properties per Host, among New England States

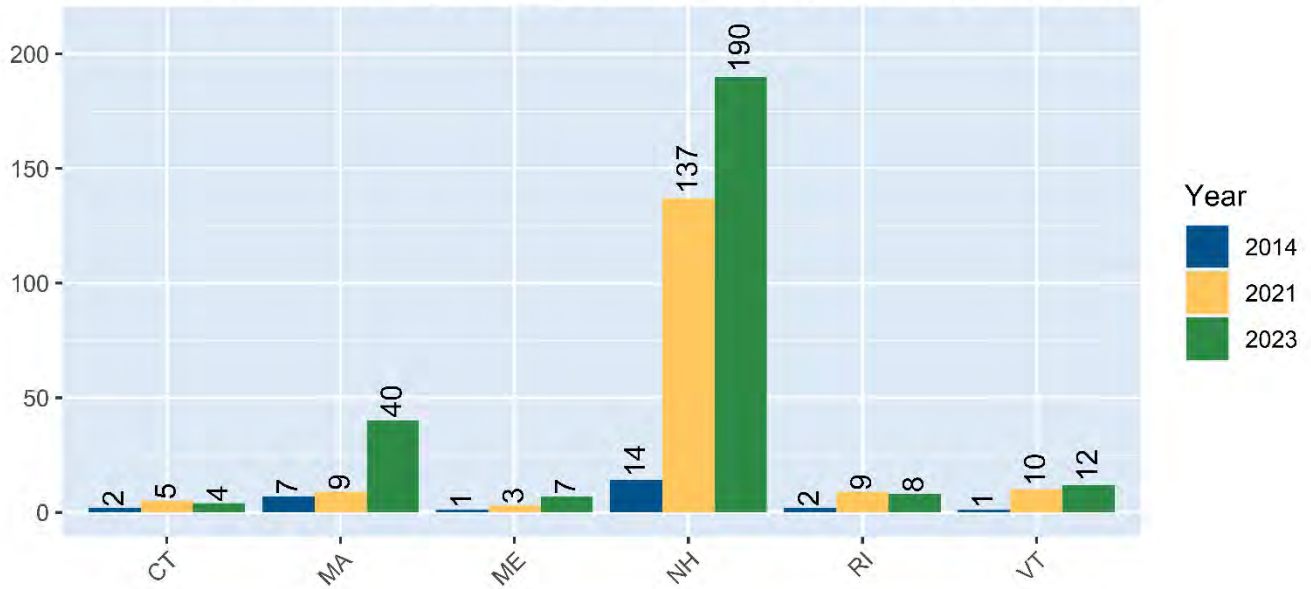
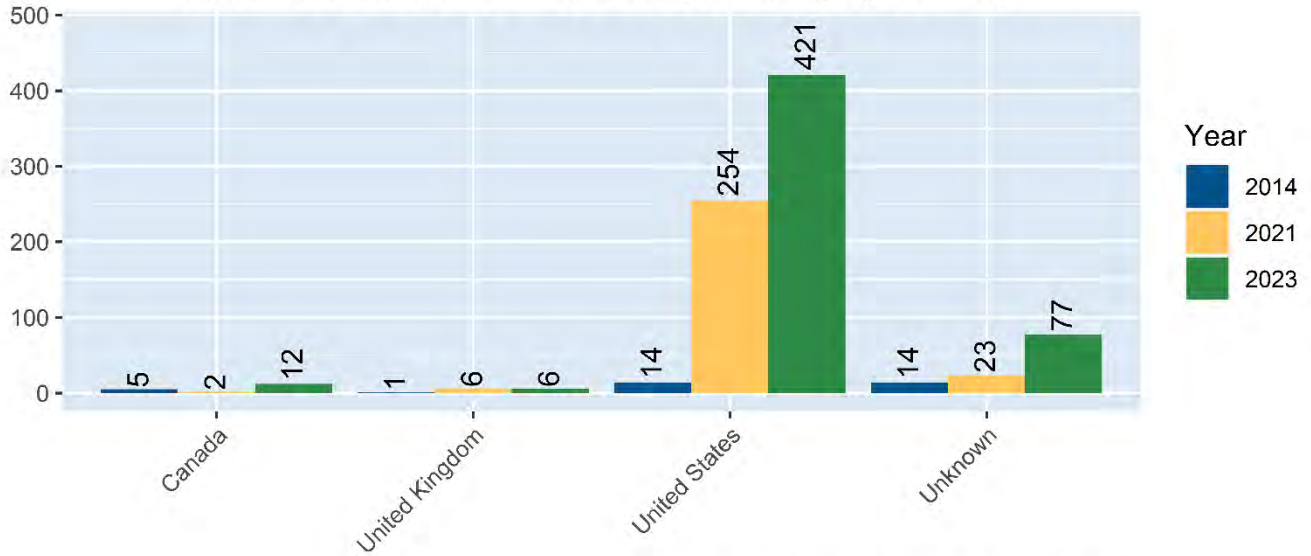


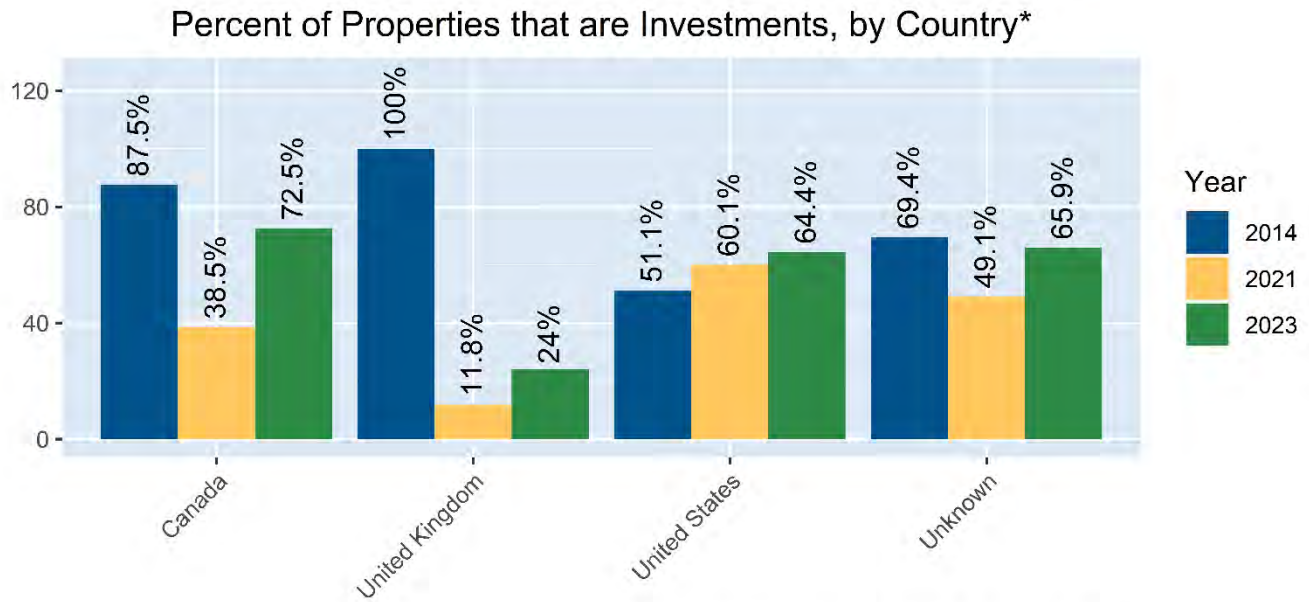
Figure xx

Maximum Number of Properties per Host, by Country*



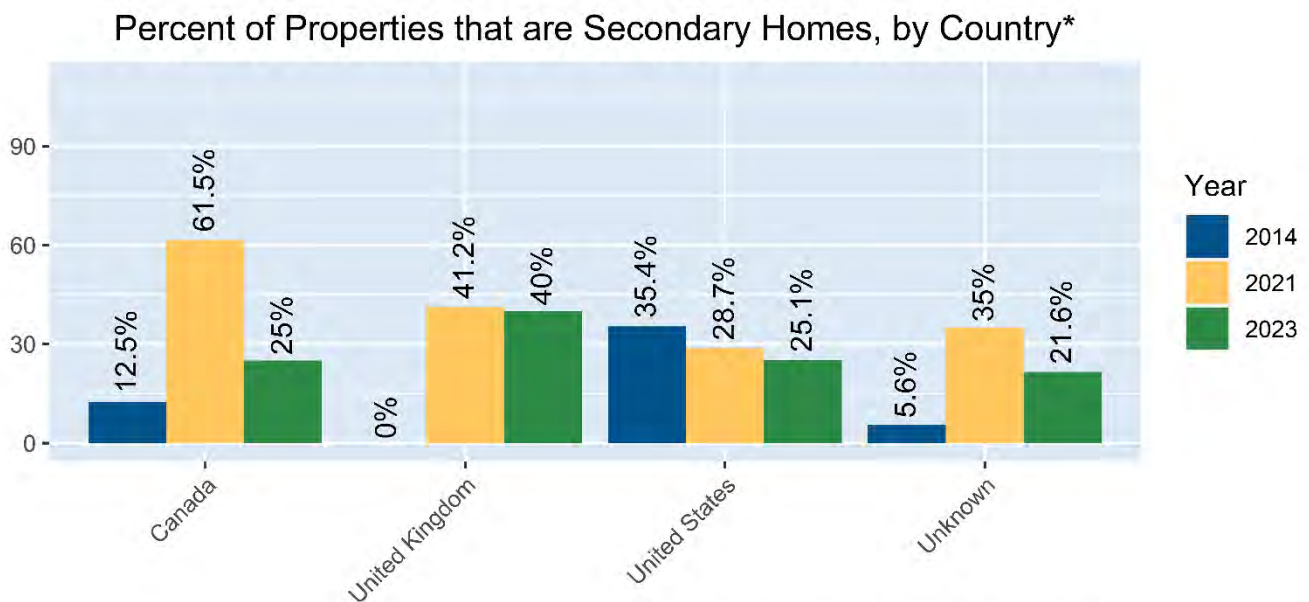
*among countries with at least 10 hosts by 2023

Figure xxi



*among countries with at least 10 hosts by 2023

Figure xxii



*among countries with at least 10 hosts by 2023

Appendix II: County-Level Regression Analysis

Note: Cells colored blue are dependent variables sourced from the NH Housing Rental Cost Survey, and the cells colored yellow are sourced from the American Community Survey

Belknap County

Figure xxiii: Change in STRs as a Share of Total Housing Units

Dependent Variable	R-Squared	p-value
Median Rent	0.01244	0.8334
Rental Vacancy Rates	7.21E-06	0.9954
Median Rent	0.002442	0.9075
Percent of Housing Units that are SROs	0.6154	0.0123

Figure xxiv: Change in STRs per 1000 People

Dependent Variable	R-Squared	p-value
Median Rent	0.001143	0.9493
Rental Vacancy Rates	0.01367	0.8029
Median Rent	0.03394	0.6623
Percent of Housing Units that are SROs	0.5362	0.02487

Belknap County: The appearance of high R-squared scores and low p-values for 'Percent of Housing Units that are SROs' may look interesting but is misleading. The trend is largely formed because of two outlier towns. These two towns saw decreases in the percentage of units that are SROs, even though they saw a minor increase in online STRs. The combination of a decrease in SROs and an increase in STRs contradicts the overall trend, which implies that an increase in online STRs leads to an increase in SROs. This, paired with the fact that we don't see this trend anywhere else in the regression analysis, is why the trend is not mentioned in the main body of this study.

Carroll County

Figure xxv: Change in STRs as a Share of Total Housing Units

Dependent Variable	R-Squared	p-value
Median Rent	0.03628	0.6825
Rental Vacancy Rates	0.06342	0.5474
Median Rent	0.01217	0.7197
Percent of Housing Units that are SROs	0.07137	0.3559

Figure xxvi: Change in STRs per 1000 People

Dependent Variable	R-Squared	p-value
Median Rent	0.01388	0.8014
Rental Vacancy Rates	0.0237	0.7158
Median Rent	0.09351	0.3096
Percent of Housing Units that are SROs	0.0209	0.6219

Cheshire County

Figure xxvii: Change in STRs as a Share of Total Housing Units

Dependent Variable	R-Squared	p-value
Median Rent	0.3367	0.07863
Rental Vacancy Rates	0.08815	0.4048
Median Rent	0.00211	0.8709
Percent of Housing Units that are SROs	0.07828	0.3125

Figure xxviii: Change in STRs per 1000 People

Dependent Variable	R-Squared	p-value
Median Rent	0.4266	0.04058
Rental Vacancy Rates	0.06254	0.4859
Median Rent	0.0004626	0.9394
Percent of Housing Units that are SROs	0.07369	0.3277

Cheshire County: The relationship between the independent variables and median rent may look promising on the surface; however, it is not. When visualizing the relationship between median rent (from the NH Housing Rental Survey) and the change in STRs as a share of total housing units, only a single outlier, separate from the fairly random cluster of all other data points, seems to have been responsible for the trendline. The same is true for the relationship between median rent and change in STRs per 1000 people.

Coos County

Figure xxix: Change in STRs as a Share of Total Housing Units

Dependent Variable	R-Squared	p-value
Median Rent	0.1147	0.5771
Rental Vacancy Rates	0.9571	0.003827
Median Rent	0.07737	0.5458
Percent of Housing Units that are SROs	0.1061	0.4311

Figure xxx: Change in STRs per 1000 People

Dependent Variable	R-Squared	p-value
Median Rent	0.05188	0.7125
Rental Vacancy Rates	0.9817	0.001056
Median Rent	0.08328	0.5302
Percent of Housing Units that are SROs	0.05695	0.5692

Coos County: The relationship with rental vacancy rates and the two independent variables was commented on in the Analysis and Results section, but the other three dependent variables, median rent (measured by NH Housing), median rent (measured by the ACS) and percent of housing units that are SROs (also measured by the ACS), also have high R-squared scores. However, their associated p-values are very high, meaning these trends are not statistically significant and no conclusions should be drawn from these analyses.

Grafton County

Figure xxxi: Change in STRs as a Share of Total Housing Units

Dependent Variable	R-Squared	p-value
Median Rent	0.0007578	0.9137
Rental Vacancy Rates	0.002776	0.8355
Median Rent	0.0186	0.5157
Percent of Housing Units that are SROs	0.02026	0.488

Figure xxxii: Change in STRs per 1000 People

Dependent Variable	R-Squared	p-value
Median Rent	1.25E-05	0.9889
Rental Vacancy Rates	2.64E-02	0.5192
Median Rent	0.0000277	0.9801
Percent of Housing Units that are SROs	0.02144	4.75E-01

Hillsborough County

Figure xxxiii Independent Variable: Change in STRs as a Share of Total Housing Units

Dependent Variable	R-Squared	p-value
Median Rent	0.02147	0.6023
Rental Vacancy Rates	0.2813	0.04195
Median Rent	0.02788	0.4945
Percent of Housing Units that are SROs	0.0003438	0.9382

Figure xxxiv. Independent Variable: Change in STRs per 1000 People

Dependent Variable	R-Squared	p-value
Median Rent	0.035	0.5043
Rental Vacancy Rates	0.3874	0.01322
Median Rent	0.02937	0.483
Percent of Housing Units that are SROs	0.0003066	0.9416

Merrimack County

Figure xxxv: Change in STRs as a Share of Total Housing Units

Dependent Variable	R-Squared	p-value
Median Rent	0.02298	0.6381
Rental Vacancy Rates	0.2319	0.1129
Median Rent	0.467	0.004977
Percent of Housing Units that are SROs	0.01089	0.7005

Figure xxxvi: Change in STRs per 1000 People

Dependent Variable	R-Squared	p-value
Median Rent	0.03863	0.5404
Rental Vacancy Rates	0.1133	0.2847
Median Rent	0.5259	0.00222
Percent of Housing Units that are SROs	0.01229	0.6827

Merrimack County: The first anomalous result was the relationship with rental vacancy rates. The R-squared score of 0.1133 is interesting, but the relatively high p-value of 0.2847 means that this result isn't statistically significant. The second result of note was the relationship with ACS median rent. However, this relationship has the same problem as the analysis for Cheshire County.

Rockingham County

Figure xxxvii: Change in STRs as a Share of Total Housing Units

Dependent Variable	R-Squared	p-value
Median Rent	0.01655	0.6226
Rental Vacancy Rates	0.008524	0.7245
Median Rent	0.1292	0.1307
Percent of Housing Units that are SROs	0.02009	0.5627

Figure xxxviii: Change in STRs per 1000 People

Dependent Variable	R-Squared	p-value
Median Rent	0.005101	0.8791
Rental Vacancy Rates	0.01232	0.6715
Median Rent	0.107	0.1717
Percent of Housing Units that are SROs	0.02651	0.5054

Rockingham County: The ACS measure of median rent has a high R-Squared score in relation to either independent variable. R-squared scores of 0.1292 and 0.107 would be of note if their associated p-values were low enough to prove statistical significance. As it stands, the p-values of 0.1307 and 0.1717 are not low enough to qualify these trends as statistically significant.

Strafford County

Figure xxxix: Change in STRs as a Share of Total Housing Units

Dependent Variable	R-Squared	p-value
Median Rent	0.1792	0.3439
Rental Vacancy Rates	0.008524	0.7245
Median Rent	0.00353	0.8889
Percent of Housing Units that are SROs	0.8312	0.001608

Figure xl: Change in STRs per 1000 People

Dependent Variable	R-Squared	p-value
Median Rent	0.005101	0.8791
Rental Vacancy Rates	0.3097	0.1945
Median Rent	0.0003651	0.9642
Percent of Housing Units that are SROs	0.8294	0.001663

Strafford County: The first trend to address in Strafford County is the relationship between median rent and the change in STRs as a share of total housing units, with a high R-squared score of 0.1792. However, the associated p-value of 0.3439 means that this result is not statistically significant. The next is the relationship between STRs per one thousand people and rental vacancy rates. The R-squared score is high, at 0.3097, but the high p-value of 0.1945 indicates that it is not statistically significant. The last trend to address is the relationship between both independent variables and the percent of housing units that are SROs. The R-squared scores are high and the p-values are low, but when visualized, it is easy to see that the cause of this is that the data form an almost vertical trendline, since there is so little variation in the independent variables along the x-axis.

Sullivan County

Figure xli: Change in STRs as a Share of Total Housing Units

Dependent Variable	R-Squared	p-value
Median Rent	NA	NA
Rental Vacancy Rates	NA	NA
Median Rent	0.2905	0.2119
Percent of Housing Units that are SROs	0.1785	0.345

Figure xlii: Change in STRs per 1000 People

Dependent Variable	R-Squared	p-value
Median Rent	NA	NA
Rental Vacancy Rates	NA	NA
Median Rent	0.2271	0.2797
Percent of Housing Units that are SROs	0.05029	0.6288

Sullivan County: The NAs seen in *Figure xli* and *xlii* are a result of a lack of data, a problem experienced in most of the analyses performed within each county.

Bibliography

- ¹ "New Hampshire Economy at a Glance." U.S. Bureau of Labor Statistics. May 2023. https://www.bls.gov/regions/new-england/new_hampshire.htm.
- ² "NH's Summer Season off to a Robust Start." NH Department of Business and Economic Affairs. June 1, 2023. <https://www.nheconomy.com/news-press/strong-start-to-the-summer-tourism-season-in-new-h>.
- ³ "New Hampshire 2022 Residential Rental Cost Survey Report." New Hampshire Housing Finance Authority. <https://www.nhhfa.org/wp-content/uploads/2022/08/NHHousing-2022-Rental-Cost-Report.pdf>.
- ⁴ "2023 New Hampshire Statewide Housing Needs Assessment." New Hampshire Housing Finance Authority. <https://www.nhhfa.org/wp-content/uploads/2023/04/2023-NH-Statewide-Housing-Needs-Assessment.pdf>.
- ⁵ "Legislative Committee Minutes SB458." The General Court of New Hampshire. January 30, 2020. https://gencourt.state.nh.us/BillHistory/SofS_Archives/2020/senate/SB458S.pdf.
- ⁶ Catherine McLaughlin. "Short-term Rentals: Towns Take up Regulation, for a Variety of Reasons." The Laconia Daily Sun, February 10, 2023. https://www.laconiadailysun.com/news/local/short-term-rentals-towns-take-up-regulation-for-a-variety-of-reasons/article_63178656-a8b6-11ed-8432-0b0a2c837098.html.
- ⁷ "Legislative Committee Minutes SB458." The General Court of New Hampshire. January 30, 2020. https://gencourt.state.nh.us/BillHistory/SofS_Archives/2020/senate/SB458S.pdf.
- ⁸ Officials of several municipalities in New Hampshire. "Opinion: Proposed State Mandate on Short-term Rentals Is Not Right for New Hampshire." New Hampshire Business Review, February 13, 2022.
- ⁹ "About." AirDNA. <https://www.airdna.co/about>.
- ¹⁰ "New Hampshire 2022 Residential Rental Cost Survey Report." New Hampshire Housing Finance Authority. <https://www.nhhfa.org/wp-content/uploads/2022/08/NHHousing-2022-Rental-Cost-Report.pdf>.
- ¹¹ "History: American Community Survey." U.S. Census Bureau. https://www.census.gov/history/www/programs/demographic/american_community_survey.html.
- ¹² "History." U.S. Census Bureau. <https://www.census.gov/history/>
- ¹³ "About Us." Airbnb. <https://news.Airbnb.com/about-us/#:~:text=Airbnb%20was%20born%20in%202007,every%20country%20across%20the%20globe>.
- ¹⁴ Nathaniel Minor. "Short-Term Vacation Rentals, A Colorado Invention, Are Under The Gun In Denver." Colorado Public Radio, May 16, 2016. <https://www.cpr.org/2016/05/16/short-term-vacation-rentals-a-colorado-invention-are-under-the-gun-in-denver/>
- ¹⁵ Coral Garnick. "Expedia buys HomeAway for \$3.9 billion." The Seattle Times, November 4, 2015. <https://www.seattletimes.com/business/expedia-buys-homeaway-for-39-billion/>.


- ¹⁶ Lori Hawkins. “Goodbye HomeAway, hello Vrbo.” Austin American Statesman, May 3, 2019. <https://www.statesman.com/story/business/technology/2019/05/03/homeaway-worlds-largest-vacation-rental-site-is-rebranding-itself-as-Vrbo/5262745007/>.
- ¹⁷ Asher Alt. “Questions you’re asking: What is considered a second home for tax purposes?” Wells Fargo, January 13, 2023. <https://lifescapes.wellsfargoadvisors.com/questions-tax-definition-second-home/>.



PO Box 5087, Manchester, NH 03108
603.472.8623 800.640.7239
TDD: 603.472.2089
info@nhhfa.org

NHHousing.org



 New Hampshire Housing promotes, finances, and supports housing solutions for the people of New Hampshire.