Assessing the Migration System of New Hampshire and Vermont's Connecticut River Valley

Part I - Migration Trends, Evidence, and Indicators

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Abstract

Current impacts of climate change, Covid-19, and political tensions are influencing the migration of human populations across the globe. Whether relocating to meet changing preferences or resettling due to unavoidable displacement, populations are redefining the place they call home. As a result, communities and local planners must identify and respond to the impacts of changing demographics. Through a series of reports, this project seeks to identify migration patterns within the towns on the Connecticut River in New Hampshire and Vermont in order to inform future planning. With a focus on implementing the responses necessary to safeguard a resilient social, environmental, and economic system, this report examines the newest analysis of migration trends and population projections influencing the migration system of New Hampshire and Vermont's Connecticut River towns.

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Introduction

Due to numerous external factors, including the impacts of climate change, Covid-19, and civil unrest, Vermont and New Hampshire are experiencing an influx of migrants throughout both states. While historic trends highlight the prevalence of immigrants relocating to urban centers such as Burlington, VT and Concord, NH, the current influx of affinity migrants, defined as migrants with ample resources, results in population increases in rural settlements of both states. Current trends show an increase in housing prices and real estate sales. As a result, demand on social services such as municipal utilities, food supply, and transportation infrastructure increased.

Following these current trends and in preparation for future changes in trends, this study focuses on the systemic impacts associated with migration to the largely rural communities situated along the Connecticut River. The study area includes 53 politically distinct communities (ie. towns, villages, etc.) covering 2,449 square miles and consisting of approximately 164,400 residents (U.S. Census Bureau, 2019). The regional population density is 67 people per square mile, ranging from 2.72 people per square mile in Lemington, VT to a maximum of 350 people per square mile in Brattleboro, VT. Due to the region's situation along a significant riparian corridor, the research places particular attention on the health of the local watershed and associated ecology. The projected impact of increased water and wastewater demand, as well as impervious surface runoff will be examined.

In addition to responding to the current trend of affinity migration, this project seeks to identify systemic approaches for receiving financially and socially disenfranchised communities who experience magnified exposure to external factors, and with less resources and public aid than affinity migrants. Situated in proximity to the northeast corridor and its population of over 56 million residents, the Connecticut River can expect an influx of migrants with increasingly diverse intersectional identities as climate impacts intensify with time.

As a collaboration between the Connecticut River Joint Commission and Antioch University New England, this project seeks to identify current and future migration trends and the interconnected impact on social, environmental, and economic systems. With particular focus placed on watershed health and social equity impacts, this study aims to identify best practices in planning for migration by highlighting ideal planning strategies to enable a resilient and just migration in New Hampshire and Vermont's Connecticut River towns.

Historic Trends of Migration

The inflows and outflows of populations from a particular region occur within a larger migration system. A migration system is a socio-environmental system defined by the structures and processes in place to influence patterns of migration. The structure of a migration system are the ties between places (ex. Pennsylvania has strong outmigration ties to New England). The processes in a migration system are the governing mechanisms which determine the rules of migration (ex. Defining a community as a receiving community for refugees). The scale and patterns of a migration system vary according to the ties connecting places and the governing mechanisms (ex. zoning codes and housing stocks), utilized to influence flows of people, resources, and economic activity. When looking at human migration at the systemic level, a pattern emerges that highlights how shockwaves from significant events and population shifts are felt throughout the entire migration system. That is to say, when one sub region of a migration system experiences a disturbance event, the resulting out-migration impacts all communities within the established macro migration-system, as the human flows redistribute throughout the entire system (Curtis et al., 2015).

With the exception of extreme disasters, determining the cause of a current migration is often impossible. Most often, the interconnected nature of climate, economic, and social shifts inhibit the identification of a primary influencer for migration (Curtis et al., 2015). For this project, we will be looking at migration through the general term of "disturbance migration." Rather than attempting to discern the exact cause of current migration, we are assessing trends of migration in accordance with current and future disturbance scenarios. This includes, although is not limited to, climate migration, pandemic migration, and political refuge.

Disturbance migration results in both affinity migration and forced migration. Affinity migration occurs by populations with ample resources who proactively move out of a non-ideal living environment. For instance, relocating from a high-risk transmission area during COVID-19 to relocate to a low-transmission area. While the migration is in response to a disturbance, it is not a forced event, but rather undergone to meet personal preferences. In contrast, people undergo forced migration without planning, often as a survival response to an acute disturbance such as a natural disaster or political danger, which poses a perceived or actual mortal threat. (Bose, 2018).

When looking at the role of environmental displacement in the matrix of migration causation, some insight can be gained by looking at the historic trends of migratory responses. While the intensification of climate change is a new phenomenon, individual environmental disasters and climatic shifts are not. Historic trends of exposure to environmental disasters in the United States demonstrate the inequitable forced settlement of marginalized land by marginalized communities (Lübken, 2019).

This inequitable settlement occurred as a result of multiple factors characteristic of systemic class-racism. Around the United States, marginalized communities, predominantly people of color and poor white people, settled in environmentally vulnerable areas as they were often the only areas free of the oppressive dominant white plantation-class. Poor whites, self-emancipating blacks, and migrant communities of color, all mobile groups, sought refuge in unstable ecosystems such as swamps, bayous, and floodplains. In this way, the settlement of targeted communities in high-risk environments created systemically inequitable exposure to environmental hazards and forced migration (Lübken, 2019). This can be seen through a recent Vermont study that found mobile homes were disproportionately affected by Tropical Storm Irene flooding. 15 percent of mobile homes were confirmed to be damaged by the Federal Emergency Management Association (FEMA), when mobile homes represented only 7 percent of the state housing stock (Baker et al., 2014).

The type of disturbance event, whether an acute event or a chronic event, influences the type of migration taking place. Acute disturbance events, such as hurricanes, often result in temporary moves, lasting from a few months to a few years. In these cases, migrants often repopulate the original

community when the region is physically restored. In the case of chronic disturbance events, such as long-term urban heat island effects and political threats, migration often results in long-term resettlement (Curtis et al., 2015).

Out-migration from areas experiencing acute disturbance is often short-distance, utilizing established governmental and familial ties within the migration system, particularly connected to more urban areas (Curtis et al., 2015; Lübken, 2019). In fact, short-distance migration is the overall global trend. Even with an increase in global refugees, the total number of international immigrants is approximately 4 percent of the global population (Bose, 2015).

When possible, migrants often resettle in regions in which they have interpersonal ties, choosing to settle in an area where family or close friends currently reside. Personal networks reduce barriers to migration by providing social capital, information on local resources, and a sense of belonging (Curtis et al., 2015). In addition, the presence of "skin networks," defined as concentrations of ethnic and cultural communities and their associated cultural capital, provide positive factors in determining relocation.

Modern Trends of Migration

While historic trends within a migration system tend to repeat along the same flows and pathways in the absence of change, many unprecedented shocks are currently occurring to impact the direction and rate of human flows. In particular, the unprecedented rate of global climate change, unpredictable impacts of COVID-19, and amplifying racial tensions of the current times all exert influential force on our migration system.

In looking at how migration trends change within the Connecticut River migration system, we will focus on the speed of change and the role of the region's historical trends in influencing current migration patterns (Curtis et al., 2015). Current and future migration trends are inextricably linked to historic governmental and settlement patterns and, without systemic interventions, often predict future patterns of migration (Lübken, 2019). Since the 2016 presidential election, the growth of xenophobia and anti-immigaration rhetoric increased, intensifying the resettlement process of migratis into their new

communities, as exposure to hate and national resistance increased. Despite this, many Vermonters continue to embrace refugee resettlement, with 40 percent in support of continuing resettlement at the current rate, 18 percent in support of continuing at a higher rate per year, and 18 percent in support of continuing at a lower rate per year (Bose, 2018).

To assess how patterns in this migration system changed in the recent past, we compared the flows of households, both in and out of the study area, across time (Curtis et al., 2015). We also assessed the direction of flows, highlighting where migrants are moving between, in order to determine the structure of the migration system, the demographics of in-migrants, and the preferences of out-migrants. These details inform planning decisions for built infrastructure and social services.

One such change in housing trends comes from the relationship between home insurers and climate impacts. Home insurers are reducing, and in some cases, eliminating coverage in regions experiencing intensification of environmental hazards, such as the unprecedented flooding in the Midwest and the record-setting hurricanes in the Southeast. This "climate redlining" is predicted to lead to displacement of entire neighborhoods as homeowners, and thus tenants, are unable to rebuild their residences. Oftentimes, the areas experiencing redlining are populated by marginalized communities typically targeted by economic and environmental inequities, resulting in those with the lowest capacity to relocate while experiencing the greatest pressure to do so (Benson, 2019). While climate redlining is not yet prevalent in the Northeast, increased coastal storms and the annual destruction of infrastructure by winter surges increasingly heightens the cost of living by the coast. The Northeast is experiencing sea level rise at a rate higher than the global average, indicating that insurance hikes are likely to follow.

With forced migration comes the need for community preparedness in receiving displaced populations. Currently, receiving communities in the United States are primarily established for international immigration. An aggregate of non-profit agencies and government run programs air official refugees, a title determined by the U.S. Refugee Admissions Program (USRAP), in the resettlement process. In addition to federal programs, some states and counties have offices of varying size focused on refugee services, in some cases, including a State Refugee Coordinator. A few states, including Maine,

have pulled out of the federal refugee program all together and manage resettlement at the state level. Other states, however, remain in the federal program and allow resettlement agencies to fill the state's role. In larger receiving communities, municipalities also play a role in providing resettlement services (Bose, 2018).

In Vermont, the main agencies involved in refugee resettlement are the Vermont Refugee Resettlement Program, the Association of Africans Living in Vermont, and the office of the State Refugee Coordinator (Bose, 2018). In New Hampshire, the refugee program runs out of the New Hampshire Office of Minority Health and Refugee Affairs and is funded by the federal government. The Office works closely with Ascentria Care Alliance and the International Institute of New Hampshire in resettlement (NHDHHS, 2016).

Since 2000, the USRAP has been placing refugees in smaller receiving communities, with half of receiving communities having a population of 60,000 or less. As a result, the percentage of refugees per capita in these communities is more substantial, adding diversity to a largely homogeneous demographic. This diversity spurs new migrant-owned businesses and housing renovation to meet increased demand, offering opportunities for renewal of declining communities (Bose, 2018).

In Concord, New Hampshire, a receiving community with a population of approximately 42,700, refugees make up 4.55 percent of the population and in Burlington, Vermont, a community of similar size, refugees make up almost 10 percent of the population, compared to 0.04 percent in New York City. The trend of resettling in smaller communities is reflected in migration patterns of non-refugees as well (Bose, 2018). In addition to Concord, Burlington, VT, (population 42,900) and Nashua, NH (population 89,000) are receiving communities. Nashua partners with Welcoming America to work towards adopting their Welcoming Standard for immigrants (Welcoming America, 2020). Such standards are particularly important in rural communities as these regions tend to have less experience and resources available for inclusive transitions (Bose, 2018).

Historic Settlement and Demographics of New Hampshire and Vermont

New Hampshire and Vermont are characterized by a predominantly white population. As of 2010, 97 percent of Vermont's population identified as White (Bose, 2018). This is due to a deep history of systematic racism in the colonial settlement of North America. Black history in the north is only recently being discovered through archaeological exploration and investigative research by black community leaders. The creation of black-led organizations and platforms now allows for the accurate sharing of the region's history. Despite cultural rhetoric depicting New England as a historically white homogeneous community, black populations have resided in the state since the beginning of slavery in the United States.

The tendency of northern enslavers to refer to the enslaved as "servants" rather than "slaves," has made it easy for history to erase the story of racism in New England. While New England often aligns themselves with the story of the abolitionist movement, a resistance to black liberation has always existed. New Hampshire, the last of the states to observe Martin Luther King Day, enslaved black populations in many of their towns including Portsmouth, Canaan, and Milford, to name a few.

In 1779, three years after the declaration of independence, blacks in New Hampshire petitioned the state for their freedom and the end of enslavement in the state. Despite submission to the state legislature and publication in the New Hampshire gazette, no action was taken on the petition. The state ignored the petition and refused to put it up for a vote, contradicting the country's newly declared democracy.

When slavery eventually ended at the end of the Civil War, the oppression of blacks continued in New Hampshire and Vermont. One story, centered in Canaan, NH, demonstrates white Granite Staters quite literally running black residents out of the state. In August 1835, in response to interactions between white and black students in the unsegregated schoolhouse of Noyes Academy, the white town members revolted, petitioning the schoolhouse on the account of "patriotism." Then, a mob with teams of oxen pulled the schoolhouse down from its foundation. They then pulled out the town cannon, dragged it down the street, and aimed it and shot it at every home of abolitionists, shooting through windows and walls.

When noting how New Hampshire and Vermont demographics are primarily white, the history of black oppression must be included. Black residents of New Hampshire, through the first half of the 20th century, struggled to receive employment. Mill Owners, such as Franklin Pierce, employed only white workers. Schools would not allow black teachers. Segregation and the lack of job opportunities for black people created a system in which young black people had no motivation to stay, leaving instead to find work and more vibrant social lives elsewhere (Vawter and Vawter, 2016).

Similar trends of settlement and racism occurred in Vermont. In 19th century Vermont, population declines of 40 percent per decade from 1850 to 1900 spurred a statewide effort to repopulate abandoned farms with white migrants, particularly of Swedish descent. Partially as a result of this effort, in the 20th century, the population of 1-29 year olds increased between 1930-1950.

Current Trends of Migration in Vermont and New Hampshire

There is a strong desire within many cities in the United States to track migration and to identify patterns that can be used to predict future changes and inform planning for beneficial social, environmental, and economic outcomes. More recently, institutions are exploring the connections between climate change and migration to understand the contributing factors and barriers to migration. The Urban Institute for example is partnered with the Texas Southern University, University of Central Florida, Enterprise Community Partners, and international RAND Corporation to research what happens to climate migrants after they relocate, the capacity of receiving communities to plan for and integrate climate migrants, along with many other questions about climate migration (Martin, 2019).

Domestic Out-Migration

In the first decade of the 21st century (2000-2010) a decline occurred in Vermont residents aged 35-54 (Morse and Geller, 2015). In general, Vermont residents possess higher levels of education than the national average, with higher percentages of high school graduates, bachelors degrees, and graduate degrees. Even so, a significant proportion of individuals holding higher education degrees choose to

migrate out of the state. Vermont's net out-migration of educated young people moving away for opportunity in more urban environments is significant. For example, over the last three decades, young residents between the ages of 19 and 34, particularly those holding master's degrees and higher, decreased by 20 percent (Morse and Geller, 2015).

Between 2010 and 2018, Vermont lost 10,000 people despite trying to attract new workers through programs that offer financial incentives for people earning more than the minimum wage. Out-migrants report job opportunities, higher wages, and more culturally diverse communities as factors influencing their decision (Morse and Geller, 2015). Populations moving out of Vermont most often relocate within the Northeast (70 percent) followed by the Southeast United States (30 percent). Those people moving from the Northeast to Florida are thought to be evidence of wealthy retirees based on adjusted gross incomes (Bulduc and Kessel, 2015). The phenomenon of opportunity migration, known as "brain drain," results in the out-migration of higher-educated residents, a decrease of an already low population, and a stressed regional economic vitality. Historically, the state experienced net in-migration from other states, diversifying the birth-state origins of VT residents. Now, with a reversal of this trend, local leaders fear the deterioration of diversity and culture (Boldoc, 2015; Bose, 2015).

Little research and evidence exist on whether individuals who leave Vermont as young adults return to the region later in life. The nuance of this "revolving-door migration" deserves further examination (Bose, 2015). The Vermont Roots Migration Project found that, of those who remained in or returned to Vermont, high value was attributed to landscape, family connections, state culture, and small communities. This population also tends to move into more populated counties of Chittenden and Washington, possibly demonstrating that the state's denser communities meet their desires (Morse and Geller, 2015).

Domestic In-Migration

In New Hampshire, the recent population growth is attributed to in-migration. Although New Hampshire's death rate exceeded its birth rate between 2017 and 2019, in-migration is helping to balance

the state's age profile. Young adults moving into New Hampshire often hold higher degrees of education and earn higher incomes (Johnson and Bundschuh, 2020). Based on the results of a survey conducted between 2018 and 2019, Johnson and Bundschuh (2020) found that migrants are concentrated in the southeastern metropolitan areas of New Hampshire and the more recent migrants are younger than the established population.

The top reasons for moving to the state are family, employment, natural environment, culture and lifestyle, quality of life, taxes, and the economy. The top reasons for staying describe family as the top precedence but natural environmental and quality of life supersedes economic importance. Many established residents report that they appreciate the small-town feel, a slower pace of life, and safety. Although the factors influencing migration are complex, policymakers can use this information to adopt policy tools that attract additional migrants and encourage existing residents to stay by "creating housing opportunities for young people who moved to New Hampshire for work, retaining tax structures that keep residents from moving to high-tax states, and investing in natural environment amenities that draw and retain residents" (Johnson and Bundschuh, 2020).

In Vermont, the IRS Migration data indicates that people relocating to the state are primarily from New York and other Northeast states. Vermont's wealthy new arrivals are between 26 and 44 years of age with an annual income over \$200,000 (Pentenko, 2019). Migrants moving into Vermont tend to receive higher income and education than native-born Vermonters. Tension between native Vermonters and new Vermonters and ideological differences, particularly due to the disparities in wealth and education, arise. The trend of increased tensions due to prosperous populations relocating to rural communities can be observed at a global level and is a symptom of gentrification (Bose, 2015).

Morse and Geller (2015) found that Vermonters that lived elsewhere and then decided to return, cited values such as the wish to be closer to family, the landscape, culture/community, and the small size of communities as primary influences. About half of the Vermont returnees surveyed said they plan to stay permanently, while a second half of the Vermont returnees may consider themselves mobile, not permanent residents, or part-time residents.

Refugee and International Migration

Political refugees began migrating to Vermont in the 1980s. While the rate of political refugee immigration has increased since 1990, making it the most prominent demographic of immigrants in Vermont, less than 5 percent of the state's approximately 650,000 residents are foreign born. International migration comprises approximately half of the state's in-migration rate. Of international migrants, the majority settle in and around Burlington, an urban center outside of our study area. Key demographics include those of Southeast Asian, Eastern and Central European, African, and South Asian origin. The most prominent populations include Bosnians, Vietnamese, and Nepali-speaking Bhutanese. Other notable populations include Somali Bantu, Congolese, Sudanese, Burudians, Meskhetian Turks, Iraqis, and Burmese. The Burlington refugee resettlement program, despite challenges with adequate social services, is remarked as an example of a successful resettlement site by the United States Committee for Refugees and Immigrants (USCRI). While refugees receive state-determined settlement locations and financial support, non-refugee migrants settle without funding in the location of their choosing (Bose, 2015). These non-refugee migrants are the most prevalent within the study area of the Connecticut River.

In New Hampshire, refugees live in Manchester, Concord, Nashua and Laconia, outside the Connecticut River study area (DHHS, 2016). Between 2011 and 2019, approximately 2,500 refugees have come to New Hampshire from European, African, Asian, and Middle Eastern countries. The majority of refugees have come from Democratic Republic of Congo. Other countries of origin with greater than 100 refugees resettled in New Hampshire include Bhutan, Burma-Rohingya, Iraq, and Somalia. With the new Biden administration, opportunities likely exist for increasing the number of refugees resettled in the area.

Migratory Indicators along the Connecticut River

The following section explores indicators available for understanding migration patterns specific to the towns along the Connecticut River in New Hampshire and Vermont. The primary indicators presented here include population, school enrollment, and housing. The reliability and limitations of the data associated with each indicator is discussed and the results of the patterns and trends observed reported.

Population and School Enrollment

Changes in population are used as a primary indicator of migration, although death and birth rates also influence these numbers. The New Hampshire Office of Strategic Initiatives (OSI) publishes estimated population data annually using 2010 decennial census data as a benchmark and data collected at the municipal level for purposes other than population estimates, resulting in a recommendation by the agency not to use this data for a year-to-year comparison (New Hampshire Office of Strategic Initiatives, 2020). Based on the information provided, all New Hampshire counties are estimated to have an increase in population. The counties with the greatest estimated rate of growth are Rockingham, Strafford, Hillsborough, and Belknap, counties that are outside the Connecticut River study area. Using the U.S. Census Bureau 2019 Population Estimates in place of using OSI data, shows a slightly different representation. This data indicates that counties within the study area (Cheshire, Coos, and Sullivan) are decreasing in population instead of experiencing small positive gains (United States Census Bureau, n.d.). When the 2020 Census Bureau data is published, 2020 can be used as a new benchmark year. The challenge with using census data is that it relies on self-reporting, and the Trump administration notably interfered with safe and accurate self-reporting.

Refer to Table 4 (Appendix B) for data reporting the 10-year population change for the Vermont towns located along the Connecticut River. Similar to the overall state trend, the Vermont towns located along the Connecticut River are also declining in population. Most notably, three of the most populated communities (populations greater than 5,000 residents) Hartford, Springfield, and Brattleboro, all located along the southern half of the state, declined between 4 and 6 percent.

In New Hampshire, there are five communities located along the Connecticut River with populations greater than 5,000 residents (Littleton, Hanover, Lebanon, Claremont, and Charlestown). They are all located along the southern half of the state similar to Vermont and vary in their population change rates. Lebanon shows a population increase of 7 percent over the past 10 years, while the other community changes range between nearly negligible except for Hanover, in close proximity to Lebanon, that experienced a 2 percent growth rate. Refer to Table 3 (Appendix B) for the 10-year population change data for New Hampshire towns located along the Connecticut River.

For the future assessment of Migration inflows and outflows in the study area, refer to Figures 1-11 (Appendix A) created using the IRS Migration data. These figures were created using the most recent year available, 2017-2018. The data represents a snapshot of inflows and outflows, but could be adapted to show inflows and outflows for a longer duration at the county or regional scale. This data set is unlikely to capture the very poor and or the most elderly populations. However, these groups of people also tend to be less mobile (Curtis et al., 2015).

The New Hampshire Department of Education publishes enrollment data for public schools on an annual basis. The data in Table 3 (Appendix B) shows a large deviation between the 10-year population change and enrollment change during the same period. This may be related to school consolidation, changes in preferences for homeschooling, enrollment in private schools, or school choice. This data should be further evaluated to understand the anomalies and the reliability of the data for inclusion as an indicator of migration in the future.

The State of Vermont Agency of Education publishes an Enrollment Report annually. Using this data to compare enrollment in public schools shows a similar overall rate of decline as the 10-year population change for the area but contains anomalies similar to those described with the state of New Hampshire. The recommendation stands that further evaluation of the data is required before reliably using it to indicate migration trends. Refer to Table 4 (Appendix B) for data relating to the 10-year population and school enrollment changes for Vermont towns located along the Connecticut River.

Housing

Housing is affected by migration and is often used to project housing needs for the future. The Vermont Housing and Finance Agency (2020), reported that growth of housing between 2010 and 2020 slowed and is expected to slow to nearly 0.2 percent. About one third of households are likely to be 65 years or older by 2025 (VHFA, 2020). Overall 25 percent of Vermonters are renters, and the data shows there is rental shortage. The projected increase in households living in Vermont between 2020 and 2025 is expected to grow by 29 in Essex, 115 in Orange, and 10 in Windsor, and decrease by 40 in Caledonia and 208 in Windham. This information is not entirely consistent with the positive and negative trends in population change, but may be related to the age, quality, and safety of the existing housing stock.

Information about housing in New Hampshire is published by the state Office of Strategic Initiatives (OSI). According to the annual OSI report, "2019 is the sixth consecutive year to see an increase in building permits issued statewide; again driven by an increase in multi-family units" (NH OSI, 2020). Growth by counties in 2019 largely follows existing patterns of development. Grafton County where Lebanon and Hanover are located, is one of three counties with the largest number of multi-family units that were issued permits. Although growth has been steady, overall building activity levels are still less than half of what they used to be in the early 2000s. This data did not distinguish between multi-family rental units versus multi-family condos or row houses.

Amenity migration often brings people to the area that possess capital resources to invest in housing, and this process can drive up housing real estate values creating tensions in communities. However, migrants may also come to the area without significant capital resources. Rental housing stock is needed to provide affordable housing to all persons relocating to the study area. A balanced supply and demand rental market is expected to have a vacancy rate between 4 and 5 percent" (Ray et al., 2018). In 2018, New Hampshire's vacancy rate was 2.1 for all units. As shown in Figure 12 (Appendix C), all four New Hampshire counties in the study area have lower than recommended vacancy rates. These low vacancy rates cause an increase in rental costs. Grafton County has the highest rental rates in all four counties. This is because it is a robust market due to Hanover and Lebanon which represent the largest percent of rentals in the county. 43 percent of the rental households in New Hampshire are cost burdened, meaning households pay 30 percent or more of their income on rent. In Grafton County, only 15 percent

of the two-bedroom units available are below affordable rental rates based on household income (Ray et al., 2018).

In 2017, Vermont's average rental vacancy rate was estimated at 3.4 percent. In 2017, two of the five counties located along the Connecticut River had healthy vacancy rates. Springfield and Hartford, two of the three towns with the highest populations in the study area are located in Windsor County, which had a vacancy rate of 4.3 percent. Refer to Figure 13 (Appendix C). Brattleboro, the largest Vermont town in the study area, has experienced a significant population decline, but had a vacancy rate of only 2.8 percent. Over half the households in Vermont are cost burdened with the highest rates located outside the study area in Chittenden County. Vacancy rates are likely a beneficial indirect indicator of whether rental housing stock is keeping up with in migration to the area.

The impacts from generations of housing discrimination are clear in Vermont and New Hampshire today. "Vermont's homeownership rate among White households is 72 percent, while Black households have a rate of just 21 percent" (VFHA, 2020). This disparity is much larger than the national average where 70 percent of White households and 41 percent of Black households are homeowners. In New Hampshire similar to Vermont, people of color are overrepresented in homelessness. "Multi-Racial and Black/African Americans in New Hampshire are four times more likely to be homeless; and Hispanic/Latinos make up 10.6 percent of the homeless population while only making up 2.68 percent of the general population" (NHCEH, 2020).

Evidence of Migration Influenced by COVID-19

Assessing the impacts from COVID-19 in 2020 by evaluating social, economic, and environmental indicators is a process that can be undertaken as new statewide data is starting to be published. This data in many circumstances for Vermont and New Hampshire was not available at the time of our research or could not be discerned from normal fluctuations. The following potential indicators are being used by common publications that are also attempting to identify and understand COVID-19 related impacts and migration. These indicators are population, school enrollment, housing, and recreation and are described below along with the challenges of data reliability.

Population

Unfortunately, data that can deny or validate an unusual population increase attributed to COVID-19 does not presently exist. Vermont Public Radio reporters Hirschfeld and Evancie (2020) researched whether Vermont is experiencing a population boom from COVID-19 in the fall of 2020. Hirschfeld and Evancie (2020) investigated housing sales for indicators. They found that the number of houses bought and sold between March and August in 2020 had declined from 2019. This may be explained by delays in releasing all the data and does not address the fact that the median sale price of single-family homes significantly increased. They investigated statewide school enrollment data and found that it had not yet been released. They also investigated data from the Vermont Department of Registry and Motor vehicles, but the department does not track data on new Vermonters (Hirschfeld and Evancie, 2020). Well many Vermonters have met New Vermonters in their communities that relocated to Vermont during the pandemic, reliable statewide data on population changes in 2020 is not yet available.

School Enrollment

School enrollment data in Vermont lags behind New Hampshire. While New Hampshire 20-21 school enrollment data is available for the towns located along the Connecticut River, it shows an overall decline for the area which contradicts available population data. As previously described there are anomalies in the data that should be researched further before using it to support arguments related to population change. Although the statewide data requires further research, some schools in New Hampshire and Vermont are reporting an increase in school enrollment as the COVID-19 pandemic influences families to relocate. Based on an article reported by WCAX, one family moved north from Western Massachusetts and chose a place to live based on the public school's shared appreciation for the outdoors, and with the approval for a spouse to work remotely. Sherry Sousa, the Windsor Central Supervisory Union Interim Superintendent said, "In a typical school year, they enroll between 50 and 70

new students. This year, they registered over 200, some from as far away as Florida, Washington state, New Mexico, and California. That's good for a net gain of 38 students, mostly from out-of-state" (Lyons, 2020). The article states that most people migrating to the area are moving to ski and tourist towns as is the case experienced in Ludlow, the ski town home to the Okemo Resort. Some residents are converting their second homes into primary homes, although the question remains, how long will they stay?

A similar pattern was reported by Duffort (2020) where the Windham Central Supervisory Union saw spikes in enrollment in Dover (where Mount Snow Ski Resort is located), and Wardsboro which form the River Valleys School District providing preK-6, and offering school choice for 7-12. The new students appear to be from mostly out of state. While increased enrollment in schools is positive for the economy in the long-term, rapid spikes in enrollment create financial challenges for school districts that must pay for school choice when budgets were previously established for the year. Unfortunately, the superintendent in the Windham Southeast Supervisory Union serving Brattleboro, VT, a large town inside the Connecticut River study area, did not see a pattern of increased enrollment. For communities experiencing an increase in school enrollment, the question remains, will the new residents stay after the pandemic?

New Hampshire schools were reported to experience similar trends of increase from COVID-19 related factors in resort and recreational towns like Waterville Valley and Conway. Superintendent Kevin Richard attributed the increase to parents working remotely, and families occupying their second homes (Urquhart, 2020). Since 70 percent of the New Hampshire school funding comes from local taxes, families occupying second homes full-time does not increase the existing tax base. If this trend continues, local municipalities may have to consider increasing taxes to cover the costs of additional students.

Housing

Vermont Realtors were involved with the sale of 313 homes worth at least \$1 million in 2020, compared to 112 in 2019 (Allen, 2021). Before COVID, sales of high-end homes had slumped, and homes would remain on the market for a long period of time. David Staige, CEO of Four Seasons Sotheby's

International Realty attributes the acquisition of Vermont's high-end homes to how well Vermont managed to mitigate COVID-19 infection rates. Staige commented that some of the buyers were also from California looking to escape the forest fires. This is an indication of amenity migration in Vermont, where affluent, primarily White people, move to rural areas for amenities like natural landscape and scenery, close proximity to the outdoors and recreation, cultural richness, or a sense of rurality (Jokisch et al. 2019).

The Vermont Association of Realtors is reporting that the average sale price for a single-family home in 2020 was \$352,537 compared to \$279,528 in 2019, a 26 percent increase. This rapid increase contrasts with the past 10 years which were relatively static (Allen, 2021). Based on Market Data Reports from the Vermont Association of Realtors, the median listing price between December 2020 and December 2019 in Caledonia remained steady. Orange county increased by 43 percent, Windham by 14 percent, and Windsor by 6.2 percent (Vermont Association of Realtors, 2021).

Homeowners have struggled through the pandemic. The majority of Vermonters that received help with their mortgage faced challenges compounded by COVID-19. Compared to all Vermont homeowners, people helped by mortgage assistance were more likely to be of color, from large households of 4 or more, more likely to be under the age of 45, and more likely to report a disability (Vermont House Finance Agency, 2021).

The New Hampshire Realtors Association published similar data to Vermont's. The statewide median sales price for single-family homes increased by 11.7 percent. County data for 2020 indicates Cheshire homes increased in median sales price from 2019 by 13.6 percent, Coos by 16.3 percent, Grafton by 14.2 percent, and Sullivan by 19.8 percent (New Hampshire Association of Realtors, n.d).

Recreation

Throughout the pandemic, people have been turning to the outdoors for relief, as anxiety and stress increases, and because gyms closed during the pandemic or are no longer considered safe. In Vermont and New Hampshire, in and out-of-staters flocked to trailheads. Michael Snyder, the

commissioner of Forests, Parks and Recreation in Vermont said the effects of this trend include, "an increase in litter and human waste, safety issues, overuse or use of sensitive areas, and the impact on wildlife, from scaring songbirds away to disrupting nesting sites" (Gokee, 2019). Synder estimates that some areas saw modest increases of 10-15 percent while other areas saw 50-60 percent more traffic, which is significant. Vermont experienced 25 percent more in-state campers over the summer, while out of state campers dropped. Fish and Wildlife issued 17 percent more fishing licenses and the Vermont Department of Public Safety Search and Rescue Coordinator, Neil Van Dyke stated that the Stowe Mountain Rescue team received more calls in 2020 than in its 40-year history. New Hampshire experienced similar trends. The New Hampshire Fish and Game Chief Colonel, Kevin Jordan said they have seen more people coming north to recreate than in any previous year (Krueger, 2020).

This year more newcomers have also given outdoor recreation a try. Snyder is excited about the prospect of "different demographics of all types, age, race, creed" increasingly getting outdoors. He acknowledged that there is a lot of work to be done to meet people where they are and to overcome barriers so that everyone can experience the benefits of the outdoors (Gokee, 2019).

Viability of Connecticut River Towns as Climate Havens

Human migration is a natural adaptation response to climate change pressures. According to a National Geographic publication, "51% of Americans under the age of 45 say climate change has influenced their decision about where to live" (Borunda, 2021). While we know migration often follows pre-existing pathways, climate change in the United States may change or accelerate historic migration patterns as people look for escape from hazards such as forest fires, warmer temperatures, hurricanes, flooding, and sea level rise.

The EPA nationwide assessment for resilience to extreme climate change events ranked Vermont and New Hampshire the third and fourth most resilient states in the country. The EPA developed the Climate Resilience Screening Index (CRSI) to characterize resilience to acute climate hazards analyzed at the county, state, and regional level. The index is a composite measure of 20 indicators, calculated from 117 metrics grouped under five domains such as Risk, Governance, Society, Built Environment, and Natural Environmental (Summers et al., 2017). Refer to Table 2 (Appendix B) for indicator general descriptions. The index does not address long-term and secondary effects for hazards except for sea level rise. This means the estimated impacts on vulnerability or recoverability from climate migration have not been considered.

The CRSI national average score is 4.213. As you can see from Table 2 (Appendix B), the counties along the Connecticut River score significantly higher in resilience than the national average, ranging from a score of 8.2 in Sullivan County, NH to 17.43 in Coos County, NH. Comparatively, other Northeastern states ranked lower than Vermont and New Hampshire. For example, Massachusetts scored 7.889, New York scored 5.914, and Connecticut, Rhode Island, and New Jersey scored less than 4. The counties located along the Connecticut River in general scored lower in risk, higher in governance, and society. There are opportunities to enhance resiliency above the national average in the built environment and natural environment categories.

Another recent study considered the effects of climate change and calculated the projected economic damage by modeling factors informed by weather driven damage between the years of 1981 and 2010. Modeling showed that "states in the north and northwest could see their fortunes mildly boosted by warming, with farming yields rising thanks to shorter winters and less need to ward off harsh cold in homes" (Voosen, 2017). Based on this study, the Connecticut River counties are estimated to see a rise in Gross Domestic Product (GDP) between 0 and 5 percent, except for Coos county, New Hampshire and Essex county, Vermont estimated to experience an increase in GDP between 5 and 10 percent.

Shaw et al. (2020) performed another study, indicating Connecticut River towns to be more resilient than many places in the United States. Refer to Table 1 (Appendix B) for county level data on Climate Risk from Compounding Factors (Appendix B). As the general population becomes more alarmed by climate change, stories about climate migrants and climate havens, a place that is considered a haven to people migrating due to climate change, are becoming more popular. For example, consider the

article published by the Guardian titled, *where should you move to save yourself from climate change*? Vivek Shandas, an expert on climate change and urban planning, recommends living in a band above 42 degrees latitude which divides New York and Pennsylvania and forms the southern border of Oregon and Idaho. New Hampshire Public Radio published an article recently titled, *As Climate Change Drives Migration to N.H., Towns Face Tension and Opportunity*. In the article, a couple identify as climate migrants that relocated to Rumney, New Hampshire from Reno, Nevada. Getting out of a high risk climate was instrumental in their decision on choosing where to live. Climate attributes pursued by climate conscious people considering relocation include a northern latitude, a reliable water source, low risk of forest fire and hurricanes, a stable source of energy, and excess infrastructure.

Based on research, the Connecticut River towns will not escape the effects of climate change but are shown to be more resilient than some places in the United States. The area possesses the attributes most desired by people considering climate change in their decisions to relocate. Based on historic migratory patterns, it is likely that the Connecticut River towns will receive additional migrants above historic baselines coming from the Northeast, significantly impacted by sea level rise. A study performed by Robinson et al. (2020), conducted simulations using historic models of human migration and models for scenarios of sea level rise to quantify changes in migration above baselines to understand the magnitude of people both directly and indirectly affected by sea level rise by 2100.

In 2010, 39 percent of the total United States population (123 million people) lived in coastal counties, with a predicted 8 percent increase by the year 2020 (Robinson et al., 2020). It is expected that 13.1 million people in the United States would be living on land flooded by 6 feet of sea level rise. This study is different from previously reviewed studies because it considers indirectly affected people, people that are living in locations that will experience an increase in pressure due to increased inflow of climate migrants. These migratory changes can impact labor markets, housing prices, and have a broad effect on inequality. Some climate migrants will bring human and financial capital to the area that was accumulated elsewhere. If properly planned for, this capital can be used to increase equitable socio-economic outcomes. If not properly planned for it can exacerbate existing inequalities in the area. The type of

climate migrants bringing financial capital have been described as amenity migrants, a dominant demographic of current migrants relocating to the Connecticut River towns at present (Robinson et al., 2020).

The study shows that the impacts on population from sea level rise will be pervasive and they will expand beyond the coastal areas due to increased migration that disproportionately affects some areas of the United States, like the Northeast. The primary destination of climate migrants are counties in close proximity just inland of their origin, which supports our previous research showing short distance migration is preferred. However, climate migrants will move farther for large cities that offer more opportunities. Given the close ties Vermonters have with migration to and from Florida, Vermonters that have moved to Florida could potentially return, thus reversing the typical migration direction, as a result of sea level rise in Florida.

Based on Figure 14 (Appendix D), the southern portion of Connecticut River counties may experience an increase of 10,000 migrants due to SLR above historic benchmarks by 2100. The northern towns may experience 100-1,000 additional migrants. Urban areas will receive the largest number of migrants because they are the most attractive and this will accelerate urbanism. However, areas with relatively low numbers of historical incoming migrants will become more popular as receiving communities because of their close proximity to counties directly affected by sea level rise (Robinson et al., 2020).

Although this study considers people directly and indirectly affected by sea level rise, the simulations are based on forced migration and not affinity migration. This means the numbers of migrants could be significantly underrepresented. In any case, a main takeaway from this study is that climate change induced migration may not follow historic migration patterns. It will likely not be business as usual and historically unpopular places for inflows of migration may become popular as a result of sea level rise (Robinson et al., 2020).

With an understanding that climate change may cause migration to change from historical patterns, it should be noted that Vermont and New Hampshire have refugee ties to communities in Africa,

Asia, and the Middle East. Climate change is expected to impact these areas through extreme temperatures, water scarcity, food insecurity, changing precipitation patterns, and flooding. Although no refugee enclaves were identified within the Connecticut River study area, they do exist within the state and it is possible that international migration to the area may also change in the future as a result of climate change, requiring additional studies to understand these relationships and future migration scenarios.

Conclusion

Based on migratory patterns in New Hampshire, Vermont, and the Connecticut River area it appears that migratory patterns within the study area closely mirror patterns at state levels. Overall, Vermont's population is declining while New Hampshire's is increasing. The historical rates of change may be impacted by COVID-19, however currently available data merely act as indicators and are not conclusive. Whether pandemic-influenced migrants are seeking short-term refuge or planning to make New Hampshire and Vermont their permanent residence for the long-term is not yet clear.

What is understood about climate change projections is that New Hampshire and Vermont are considered more resilient than many other places in the country and there are people moving to the area that were influenced in their decision by climate change. As more people experience the effects of climate change it is not unreasonable to believe that climate change will become one of the prominent parameters influencing decisions about where to live, potentially changing or shifting pre-existing migratory patterns. Vermont and New Hampshire have the opportunity to become committed receiving communities. The impacts of migration and effects of being a receiving community are discussed in the partner report, *Assessing the Connecticut River Migration System of New Hampshire and Vermont: Part II - Impacts on Ecology and Social Systems from Human Migration and Public Desire.*

Future Recommendations

Due to limitations in time, resources, and student capacity, this report did not exhaust all avenues of research and analysis. Below are recommendations for future research and analysis:

- Map the Connecticut River Migration system either spatially, through GIS, or spherically, utilizing mobility tracking programs. Alternatively, a systems map of flows and magnitudes could be created.
- Analyze housing prices, school enrollment, and IRS data from 9/11 migration patterns and compare to the current migration patterns to assess if COVID-19 and 9/11 share similar patterns. If so, 9/11 patterns may be used to inform predictions of short and long-term COVID migration patterns, as both are similar acute disturbances in which residents are inclined to move from urban centers to rural areas.
- Assess the climatic conditions and changing impacts experienced by other countries who have skin networks in the receiving communities of NH/VT, as these are the most likely to relocate to this region.

Appendices

Appendix A - Charting The Connecticut River Migration System



Figure 1 2017-2018 Vermont Out-Migration

Figure 2 2017-2018 Vermont Domestic Out-Migration







Figure 4 2017-2018 Vermont Domestic In-Migration







Figure 5 2017-2018 New Hampshire Domestic Out-Migration







Figure 7 2017-2018 New Hampshire Domestic In-Migration





Figure 9 2017-2018 Grafton County Domestic In-Migration





Figure 11 2017-2018 Windham County Domestic In-Migration



Note: Figure 1-11 adapted from data provided by the IRS, 2019.

Appendix B - Tables

County	State	CRJC Subcommittee	Heat	Wet Bulb	Farm Crop Yields	Sea Level Rise	Very Large Fires	Economic Climate Damage
Coos	NH	Headwaters	3	2	1	1	1	3
Essex	VT	Headwaters	3	2	1	1	1	1
Grafton	NH	Riverbend	3	2	1	1	1	4
Caledonia	VT	Riverbend	3	4	1	1	1	2
Orange	VT	Riverbend	3	2	1	1	1	1
Windsor	VT	Upper Valley	3	4	1	1	1	3
Sullivan	NH	Mount Ascutney	3	4	1	1	1	4
Windham	VT	Mount Ascutney	3	4	1	1	1	3
Cheshire	NH	Wantastiquet	3	4	1	1	1	4

Table 1 - Climate Risk from Compounding Factors by County

Note. This table is adapted from Shaw et al, 2020 data.

Indicator Descriptions

Heat (0-26): Weeks per year above 95 degrees Fahrenheit

Wet Bulb (0-70): Days with wet bulb temperatures

Farm Crop Yield (-20-92): Percent decline in yields

Sea Level Rise (0-25): Percentage of property below high tide

Very Large Fires (0.01-2.45): Average number of very large fires per year

Economic Climate Damage (-0.05-59): Climate damage as a percent of GDP

County	State	CRJC Subcommittee	Risk	Gover- nance	Built Environment	Natural Environment	Society	CRSI Score
Coos	NH	Headwaters	0.112	0.922	0.536	0.549	0.64	17.43
Essex	VT	Headwaters	0.074	0.78	0.327	0.56	0.468	12.33
Grafton	NH	Riverbend	0.129	0.905	0.785	0.468	0.571	17.56
Caledonia	VT	Riverbend	0.115	0.942	0.401	0.396	0.815	13.74
Orange	VT	Riverbend	0.14	0.961	0.4	0.351	0.689	8.895
Windsor	VT	Upper Valley	0.188	0.915	0.558	0.367	0.651	8.435
Sullivan	NH	Mount Ascutney	0.12	0.92	0.363	0.379	0.594	8.2
Windham	VT	Mount Ascutney	0.104	0.932	0.467	0.364	0.638	12.74
Cheshire	NH	Wantastiquet	0.108	0.856	0.457	0.4	0.574	10.98
National A	werag	e	0.2288	0.5876	0.3932	0.4136	0.5156	4.2125

Table 2 - EPA Climate Resilience Screening Index Scores by County

Note. The information in this table is adapted from Summers et al. 2017.

Indicator Descriptions

Risk: A product of exposure and probability of a hazard occurrence from acute climate events and natural geological hazards and additional technological hazards and the vulnerabilities associated with the exposure. **Governance:** Formal and informal coordination between, across, and beyond different sectors of public administration. The indicators are community preparedness, personal preparedness, and natural resource conservation.

Society: Human aspects of a community except for the built environment represented by demographics, economic diversity, health characteristics, labor and trade services, safety and security, social cohesion, social services, and socio-economics indicators.

Built Environment: Man-made surroundings, ranging from buildings and greenspaces to neighborhoods and cities. The indicators are community, transportation, and utility infrastructure, housing characteristics, and vacant structures.

Natural Environment: Encompasses all living and nonliving things, occurring naturally. The indicators are Extent of Ecosystem Types and Condition.

		Population Density Per	2019	10-Yr Population Change	2019 School	10-Yr Enrollment
Towns	County	Sq. Mi.	Population	(%)	Enrollment	Change (%)
Pittsburg	Coos	3	888	2.2	80	-37.0
Clarksville	Coos	4	278	4.9	ND	ND
Stewartstown	Coos	22	1,040	3.6	66	-20.5
Colebrook	Coos	57	2,323	1.0	337	-20.3
Columbia	Coos	13	779	2.9	ND	ND
Stratford	Coos	10	768	2.9	57	-47.7
Northumberland	Coos	61	2,251	-1.6	338	-10.1
Lancaster	Coos	69	3,542	1.0	407	-6.7
Dalton	Coos	35	1,001	2.2	ND	ND
Littleton	Grafton	110	5,939	0.2	660	-18.6
Monroe	Grafton	34	813	3.2	90	25.0
Bath	Grafton	29	1,114	3.4	77	30.5
Haverhill	Grafton	89	4,663	-0.7	681	-11.3
Piermont	Grafton	20	790	0.0	68	0.0
Orford	Grafton	26	1,258	1.7	201	ND
Lyme	Grafton	31	1,729	0.8	198	2.1
Hanover	Grafton	229	11,502	2.1	589	17.8
Lebanon	Grafton	341	14,079	7.1	1648	-4.6
Plainfield	Sullivan	46	2,443	3.3	223	-10.8
Cornish	Sullivan	39	1,654	0.9	104	-25.2
Claremont	Sullivan	301	13,246	-0.8	1753	-11.4
Charlestown	Sullivan	135	5,154	0.8	393	2.3
Walpole	Cheshire	105	3,863	3.5	245	0.0
Westmoreland	Cheshire	47	1,748	-6.7	135	104.5
Chesterfield	Cheshire	78	3,705	2.8	290	-12.7
Hinsdale	Cheshire	179	4,058	0.3	531	-15.8
Total			90,628	1.7	9,171	-9

 Table 3 - New Hampshire Population and School Enrollment 10-Year Change

Note. The information in this table is adapted from the New Hampshire OSI, 2020 and the New Hampshire

Department of Education, n.d.

		Population		10-Yr Population		10-Yr
Towns	County	Density Per Sa Mi	2019 Population	Change	2019 School Enrollment	Enrollment Change (%)
Canaan	Essex	28	921	-5.2	197	-7.1
Lemington	Essex	3	96	-7.7	ND	ND
Bloomfield	Essex	6	235	6.3	ND	ND
Brunswick	Essex	4	102	-8.9	ND	ND
Maidstone	Essex	6	195	-6.3	ND	ND
Guildhall	Essex	8	248	-5.0	ND	ND
Lunenburg	Essex	29	1,326	1.8	144	15.2
Concord	Essex	23	1,211	-1.9	117	-47.8
Waterford	Caledonia	31	1,246	-2.7	155	-8.8
Barnet	Caledonia	37	1,632	-4.4	191	4.9
Ryegate	Caledonia	30	1,101	-6.2	405	-7.5
Newbury	Orange	33	2,151	-2.9	144	21.0
Bradford	Orange	90	2,701	-3.4	287	31.7
Fairlee	Orange	46	980	0.3	168	-13.4
Thetford	Orange	57	2,531	-2.2	249	23.9
Norwich	Windsor	76	3,409	-0.1	318	7.8
Hartford	Windsor	208	9,556	-4.0	1,529	-3.2
Hartland	Windsor	78	3,507	3.4	285	-3.4
Windsor	Windsor	167	3,298	-7.2	563	-4.9
Weathersfield	Windsor	62	2,736	-3.2	226	9.2
Springfield	Windsor	180	8,908	-5.0	1,213	5.2
Rockingham	Windham	118	4,981	-5.7	565	-40.9
Westminster	Windham	64	2,970	-6.5	215	-1.4
Putney	Windham	92	2,456	-9.1	192	-5.0
Dummerston	Windham	57	1,744	-6.4	165	3.8
Brattleboro	Windham	350	11,332	-5.9	1,950	-4.1
Vernon	Windham	110	2,196	-0.5	194	18.3
Total			73,769	-4.1	9,472	-4.7

Table 4 - Vermont Population and School Enrollment 10-Year Change

Note. The information in this table is adapted from the Vermont Department of Health, 2020 and State of Vermont

Agency of Education, n.d.

Table 5 -	• County	Housing	Stock
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County	State	CRJC Subcommittee	Total Housing Units	% Owner Units	% Rental	% Seasonal	% Vacancy
Coos	NH	Headwaters	21,594	45%	19%		36%
Essex	VT	Headwaters	4,934	44%	13%	43%	
Grafton	NH	Riverbend	52,913	46%	20%		34%
Caledonia	VT	Riverbend	15,534	59%	22%	19%	
Orange	VT	Riverbend	14,541	70%	17%	13%	
Windsor	VT	Upper Valley	33,281	54%	22%	24%	
Sullivan	NH	Mount Ascutney	22,652	56%	20%		24%
Windham	VT	Mount Ascutney	29,234	45%	22%	33%	
Cheshire	NH	Wantastiquet	35,588	59%	26%		15%

Note: This data is adapted from VHFA, 2020 and NHHFA, 2021.

Appendix C - Rental Vacancy Rates



Figure 12 Connecticut River Area New Hampshire County Rental Vacancy Rates

Note. This figure is adapted from Ray et al., 2018.

Figure 13 Connecticut River Area Vermont County Rental Vacancy Rates



Note. This figure is adapted from VFHA, 2020.

Appendix D - Prediction of Increased Migration as a Result of Sea Level Rise

Figure 14 Magnitude of Sea Level Rise Migration Change Above Historic Benchmarks



Note: This Figure is adapted from Shaw et al., 2020. It shows the spatial distribution of changes in migration patterns. Counties experiencing any SLR inundation (i.e. that are directly affected by SLR) are highlighted in blue. The remaining counties are colored according to how many additional migrants they will receive by 2100 based on the 6 feet SLR scenario.

Glossary

Adaptive Management - A systematic and evolving process for improving the effectiveness of natural resources management by learning from experience and utilising current knowledge and data to inform further decision-making over time (Brears, 2018).

Affinity Migration - Occurs by populations with ample resources who proactively move out of a non-ideal living environment (Bose, 2018).

Afforestation - Planting trees in new areas (Angus et al., 2020).

Climate Haven - There is no standard definition for this term. It generally refers to a place that is considered a haven to people migrating due to climate change.

Biophilia - The innately emotional affiliation of human beings to other living organisms (Beatley, 2016). **Blue-Green Infrastructure** - "A planned network of natural and semi-natural areas that utilise natural processes to improve water quality and manage water quantity by restoring the hydrological function of the urban landscape and managing stormwater" (Brears, 2018).

Disturbance Migration - Disturbance migration results in both affinity migration and forced migration (Bose, 2018).

Eutrophic - Relates to water resource's trophic state. If the water resource is eutrophic, it has high nutrients and generally sees high plant or phytoplankton growth (DEC, n.d.).

Forced Migration - occurs without planning, often in response to an acute disturbance such as a natural disaster or political danger, and is undergone in order to survive a potentially mortal threat (Bose, 2018).

Green Streets - "Green streets incorporate nature-based solutions and green infrastructure elements such as trees and vegetation that help connect and integrate the natural and built environments while reducing urban heat island and other climate-related impacts" (Angus et al., 2020).

Mesotrophic - is a water resource with a trophic state that falls somewhere in between eutrophic and oligotrophic (DEC, n.d.).

Oligotrophic - is a water resource that has low nutrient concentrations and generally low plant growth (DEC, n.d.).

Receiving Communities - The communities where immigrants settle.

Resilience - The capacity of a system to absorb, utilize, and even benefit from perturbations. and changes, and thrive without a qualitative change in the system's structure (Beatley, 2016).

Urban Heat Island Effect - "The urban heat island effect is a measurable increase in ambient urban air temperatures resulting primarily from the replacement of vegetation with buildings, roads, and other heat-absorbing infrastructure. The heat island effect can result in significant temperature differences between rural and urban areas" (EPA, 2009).

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