



Geospatial Analysis of Drug-Related Crimes in Local Communities in Utah

ERIN CRUMP

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Research Motivation

GLOBAL – 2021 WORLD DRUG REPORT

- 275 million people used drugs worldwide
- 36 million people suffered from drug use disorders
- Social impacts of Pandemic have increased usage

LOCAL – LCPD 2020 INTERNAL REPORT

- Top Adult Arrests
 - 1) Failure to Appear Warrants
 - 2) Possession of Drug Paraphernalia
 - 3) Possession of Marijuana
- Crime Trends Year - to - Year
 - 24.3% increase in Marijuana from 2019

Objective

- Find Patterns in Data Through Clustering
- Visualize Those Patterns
- Characterize Each Cluster
- Provide Insights to Help the Community

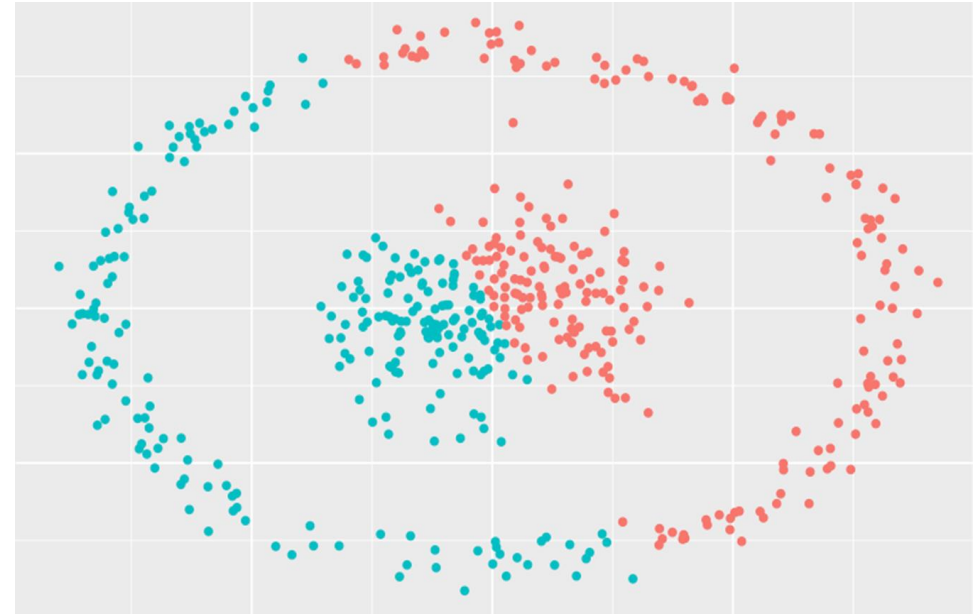
Methodology

Cluster Analysis

DBSCAN



K-MEANS

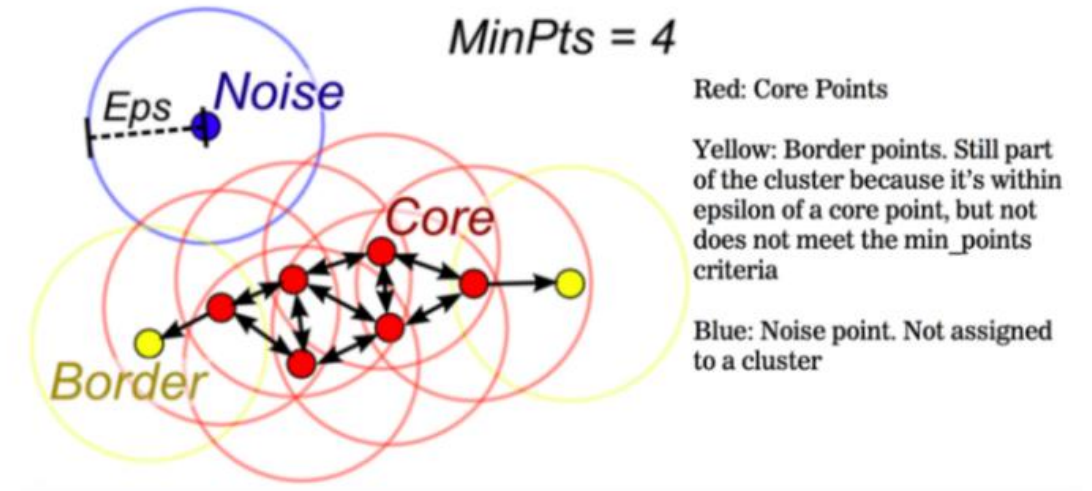


Results are computed along Table (across).

```
STR(SCRIPT_REAL("
import numpy as np
from sklearn.cluster import DBSCAN
from sklearn.preprocessing import StandardScaler

x = np.column_stack([_arg1, _arg2])
X = StandardScaler().fit_transform(x)
db = DBSCAN(eps = 0.15, min_samples = 5).fit(X)

return db.labels_.tolist()
",
AVG([Longitude]), AVG([Latitude])
))|
```



DBSCAN



1,000

Analysis

Data Set & Preprocessing

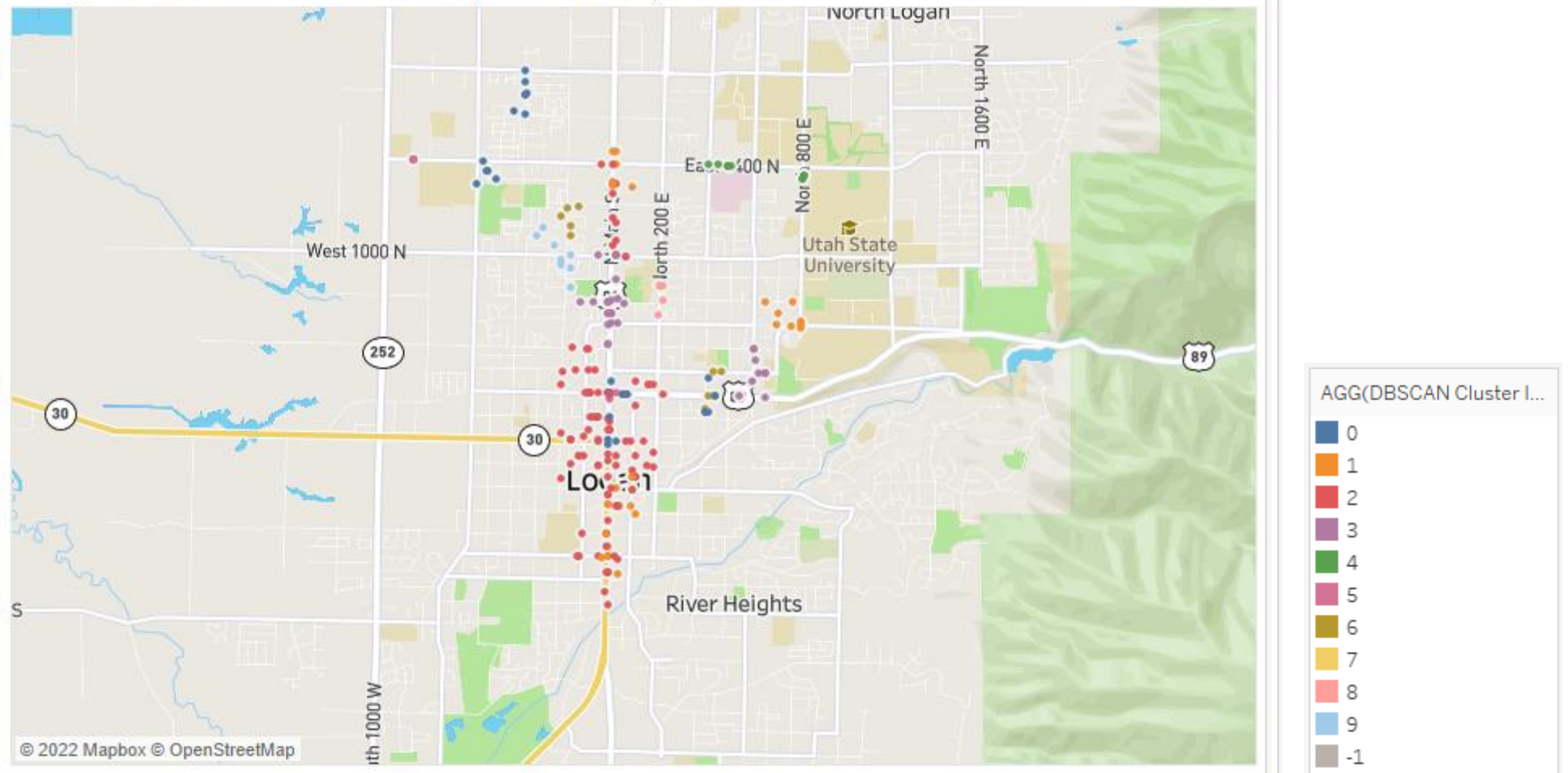
- Limitations of finding high-quality data
- Utah.gov Open Data Catalog
 - Logan City Police Crime Data
- 15 k rows of incident data with
 - Case Number
 - City
 - Longitude and Latitude
 - (Parent) Incident Type



© 2022 Mapbox © OpenStreetMap

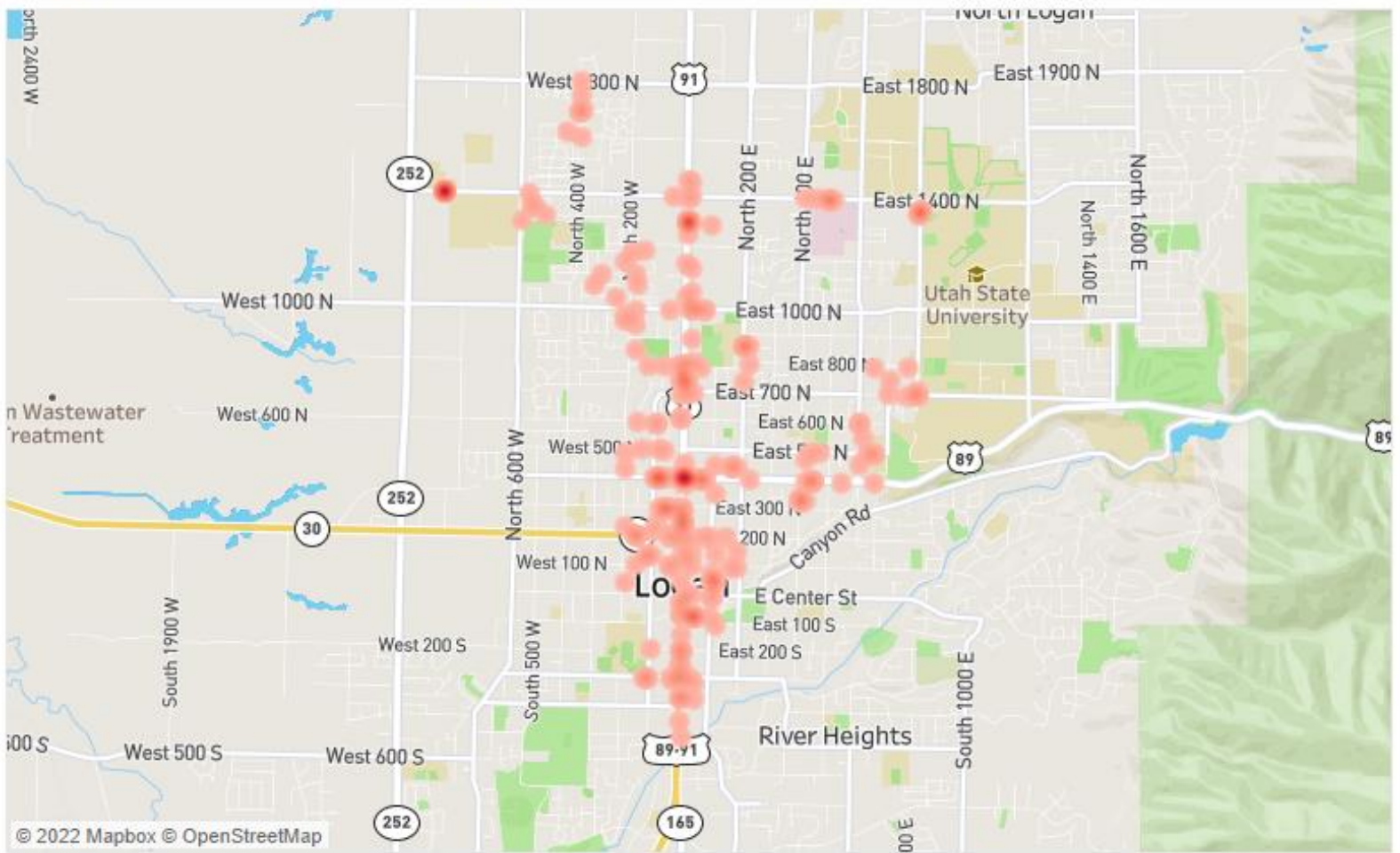


Drug Crime DBSCAN Clusters (No Outliers)

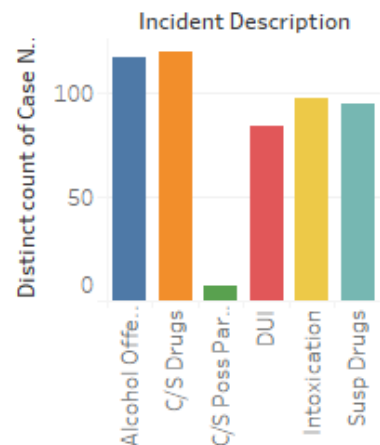


Drug Crime DBSCAN Density

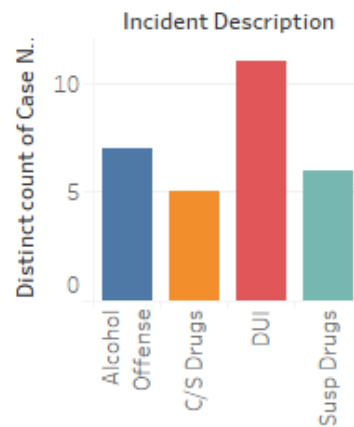
This map displays the density of drug crimes in Logan, Utah, using DBSCAN clustering. The density is represented by red circles, with larger circles indicating higher concentrations. The map shows a high density of drug crimes in the central urban area, particularly around the intersection of I-15 and I-89, and along the I-15 corridor. The density decreases as one moves away from the center, with some isolated points in the western and southern parts of the city. The map also shows major roads, landmarks like Utah State University, and surrounding areas like River Heights.



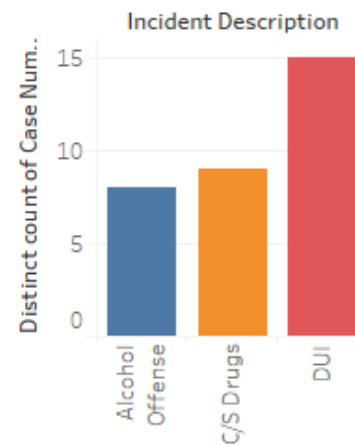
Outliers



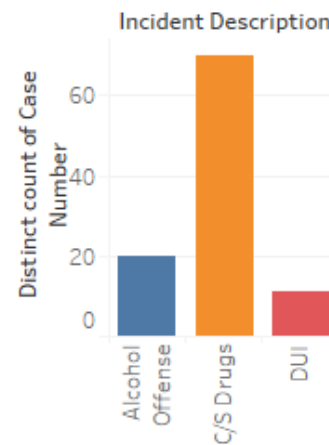
Cluster 0



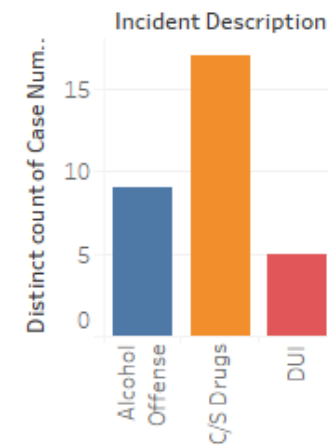
Cluster 1



Cluster 2



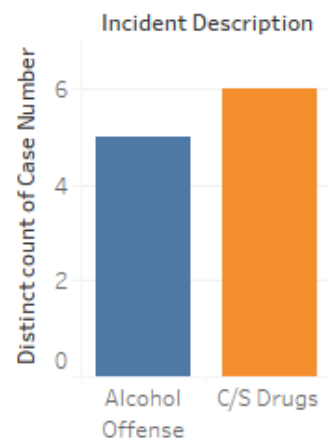
Cluster 3



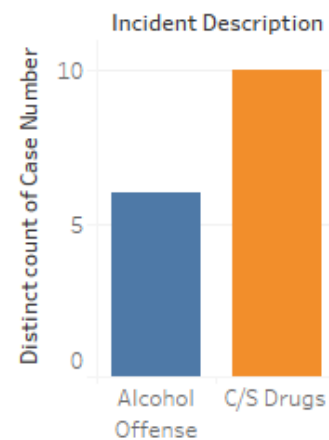
Incident Description



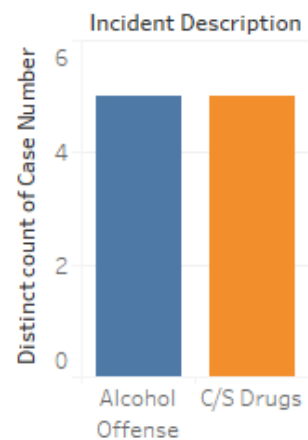
Cluster 4



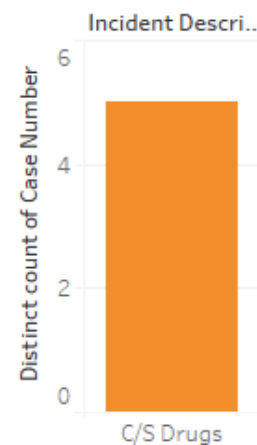
Cluster 5



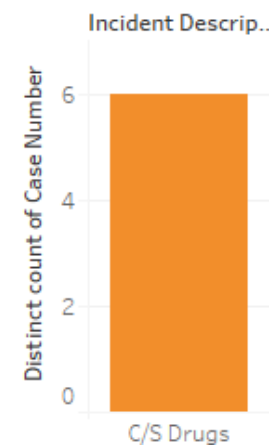
Cluster 6



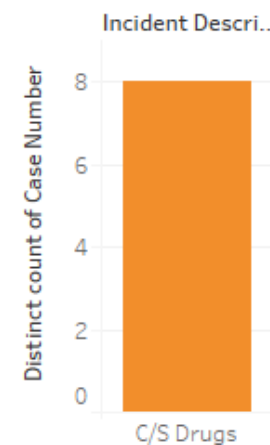
Cluster 7



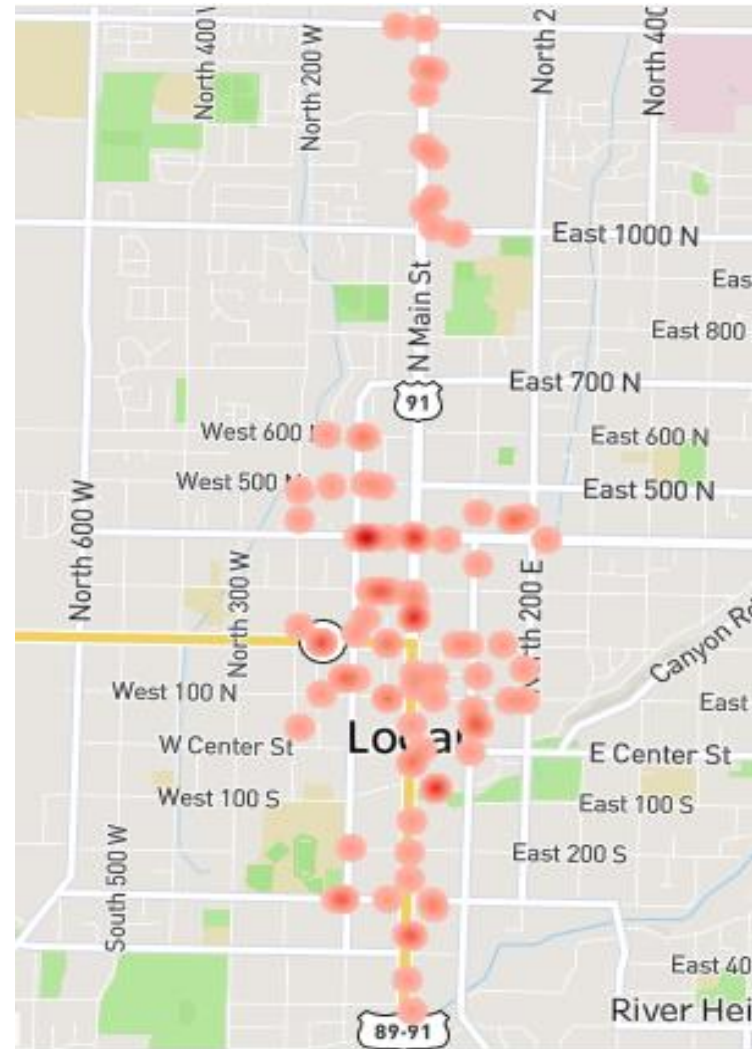
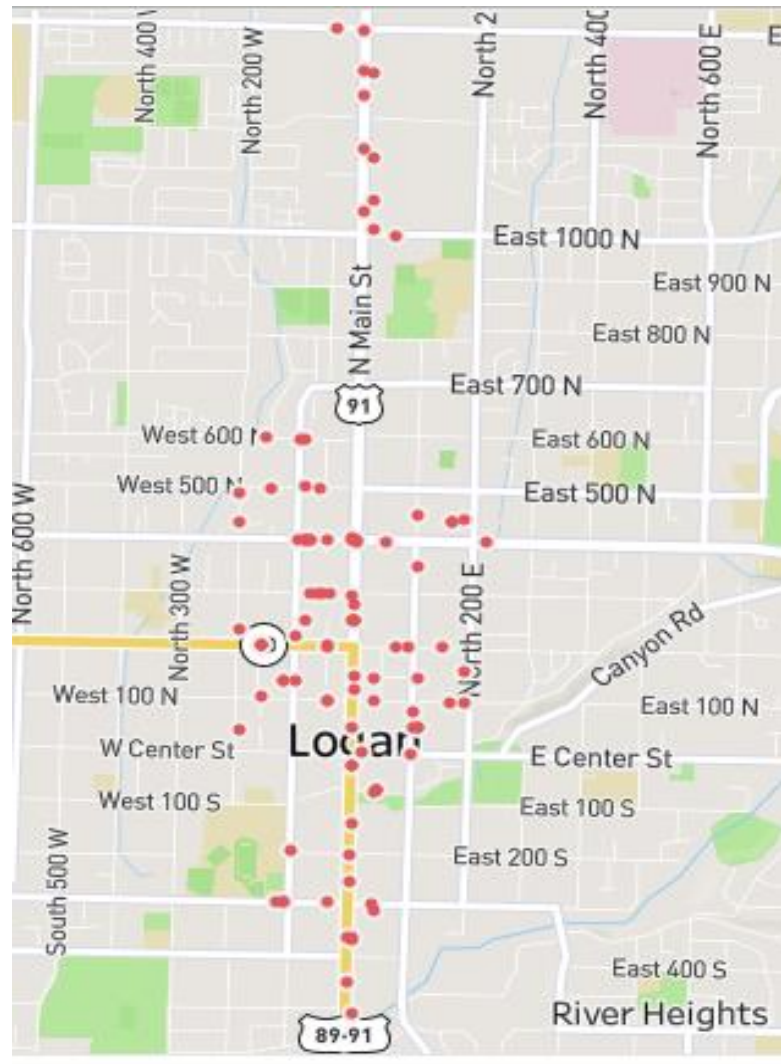
Cluster 8



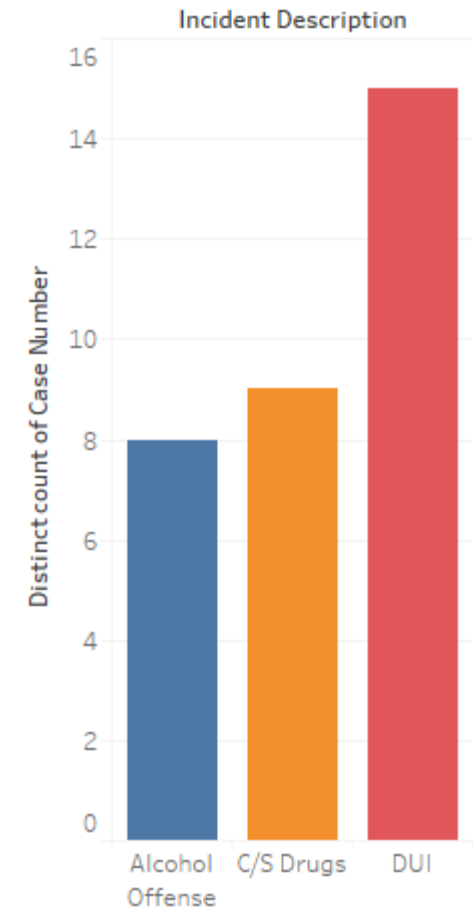
Cluster 9

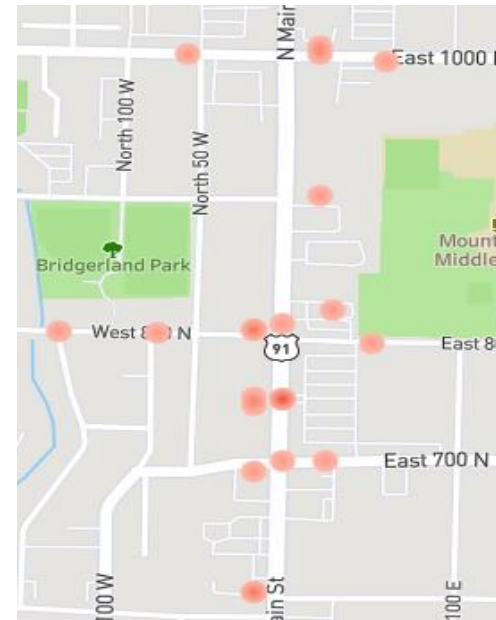
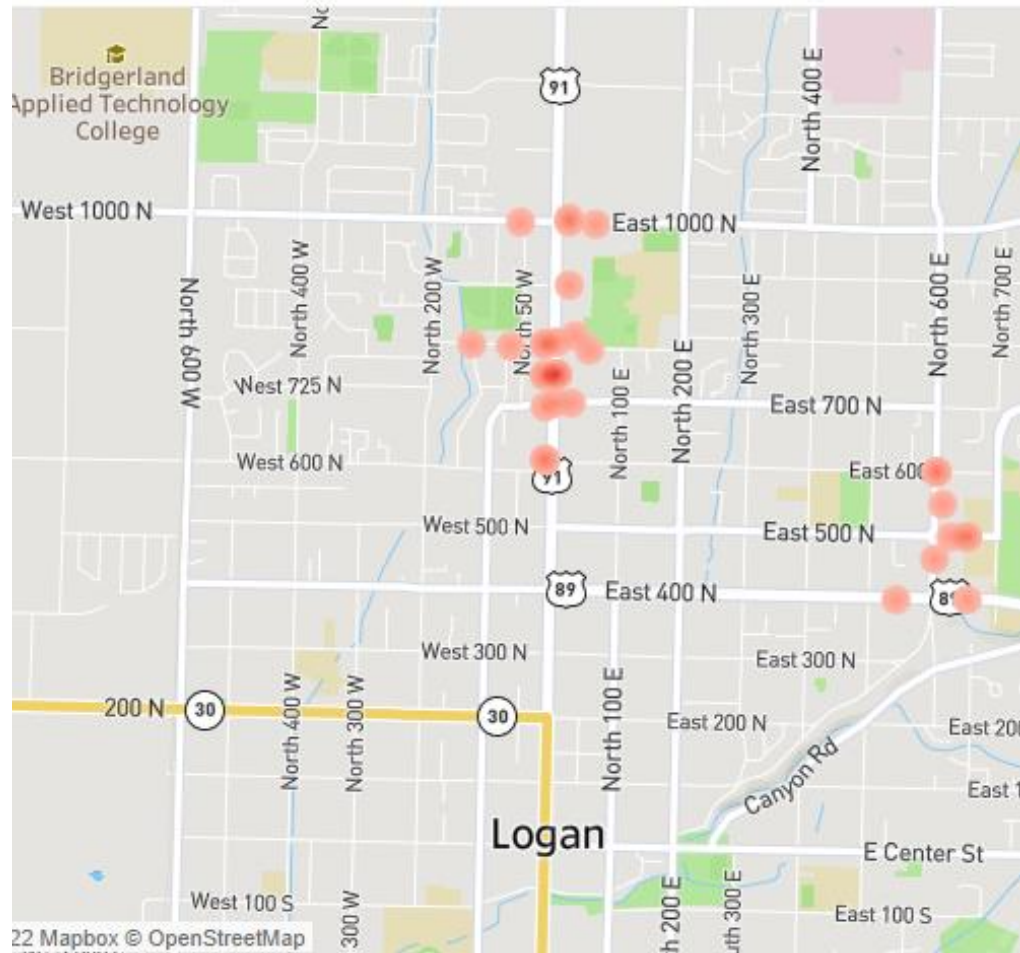


Drug Crime DBSCAN Cluster 1

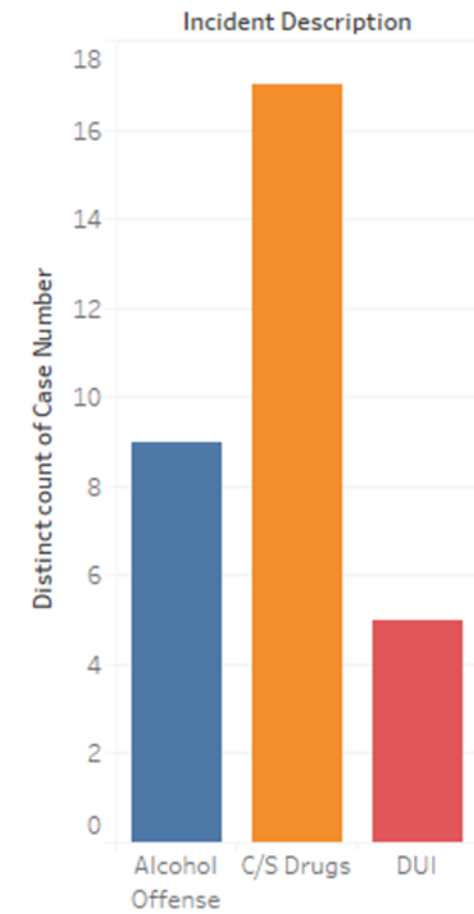


Cluster 1

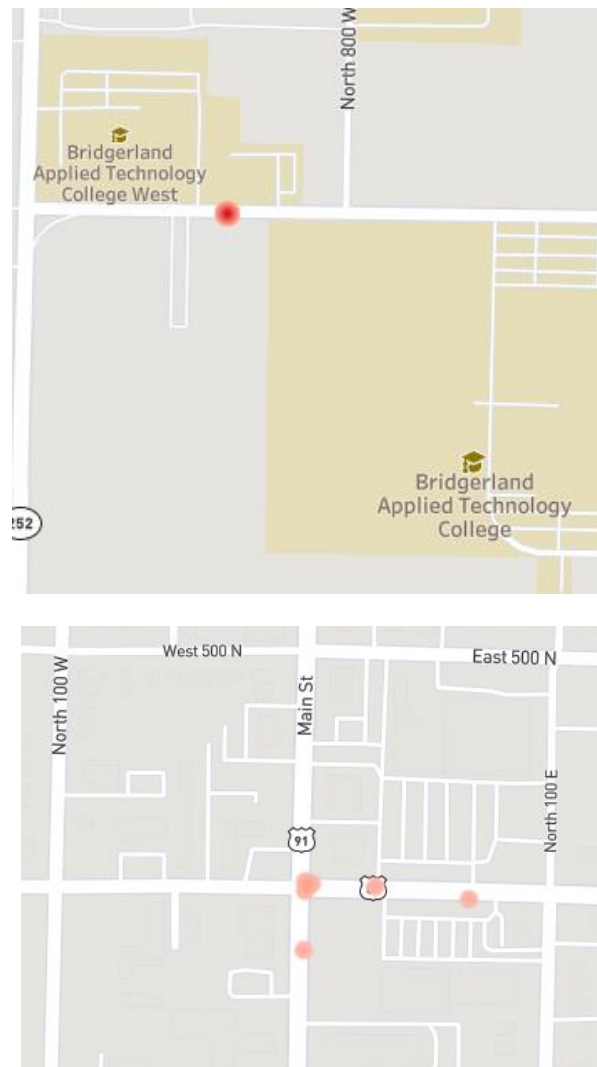
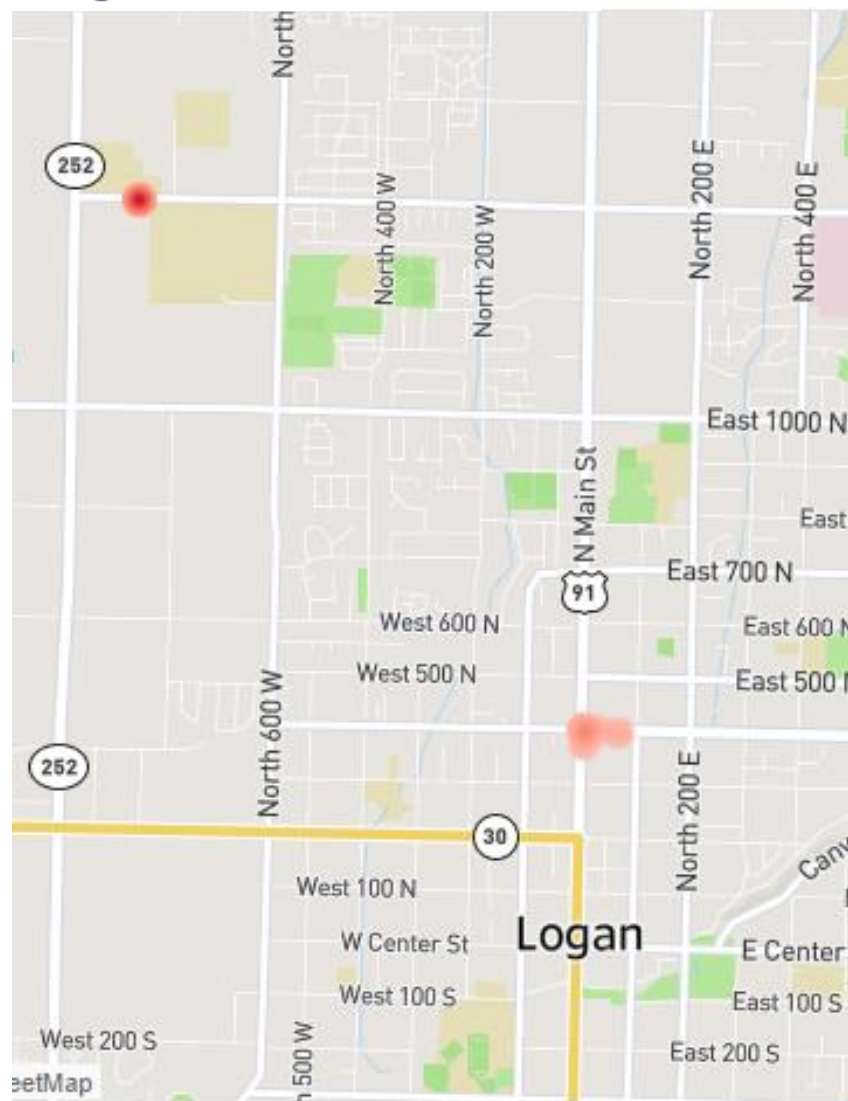




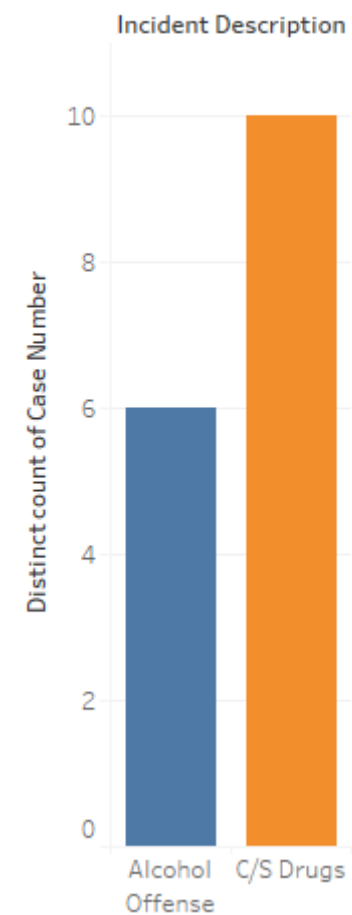
Cluster 3



Drug Crime DBSCAN Cluster 5



Cluster 5



Drug Crime Areas of Interest

Logan City's Main Street

- Between 500 N and 100 S with a buffer of 2 blocks out from Main
- Along Highway 89 (400 N)

Schools

- Adams Elementary School
- Mount Logan Middle School
- Bridgeland Technical School

Public Parks

- Bridgerland Park
- Adams Park (Next to Adams Elementary School))

Specific Neighborhoods

- Oakridge Student Apartments
- Student Housing West of the Aggie Recreation Center
- 1900 South 1100 West Block
- 1600 N to 1800 N along 400 W
- Apartment south of Sam's Club (3 blocks)



Question?

Citations

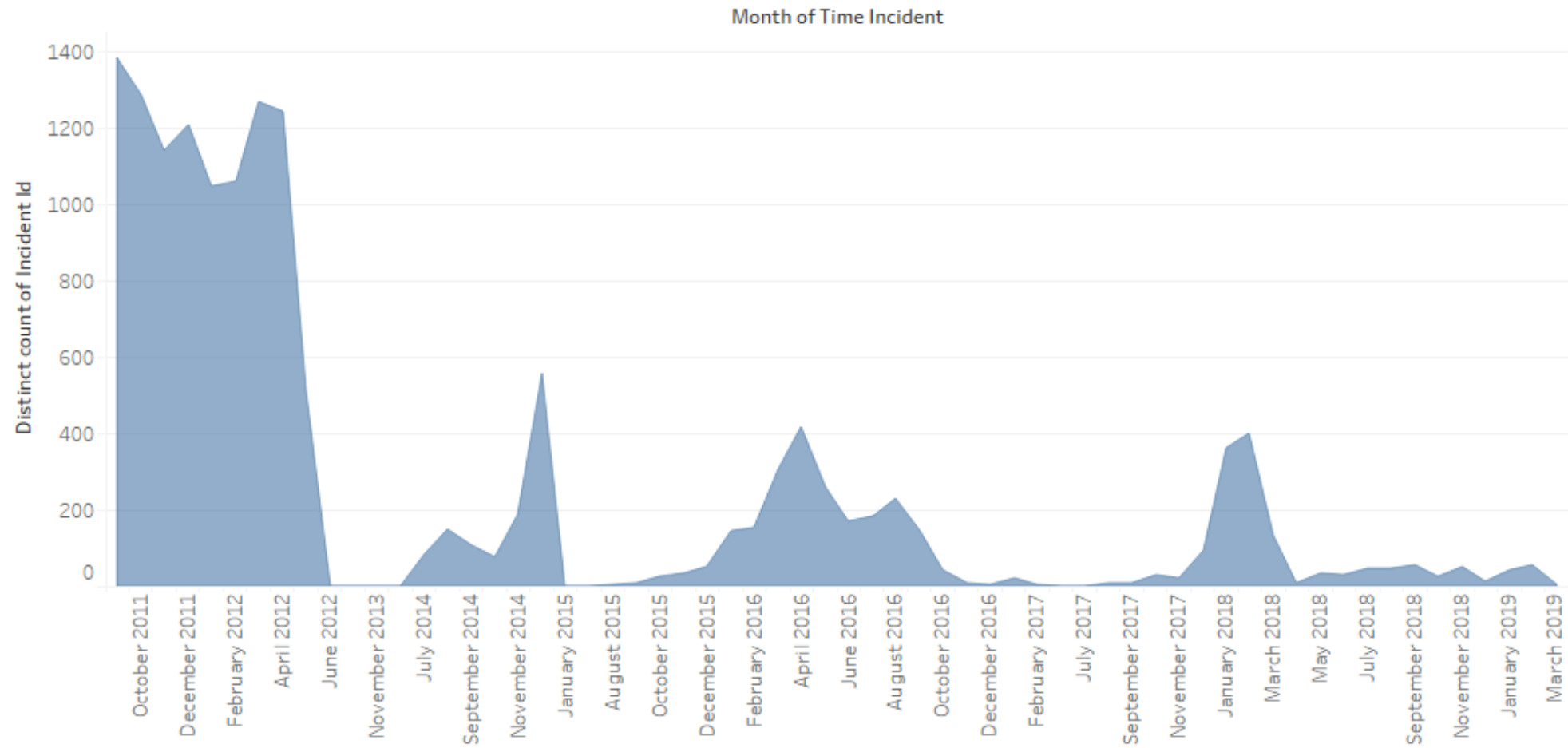
- Luisi Legal Group. (n.d.). Chicago Drugs Crime Defense Attorneys. Chicago Criminal Defense Lawyer. photograph. Retrieved March 14, 2022, from <https://www.chicagocriminaldefenselawyer.net/drug-crimes>.
- UNODC World Drug Report 2021: Pandemic effects ramp up drug risks, as youth underestimate cannabis dangers. United Nations : Office on Drugs and Crime. (2021, June 24). Retrieved March 14, 2022, from https://www.unodc.org/unodc/press/releases/2021/June/unodc-world-drug-report-2021_-pandemic-effects-ramp-up-drug-risks--as-youth-underestimate-cannabis-dangers.html
- Kasiarunachalam. (2007). Wikipedia Commons. photograph, Wikipedia. Retrieved March 14, 2022, from <https://upload.wikimedia.org/wikipedia/commons/a/a8/Logan-Canyon.JPG>.
- Utah Open Data Portal Kung-Fu Master. (2019). Logan City Police Crime Data. [Data set]. Utah.gov Open Data Catalog. Retrieved October 6, 2021, from <https://opendata.utah.gov/dataset/Logan-City-Police-Crime-Data/inki-w62p>



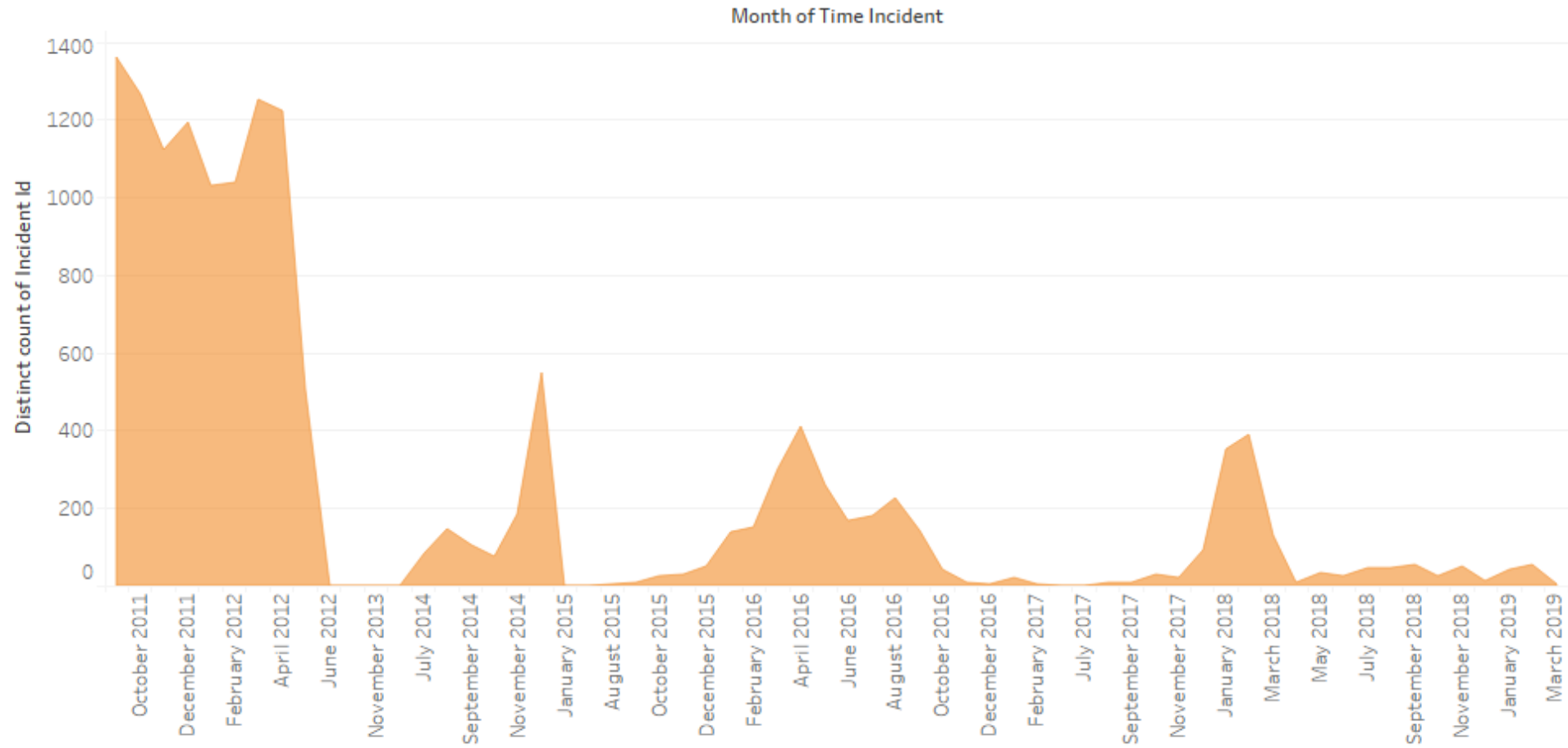
Local Drug Problem

- 2020 Internal LCPD Report:
 - Top Adult Arrests
 - 1) Failure to Appear Warrants
 - 2) Possession of Drug Paraphernalia
 - 3) Possession of Marijuana
 - Cache/ Rich Drug Task Force
 - 1) Prescriptions 22.4 %
 - 2) Marijuana 22.1 %
 - 3) Paraphernalia 19.1 %
 - Crime Trends Year - to - Year
 - 24.3% increase in Marijuana from 2019

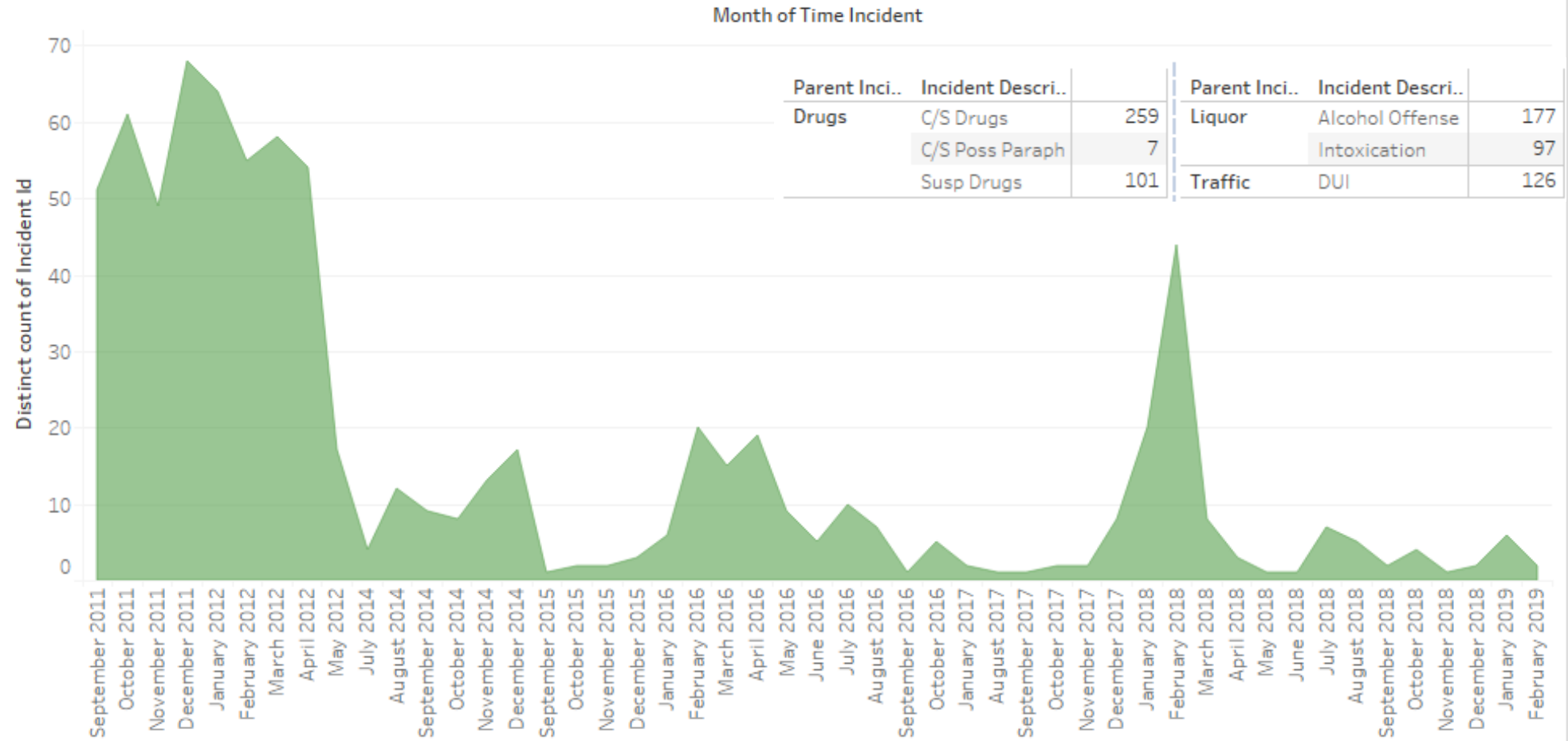
Dataset Incident Count



Logan Incident Count



Logan Drug Incident Count



Incident Count by External Cities

