

Factors Associated with Accessory Dwelling Unit Density

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A thesis

Submitted in partial fulfillment of the
requirements for the degree of

Master of Urban Planning

University of Washington

2013

Committee:

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Program Authorized to Offer Degree:

Urban Design and Planning

University of Washington

Abstract

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Accessory dwelling units (ADUs) are self-contained living quarters with kitchen and bath, found in single family properties. These quarters are either attached to the home or are detached structures on individual lots. Zoning codes often prohibit ADUs in single family neighborhoods. Advocates for ADUs have championed their legitimacy arguing that they offer low cost, parcel based solutions to increasing the stock of affordable housing and the need to accommodate elderly family members. ADUs have been legal in Washington State in most cities since 1995. Some cities have seen greater installation rates than others. This research explored the socio-economic, socio-demographic and built environments factors associated with ADU density in four cities: Kirkland, Mercer Island, Sammamish and Shoreline. Logistic regression modeling was performed analyzing factors on a census block group level.

Results suggest that the density of ADUs in census block groups was positively associated with street blocks that had alleys, the percentage of households that include relatives besides children under 18 or a spouse, and wealthier non-White households. Neighborhood wealth, residential unit density, and assessed value per square foot were all hypothesized to be positively associated, but were not found to be associated at all.

This research provided a first look at a wide range of variables. Further research is warranted. Of particular interest is the potential effect of alleys in facilitating the provision of ADUs in single family areas.

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Acknowledgements

Ayn Leslie-Cook of the University of Washington Statistical Consulting Services designed the statistical procedure, wrote the code for the statistical functions and assisted with interpretation.

Phil Hurvitz of the University of Washington Urban Form Laboratory provided guidance on project approach, research design and general feedback. Members of the thesis committee provided guidance on research design, methodology and interpretation.

Chapter 1: Introduction

1.1 Research Context and Relevance

A series of forces are converging to fuel the need to pursue infill development strategies, especially in communities with a large supply of low density single family housing. Planners are looking for ways to adapt the existing form to address an aging population, decreasing household size, and rising energy costs. Accessory dwelling units (ADUs) are self-contained living quarters with a kitchen and bath, and can be either attached or detached to the main structure of a single family house. ADU installation increases housing density on a parcel level, and has been carried out both legally and illegally in single family neighborhoods. In many cases, the introduction of these extra units has stoked controversy. Beginning in 1995, the Washington State Legislature, as part of the Growth Management Act (GMA), mandated that all cities over 20,000 in population allow ADUs in areas zoned for single family housing. Yet some neighborhoods have seen greater installation rates than others. This research is concerned with studying ADUs in this context, and includes an analysis of ADU installation rates in four cities in King County: Kirkland, Mercer Island, Sammamish and Shoreline (Figure 1). The purpose of this research is to examine accessory dwelling units as a viable infill strategy by exploring whether neighborhood factors are associated with density of accessory dwelling units. The results are intended to provide urban planners with information about the spatial context of existing units. Although this research is an exploratory “first look,” the hope is that by understanding this phenomenon better, planners might eventually be able to identify and target neighborhoods in which this type of development might be successfully encouraged.

Location of Cities in Study Area



Figure 1: Location of the four cities included in the study area

1.2 Definition and History

Accessory dwelling units are known by several terms: mother-in-law units, granny flats, and accessory apartments. They are distinguished from accessory units of other types, such as shops, garages, basements or other outbuildings by their inclusion of kitchens and sanitary facilities. Precise definitions of ADUs vary by jurisdiction, but generally these units provide kitchen, bathroom and cooking facilities. Although some jurisdictions limit them to attached units, the common definition of ADUs does not distinguish between attached and detached units (Gellen 1985, Municipal Research and Services Center 1995).

Accessory dwelling units are distinguished from duplex units by their being subordinate in size and prominence to the main single-family unit. The ADU can be built at the same time as the original, main structure, an addition at a later date, or a conversion of existing space. ADUs are commonly constructed as conversions of basements, attics or space over garages (Hare 1989).

The specific practice of adding ADUs to single family housing was commonplace during the 1940s and 1950s in the United States. There is a popular notion that these units were built in response to the growing need to house elderly parents, especially women who outlived their husbands, hence the terms “mother-in-law” or “granny flat.”. According to University of California Professor Martin Gellen, there is not much evidence to support this explanation, but the terms persist probably because of the natural link ADUs have to caring for extended family (Chapman and Howe 2001). It was, however, common for many households during the 1940s and 1950s to take in extra boarders for the income to help defray the costs of homeownership; some of these boarders were accommodated with ADUs (Gellen 1985, Hare 1989, Municipal Research and Services Center 1995). In the decades that followed, as zoning restrictions

increased in single family neighborhoods, it became more difficult to build them, and they thus fell out of favor.

By the 1980s and early 1990s, the recognition of changing demographics, an affordable housing crisis, and increased surplus space in single family homes gave rise to a renewed interest in ADUs. Gellen and planning consultant Patrick Hare began to study and promote these units as an acceptable housing solution. In 1981, it was estimated that eight percent of the housing stock in Renton, Washington, and ten percent of the single family housing stock of Weston, Connecticut and Lydenhurst, New York had ADU conversions (Hare 1981). Babylon, next to Lydenhurst, had ADUs in ten to twenty percent of its housing stock. Almost all of Babylon's units were originally illegal. During 1980, when Babylon legalized ADUs, they received six new applications and 700 for legalizing illegal units.

With the recognition that ADUs were being built both legally and illegally to meet demand for housing options, advocates championed their legitimacy, and encouraged municipalities to embrace them. In 1982, California enacted the "Second Unit Law," but left local jurisdictions enough latitude to implement the policy as a "conditional use." The burdensome conditional use permit process was believed to be the reason for the low policy uptake, and the state responded by enacting more strict enabling legislation in 2003 (Center for Housing Policy 2012). In the Boston area, the regional planning agency actively promoted legalizing ADUs during the late 1980s to combat the increasing underutilization of housing space (Metropolitan Area Planning Council 1988). In the early 1990s, Washington studied the issue as part of the state-wide effort to create more affordable and higher quality housing. And by 1995, as part of the Growth Management Act, the State of Washington mandated that cities over 20,000 must allow ADUs.

Policy makers in the United States, especially at the state and regional level, have been successful at changing the regulatory climate to allow ADUs. But in most cases, homeowner demand for, and conversion of, accessory dwelling units has consistently fallen short of expectations (Gellen 1985, Metropolitan Area Planning Council 1988, Hare 1991, Hickey 2010).

1.3 Regulatory Framework in Washington State

Although their allowance in cities over 20,000 is mandated by the state under GMA, local jurisdictions in Washington State have been given much latitude in crafting specific implementation policies. As an example, until recently, Seattle restricted the definition of accessory dwelling units to attached units. This policy was changed to include detached units in 2009.¹ Detached accessory dwelling units (DADUs) have been a source of controversy in Seattle, and much confusion has existed about whether DADUs are permitted as backyard cottages (Wolfe 2009). While a comprehensive review of ordinances in Washington State is outside the scope of this research, it should be noted that Seattle was the only jurisdiction encountered that did not allow DADUs in recent history.

Most of the language in the city ordinances focuses on appearance of the ADU, especially in relation to the primary unit and the view from the street. In an effort to preserve the character of the neighborhood, lot coverage, setbacks, size (overall and relative to the main unit), and parking requirements are addressed in the development code. The ordinances for all four jurisdictions included in this study (Kirkland, Mercer Island, Sammamish and Shoreline) specify that the owner of the home should occupy either the primary or accessory unit. Specific language for each city is included in Appendix 1.

¹ For this reason, Seattle was not selected for the study. The selection process for study area cities is discussed in the chapter on Methodology (Chapter 3).

An important finding from the review of ordinances for the cities selected for analysis (Kirkland, Mercer Island, Sammamish and Shoreline) is that the regulatory framework is comparable between jurisdictions. In these four cities there does not appear to be any notable regulatory barriers to policy uptake. Interviews with planning staff in each of the cities confirmed the notion that the ADU permit process and regulation compliance does not present a significant barrier (relative to any other ordinary construction permit). However, no information was available from builders or property owners involved in seeking a permit. It is not known whether the requirements for obtaining a legal ADU building permit are barriers to property owners or builders considering an ADU, and whether this results in illegal installations. The focus of this study is to examine ADU installation rates in jurisdictions in which the regulatory barriers are believed to be minimal, comparable, and likely not a factor influencing a homeowner's or builder's decision to build an ADU.

1.4 Research Question and Thesis Organization

With the regulatory barriers minimized, the path appears to be cleared for commonplace installation of accessory dwelling units in single family neighborhoods. And yet, some jurisdictions, and some neighborhoods within them, have more of these units than others. Specifically, this research attempted to identify socio-demographic, socio-economic and built environment factors associated with neighborhoods that have more accessory dwelling units. For example, does the percentage of non-Whites or households with relatives other than children under the age of eighteen or a spouse affect the number of ADUs found in the neighborhood? Or does the wealth of the neighborhood, property value or percentage of renters in the neighborhood have any effect on the number of ADUs? Another example is whether alleys or average single family lot size had any effect on the rate of ADU installation in these neighborhoods.

This research was limited to units that had a legal building permit for which data were available. The density of existing ADUs within a “neighborhood,” defined as a census block group, was the dependent variable. The independent variables were neighborhood factors that were hypothesized to be associated with neighborhoods that have higher concentrations of ADUs. These factors were selected based on professional and academic literature, thesis committee guidance, and common sense hypotheses. Much of the literature on the topic had focused on why homeowners build these units. This research added to the body of knowledge by focusing on neighborhood level characteristics which might be associated with actual installations. The selection of specific independent variables, and their hypothesized importance, is detailed in the methodology section following the literature review.

The organization of this thesis document is as follows: *Chapter 1: Introduction* (this chapter) outlines the research context and question, contains a location map of the study areas and information on how this thesis document is structured. The next chapter, *Chapter 2: Literature Review* discusses what is already known on the topic. This information was useful in developing the list of independent variables to consider in the analysis. *Chapter 3: Methodology* provides information on data sources, definition of the dependent variable, rationale for final selection of independent variables, and statistical analysis technique used. *Chapter 4: Findings* contains maps of ADU locations within their cities and also of the dependent variable, ADU density. The results of the regression analysis are also included in this chapter. Lastly, *Chapter 5: Discussion* provides interpretations of the data, possible explanations, limitations and suggestions for further study.

Chapter 2: Literature Review

Most of the professional and academic literature was produced in the 1980s and 1990s, when ADUs were built but typically not permitted. This literature makes the case for legalization, and touts the community and individual benefits of allowing ADUs. There is a limited body of research addressing the question of who is building, and why the construction rates of legal ADUs have been low. Much of the literature produced in the last ten years is limited to news articles and student theses or dissertations.

2.1. Reasons to Build Accessory Dwelling Units

The two most common motivations for building accessory dwelling units are additional income from rental of the unit, and meeting the needs of a family member (Hare 1989, Gellen 1985, Reule 1991, Chapman and Howe 2001, Hickey 2010). While homeowners install ADUs for the benefits of additional rental income or housing a family member, actual use is likely to alternate between family-related and non-related tenants over time (Hare 1989). In their 2001 survey of ADU owners in Seattle, Portland State University Professors Chapman and Howe subdivided the economic benefit into three categories: 64 percent of respondents cited extra income as the reason to add an ADU, 53 percent specified making house payments more affordable, while 47 percent cited the increased home value as a reason.

There are many benefits to older homeowners. In some cases the unit is built to house an elderly relative (usually a parent) but in other cases, the additional unit is built to house a tenant who will provide either rental income or services or both. Older homeowners also cite deterrence from crime, companionship and exchange for services as reasons to build (Reule 1991). Most Americans would prefer to “age in place,” to stay in their current residence as long as possible

(A.A.R.P. 2010). The additional income, added security and potential for service exchange afforded by an ADU can help make aging in place a more realistic option for single family homeowners. Not surprisingly, the older age groups in the survey by Chapman and Howe were more likely than younger age groups to cite having space for a caregiver or someone to help with household chores as a motivation for adding an ADU.

2.2 Characteristics of Existing Accessory Dwelling Units and their Owners

Few recent studies exist of owners and occupants of existing units. Chapman and Howe conducted surveys with owners and occupants in Seattle in 1999 (Chapman and Howe 2001). Their findings were published in *Housing Studies* in 2001. PhD Candidate Daniel Mazur conducted interviews with occupants and builders for his dissertation (Mazur 2000). Older studies include a 1988 survey of Boulder, Colorado ADU owners (Hare 1988), and a survey conducted for the Andrus Foundation of the American Association of Retired Persons, which is cited extensively in Patrick Hare's comprehensive work on the topic, "Accessory Apartments: The State of the Art." (This author was unable to locate the original Andrus survey report.)

Limited as they may be, the studies do contain relevant information about property owners who have built accessory dwelling units and their tenants. In Seattle, ADU owners were found to have median incomes slightly higher than the median income of Seattle overall, and were more likely to be empty nesters (Chapman and Howe 2001). Tenants of ADUs are often relatives who could not otherwise afford other housing, and ADUs are often rented out below market value (Hare 1989 and Mazur 2000). In a survey of ADU property owners in Boulder, CO, 66 percent reported charging rates that were below the HUD Fair Market rent, and some were significantly below it (Hare 1989). On Mercer Island, Mazur found that the majority of ADUs were on smaller lots and that homes with ADUs were older than average (2000).

2.3 Relevant Demographic Trends

With the understanding that the impetus for building an accessory dwelling unit is driven in large part by family needs, as noted above, literature on housing and demographic trends was also reviewed to shed light on the future demand of ADUs as a means of increasing housing production and meeting actual and latent demand.

Examining trends in multi-generational housing is worthwhile given the ADU literature emphasis on the need to support a family member. Indeed, multi-generational households have been on the rise, especially since the Recession of 2009. The Pew Research Center defines multi-generational households as “containing adults over the age of twenty-five of different generations.” Those are households in which grown children are living with their parents or vice versa. Between 2007 and 2009, the number of Americans living in such households increased by more than ten percent. In absolute terms, the number increased from 46.5 million to 51.4 million, or 16.9 percent of Americans (Pew 2011). This increase represents a spike, which could be attributed to the economic hardship of the Recession of 2009, but the phenomenon has been trending upward steadily since the low point in 1980. The 1980 figure was a seventy year low, with 12.1 percent of Americans living in multi-generational households.

Car-dependence is typical for dwellers of single-family neighborhoods, and this presents a unique challenge to housing older Americans. A study on aging revealed that 600,000 Americans give up driving every year due to decreased ability (Foley 2002). Accessory dwelling units can mean living with other adults who may act as chauffeurs to the elderly. Also, ADUs built on single family properties with access to transit and services might be more suitable for accommodating older family members.

In summary, it appears that the volume of literature on the topic of accessory dwelling units peaked in the early 1990s, and focused primarily on homeowners' benefits and legalization. The tone of this literature was hopeful; increasing intensity of the residential land use in this way seems to be a logical and promising solution to increasing the stock of affordable housing and caring for aging adults or supporting extended family. But single family homeowners have been slow to build these units, and planning professionals seemed to have lost interest in the topic. Virtually all of the available literature in the last ten years has been written by students and journalists. The available research, although limited and decades old, was consistent, and as such, useful in developing the list of socio-demographic, socio-economic and built environment factors to pursue in the analysis.

Chapter 3: Methodology

This section contains a discussion of the rationale for city selection, spatial unit of analysis, and dependent variable definition. It also includes information on the independent variable selection criteria, which together form the research design and detailed hypothesis.

3.1 Selecting the Jurisdictions and Obtaining Data

One of the limitations of studying the phenomenon of built accessory dwelling units is documentation of the actual units at the parcel level. General data sets were sought from Puget Sound Regional Council and King County Department of Assessments. In King County, a data set of all parcels containing any accessory structure in King County was obtained. The data were sorted for “Accessory Dwelling Unit” or “ADU” in the accessory description field. This yielded 297 records. The Puget Sound Regional Council (PSRC) collects data from all four counties in its service area on accessory dwelling units, and the agency supplied a file containing over 2,300 records on ADUs in the four-county area. These data sets seemed promising, but when checked for completeness and accuracy, they were both determined to be unreliable.² The most reliable sources for ADU permit data were the individual cities themselves.

Although jurisdictions in Washington State with populations greater than 20,000 have been required to allow ADUs since 1995 as part of the Growth Management Act, each is given latitude in how to administer its program. Each jurisdiction has its own permit system, which results in a wide range of record-keeping and data retrieval capabilities. Consequently, obtaining data on permitted ADUs is not possible from all jurisdictions, and this became a key factor in

² This was done using King County iMAP interactive mapping tool. ADUs were frequently missing or incorrectly categorized. For example, triplexes or other small apartment buildings were frequently identified as ADUs.

determining which jurisdictions to study. The cities of Kirkland, Mercer Island, Sammamish and Shoreline were able to readily supply data on permitted ADUs.

The availability of data was a practical limitation, but the selection of study areas was also aided by the “information-oriented selection” concepts discussed by Bent Flyvbjerg (2001). Maximum variation on density of ADUs was sought to support the exploratory nature of the inquiry. The selected cities also varied on several of the important independent variables, such as residential unit density, average single family lot size and property values.

The ADU data used were supplied directly by the jurisdictions’ development services and permitting personnel (Appendix 2). Data were standardized by time period: January 2004 to April 2013. Permit status terms vary by jurisdiction, but only ADUs with a permit status indicating that the unit was built were included in the analysis. Each permit was associated with a parcel number, and these parcel numbers were joined with the King County parcel database obtained from King County GIS Services and mapped for viewing and analysis using GIS software (Chapter 4, Figures 2 - 5).

3.2 Defining the Spatial Unit of Analysis and the Dependent Variable

The census block group was chosen as the spatial unit of analysis. A spatial unit defined by the census was necessary because all the socio-demographic characteristics and one socio-economic characteristic were based on census data. Groups were chosen over blocks because many blocks were too small to contain an ADU, making ADU density an infeasible dependent variable for a regression analysis. Tracts are too large and more heterogeneous on the independent variables of interest. Also problematic was the fact that many tracts crossed city boundaries. The majority of block groups followed along city boundary lines.

There are disadvantages of using census-based spatial units. Some of the block groups were oddly shaped, especially those bordering the major water bodies of Puget Sound, Lake Washington and Lake Sammamish. And certainly, as with any spatial unit of analysis, the variability of the factors of interest might be too high for the averages to have relevance to the study. Property values in block groups with waterfront homes are particularly problematic because values drop precipitously away from the shore.

Combined, the four cities of Kirkland, Mercer Island, Sammamish and Shoreline contained part or all of 194 block groups. After eliminating block groups containing zero residential parcels, 174 block groups remained. Some block groups crossed city boundaries, so those with less than 50 percent area in city limits were eliminated, leaving 151 block groups. The City of Kirkland contains 81 census block groups, but 38 of those were annexed in 2011. The city did not begin tracking permits in the pre-annexation area prior to June 1, 2011, so those block groups were eliminated from the study area. In all, 123 census block groups remained in the study area, covering the cities of Kirkland, Mercer Island, Sammamish and Shoreline.

A count of ADUs was summed by block group. This total was then divided by the total number of single family (SF) residential parcels in the block group to derive the dependent or response variable, which is the percent of SF residential parcels that contain an accessory dwelling unit.

3.3 Selecting the Independent Variables

Independent variables were selected according to hypothesized associations between neighborhood socio-economic, socio-demographic and built environment factors and accessory dwelling unit density. The selection process was based on information contained in the literature,

input from thesis committee, observed spatial patterns in mapped ADUs, and common sense hypotheses. In all, fourteen variables were explored across these three categories (Table 1).

Socio-demographic variables selected were population age, household composition and race. Age and household composition were selected because past studies had shown that family need, especially caring for aging parents, was a strong impetus to build an ADU. The metrics for household composition were mean household size, and percent of households which contained “other family,” defined as any relative other than a spouse or householder’s biological, adopted or step-children under eighteen. This could include a child over eighteen, parent, parents-in-law, son-in-law, daughter-in-law brother, sister, grandchild, cousin, niece, or nephew, or any other relative not listed above. Percent of households with children under eighteen was considered, but removed because it was highly correlated (>0.9) with mean household size. Mean household size was inversely correlated with residential unit density (-0.66) but both were kept for consideration. Percent of households with no children was correlated with neighborhood wealth (0.65). Both of these factors were also kept for consideration. Race/ethnicity was included because studies have shown that some races are more likely to live in multi-generational households than others.

Socio-economic factors were included because past studies had shown that the need for extra income was a key reason to build an ADU. Socio-economic variables selected were neighborhood wealth (defined as average assessed property value per residential unit), percent of households who rent, and average assessed property value per residential lot square foot. Neighborhood wealth was considered because the cost of constructing an ADU might be a barrier for less wealthy residents. This measure of neighborhood wealth was used in health research and found to reliably capture household income, education, and other wealth or

deprivation factors (Moudon et. al. 2001). Percent of households who rent was included because of a common sense hypothesis that neighborhoods with high percent of renters might be less likely to invest in ADU conversion due to the requirement that the homeowner to occupy either the main or accessory unit (although it should be noted that this can be hard to enforce). Assessed value on a per residential lot square foot basis was selected because of the common sense hypothesis that higher property values may help justify the increased investment in home improvement by homeowner. It also seemed important to explore the notion that moderately wealthy people might be more likely to invest in an ADU, as compared to those on either end of the wealth spectrum. Lower income people might not be able to afford to make significant modifications to their homes, especially not within the constraints of the permitting process, while wealthy people might not have an economic incentive to build an ADU. To investigate this phenomenon specifically, the neighborhood wealth metric was squared and included as a separate variable in the analysis. (If the association exists as hypothesized, the coefficient would be negative, thus producing an upside-down parabola of the dependent variable.).

Built environment factors selected were residential unit density, mean single family lot size, three network connectivity variables (street block size, linear miles of alleys, number of cul-de-sacs), and proximity to routine destinations. Residential unit density included both single family and multi-family residents, and was selected because ADUs are a means to increase density, so existing neighborhood density seemed important. The metric used for residential unit density was total number of dwelling units (multi-family and single family) per acre of the census block group itself. Mean single family lot size was selected because past studies suggest that houses on smaller lots contained more ADUs. Street block size and number of cul-de-sacs were selected because of the hypothesized relationship between traditional neighborhood layouts

and the likelihood of constructing an ADU. The metric for street block size was number of intersections, which was calculated using the King County transportation network, with freeways, rails and trails removed. Number of cul-de-sacs was calculated from the same network, using a feature in ArcGIS which converts lines with dead ends to vertices called “dangles.” Cul-de-sacs and number of intersections were highly correlated (0.7) but both were kept for consideration because of the interest in exploring the specific form of cul-de-sacs. Linear miles of alleys were selected based on visual observations of the spatial arrangements of the mapped existing ADUs. There seemed to be a high number of ADUs near alleys in Kirkland. Routine destinations were selected because studies show that ADUs are often rented out below market value, and also to older relatives. These occupants might not be able to afford or drive a car, and hence might require easy access to daily services. Routine destinations were those that a resident might be likely to use on a frequent basis to go about daily or at least weekly business, and included grocery and convenience stores, drug stores, banks, post offices and restaurants. The metric was developed using the parcel data supplied by King County, which includes codes for present land use. The individual parcels containing these land uses were totaled by block group.³

Data sources are detailed for each variable in Table 1. Socio-demographic data were obtained from the 2010 Decennial Census. This data set was already in a form that applied to the entire the block group. Aside from tenure, all socio-economic data came from King County Department of Assessments. Assessment data, used for neighborhood wealth and assessed value

³ Several block groups straddled city boundaries; only the area that fell within city limits was considered in the analyses. For the four independent variables that were based on absolute values (alleys, intersections, dead end streets and routine destinations), their values were adjusted based on the percent of area that remained in the partial block group.

per square foot, were obtained at the parcel level and then averaged by block group.⁴ Data on residential unit density, including condos and apartments, and lot size were obtained from the King County parcel file (April 17, 2013), which is available from the GIS Center, and then averaged by block group. Network connectivity factors (alleys, intersections, cul-de-sacs) were developed using the data from the transportation network file from King County GIS Center (April 19, 2013).

Descriptive statistics for all independent variables are shown in Appendix III.

⁴ Residential parcels include total number of dwelling units per census block group. Residential uses were identified using the “present use” attribute in the King County parcel address data set. The dataset was first clipped to include only the four cities, and then queried to select only residential uses. Multi-family parcels were included, and their units tallied by parcel. Information for assessed value was also contained in the same parcel address file. Improvement value and land value were combined for total value.

Characteristic	Source of data	Definition of Metric (per block group)	Hypothesized Importance
<i>Socio-demographic</i>			
Age of residents	2010 Census (100% data)	Median age of residents	High
Race	2010 Census (100% data)	Percent non-White residents	High
Number of persons in household	2010 Census (100% data)	Mean household size	High
Households without children	2010 Census (100% data)	Percent of households containing no children under 18	High
Other family in household	2010 Census (100% data)	Percent of households that contain a relative other than a child under 18 or spouse (e.g. mother-in-law, cousin, adult child, etc.)	High
<i>Socio-economic</i>			
Neighborhood wealth	King County Dept. of Assessments	Average assessed property value (land+improvement) per residential unit (per \$100,000) ⁵	High
Housing tenure	2010 Census (100% data)	Percent of households that are rental occupied	High
Assessed value per residential lot square foot	King County Dept. of Assessments	Average land + improvement value per average residential ⁶ lot square foot (per \$100,000)	High
<i>Built environment</i>			
Residential unit density	King County parcel file	Number of dwelling units per acre of block group area (gross density)	High
Average SF residential lot size	King County parcel file	Mean single family lot size (acres)	High
Network connectivity: street block size	King County transportation network	Number of intersections; freeways, railroads, trails excluded, alleys	Medium
Network connectivity: alleys	King County trans network	Total linear miles of alleys	Medium
Network connectivity: cul-de-sacs	King County trans network	Number of dead end streets	Low
Routine destinations	King County parcel file	Number of parcels containing grocery, convenience, drug stores, banks, post office, restaurants	Medium
City	Individual city boundaries	City variable	High

Table 1: Independent variables considered for analysis

⁵ Values were expressed as per hundred thousand dollars to adjust the place value of the model coefficients to make them more readable.

⁶ “Residential” includes single family and multifamily parcels.

3.4 Preparing the Data for Analysis

In addition to the hypothesized independent variables, three more variables were added prior the regression analysis. The first was included to account for spatial autocorrelation, that is to investigate whether there was spatial clustering of data not otherwise explained by the independent variables. Quantifying this phenomenon was important because the ADUs appeared to cluster in downtown Kirkland, but seemed more random in other areas, including the block groups outside of downtown Kirkland. By measuring the level of spatial autocorrelation, it was possible to investigate whether ADU density was correlated with the City of Kirkland overall or only specific block groups in Kirkland. Also known as a “distance-weighted auto-covariate,” this variable is referred to henceforth as the “auto-covariate.” It was calculated using the x- and y-coordinates of the centroid of each block group. All x- and y-values were based on a common point of origin, and distance values were assigned to each centroid by calculating their differences from this point of origin. This distance between centroids of block groups was inverted to give higher values to closer block groups. Then distances were weighted by the dependent variable, percent of SF parcels that contain an ADU to create the auto-covariate. Block groups with higher auto-covariate values were those that were located nearer to other block groups with higher ADU densities.

Two interaction variables were added to further explore hypothesized impact of certain variables when considered together. The first was neighborhood level assessed value and percent non-White. This was done to investigate the possible relationship between ADU installations and the recent phenomenon that the population of wealthier, educated immigrants and non-Whites has been increasing in suburban communities in King County. This line of inquiry was inspired by Pew Research findings that Asians are twice as likely as Whites to live in multi-generational

households, while Hispanics are nearly twice as likely to live in multi-generational households (2011). It is hypothesized that wealthy non-Whites might accommodate these family members with their own living space, such as an accessory dwelling unit would provide.

The other interaction variable was average single family lot size and cul-de-sac density. This variable was selected to explore the hypothesis that the form of low density subdivisions with curvilinear streets, loops and cul-de-sacs does not lend itself to conversion or more intense use at the same rate as way traditional street block layouts.

The number of variables of “high” importance (shown in Table 1) needed to be reduced for inclusion in the statistical analysis. Those that were considered to be the most theoretically important were named “keep” variables and included in all models. These variables were: neighborhood wealth because of cost associated with construction of an ADU and the need for extra income as a reason to build; residential unit density because ADUs are a means to increase density; average single family lot size, because some studies show ADUs are found on smaller lot sizes while logic would suggest larger lots could accommodate the extra unit; assessed value per residential lot square foot because it could provide justification for the expense of building; and lastly, the auto-covariate, mentioned above, to account for spatial clustering not otherwise explained in the data. The remaining variables were analyzed as “exploratory” variables (Table 2).

Table 2: Independent variables

“Keep” variables: theoretically most important	“Exploratory” variables: all others
<ol style="list-style-type: none"> 1. Neighborhood wealth 2. MF & SF residential unit density 3. Average SF residential lot size 4. Assessed value per MF & SF residential lot square foot 5. Auto-covariate 	<ol style="list-style-type: none"> 1. Age of residents 2. Race 3. Average household size 4. Other family in household 5. Households without children 6. Percent who rent 7. Linear miles of alleys 8. Number of intersections 9. Number of dead end streets 10. Routine destinations 11. City variable 12. Interaction: non-White & wealth 13. Interaction: SF lot size & dead end streets

3.5 Regression Analysis

The response variable was composed of original data that were binomial: single family parcels either contained an accessory dwelling unit or did not. But when aggregated into the spatial unit of analysis, the response variable became an expression of probability. In other words, a single family parcel within a given block group had a certain percent chance of having an ADU. For this reason, binomial logistic regression was used. Specifically, a quasi-binomial regression model was used (a type of generalized linear model) to account for the overdispersion of the response variable. A subset of variables was selected for all models, as mentioned above, and designated “keep” variables. The remaining variables were chosen using a bi-directional stepwise procedure. Each step included addition and subtraction of “exploratory” variables, and evaluated using the Akaike Information Criterion (AIC), a procedure that aims to balance the tradeoff between model simplicity and best fit. The model with the lowest AIC value was interpreted to be the best fit.

The high number of independent variables was due to the exploratory nature of the research. With such a high number of variables and a stepwise procedure, the p-values must be interpreted with caution.

Geospatial analyses were conducted using ArcGIS[®] version 10.0. Code for the statistical analyses was written by Ayn Leslie-Cook of University of Washington Statistical Consulting Services, using R Studio version 0.97.551 statistical software. Descriptive statistics were calculated using Microsoft[®] Excel 2010.

Chapter 4: Findings

4.1 Accessory Dwelling Unit Installations – General

During the ten year period included in the analysis, only 240 accessory dwelling were built on single family residential parcels in the four cities, Kirkland, Mercer Island, Sammamish and Shoreline (Figures 2 – 5). For all the promise that ADUs seem to offer, this figure seems very small when compared to the 52,000 SF residential parcels in the study area.

Kirkland⁷ had 101 units, the highest of any of the four cities. Shoreline had 66 units, and Mercer Island had 51. Sammamish had the smallest number, 22. Table 3 shows ADU densities by city.

Table 3: ADU density in study area cities

City	Number of ADUs	Number of SF parcels	ADU Density (Percent of SF Parcels with an ADU)
Kirkland	101	9,925	1.02%
Mercer Island	51	7,066	0.72%
Sammamish	22	14,466	0.15%
Shoreline	66	15,323	0.43%

⁷ All figures for Kirkland include only the pre-annexation area of Kirkland.

Kirkland Accessory Dwelling Units

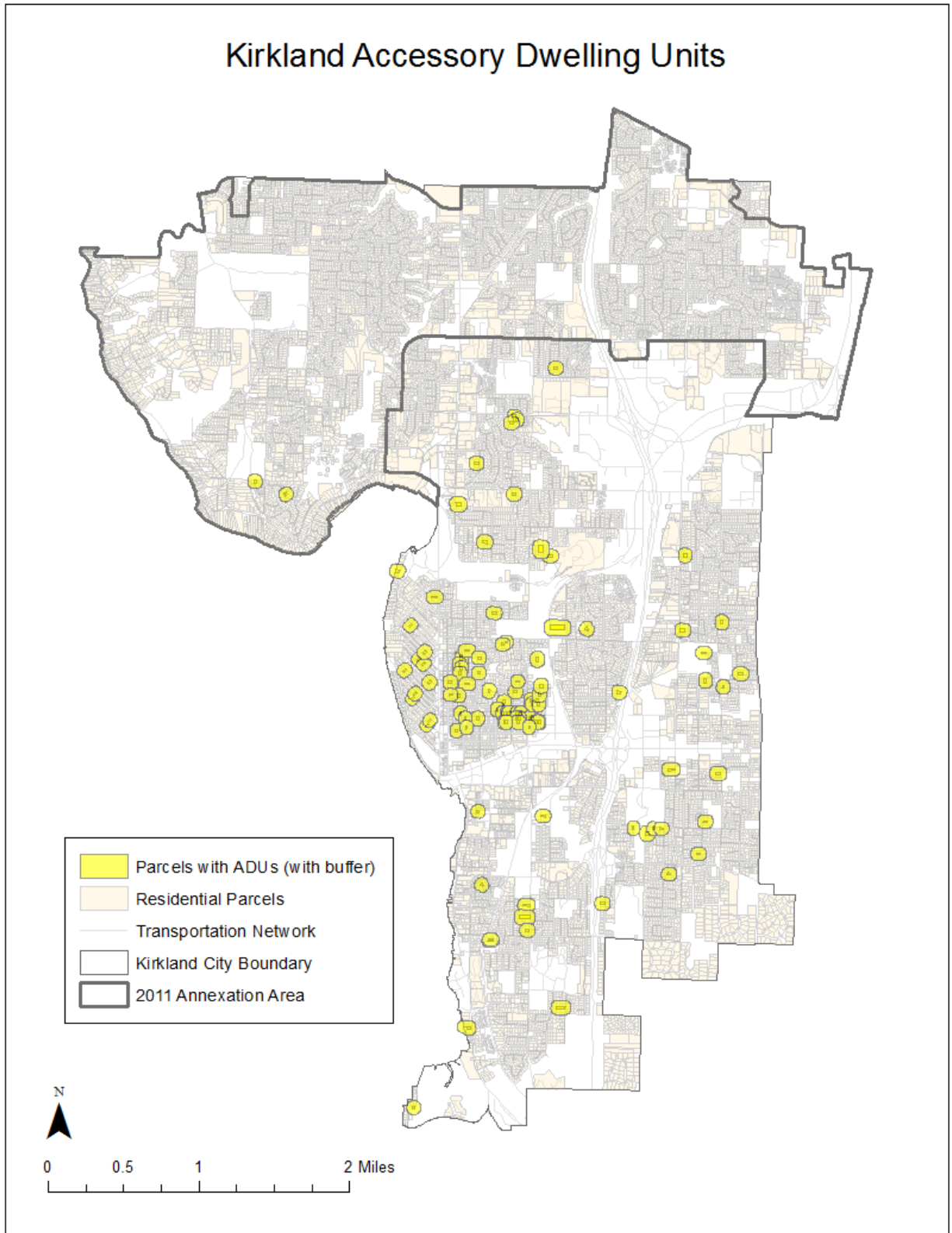


Figure 2: Kirkland ADUs with buffer

Mercer Island Accessory Dwelling Units

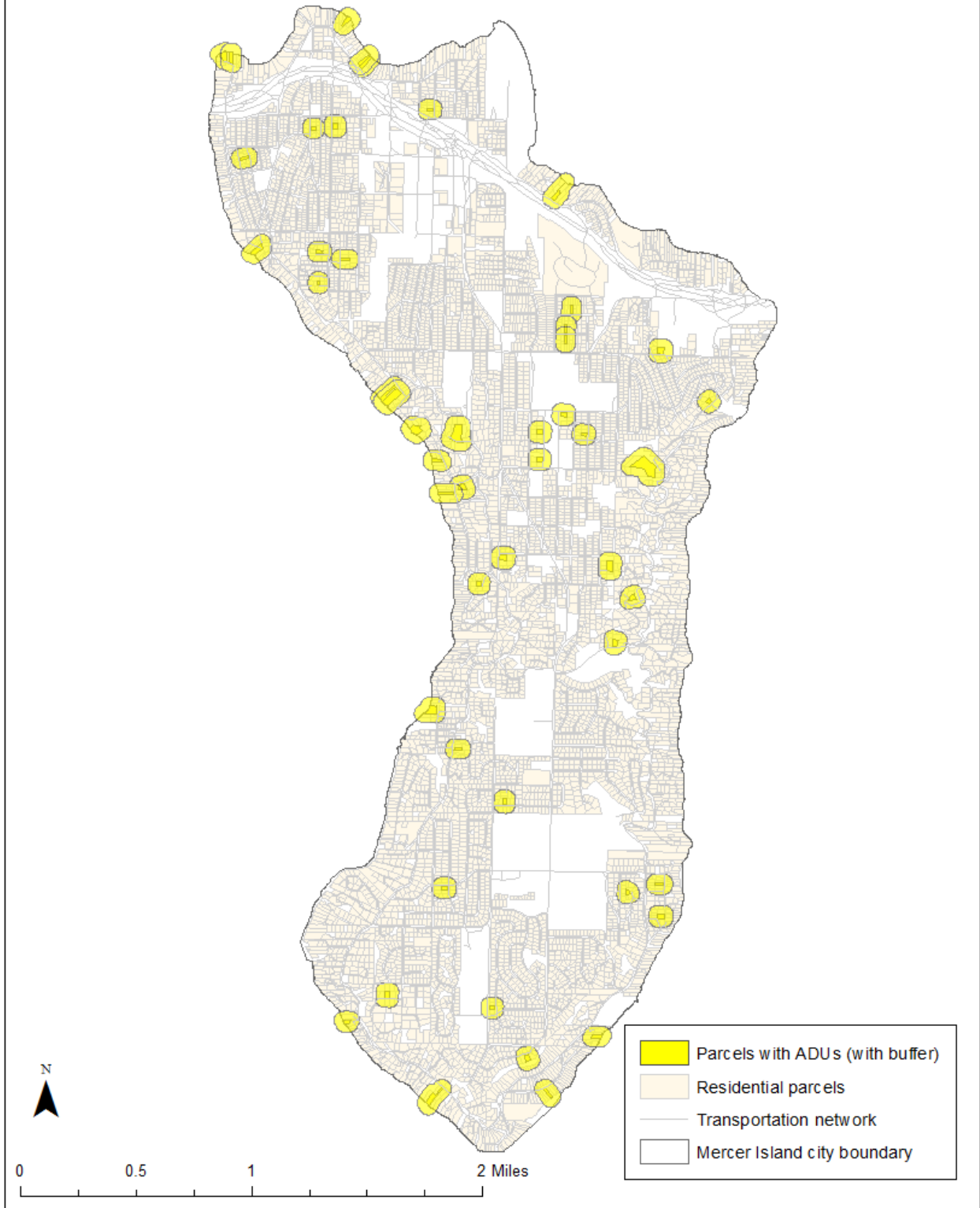


Figure 3: Mercer Island ADUs with buffer

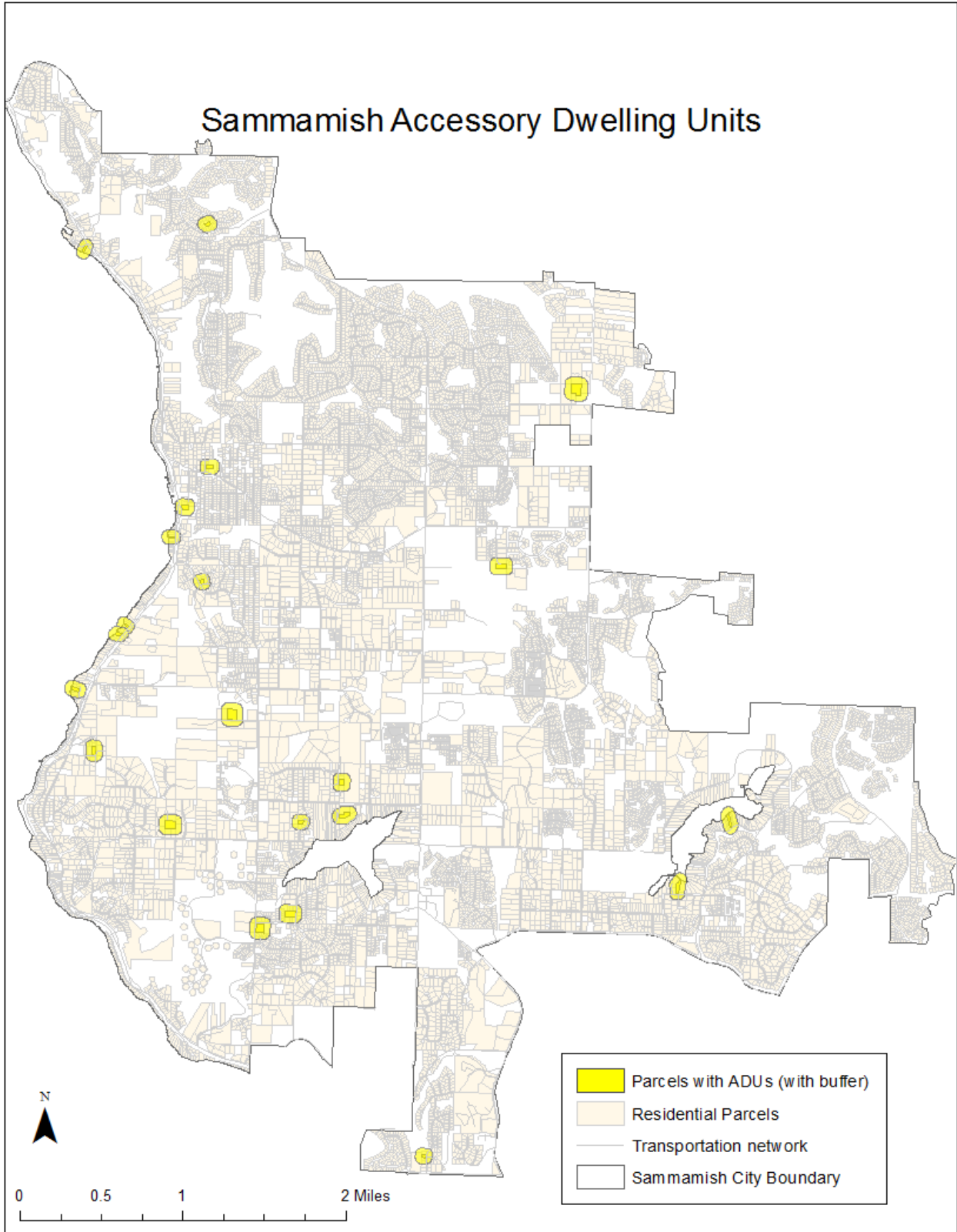


Figure 4: Sammamish ADUs with buffer

Shoreline Accessory Dwelling Units

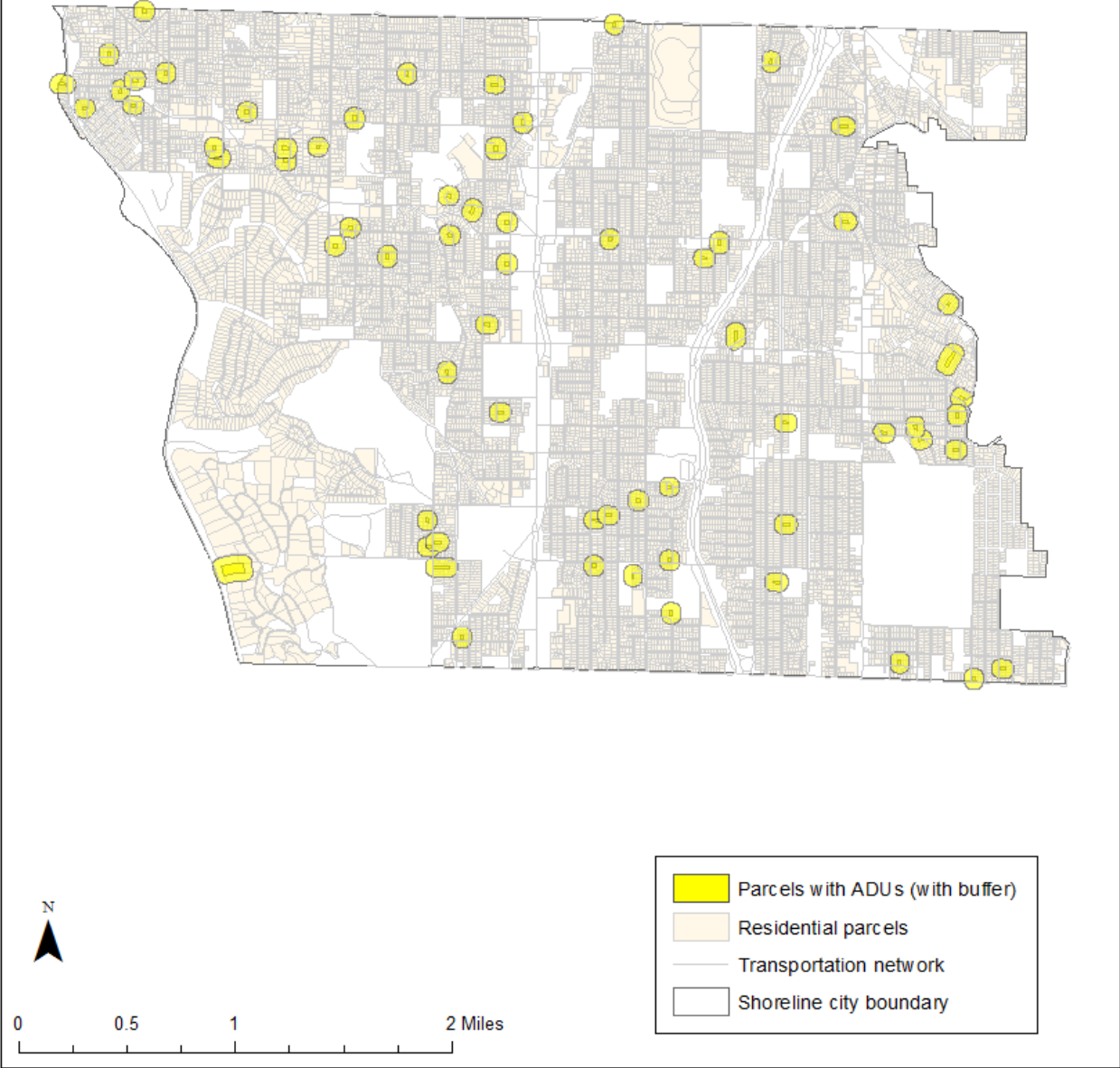


Figure 5: Shoreline ADUs with buffer

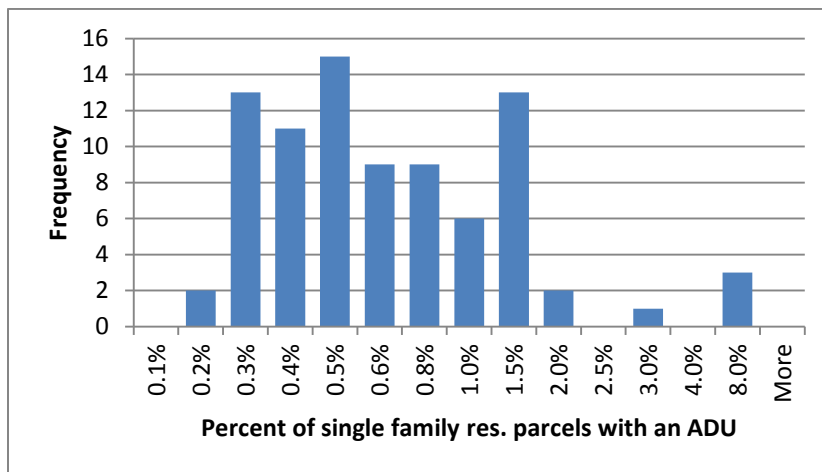
4.2 Accessory Dwelling Unit Density by Block Group

The spatial distribution of the outcome variable, percent of single family residential parcels that contain an ADU, is shown in Figure 7. Among the 123 block groups, the mean percent of SF residential parcels with an ADU was 0.58%, with a median of 0.36%. Of the 123 block groups, 39 had no permitted ADUs, and almost half of these were located in Sammamish. Shoreline had twelve block groups with no ADUs; Kirkland had eight, and Mercer Island only one. Frequency distribution is shown in Figure 6. Among the subset of block groups that have non-zero ADU density, the mean and median were 0.85% and 0.52% respectively. Two block groups in downtown Kirkland were unusually high, at 7.18% and 5.0% (see Table 4).

Table 4: Descriptive statistics for ADU density by block group

	Median	Mean	Std deviation⁸	Min	Max
All block groups (123)	0.36%	0.58%	0.96%	0	7.18%
Non-zero block groups (84)	0.52%	0.85%	1.06%	0.16%	7.18%

Figure 6: Histogram showing distribution of ADU densities of non-zero block groups



⁸ Because the sample is expressed in percent, the standard deviation is shown in percentage points.

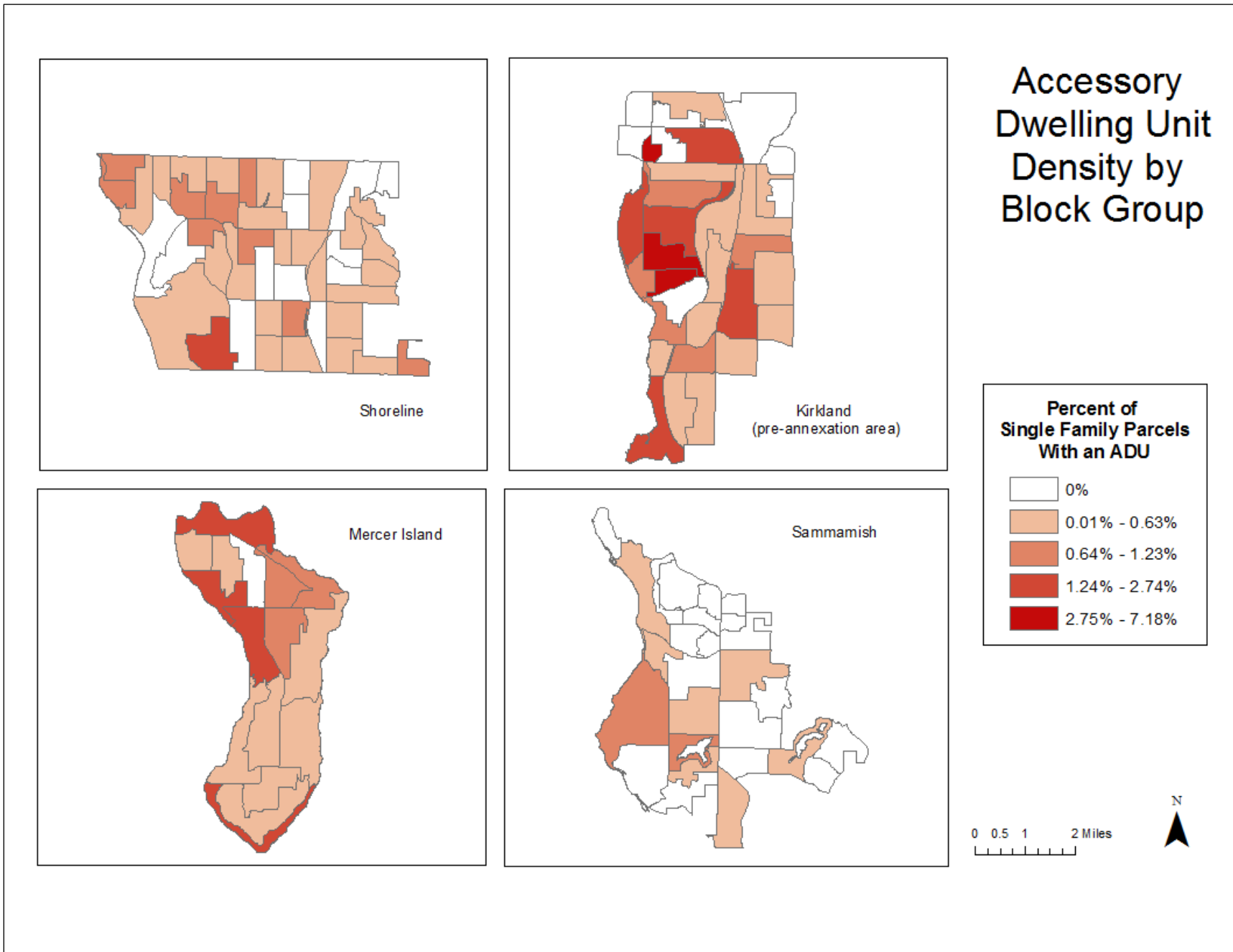


Figure 7: Spatial distribution of ADU density

4.3 Regression Analysis Results – Best Fit Model

The highest association in the model containing the fewest variables considered, (the “keep” model), was the auto-covariate. In this same model, there was a significant association with neighborhood assessed value per residential unit (neighborhood wealth). The high coefficient value of the auto-covariate, which accounts for associations not otherwise explained, suggests that the other variables in the keep model do not explain the phenomenon of accessory dwelling unit density very well (Table 5).

Table 5: Quasi-binomial regression model for smallest model considered

	Coefficient	Std. error	z-value	p-value
(Intercept)	-6.477	0.303	-21.365	< 2e-16
Residential unit density	-0.039	0.051	-0.762	0.446
Average SF lot size (acres)	-0.567	0.639	-0.890	0.373
Neighborhood wealth	0.091	0.036	2.523	0.012
Auto-covariate	7.032	1.037	6.781	1.2e-11
Assessed value per residential lot square foot	0.006	0.004	1.753	0.080

The stepwise procedure began with a model containing only the five keep variables listed above, and this model had an AIC value of 450.14. After adding and subtracting exploratory variables, the operation stepped through seven models, which decreased in AIC values. The AIC value for the final model was 428.39. Comparing the AIC values of the initial model (keep) to the final model, there is almost no chance that the final model explains the phenomenon of ADU density better than the original keep model.⁹ Table 6 shows the stepwise model that best fit the data. It includes the five keep variables, and the exploratory variables that best fit the data, using

⁹ The probability that the initial model contains more information loss than the final model is expressed by $p=e^{-(AIC_{\text{final}}-AIC_{\text{initial}})/2} = e^{-(428.39-450.14)/2}=0.0000189$.

the AIC selection criteria. In this process, variables that improve the fit were included in the final model even if they had p-values above levels considered significant because the AIC process is not based solely on p-values; it is an optimization process, trading off number of variables and likelihood that the variable is associated with the outcome.

The stepwise analysis revealed notable associations between certain neighborhood factors and ADU density (Table 6). The strongest association in the stepwise model was percent of households that had “other family” (8.18). Block groups with a higher percent of people living in households that include a relative other than a spouse or child under the age of eighteen were found to have higher ADU densities. Linear miles of alleys were found to have an association with ADU density (0.79). That is, the greater the number of linear miles in a block group, the greater the ADU density. This was the only built environment factor found to be associated with ADU density. When evaluated separately, the main effect of either race (non-White) or neighborhood wealth was found not to be significant. However, when taken together as interaction variable, non-White and neighborhood wealth were shown to have a positive association with ADU density (1.34). These coefficients are included to provide information as to the magnitude and direction of the association, but the stepwise procedure and high number of independent variables limit the ability to precisely quantify the relationship between the coefficients, independent variables and outcome variable.¹⁰ The coefficients are intended only to indicate general findings about these relationships.

In comparing the original keep model and the full explore model, the auto-covariate dropped in significance (from $p < 0.001$ to $p > 0.10$). Because the auto-covariate explains correlations not otherwise explained, this can be interpreted to mean that the independent

¹⁰ In addition to uncertainty, it should be noted that model calculations in the binomial family must also be transformed to accommodate the unique behavior of the s-shaped logit function, especially for values near 0 and 1.

variables in the exploratory model explain the data better than the original keep model.

Neighborhood wealth was significant in the keep model but was not so in the final model.

The city variable was considered as an exploratory variable in the stepwise regression procedure, but was not included in the final model because through the AIC selection process, the city in which the block group was located was not found to be associated with ADU density. Other independent variables that were not in the final model were percent of households without children, percent who rent, number of cul-de-sacs, and the interaction variable between single family lot size and cul-de-sacs.

Table 6: Quasi-binomial regression model based on stepwise regression procedure

	Coefficient	Std. error	z-value	p-value
(Intercept)	-6.177	2.539	-2.433	0.017
Residential unit density	-0.0001	0.073	-0.001	0.999
Average SF lot size (acres)	0.064	0.944	0.064	0.949
Neighborhood wealth	-0.204	0.126	-1.627	0.107
Auto-covariate	3.585	2.247	1.595	0.114
Assessed value per residential lot square foot	-0.003	0.007	-0.464	0.644
Number of retail parcels	-0.037	0.031	-1.116	0.267
Percent non-White	-4.565	2.819	-1.619	0.108
Median age	0.043	0.024	1.811	0.073
Mean household size	-0.854	0.518	-1.648	0.102
Street block size	0.003	0.002	1.450	0.150
Alleys (miles)	0.794	0.291	2.731	0.007
Other family in household	8.180	3.741	2.187	0.031
Interaction variable: non-White and wealth	1.314	0.562	2.336	0.021

Bold indicates p-values <0.05.

Chapter 5: Discussion

The regression analysis produced some important information to consider on the topic of neighborhood factors affecting accessory dwelling unit density. The strongest association was the percent of households that include a relative other than children under the age of eighteen or spouse. See Figure 8 for an example of “other family” distribution by block group in Shoreline. This finding is not surprising when considering that past studies have shown that one of the primary reasons to build an ADU is to meet the needs of a family member. Of note, the analysis was performed on an aggregated figure for this variable, and it was not limited to parents or parents-in-law. It might be useful in future analyses to examine what percent of the relatives in this figure are elderly, which would be relevant information for urban planners considering future housing options for an aging population.

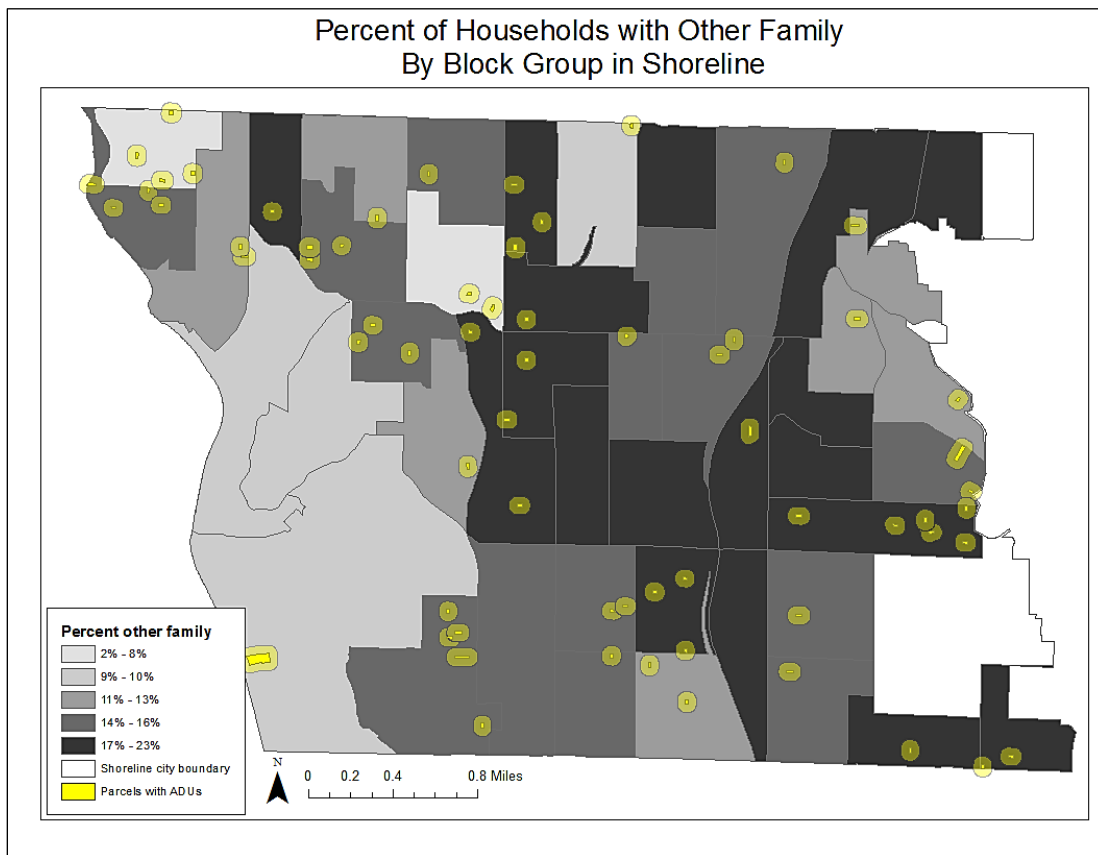


Figure 8: Percent "other family" shown by block group in Shoreline

The main effect of race (percent non-White) was not found to be associated with ADU density. However, the interaction variable that included race and neighborhood wealth was shown to have a positive association with ADU density. Many suburban cities, and single family subdivisions within them, have been receiving locations for “White flight” for decades. Recently, however, wealthy suburban cities have seen substantial growth in their non-White populations (Table 7). This is an important planning concern because non-White cultures, especially Asians, which make up a large percentage of the growth shown in Table 7, are known to be more likely to live in multi-generational households than native born, White Americans (Pew Research 2011).

Number of miles of alleys was associated with ADU density. A possible explanation is that ADUs, many of which have their entrances on alleys, offer more options for separate access for occupants of the main and accessory units—access by both foot and car. Such separate access might be seen by residents and neighbors as affording added privacy, which is considered desirable by many living in single family neighborhoods. Alleys also provide options for additional parking, reducing the need for long driveways, thus reducing land consumption compared to lots with the front access only. Almost all alleys were found in downtown Kirkland (Figure 9). While these possible explanations are supported by common sense, the data do not provide any evidence of a causal relationship between alleys and ADU density.

Table 7: Changes in race between 2000 and 2010 Decennial Census

	Percent change in population overall	Percent change in non-White population	Percent change in White population
Kirkland	8.29%	52.17%	0.71%
Mercer Island	3.01%	27.53%	-4.60%
Sammamish	34.24%	178.60%	14.21%
Shoreline	-0.03%	24.24%	-7.29%

Accessory Dwelling Units and Alleys Downtown Kirkland

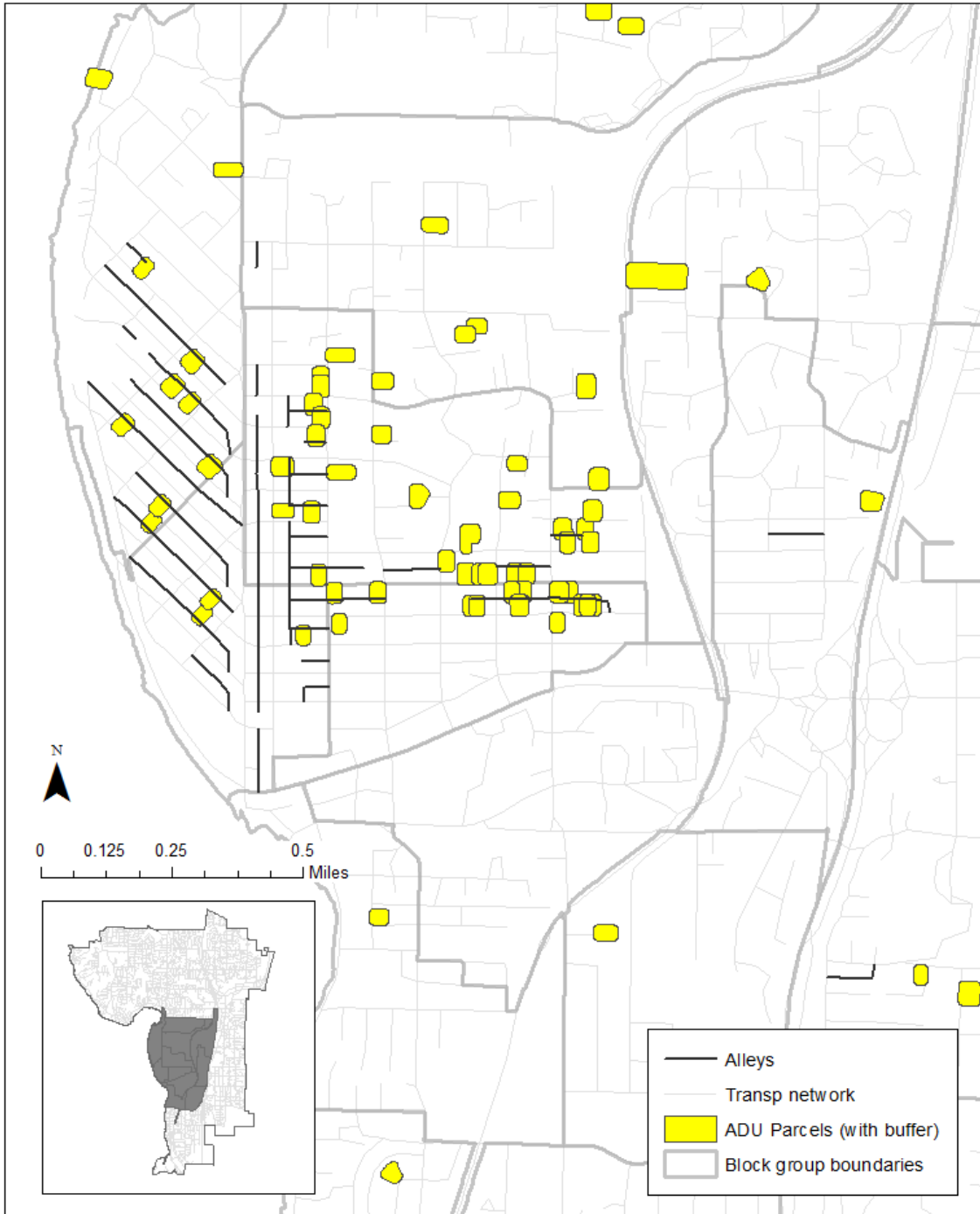


Figure 9: ADUs in Downtown Kirkland

Another possible explanation for the association between alleys and ADU density is the possibility that there is an unidentified city effect in the Kirkland. The analysis included individual cities as an independent variable, and the Kirkland variable was not seen as having an association as a main effect. But it is possible that as an interaction variable, Kirkland might have been found to influence the outcome. It would be useful to run a similar analysis using Kirkland data alone.

Another explanation, related to the city effect, is the auto-correlated nature of the data. It is possible that a phenomenon exists near alleys that homeowners or builders are influenced by the presence of existing ADUs. In an interview, City of Kirkland Planning Supervisor mentioned that ADUs have been very well accepted by neighbors, and they rarely receive complaints. “It [presence of an ADU] is of no great concern” was how she characterized it. Once installed, ADUs are typically not an issue in Kirkland.

Alleys might also be related to the age of the neighborhood. No specific metric was included for determining age of neighborhood, subdivision or age of housing stock. Street block size (number of intersections), which is known to be associated with age of neighborhood, was analyzed and not found to be associated. In the previously mentioned interview, the City of Kirkland Planning Supervisor opined that the traditional block layout of downtown Kirkland lends itself to accommodating accessory dwelling units and their tenants. It would be useful to consider age of the neighborhood and housing stock more directly.

The analysis did not support several of the associations that were hypothesized. Neighborhood wealth was found to be associated with ADU density in the original model (“keep”), but not in the final model that included “exploratory” variables. Because the final model is considered to be a more likely explanation of the data, this suggests that one or more of

the exploratory variables better explained ADU density than neighborhood wealth. Taken together, the two models suggest that neighborhood wealth plays a role in ADU density, but it might only be relevant when considered in conjunction with another factor. This is supported by the association found with the interaction variable, neighborhood wealth and race, but there may be others. It is logical to consider that financial means is a necessary but not sufficient precondition for an individual to install an ADU on a single family property.

Single family lot size and residential unit density were also considered theoretically important, but were not found to be associated with ADU density. It is not clear whether this is because lot size and density have no correlation to ADU density, or if an association was obscured by the heterogeneity of block groups, or of the choice of method of analysis in general.

The exploratory nature of the research and high number of independent variables require that any findings should be taken as preliminary. Future research might be conducted using a different spatial unit of analysis. Census block groups were chosen because they contained data on the neighborhood-level exploratory variables (age, race, household size, percent who rent and the presence of children or other family). But census block groups have limitations. They cover large areas for which averages might obscure or distort patterns in key attributes. This is an issue for measuring patterns of residential density. Areas with different mixes of single and multi-family development might have different patterns of ADU installation rates than areas with only single family development. Some block groups have relatively high density apartments and low density single family housing in close proximity, especially in Sammamish and Mercer Island, while other block groups display a more homogenous density pattern. Future studies might be better served by comparing smaller, more homogeneous neighborhood units to understand ADU trends.

The data used in this study were based on permitted units obtained over a ten year period between 2004 and 2013. Additional permitted units in each of the cities included in the study area were not included in the analyses because of the need to standardize the data across a consistent time period. Additionally, it should be noted that there are unknown numbers of illegal ADUs in each of the cities. Past studies have estimated that approximately 10% of single family properties may contain an ADU, including both legal and illegal units (Hare 1981). Also excluded from the research, but potentially relevant to planning, is the existence of units that are similar to ADUs in that they might contain one or two but not all of the features that define an ADU. For example, a unit with only limited cooking facilities might not be considered an ADU, but could be a perfectly suitable housing solution for an older relative.

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Appendices

Appendix 1: Local Ordinances Concerning Accessory Dwelling Units

City of Kirkland

115.07 Accessory Dwelling Units

One (1) accessory dwelling unit (ADU) is permitted as subordinate to a single-family dwelling; provided, that the following criteria are met:

1. Number of Occupants – The total number of occupants in the principal dwelling unit and the ADU combined shall not exceed the maximum number established for a single-family dwelling as defined in KZC [5.10.300](#).
2. Owner Occupancy – One (1) of the units must be the principal residence of the property owner(s).
3. Subdivision – Accessory dwelling units shall not be subdivided or otherwise segregated in ownership from the principal dwelling unit.
4. Scale –
 - a. Attached ADU: The square footage of the accessory dwelling unit shall not exceed 40 percent of the primary residence and accessory dwelling unit combined. If the accessory unit is completely located on a single floor, the Planning Director may allow increased size in order to efficiently use all floor area. Garages, sheds and outbuildings are excluded from the square footage calculation for the primary residence and the ADU.
 - b. Detached ADU:
 - 1) An accessory dwelling unit will be considered to be “detached” from the principal unit if it has any of the following characteristics:
 - a) It does not share a common roof structure with the principal unit.
 - b) It is not integrated into the footprint of the principal unit.
 - c) The design is inconsistent with the existing roof pitch, siding treatment, and window style of the principal unit.
 - 2) The square footage of the detached ADU shall not exceed the lesser of 800 square feet of gross floor area or 40 percent of the primary residence and accessory unit combined. Garages, sheds and outbuildings are excluded from the square footage calculation for the primary residence and the ADU. When calculating the square footage of the ADU see KZC [5.10.340](#), definition of “gross floor area.” The gross floor area shall not include:
 - a) Area with less than five (5) feet of ceiling height, as measured between the finished floor and the supporting members for the roof.
 - b) Covered exterior elements such as decks and porches; provided, the total size of all such covered exterior elements does not exceed 200 square feet. See KZC [115.08](#) for additional size and height limitations.
5. Location. The accessory dwelling unit may be added to or included within the principal unit, or located in a detached structure. Detached structures must conform with the setbacks, height restrictions, lot coverage and other applicable zoning regulations required for single-family dwellings in the applicable use zone; provided, that an accessory dwelling unit shall not be considered a “dwelling unit” in the context of Special Regulations in Chapters [15](#) through [60](#) KZC which limit the number of detached dwelling units on each lot to one (1).
6. Entrances. The primary entrance to the accessory dwelling unit shall be located in such a manner as to be clearly secondary to the main entrance to the principal unit and shall not detract from or alter the single-family character of the principal unit.
7. Parking. There shall be one (1) off-street parking space provided for the accessory dwelling unit.

8. Small Lot Single-Family and Historic Preservation Subdivisions. Accessory dwelling units are prohibited on lots smaller than the required minimum lot size approved using the small lot single-family and historic preservation subdivision regulations contained in KMC 22.28.042 and 22.28.048.
9. Applicable Codes. The portion of a single-family dwelling in which an accessory dwelling unit is proposed must comply with all standards for health and safety contained in all applicable codes, with the following exception for ceiling height. Space need not meet current International Building Code (IBC) ceiling height requirements if it was legally constructed as habitable space.
10. Permitting
 - a. Application
 - 1) The property owner shall apply for an accessory dwelling unit permit with the Building Department. The application shall include an affidavit signed by the property owner agreeing to all the general requirements outlined in this section.

In the event that proposed improvements in the accessory dwelling unit do not require a building permit, a registration form for the unit must be completed and submitted to the Planning Department.
 - 2) The registration form as required by the City shall include a property covenant. The covenant must be filed by the property owner with the City for recording with the King County Department of Records and Elections to indicate the presence of the accessory dwelling unit, and reference to other standards outlined in this section. The covenant shall run with the land as long as the accessory dwelling unit is maintained on the property.
 - 3) If an ADU was or is created without being part of a project for which a building permit was or is finalized, an ADU inspection will be required for issuance of an ADU permit. The ADU inspection fee will cover a physical inspection of the ADU. This fee will be waived if the ADU existed on January 1, 1995, and the ADU permit is applied for by December 31, 1995.
 - b. Eliminating an Accessory Dwelling Unit – Elimination of a registered accessory dwelling unit may be accomplished by the owner filing a certificate with the Planning Department, or may occur as a result of enforcement action.
 - c. Appeals. An applicant may appeal to the Hearing Examiner the decision of the Planning Official in denying a request to construct an accessory dwelling unit. A written notice of appeal shall be filed with the Planning Department within 14 calendar days of the date the Planning Official’s decision was mailed or otherwise delivered to the applicant. The City shall give notice of the hearing to the applicant at least 14 calendar days prior to the hearing. The applicant shall have the burden of proving the Planning Official made an incorrect decision. Based on the Hearing Examiner’s findings and conclusions, he or she may affirm, reverse, or modify the decision being appealed.

City of Mercer Island

19.02.030 Accessory dwelling units.

- A. Purpose. It is the purpose of this legislation to implement the policy provisions of the housing element of the city’s comprehensive plan by eliminating barriers to accessory dwelling units in single-family residential neighborhoods and provide for affordable housing. Also, to provide homeowners with a means of obtaining rental income, companionship, security and services through tenants in either the accessory dwelling unit or principal unit of the single-family dwelling.
- B. Requirements for Accessory Dwelling Units. One accessory dwelling unit is permitted as subordinate to an existing single-family dwelling; provided, the following requirements are met:
 1. Owner Occupancy. Either the principal dwelling unit or the accessory dwelling unit must be occupied by an owner of the property or an immediate family member of the property owner. Owner occupancy is defined as a property owner, as reflected in title records, who makes his or her legal residence at the site, as evidenced by voter registration, vehicle

registration, or similar means, and actually resides at the site more than six months out of any given year.

2. Number of Occupants. The total number of occupants in both the principal dwelling unit and accessory dwelling unit combined shall not exceed the maximum number established for a family as defined in MICC [19.16.010](#) plus any live-in household employees of such family.

3. Subdivision. Accessory dwelling units shall not be subdivided or otherwise segregated in ownership from the principal dwelling unit.

4. Size and Scale. The square footage of the accessory dwelling unit shall be a minimum of 220 square feet and a maximum of 900 square feet, excluding any garage area; provided, the square footage of the accessory dwelling unit shall not exceed 80 percent of the total square footage of the primary dwelling unit, excluding the garage area, as it exists or as it may be modified.

5. Location. The accessory dwelling unit may be added to or included within the principal unit, or located in a detached structure.

6. Entrances. The single-family dwelling containing the accessory dwelling unit shall have only one entrance on each front or street side of the residence except where more than one entrance existed on or before January 17, 1995.

7. Additions. Additions to an existing structure or newly constructed detached structures created for the purpose of developing an accessory dwelling unit shall be designed consistent with the existing roof pitch, siding, and windows of the principal dwelling unit.

8. Detached Structures. Accessory dwelling units shall be permitted in a detached structure.

9. Parking. All single-family dwellings with an accessory dwelling unit shall meet the parking requirements pursuant to MICC [19.02.020\(E\)\(1\)](#) applicable to the dwelling if it did not have such an accessory dwelling unit.

C. Exceptions – Ceiling Height. All existing accessory dwelling units that are located within a single-family dwelling, which was legally constructed but does not now comply with current ceiling height requirements of the construction codes set forth in MICC Title [17](#), shall be allowed to continue in their present form.

D. Permitting and Enforcement.

1. Application. The property owner shall apply for an accessory dwelling unit permit with the development services group. The application shall include an affidavit signed by the property owner affirming that the owner or an immediate family member will occupy the principal dwelling unit or accessory dwelling unit for more than six months per year.

2. Notice. The city shall provide notice of the intent to issue a permit for an accessory dwelling unit as required by MICC [19.15.020\(D\)](#) and (E).

3. Applicable Codes. The accessory dwelling unit shall comply with all construction codes set forth in MICC Title [17](#) and any other applicable codes, except as provided in this chapter. The ADU shall comply with all development code provisions for single-family dwellings including height and setbacks, and the ADU shall be included as part of the impervious surface and floor area limitations for a building site.

4. Inspection. After receipt of a complete application and prior to approval of an accessory dwelling unit, the city shall inspect the property to confirm that all applicable requirements of this code and other codes are met.

5. Recording Requirements – Permits. Approval of the accessory dwelling unit shall be subject to the applicant recording a document with the King County department of records and elections which runs with the land and identifies the address of the property, states that the owner(s) resides in either the principal dwelling unit or the accessory dwelling unit, includes a statement that the owner(s) will notify any prospective purchasers of the limitations of this section, and provides for the removal of the accessory dwelling unit if any of the requirements of this chapter are violated.

6. Permit. Upon compliance with the provisions of this section, a permit for an accessory dwelling unit will be issued.

7. Enforcement. The city retains the right with reasonable notice to inspect the ADU for compliance with the provisions of this section.

E. Elimination/Expiration. Elimination of an accessory dwelling unit may be accomplished by the owner recording a certificate with the King County department of records and elections and development services stating that the accessory dwelling unit no longer exists on the property.

F. Variance. Variances to this chapter shall require variance approval as outlined in MICC [19.15.020](#)(G)(4).

G. Violations. Any violation of any provision hereof is a criminal violation under MICC [19.15.030](#). (Ord. 08C-01 § 1; Ord. 04C-12 § 10; Ord. 99C-13 § 1).

City of Sammamish

Accessory dwelling units:

- (1) Only one accessory dwelling per primary single detached dwelling unit;
- (2) Only in the same building as the primary dwelling unit when there is more than one primary dwelling on a lot;
- (3) The primary dwelling unit or the accessory dwelling unit shall be owner occupied;
 - (a) The accessory dwelling units shall not exceed a floor area of 1,000 square feet when detached, except when one of the dwelling units is wholly contained within the existing residence then the floor area shall not exceed 50 percent of the floor area of the existing unit;
 - (b) When the primary and accessory dwelling units are located in the same building, only one entrance may be located on each street side of the building;
 - (c) The total number of occupants in both the primary residence and the accessory dwelling unit combined may not exceed the maximum number established by the definition of family in SMC [21A.15.450](#);
 - (d) Additions to an existing structure or the development of a newly constructed detached ADU shall be designed consistent with the existing facade, roof pitch, siding, and windows of the primary dwelling unit;
- (4) No additional off-street parking space shall be required when the parcel contains four or more parking spaces;
- (5) The accessory dwelling unit shall be converted to another permitted use or shall be removed if one of the dwelling units ceases to be owner occupied; and
- (6) An applicant seeking to build an accessory dwelling unit shall file a notice approved by the department with the records and elections division that identifies the dwelling unit as accessory. The notice shall run with the land. The applicant shall submit proof that the notice was filed before the department shall approve any permit for the construction of the accessory dwelling unit. The required contents and form of the notice shall be set forth in administrative rules.

City of Shoreline

20.40.210 Accessory dwelling units.

- A. Only one accessory dwelling unit per lot, not subject to base density calculations.
- B. Accessory dwelling unit may be located in the principal residence, or in a detached structure.

- C. Either the primary residence or the accessory dwelling unit shall be occupied by an owner of the property or an immediate family member of the property owner. Immediate family includes parents, grandparents, brothers and sisters, children, and grandchildren.

Accessory dwelling unit shall be converted to another permitted use or shall be removed, if one of the dwelling units ceases to be occupied by the owner as specified above.

- D. Accessory dwelling unit shall not be larger than 50 percent of the living area of the primary residence.

Exception to SMC 20.40.210(D): An accessory dwelling unit interior to the residence may be larger than 50 percent of the primary residence where the unit is located on a separate floor and shares a common roof with the primary residence.

- E. One additional off-street parking space shall be provided for the accessory dwelling unit.
- F. Accessory dwelling unit shall not be subdivided or otherwise segregated in ownership from the primary residence.
- G. Accessory dwelling unit shall comply with all applicable codes and standards.
- H. Approval of the accessory dwelling unit shall be subject to the applicant recording a document with the King County Department of Records and Elections prior to approval which runs with the land and identifies the address of the property, states that the owner(s) resides in either the principal dwelling unit or the accessory dwelling unit, includes a statement that the owner(s) will notify any prospective purchasers of the limitations of this Code, and provides for the removal of the accessory dwelling unit if any of the requirements of this Code are violated. (Ord. 631 § 1 (Exh. 1), 2012; Ord. 581 § 1 (Exh. 1), 2010; Ord. 238 Ch. IV § 3(B), 2000).

Appendix 2: Municipal Contacts for Permit Data

The following staff members provided the accessory dwelling unit permit data used in this research:

City of Kirkland, Kyle Coulson, Senior Applications Analyst and Nicole Unger,
Applications Analyst, Information Technology Department

City of Mercer Island, Senior Planner, Development Services Group

City of Sammamish, Darci Donovan, Permit Manager, Planning and Community
Development

City of Shoreline, Joanne Dillon, Management Analyst Planning & Community
Development

Appendix 3: Descriptive Statistics for Independent Variables

	Socio-demographic					Socio-economic			Built environment					
	Median age of residents	Non-white	Mean HH Size	HH with no children <18	Other family	Mean prop value per res unit (in \$100K)	Renter occupied	Prop. value per resid. Lot square foot	Dwelling units per block group acre	Mean SF lot (acres)	No. of intersec tions	Linear miles of alleys	Cul-de-sac density	No. of retail and rest. parcels
Median	40.3	24%	2.54	30%	11%	\$3.36	20%	\$37	3.20	0.28	106	-	16	-
Mean	41.1	24%	2.52	30%	12%	\$4.14	26%	\$45	3.51	0.34	114	0.06	18	3
Std	5.6	9%	0.40	8%	4%	\$2.83	18%	\$27	2.46	0.17	48	0.27	12	5
Maximum	62.9	45%	3.46	48%	23%	\$17.40	76%	\$155	16.77	1.11	322	1.98	61	22
Minimum	31.5	9%	1.54	14%	2%	\$1.13	3%	\$12	0.46	0.18	37	-	-	-