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Executive Summary:

Illegal Marijuana and Drug-Related Violent Crime in North Texas

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Introduction

Across the nation, states are increasingly passing legislation that allows for state-approved cannabis/marijuana[1] (i.e., medicinal or recreational) in their jurisdictions. The implications of such policies are a topic of interest for academics, policymakers, and criminal justice officials. In areas without such legislation, law enforcement officials expect a fundamental change in both supply and demand aspects of local marijuana markets. Indeed, anecdotal evidence in North Texas suggests that these legislative changes in other states produced an increased supply of cannabis into the local market as vendors from these states and/or individuals who visit out-of-state vendors utilized diverse strategies to mail or transport marijuana into areas where there was growing demand for it. Furthermore, due to the high volume of interdicted cannabis parcels, law enforcement officials also believe that the anonymous "Dark Web" is being utilized to fuel cannabis sales and the distribution of cannabis products through the mail. In addition to these changes in market dynamics, law enforcement officials also express concerns regarding the influx of cannabis products into the region and their association with local crime, particularly violent crime.

With these issues in mind, this study examined illegal marijuana markets and drug-related violent crime in Tarrant County, a northern region of Texas (including Fort Worth), and proximate to Colorado and the U.S. Southwest Border. Researchers in the School of Criminology, Criminal Justice, and Public Administration at Tarleton State University collaborated with the Tarrant County Sheriff's Office (TCSO), the Tarrant County Combined Narcotics Enforcement Team (CNET), and the United States Postal Inspection Service (USPIS). The study addressed four research questions:

1. What are the trends and patterns related to the illegal marijuana market in North Texas?
2. How has state-approved marijuana in other proximate states affected the illegal marijuana market in North Texas?

[1] The research team recognizes there are numerous forms of cannabis. The report uses cannabis and marijuana interchangeably. Study data included all forms of illegal cannabis in our analyses.

3. Is there a relationship between illegal marijuana and violent crime in North Texas?
4. What role does the Dark Web play in facilitating the illegal marijuana market in North Texas and beyond?

The subsequent sections of this executive summary describe the study methodology, highlight results, and offer recommendations.

Methodology

The study used a mixed-methods research design to obtain information about marijuana market dynamics and to explore any potential relationship between illegal marijuana and violent crime. The following subsections highlight information about the study setting, data sources and structure, and data collection procedures. Readers interested in additional methodological details should refer to the study's final report.

Study Setting

This study examined illegal marijuana markets and drug-related violent crime in Tarrant County, a northern region of Texas, and proximate to Colorado and the U.S. Southwest Border. The study setting included locations where the TCSO responds to calls for service and did not include crime incident data from the 41 incorporated areas within Tarrant County that have their own respective police agencies (e.g., Fort Worth, Arlington, Grand Prairie). In other words, crime data in this study only reflect calls for service where an incident report was taken by TCSO personnel, most of which occurred in unincorporated areas of Tarrant County.

Quantitative and Qualitative Data Sources and Data Structure

The study draws from multiple sources of data that include: (1) information extracted from the Tarrant County's Combined Narcotics Enforcement Team (CNET) investigative casefiles; (2) incident data obtained from the Tarrant County Sheriff's Office (TCSO) on violent crime and cannabis crime; (3) interdicted cannabis parcel data bound to Tarrant County received from the United States Postal Inspection Service (USPIS); (4) demographic data collected at the census block and zip code level from

the U.S. Census Bureau and other open sources; (5) cannabis licensee data from top source states for cannabis parcels bound to Tarrant County); (6) survey data from inmates at the Tarrant County Jail; (7) interview data from inmates at the Tarrant County Jail; and (8) cannabis listing and marketplace data extracted from several Dark Web websites. These data sources and data collection procedures will be discussed in the subsequent subsections. Quantitative data was analyzed using an array of spatial and multivariate analytic strategies (e.g., OLS Regression, Logistic Regression, Negative Binomial Regression, Hierarchical Linear Modeling) and Risk Terrain Modeling (see final report for further explanation and details).

1. CNET Investigative Case File Data

Researchers collected cannabis-related incident data from CNETS's investigative case files from October 1, 2018 through December 31, 2020. Study data was collected by manually reviewing case files at CNET. De-identified data were collected from 344 cases involving 394 unique suspects. All data was entered into MS Excel, and then converted to an Access relational database for queries and analysis. The Access database contains data fields ranging from suspect characteristics (race, age, sex, previous violent crime history), location characteristics, types of seized drugs, drug weights, and general characteristics of the investigation (offenses, weapons). Violent crimes were operationalized as: Murder, Robbery, Assault, and Sexual Assault. Cannabis offenses were operationalized by grouping offenders under the Health and Safety Code 481.121 (b) (3)(4),(5)(6)[2]; and any offenses under Health and Safety Code 481.112 Penalty Group 1[3] together to constitute "intent to distribute" versus possession cases.

2. Tarrant County Sheriff's Office (TCSO) Incident Data

Information Technology (IT) personnel at TCSO provided incident-based data on violent and cannabis-related offenses for 891 unique suspects between January 1, 2018, and December 31, 2020 in

[2] These charges include possession of large amounts: more than 4 oz bit less than 5 pounds (subsection 3); more than 5 pounds, but less than 50 pounds (subsection 4), more than 50 pounds, but less than 2,000 (subsection 5), and possession of more than more than 2,000 pounds (subsection 6).
[3] This includes offences of Manufacture or Delivery of Substance In Penalty Group 1a

de-identified Excel files.[4] TSCO incident data includes only those areas where TCSO responds to calls for service (CFS), including unincorporated areas of Tarrant County. Violent crime incidents were coded into two categories of violent crime: (1) violent crime and (2) a broader category to include all assaultive crimes.[5] Violent specific crimes included: murder and nonnegligent manslaughter, robbery, and simple and aggravated assault.[6] The broader assaultive crime variable included the specified violent crimes and was also expanded to include crimes with any possibility of the threat of violence. We included simple assault in the category of violent crimes to increase our sample size, even though it is not technically considered a violent crime by the UCR. Cannabis-related incidents were categorized based on Tex. Health & Safety Code Ann. § 481.121 (West 2019).

3. United States Postal Inspection Service (USPIS) Data on Interdicted Cannabis Parcels Bound to Tarrant County

The USPIS Contraband Interdiction and Investigations Unit (USPIS) provided data about interdicted mail parcels that met two criteria: (1) the parcel contained cannabis, and (2) the parcel was bound to a Tarrant County zip code during the study timeframe January 1, 2018 to December 31, 2020. The USPIS data included the zip code plus level (i.e., the 9-digit zip code) and did not include an exact address. To facilitate spatial analysis, addresses associated with each zip code plus were obtained by researchers using a public website (i.e., Melissa.com) that converts nine-digit zip codes and produces an approximation of an address group (e.g., an entire apartment building might share the same plus four zip code). This required researchers to manually look up 1,084 zip codes to obtain more precise locations.[7] From these approximated locations, unique addresses were obtained to constitute "receivers" and

[4] The timeframe of this data January 1, 2018-December 31, 2020 exceeds what was required in the original grant proposal, which was October 1, 2018-June 2020.
[5] The inclusion of a broader conceptualization of violent crime represented an enhancement of our analysis but was not required in our grant proposal.
[6] The crime of sexual assault (rape) was excluded from this analysis due to TCSO data restrictions.
[7] Per MOU terms, USPIS data cannot be released to an outside entity, including the NACJD archive. Per advice from NIJ, researchers interested in obtaining similar data will receive a data map directing them to request data directly from USPIS to follow their internal process related to data releases. At no point, was USPIS data released to an outside entity or left the control of Tarleton researchers.

"senders" variables for subsequent multivariate and spatial analyses. Since the data structure assumes potential multiple addresses on both sides of receivers and senders, we created a table that contains all possible combinations for all pairs of addresses. The total number of combinations of addresses for the study period is 13,140.

We emphasize that our results were dependent on information provided on the parcel, and it is likely that those sending cannabis packages used return addresses that did not reflect their exact location or even the correct zip code, though the state of origin is more reliable. Nonetheless, specific results concerning the location of senders must be interpreted with extreme caution.

Several additional variables were obtained and analyzed from USPIS. These include: parcel weight, cannabis weight, and shipping class. These variables were operationalized in the following ways. Shipping class included 1st class, priority mail, and express mail. Shipping classes vary in delivery speed, and price with express mail being the fastest (next day delivery), priority mail being the second fastest (1-3 business days), first class being third fastest (1-5 business days) and media mail being the slowest shipping rates (2-8 business days).[8] We also used official data from the USPS website to rank shipping classes by speed for our analysis. The weight of cannabis (cannabis) was measured in grams, and the weight of parcels (total) was also measured in grams.

4. Demographic and Other Open-Source Data

Several variables were included in the study as socio-demographic controls. Data on education, unemployment, poverty, single-parent households, and the racial composition of census block groups in Tarrant County were obtained by using data downloaded from the U. S. Census Bureau website.[9] All socio-demographic data were collected from the American Community Survey (5-year estimates of geodatabase format records as of 2018) to maintain the temporal consistency with the crime data used in this study. This data has been used in all spatial regressions and block group analysis. Using census block

[8] See USPS website for more description at https://www.usps.com/ship/mail-shipping-services.htm
[9] https://www.census.gov/data.html

data, we assigned the values of demographic factors to blocks nested within the block group. These factors include the population with less than a high school education (Education), the population over 16 years of age who were unemployed (Unemployment), the number of single-parent households with children (Single-parent household), and the number of households below poverty (Poverty).

Because some of our analyses involved the use of zip code data from USPIS and the fact that census blocks cannot be spatially aligned with zip code polygons,[10] the research team manually collected zip code-level demographic data from two external websites.[11] We also manually searched Google Earth Software to locate information about the count of 32 locations for student residencies (dorms), 21 libraries with public internet, 469 liquor stores, 137 tobacco shops, and 258 low-income housing per area cell of Tarrant County. The rationale for using these variables was based on the theory of risky places, which posits that crime emerges in places based on the combined influence of several criminogenic factors. These factors are usually related to increased criminal opportunity, either due to increased supply of potential victims or motivated offenders (Caplan & Kennedy, 2016). For example, according to the National Survey on Drug Use and Health (NSDUH), younger people ages 18 to 25 are more likely to consume marijuana (SAMHSA, 2022), therefore we included the university dorms as potential criminogenic factors of supply for motivated offenders (Aiello, 2020; Lazarow, 2019). We also included traditional criminogenic factors used in many RTM studies of crime concentration such as liquor and tobacco shops and low-income housing (Barnum, Caplan, Kennededy & Piza, 2017; Garnier, Caplan, & Kennedy, 2018; Hall, Walters, Gould, & Lim, 2020; Sytsma, Connealy, & Piza, 2021; Tillyer & Walter, 2019; Torres & Apkarian, 2018; Zhang, Zhao, Ren & Hoover, 2015). Libraries with public Internet were included as libraries are busy and dynamic public spaces with an influx of diverse socio-demographic populations, some of whom are transitory. Furthermore, due to the nature of the crime potentially committed online, it was deemed a location worthwhile to study. The dorms were defined as any

[10] See more discussion of this issue at https://www.census.gov/programs-surveys/geography/guidance/geo-areas/zctas.html
[11] https://zipwho.com/; https://www.unitedstateszipcodes.org/

university dormitories located in Tarrant County. Tobacco and liquor stores were defined as any establishments licensed to sell tobacco and alcohol products in Tarrant County. Low-income housing was defined as such when the housing location qualified for low-income housing according to the Housing Assistance Office of Tarrant County.[12] Public libraries were defined as any library that was open to the public in Tarrant County and had Internet service on its website. Once located, the data was examined and keyed into Excel. The files were geocoded using ArcGIS mapping service, converted into shapefiles, and entered into RTMDx software for analysis. Consult the final report for an explanation of RTM analysis.

5. Cannabis Licensees in Source States and Source State Demographics

Researchers used USPIS interdicted parcel data bound to Tarrant County to determine the top source states for cannabis mailed into Tarrant County. For the study timeframe, these states include California, Colorado, Washington, and Oregon. Next, data for cannabis licensees for each source state were obtained from open data sources published online. For Colorado, only medical cannabis licensing was publicly available at the time of data collection. For Oregon, only retail licensee information was publicly available at the time of data collection.[13] For each licensee/dispensary, the name and zip code were manually entered into an Excel spreadsheet. The location for each licensee was geocoded using ArcGIS mapping services.

6. Inmate Survey

The research team jointly developed the content of the survey instrument in collaboration with partner agencies through informal semi-structured interviews with CNET investigators and USPIS personnel. The purpose of the survey was not to obtain information from inmates regarding the specifics of their current charges but to gather general information about the marijuana market, sources of

[12] See more on Section 8 Housing Choice Voucher Program at https://www.tarrantcounty.com/en/housing-assistance-office.html

[13] For CA see https://cannabis.ca.gov/; for CO see https://codor.mylicense.com/MED_Verification/Search.aspx?facility=Y; for Washington see https://lcb.wa.gov/taxreporting/licensee-list; for Oregon see https://www.oregon.gov/olcc/marijuana/pages/default.aspx

marijuana (locally and from states where marijuana is legal), past experience with marijuana related violent crime, and their awareness and use of the Dark Web. To minimize concerns about self-incrimination, several survey questions asked about "general" knowledge about survey topics (e.g., do "other people who do X") without asking for any personal identifiers. At the beginning of the survey, all respondents were shown a definitional statement that indicated that while the survey references "marijuana," this reference also includes all forms of cannabis. This was also emphasized to participants before beginning the survey.

Due to the COVID-19 pandemic, our ability to survey inmates was delayed for a substantial portion of the project due to the jail being closed to the public and other operational restrictions. Once this aspect of the project was initiated, our access was limited due to general COVID-19 restrictions as well as space and jail staffing challenges. For these reasons, the number of days we had access to the jail and the amount of time we could stay in the facility each day was reduced, resulting in narrow administration timeframes and a smaller sample of participants. Researchers did not have access to information about which inmates were unavailable to participate due to a COVID-19 illness.

The survey was administered at the two largest jail facilities in Tarrant County across a 3-4 day period in May, June, October, and November of 2021. Recruitment for the survey involved designated jail staff who approached specified inmates in their pods or housing units to offer them the opportunity to learn about the possibility of participating in the survey following an IRB-approved script provided by the research team. Those who agreed to learn more were transitioned to the devoted area for survey recruitment and administration, most often a classroom or recreation room. Upon their arrival, potential participants were greeted, and the recruitment script was reviewed once again by the research team. No participation incentives were permitted. For those who expressed interest, the researcher team reviewed informed consent materials, provided time for questions/clarifications, and then asked the inmate to sign (or decline to sign) the consent form. Those who did not wish to participate returned to their housing area. Following the consent process, electronic surveys were administered via tablet computers using Qualtrics in offline mode to prevent unauthorized access to the internet.

During survey recruitment, a substantial number of inmates refused to leave their housing area to learn more about the study with the research team. For those who agreed to meet research staff and learn more about the study, fewer than 35 declined to participate in person. In total, 231 eligible inmates agreed to take the survey out of 803 approached by jail deputies for a response rate of 29%. While not ideal, the challenges of administering a survey in a jail setting amid a global pandemic cannot be overstated, and the fact that we had access and participation is noteworthy.

The survey was administered across several survey waves in 2021 at two of the largest TCSO jail facilities. During each survey wave, researchers met with designated jail personnel from TCSO to access a spreadsheet of the inmate population at each facility to subsequently draw the inmate sample. Our research design indicated we would oversample inmates with marijuana arrests, and thus, all inmates with any type of marijuana arrest were included in the sampling frame. Next, we took a random sample of the remaining jail population, as it is highly likely that many inmates use or abuse marijuana and are aware of local market dynamics even if they were not specifically charged with a marijuana-related offense. Because this research explores a potential link between marijuana and violent crime, it was imperative to survey a diverse array of inmates and offenses.

7. <u>Inmate Interviews</u>

The purpose of the inmate interviews was to obtain additional contextual information regarding survey topics involving the marijuana drug market, the use of the Dark Web, and violent crime. A purposive subsample of inmates was invited to participate in semi-structured interviews during the same week of survey administration. We used the following selection criteria derived from inmate responses to the survey to generate a sample for subsequent in-depth interviews: knowledge of the local marijuana market; familiarity with the diversion of marijuana from states with legal marijuana; and familiarity with the use of the Dark Web. This means that the experiences of these inmates must be interpreted with the caveat that their experiences are different than the average survey participant. This was done by design to allow us to learn more about topics of interest for the study. We also considered inmate sex, race, and

ethnicity to ensure a diverse sample. Sixteen of 18 inmates agreed to participate in the interview for a response rate of 88%.

The recruitment process was identical to the process described above for the survey. We were not permitted to offer participation incentives. Interviews were audio recorded, transcribed, and loaded into NVivo for content analysis to identify linkages between marijuana and crime, specifics of market dynamics, and other emergent topics raised by participating inmates. Following informed consent, inmates were asked if they would be willing to allow a recording of the interview, and 13 of 16 participants agreed to have the interview recorded. Audio recordings were transcribed and loaded into NVivo for content analysis. Many of the identified themes directly correspond to the semi-structured interview instrument, but independent themes also emerged. Two rounds of iterations were completed to improve the reliability of coding.

8. Dark Web Methodology

The Dark Web, or darknet, is a subset of the deepweb to foster hidden marketplaces that sell drugs, weapons, counterfeit money, etc. (Lacson & Jones, 2016). It was not feasible to monitor and conduct a content analysis of the entire Dark Web; however, this study was initially designed to track several websites on a near-weekly basis[14] using several criteria. In brief, the following criteria were desirable for site selection: market share, longevity and popularity, analyzable data, and market technical specifications like the use of escrow and Pretty Good Privacy (PGP) encryption. The sites included in the study were: Cryptonia, Empire Market, Monopoly, and the White House Market.

It should be noted that early in the study, the team sought and gained approval from NIJ to identify and replace sites as needed due to ever-present market fluctuations whereby sites go offline quickly due to Distributed Denial of Service (DDOS) attacks, law enforcement interventions, etc. Indeed,

[14] Weekly monitoring was disrupted throughout the observation period due to issues beyond the control of the researchers. This includes intermittent internet and Tor network connection volatility, disruptions to the markets, and crawler issues. As an example, The Empire Market went offline August 13, 2020.

at various points throughout the study, several originally proposed, and replacement sites went offline, some encountered operational problems during data collection, and access was delayed to some sites due to automated data collection issues with Python programming to export data systematically.[15] Because the market was in constant flux, it was not always possible to identify and replace sites that met all of our initial criteria for inclusion. Table 1 summarizes this discussion.

Table 1. Summary of Dark Web Markets Monitored and Desired Site Selection Criteria

Market	Market Share	Popular	Longevity	Encryption/PGP	Cryptocurrency	Data Availability From Website Fields
Cryptonia	Large	Yes	Short	Yes	Yes	Good
Empire	Large	Yes	Long	Yes	Yes	Fair
Monopoly	Small	Yes	Medium	Yes	Yes	Limited
White House	Large	Yes	Long	Yes	Yes	Good

Given the market volatility issues described above, the four selected markets were observed at different time intervals during the study duration due to the volatility of these sites, inter-market dynamics, and DDOS attacks that rendered sites inoperative, and active law enforcement investigations that resulted in market take downs.

Data from each selected market was collected and analyzed, with the unit of analysis being the individual listing of illicit cannabis, specifically limited to vendors who sold and shipped only in the United States. A listing is defined as an attempt to sell a product or products on a market website. Like any advertisement, one listing can produce numerous sales. The terms listing, listings, advertised product, and advertisements may all be used interchangeably due to variations in terminology from market to market. The same variations happen with the terms sellers and vendors depending on the market. Both terms (seller and vendor) were defined as someone who sells products on a market website, but are used interchangeably.

[15] Automated data collection was programmed in the Python programming language. Due to the nature of user submitted data on cryptomarkets, the scripts did have issues with types of special characters and ASCII symbols.

Listing data was collected, time-stamped, and stored in Excel files for each market using a combination of manual data collection[16] and automated Python applications when feasible. Manual data collection was utilized with the Empire and Cryptonia markets, and automated Python programming was used to systematically scrape and export all site data (e.g., data in fixed or free form fields and listing narratives) and product images for White House and Monopoly. While this process involved automation, it also required a researcher to enter in captcha data at continuous intervals (e.g., every 10-12 minutes) during the data collection process to enable the automated process to occur. Manual data collection involved cutting and pasting market data from existing site fields that consisted of either fixed responses or allowed for free form entry into an Excel spreadsheet, copying narratives listings that contained detailed information about product types, strains, origin, shipping instructions, etc., as well as archiving any product images.

As shown in Table 2, across the four markets, a total of 5,233 listings were collected during the study. Cryptonia was collected from September 6, 2019, to November 20, 2019, when the market went offline November 20, 2019, for a total of 560 listings. Empire was collected from October 1, 2019, to August 20, 2020, when the market shut down on that date and went offline for a total of 390 listings. Monopoly was collected weekly with little interruption from April 5, 2020, and ended May 2, 2021, for a total of 963 listings. White House Market (WHM) was collected weekly from May 11, 2020, to May 2, 2021, for a total of 3,320 listings.

[16] Data collected from manual processes were not initially time stamped. Once automated methods became available, all data was time-stamped in the file name of the raw data.

Table 2. Timeframe of Dark Web Markets Monitored and Number of Listings

Market	Timeframe Monitored	Number of Listings Collected
Cryptonia	09-06-19 - 11-20-19	560
Empire	10-01-19 - 08-20-20	390
Monopoly	04-05-20 - 05-02-21	963
White House	05-11-20 - 05-02-21	3,320
Total		5,233

Following the initial data collection process, the data was reviewed to remove duplicate listings. Listings were deemed duplicates if they had the same unique listing number. The process of identifying duplicates occurred through a two-stage process. In the first stage, a researcher examined the initial data files in Excel and removed duplicate listings. In the second stage, researchers identified duplicate listings during the qualitative coding process that were missed in the first stage (see below).

Following data collection, the general trend data that was captured from the fixed categories or free entry fields for each market was analyzed in Excel to produce frequency counts for key variables of interest: top vendors, types of cannabis sold (i.e., categories), cannabis prices, cannabis weight, shipping method, and shipping prices (see findings chapter). Next, the listing narratives and images were loaded into the QSR NVivo version 12 qualitative software package for content analysis. This type of analysis has been performed before on various Dark Web, social media, and online radicalization studies (Greer & Ferguson, 2011; Humphreys, Gill, Krishnamurthy, & Newbury, 2013; Qin, Zhou, Reid, Lai, & Chen, 2007). Content analysis is an ideal method when studying trends in language, slang, and descriptive data only found in the narrative content of a data record (Berelson, 1952). The content analysis of Dark Web cannabis sales across several markets allowed for a unique and rare understanding of the illicit online drug market.

Excel data files for each market were organized by calendar quarter so that multiple coders could code data simultaneously while working independently in their assigned quarter file. The team used an inductive process whereby key information or nodes were derived directly from the data. To standardize coding, the coding team met weekly to discuss proposed codebook additions, updated descriptions, and recommended changes to the codebook. Following the first round of coding, iterations were completed by a smaller team of coders who iterated over files not originally assigned to them as an additional quality control. A final check of all content analysis of the listing narratives was performed by the CO-PI lead on this part of the project before analysis.

Findings

Key findings from various data sources are organized by research question. The research report should be consulted for a full account of study findings.

First, what are the trends and patterns related to the illegal marijuana market in North Texas? Results from both CNET cases and TCSO incident data indicate that the majority of suspects were white males who were in possession of small amounts of marijuana. Spatial analyses of local law enforcement data indicated widespread distribution of cannabis hot spots across Tarrant County, with few apparent concentrations. Depending on the data source, there were some notable exceptions discussed at length in the final report, but our overall findings suggest the presence of a saturated Cannabis market. The role of socio-demographic factors and the location of cannabis hot spots was difficult to assess due to conflicting results across data sources. In the analysis of CNET cases, hot spots were generally more likely in areas comprised of whites and residents with lower education at both the census block and zip-code levels. In the analysis of TCSO incidents, cannabis incidents were more likely to be concentrated in areas that were less poor, had lower rates of unemployment, and had more White residents.

Analysis of inmate surveys and interviews also showed evidence of a saturated market. Indeed, the majority of inmates reported it was “very easy” or “fairly easy” to obtain marijuana in Tarrant County, and sources of marijuana were distributed all across Tarrant County. Furthermore, inmates

reported not needing to travel long distances to obtain marijuana prior to their incarceration, with most traveling fewer than 5 miles to obtain it from their primary source. Most inmates reported in the survey and interviews that they received their marijuana directly from a local source but there was a subset that admitted to receiving marijuana through the mail most often using USPS sent to a vacant house or to a friend.

Second, how has state-approved marijuana in other proximate states affected the illegal marijuana market? Data from the USPIS on interdicted cannabis parcels bound for Tarrant County revealed that legalization of cannabis in neighboring states had a major impact on the local cannabis market by providing a continuous supply of cannabis products into Tarrant County. From 2018 to 2020, a total of 1,333 interdicted cannabis parcels were studied involving 1,084 zip codes and 13,140 pairs of addresses. Interdicted cannabis parcels were mailed from 41 states, and the top four source states included: California, Colorado, Washington, and Oregon. Figure 1 shows a path analysis that was conducted to provide a visual representation of the intended movement of interdicted cannabis parcels bound to Tarrant County, with local traffic indicated in red and green traffic representing long-distance traffic over 2,00 miles. Yellow and orange indicate distances between 500-2,000 miles. It is noteworthy that the intensity of activity originates from the Pacific West Coast states.

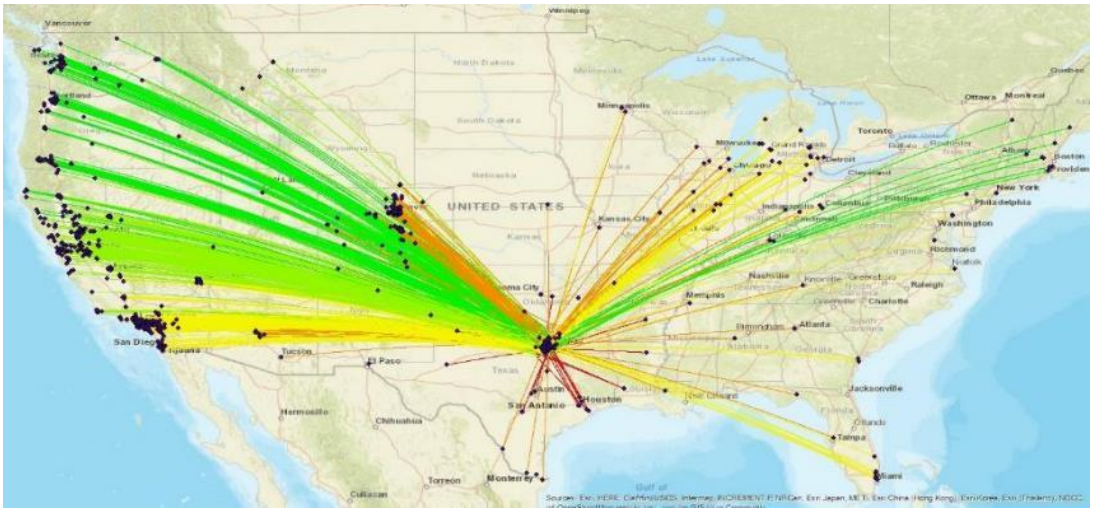

Figure 1. Path Analysis of Interdicted Cannabis Parcels Bound to Tarrant County

Spatially, there were few consistent patterns where the cannabis parcels were shipped to, as interdicted parcels were widely dispersed across the entire county. Figure 2 shows a Kernel Density Estimation (KDE) hot spot map for interdicted cannabis parcels bound to Tarrant County. While parcels were sent to locations throughout the county, there were a few hot spots/crime concentrations in Tarrant County, including: the North and Northeast suburbs (Keller, Bedford, Euless), the Southeast suburbs (Arlington, Mansfield), and areas inside the I-20 loop. The areas identified as hot spots for interdicted cannabis parcels were somewhat different from the KDE hotspots identified with CNET cases and TSCO incidents (see final report for these figures). One reason for this is the law enforcement data involves face-to-face seizures, and the data informing this analysis were mailed parcels that were interdicted by the USPIS. This finding may suggest important intelligence for CNET about other active areas in the county.

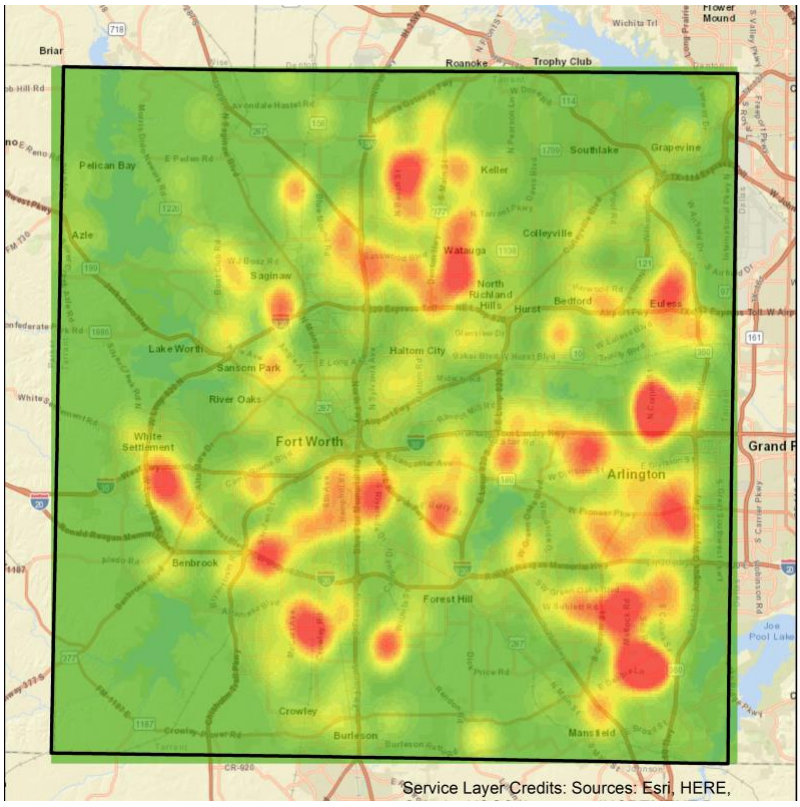

Figure 2. Kernel Density Estimation for Hot Spots of Interdicted Cannabis Parcels Bound To Tarrant County

A noteworthy finding emerged when examining the locations where interdicted cannabis parcels originated from, results indicated that the locations of cannabis dispensaries and cannabis senders were significantly correlated at the census block level (see Figure 3 below).

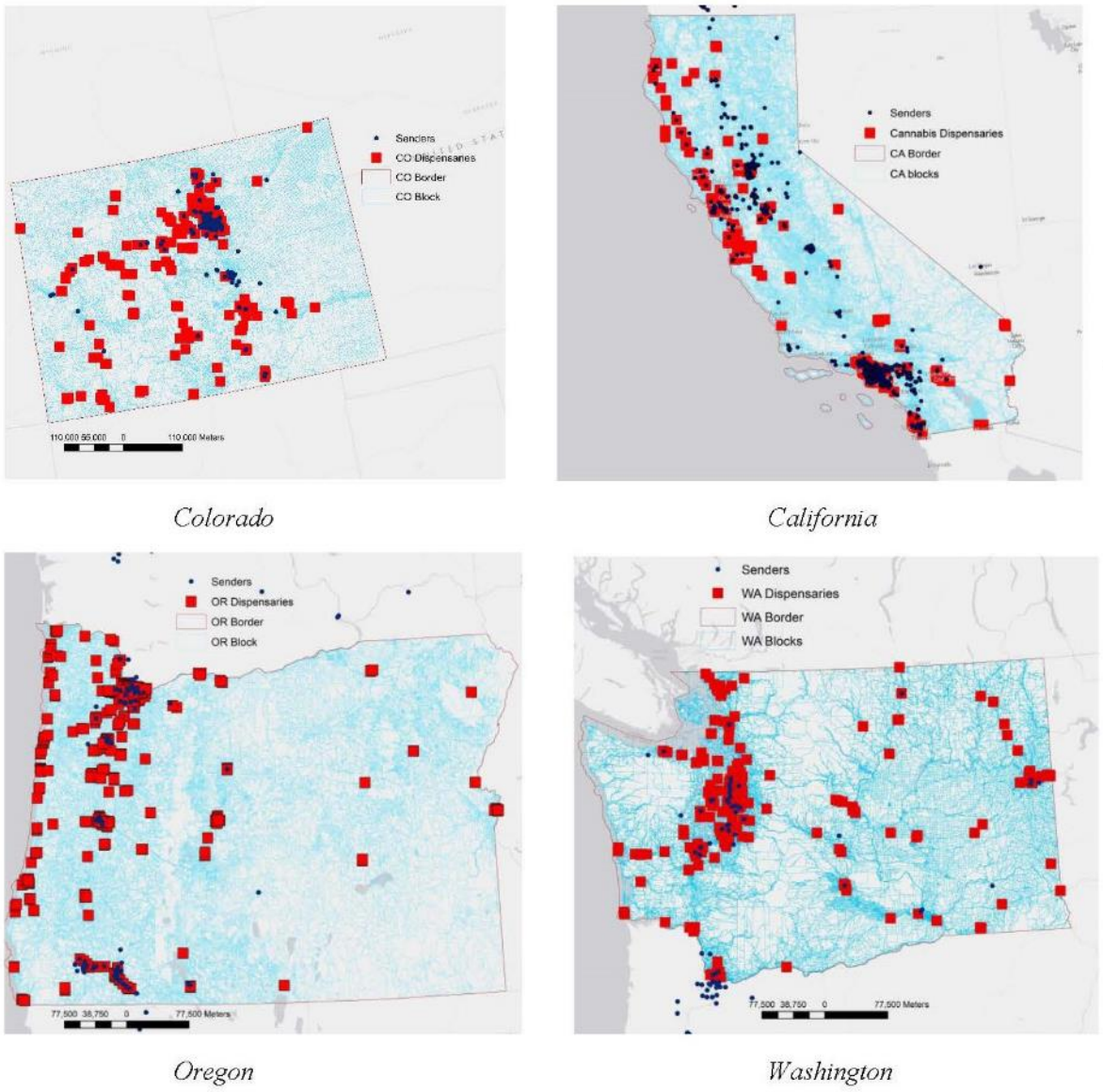

Figure 3. Spatial Distribution of Cannabis Parcel Senders and Legal Cannabis Dispensaries across Census Blocks in California, Colorado, Oregon, and Washington

Inmates noted that marijuana is both mailed and driven into Tarrant County with regularity from states where it is legal. As shown in Figure 4, inmates also identified Colorado and California as top source states for marijuana, as well as other states with legal marijuana. As one inmate disclosed in an interview, *"A group of three of us would take about $7,500 to Colorado per trip and pay $1,000 a pound for weed and then sell at $1,800 for mark up.*

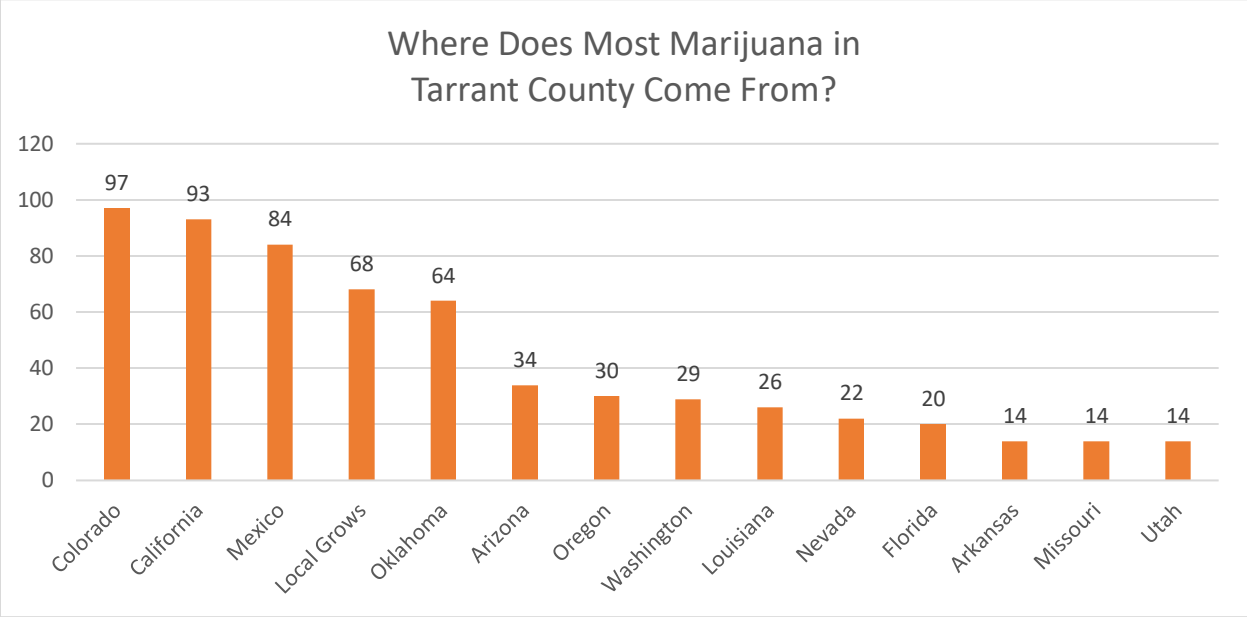

Figure 4. Source State or Country for Tarrant County Marijuana

Third, is there a relationship between illegal marijuana and violent crime in North Texas? TSCO incident and CNET case data indicated that violent crime did have a spatial relationship with cannabis hot spots. Data on suspects produced mixed findings. The CNET case data showed that suspects with large amounts of seized cannabis and those involved with multi-drug cases were not more likely to have had a previous violent history. In addition, CNET case data did not show a connection between a suspect's violent crime history and charges associated with an intent to distribute. TSCO incident data also showed no connection between violent crime and general cannabis charges (i.e., possession) filed at the same time, but there was a connection between violent crime and incidents

involving the intent to distribute. Results did not show a spatial relationship between violent/assaultive crimes and locations for intended receivers of interdicted cannabis parcels in Tarrant County.

Descriptive results from the inmate surveys and interviews also suggest a weak connection between marijuana and crime; most inmate participants reported never seeing or hearing about conflict and violence associated with a drug transaction in Tarrant County (see Figure 5 below).

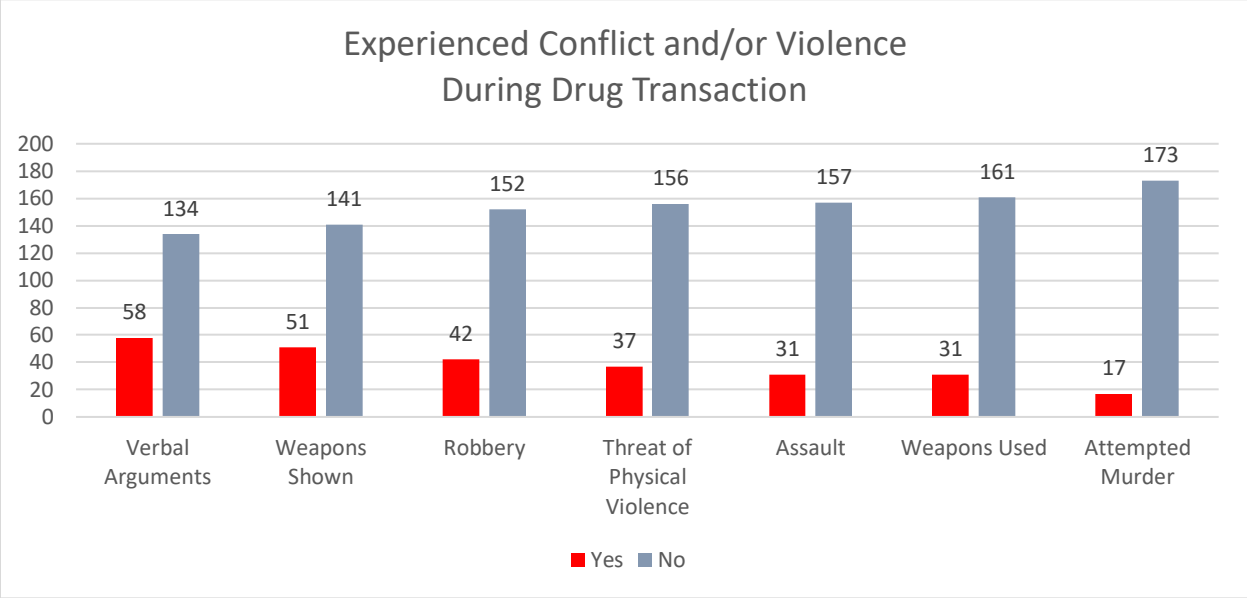

Figure 5. Experience with Conflict and/or Violence during Drug Transaction in Tarrant County

While most inmates reported that drug transactions occur without violence, they pointed out that the potential for violence is ever-present and more likely to manifest when larger amounts of narcotics are involved. As one inmate participant explained, *"There are people that sell their hooks to make money, and then there's people that jack them to make their money. The only time I've ever seen violence over weed is if a jack boy finds out where a hundred pounds or something like that, or $50,000 that they make from selling a hundred pounds somewhere that, they know where it is, so they can go get it."* Given the potential for violence, it is also not surprising that some inmates (roughly one-third) reported the presence of weapons during drug transactions.

Fourth, what role does the Dark Web play in facilitating the illegal marijuana market in North Texas and beyond? Results revealed that the Dark Web facilitates extensive illegal sales of cannabis products, and crypto-markets do provide a viable route for the purchase of cannabis online. The variety and volume of vendor cannabis listings, coupled with extensive marketing strategies, detailed production processes, shipping policies, and law enforcement evasion tactics, is indicative of a sophisticated marketplace. The markets studied in this research revealed that most vendors listed prices for smaller amounts of cannabis. This suggests that most Dark Web cannabis customers in the observed crypto markets purchased small amounts for personal use rather than for distribution. Examination of vendor narratives also revealed evidence that cannabis produced in states where it is legal was in demand and was sold on the Dark Web. Vendors actively advertised and marketed their product as grown in legal states (often California and Colorado) or even referenced a state in their vendor handle. For example, one vendor noted, *"We run a farm here in beautiful Colorado in the Rocky Mountains. We have been growing Cannabis for Medical use for over 30 years. We are very experienced. We are also Business People."* Our data do not allow us to speak with any certainty about who specifically is involved or if a vendor is associated with a production farm or dispensary. Finally, while Texas and other buyers' locations were never explicitly mentioned on the markets studied here, the other data in this report (i.e., survey and interview data) suggest it is highly likely that some individuals in Texas are ordering cannabis off the Dark Web.

Summary of Findings

In sum, this study found evidence of a saturated cannabis market in Tarrant County with few consistent socio-demographic patterns across data sources. Data from the USPIS on interdicted cannabis parcels bound for Tarrant County revealed that legalization of cannabis in neighboring states had a major impact on the local cannabis market by providing a continuous supply of cannabis products into Tarrant County. Spatially, there were few consistent patterns where the cannabis parcels were shipped to, as interdicted parcels were widely dispersed across the entire county. Results from inmate surveys and interviews revealed that cannabis is both mailed and driven into Tarrant County with regularity from

states where it is legal. TSCO incident and CNET case data indicated that violent crime did have a spatial relationship with cannabis crime hot spots. Results did not show a spatial relationship between violent/assaultive crimes and locations for intended receivers of interdicted cannabis parcels in Tarrant County. Descriptive results from the inmate surveys and interviews suggest a weak connection between cannabis and crime; most inmate participants reported never seeing or hearing about conflict and violence associated with a drug transaction in Tarrant County. Results revealed that the Dark Web facilitates extensive illegal sales of cannabis products and that cannabis produced in states where it is legal was in demand and was sold on the Dark Web.

Recommendations

We suggest several policy recommendations derived from or related to our research findings. First, the locations of CNET cannabis cases and TCSO cannabis incidents do not generally overlap with the locations of intended cannabis parcels before their interdiction. While specific zip codes from USPIS cannot be shared in this report, there is an opportunity for CNET to proactively work cases along with USPIS where there is demonstrated geographic demand for illegal cannabis, as signaled by interdicted packages bound to locations in Tarrant County. CNET and USPIS already work collaboratively together with CNET assisting USPIS with controlled deliveries (when requested). We recommend that this partnership should evolve further to include the sharing of intelligence on areas where there is a high number of interdicted packages, as this may signify a demand associated with street-level dealing and other drug transactions. Data from this study suggest these are untapped geographic areas for proactive and systematic investigations.

With few exceptions, our spatial analysis of cannabis incidents did not reveal macro-level hot spots where there were large amounts of cannabis crime concentrated within specific demographic areas in Tarrant County. Instead, our RTM results showed a large number of highly concentrated micro-places located throughout different demographic groups and areas in Tarrant County. A micro-place is a small geographic location such as a block, street segment, alley, intersection, specific address or cluster of

addresses (Santos and Santos, 2015). Research on micro-places suggests that interventions that target these small geographic locations are mostly successful; however, studies indicate that such micro-places are often short-lived and need to be addressed as soon as they are discovered for the biggest impact (CEBCP, n.d.). Study results indicated that smoke shops and liquor stores were related to cannabis micro-places, and as such, directed law enforcement activity in close proximity (up to 500 feet) to these areas could be productive.

After the changes introduced by a 2018 federal law known as the "2018 Farm Bill", 48 states considered new legislation regarding hemp. These new legislative changes produced additional barriers for law enforcement to prosecute cannabis cases due to the requirement and budgetary expense to test for THC concentration in seized products.[17] Considering the saturation of the cannabis market in Tarrant County coupled with these additional challenges in investigating/prosecuting cannabis cases, law enforcement should carefully consider the benefits of investigating small level cannabis cases (i.e., possession) since in many situations the costs to do so could be high (i.e., lab costs), the experience of delays (i.e., lab availability), and successful conviction may be difficult to achieve depending on the local prosecutor and community acceptance or intolerance of cannabis use. Given these challenges, leveraging the expertise of specialized narcotic units along with intelligence-led policing strategies (including analytic capacity like RTM) could operate as a disruptor at a larger scale.

[17] In Texas https://www.texastribune.org/2019/07/03/texas-marijuana-hemp-testing-prosecution/#:~:text=This%20year%2C%20Texas%20passed%20a,is%20legal%20hemp%20or%20marijuana. Also in other states like Ohio https://local12.com/news/local/with-ohios-new-hemp-law-ag-tells-prosecutors-not-to-indict-cannabis-cases-at-this-time; Georgia https://apnews.com/article/d662239b6f674c918555289bb87ca4f3

The findings associated with information observed on the Dark Web suggest widespread use of cryptomarkets to sell and order cannabis products in addition to a plethora of other illegal activity and illicit goods. For this reason, efforts should be made to invest in developing technical expertise among specialized law enforcement personnel for intelligence gathering purposes at a minimum and for investigative purposes as well. Due to the anonymity of the Dark Web and the tools used to access it, linking a vendor to a suspect in a local investigation is highly unlikely through passive observation. There is intelligence value for investigators to view what is being sold, the latest product pricing, packaging, concealment tactics, how a product is marketed, and other emergent trends. Furthermore, as investigators interact with individuals during a narcotics investigation, there may be signs and evidence of Dark Web activity that can be missed without proper training. Examples of this include user handles or email addresses that are only available on the Dark Web, lingo and phrasing that reference Dark Web activity or suggested use, and references to as yet unknown markets on the Dark Web.

Conclusion

The study provided a unique opportunity to examine how the supply of drugs from states with state-approved marijuana policies (i.e., medicinal or recreational) influenced the local market in Tarrant County, a northern region of Texas, and an area geographically proximate to several states with legalized marijuana. Results from several data sources indicate there was evidence of a saturated marijuana/cannabis market in Tarrant County. Data from the USPIS on interdicted cannabis parcels bound for Tarrant County revealed that legalization of cannabis in neighboring states had a major impact on the local cannabis market by providing a continuous supply of cannabis products into the area. Spatially, there were few consistent patterns where the cannabis parcels were shipped to, as interdicted parcels were widely dispersed across the entire county. Results from inmate surveys and interviews revealed that cannabis is both mailed and driven into Tarrant County with regularity from states where it is legal. There was some evidence that violent crime had a spatial relationship with cannabis crime hot spots, however, results did not show a spatial relationship between violent crimes and locations for

intended receivers of interdicted cannabis parcels in Tarrant County. Results further revealed that the Dark Web facilitates extensive illegal sales of cannabis products and that cannabis produced in states where it was legal was in demand and was sold on the Dark Web.

In addition to these findings, the study provided an array of information that could be useful to law enforcement and other criminal justice professionals. For example, data collected from inmates revealed emergent trends and techniques related to trafficking cannabis into the area, emergent slang names for cannabis products, transaction trends on social media, and trafficking evasion tactics. Data collected from the Dark Web documented emerging products, shipping policies and trends, current pricing, and concealment methods utilized by shippers. Spatial analyses revealed the need for law enforcement to focus on specific micro-places where risk is highest for cannabis-related crime. Interdiction data on cannabis parcels revealed significant activity out of California and Colorado into North Texas, and the need to share information about interdiction trends to enhance federal and local law enforcement partnerships.

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