

Johnson Creek Floodplain Residential Vulnerability Analysis

*A project completed by Portland State University's
Institute for Sustainable Solutions in partnership with the
City of Portland's Bureau of Environmental Services*

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Introduction

Portland residents living in Johnson Creek's 100-year floodplain are vulnerable to flooding or the potential for flooding every year. Whether or not the creek floods and whether or not a household's property is damaged, floodplain residents' lives are impacted by their proximity to Johnson Creek. There are many short and long term effects associated with the flooding of Johnson Creek and even the threat of flooding can serve as a burden for households.

Research has shown that not only does the scale or intensity of a physical disaster or event affect a community, but the social characteristics of that community play a very strong role in influencing the impact as well, specifically in terms of prevention, mitigation, and ability to cope. These factors, the ability to prevent, mitigate and cope can be understood as a community's vulnerability or resiliency. As Portland strives to develop in a sustainable way amidst population growth and climate change, it becomes increasingly important for the City of Portland to understand the vulnerabilities of the communities within its boundaries and to use this understanding to take appropriate and necessary actions to reduce burdens on vulnerable populations and ensure that all of Portland can be resilient.

This project was undertaken by Portland State University's Institute for Sustainable Solutions in partnership with the City of Portland's Bureau of Environmental Services. The purpose was to better understand the residential demographics of Johnson Creek's floodplain and what burdens residents may face by living in or near the floodplain. This project builds directly on the work previously completed by the Portland State University Capstone class with Dr. Thad Miller in the spring of 2015.

This report is comprised of two sections; the first includes a statistical analysis to determine whether or not residents living in or near the Johnson Creek floodplain are more vulnerable than the average Portland resident. The second section includes results from a set of interviews conducted with homeowners who live within Johnson Creek's 100-year floodplain. This mixed methods approach serves to provide stakeholders with an improved understanding of who is affected when Johnson Creek floods, how their lives and properties are impacted, and whether or not these residents are well-suited to cope with the burdens associated with living in a floodplain.

Section 1. Are Johnson Creek Floodplain Residents Vulnerable?

The first section of this report strives to determine if households living in or near Johnson Creek's 100-year floodplain are more or less vulnerable than the average Portland household. Vulnerability is a term used by scholars to refer to the, "Characteristics of a person or group in terms of their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard. It involves a combination of factors that determine the degree to which someone's life and livelihood is put at risk by a discrete and identifiable event in nature or in society."¹ Some of these characteristics are demographic and economic; others include inadequate access to resources or information, or a lack of political power and representation.

Methods

The vulnerability analysis presented below was conducted following the methodology employed by Zandt et al. to show ways in which residents of the Johnson Creek floodplain may be more vulnerable than the average Portland resident.² The Zandt et al. study used 17 indicators to determine the level of vulnerability of the community of Galveston, Texas. Prior to Zandt et al.'s study Susan Cutter et al. compiled a list of 85 indicators for use in a vulnerability study.³

Based on limited resources, availability of existing data, and priorities determined by a few key staff members in the City of Portland's Bureau of Environmental Services, 26 indicators were chosen for this specific analysis. It is typical with social vulnerability studies to analyze socioeconomic status, minority status, housing and population characteristics, and educational attainment. In addition, the author of this report felt it was important to include an examination of nativity status and language skills since these characteristics can play an important role when a householder or parent is trying to understand a situation and how to make the right decisions for his/her family.

U.S. Census (2010) and American Community Survey (2009-2013) data were compiled at the Census tract level in order to determine whether or not the differences of a series of indicators between floodplain and Portland households were statistically significant. Census tracts were chosen as the unit of measurement because they represent the smallest geographic unit for which reliable five-year estimates of socioeconomic characteristics are available from the American Community Survey.

Census tracts, floodplains, and neighborhood boundaries are not perfectly aligned. The Lents Study Area was developed using Census tract boundaries because the method was deemed

¹ Benson Blaikie, T. Cannon, I. Davis, and B. Wisner. 1994. *At Risk: Natural Hazards, People's Vulnerability, and Disasters*. London: Routledge.

² Van Zandt, S., W.G. Peacock, *D. Henry, H. Grover, W. Highfield, and S. Brody. 2012. Mapping Social Vulnerability to Enhance Housing and Neighborhood Resilience. *Housing Policy Debate* 22(1): 29-55.

³ Cutter, Susan L., Jerry T. Mitchell, and Michael S. Scott. 2000. Revealing the vulnerability of people and places: A case study of Georgetown County, South Carolina. *Annals of the Association of American Geographers* 90, no. 4: 713-37.

the most accurate way to produce local household data that could be compared to citywide averages. The map in Appendix A shows the boundary and Census tracts included in the Lents Study Area. It should be noted that the study area extends beyond the Lents neighborhood, and includes a portion of the eastern Powellhurst-Gilbert neighborhood that is also in the floodplain.

The following 26 indicators were chosen for analysis and include community characteristics such as household and population structure, housing, socioeconomic status, minority status, educational attainment, language skills, and nativity status.

Household and Population Structure

- Household size
- Percentage of children
- Percentage of seniors
- Percentage of households with children
- Percentage of households with seniors
- Percentage of single parent households

Housing Characteristics

- Percentage of renters
- Percentage of homeowners
- Percentage of owned house units with a mortgage or a loan

Socioeconomic Status

- Median Household Income
- Per Capita Income
- Percentage of families living below the Federal Poverty Line

Educational Attainment

- Percentage of persons age 25 or older with a Bachelor's degree or higher
- Percentage of persons age 25 or older with a high school diploma (or equivalent)

Minority Status

- Percentage of residents that are Hispanic or Latino
- Percentage of residents that are White alone (not Hispanic)
- Percentage of residents that are not White
 - Percentage of residents that are Black or African American alone
 - Percentage of residents that are Asian alone
 - Percentage of residents that are American Indian or Alaskan Native alone
 - Percentage of residents that are Some other race
 - Percentage of residents that are Two or more races

Foreign Born and Language Skills

- Percentage of residents born outside of the United States (Foreign born)
- Percentage of residents that are Naturalized Citizens
- Percentage of the population age 18 or above who speak English or speak English “very well”
- Percentage of the population above age 5 who speak English “not well” or “not at all”

All of the indicators used in this analysis highlight potential vulnerabilities for a community or household. For example, a community with a high elderly population may mean that residents are less able to move items to protect them from flooding, or these households may be less able to cope with changes or increases in flood insurance rates if they are living on a fixed income.

The indicators, single parent household, percentage of children, and households with children indicate childcare needs, and also suggest a household may be incurring extra expenses in addition to flood insurance. A household with children may have a harder time coping with the effects of a flood or increases in flood insurance than a household with no children. Having a higher percentage of renters or owners may also shed light on the general upkeep of homes and responsiveness of home repair after experiencing flood damage.

Indicators such as educational attainment, race and ethnicity, foreign born population, and languages spoken at home illuminate potential vulnerabilities regarding a community’s civic capacity. Understanding the meaning of living in a floodplain and navigating FEMA regulations can be difficult for anyone, but residents who are less proficient in English or have less experience navigating bureaucratic processes will be at a greater disadvantage compared to college educated native English speakers. An adult who cannot speak English well, has a low educational attainment, or is a new or recent immigrant to the community may find it especially difficult to understand complex paper work, flood insurance bills, or have difficulties accessing resources such as FEMA floodplain maps.

Data for each of these indicators was obtained for all Census tracts within the city of Portland and a flag was created to denote tracts that are within the Lents Study Area. A T-test ($p < .05$) was then used to test for statistical differences between Census tracts in the city of Portland compared to those in the Lents Study Area.

Results

The results of the T-test are presented below. Each table lists the indicator examined, the average for Portland, the average for the Lents Study Area, and the percentage difference between the two. Each indicator with an asterisk denotes a data point with a statistically significant difference between the average for Portland Census tracts and the average for Census tracts in the Lents Study Area.

The first category examined was household demographic indicators. As shown in Table 1, for all six household demographic indicators examined, the Census tracts in the Lents Study Area had higher percentages than those of Portland. The differences for each indicator between Portland and the Lents Study Area were statistically significant for four of the six indicators tested. Statistically significant differences were found for average household size, percentage of

children (persons under 18 years of age), percentage of households with children, and percentage of single parent households. This means that on average, Lents Study Area residents have greater household sizes, more children, and more single parent households and a similar number of seniors compared to Portland. Therefore, in terms of household demographics, Lents Study Area households could be considered more vulnerable than the average Portland household.

Table 1. Household Demographic Indicators	Portland	Lents Study Area	Percent Difference
Household Size*	2.28	2.74	20.2%
% Children*	19.1%	24.8%	29.8%
% Seniors	10.4%	10.6%	1.9%
% Households with Children*	24.9%	37.1%	48.9%
% Households with Seniors	18.6%	21.4%	15.1%
% Single Parent Households*	8.8%	14.1%	60.2%

**Denotes Statistically Significant Difference*

Source: U.S. Census, 2010

The second category examined was housing characteristics. Table 2 shows that for the three housing indicators examined, there were no statistically significant differences between Portland and the Lents Study Area. Census tracts in the Lents Study Area have a similar percentage of renters, owners, and owned homes with a mortgage or loan compared to those of Portland. It was beyond the scope of this study to characterize property and housing values in the study area and compare them to citywide averages.

Table 2. Housing Characteristics	Portland	Lents Study Area	Percent Difference
% Renters	44.2%	41.8%	-5.4%
% Owners	55.8%	58.2%	4.3%
% Occupied Units Owned with a Mortgage or Loan	76.4%	82.1%	7.5%

**Denotes Statistically Significant Difference*

Source: American Community Survey 2009-2013

Table 3 shows the three economic indicators that were examined. The differences for each indicator between Portland and the Lents Study Area were only statistically significant for per capita income. While the Lents Study Area had a similar Median Household Income to that of Portland, the larger average household size (shown in Table 1) suggests that a similar household income has to stretch further for households in the Lents Study Area than in Portland. This indicates greater financial stressors for Lents Study Area families. In addition to demonstrating the financial vulnerability of households in this community, this information should inform the structure and implementation of outreach and educational events to households in this neighborhood. Increased financial stressors suggests that households in the Lents Study Area may be working multiple jobs and/or unable to afford childcare. Therefore if

the City or another agency holds an event in the community, the hosts should be mindful of the limited amount of free time these residents may have and should provide transportation vouchers and childcare in order to increase the ability of residents to attend.

Table 3. Economic Indicators	Portland	Lents Study Area	Percent Difference
Median Household Income	\$52,657	\$46,882	-11.0%
Per Capita Income*	\$31,949	\$19,490	-31.1%
% Families Below Federal Poverty Line	12.0%	19.1%	59.2%

**Denotes Statistically Significant Difference*
Source: American Community Survey 2009-2013

Table 4 shows the two education indicators that were examined. The differences for each indicator between Portland and the Lents Study Area were statistically significant for both of the indicators tested. Portland Census tracts had a significantly higher rate of persons age 25 or older with at least a Bachelor’s Degree in comparison to Census tracts in the Lents Study Area. The difference in percentage of adults age 25 or older with at least a high school degree (or equivalent) is smaller, but still significant.

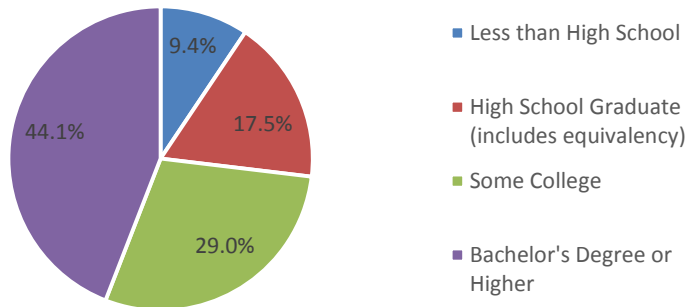
The lower average educational attainment of Lents Study Area residents has noteworthy implications for the types of educational outreach methods that should be utilized by the City and other organizations in this area. Hosts of events and informational materials developed for this community should use simple and clear language to communicate messages and visual aids should be utilized whenever possible.

Table 4. Education Indicators	Portland	Lents Study Area	Percent Difference
% Adults Age 25 or above with a Bachelor’s Degree or Higher*	44.1%	17.1%	-61.2%
% Adults Age 25 or above with a High School Degree or Higher*	90.5%	80.4%	-11.2%

**Denotes Statistically Significant Difference*
Source: American Community Survey 2009-2013

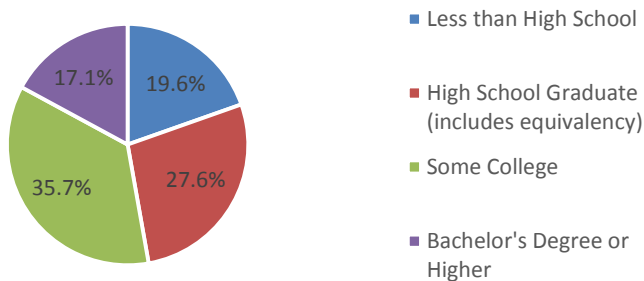
Figures 1 and 2 below highlight the differences in educational attainment between Portland and the Lents Study Area. In Portland, about 9% of residents age 25 or older have less than a high school degree (or equivalent) while that percentage is nearly 20% for the Lents Study Area. Similarly, while about 44% of Portland residents have a Bachelor’s Degree or higher, only 17% of Lents Study Area residents have a Bachelor’s Degree or higher.

Figure 1. Highest Level of Education Attained, Portland



Source: American Community Survey 2009-2013

Figure 2. Highest Level of Education Attained, Lents Study Area



Source: American Community Survey 2009-2013

Tables 5 and 6 show the racial and ethnic composition of residents of the Lents Study Area compared to that of Portland. Table 5 shows the percentage of residents who are White alone (Not Hispanic), and those that are not White. The percentage of non-White residents are then delineated into six categories. The Lents Study Area was found to have a significantly higher percentage of non-White residents compared to that of Portland. The Lents Study Area has a relatively similar percentage of Black or African-American residents to Portland but significantly higher percentages of Hispanic and Asian residents.

These racial and ethnic indicator findings denote that there may be important language and cultural differences in the Lents Study Area and that these differences likely play a greater role in the Lents Study Area than in Portland as a whole. This information should be kept in mind as the City or other community groups plan educational or outreach efforts in the Lents Study Area.

<i>Table 5. Racial Indicators</i>	Portland	Lents Study Area	Percent Difference
% White alone, not Hispanic*	76.2%	66.1%	-13.2%
% Not White*	23.8%	33.9%	42.4%
% Black or African American alone	6.3%	4.7%	-25.4%
% Asian alone*	7.0%	13.6%	94.3%
% American Indian or Alaskan Native alone	1.0%	1.3%	30.0%
% Native Hawaiian or other Pacific Islander alone	0.5%	0.6%	20.0%
% Some other race	4.3%	8.6%	100%
% Two or more races	4.7%	5.1%	8.5%
<i>*Denotes Statistically Significant Difference</i>			

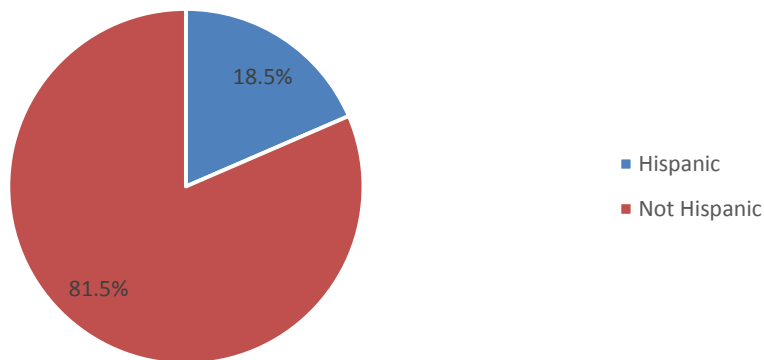
Source: U.S Census, 2010

<i>Table 6. Ethnic Indicator</i>	Portland	Lents Study Area	Percent Difference
% Hispanic*	9.4%	18.5%	96.8%
<i>*Denotes Statistically Significant Difference</i>			

Source: U.S. Census, 2010

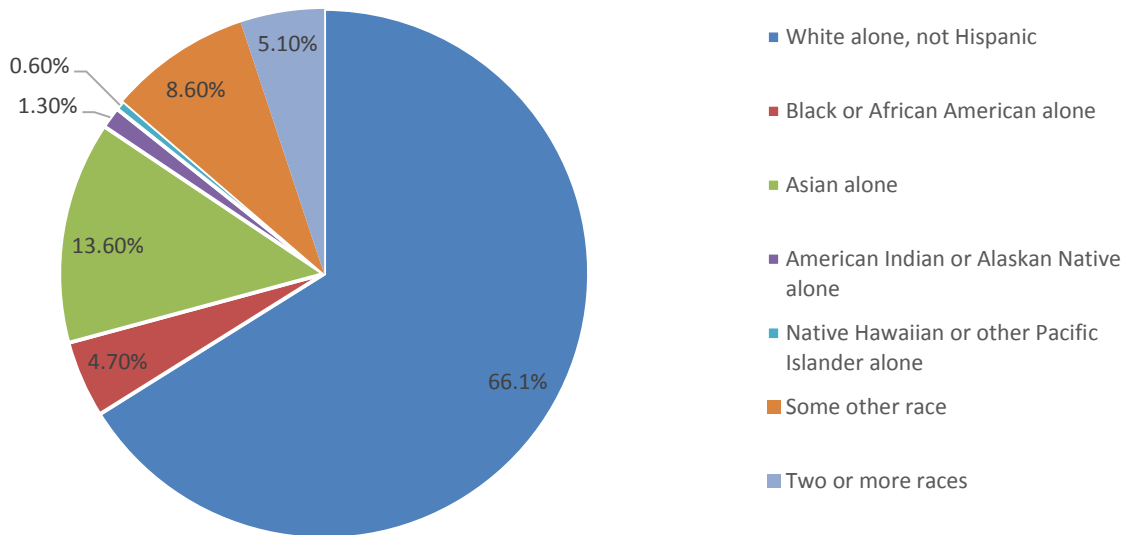
Figures 3 and 4 show the racial and ethnic composition of the Lents Study Area. Nearly one in five Lents Study Area residents is of Hispanic origin.

Figure 3. Hispanic Origin, Lents Study Area



Source: U.S. Census, 2010

Figure 4. Racial Composition, Lents Study Area



Source: U.S. Census, 2010

Table 7 further highlights the cultural diversity present in the Lents Study Area. While not statistically significant, the Lents Study Area has a higher percentage of the population that is foreign born and who are naturalized citizens. It is likely that the percentage of foreign born residents in both Portland and the Lents Study Area are slightly higher than shown by the data from the American Community Survey or US Census since it is likely that there are a number of undocumented immigrants living in Portland. Nearly one in five Lents Study Area residents were not born in the United States. This suggests that there may be cultural barriers preventing residents from knowing where to access flood related information and getting involved in the traditional political mediums in their community.

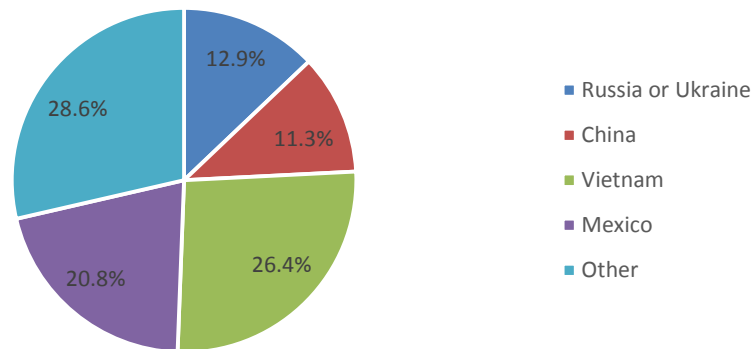
The Lents Study Area had a slightly smaller percentage of the population age 18 or older who speak English or speak English “very well” compared to Portland. Nearly one in ten Lents Study Area residents is above age 5 and speaks English “not well” or “not at all,” this percentage is just over twice that of Portland.

<i>Table 7. Place of birth and Languages spoken at home</i>	Portland	Lents Study Area	Percent Difference
% Foreign Born	12.3%	19.70%	60.1%
% Naturalized Citizens	5.4%	8.70%	61.1%
% Population above 18 who speak English or speak English very well*	92.1%	83.9%	-8.9%
% Population above 5 who speak English “not well” or “not at all”	4.3%	9.4%	118.6%
<i>*Denotes Statistically Significant Difference</i>			

Source: American Community Survey 2009-2013

In addition to noting that there are slightly more foreign-born residents in the Lents Study Area compared to Portland, it is important to take note of where these residents are coming from. Figure 5 shows the percentage of residents from the top five countries of origin for the foreign-born population. This information should be used to better understand the cultural and linguistic dynamics and barriers that might be at play in the Lents Study Area. This also provides an estimate of the diversity of languages spoken and cultural sensitivities that should be kept in mind and used for translations for educational and outreach materials to residents within the Lents Study Area.

Figure 5. Place of Birth for the Foreign-Born Population, Lents Study Area



Source: American Community Survey 2009-2013

Change Over Time

While the above analysis is based on data from a specific point in time, this snapshot is reflective of a longer term trend occurring in this area. In 2007 the City of Portland's Bureau of Planning and Sustainability (BPS) published the East Portland Review, a report which shows the changing demographics of East Portland⁴. The data used in BPS's report and reproduced below used information from the US Census Bureau and models from ESRI Business Analyst to develop the 2011 forecasts.

BPS's report showed that the Lents and Powellhurst-Gilbert neighborhoods grew at faster rates than the citywide average both from 1990-2000 and from 2000-2011. Lents and Powellhurst-Gilbert have also grown more racially and ethnically diverse than Portland over the last 10 years. This has likely been occurring as minority residents who used to live closer in have been pushed farther east due to gentrification and rising housing costs. BPS also found that the average household size in Lents and Powellhurst-Gilbert grew from 1990 to 2000 and from 2000 to 2011 whereas the citywide average household size remained the same during those time periods. The percentage of people age 19 or younger grew by 4.5% in Lents, 15.2% in Powellhurst-Gilbert and by 0.3% in the City of Portland from 2000 to 2011. From 1990 to 2000 the percentage of residents with a Bachelor's Degree or higher grew from 8% to 11% in Lents, from 9% to 10% in Powellhurst-Gilbert, and from 24% to 32% in Portland as a whole.

The findings from the BPS report indicate that the relative differences found in this analysis do not represent a new trend in this area. Lents and Powellhurst-Gilbert neighborhoods have had lower educational attainment, been more racially and ethnically diverse, and had larger household sizes and a greater percentage of youth than the city of Portland for the last two decades.

The trends mentioned above appear to be continuing into the future, at least in the short term. A 2013 report commissioned by BPS calls three of the four Lents Study Area Census tracts, "Landing Zones."⁵ This means that while other parts of the city gentrify these Census tracts serve as "Landing Zones" for residents who have been priced out of other neighborhoods. In the short term, this area will continue to experience a rise in the number of poor Portlanders, ethnic minorities, and people with lower education levels than the citywide averages.

⁴ Bureau of Planning and Sustainability. *East Portland Review*. November 2007.

<https://www.portlandoregon.gov/bps/article/177862>

⁵ Bates, Lisa. *Gentrification and Displacement Study: implementing an equitable and inclusive development strategy in the context of gentrification*. Bureau of Planning and Sustainability, May 2013.

<http://www.portlandoregon.gov/bps/article/454027>

Conclusion

This analysis provides a quantitative understanding of the factors that make residents of the Lents Study Area more vulnerable than the average Portland resident. These factors include lower educational attainment, greater racial and ethnic diversity, differences in English language skills, larger household sizes, higher percentages of children, and higher percentages of single-parent households. It should also be noted that, while median household income may be similar to the citywide average, households in the Lents Study Area are 20.2% larger than the average, which means each dollar in Lents needs to stretch further.

In addition to the everyday decisions and struggles that all households face in order to keep their homes and assets safe, and families healthy, residents living in Johnson Creek's floodplain have a plethora of other concerns. Are household possessions safe if the basement floods? If flooding occurs, are homes dried out properly so as not to create mold? How do I know if I have to pay flood insurance? How much flood insurance do I have to pay each month and can I cope when the insurance rate increases? Will the value of my home change if we experience more flooding? How do I find out if my home is still in the floodplain if FEMA changes their delineation of the floodplain? Who do I speak to about questions regarding the floodplain? These are just some of the questions that some households in the floodplain likely to consider. All of the issues raised in these questions, including flood insurance, support, mitigation, prevention, and household health are much harder for a vulnerable household to address than for one who is economically well-off, speaks English well, is knowledgeable about political processes and community and federal resources, or has the time and money to invest in making the best decision for one's household. Other households, particularly renters and those where English fluency is low, may not even know they are in a flood zone.

Of the six vulnerability topics covered in the statistical analysis, Lents Study Area residents were found to be more vulnerable than the average Portlander for at least one indicator in five of the six topics. Housing Characteristics was the only topic in which there were no statistical differences between Portlanders and Lents Study Area residents. This shows that there isn't just one or two vulnerability factors associated with Lents Study Area residents. Instead this community is dealing with a number of disadvantages often acting in conjunction with one another. In addition, the housing characteristics we were able to study were limited in scope. Other untested characteristics, such as value-to-loan ratio, may have indicated additional vulnerability.

Lents Study Area households are larger, have more children, and are more often single parent households than the average Portland Household. This, in combination with the fact that they, on average, have a much lower educational attainment, are more racially and ethnically diverse, and have lower percentages of strong English speakers increases the burdens and vulnerability of this community. Imagine being a recently immigrated single parent without a college degree who doesn't speak English very well trying to navigate flood insurance, or access a FEMA flood map. Accomplishing these tasks and finding assistance becomes increasingly difficult with each vulnerability you add to the story.

The results of this analysis should be used to inform future work conducted by the City, community, and other groups in the Johnson Creek floodplain. The fact that there are more households with children and more single parent households indicate that any outreach or educational events that the City or other organizations hold must be family-oriented and include childcare.

Since the average educational attainment is considerably lower than that of Portland and there is a greater percentage of non-English speakers, educational and outreach events or methods must be multi-lingual and be conducted or displayed in simple, easily translatable messages. In some instances, it will be the children who translate information for their parents, so it is very important that outreach and education is engaging and appropriate for youth. Targeted information and advice to vulnerable groups on flooding, flood insurance, and flood mitigation resources should be developed in collaboration with local agencies and organizations that have experience working with or ties to particular cultural groups and have local knowledge. When working with cultural groups it will be important to engage a local champion or ambassador from that community to bridge gaps between the community and government body since many immigrant and lower income groups in this area likely have some level of distrust of government.

In 2014 Prichard Communications prepared a report for the Bureau of Environmental Services which had similar findings to this analysis. Prichard advised BES in connecting with racial and ethnic minority communities, low income homeowners, and stressed the importance of engaging children as a means of engaging parents. The findings and recommendations provided in the Prichard report are supported by the findings in this analysis.

Section 2. How are Residents' Lives Affected?

Section 1 provided information on the general characteristics of residents in the Lents Study Area. While helpful, a statistical analysis does not yield information regarding the specific effects of living in an urban floodplain. In order to shed light on the specific benefits and struggles of living in a floodplain a series of interviews were conducted with residents of the Johnson Creek floodplain.

Methods

Due to limited time and resources, only four interviews were able to be conducted as part of this project. While this is a very small number, these sentiments likely represent the general sentiments of the specific demographic population they represent.

Residents were asked a series of questions regarding their thoughts about living in the floodplain, their interactions or relationship with Johnson Creek, if and how their household and/or property has been effected by flooding or the threat of flooding, and what actions they would like to see the City, community leaders, or others take to reduce the burdens of living in the Johnson Creek floodplain.

All four interviewees were White homeowners, and lived in households with children. Interviewees have been living in their home in the floodplain for seven to ten years and also live in the Lents neighborhood.

Results

When asked what they enjoy about living in the Lents neighborhood, interviewees mentioned the location, proximity to public transportation and nature, affordability, ability to have a yard, and good neighbors. When asked about the cons of their neighborhood, interviewees mentioned the homeless population, squatters, upkeep of homes, overall appearance, lack of economic attention from the City and quality of amenities that inner Portland neighborhoods have, including frequency of street sweeping, and maintenance of parks. Similarly, two interviewees mentioned that if the flooding and requirement to pay flood insurance was occurring in a well-off neighborhood the City would already be much more aware of and prompted to take action to reduce the burdens associated with living in the floodplain.

All participants mentioned enjoying the benefits of living near Johnson Creek, especially the recently completed Foster Floodplain Natural Area. Interviewees reported going to the natural area and other trails near the creek for bike riding, walking, and to see wildlife. One interviewee mentioned that he hopes to see more floodplain wildlife in his neighborhood in the future, "I'd love to see a blue heron fly over my yard." One interviewee mentioned that having lived here for seven years and knowing what she knows now about flood insurance and the lack of economic investment in Lents that, "No one in their right mind would buy a house in Lents if they can afford otherwise." Two interviewees specifically mentioned that affordability was the primary driver behind their decision to purchase a home in Lents.

All interviewees also cited the residence of the homeless population in the creek's natural area as an area that needs improvement and city attention. Two interviewees specifically stated that they think the natural area would receive a lot more use from local residents if there weren't as many homeless people living there.

All four interviewees were familiar with flood mitigation projects conducted by the City. Interviewees also mentioned that many of their neighbors are also familiar with these projects; however there is some misinformation in the neighborhood in that a number of residents believe that the green street facilities were built to reduce flooding. "Some people think that since there is a bioswale in the street by their house they are protected from flooding." This indicates that while some residents are aware of the City's actions to mitigate the effects of flooding, there is still a lot of education to be done to clarify exactly what these projects are, what their purpose is, and which areas they were designed to protect.

None of the four interviewees have experienced flooding on their property. When asked what measures (if any) are taken to prevent property damage, interviewees mentioned that raising their homes is cost prohibitive. One interviewee mentioned that his neighbor raised his house but when the interviewee asked how much it cost him, he knew it wasn't something his family could afford. All four interviewees mentioned that they don't keep important documents or possessions in their basements or make sure to keep them on shelves to keep the items protected in case their basements flood.

The interviewees mentioned that it is not very common to hear their neighbors talk about flooding, but everyone talks about flood insurance. Three out of the four interviewees didn't know that they would have to pay flood insurance before they signed the final papers when purchasing their homes. Only one interviewee was able to take action to reduce his flood insurance payment, given his stable and higher income, he decided to pay off his mortgage to avoid paying flood insurance after he saw his insurance rate double in five years. Two interviewees stated that their insurance went up by 25% in one year. Interviewees mentioned paying \$700-\$1,800 per year in flood insurance.

In addition to the financial burden associated with living in the floodplain, interviewees also mentioned that it affects their livability and can be a strong emotional drain during the rainy season. One interviewee explained how he checks the weather and rain predictions every day during the winter to make sure he doesn't need to rush home and make sure his basement is flood proof.

One interviewee mentioned that she thinks the houses being in the floodplain and households having to pay flood insurance likely has some effect on the sale of houses, "Having to pay flood insurance might make or break a housing deal." This thought was corroborated by another interviewee who mentioned that had his household known about the flood insurance before they were signing the papers on their house, they likely would have continued their search for another house outside the floodplain. Three interviewees also mentioned that it seems like there are more vacant homes in their neighborhood than in other parts of Portland. It was suggested that having to pay flood insurance in addition to mortgage payments might be contributing to the vacancies.

Interviewees appreciated the work that the City has done to mitigate flooding, however most advocated for a way to reduce the burden of flood insurance. Interviewees also requested that the City provide information about which agencies have jurisdiction over which flood-related issues. Interviewees think that more outreach could be done about the elevation survey, and more effort should be taken to ensure that residents have access to the correct FEMA floodplain map. One interviewee explained that he was paying flood insurance, saw a copy of new FEMA map that put his home outside of the 100-year floodplain and therefore was no longer obligated to pay flood insurance, but decided to continue to pay some flood insurance as a precaution. He mentioned that he was happy he decided to continue to pay insurance because he later found out that the FEMA map he had seen was wrong and his home was still in the floodplain. The interviewee mentioned that his neighbors who were in a similar situation halted all of their flood insurance payments and when they went back to reinstate their payments after finding out that they too were still in the floodplain they were given a higher rate than what they had been previously been paying.

One interviewee stated that he'd like to see more collaboration between the City and those upstream. For example, the City of Portland could work with Gresham or Happy Valley to implement flood mitigation techniques. He stated that, "Not all of the [flood mitigation] efforts have to be completed in Portland for them to be successful at protecting Portland homes."

Conclusion

While only a small number of residents were able to be interviewed, the issues mentioned in the interviews are likely reflective of the larger population. None of the interviewees own homes that have experienced flood damage during their tenure, however these residents still bear an emotional burden of fear of flooding during the rainy season and a financial burden through the payment of flood insurance subject to increases in rates. The information gathered in these interviews highlights a desire from residents for the City to take action to help reduce the burdens of flood insurance, to continue the implementation of flood mitigation projects and to provide education on access to FEMA maps, and flood insurance resources, including elevation surveys which may result in homeowners eliminating their obligation to pay flood insurance. Further investigation is needed into the prevalence of the thought that green street facilities serve as flood mitigation, which could result in a campaign to educate residents on the true purpose of the green street facilities.

These interviews represent the results of a specific demographic living in the Johnson Creek floodplain. As Section 1 highlighted, it is important to conduct interviews with other groups living in the floodplain, for example racial and ethnic minorities and non-English speakers, to ensure that their perspectives on living in a floodplain are heard.

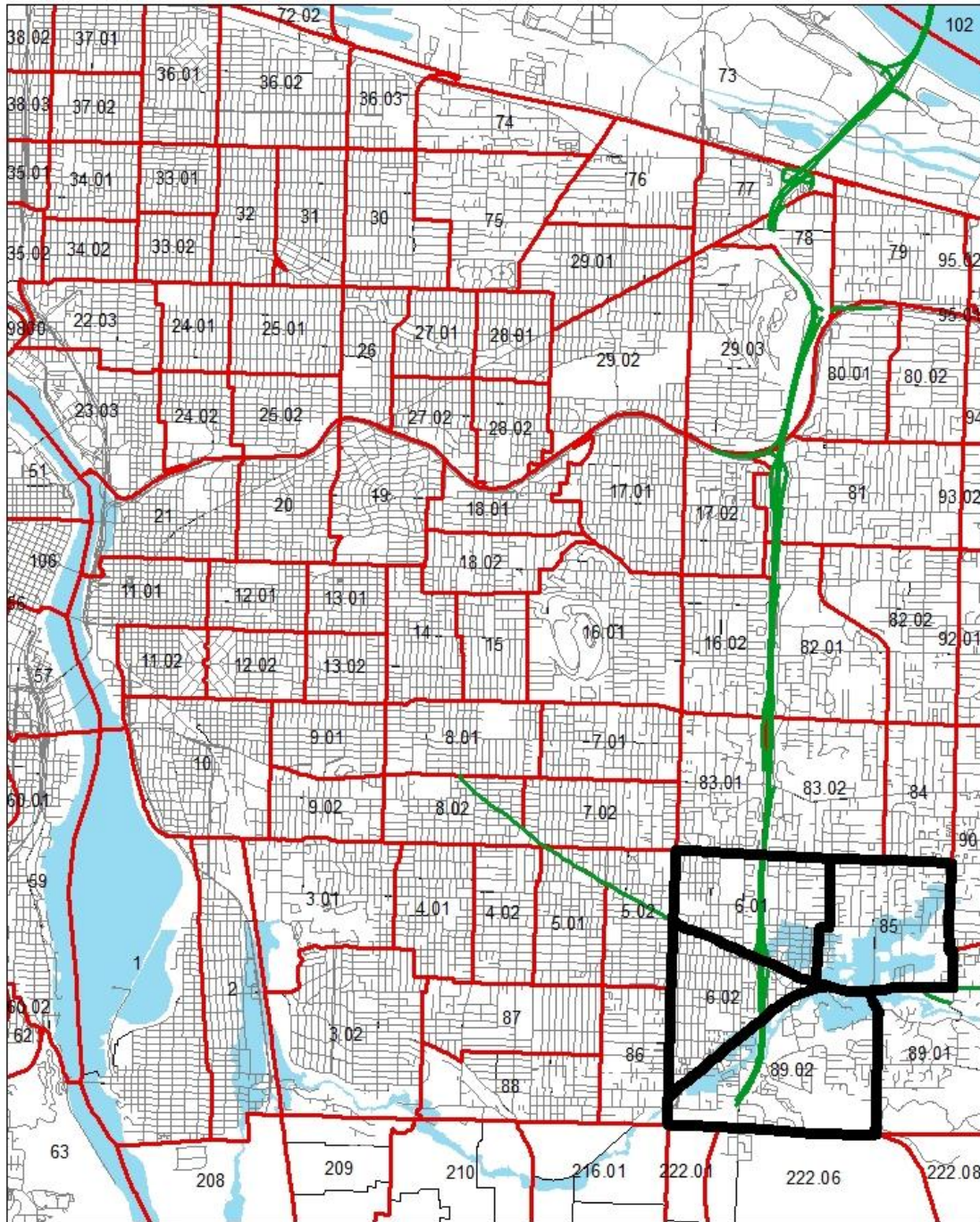
Ideas for Future Research




Based on the information that emerged from the interviews and Census tract analysis there are more questions that could be answered in future research projects. For example, does the flooding or flood insurance have an effect on the real estate market in the Lents area? Does the average Lents home remain on the market for more time than a similar home in a similar neighborhood in Portland that isn't within the 100-year floodplain and therefore does not need to pay for flood insurance? Are there significantly more vacant homes in the Lents neighborhood than in the average Portland neighborhood? Is this affected by the fact that residents may be unable to keep up with mortgage payments and flood insurance, as has been suggested by some residents?

It may also be helpful to quantify exactly how large the scope of the flood insurance and property damage burdens are. This could include researching exactly how many homes are located within the floodplain, or calculating how many households are paying flood insurance. What is the average amount of flood insurance being paid? What percentage of homes or buildings in the floodplain have actually experienced flooding or property damage? This number could be tracked over time to help measure the success of the City's future flood mitigation projects. All of this information could be useful in tracking the effectiveness and appropriateness of future efforts by the City and community groups as they determine the best way to help reduce the burden of flooding faced by residents of the Johnson Creek floodplain.

Appendix A

Map of Lents Study Area



-  Lents Study Area
-  2010 Census Tracts
-  100 Year Floodplain

Lents Study Area Boundary