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Motor Vehicle Theft in Portland, Oregon

by

Io Nicholls

An undergraduate honors thesis submitted in partial fulfillment of the

requirements for the degree of

Bachelor of Science

in

University Honors

and

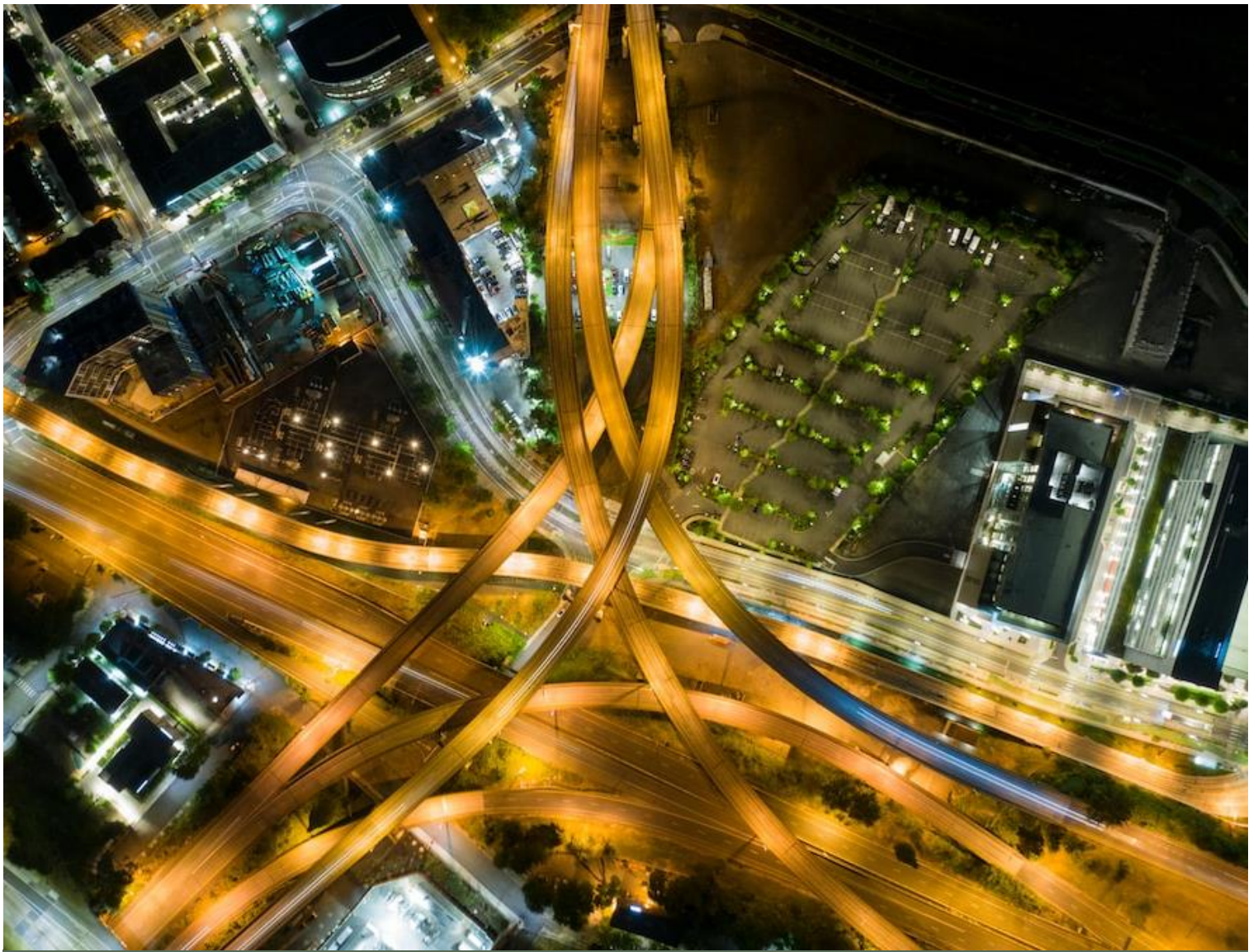
Criminology and Criminal Justice

Thesis Advisor

Dr. Kris Henning

Portland State University

2023



Analysis of Motor Vehicle Theft

Portland, Oregon 2000 – 2021

Compiled by: Io Nicholls

Advisor: Dr. Kris Henning

Department of Criminology & Criminal Justice

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Introduction

Per Oregon law, unauthorized use of a vehicle is when a person knowingly takes, operates, exercises control over, or otherwise uses another's vehicle, boat, or aircraft. It is a class C felony (ORS 164.135, 2022). This report refers to unauthorized use of a vehicle as motor vehicle theft (MVT).

Residents and stakeholders are increasingly concerned about trends related to this offense in Portland, Oregon. Currently there are no in-depth studies regarding this crime. This analysis identifies trends in vehicle theft over time, compares Portland to other similar cities, and assesses demographics of neighborhoods with high counts and rates of MVT. First, a broad overview of MVT over a 21-year period spanning from 2000 to 2021 provides context. Then, a more focused analysis of this crime in Portland during more recent years provides information about offenders, types of vehicles stolen, and hot spots where vehicles are most likely to be stolen from. Offender demographics and environmental characteristics of areas that are at high risk for MVT are examined. Finally, this report concludes with a review of literature addressing potential methods to reduce MVT and closing thoughts.

Theft from a vehicle, theft of vehicle parts, and incidents where vehicles are otherwise damaged or vandalized are all excluded; they are treated as separate offenses.

This report is limited to MVT reported to law enforcement agencies. Data for 2022 are not yet available. This analysis is not intended to solve the problem of MVT in Portland, or even offer suggestions on how to address the crime. Rather, the goal is to synthesize available data to provide a starting point for future researchers wishing to assess this topic. There is much room for further research in this area.

Data Sources Used

This section of the report describes the three major data sources used in this analysis the limitations of said data sources.

Resources used in this report consist of, but are not limited to the following resources:

Unified Crime Report (UCR): The Federal Bureau of Investigation's (FBI) Uniform Crime Reporting (UCR) Program was created during the 1930s to track data on crime. UCR data consists of incident counts and does not provide additional details about crimes. Prior to 2021, UCR data was collected through the Summary Reporting System (SRS), which tabulated summary totals from participating law enforcement agencies for seven major indexed offenses: murder, rape, robbery, aggravated assault, burglary, motor vehicle theft, and larceny-theft.

There are several limitations to UCR data. Most notably the fact that it is being phased out in favor of a new, more in depth reporting system. The National Incident Based Reporting System (NIBRS) is the newer platform preferred by the FBI. Since agency participation in the UCR program is voluntary, there has been a reduction in participating agencies since many have already transitioned to the new system. In 2015, when agencies had the choice of submitting data through the SRS or the new system, 18,439 local and state agencies representing 99% of U.S. residents participated in the UCR (Strom and Smith, 2017). However, the Department of Justice reported in January 2023 that only 66% of the nation's 18,600 agencies have made the transition to NIBRS (Department of Justice, 2023). This means that roughly one-third of state and local agencies stopped reporting UCR crime data in 2021-22. Missing or incomplete data is a common problem with the UCR.

Individual agencies choose whether to report all the index crimes, just a portion of them, or none. Given the lack of standardization, there are variations from agency to agency in how counts are tallied and what data is submitted. UCR data only includes crimes that are reported to law enforcement and that agencies or individual officers choose to record. Crimes that go unreported or unrecorded are not included in the data. UCR has a hierarchy rule. This means that if a crime incident consists of multiple offenses, only the most serious offense is counted. This results in discrepancies between the UCR and NIBRS databases because the latter counts all offenses that take place during a single incident.

National Incident-Based Reporting System (NIBRS): As mentioned above, the FBI is replacing the UCR system with a more in-depth crime reporting database, NIBRS. NIBRS collects data on 52 crimes across 24 offense categories and provides details on the context of the crime. It includes up to 10 offenses per incident, creates a profile of victims and offenders, and provides insight into incidents involving multiple offenses. NIBRS collects additional data such as types and amounts of property lost, demographic information about offenders and victims, persons arrested or cited, and what type of weapon, if any, was used in the incident.

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As of January 1, 2021, NIBRS has become the officially preferred reporting system of the FBI, which changes how reported crime is measured and analyzed by the federal government. NIBRS more accurately expresses the types of crime dealt with by law enforcement, such as destruction of property, identity theft, animal cruelty, and simple assault. Some of the major advantages of NIBRS are higher quality detailed data that produces more thorough and error-free descriptions of crime, standardized data to compare crime across jurisdictions, and added factors to better understand victimization and offenders. Currently, only 66% of the U.S. population is covered by NIBRS-reporting law enforcement agencies.

Some of the limitations to the NIBRS data used in this report are that Portland switched to NIBRS reporting during the middle of 2015, and as mentioned previously a lack of standardization is of concern. Another limitation is that NIBRS, like all crime databases, only documents crimes that were reported to the police.

Portland Police Bureau (PPB) Criminal Incident Report: PPB publishes crime statistics on their website in their Open Data dashboard.

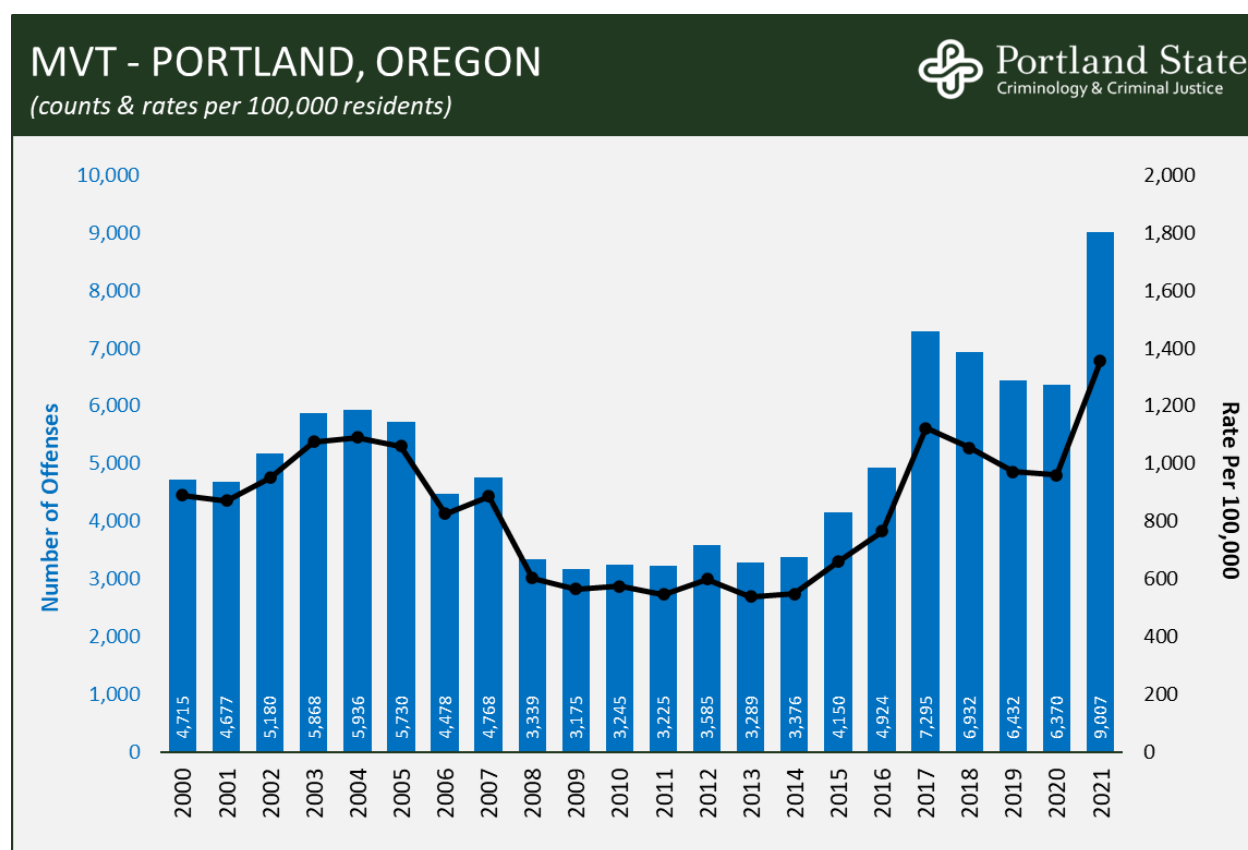
The PPB Open Data website includes statistics on crime in Portland including information about stolen vehicles, a business districts crime summary, shooting incidents, neighborhood offenses, offense counts by category, and frequency maps (PPB Open Data, 2023).

Again, this data source is limited by the fact that statistics only cover crimes reported to the police. Only limited information is provided on each offence which presents challenges to analyses. PPB does not post details on certain sensitive crimes, such as exact geographic location, due to privacy concerns. The exact geographic locations of crimes are not provided to protect the privacy of victims. Finally, data only go back to 2015 when PPB transitioned to a new reporting system.

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Trends in Portland

This section assesses UCR data for MVT in Portland from 2000 - 2021. A broad overview of counts and rates of MVT shows the evolution of MVT in Portland over time to provide context for this crime. Offense counts detail trends regarding the total number of vehicles stolen in Portland annually. Offense rates assess the amount of MVT in Portland per 100,000 residents. As MVT and population have both grown over the last 21 years, rates add clarity to the scope of MVT in Portland because they account for population growth. This broad overview is a good starting point to begin assessing the scope of MVT in Portland.



Counts: The blue bars and legend in the chart above represent counts of MVT in Portland from 2000 to 2021. Exact counts are shown within each bar. There was a 91% increase in MVT in Portland between 2000 (4,715 thefts) and 2021 (9,007). There was a sizeable 41% decrease between 2005 (5,730) and 2008 (3,339). PPB changed their reporting method from UCR to NIBRS in 2015 which might slightly skew statistics before and after that year. Between 2016 (4,924) and 2017 (7,295), there was a 48% increase in one year. Crime counts increased 83% between 2016 (4,924) and 2021 (9,007). The most drastic annual change was in the number of MVT in 2020 (6,370) compared to 2021 (9,007).

Rates: The black line and legend to the right in the chart above detail the annual rate of MVT per 100,000 residents in Portland. Crime counts detail the total number of MVT reported that

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resulted in a police report. Rates adjust the count to express the number of MVT per 100,000 residents. Adjusted for population growth, the rate of MVT per 100,000 residents increased by 52.1% in Portland between 2000 (891.1) and 2021 (1,355.8).

From 2005 to 2008 the rate of MVT decreased by 43% per 100,000 residents. The Rate of MVT reached 1,123.3 per 100,000 residents in 2017 before dropping back down to 960.9 in 2020. The rate of MVT in Portland in 2005 (1060.3) was less than 1% different than the rate in 2018 (1054.7). After Portland transitioned to reporting to NIBRS the rate of MVT increased by 46% from 2016 (776.8) until 2017 (1123.3). The most drastic change in annual rate of MVT in Portland was between 2020 (960.9) and 2021 (1355.8). This marked a 41.1% increase in MVT per 100,000 residents in just a single year.

Summary: The chart above shows a trend of increasing counts and rates of MVT in Portland between 2000 and 2021. The biggest increase in counts and rates occurred between 2020 and 2021, so it seems as if this is an emerging issue that should be studied more closely. To better understand the scope of MVT in Portland the following section will examine how Portland compares to other similar cities in the United States.

Portland vs. Other Cities

This section compares MVT in Portland to other cities in the Western region of the United States and major U.S. cities with 250,000 or more residents. Portland is also compared to five cities that were selected based on their geographic and demographic similarity.

This section uses average rates of MVT per 100,000 residents and does not assess the count of vehicles stolen. When analyzing MVT data from many cities with a wide range of populations it would be impractical and misleading to include the number of offenses for each city. Averages of MVT adjusted to reflect rates per 100,000 residents provides a more accurate benchmark against which to compare the scope of MVT in Portland.

Whole year data for Portland was not available for 2015 due to the fact that PPB transitioned from UCR to NIBRS reporting that year. Data for this one year gap were estimated using an average of adjoining years. In this section 2021 data for Sacramento were not available from other sources and were obtained directly from the Sacramento Police Department UCR statistics published on the governmental website hosted by the City of Sacramento (Crime statistics—City of Sacramento, 2022).

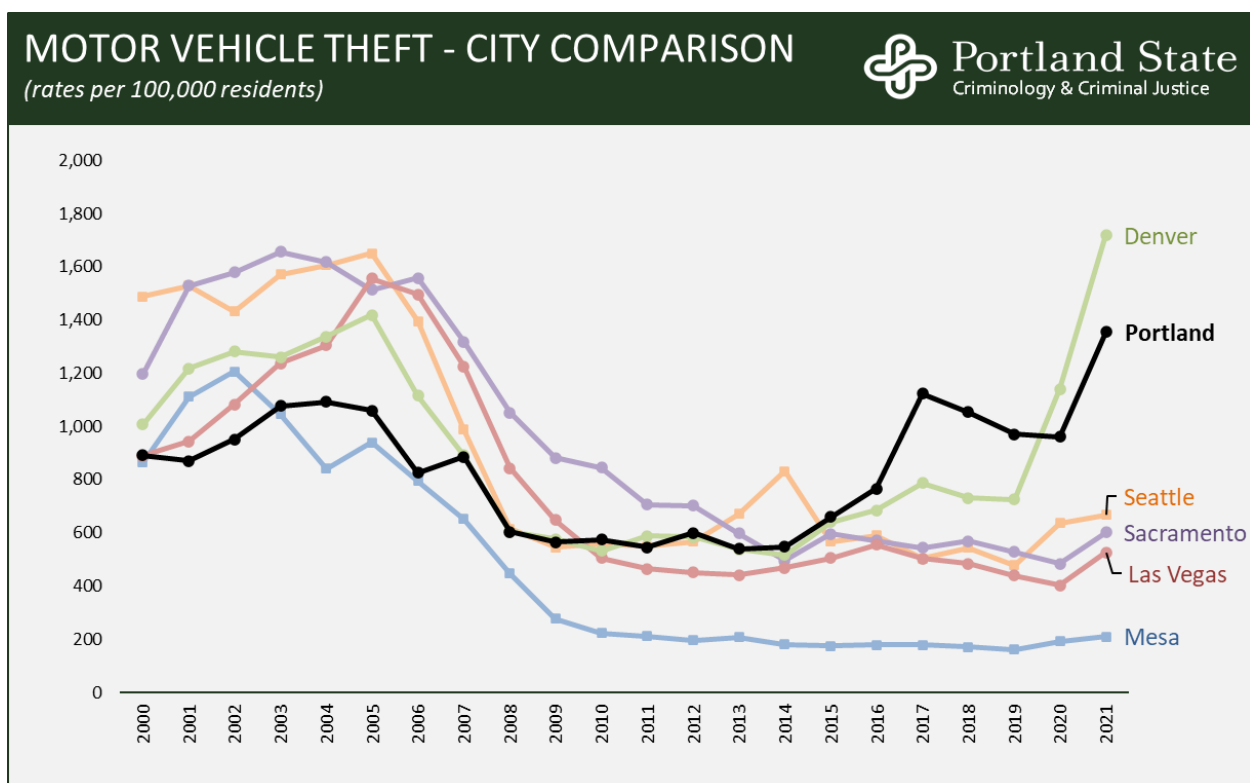
Methodology for Selecting Comparison Cities: A list of cities geographically and demographically similar to Portland was developed using publicly available data from the U.S. Census Bureau's website (QuickFacts, 2023). The U.S. Census Bureau estimates Portland's population in 2021 was 641,000 people. Cities in the Western region of the U.S. with 250,000 or more residents were considered. A list of variables for each city was collected including population, population density, square miles, median income, percentage of persons living in poverty, percentage of people employed, percentage of the population identifying as "white only" (because that is the most common race in Portland), and the percentage of high school graduates.

Cities were sorted by each variable; the cities two spaces above and below Portland were recorded. Cities that appeared two or less times were eliminated. San Jose was eliminated as an outlier because of its notably higher population. Cities were sorted by each variable again. Cities immediately above or below Portland were awarded two points. Cities two spaces above or below Portland were awarded one point. Cities were ranked by the sum of similarity points and the five highest scoring cities were selected. Denver, CO scored the most at 14 points; followed by Sacramento, CA (9); Mesa, AZ (8); Seattle, WA (7); and Las Vegas, NV (6).

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Portland vs. Five Comparison Cities: Annual rate per 100,000 residents for Portland is shown in the same prominent dark black line that detailed rate of MVT in Portland in the previous section. The rate of MVT decreased in Portland and all five comparison cities between 2000 and 2009.

Overall, between 2000 and 2021 the rate of MVT increased in Portland by 91%. Portland was only outpaced by Denver (127.6%). The rate of MVT decreased in Seattle (37.3%), Mesa (68.6%), Sacramento (35%), and Las Vegas (6.1%). Between 2020 and 2021 Denver (50.9%) was the only city that saw a larger increase in MVT in that one-year period than Portland (41.4%). Las Vegas (30.4%) and Sacramento (24.6%) also saw noticeable upticks in MVT. Rates in Mesa (8.9%) and Seattle (4.9%) did not notably increase between 2020 and 2021, but they still saw a slight increase.

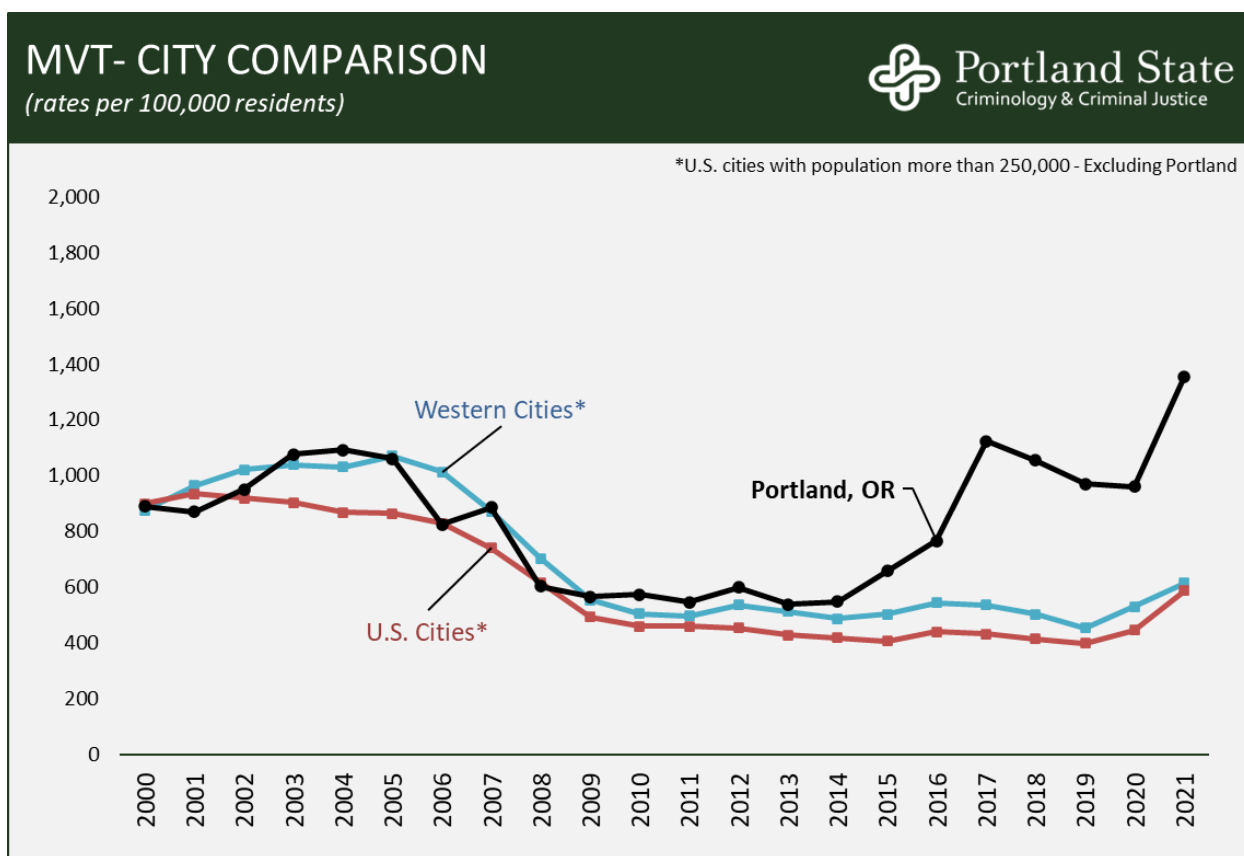


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Portland vs. U.S. and Western Cities: This section compares MVT in Portland to all other cities in the Western Region and the U.S. with 250,000 or more residents. Data for Portland were excluded from averaged data of cities in the Western region and the entire U.S. to not skew the comparison.

In 2000 the rate of MVT per 100,000 residents was similar when comparing Portland (891.1) to other cities in the Western region of the U.S. (875.7) and all cities in the U.S. (901) with more than 250,000 residents. In 2021 rates for cities in the Western region of the U.S. (615) and all cities in the U.S. (588.8) were very similar, but the rate for Portland (1,355.8) skyrocketed and was much higher.

Rates were relatively clustered before a notable divergence in 2017 when the rate in Portland (1,123.3) far surpassed rates for the Western region (536.5) and the U.S. (433.4). Between 2000 and 2021 rates decreased in the Western region (875.7; 615) and the U.S. (901; 588.8), while rates surged in Portland (891.1; 1,355.8).



Between 2000 and 2021 the rate of MVT decreased in the Western region and the U.S. but rose in Portland. All three areas saw an increase between 2020 and 2021, but Portland's uptick was far more pronounced.

Summary: By all measures MVT is an increasing problem crime in Portland. Looking at Portland alone, counts and rates rose between 2000 and 2021 and between the two most

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recent years where data were available, 2020 and 2021. Of the five comparison cities in the Western region, Denver is the only other city that stood out as an extreme outlier on par with Portland for an increase in the rate of MVT theft. Every other comparison city saw an overall decrease between 2000 and 2021. While each city saw an uptick between 2020 and 2021, the increase was slight in Seattle, Las Vegas, Sacramento, and Mesa compared to the drastic increases in Portland and Denver. Similarly, when compared to other cities in the Western region and the U.S., rates of MVT decreased between 2000 and 2021 while rates of MVT in Portland drastically increased.

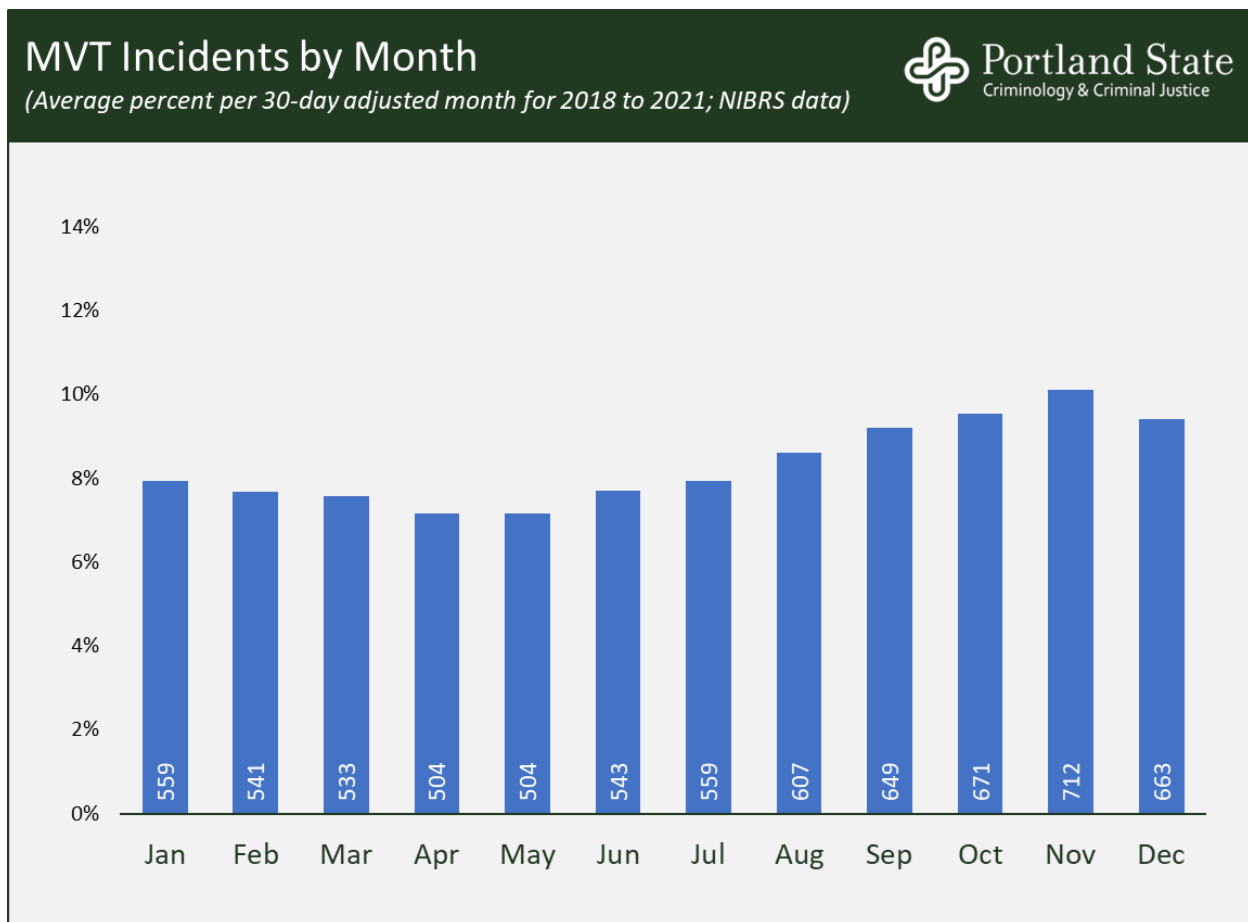
As mentioned before, law enforcement in Portland changed reporting methods from UCR to NIBRS in 2015. This is worth noting but does not impact the outcomes of this report since UCR data were used for all years. MVT in Portland has increased dramatically and at a massively disproportionate rate compared to other cities and regions over both the last 21 years and the last five years. Denver is the only city with comparable MVT to Portland in this analysis. MVT is clearly a problem crime impacting many residents in Portland that warrants serious consideration.

The following sections of this report will outline patterns in MVT in Portland to better understand this crime. An analysis of vehicles targeted, temporal patterns, and geographic patterns will identify which vehicles are at high risk for theft, when they are most likely to be stolen, and where they are being stolen from. A review of the literature will examine potential methods for preventing this crime.

Temporal Patterns

This section discusses times when MVT occurred in Portland. Four years of NIBRS data from 2018 to 2021 were used to create annual averages. This section discusses MVT by month, day of week, and time of day.

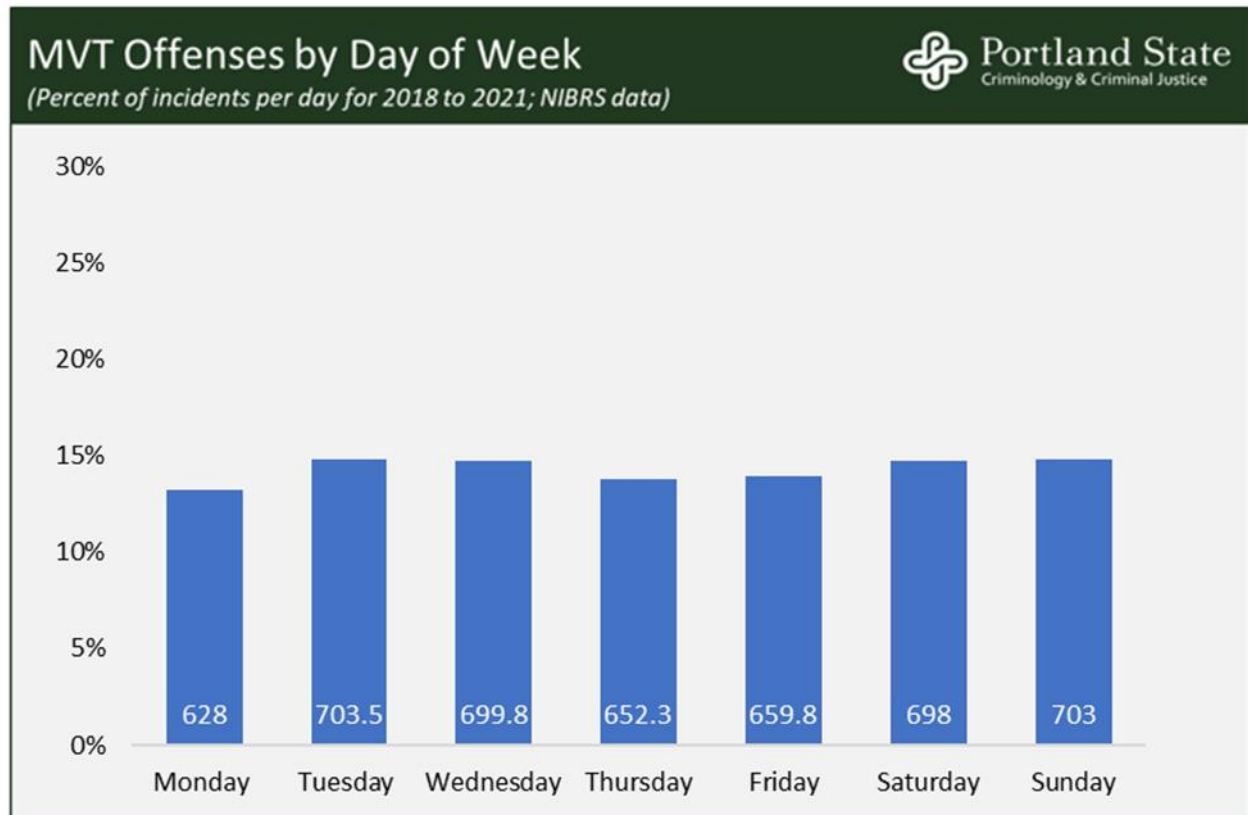
MVT by Month: The chart below shows the average count and percentage of MVT by month. Averages were adjusted to reflect 30-day months. A month is a sizeable period that allows for delays in reporting, so this chart includes both reported dates of MVT and the dates reports were filed when the date was unknown.



The blue bars show the average percentage of MVT from 2018 to 2021 in Portland by month. The fewest vehicles were stolen in April and May with an average of 7.2% of MVT occurring in each month (504 each month). The most vehicles were stolen in November with 10.1% of MVT occurring during that month (712). There is not a particular month or time of year that stands out as particularly prone to this offense.

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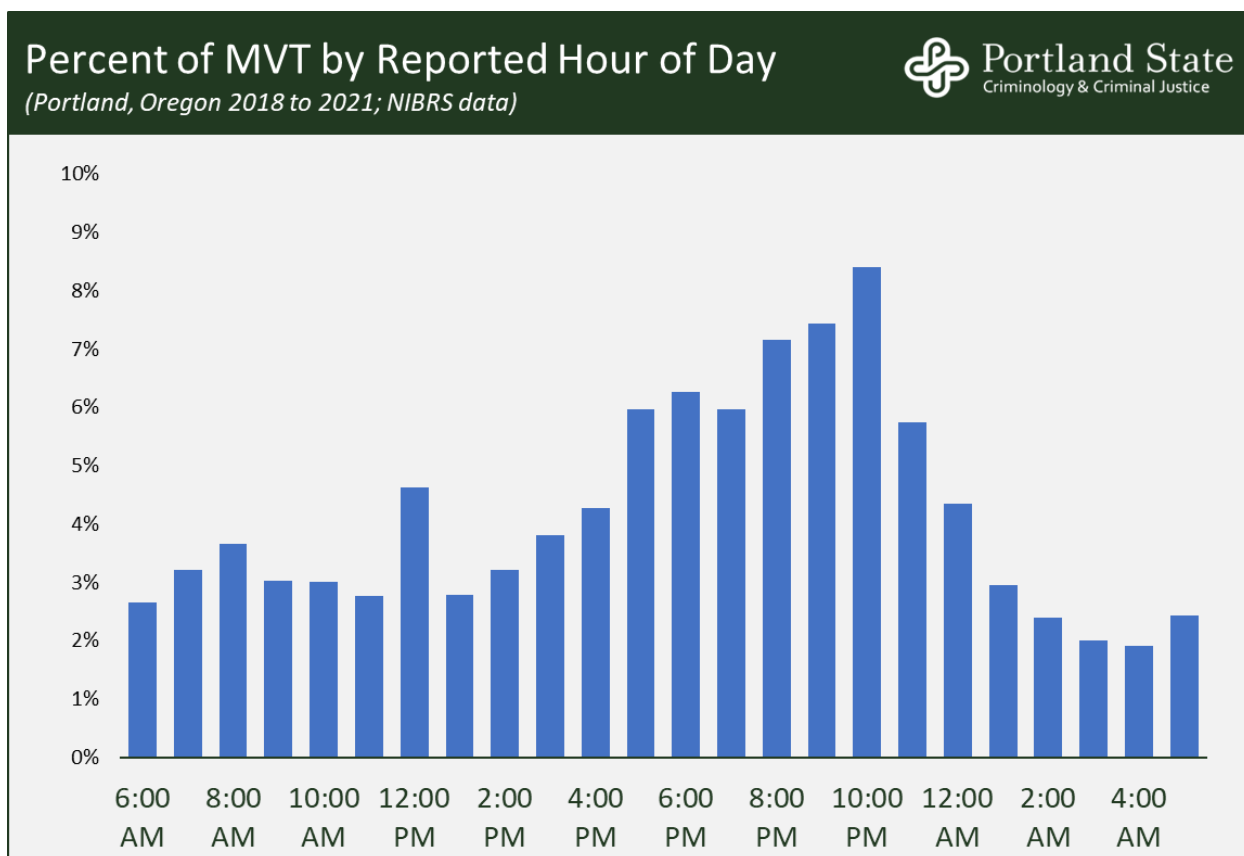
MVT by Day of Week: The chart below shows the dispersion of MVT by day of week from 2018 to 2021. For this chart, reports that indicated the date the report was filed rather than the date the incident occurred were excluded. The left of the chart indicates the percentage of vehicles reported stolen for each weekday. The white numbers inside the blue bars are the average annual count of vehicles stolen annually for each weekday. On Mondays, Fridays, and Saturdays 15% of MVT occurred. On Tuesdays, Wednesdays, and Thursdays 14% of MVT occurred. On Sundays 13% of MVT occurred. Day of the week did not have a meaningful impact on MVT in Portland.



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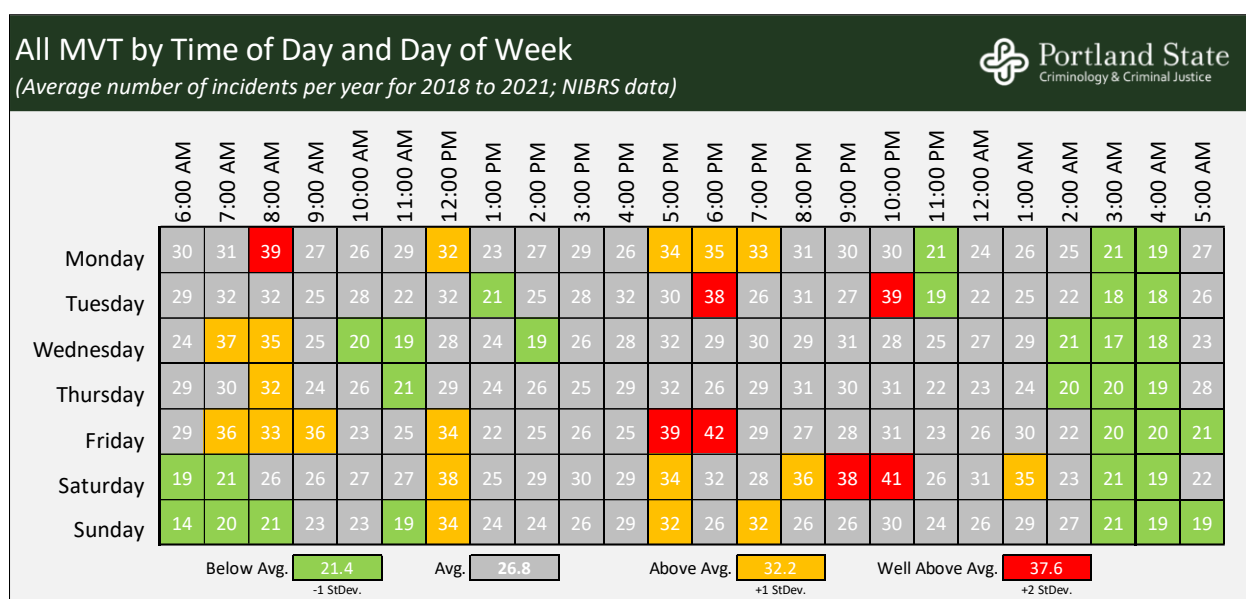
MVT by Time of Day: The chart below shows the percentage of MVT reported stolen in Portland by hour of day from 2018 to 2021. In that four-year period there were 27,907 reports of MVT offenses filed that indicated the hour the offense occurred. Offenses for the hour of midnight were calculated by averaging offenses occurring at 11pm and 1 am to account for entry errors. Entries that indicated the date the report was filed rather than the date the incident occurred were excluded. Data in this section are somewhat limited because NIBRS uses the low time and date to determine an estimate of when vehicles were stolen. That means they only report the earliest time people assume their vehicle might have been stolen. For example, if someone parks their vehicle at 8 pm and notices it is missing at midnight the time on the report will reflect the earliest possible time, 8 pm. People do not always immediately realize their vehicle has been stolen. There is no way to assess how many people knew the exact hour the theft occurred and/or how many people knew the general time and guessed.

Starting from the left, the blue bar shows 2.7% of reports indicate the vehicle was stolen during the 6 am hour. There was an increase of reports indicating vehicles were stolen during the noon hour (4.6%) before dropping down again. After 12 pm reports steadily climbed before capping out during the 10 pm hour which had the highest reports of MVT of all hours (8.4%) then falling again. There were the least thefts reported during the 4 am hour (1.9%).



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MVT by Time of Day and Day of Week: The following chart shows the average annual number of vehicles reported stolen in Portland by day of week and hour of day from 2018 to 2021. The hour of midnight was calculated by averaging the hours of 11pm and 1am to account for entry errors. Grey boxes indicate an average number of vehicles were stolen during that hour on that day of the week. Yellow boxes indicate hours of days when the number of MVT was one standard deviation above average. Red boxes indicate hours of days when MVT was two standard deviations above average and indicate a higher frequency of MVT. Green boxes indicate hours of days when the average annual number of MVT was at least one standard deviation below average, indicating a decreased occurrence of MVT during that hour of day throughout the four-year period. Vehicles were slightly more likely to be reported stolen between 5pm and 7pm on Fridays, between 9pm and 11pm on Saturdays, during the 8am hour on Mondays, or during the 6pm or 10pm hour on Tuesdays. These are reported times, not times of actual occurrence. Limitations of this data source is that there is no high/maximum time reported so there is no way to average to estimate when MVT occurred.



Temporal Summary: There are slight variations in MVT counts and rates by month, time of day, day of week, and hour of day. The slight variations do not indicate there is any meaningful correlation between temporal patterns and MVT. There is not enough fluctuation to claim MVT occurs more often during various months, times, or weekdays. The following section will assess MVT in relation to geographic patterns.

Geographic Patterns

This section discusses geographic patterns in relation to MVT in Portland. Knowing where vehicles were stolen from might provide a useful starting point to target this crime or inform residents they are in a high risk area. Data for this section were compiled using data from PPB's Criminal Incident Reports published on their Open Data website which include a general location for incidents. Data were cross referenced with population data from Portland State University's Population Research Center (PRC). The PRC maintains a database of population and demographic information extracted from US Census data and redistributed to reflect population information according to the boundaries of Portland's neighborhoods rather than by US Census tracts. PPB codes for both Buckman East and Buckman West neighborhoods. For these charts they were combined into one neighborhood "Buckman."

MVT by Neighborhood: The following table shows the Portland neighborhoods with the highest counts and rates of annual MVT from 2018 to 2021. Portland's 94 neighborhoods were sorted by annual count of MVT; the 25 neighborhoods with the highest counts were recorded. The 25 neighborhoods with the highest rate of MVT per 1,000 residents were also recorded. Neighborhoods that ranked in the top 25 for both count and rate of MVT were classified as a "high/high" neighborhood. By far, the highest count of MVT was in Hazelwood (466.6) followed by Buckman (239.2). Hayden Island had the highest rate of MVT per 1,000 residents (42.2) followed by Lloyd (40). Lloyd had the lowest count of MVT on the high/high list (111). From 2018 to 2022 the count of MVT increased by 398% in Overlook.

MVT in High Offense Neighborhoods


Annual Count and Rate 2018 to 2022; PPB, PSU Population Research Center

Neighborhood	Average Annual MVT	% Change Annual MVT 2018 to 2022	Average Annual Rate per 1,000
Hayden Island	128.8	111%	42.2
Lloyd	111.0	64%	40.0
Parkrose	230.2	43%	36.8
Eliot	133.0	195%	24.0
Kerns	151.4	138%	21.7
Buckman	239.2	106%	21.5
Argay	125.4	97%	19.9
Piedmont	125.4	153%	17.8
Hazelwood	466.6	9%	17.5
Overlook	121.8	398%	16.8
Kenton	130.8	45%	16.2
Hosford-Abernethy	123.0	30%	15.9
St. Johns	201.8	67%	15.6
Sunnyside	121.8	26%	14.8

Neighborhoods that ranked in the top 25 for both count and rate of MVT were classified "High."

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Neighborhood Demographics: A list of “low/low” neighborhoods was generated using the same methods used to generate the “high/high” list, using the bottom 25 neighborhoods ranked for count and rate of MVT. The Social Vulnerability Index (SVI) was developed and is maintained by the Geospatial, Research, Analysis, and Services Program (GRASP) for the Centers for Disease Control. The SVI considers 16 factors such as poverty, lack of vehicle access, and crowded houses. SVI is scored up to 100%. The chart below compares demographic characteristics of neighborhoods that experience high counts and rates to neighborhoods that experience low counts and rates of MVT.

High vs Low* MVT Neighborhood Demographics		
<i>Weighted averages of high vs low Portland neighborhoods; NIBRS, PPB, U.S. Census data</i>		
	High MVT Neighborhoods	Low MVT Neighborhoods
Social Vulnerability Index	50.27	12.25
Weighted Average of Neighborhoods 2020		
Households Living Below Poverty	14.4%	6.1%
Food Insecurity	12.2%	6.4%
Owner Occupied Housing Units	43.7%	77.5%
Population Under 18	15.0%	20.1%
Non Hispanic White Alone	64.2%	77.4%
Household Income Less Than \$75,000	58.2%	31.6%
Average Percent Change 2010 to 2020		
Population	15.6%	7.3%
Housing Units	21.2%	3.1%
Neighborhoods that ranked in the top 25 for both count and rate of MVT were classified "High." Neighborhoods that ranked in the bottom 25 for both count and rate of MVT were classified "Low."		
		

High MVT neighborhoods have over twice as many households living in poverty compared to low MVT neighborhoods (14.4%, 6.1%) and almost twice the amount of food insecurity (12.2%, 6.4%). High MVT neighborhoods are more racially heterogenous with less people identifying as white alone (64.2%, 77.4%). People in high MVT neighborhoods are less likely to own their own homes (43.7%, 77.5%) and households are more likely to earn less than \$75,000/year (58.2%, 31.6). There are fewer people under the age of 18 living in high MVT neighborhoods (15.0%, 20.1%). High MVT neighborhoods have an SVI of 50.3% which means they are much more likely to experience vulnerability in a natural disaster or emergency situation because of limited means. Low MVT neighborhoods have a social vulnerability of 12.3% which means that 87.7% of neighborhoods are more vulnerable.

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Hot Spot Crime Maps: This section shows MVT activity in Portland from 2018 to 2021. Locations where vehicles were stolen were entered to create the map for 2018. Red areas indicate areas that had an especially high rate of MVT that year. Orange areas show where MVT was above average. Yellow areas show places that experienced an average amount of MVT theft in 2018. Subsequent maps were created by entering locations where vehicles were stolen for each year, but the benchmarks for averages from 2018 were applied to create hot spot maps to show change over time.

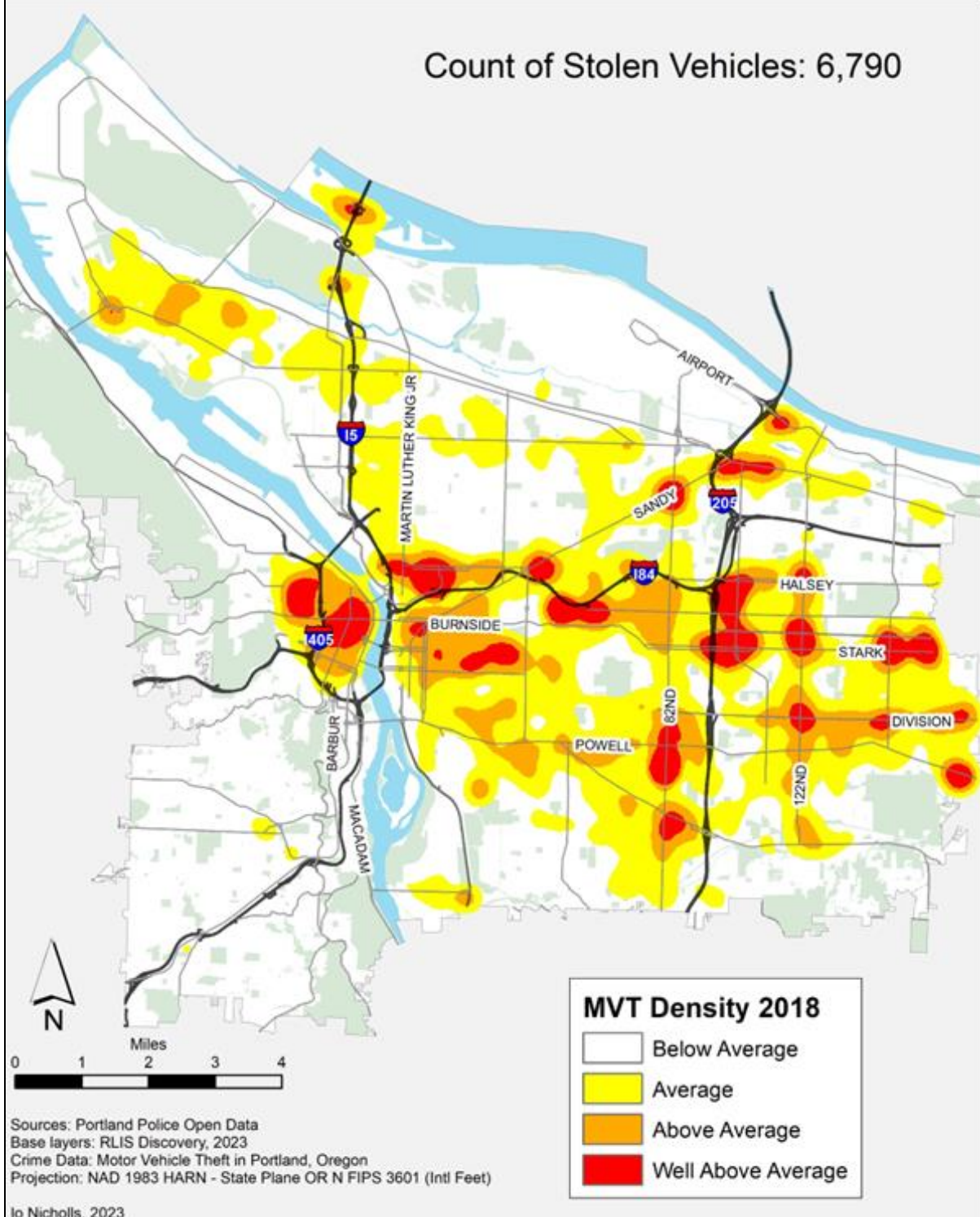
There is not a notable change from 2018 to 2019, but the 2020 and 2021 maps show the rapid increase of MVT in Portland since 2018. The 2022 map shows a stark increase in the count of MVT over the last five years. MVT seems to have increased most along the I5 corridor and other major freeway systems.

The top of each hot spot density map shows the count of MVT for that year. There was 56% more MVT in 2022 compared to 2018.

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Density of Motor Vehicle Theft 2018; Portland, Oregon

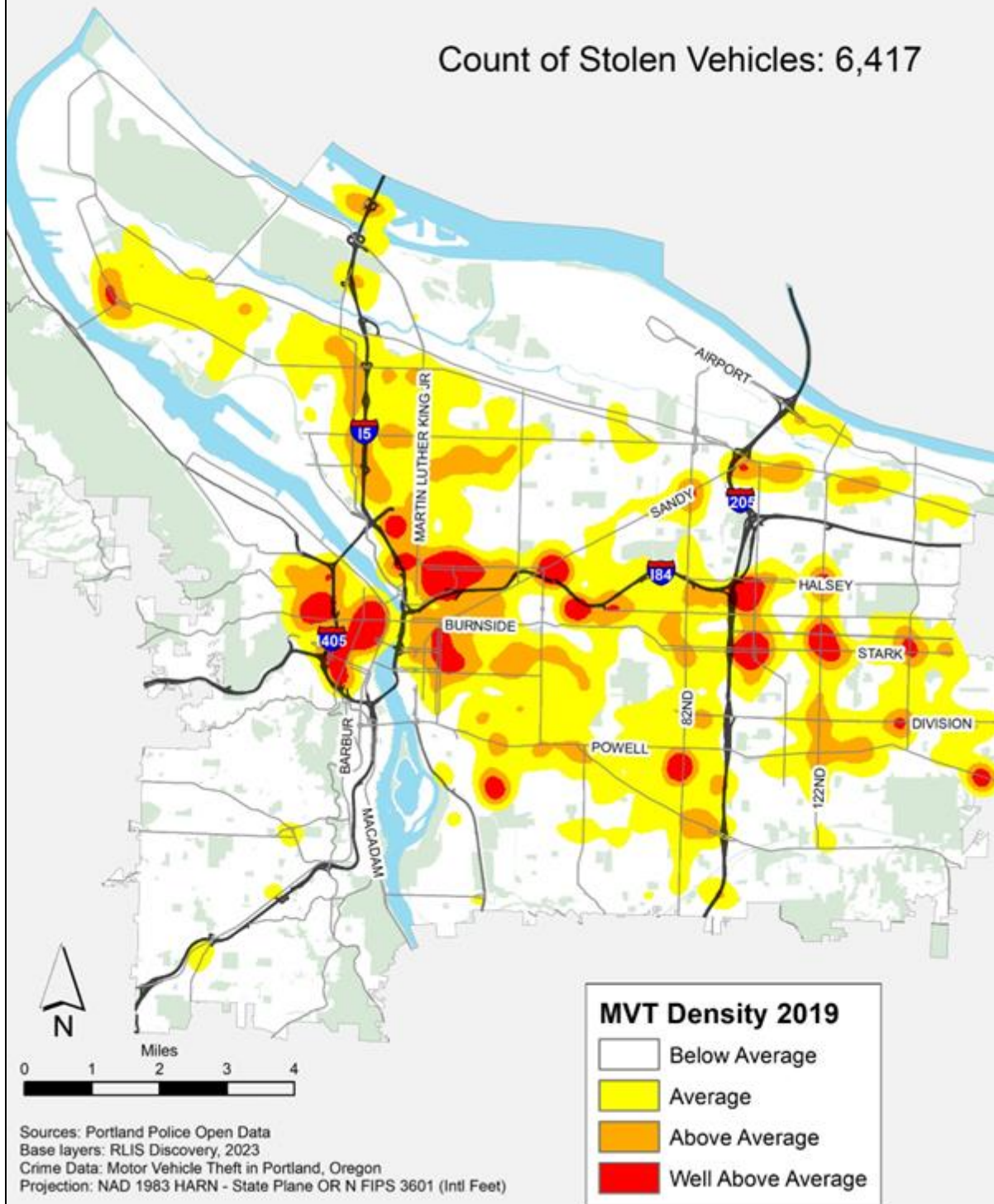
Count of Stolen Vehicles: 6,790



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Density of Motor Vehicle Theft 2019; Portland, Oregon

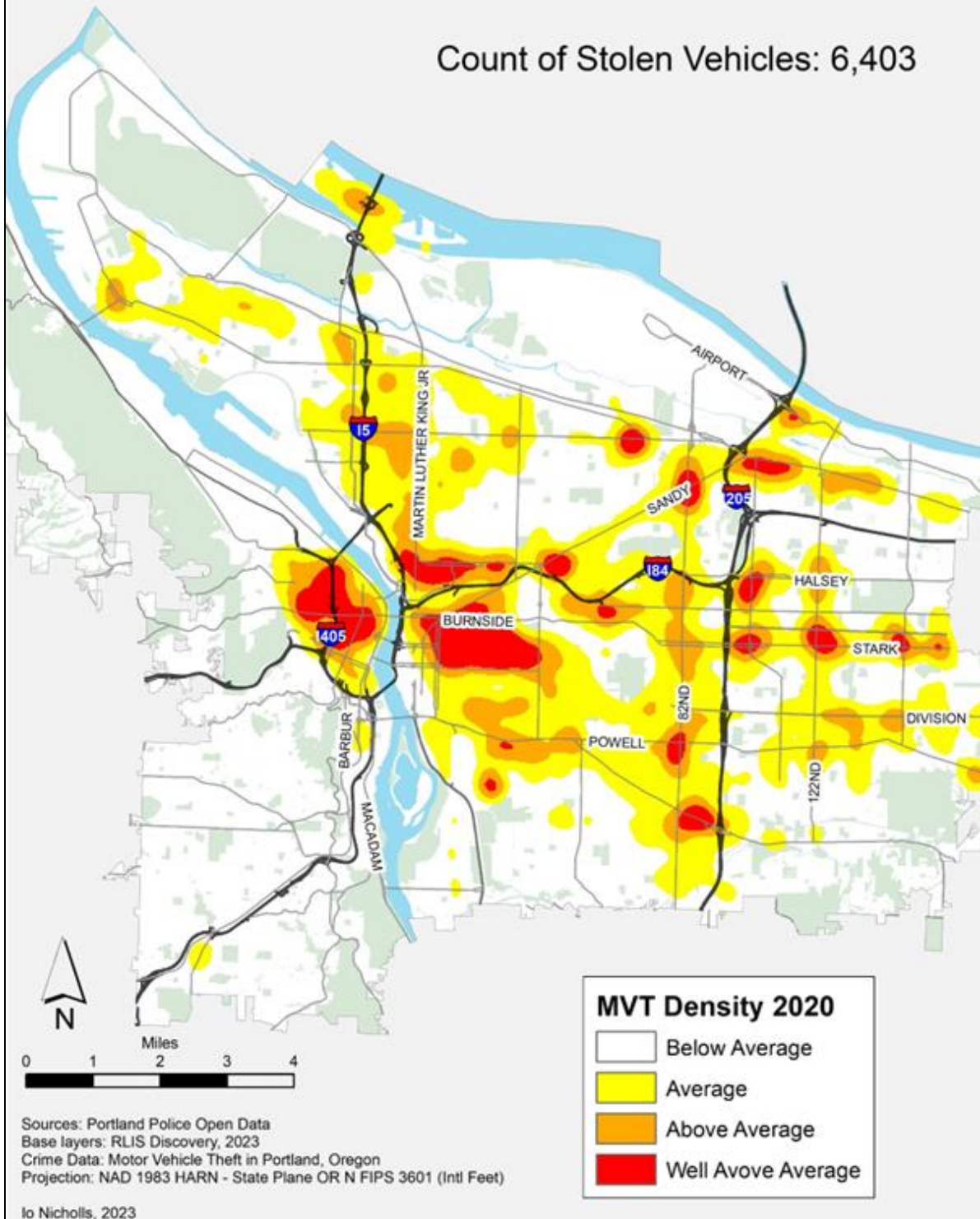
Count of Stolen Vehicles: 6,417



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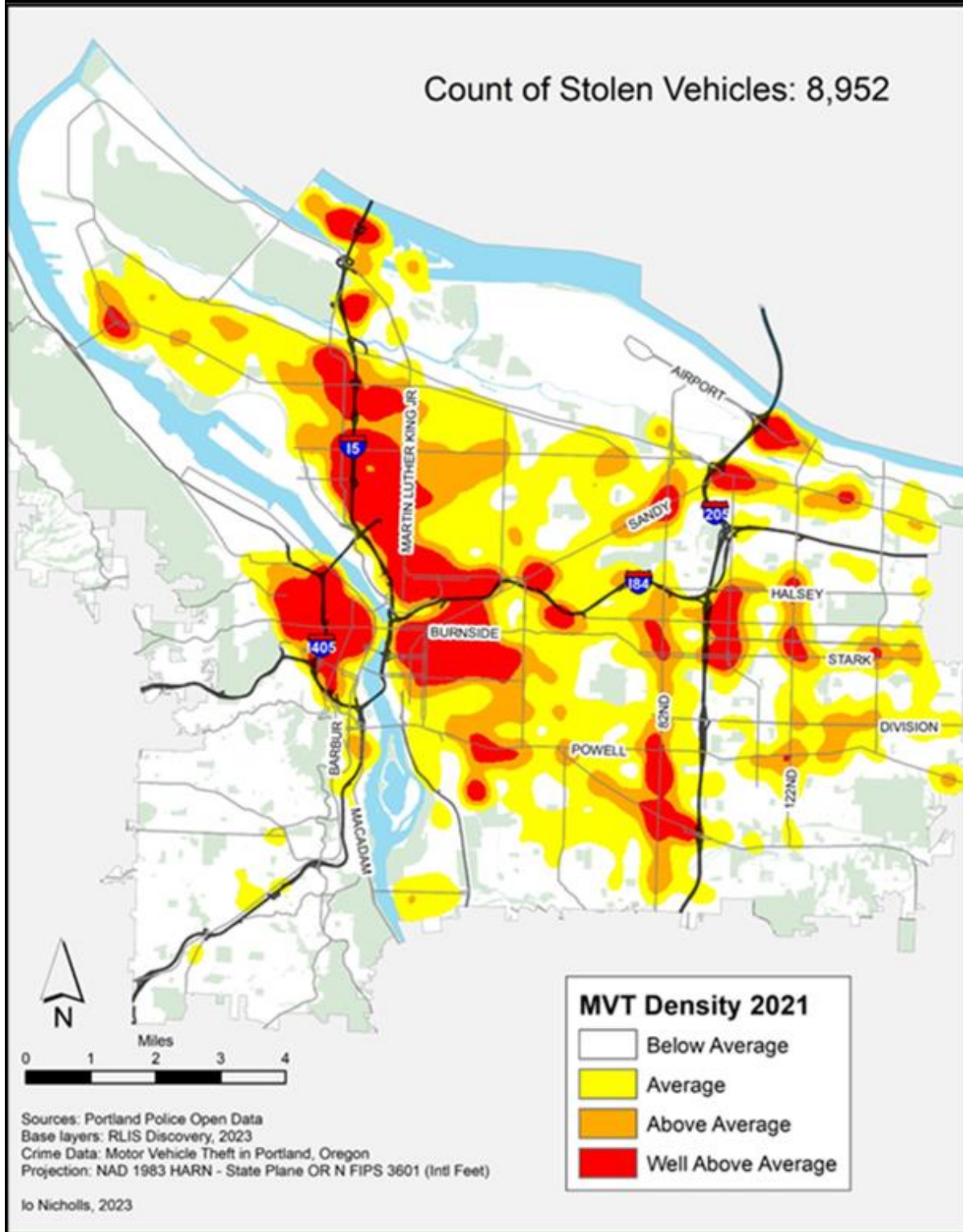
Density of Motor Vehicle Theft 2020; Portland, Oregon

Count of Stolen Vehicles: 6,403



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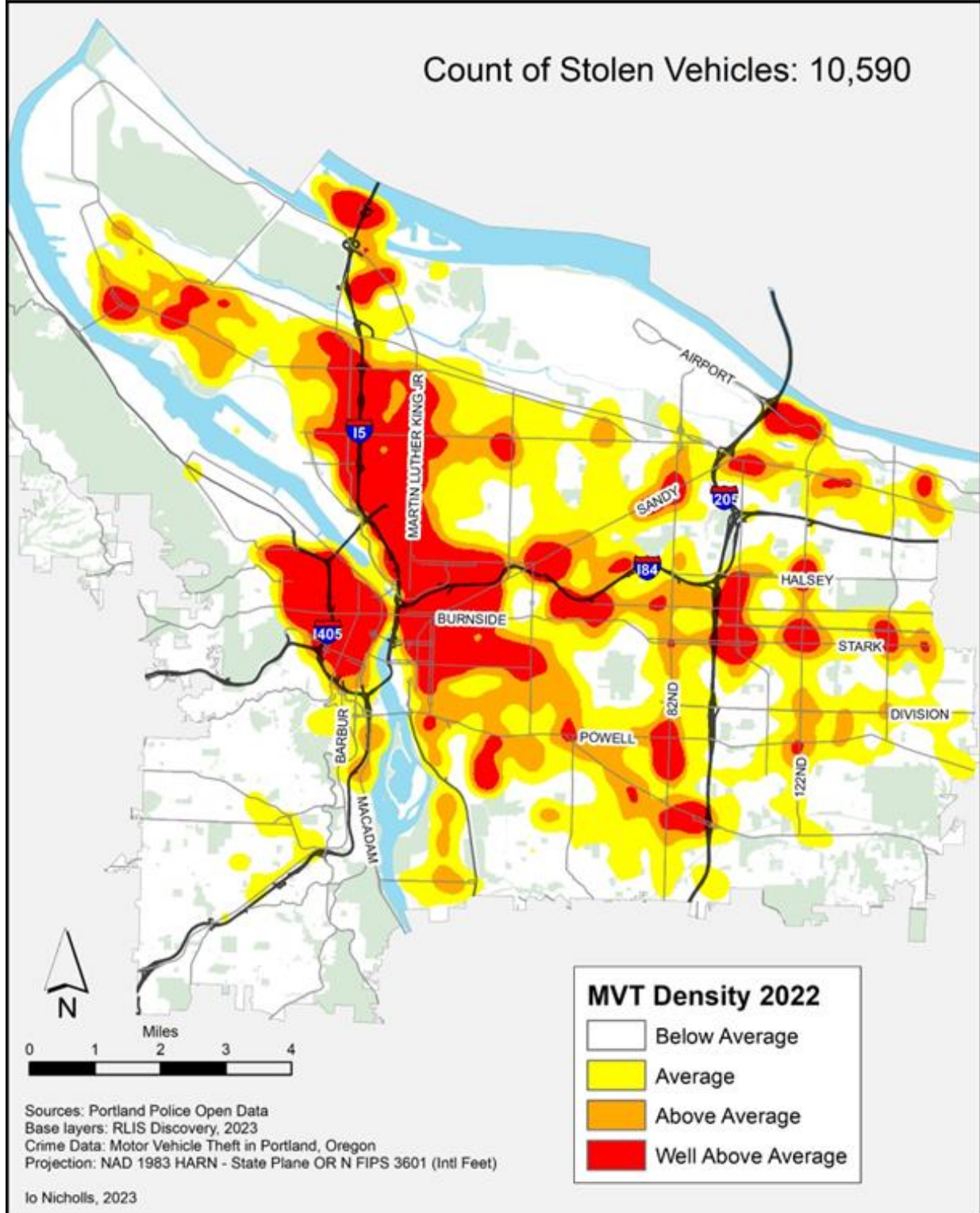
Density of Motor Vehicle Theft 2021; Portland, Oregon



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Density of Motor Vehicle Theft 2022; Portland, Oregon

Count of Stolen Vehicles: 10,590



This section discusses demographics of offenders who were arrested in connection with MVT in Portland from 2018 to 2021. Understanding who is stealing vehicles might provide valuable information to help reduce this crime. Data in this section were pulled from the NIBRS database. Most MVT does not result in an arrest or citation, so information is limited to available offender demographic information.

Age and Sex: The table below shows the percentage of individuals arrested for MVT by year in each age group. The right half of the chart shows the average percentage of people arrested in each age group and the percentage of males and females arrested in each age group over the four-year period. Arrestees were male 79.8% of the time and female 20.2% of the time.

Individuals were most likely to be between the ages of 16 - 24 (17%), 25 - 34 (39.3%), or 35 - 44 (25.9%). On average, 521 people were arrested per year in Portland for MVT (415 male and 106 female). Individuals 45 and older offend far less frequently.

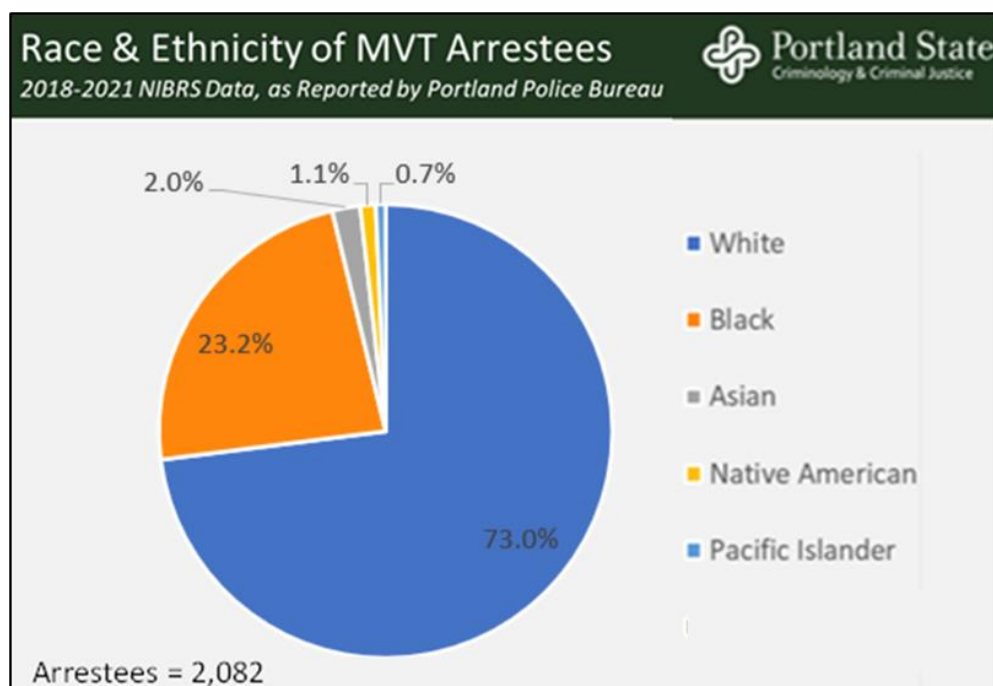
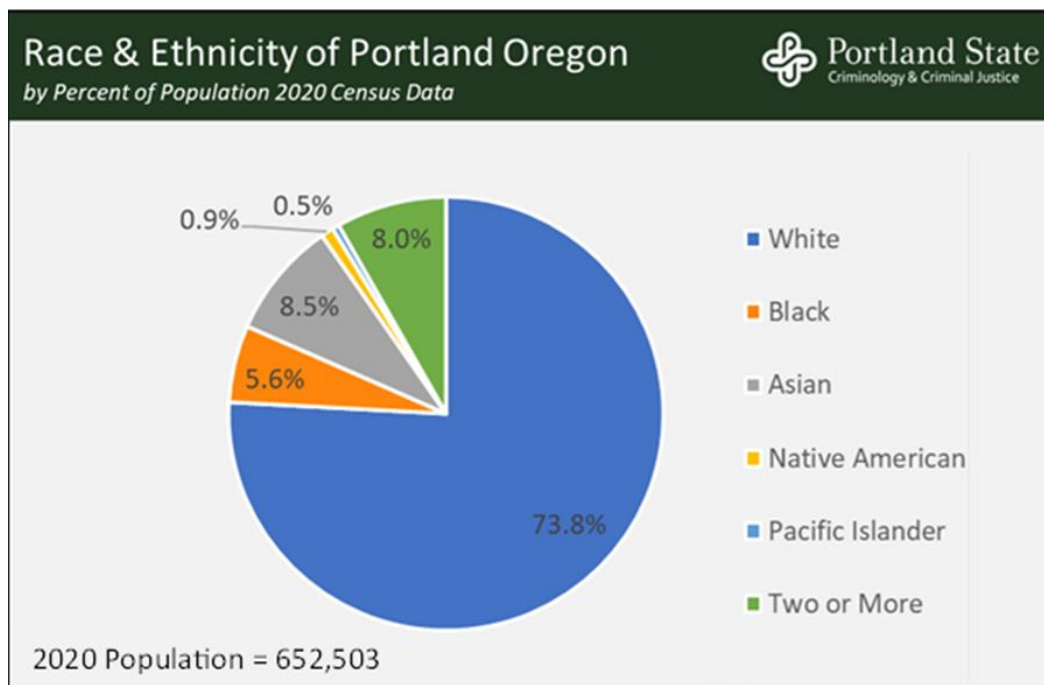
MVT Arrestees by Age and Sex

2018-2021, Portland, Oregon, NIBRS Data

	2018	2019	2020	2021	Average	Male	Female
10-15	1.1%	1.3%	2.4%	0.9%	1.4%	1.4%	0.0%
16-24	23.4%	21.8%	22.1%	20.8%	22.0%	17.0%	5.0%
25-34	40.8%	41.3%	39.1%	36.0%	39.3%	30.6%	8.6%
35-44	23.9%	26.4%	22.1%	31.1%	25.9%	20.5%	5.4%
45-54	9.3%	7.5%	9.7%	8.8%	8.8%	7.8%	1.0%
55+	1.5%	1.7%	4.7%	2.5%	2.6%	2.4%	0.2%
Count	461	477	494	650	521	415	106
% Total	22.1%	22.9%	23.7%	31.2%	25.0%	79.8%	20.2%

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Race: The first chart below shows the race and ethnicity of Portland residents according to the 2020 census. The second chart shows the race and ethnicity of people arrested for MVT from 2018 to 2021. It appears African Americans are arrested at a disproportionately high percentage and Asians are arrested lower than their representation in Portland's population. It is difficult to draw conclusions about offenders because a very low percentage of MVT results in an arrest or citation. The next section examines these incidents more closely.



Motor Vehicle Theft

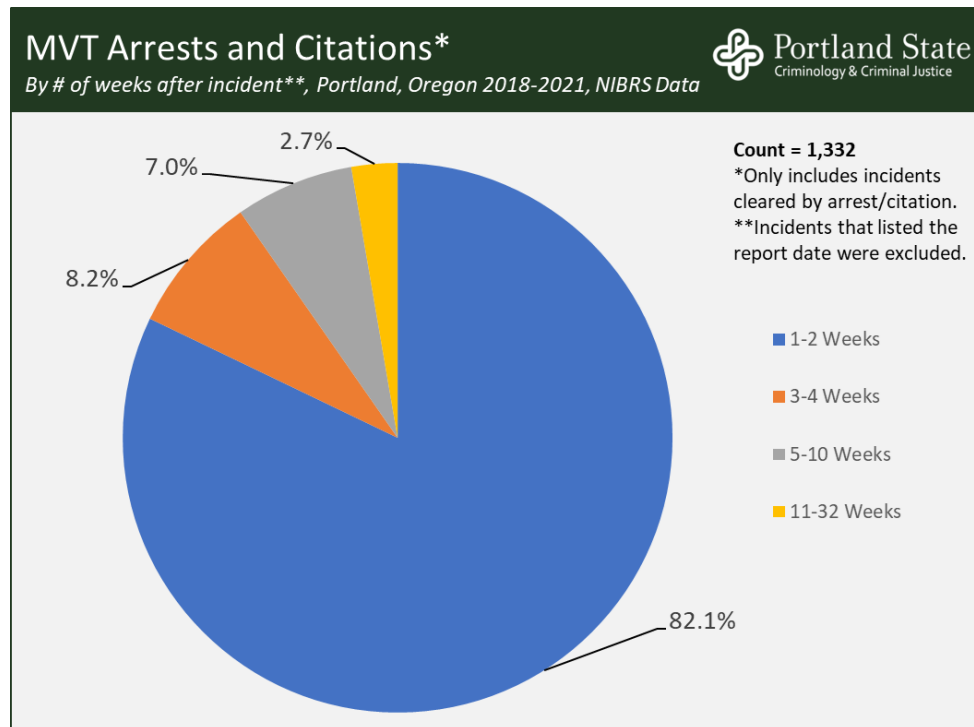
Cleared by Arrest: As shown in the chart below, there were 28,572 incidents of MVT in Portland between 2018 and 2021. MVT resulted in at least one individual being arrested or issued a citation in only 6.7% of incidents. The fewest percentage of MVT were cleared by arrests in 2018 (6.1%) and the most in 2020 (6.8%). The 1,914 incidents that were cleared by arrests resulted in the arrest of 2,082 individuals. In most incidents that resulted in an arrest one person was arrested, with an average of 1.09 arrests. The most people arrested in connection with one incident was four.

MVT Incidents Arrests or Citations <i>Portland Oregon 2018-2022</i>			
Year	# Incidents	Cleared by Arrest/Citation	% Cleared
2018	6,890	419	6.1%
2019	6,399	434	6.8%
2020	6,345	449	7.1%
2021	8,938	612	6.8%
Average	7,143	479	6.7%

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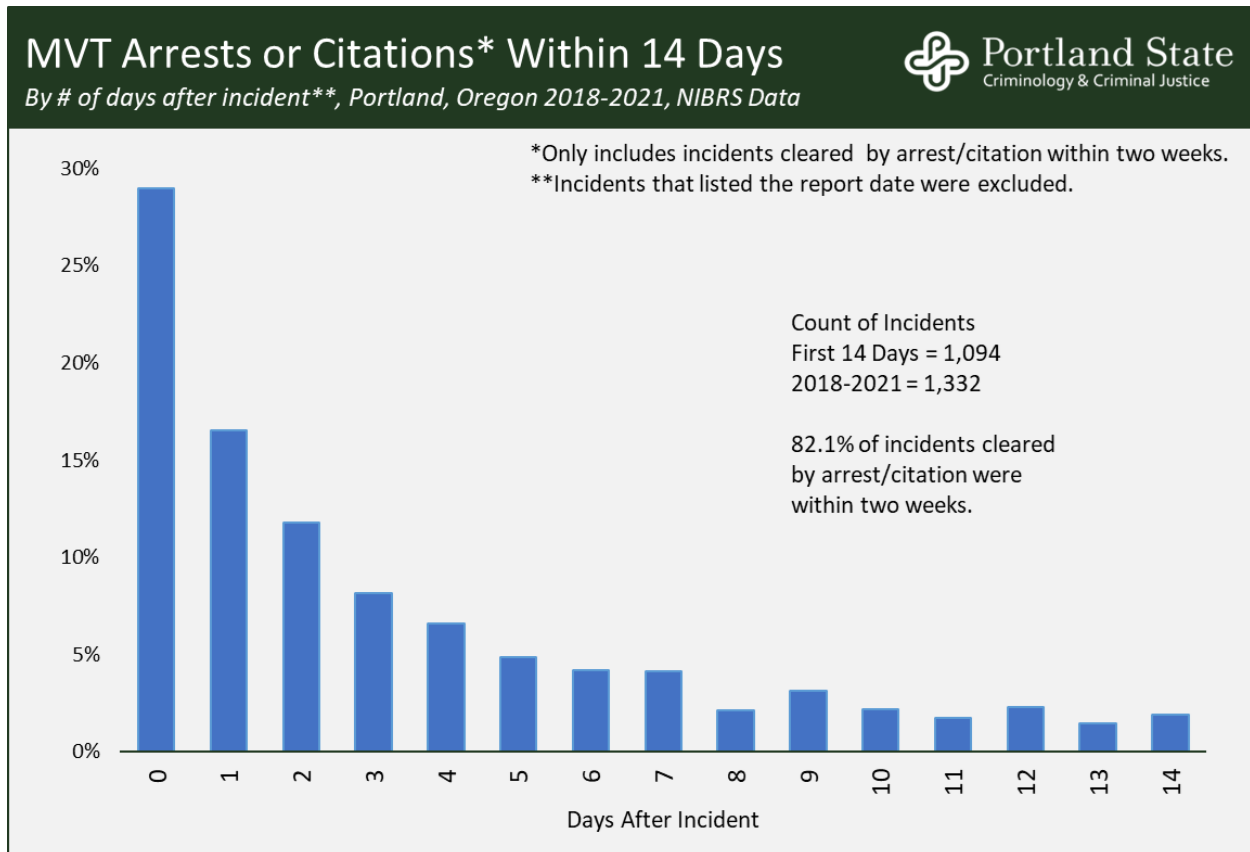
Motor Vehicle Theft

Time Until Arrest or Citation: The chart below shows the average time between the date of the MVT incident and an arrest. This chart only includes incidents that were cleared by arrest. Incidents that listed the date the report was filed rather than the date the incident occurred were excluded from this chart. In a vast majority (82.1%) of incidents cleared by arrest or citation, an arrest or citation occurred within two weeks of the incident date.



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Of the 82.1% of incidents cleared by arrest or citation within the first two weeks, most of those arrests or citations occurred within a few days after the incident. When arrests or citations occurred, they were generally on the same day of the incident (29%). One day following the incident (16.5%) and two days following the incident (11.8%) are when most other arrests or citations occurred.



Theft Details


Types of Vehicles Stolen: Understanding the types of vehicles most likely to be stolen might provide valuable information to help prevent this crime. The chart below shows the types of vehicles stolen. Automobiles made up the greatest number of stolen vehicles from 2018 to 2021, accounting for 59.9% of all stolen vehicles. Trucks accounted for 34.7% of stolen vehicles. All other vehicles, including but not limited to boats, aircraft, tractors, and snowmobiles were 5.5% of stolen vehicles.

MVT Types of Vehicles Stolen				
Portland Oregon 2018-2022				
Year	Auto	Truck	Other	Total Count
2018	68.2%	27.3%	4.5%	6,985
2019	66.8%	28.7%	4.5%	7,124
2020	56.5%	36.6%	6.9%	7,124
2021	47.9%	46.1%	6.0%	8,997
Average	59.9%	34.7%	5.5%	7,558

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NIBRS does not provide further information or details on the type of vehicle including information about make, model, or year. PPB does provide this information on their website. The chart below details the 10 most stolen vehicles by make and model according to PPB. The six most stolen vehicles on the chart are various models of Hondas and Subarus. Data on the most commonly driven vehicles in Portland are not available.


Most Commonly Stolen Vehicles	
Portland, OR; 2018-2022; PPB Data	
Make and Model	Count
Honda Civic, CRX, Del Sol	3,342
Honda Accord, Accord Crosstour	2,752
Subaru Legacy, Legacy GL, Outback Legacy	2,618
Honda CRV	2,025
Subaru Forester	1,246
Subaru Impreza, Outback Impreza, WRX	1,140
Ford F250	963
Toyota Camry	782
Ford F350	676

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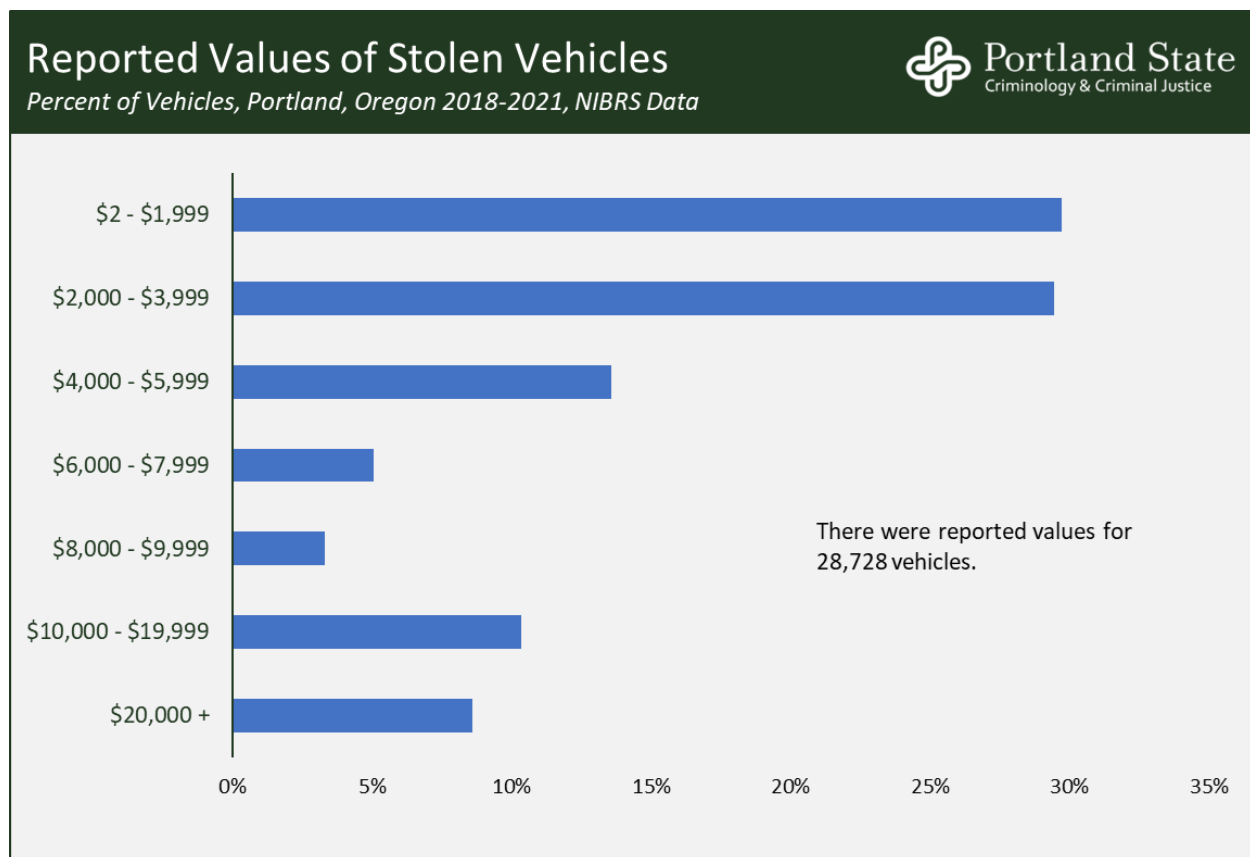
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Value of Stolen Vehicles: The chart below shows the total reported value of stolen vehicles in Portland from 2018 to 2021 in millions of U.S. Dollars. Although automobiles were stolen at a higher rate than trucks (see above: 59.9%, 34.7%), the value of stolen trucks was higher. The total reported value of stolen automobiles was 82.2 million dollars. Although fewer trucks were stolen than automobiles, the reported value was 95.2 million dollars, 13 million dollars higher than that of the stolen automobiles. Vehicles that were not recovered were replaced with the mean value of recovered vehicles.

Reported Value of Stolen Vehicles				
Millions of Dollars; Portland Oregon 2018-2021; NIBRS Data				
Vehicle	2018	2019	2020	2021
Auto	\$ 21.3	\$ 17.1	\$ 18.3	\$ 25.5
Truck	\$ 18.6	\$ 17.0	\$ 20.6	\$ 38.9
Other	\$ 1.5	\$ 1.9	\$ 2.1	\$ 3.4

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The chart below shows the reported values for 28,728 vehicles that were reported stolen from 2018 to 2021. The chart shows that most vehicles were reported as being worth under \$4,000.



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Rates of Recovery: The number of vehicles that were recovered might provide information about who was stealing vehicles and why. From 2018 to 2021 72.4% of stolen vehicles were recovered. Data is not available for the condition of the recovered vehicles, how they were recovered, or by whom. Stolen vehicles were recovered 88.2% of the time in 2018 compared to only 68.1% in 2021. There were 2,080 more vehicles stolen in 2021 compared to 2018. Between those same two years the number of vehicles recovered stayed roughly the same, decreasing by only 16.

Stolen Vehicle Rate of Recovery			
Portland Oregon 2018-2021; NIBRS Data			
Year	Vehicles Stolen	Vehicles Recovered	% Recovered
2018	7,130	6,289	88.2%
2019	6,420	4,416	68.8%
2020	6,486	4,195	64.7%
2021	9,210	6,273	68.1%
Grand Total	29,246	21,173	72.4%



The chart below shows the number of days between the MVT incident date and recovery of the vehicle. This chart only includes data for incidents where the vehicle was recovered. Incidents with a blank recovery date were excluded from this table. When vehicles were recovered it generally occurred within the first two weeks after the incident date. After 30 days the likelihood of recovering a vehicle diminished rapidly.

Stolen Vehicles Days to Recovery					
Portland Oregon 2018-2021; NIBRS Data					
Year	Count	0-14 Days	15-30 Days	31-60 Days	61-365 Days
2018	6,204	78.9%	13.2%	5.6%	2.3%
2019	4,372	92.4%	6.0%	0.9%	0.7%
2020	4,149	92.0%	6.4%	0.9%	0.7%
2021	6,124	91.6%	6.5%	1.1%	0.8%



MVT Prevention

An exhaustive search of the literature showed there is little research done in the area of MVT. Many papers offer suggestions on strategies that might potentially prevent MVT, but few works test these theories methodically. This section examines available suggestions from the literature. The most common methods of MVT prevention noted in the literature include following best practices based on routine activity theory, using antitheft devices, participation in voluntary vehicle monitoring initiatives, public awareness campaigns, and legislation.

Background and Strategies: Vehicle manufacturers traditionally attempted to prevent MVT by making vehicles more difficult to break into (windows, locking doors) and installing analogue antitheft devices. The most common antitheft device is the steering column lock. This device locks the steering wheel if someone attempts to turn the wheels without a key in the ignition making it harder to move or steal the vehicle. Germany introduced regulations requiring manufacturers to include steering column locks in the early 1960s. The U.K. and U.S. followed suit in the early 1970s. MVT in all three countries either declined or stabilized after regulations were introduced and rates of MVT stayed low over a sustained period. Germany was the only country that required the timely installation of steering column locks on all vehicles, and they had a sharp decline in MVT. In the U.K. and U.S. regulations only required new vehicles to come equipped with steering column locks. Rates in these two countries stabilized rather than declining. MVT dropped for new vehicles with locks in both countries but was displaced to older vehicles without antitheft devices and motorcycles. This is the only regulation requiring manufacturers to install a specific antitheft device that has passed in the U.S. Comparing results of the widespread addition of antitheft devices with two other countries provides a unique opportunity to assess how mass rollout of antitheft devices can impact rates of MVT. There is strong evidence these types of regulations reduce MVT, especially when regulations require all vehicles to comply in a short amount of time as was the case in Germany. Continuously introducing new regulations requiring the auto industry to include antitheft devices could lead to a reduction in MVT. (Webb, 1994)

Between 2010 and 2012 Connecticut raised the age to automatically prosecute offenders as adults from 16 to 18. Property and violent crime decreased, but MVT increased. Critics say the change in legislation was to blame, claiming teenagers were responsible for the spike in MVT. However, by 2016 the number of juveniles admitted to youth prison was down 69% from 2012. The rise in MVT mirrored nationwide trends and was likely due to the fact cars became easier to steal (Circo & Scranton, 2020). Similarly, as seen in the section on ages of offenders in Portland, most people arrested or cited for stealing vehicles were adults.

A study in Ohio showed deploying law enforcement with license plate readers resulted in a higher number of detected stolen vehicles. This was true both in and out of hot spots, but the occurrence of MVT was higher within large hot spot areas resulting in more detected stolen vehicles (Koper, 2019). Police in Vallejo, CA identified a shopping mall as a MVT hot spot and conducted a sting for one month over the 2017 holiday season. They utilized various tactics such as blinking lights, checking registrations, and patrolling the parking lot. Compared to

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2016 over the same period there was 40% less MVT. This was especially noteworthy because overall MVT was higher in 2017 compared to 2016 (Potts, 2019). Hot spot detection and use of targeted patrols can help reduce MVT.

Routine Activities & Environmental Design: According to routine activity theory, for crime to occur there needs to be a suitable target, a likely offender, and a lack of capable guardians. Guardians can be property owners who take measures to prevent theft, or they can be bystanders willing to step in to stop the commission of a crime. The routine activity of vehicle owners, such as locking their doors, not leaving keys in the ignition, and parking in well-lit areas can reduce the availability of suitable targets and help reduce MVT (Copes, 1999).

A survey of MVT at 265 U.S. shopping malls found MVT required a lack of guardians and motivated offenders, as expected. The availability of suitable targets, the average number of cars visiting the mall each day, did not have an impact on MVT. The authors rationalized although a very full, busy parking lot results in a higher count of potential targets, the number of people in the parking lot would also be much higher. They concluded the increased presence of capable guardians negated the increased number of suitable targets and served as a deterrent. Offenders are less likely to attempt to steal a vehicle in high traffic areas where detection is more likely (Hollinger & Dabney, 1999).

Unmanned parking lots are the riskiest places to park. Exit barriers and parking lot attendants can help reduce MVT. Encouraging vendors to operate near parking lots can make vehicles in that location less appealing because of the increased activity on the street and presence of guardians. Well-lit areas with regular activity on the street, monitoring systems such as cameras, street level windows that allow easy visibility of the street, and removing shrubs and other areas for criminals to hide behind can all help reduce MVT (Tilley, 2013). At home, parking in a driveway or locked garage is the best way to prevent MVT. If a driveway or garage are not available, parking in well-lit areas directly in front of homes and installing motion activated flood lights might deter potential offenders (“Car theft prevention,” 2017).

Target Hardening and Deterrence: According to the NHTSA, about half of vehicle thefts in 2020 were due to driver error. This includes things such as leaving keys in the vehicle, leaving windows open, leaving doors unlocked, and leaving valuables in the vehicle. Common sense measures are the easiest way to prevent MVT. The NHTSA suggests audible and visible theft deterrent devices, immobilizing devices, and vehicle recovery systems. Loud audio devices deter theft by bringing attention to the vehicle. Visual devices such as blinking lights, etching the VIN onto the windows, and decals deter would be offenders. Immobilizing devices prevent unauthorized users from starting the vehicle. Vehicle recovery systems, such as GPS systems, help to locate stolen vehicles (“Vehicle theft,” 2023).

The National Insurance Crime Bureau suggests four layers of protection to prevent MVT. Layer one consists of common-sense steps to eliminating driver error as discussed by the NHTSA above. Layer two consists of warning and deterrent devices such as steering wheel locks like “The Club,” brake pedal locks, wheel locks or “boots,” tire locks, theft deterrent decals, audible alarms, identification markers, laminated glass, and window etching. Laminated glass is an

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impact resistant glaze that makes it harder to break the glass. Window etching is marking the VIN number on the vehicle's windows which makes it difficult to resell. The third layer of protection is immobilizing devices such as smart keys, fuse cut-offs, and kill switches. Finally, the fourth layer is tracking devices to help law enforcement locate a vehicle should it be stolen ("Anti-Theft Devices," 2023).

There are several models of GPS trackers available, allowing owners to track the location of their vehicles in real time. Different models have the ability to send various alerts to the owner via an app such as when a vehicle is driven during certain hours, if erratic driving is detected, if the vehicle leaves a certain geographic area (geofencing), or if the vehicle is speeding (Paul, 2023). Some systems allow owners to immobilize their vehicle remotely by gradually cutting off the fuel supply or disabling the ignition. Two major brands with remote immobilization features were shown to be vulnerable to attack by hackers. Researchers demonstrated it was possible for potential thieves to access user accounts undetected and even take over the user account, locking the owner of the vehicle out of the app. This allowed them to track the vehicle in real time, control alarms on the vehicle, start and stop the engine, and listen in on vehicle owners' conversations in models equipped with a microphone intended for making SOS calls. Researchers informed the companies of the vulnerabilities, and they were fixed, but these types of systems have continued vulnerability. Vehicle owners and law enforcement should be aware this type of technology has the potential to make motorists less safe (Munro, 2019).

Campaigns: Law enforcement across the U.S. have tried various campaigns to curb MVT. The Watch Your Car (WYC) initiative allows vehicle owners in participating jurisdictions to put a sticker on their car indicating they give permission for law enforcement to pull them over without cause to check owner status if they are driving through certain high crime areas during certain hours. Participating agencies initially thought it was an innovative idea because they thought it would be deployed nationwide, enabling communication between agencies. In practice each state had to develop their databases without instruction on database development, program implementation, or specific goals or benchmarks. It was difficult to collect program efficiency data because agencies either did not prioritize the program or could not afford to do so. When surveyed, non-participating agencies indicated they thought the idea would be good in theory but chose not to participate citing concerns about lack of a national database and expense to implement the program. Some agencies indicated a lack of interest, or a lack of funding were reasons they did not participate in the program (Curtin et al., 2005).

Public awareness campaigns have had better success, sometimes accidentally. A huge public awareness campaign was undertaken by police in Queensland, Australia. The main focus of the campaign was encouraging vehicle owners to register VIN etching so law enforcement could more easily identify stolen vehicles. Following the campaign rates of MVT lowered drastically despite no significant change in owner behavior. Those conducting the study reasoned the drop in MVT was due to an increased perception of risk by would be MVT offenders (Wortley et al., 1998).

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Portland: The city of Portland issued a guide informing residents how to avoid MVT. The guide suggests many of the same measures recommended by the NHTSA such as: do not leave idling vehicles unattended, do not leave keys or valuables in the vehicle, lock all doors, roll up all windows, park in a well-lit area, and activate security systems if available. The guide recommends after-market security measures such as steering wheel locks, GPS tracking systems, steering column locks, immobilizers, and audible alarm systems. Furthermore, the guide recommends reporting any suspicious activity to law enforcement (“Car theft prevention,” 2017).

The PPB’s East Precinct recently launched a pilot program conducting Stolen Vehicle Operations (SVOs). Officers collect and analyze information about stolen vehicles to formulate a checklist to identify potentially stolen vehicles. Their goal is, “Fewer stops, better results.” Officers partnered with researchers at Oregon Health and Science Institute to ensure items on the developing checklist are data driven. According to PPB, prior to initiating the program one in 30 vehicles pulled over was an occupied stolen vehicle. Since the implementation of the program that number has gone down to one in six (Portland Police Public Information Office, 2023). This is a new program, and more data is needed to gauge its efficacy.

Conclusion

Data shows MVT in Portland is most likely to occur in neighborhoods with a high Social Vulnerability Index, low income, and poverty. The high rate of vehicle recovery vs low rate of arrest or citation implies offenders are often stealing vehicles for joyriding or transportation purposes rather than for profit. That said, with so few vehicle thefts resulting in arrest or citation there is no clear data to indicate a particular motivation or type of offender. The hot spot maps show clearly defined areas where MVT occurs, mainly along the I5 corridor. Focusing on problem areas might reduce MVT. Targeting hot spots might be a good place to test MVT prevention techniques.

Because of limited data the approach to combatting MVT needs to be holistic. Increasing security on the vehicle itself would reduce MVT on the micro level, environmental design such as parking lot design and adequate lighting might reduce MVT on the meso level, and improving interagency data sharing and increasing antitheft device regulations can prevent MVT on the macro level (Tilley, 2013).

Public awareness campaigns can help get necessary information to vehicle owners so they can better protect their property and know what to do should their vehicle get stolen. Campaigns might also act as an unintentional deterrent. For such a prolific problem crime both nation-wide and in Portland there is shockingly little research surrounding MVT. Data driven traffic stops have the potential to lead to a more robust data set that can be used to identify potential offenders and motivations for MVT more clearly, allowing for further research on those topics. Although low arrest or citation rates make it difficult to identify who is stealing vehicles in Portland and why, there is much room for further research surrounding the effectiveness of various methods MVT preventative measures.

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