

Assessment of Motor Vehicle Thefts in Colorado 2018



Prepared by:
Auto Theft Intelligence Coordination Center (ATICC)
February 2019
cdps_aticc@state.co.us

This program is funded by



Purpose

The Auto Theft Intelligence Coordination Center (ATICC) has prepared the following assessment regarding the occurrence of motor vehicle theft in Colorado, during the period of January 1, 2018 through December 31, 2018.

Data used in this report is sourced from the Colorado Stolen Vehicle Database Repository administered by the ATICC. The repository contains records of all stolen and recovered vehicles entered and removed from the Colorado Crime Information Center (CCIC).



Key Findings

- The Colorado Stolen Vehicle Database Repository captured a total of 21,324 motor vehicle thefts statewide during 2018.
- Compared to the 19,488 thefts that were reported during 2017, Colorado experienced an 9.4% increase in motor vehicle thefts during 2018. The rate of increase over the past few years has been less drastic than it was in the beginning of the upturn that started in 2015.
- In 2018, the Auto Theft Task Force areas were renamed as follows: Gold Camp-Denver Metro, Pikes Peak-Southern, Longs Peak-Northern, Grand River-Western, Four Corners-South West and High Prairie-Eastern.
- 62% of stolen vehicles were reported in the Denver Metro area, 24% in Southern area, 8% in Northern area, 2% in the Western area, 2% in the South West area, and 1% in the Eastern area.
- 18,751 stolen vehicles were recovered in 2018, which equates to an 88% vehicle recovery rate;
- While 18,751 vehicles were recovered, only 18,042 recoveries entered into CCIC included a theft address; therefore, 3.8% of recovery records statewide do not include a recovery address– a mandatory entry in the “locate vehicle” mask of CCIC. However, agencies are bypassing the “locate vehicle” screen and either clearing or deleting the vehicle entry.
- The completion of information in the ATICC supplemental continues to be an area of concern. ATICC Team members continued traveling around Colorado in 2018, which has shown to be effective as 2018 has shown to have the highest completion rate in years, which equated to 9.6%.
- The top five vehicles stolen statewide in 2018 were (in ranking order): Honda Civic, Honda Accord, Ford F250, Chevrolet Silverado, and Ford F-150.
- Although mostly accurate, the ATICC continues to strive to improve collection standards and account for gaps that exist. Reporting standards in 2018 are similar to 2017 through the ATICC database. However, the ATICC database results should not be directly compared to the 2018 FBI Crime in the US Report due to different collection methods.

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Disclaimer: Information contained in the Stolen Vehicle Database Repository is considered multifarious; modifications to records are made on a daily basis. Stolen vehicle records were screened for accuracy and normalized for standardization prior to use in this analysis.

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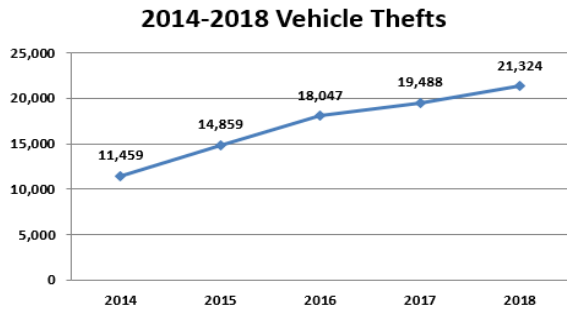
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General Observations

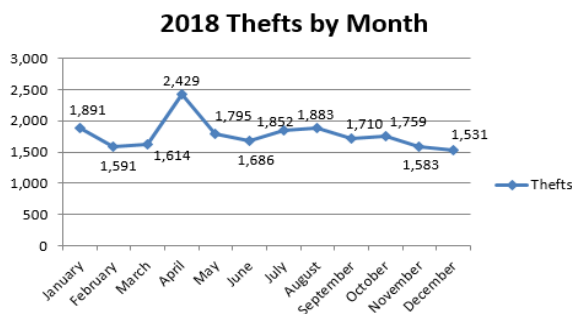
Auto theft has continued on a gradual rise since 2012. In 2018, Colorado experienced a 9.4% increase in auto theft from the previous year. Even though, the thefts from 2018 increased from 2017 (8%), the rate of theft as started to show a plateau.



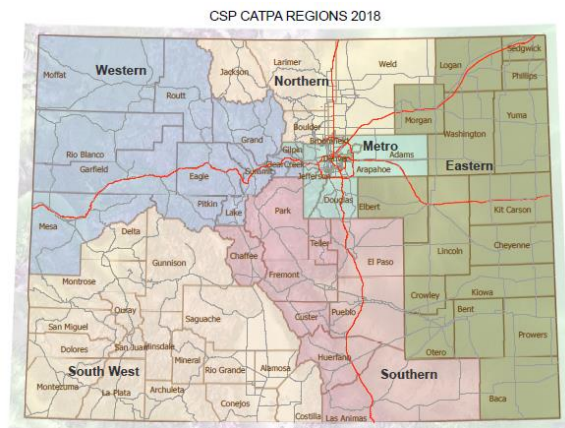
In 2018, there was an average of 1,777 vehicles stolen every month in Colorado. This is a monthly increase of 153 more stolen vehicles per month than experienced in 2017. There was an average of 410 vehicles reported stolen every week, and an average of 58 vehicle thefts every day in the state.

Using the F.B.I.'s average dollar loss per stolen vehicle reported in 2018 (\$7,680)¹, Colorado experienced \$163,768,320.00 loss. Compared to 2017, there was an additional \$14,100,480.00 of loss in 2018. This value is not considered an average vehicle value but a value based on the economic survival loss related to the vehicle's theft from the time it was stolen until it was recovered.

In 2018, mid-summer through late winter showed a decrease rate of theft pattern, compared to an increase theft pattern that was observed in 2017.



The US Census Bureau estimated the population of Colorado in 2018 was 5,695,564.² On average Colorado has observed a population growth of 79,663 per year for the last five years. With this in mind, there was an annual average of 374 vehicle thefts per 100,000 people. This is an increase of 26 vehicles per capita compared to 2017.



In Colorado, the state is divided into six different areas pertaining to auto theft and auto theft task forces. The Denver Metro and Southern areas accounted for an 86% majority of reported vehicle thefts.

CATPA Area	2015	2016	2017	2018	%Δ 2017/2018
Denver Metro	10,014	11,760	13,026	13,362	2.6%
Eastern	157	159	151	250	65.6%
Northern	1,171	1,504	1,453	1,734	19.3%
Southern	2,849	3,598	3,630	5,130	41.3%
South West	263	317	386	362	-6.2%
Western	405	400	435	469	7.8%
Total	14,859	18,047	19,488	21,324	9.4%

¹ <https://ucr.fbi.gov>

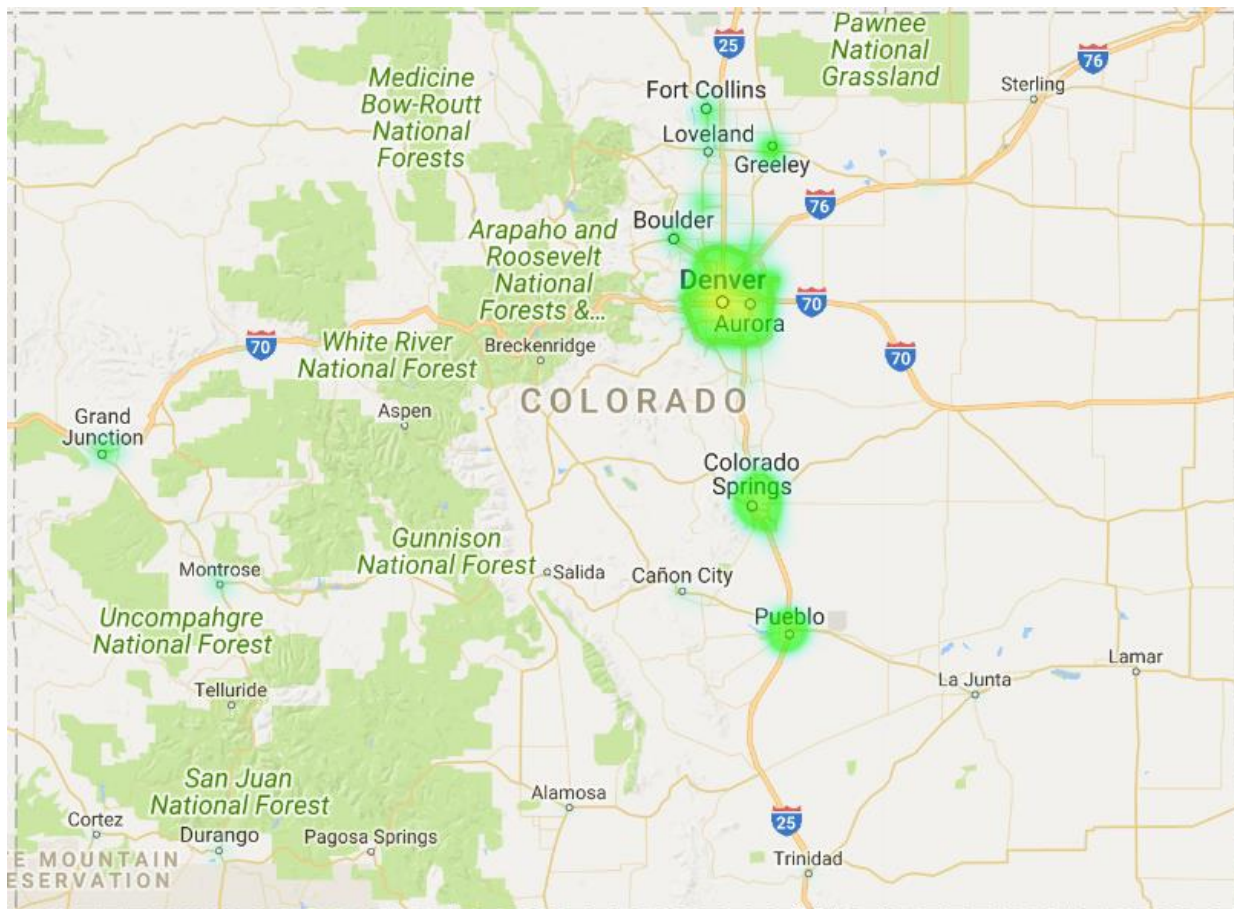
² <https://www.census.gov/>

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Colorado Auto Theft Hot Spots

In 2018 the hot spots for auto theft occurred in and around larger cities. As seen in the heat map below, these include: Boulder, Canon City, Colorado Springs, Denver Metro, Fort Collins, Grand Junction, Greeley, La Junta, Lafayette/Erie, Loveland, Montrose, Pueblo, and Sterling.



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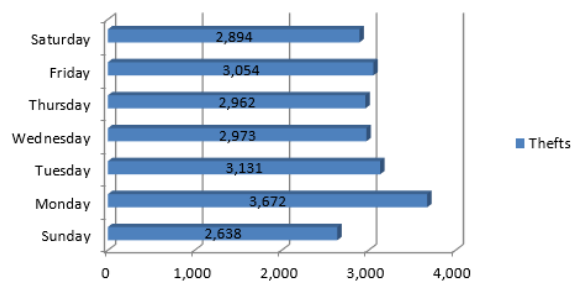
Statistics

The following reporting agencies reported three or more vehicle thefts per week. These communities accounted for 87% of all reported vehicles thefts in the state. These reporting agencies were located in or around Denver, Colorado Springs, Pueblo, Fort Collins, and Greeley.

Reporting Agency	Thefts	Weekly Average
Statewide	21324	410
Denver	5096	98
Colorado Springs	2536	49
Aurora	2171	42
Pueblo	938	18
Lakewood	873	17
Adams County	757	15
Thornton	628	12
Westminster	623	12
Arapahoe County	545	10
Arvada	438	8
Commerce City	352	7
Jefferson County	346	7
El Paso County	337	6
Englewood	307	6
Greeley	285	5
Boulder	274	5
Northglenn	245	5
Wheat Ridge	240	5
Longmont	236	5
Douglas County	221	4
Littleton	205	4
Fort Collins	184	4
Brighton	164	3
Grand Junction	157	3
Pueblo Co.	157	3
Weld County	148	3
Broomfield County	132	3

The highest volume of theft days continues to be on Mondays, however in 2018, Tuesday surpassed Friday for the second highest theft day.

2018 Thefts by Day of Week



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Of the 21,324 vehicles stolen during 2018, 88% (18,751) of reported stolen vehicles were deemed “inactive” in 2018. The following is a breakdown of the reported stolen vehicles by vehicle type.

Rank	Name	Active	Inactive	Count
1	Passenger Car	1009	7290	8299
2	SUV	614	4574	5188
3	Pickup Truck	526	3616	4142
4	Trailer	260	1050	1310
5	Motorcycle	675	571	1246
6	Van	49	299	348
7	Flatbed	65	276	341
8	Open Body	27	103	130
9	Multi-wheeled Vehicle	36	62	98
10	BUS	1	91	92

In 2018 there were 18,751 recovered vehicles where the vehicle was stolen during 2018. Of these vehicles, 45% of the vehicles were recovered within one week from the date of theft.

Recovery Delay	Stolen in 2018	Percentage
Same Day	1624	8.70%
Same Week	8458	45.10%
Same Month	5598	29.90%
3 Months	2411	12.90%
6 Months	816	4.40%
1 Year	490	2.60%
Greater than a Year	390	2.10%

For the 2018 Auto Theft report, we have captured the top 20 most stolen vehicles by utilizing year, make and model. In previous year, we just calculated by make and model. For the 11 of the 20, are a combination of Honda Civic's & Accords, the next type of vehicle is the Ford F-250.

Rank	Make & Model	Class	Thefts
1	1998 Honda Civic	Small Car	171
2	1997 Honda Accord	Mid-size Car	162
3	1997 Honda Civic	Small Car	138
4	2000 Honda Civic	Small Car	138
5	1996 Honda Accord	Mid-size Car	128
6	1999 Honda Civic	Small Car	117
7	1994 Honda Accord	Mid-size Car	115
8	1996 Honda Civic	Small Car	99
9	1995 Honda Accord	Mid-size Car	82
10	1995 Honda Civic	Small Car	81
11	1992 Honda Accord	Mid-size Car	66
12	1999 Ford F-250	Full-size Pickup	63
13	2000 Ford F-250	Full-size Pickup	60
14	2004 Ford F-250	Full-size Pickup	60
15	2003 Ford F-250	Full-size Pickup	59
16	2006 Ford F-250	Full-size Pickup	59
17	2001 Ford F-250	Full-size Pickup	58
18	2006 Ford F-350	Full-size Pickup	58
19	2002 Ford F-250	Full-size Pickup	55
20	2005 Chevrolet Silverado	Full-size Pickup	55

We also ran the number list of most stolen vehicles based solely on Make & Model. We observed similar results in 2018 as we observed in 2017 that the Honda Civic & Accord were the most stolen Make & Models. These two vehicle models account for 9.4% of all vehicle thefts in 2018. However, this is a decrease of 20.2% from 2017.

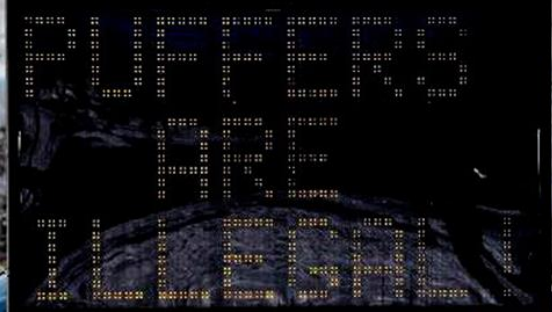
Rank	Make & Model	Class	Thefts
1	Honda Civic	Small Car	1,064
2	Honda Accord	Mid-size Car	936
3	Ford F-250	Full-size Pickup	577
4	Chevrolet Silverado	Full-size Pickup	537
5	Ford F-150	Full-size Pickup	404
6	Dodge RAM	Full-size Pickup	399
7	Ford F-350	Full-size Pickup	376
8	Subaru Legacy	Mid-Size Car	376
9	GMC Sierra	Full-size Pickup	332
10	Jeep Grand Cherokee	Mid-size SUV	324
11	Subaru Impreza	Small Car	304
12	Toyota Camry	Mid-size Car	303
13	Honda CR-V	Mid-Size MPV	218
14	Chevrolet Tahoe	Full-size SUV	217
15	Jeep Cherokee	Mid-Size SUV	215
16	Toyota Corolla	Small Car	211
17	Nissan Altima	Small Car	196
18	Ford Explorer	Mid-size SUV	194
19	Toyota 4-Runner	Mid-size SUV	183
20	Acura Integra	Small Car	175

Puffer Vehicles

Puffer data was not obtained this year for the annual report, based on the lack of standardization in reporting across the state. To obtain an exact number is currently inaccurate, based on the many options that are in the system to choose from, and for the fact that some of the options that were chosen may not have been a true puffer. The Stolen Vehicle Database Repository can be searched to identification a vehicle theft where, at the time of theft, the vehicle was unattended and left running, keys in the ignition, keys in the car, keys in the ignition and vehicle running, puffer, etc. Additionally, the numbers that can be entered into the system will not include victims of vehicle theft who do not report they left their vehicle unattended and running. Additionally, the ATICC database does not require law enforcement reporting of a puffer event.

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Auto Theft Victim Impact

Auto theft is considered a property crime; however, stolen vehicles are often used to commit other crimes. Drug use connected with auto theft is very common in Colorado. There is a financial impact on the victim as well as potential danger associated with a recovered stolen vehicle. Victims are encouraged to check their cars for damage, illegal drugs, drug paraphernalia, and other contraband. The victim should carefully vacuum the vehicle and wipe down the interior surfaces with a disinfectant. If the vehicle was stolen with the key and they key was not recovered, a new ignition switch should be installed. Locks on the victim's home, office, and other buildings should be changed if the thief had access to their keys. Garage door codes should be changed and enhanced security measures should be taken at home, since the thief knows where the victim lives.

Auto Theft Volume by County

County	CATPA Area	2016 Thefts	% Δ '15-'16	2017 Thefts	% Δ '16-'17	2018 Thefts	% Δ '17-'18
Adams County	Denver Metro	4,447	83%	3,039	-31.7%	3,118	2.6%
Alamosa County	South West	27	-	34	25.9%	41	20.6%
Arapahoe County	Denver Metro	973	-43%	2,843	192.2%	3,009	5.8%
Archuleta County	South West	3	-27%	11	266.7%	12	9%
Baca County	Eastern	1	-50%	1	-	3	200%
Bent County	Eastern	9	80%	10	11.1%	14	40%
Boulder County	Northern	398	16%	470	18.1%	667	41.9%
Broomfield County	Denver Metro	130	53%	144	10.8%	128	-11.1%
Chaffee County	Southern	33	57%	22	-33.3%	25	13.6%
Cheyenne County	Eastern	0	-	2	200%	4	100%
Clear Creek County	Western	18	20%	21	18.7%	17	-19%
Conejos County	South West	5	-29%	9	80%	15	66.7%
Costilla County	South West	5	-	12	140%	28	133.3%
Crowley County	Eastern	7	4%	0	-100%	4	400%
Custer County	Southern	2	-	3	50%	1	-66.7%
Delta County	South West	51	31%	43	-15.7%	45	4.7%
Denver County	Denver Metro	4,210	7%	4,700	11.6%	4,733	0.7%

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County	CATPA Area	2016 Thefts	% Δ '15-'16	2017 Thefts	% Δ '16-'17	2018 Thefts	% Δ '17-'18
Dolores County	South West	3	50%	2	-33.3%	3	50%
Douglas County	Denver Metro	244	13%	268	9.8%	378	41%
Eagle County	Western	24	-4%	27	12.5%	31	14.8%
El Paso County	Southern	2,190	25%	2,249	2.7%	2,869	27.6%
Elbert County	Denver Metro	13	44%	10	-23.1%	14	40%
Fremont County	Southern	66	5%	62	-6.1%	78	25.8%
Garfield County	Western	65	8%	69	6.2%	82	18.8%
Gilpin County	Denver Metro	15	114%	18	20%	13	-27.8%
Grand County	Western	22	450%	17	-22.7%	10	-41.2%
Gunnison County	South West	8	-43%	20	150%	13	-35%
Hinsdale County	South West	0	-100%	0	-	0	-
Huerfano County	Southern	18	64%	15	-16.7%	10	-33.3%
Jackson County	Northern	3	200%	1	-66.7%	1	-
Jefferson County	Denver Metro	1,838	13%	1,969	7.1%	2,043	3.8%
Kiowa County	Eastern	1	-50%	4	300%	0	-400%
Kit Carson County	Eastern	11	-	7	-36.4%	9	28.6%
La Plata County	South West	64	31%	77	20.3%	67	-13%
Lake County	Western	8	14%	5	-37.5%	6	20%
Larimer County	Northern	390	44%	419	7.4%	367	-12.4%
Las Animas County	Southern	29	142%	29	-	23	-20.7%
Lincoln County	Denver Metro	8	-11%	7	-12.5%	9	28.6%
Logan County	Eastern	39	39%	24	-38.5%	37	54.2%
Mesa County	Western	227	35%	243	7.1%	252	3.7%
Mineral County	South West	0	-	0	-	0	-
Moffat County	Western	8	-	17	112.5%	7	-58.8%
Montezuma County	South West	24	-29%	33	37.5%	34	3%
Montrose County	South West	89	68%	121	36%	87	-28.1%
Morgan County	Eastern	36	24%	41	13.9%	59	44%
Otero County	Eastern	34	31%	37	8.8%	63	70.3%
Ouray County	South West	4	300%	5	25%	2	-60%
Park County	Southern	16	60%	9	-43.8%	11	22.2%
Phillips County	Eastern	1	-50%	1	-	4	300%
Pitkin County	Western	15	400%	13	-13.3%	13	-
Prowers County	Eastern	10	-9%	9	-10%	13	44.4%
Pueblo County	Southern	1,228	101%	1,216	-1%	1,065	-12.4%
Rio Blanco County	Western	1	-67%	3	200%	5	66.7%
Rio Grande County	South West	19	73%	11	-42.1%	14	27.3%
Routt County	Western	4	-67%	10	150%	9	-10%
Saguache County	South West	5	-17%	5	-	4	-20%
San Juan County	South West	0	-	1	100%	0	-100%

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County	CATPA Area	2016 Thefts	% Δ '15-'16	2017 Thefts	% Δ '16-'17	2018 Thefts	% Δ '17-'18
San Miguel County	South West	2	-60%	2	-	3	50%
Sedgwick County	Eastern	0	-	4	400%	4	-
Summit County	Western	27	17%	20	-25.9%	40	100%
Teller County	Southern	15	-12%	17	13.3%	15	-11.8%
Washington County	Eastern	4	-	4	-	2	-50%
Weld County	Northern	713	87%	560	-21.5%	705	25.9%
Yuma County	Eastern	4	-60%	7	75%	14	100%
Total		18,046	20%	19,488	8%	21,324	9.4%

Call to Action

The ATICC along with the CATPA funded Auto Theft Task Forces need to work collaboratively to improve collection and reporting standards of auto theft data. ATICC is also reaching out to all Agency dispatcher/records unit to give update training on entering data into the ATICC Mask database.

Appendix A – Stolen Vehicle Data Validation Processes and Reliability

The Stolen Vehicle Database Repository is the best solution we have to compile a review of statewide auto theft data. It is believed that this data could be significantly more useful with statewide agencies participating to complete the ATICC Supplemental. The ATICC Supplemental is accessed through the Colorado Crime Information Center and enables the ability to collect additional data for a motor vehicle theft event. This supplemental reporting includes additional identifiers related to suspects, modus operandi, victims and the vehicle condition when the vehicle was stolen and when it was recovered. Lastly, ATICC encourages using CCIC stolen vehicle entries compliant with the data standards as outlined in the National Crime Information Center (NCIC) /CCIC User's Manual.

Process 1: Origination of Data

Since January 2010, the CATPA has funded a project for the collection, analysis and dissemination of auto theft incidence occurring within Colorado. This project funded the ATICC, operated and managed by the Colorado State Patrol. ATICC was funded to provide reliable, timely, and accurate information/intelligence pertaining to the incidence of auto theft. ATICC has acquired stolen vehicle records for conducting analysis and study of vehicle thefts reported to the Colorado Crime Information Center (CCIC). These stolen vehicle records are classified as law enforcement sensitive and are compliant with the FBI Criminal Justice Information Services Security Policy. ATICC uses the stolen vehicle records, as entered into CCIC, for administrative, strategic and tactical analytical products. In July 2012, ATICC successfully implemented an information technology system to database stolen vehicles reported into CCIC. This database, called the Stolen Vehicle Database Repository (SVDR), affords the ability to capture vehicles that are reported stolen and those that are cleared, located and/or recovered. This report is exclusive to information obtained from the SVDR.

Data used in this report is inclusive of vehicles stolen that are reported to the Colorado Crime Information Center with a date of theft range of January 01, 2018 to December 31, 2018. Stolen vehicles included in this report include vehicles entered into CCIC as a "stolen vehicle" message. The actual number of auto thefts in Colorado is likely higher than reported, as some incidences of auto theft may not be reported to law enforcement, law enforcement agencies may not have entered other stolen vehicles into CCIC due to a stolen vehicle recovery occurring prior to completing the jurisdiction's reporting and processing procedures, and other stolen vehicles may have been reported as a carjacking

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and/or a felony crime involved stolen vehicle incident. Information contained in the Stolen Vehicle Database Repository is considered dynamic, as modifications, changes and amendments to the stolen vehicle records are made on a daily basis.

Process 2: CCIC Data Validation

Stolen vehicle records entered into CCIC undergo validation standards established by National Crime Information Center and CCIC.

Process 3: Data Range

Stolen vehicles were obtained by a query of the SVDR for thefts occurring from January 01, 2018 through December 31, 2018, and this data was pulled on February 5, 2019.

Process 4: Deduplication of the 2017 Dataset

The dataset was reviewed for duplicate records, based on unique record identifier, vehicle identification number, case number, and license plate number, to ensure a single vehicle theft record is not counted more than one time.

Process 5: Test Records

The 2018 database was examined to identify “test records”, which were not records of actual stolen vehicles, but records entered as tests in the system. These records were not used in this report.

Process 6: Identification of Removed Vehicles

Records that were removed during the year were not identified as to why the stolen vehicle was inactive from CCIC. ATICC has identified user errors and misuse of message keys where vehicles are removed from CCIC that may not have been actually “recovered.” However, ATICC does not have the technological advantage to ensure the appropriate message keys to validate the purpose of the inactivation, e.g., cancellation, locate or clear (recovery). Briefly stated, removals from the CCIC database occur from three messages conducted by CCIC authorized users from the Originating Agency who performed the initial entry. These three CCIC message keys are a “clear”, “locate” and “cancel” of the record. The “clear” (CV) and “locate” (LV) message is performed when a vehicle has been located and is subsequently removed from the CCIC/NCIC database. Accordingly, a “clear” is supposed to be performed by the agency that entered the vehicle and then subsequently recovered it. The “locate” is supposed to be performed when an agency, other than the one who originally entered the vehicle into CCIC, has located the vehicle. The “cancel” (XV) record is supposed to be performed when an agency discovers the vehicle was not stolen, yet was originally recorded into CCIC as stolen, and thus needs to be cancelled. Current data processes/practices within the CCIC system treats the CV, LV and XV message the same, regardless of the technical definitions. When reviewing the SVDR records for the purpose of removal from CCIC, it was observed that CCIC Users inappropriately utilize the XV (Cancellation) message key in lieu of the CV (Clear) or LV (Locate). This cause’s additional analytical concern as each XV message key had to be examined as to whether or not the vehicle was truly cancelled or recovered. The process of using a Cancel message key should invoke cases where a previously stolen vehicle entry was discovered not to have been stolen (e.g., joyriding, mistaken vehicle identity, etc.). However, based on law enforcement experience of ATICC personnel, the comparative records of “true” XV messages affecting the overall analysis are minimal. In other words, ATICC believes some of the identified cancellations were a result of stolen vehicles being recovered. In accordance with NCIC policy and law enforcement practice, an official police report of a stolen vehicle must be made prior to the CCIC entry. The result of the aforementioned is that ATICC treated the message keys of “inactive,” “cancel,” “clear,” and “locate” as inactivity in the stolen vehicle database, thus inferring each message key was a recovery.

Process 7: Identifying Re-Entered Entries

As discussed in last year’s Annual Report, several law enforcement agencies have engaged in a practice to re-enter a stolen vehicle in CCIC/NCIC in order to maintain an alert on the vehicle in the event the vehicle is checked through the system. Qualitative screening involved searching the miscellaneous field for key words and notations, and the stolen vehicle case number indicating re-entry from previous purging.

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Process 8: Normalizing the Dataset

The SVDR populates a list of common terminologies to normalize the dataset, including the common name of the reporting agency, vehicle identifiers based on the vehicle identification number (using VinLink lookup), theft/recovery areas in accordance with the designated CATPA area map, and county assignments based on the assigned CCIC originating reporting agency identifier. As part of using the key indexing charts, many fields of the database underwent cleaning and scrubbing to ensure normalization of key words and terms (e.g., Denver PD vs. Denver vs. Denver City vs. Den vs. Denver CO vs. Denver, CO vs. Denver, Colorado vs. Denver Colorado, etc.).

Process 9: Cleaning the Dataset with Investigatory Tools

Current CCIC policies do have mandates for a stolen vehicle file to be accepted into the CCIC database, where limited primary fields of information are required. These primary fields of information include, but all are not necessarily required: the date of theft, case number, originating agency identifier number, vehicle make, and vehicle identifier (license plate, vehicle identification number, owner applied number or production number). Unfortunately, for analytical purposes, other key information is not required for entry by the CCIC authorized user. Examples include the vehicle model and style. To add further challenges to cleaning the dataset, when key analytical data is entered, it is oftentimes inaccurate due to a lack of data standardization. For example, when the style of the vehicle is entered, it is oftentimes incorrect as the style field does not match the vehicle make and model (i.e., pickups may be entered as passenger cars; SUVs as pickups; scooters as motorcycles, etc.). The most significant value added to the data analysis was information obtained from VinLink®. This tool provided 47 various identifiers for each vehicle possessing a valid VIN entry in the database.

Process 10: Reliability Note

Based on the above notations, it is obvious the database used to compile this report has limitations and justifies the direction that ATICC is moving in acquiring completion of the ATICC Supplemental. The ATICC Supplemental provides the ability to analyze additional information involving the vehicle theft event and its recovery, such as the suspect information, their location, how a vehicle was stolen (e.g., puffing, forcible entry, etc.), the condition of a vehicle upon recovery, and any associated crimes involving the particular vehicle theft and its recovery. Unfortunately, the dataset is unable to provide valid analysis of these identifiers as few agencies used the ATICC Supplemental within the CCIC stolen vehicle file upon the report of theft and/or the vehicle recovery event.

With regards to the accuracy and reliability of the CCIC data used in this report:

- 1) There is no other uniform statewide reporting system for auto theft other than CCIC stolen vehicle file,
- 2) The CCIC entries were not intended to provide a records management system for analysis of auto theft,
- 3) There is established criteria and validation of entries made into the SVDR that many individual law enforcement records management systems do not possess (e.g., VinLink, CJIS validation standards, etc.) and
- 4) It is recommended to keep in mind the actual numbers are likely higher than portrayed, but it is believed this report provides the best picture of auto theft experienced in Colorado.

(UNCLASSIFIED)

Disclaimer: Information contained in the Stolen Vehicle Database Repository is considered multifarious; modifications to records are made on a daily basis. Stolen vehicle records were screened for accuracy and normalized for standardization prior to use in this analysis.