



**The Predictive Validity of Marijuana Odor Detection:
An Examination of Alaska State Trooper Case Reports 2006–2010**

Prepared for the
Alaska State Troopers

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Executive Summary

Purpose and Scope

The primary purpose of this study is to provide an empirical estimate of the extent to which Alaska State Troopers (AST) investigators' detection of marijuana odors served as a reliable indicator of the presence of illegal quantities of marijuana in suspected structures/buildings. In other words, this study's primary aim is to determine the *predictive validity* of marijuana odor detection.

A secondary objective of this research is to provide a detailed description of marijuana grow searches conducted by AST investigators. The data used for this study were compiled from the case records for all marijuana grow searches conducted by AST for the years 2006–2010 (n=333). Photocopies of case reports were provided to the University of Alaska Anchorage Justice Center (Justice Center) by the Alaska Department of Public Safety, Alaska State Troopers. Case reports were provided for all AST detachments and units. Information pertaining to individual identities was redacted, as was information pertaining to the specific locations/addresses of the structures/properties searched.

A total of 115 variables measuring the amount of marijuana discovered/seized, the situational conditions present when searches were conducted (including the detection of marijuana odors by AST investigators), the investigative activities undertaken by AST investigators, information provided by informants and suspects, the temporal and geographic patterns of marijuana grow searches, offenses charged, and property/evidence seized were coded from the 333 case records provided.

Key Findings

Marijuana Seized

- Detailed information pertaining to the amount of marijuana discovered/seized was compiled for each of the 333 case records reviewed. Marijuana, in some form, was seized by investigators in 326 cases (97.9%). A total of 282 case records (84.7%) noted the total aggregate weight of marijuana seized; AST investigators recorded the total number of marijuana plants seized in 314 case reports (94.3%).
- The average aggregate weight of marijuana seized, for the 282 case records containing aggregate weight information, was 58.4 ounces. The largest weight recorded was 1,544 ounces (96.5 pounds).
 - 87.9% of these seizures yielded an aggregate weight of 4 ounces or more of marijuana.

- 7.1% of these seizures yielded an aggregate weight of at least 1 ounce, but less than 4 ounces of marijuana.
- 5.0% of these seizures yielded an aggregate weight of less than 1 ounce of marijuana.
- The average aggregate number of marijuana plants seized, for the 314 case records containing plant seizure information, was 60.8 plants. The largest number of plants seized was 548.

Marijuana Odor Detection

- AST investigators reported detecting the odor of growing/green marijuana in 185 (55.6%) of the case records reviewed. Among these:
 - 95 (51.4%) case records indicated that the primary and at least one assisting investigator detected the odor of marijuana;
 - 60 (32.4%) case records indicated that the primary investigator detected the odor of marijuana, but there was no indication that an assisting officer smelled marijuana; and,
 - 30 (16.2%) case records indicated that at least one assisting investigator detected the odor of marijuana, but there was no indication that the primary investigator smelled marijuana.

The Association Between Marijuana Odor Detection and the Discovery of Illegal Quantities of Marijuana

- Alaska statutes specify five quantitative thresholds for criminal offenses pertaining to the possession of marijuana. This report examined four of these:
 - Threshold 1: Less than one ounce of marijuana;
 - Threshold 2: One ounce or more of marijuana;
 - Threshold 3: Four ounces or more of marijuana; and,
 - Threshold 4: 25 or more plants of the genus cannabis.
 - Detection of marijuana odors was not found to be a good predictor of whether or not a search would result in the discovery of less than one ounce of marijuana or, conversely, one ounce or more of marijuana.
 - Detection of marijuana odors was found to be significantly associated with the discovery of relatively “large” amounts of marijuana – that is, quantities of four ounces or more, as well as 25 or more plants. More specifically:
 - AST investigators discovered four ounces or more of marijuana in 91.5% of the searches that were preceded by the detection of marijuana odors by one or more investigators. In contrast, four or more ounces of marijuana were discovered in 83.1% of searches that were not preceded by the detection of marijuana odors.
 - AST investigators discovered 25 or more marijuana plants in 72.7% of the searches that were preceded by the detection of marijuana odors by one or more investigators. In contrast, 25 or more marijuana plants were discovered in only 51.4% of searches that were not preceded by the detection of marijuana odors.
-

Offenses Charged

- A total of 1,014 statutory violations were coded for the 333 case files reviewed. Of those offenses:
 - 896 (88.4%) of the offenses recorded by AST investigators were for violations of Alaska's *Misconduct Involving Controlled Substances* (MICS) statutes. Of these:
 - 826 (92.2%) were classified as MICS-4th Degree offenses;
 - 36 (4.0%) were classified as MICS-5th Degree offenses;
 - 18 (2.0%) were classified as MICS-3rd Degree offenses;
 - 13 (1.5%) were classified as MICS-6th Degree offenses; and,
 - 3 (0.3%) were classified as MICS-2nd Degree offenses.
 - 104 (10.3%) of the offenses recorded by AST investigators were for other criminal offenses. Highlights of these offenses included the following:
 - 40 (38.5%) were classified as *Offenses Against Public Order*. All but four of these violations was a misconduct involving weapons violation.
 - 32 (30.8%) were classified as *Offenses Against Property*. More than half of these were violations of theft statutes.
 - 13 (12.5%) were classified as *Offenses Against Persons*. All but one of these violations was an assault charge (6 felonies, 6 misdemeanors).
 - 11 (10.6%) of the offenses recorded by AST investigators were classified as *Offenses Against Family Members and Vulnerable Adults*. All but one of these offenses were violations of 11.51.130(a)(2), which makes it a crime to allow a child under 18 years of age to enter or remain in the immediate physical presence of the unlawful manufacture, use, display, or delivery of a controlled substance.

Characteristics of Marijuana Grow Searches

- Month-to-month marijuana grow search activity varied widely during the study period, but was fairly consistent once monthly totals were collapsed into quarterly totals.
 - Marijuana grow search activity peaked at mid-week (i.e., Tuesdays, Wednesdays, and Thursdays) and declined on weekends, most notably on Sundays.
 - Marijuana grow searches typically occurred during business hours (i.e., 10:00 a.m. – 6:00 p.m.).
 - A large majority of marijuana grow searches (80.5%) were conducted by investigators assigned to the Alaska Bureau of Alcohol and Drug Enforcement (ABADE).
 - The bulk of all marijuana grow searches (43.2%) were conducted by investigators assigned to the Palmer Detachment (PALD).
 - Nearly two-thirds of all case records (n=216, 64.9%) indicated that the investigation/search
-

was initiated by information received from one or more informants.

- In more than half (n=132, 61.1%) of these cases, a member of some other agency/organization provided the “tip” to AST investigators, most commonly this informant was a police officer. Other agencies/organizations included the Office of Children’s Services and the Department of Corrections.
- In most cases (n=178, 82.4%), AST investigators relied on information from a single informant.
- AST investigators reported making initial contact with suspects via a “knock-and-talk” in approximately a third (29.7%) of all cases.
- AST investigators reported conducting background investigations of suspects in 101 (30.3%) case reports.
- Search warrant applications were reported by AST investigators in 203 (61%) case reports.
- Suspects admitted to growing marijuana, prior to any issuance of a Miranda warning, in almost half of the case records reviewed (n=164, 49.3%). Nearly one-in-five suspects (n=60, 18%) admitted to growing marijuana following the issuance of a Miranda warning.
- Suspects admitted to distributing marijuana, prior to any indication of a Miranda warning, on 42 occasions (12.6% of all case records). Approximately one-in-ten suspects (n=31, 9.3%) admitted to distributing marijuana following the issuance of a Miranda warning.
- Nearly all case records (n=316, 94.9%) included evidence sheets describing items and quantities of property seized and placed into evidence. In all, AST investigators documented 2,931 pieces of evidence.
 - More than a quarter of all items (n=854, 29.1%) seized were described as some form of marijuana (i.e., growing plants, cultivated or processed marijuana, marijuana seeds, or hashish).
 - AST investigators reported seizing 676 pieces of equipment used to grow marijuana, for example lights, ballasts, and fans; 241 items used to process marijuana were seized.

The Legal Status of Marijuana and Probable Cause for Search Warrants

In addition to the empirical findings summarized above, this study also included a review of federal and Alaska laws regulating the possession and use of marijuana, as well as law governing the execution of search warrants. Below are the key highlights of this review:

- Under federal law, marijuana is classified as a Schedule I controlled substance. This classification is reserved for substances deemed to have “a high potential for abuse,” “no currently accepted medical use in treatment,” and “a lack of accepted safety for use of the drug or other substance under medical supervision.”
 - Under Alaska law, marijuana is classified as a Schedule VIA controlled substance. This classification is reserved for substances with the lowest degree of danger to a person or the public.
-

- According to judicial interpretation of the Alaska Constitution's right to privacy, adults may possess a limited amount of marijuana in their homes for personal use (see *Ravin v. State of Alaska*). Alaska statutes also provide for the medical use of marijuana by individuals suffering from debilitating conditions, pursuant to a doctor's orders.
- Currently, Alaska statutes make possession of any amount of marijuana a crime. The penalties associated with marijuana possession vary according to the amount possessed (see AS 11.71.010-11.71.090).

Probable Cause to Search the Home Based on the Odor of Marijuana

- The United States Supreme Court has long permitted the odor of narcotics to be used to establish sufficient probable cause to issue a search warrant. Other federal courts, including the Ninth Circuit Court of Appeals, have suggested that the odor of marijuana alone is sufficient probable cause to issue a search warrant to enter the home.
 - As established in *State of Alaska v. Crocker*, because some marijuana possession is permitted under Alaska law, additional indication of illegal activity is needed to establish probable cause that a crime has been committed.
 - Within Alaska, there is an unresolved tension between state statutes, which prohibit the possession of any marijuana, and the *Ravin* and *Noy* decisions, which have established that adults may possess a limited amount of marijuana in their homes for personal use.
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Introduction

Purpose

The primary purpose of this study is to provide an empirical estimate of the extent to which Alaska State Troopers (AST) investigators' detection of the odor of green/growing marijuana served as a reliable indicator of the presence of a legally prohibited quantity of marijuana in a suspected structure or building for searches conducted during the five-year period 2006–2010. In other words, this study's primary aim is to determine the *predictive validity* of marijuana odor detection. As it is used here, the term “predictive validity” refers to the ability of a particular test (in this case, detection of marijuana odors by AST investigators) to predict a subsequent criterion measure (in this case, the discovery of an illegal quantity of marijuana). The quantity of marijuana seized by AST investigators (measured as the number of marijuana plants, or the total aggregate weight of marijuana) is used as the validation criterion.

A secondary aim of this research is to provide a detailed description of marijuana grow searches. In addition to documenting how often AST investigators detected an odor of growing/green marijuana and the total amount of marijuana discovered during searches of suspected structures/properties, case records were reviewed for information pertaining to the specific statutory violations individuals were charged with, the situational/contextual conditions that existed when searches were conducted, the investigative activities performed by AST officers, information provided by informants, suspects and third parties, and the articles of evidence (other than marijuana) that were seized.

Scope

To estimate the predictive validity of marijuana odor detection, information was obtained from the case records for all searches conducted during 2006–2010 by Alaska State Troopers of structures/property suspected of harboring illegal marijuana grow operations. The findings presented in this report are based on data compiled by the University of Alaska Anchorage Justice Center (Justice Center) from case reports provided by the Alaska Department of Public Safety, Alaska State Troopers (AST).

Copies of case reports were provided to the Justice Center by AST for all searches of structures/property where illegal marijuana grow activities were suspected of occurring for the years 2006–2010 (hereafter termed “marijuana grow searches”). Case reports were provided for all AST detachments and units. Information pertaining to individual identities (e.g., the names of suspects, witnesses, and investigators) was redacted, as was information pertaining to the specific location/address of the structures/properties searched. In all, 333 case records were coded for analysis.

A total of 115 variables measuring the amount of marijuana discovered/seized, the situational

conditions present when searches were conducted (including the detection of marijuana odors by AST investigators), the investigative activities undertaken by AST investigators, information provided by informants and suspects, the temporal and geographic patterns of marijuana grow searches, offenses charged, and property and evidence seized were coded from each of the 333 case records provided. (A complete description of all variables is provided in a codebook in the Appendix.)

Outline of Report

This report provides a summary of the marijuana grow searches conducted by AST between January 2006 and December 2010. The report begins with an Executive Summary of the study's most salient findings.

Part I provides a brief overview of the legal status of marijuana in the United States, focuses on the differences in marijuana regulation under federal law and the laws of the state of Alaska, and identifies the marijuana-related acts that constitute violations of Alaska's *Misconduct Involving a Controlled Substance* (MICS) statutes during the study period. The issue of the probable cause necessary to search the home based on the odor of marijuana under both federal and Alaska state law is also discussed.

Part II describes the methodology used to collect the data that are summarized in the report.

Part III presents the study's empirical findings. The analyses in this portion of the report are limited almost exclusively to univariate descriptive statistics (i.e., percentages, measures of central tendency, and dispersion). One exception is the bivariate analysis examining the association between the detection of marijuana odors by investigators and the discovery of legally prohibited quantities of marijuana following searches of structures/properties. Specific results are presented for: the temporal and geographic patterns of searches conducted by AST investigators during the study period; the statutory violations cited by AST investigators; the various forms of marijuana discovered (e.g., plants, processed); the total amount of marijuana seized (e.g., number of plants, aggregate weight); the situational conditions present when searches were conducted (e.g., Did investigators detect the odor of marijuana prior to conducting a search?); the investigative activities performed by investigators (e.g., Did officers perform surveillance of a suspected structure/property prior to conducting a search?); the information provided by informants, suspects, and third parties; and the types and amounts of evidence seized as a result of searches.

Part III concludes with a summary and brief discussion of the study's findings.

The report also includes an Appendix, which contains a codebook describing the operationalization and descriptive statistics for each of the variables coded from AST investigators' case reports.

The Legal Status of Marijuana

Marijuana Prohibition Under Federal Law

As part of President Nixon’s “War on Drugs,” the United States Congress passed the Comprehensive Drug Abuse Prevention and Control Act in 1970, commonly known as the Controlled Substances Act (“CSA”).¹ The CSA categorizes controlled substances into five different schedules.² Substances are grouped together in each schedule based on their accepted medical uses, the potential for abuse, and their psychological and physical effects on the body.³

Marijuana is a Schedule I controlled substance under the CSA.⁴ Schedule I controlled substances have “a high potential for abuse,” “no currently accepted medical use in treatment,” and “a lack of accepted safety for use of the drug or other substance under medical supervision.”⁵ As a Schedule I drug, the possession of any amount of marijuana is illegal under federal law.⁶ Federal marijuana crimes carry maximum prison sentences ranging from one year to life in prison and maximum fines ranging from one thousand dollars to eight million dollars, depending upon the amount of marijuana involved and the circumstances surrounding the conviction.⁷

Marijuana Prohibition Under Alaska State Law

Similar to the CSA, the Alaska Statutes contain criminal penalties for possession of any amount of marijuana.⁸ (See Table 1). However, there are distinctions between the state and federal laws governing the possession and use of marijuana. For instance, the State of Alaska does not consider marijuana as dangerous a substance as the federal government does. Marijuana is classified as a schedule VIA drug in Alaska—a drug with the lowest degree of danger to a person or the public.⁹ Additionally, through judicial interpretation of the Alaska Constitution’s right to privacy, adults may possess a limited amount of marijuana in their homes for personal use.¹⁰ A state medical marijuana law also allows individuals suffering from debilitating medical conditions to use

1. *Gonzales v. Raich*, 545 U.S. 1, 10 (2005).

2. 21 U.S.C. § 812(a) (2010).

3. 21 U.S.C. §§ 811, 812 (2010).

4. 21 U.S.C. § 812(c).

5. 21 U.S.C. § 812(b)(1)(A)-(C).

6. 21 U.S.C. § 844(a) (2010). There is an exception for marijuana possession for government-approved and registered scientific research. 21 U.S.C. §§ 822-23 (2010).

7. 21 U.S.C. §§ 841(b), 844(a) (2010).

8. AS 11.71.060(a)(1).

9. AS 11.71.190(a), (b).

10. *Ravin v. State*, 537 P.2d 494 (Alaska 1975).

Activity	Classification/penalty¹	Source
Use or display of any amount of marijuana.	MICS-6th: Class B misdemeanor	AS 11.71.060(a)(1) AS 11.71.060(b)
Possession of less than one ounce of marijuana.	MICS-6th: Class B misdemeanor	AS 11.71.060(a)(2) AS 11.71.060(b)
Possession of less than one ounce of marijuana with intent to manufacture or deliver.	MICS-5th: Class A misdemeanor	AS 11.71.050(a)(1) AS 11.71.050(b)
Possession of one ounce or more of marijuana	MICS-5th: Class A misdemeanor	AS 11.71.050(a)(2)(E) AS 11.71.050(b)
Possession of one or more ounces of marijuana with intent to manufacture or deliver.	MICS-4th: Class C felony	AS 11.71.040(a)(2) 11.71.040(d)
Possession of four ounces or more of marijuana.	MICS-4th: Class C felony	AS 11.71.040(a)(3)(F) 11.71.040(d)
Possession of 25 or more plants of the genus cannabis.	MICS-4th: Class C felony	11.71.040(a)(3)(G) 11.71.040(d)
Possession of any amount of marijuana with reckless disregard that the possession occurs on, at or within 500 feet of school grounds, a recreation/youth center, or a school bus.	MICS-4th: Class C felony	AS 11.71.040(a)(4)(A)(i)-(ii) 11.71.040(a)(4)(B) 11.71.040(d)
Delivery of any amount of marijuana to a person who is under 19 years old and at least 3 years younger than the person delivering the marijuana.	MICS-3rd: Class B felony	AS 11.71.030(a)(2) AS 11.71.030(c)

1. Misconduct Involving a Controlled Substance is abbreviated as "MICS." The corresponding number represents the degree of misconduct.

marijuana pursuant to a doctor's orders.¹¹

A review of the legal status of marijuana in Alaska begins with the Alaska Supreme Court's 1975 decision *Ravin v. State*.¹² In *Ravin*, the Court held that possession of marijuana by adults at home for personal use is protected under the right to privacy contained in the Alaska Constitution.¹³ This holding was limited: it did not include the buying or selling of marijuana, use or possession of marijuana in public, or possession of marijuana at home in amounts indicative of an intent to sell.¹⁴ *Ravin* only allowed personal possession and consumption by adults in the home without specifying a bright-line quantity. The *Ravin* decision has never been overturned and it remains the controlling authority on this issue.¹⁵

Following *Ravin*, the Alaska Legislature revised the State's marijuana possession laws "to

11. AS 17.37.010.

12. 537 P.2d 494 (Alaska 1975).

13. *Id.* at 511.

14. *Id.* Alaska courts have declined to extend protection under the right to privacy to personal consumption of cocaine or alcohol. *State of Alaska v. Erickson*, 574 P.2d 1, 12 (Alaska 1978); *Harrison v. State of Alaska*, 687 P.2d 332, 339 (Alaska App. 1984).

15. *See, e.g., Hotrum v. State of Alaska*, 130 P.3d 965, 969-70 (Alaska App. 2006).

take into account the supreme court's ruling."¹⁶ In 1975, the State Legislature enacted "special provisions" concerning marijuana possession which eliminated any criminal penalty for possession of marijuana in one's home for personal use, but provided for a civil penalty of up to \$100.¹⁷

In 1982, the Legislature moved Alaska's criminal drug laws from Title 17 of the Alaska Statutes to Title 11.¹⁸ In doing so, the Legislature repealed the marijuana provisions of AS 17.12 and enacted new marijuana laws in AS 11.71 (where they remain today).¹⁹ The Alaska Legislature has the power to determine the amount of marijuana that adults may possess for personal use in their homes, and the 1982 laws were intended to clearly define the amount of marijuana adults could possess in the home without violating the law.²⁰ Following these revisions, there was no penalty (whether criminal or civil) for possessing less than four ounces of marijuana in one's home "for personal use."²¹

These laws changed again in 1990 when Alaska voters approved a ballot proposition (1990 Initiative Proposal No. 2) that made possession of any amount of marijuana under eight ounces a class B misdemeanor.²² However, in the 2003 *Noy v. State* decision, the Alaska Court of Appeals found this change to be unconstitutional in light of *Ravin* and held that "with regard to possession of marijuana by adults in their home for personal use, AS 11.71.060(a)(1) must be interpreted to prohibit only the possession of four ounces or more of marijuana."²³

In 2006 the Alaska Legislature passed a bill that once again amended several sections of the state's marijuana statutes.²⁴ In particular, the 2006 amendments changed the criminal penalties associated with various types of marijuana use and possession as well as the method for determining the weight of marijuana contained in growing plants.²⁵ Similar to the 1990 laws, the 2006 amendments contained criminal penalties for any possession of marijuana without regard for personal use in the home. An overview of the current marijuana statutes, as revised by the 2006 amendments, is contained in Table 1.

16. *Noy v. State*, 83 P.3d 538, 541 (Alaska App. 2003).

17. *Id.*

18. *Id.*

19. *Id.*

20. *Walker v. State of Alaska*, 991 P.2d 799, 802-03 (Alaska App. 1999) (quoting Commentary and Section Analysis for the 1982 Revision of Alaska's Controlled Substance Laws, *Conference Committee Substitute for Senate Bill No. 190* at 19); *Hotrum*, 130 P.3d at 969-70.

21. *Noy*, 83 P.3d at 542.

22. *Id.*

23. 83 P.3d 538, 542-45 (Alaska App. 2003), *on rehearing* 83 P.3d 545, 548 (Alaska App. 2003); *Hotrum v. State of Alaska*, 130 P.3d 965, 970 (Alaska App. 2006). Following the Court of Appeals decision on rehearing, the State filed a petition for hearing before the Alaska Supreme Court which was denied. Order Denying Pet. For Hrg., *State v. Noy*, Supreme Court No. S-11297 (Sept. 7, 2004).

24. Ch. 53, § 9, SLA 2006.

25. Under the revised AS 11.71.080, the aggregate weight of a live marijuana plant "shall be one-sixth of the measured weight of a live marijuana plant after the roots of the marijuana plant have been removed."

Shortly after this legislation passed, a lawsuit was filed that challenged the constitutionality of several of the 2006 amendments.²⁶ The plaintiffs argued that the 2006 amendments conflicted with *Ravin* and the privacy clause of the Alaska Constitution to the extent that the amendments criminalized possession of marijuana in the home by adults for personal use.²⁷ Ultimately, the Alaska Supreme Court ruled that the case was not ripe for decision and dismissed it on a technicality without addressing the constitutional issues.²⁸

The court stated that any challenge to the constitutionality of the 2006 amendments must wait until there is an actual prosecution under the revised laws.²⁹ Since that ruling, there has not been another reported decision that addresses the constitutionality of the 2006 amendments. Thus, a tension remains between the marijuana possession prohibited by state statute and the personal use permitted under the *Ravin* and *Noy* court decisions.

In addition to personal consumption of small amounts of marijuana in the home, Alaska law permits limited possession and use of marijuana for medicinal purposes. In 1998, Alaska voters approved a “medical marijuana” ballot initiative.³⁰ This initiative codified laws that establish procedures for Alaskans with debilitating medical conditions to use marijuana for medicinal purposes.³¹ Such medicinal marijuana use is conditioned upon a physician’s certification that the use will be beneficial and the user must register with the state, which will then issue an identification card and maintain a registry of all authorized users.³²

Registered medicinal marijuana users have an affirmative defense to prosecution for certain marijuana-related crimes.³³ Registered users may possess up to one ounce of marijuana and six cannabis plants (of which only three can be flowering).³⁴ They may not smoke marijuana in public, but may possess it in public under certain conditions (the marijuana must be in a sealed container, concealed, and the individual must be transporting it to a location where it is permissible to use it).³⁵ Failure to comply with the medical marijuana formalities is a Class A misdemeanor.³⁶

26. *American Civil Liberties Union of Alaska, Jane Doe, and Jane Roe v. State of Alaska and David Marquez*, Case No. 1JU-06-0793CI (June 5, 2006).

27. *State of Alaska v. American Civil Liberties Union of Alaska*, 204 P.3d 364, 366 (Alaska 2009).

28. *Id.* at 373-74.

29. *Id.* at 366-67.

30. 1998 Ballot Measure No. 8, § 1; SLA 1999, ch. 37, § 3. Amended by SLA 2010, ch. 58, § 13; *Rollins v. Ulmer*, 15 P.3d 749, 750 (Alaska 2001).

31. AS 17.37.010.

32. AS 17.37.010(c).

33. AS 17.37.030(a); 11.71.090.

34. AS 17.37.040(a)(4)(A), (B).

35. AS 17.37.040(a)(2)(A)-(C).

36. AS 11.71.050(a)(3).

Probable Cause to Search the Home Based on the Odor of Marijuana

Federal Law

The Fourth Amendment to the United States Constitution protects against unreasonable search and seizure:

The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.³⁷

The plain text of the Amendment establishes two main requirements before a home can be searched by law enforcement officials: “First, all searches and seizures must be reasonable. Second, a warrant may not be issued unless probable cause is properly established and the scope of the authorized search is set out with particularity.”³⁸

Probable cause is defined as “A reasonable ground to suspect that a person has committed or is committing a crime or that a place contains specific items connected with a crime.”³⁹ In the context of a search of an individual’s home for evidence of illegal narcotics, the United States Supreme Court has long permitted the odor of narcotics to be used to establish sufficient probable cause to issue a search warrant.⁴⁰ Other federal courts, including the Ninth Circuit Court of Appeals, have suggested that the odor of marijuana alone is sufficient probable cause to issue a search warrant to enter the home.⁴¹

Alaska State Law

The Alaska Constitution’s prohibition against unreasonable search and seizure largely mirrors the Fourth Amendment:

37. U.S. Const. amend. IV.

38. *Kentucky v. King*, ___ U.S. ___, 131 S.Ct. 1849, 1856 (2011), (citing *Payton v. New York*, 445 U.S. 573, 584 (1980)).

39. *Black’s Law Dictionary* 1219 (7th ed. 1999).

40. *Taylor v. United States*, 286 U.S. 1, 6 (1932) (The mere odor of illegal whiskey can provide probable cause sufficient for a warrant to search private property.); *Johnson v. United States*, 333 U.S. 10, 12-13 (1948) (The “strong odor of burning opium which [] was distinctive and unmistakable” can constitute sufficient evidence for probable cause.); *United States v. Ventresca*, 380 U.S. 102, 111 (1965) (The smell of contraband by a trained officer supports a finding of probable cause.).

41. *United States v. Kerr*, 876 F.2d 1440, 1445 (9th Cir. 1989) (Marijuana odor may itself establish probable cause.); *United States v. Pierre*, 958 F.2d 1304, 1310 (5th Cir. 1992) (*en banc*) (The smell of marijuana can give rise to probable cause to search a car); *cf. United States v. Tate*, 694 F.2d 1217, 1221 (9th Cir.1982) (Because ether has legitimate uses, its odor, absent additional evidence, does not establish probable cause to issue a search warrant.).

The right of the people to be secure in their persons, houses and other property, papers, and effects, against unreasonable searches and seizures, shall not be violated. No warrants shall issue, but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.⁴²

However, the Alaska Constitution provides “an even broader guarantee against unreasonable searches and seizures than does the fourth amendment to the Constitution of the United States.”⁴³ This is because the fourth amendment does not contain the phrase “other property” and the federal constitution, unlike Alaska’s, does not contain an explicit guarantee of privacy.⁴⁴

Under Alaska state law, “[p]robable cause to issue a search warrant exists when ‘reliable information is set forth in sufficient detail to warrant a reasonably prudent [person] in believing that a crime has been or was being committed.’”⁴⁵ In other words, “no search warrant can issue until the police present a magistrate with good reason to believe that the law has been broken (and that evidence of illegality can be found on the premises to be searched).”⁴⁶ To satisfy the probable cause requirement for a search of an individual’s home for suspected marijuana-related crimes, the smell of marijuana alone is not sufficient.⁴⁷ Because some marijuana possession is permitted under Alaska law, additional indication of illegal activity is needed to establish probable cause that a crime has been committed.⁴⁸

This rule was established in *State of Alaska v. Crocker*.⁴⁹ In *Crocker* the Alaska Court of Appeals held that “Evidence that a person possesses an unspecified quantity of marijuana in their home does not, standing alone, establish probable cause to believe that the person is breaking the law.”⁵⁰ In order to obtain a warrant to enter and search a person’s home for evidence of marijuana possession, the search warrant application must establish evidence that the possession exceeds the scope of what is constitutionally protected under *Ravin* and *Noy*: that marijuana is being sold on the premises, is possessed for commercial purposes, or that the total amount of marijuana

42. Alaska Const. Art. I Sec. 14.

43. *Ellison v. State*, 383 P.2d 716, 718 (Alaska 1963).

44. *Woods & Rhode, Inc. v. State, Dept. of Labor*, 565 P.2d 138, 148 (Alaska 1977).

45. *Badoino v. State*, 785 P.2d 39, 41 (Alaska App.1990) (quoting *Harrelson v. State*, 516 P.2d 390, 396 (Alaska 1973)).

46. *State of Alaska v. Crocker*, 97 P.3d 93, 96 (Alaska App. 2004). “This same rule governs search warrants for all controlled substances, not just marijuana.” *Id.*

47. *Id.*

48. *Id.*

49. 97 P.3d 93 (Alaska App. 2004).

50. *Id.* at 96-97; cf. *Lustig v. State*, 36 P.3d 731 (Alaska App. 2001), where in a pre-*Noy* decision, the Alaska Court of Appeals held that an officer who smelled growing marijuana from a defendant’s home had probable cause to obtain a search warrant.

possessed exceeds four ounces.⁵¹

The *Crocker* court concluded that there was no evidence in the search warrant application that established a correlation between the strength of the odor of growing marijuana and the amount of marijuana being grown on the premises.⁵² The court did not disregard the possibility that such a correlation may exist, but it would “not simply assume that there is a direct proportionality between the strength of the odor and the amount of marijuana giving rise to that odor.”⁵³

The correlation between the strength of marijuana odor and the amount of growing marijuana was addressed again in *State of Alaska v. Smith*.⁵⁴ In that case, an investigator with the Alaska Bureau of Alcohol and Drug Enforcement applied for a search warrant to search a mobile home for a possible marijuana grow operation.⁵⁵ In support of his warrant application, the investigator swore out a thirteen-page affidavit that included the following information:

- The investigator and another trooper smelled a “moderate odor” of growing marijuana coming from inside the defendant’s mobile home;
- The investigator searched a neighboring residence (with consent) to eliminate it as a possible source of the marijuana odor;

51. *Id.* at 95-97. *See, e.g., Nelson v. State*, Case No. A-10113, (Alaska App., July 15, 2009), 2009 WL 2092450, a memorandum decision that may not be cited as legal precedent, where the Alaska Court of Appeals found the following evidence sufficient to establish probable cause that the defendant possessed marijuana for more than just personal use:

- (1) reports of a strong odor of marijuana during the nights (suggesting venting);
- (2) reports of periodic heavy traffic in and out of the residence;
- (3) the trooper’s observation of electrical ballasts, a vent hole, and a box for a 10,000-watt grow light bulb, and plant food;
- (4) the trooper’s observation of high use of electricity in a house that appeared to be heated by fuel;
- (5) a neighbor’s report that the defendant was unemployed but had built a house and purchased four wheelers and a motor home;
- (6) evidence of two grows in different locations on the property;
- (7) the defendant’s own admission that he had a multiple-stage marijuana grow with more than ten plants; and
- (8) the trooper’s assertion that based on his experience, his observations led him to believe that the grow operation was not for personal use. This evidence was sufficient to establish probable cause that Nelson possessed marijuana for more than just personal use.

52. *Id.* at 97. The court identified specific shortcomings with the search warrant at issue in *Crocker*: Though there was “ample” probable cause to believe marijuana was being grown in Crocker’s residence (based on the arresting officers’ perception of “a strong odor of growing marijuana” when they stood at his front door), the search warrant application did not contain an assertion that the strength of the smell gave the officers any indication as to the amount of marijuana that might be growing in Crocker’s house. *Id.* Similarly, though there was evidence of “higher than average” electricity usage,” the officers did not elaborate on the details, or explain the relationship between high electricity usage and probable cause to believe that the amount of marijuana being grown was outside the amount protected under *Ravin* and *Noy*. *Id.* at 98.

53. *Id.*

54. 182 P.3d 651 (Alaska App. 2008).

55. *Id.* at 652.

- Based on the investigator’s experience in smelling felony level marijuana grow operations, he believed there was sufficient marijuana growing at the mobile home to support a felony charge;
- If an officer can smell cultivating marijuana on the outside air, the amount being cultivated is likely in excess of four ounces because marijuana plants must be present in sufficient number or mass for the odor to be detectable outside of a residence;
- The ability to smell the odor of cultivating marijuana outside a building is, by itself, indicative of a commercial grow operation because it typically indicates the use of an installed air venting system which is not often used in personal-use grow operations;
- The investigator has never smelled packaged or personal-use marijuana stored in someone’s house;
- The investigator’s unit rarely found personal use grow operations; and
- Statistical data that asserted that eighty-one of the marijuana grows seized by the investigator’s unit from 2000-2004 were discovered by officers smelling growing marijuana, and in ninety-six percent of those seizures, a felony-level grow operation was discovered.⁵⁶

The Court of Appeals found that the information contained in the investigator’s affidavit cured the deficiencies in the search warrant in *Crocker*.⁵⁷ The affidavit therefore established probable cause to believe that evidence of commercial marijuana cultivation would be found in the mobile home.⁵⁸ However, the defendant questioned the statistical information, arguing that the statistics cited were “unreliable because the data consists only of those instances in which the police ultimately *seized* the marijuana they smelled” and the data did “not specify whether and how many times [the investigator’s] unit smelled cultivating marijuana but did *not* seize it because the grows were not commercial grows.”⁵⁹ Because the defendant had not had a formal opportunity to review the data, the court remanded the case to the Superior Court in order to give the defendant an opportunity to discover if there were flaws in the statistical analysis that would undercut the finding of probable cause.⁶⁰ The subsequent proceedings did not produce any reported findings on the quality of the statistical analysis.⁶¹

56. *Id.* at 652-54.

57. *Id.* at 654.

58. *Id.*

59. *Id.*

60. *Id.* at 655. This same “study” was recently cited as “statistically flawed” by the U.S. District Court for the District of Alaska. *U.S. v. Thoms*, Docket No. 186, Case No. 3:10-cr-00069 JWS, ___ F.Supp.2d ___, 2011 WL 1540206 at *2 (D. Alaska Apr. 22, 2011). For a more detailed discussion of the methodology used in the study, see Recommendation Regarding Motion to Suppress, *U.S. v. Thoms*, Docket No. 182, Case No. 3:10-cr-00069-JWS-JDR, 2011 WL 1212244 at *2-4 (D. Alaska Mar. 21, 2011).

61. *State of Alaska v. Nick L. Smith*, Case No. 3KN-06-00330CR.

Summary of Federal and Alaska State Marijuana Laws

There are different federal and state laws governing the classification and regulation of marijuana. Under federal law, possession of any amount of marijuana is prohibited.⁶² Under Alaska state law, marijuana is generally illegal, but there are exceptions for medicinal use and personal use in the home.⁶³ Medicinal users must suffer from a debilitating condition, consult with a doctor, and register with the state.⁶⁴ Registered medicinal users may possess up to one ounce of marijuana and six plants.⁶⁵ The exception for personal use of marijuana in the home stems from the Alaska Supreme Court's interpretation of the state constitution's right to privacy in *Ravin v. State*.⁶⁶ Subsequent court rulings and legislative action establish that an adult may possess up to four ounces of marijuana in the home for personal consumption.⁶⁷

Due to the varying legal status of marijuana under federal and state law, different standards also exist for determining the probable cause necessary to issue a search warrant to search a home for evidence of marijuana possession. Under federal law, the odor of illegal narcotics is sufficient to establish probable cause.⁶⁸ But because not all marijuana possession is illegal under Alaska law, the Alaska Court of Appeals has ruled that marijuana odor alone does not establish probable cause for a search warrant.⁶⁹ In order to obtain a warrant to enter and search a person's home for evidence of marijuana possession, there must be additional evidence of illegal marijuana activity—specifically that marijuana is being sold on the premises, is possessed for commercial purposes, or that the total amount of marijuana possessed exceeds four ounces.⁷⁰

62. 21 U.S.C. §844(a) (2010).

63. AS 11.71.060(a)1; AS 17.37.010; *Ravin v. State*, 537 P.2d 494 (Alaska 1975).

64. AS 17.37.010.

65. AS 17.37.040(a)(4)(A).

66. 537 P.2d 494 (Alaska 1975).

67. *Noy v. State*, 83 P.3d 538, 542-43 (Alaska App. 2003), *on rehearing* 83 P.3d 545 (Alaska App. 2003).

68. *Taylor v. United States*, 286 U.S. 1, 6 (1932); *Johnson v. United States*, 333 U.S. 10, 12-13 (1948); *United States v. Kerr*, 876 F.2d 1440, 1445 (9th Cir. 1989).

69. *State of Alaska v. Crocker*, 97 P.3d 93, 96 (Alaska App. 2004).

70. *Id.* at 95-97.

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Methodology

The information presented in this report was extracted from all *case reports* generated by the Alaska State Troopers (AST) for *searches* of structures and property suspected of containing *marijuana grow operations* in violation of Alaska's *controlled substance offense* statutes AS 11.71.010-11.71.090 for the five-year period spanning 2006-2010. Case reports were collected from every AST detachment and investigative unit. All case files containing the "marijuana produce" offense code were included. Photocopies of case files were provided to the UAA Justice Center by AST for coding and analysis. Information that could be used to personally identify any individual involved in the case (including the names of investigators, suspects, witnesses, and third parties, as well as specific locations and addresses of encounters with individuals) was redacted from every case file by AST prior to delivery to the UAA Justice Center.

Coding of Variables

Unit of analysis. The primary unit of analysis was each *marijuana search*.

Method. *Content analysis* was used to extract data elements from each case report. Content analysis refers to a methodology social scientists use to systematically and objectively quantify information that is embedded within texts. The "texts" referenced in this study are the case reports generated by AST. Operational definitions, levels of measurement, coding rules, and data entry protocols were established before data collection was initiated.

Data domains. Five domains of information were coded from each case report: case report identification, activity information, investigative activity, situational/environmental information, and evidence/property seized.

Case report identification. The unique number identifying each case report was recorded. Unique case identifiers were obtained from the State of Alaska Department of Public Safety (DPS) form 12-201 (Rev. 4/01).

Activity information. Each case report contained at least one "activity," but many case reports contained multiple "activities." Within each activity, a number of variables were coded, for example: investigating agency, activity code, statute/regulation, date reported, and time reported. All activity information was coded from pre-defined fields within DPS form 12-201 (Rev. 4/01).

Investigative activity. Approximately 50 binary (0=No, 1=Yes) variables were coded in order to capture information pertaining to the specific investigative activities performed by AST troopers and investigators. Some examples of investigative domain variables are: Was investigation initiated due to information received from an informant? Did the investigating officer indicate smelling marijuana on the open air? Did the investigating officer ask the suspect if they grew marijuana? Did the suspect admit to growing marijuana? Did the investigating officer interview neighbors about the suspected marijuana grow? Investigative activity was coded from all available narrative

materials contained in the case report, including the case synopsis provided on DPS form 12-201 (Rev. 4/01), supplemental information provided on DPS form(s) 12-202 (Rev. 1/00), and other included addenda and attachments.

Situational/environmental information. Narrative materials were also used to code environmental and situational variables. Environmental variables included such things as season, ambient outdoor temperature, exterior lighting, and wind conditions. Situational variables focused primarily on the characteristics and conditions of the structure suspected of housing a marijuana grow, for example: Was there observable evidence of excessive humidity on the exterior of the structure? Did the investigating officer observe glaciation/ice damming on the roof? Were any doors or windows open? Did the investigating officer detect the sound of fans? If marijuana odor was detected: Where was the investigating officer located when marijuana odor was detected? Situational/environmental variables were coded from all available narrative materials contained in the case report, including the case synopsis provided on DPS form 12-201 (Rev. 4/01), supplemental information provided on DPS form(s) 12-202 (Rev. 1/00), and other included addenda and attachments.

Evidence/property seized. For each case report, information pertaining to evidence generated as a result of the investigation/search was recorded. This data was obtained primarily from DPS form 12-210 (Rev. 1/00); however, additional evidence/property information was coded from additional narrative materials contained in the case report, including the case synopsis provided on DPS form 12-201 (Rev. 4/01), supplemental information provided on DPS form(s) 12-202 (Rev. 1/00), and other included addenda and attachments. For most cases where evidence was seized, two or more items were recorded on DPS form 12-210. Multiple variables were recorded for every article of evidence/property seized, for example: type code, article description, and estimated item value. For each case report, every item listed on DPS form 12-210 was recorded. Data coded from case report narratives was intended to serve as a supplement to the limited information provided in DPS form 12-210 such as the total weight of marijuana (and other drugs) seized as well as the amount of marijuana (and other drugs seized) by type (e.g., cultivated, processed, “shake”).

Total variables. In all, 115 variables were coded for each case record.

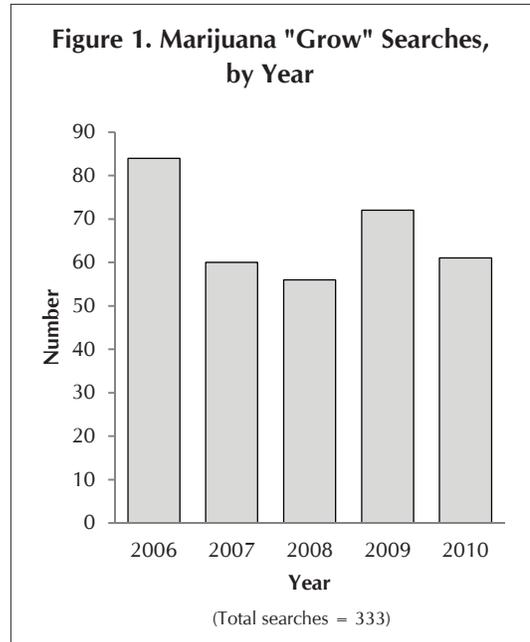
Total case records. Three hundred thirty-three case records were coded for the period January 2006 thru December 2010.

Findings

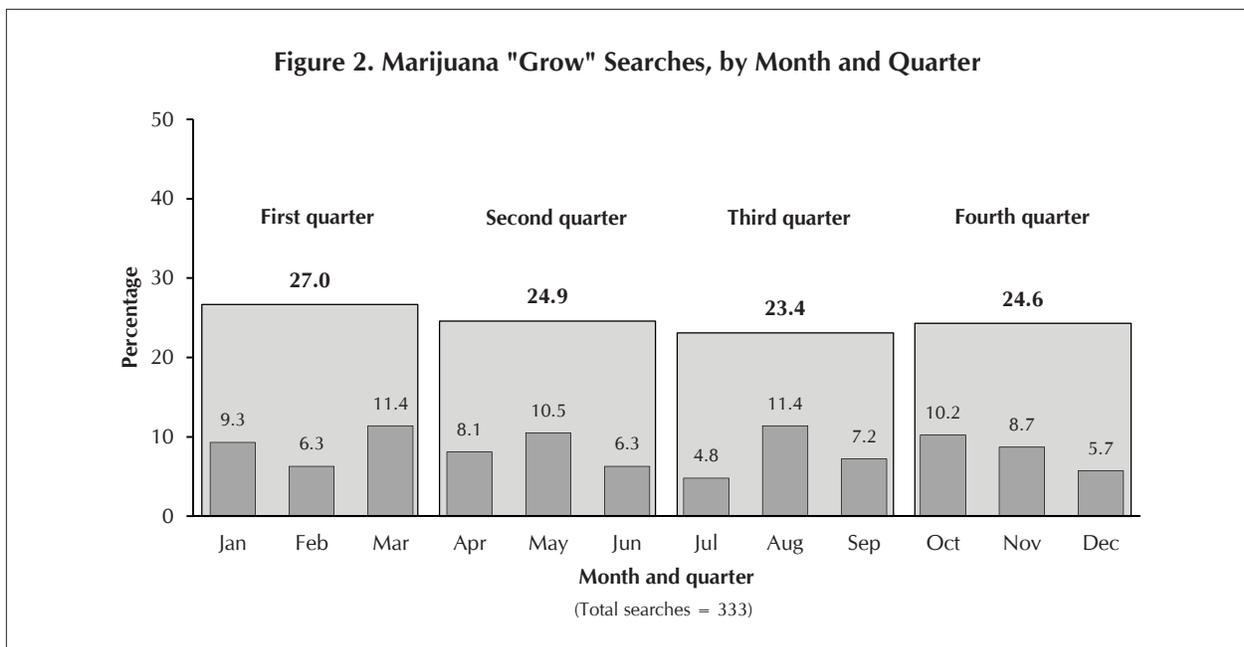
Marijuana Grow Searches: Temporal and Geographic Patterns

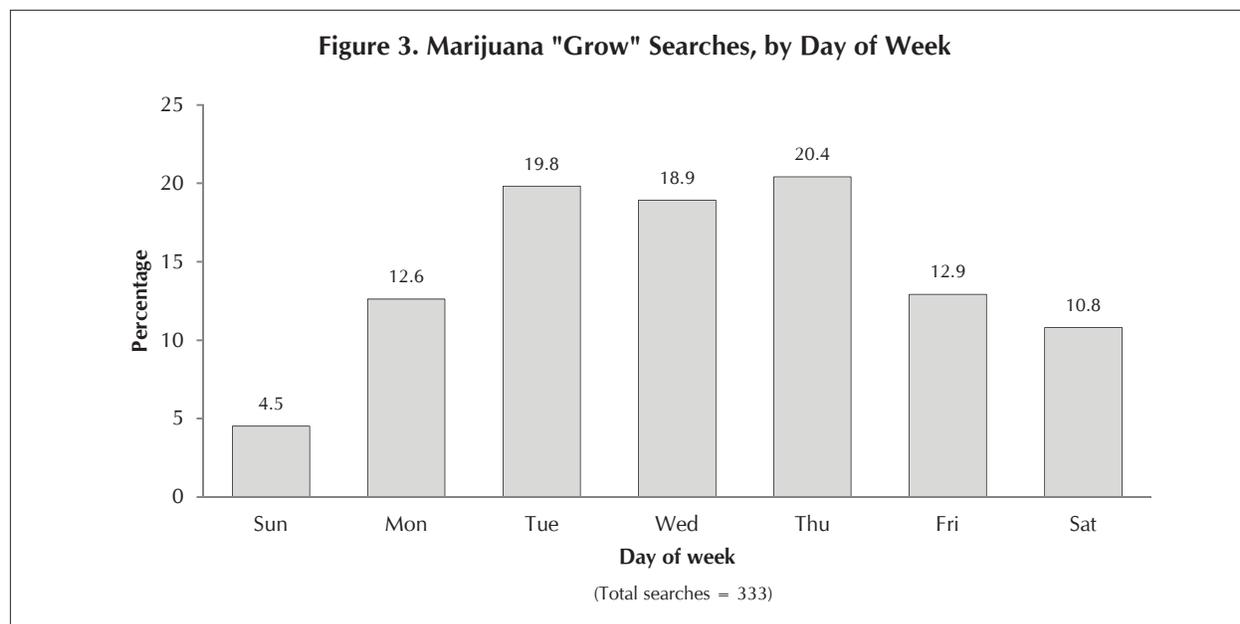
By Year. A total of 333 AST case records representing 333 searches/investigations of buildings, structures, and property—were coded for the period spanning January 2006 through December 2010, as shown in Figure 1.

By Month. Month-to-month search activity varied considerably, but was fairly consistent once monthly totals were collapsed into quarterly totals (see Figure 2). Marijuana grow searches were most often conducted in the months of August and March (11.4% of all searches each), followed by May (10.5%), October (10.2%), and January (9.3%). The months with the fewest marijuana searches were July (4.8%), December (5.7%), June (6.3%), and February (6.3%).



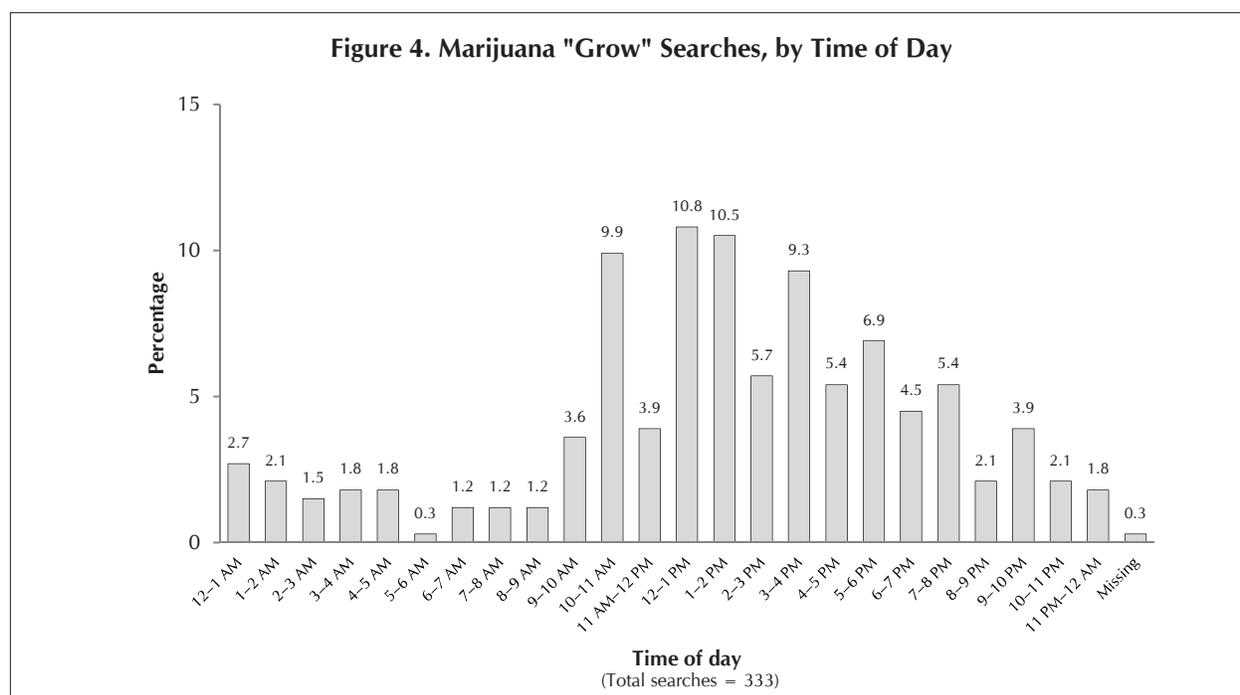
By Day-of-Week and Time-of-Day. The intensity of AST marijuana grow search activity also varied according to day-of-week (see Figure 3) and time-of-day (see Figure 4). In general, search activity peaked at mid-week and declined during weekends, most notably on Sundays. Marijuana grow searches were most likely to occur on Thursdays (20.4% of all searches), Tuesdays (19.8%)

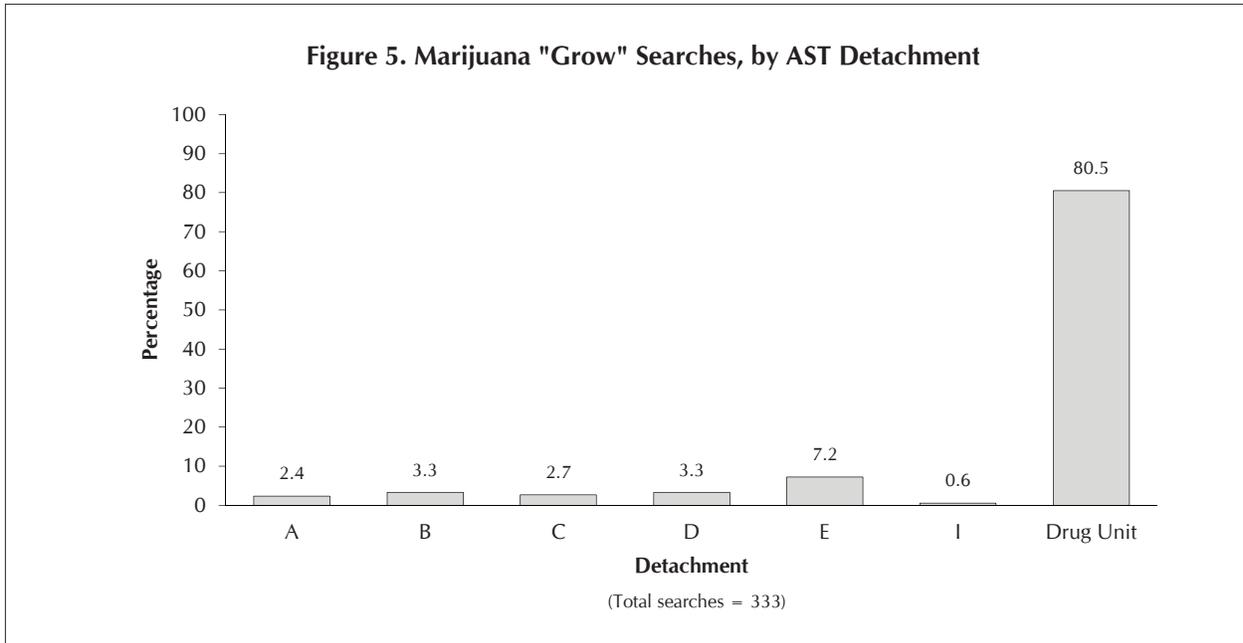




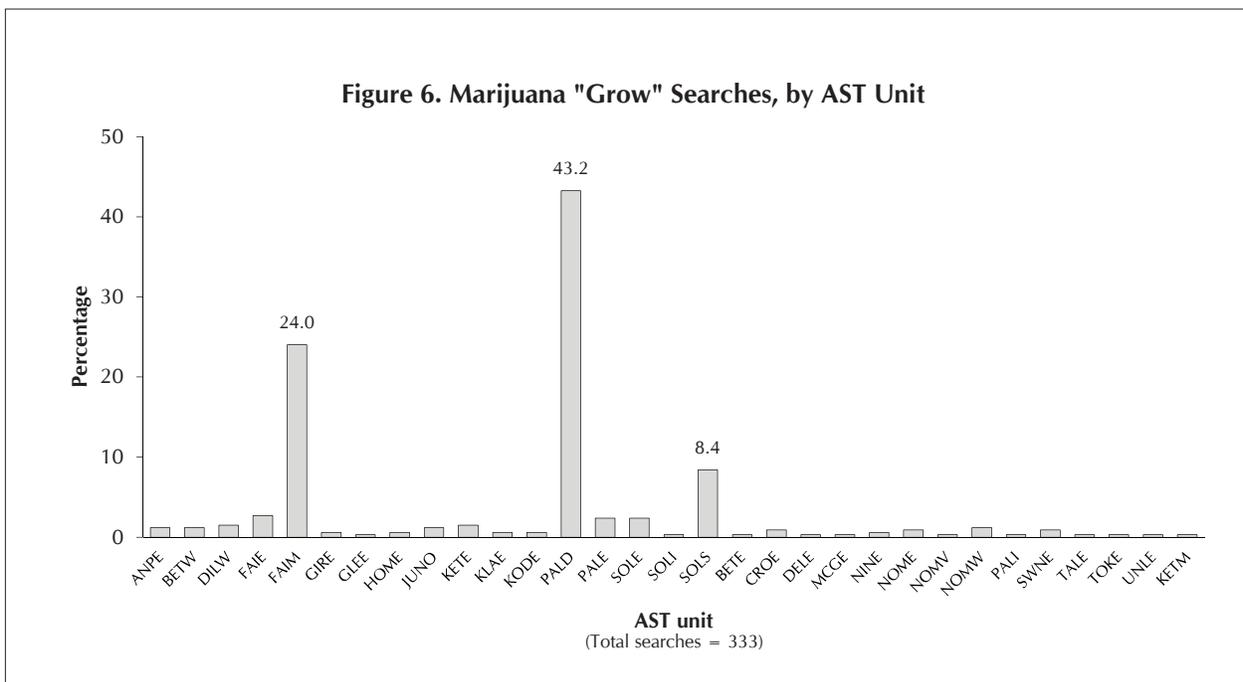
and Wednesdays (18.9%). In similar fashion, the distribution of search activity by time-of-day also shows a clearly defined peak period. Marijuana grow searches typically occurred during business hours, between 10:00 a.m. and 6:00 p.m.

By Detachment and Unit. While it was common for other AST detachments (and, in some instances, other law enforcement agencies) to assist with investigations, the Alaska Bureau of Alcohol and Drug Enforcement (ABADE) was cited as the primary investigative unit in most of the cases records filed between 2006 and 2010. Of the 333 case records included in this study, 268





(80.5%) were submitted by ABADE (see Figure 5). A total of 24 case records were submitted by troopers assigned to E-Detachment, 11 by B-Detachment troopers, 11 by D-Detachment troopers, 9 by C-Detachment troopers, 8 were completed by troopers assigned to A-Detachment, and 2 by troopers assigned to I-Detachment. Figure 6 presents the number of case records according to the specific AST unit to which the lead investigator was assigned. Nearly half of all marijuana grow searches were conducted by troopers working in the Matanuska-Susitna borough.

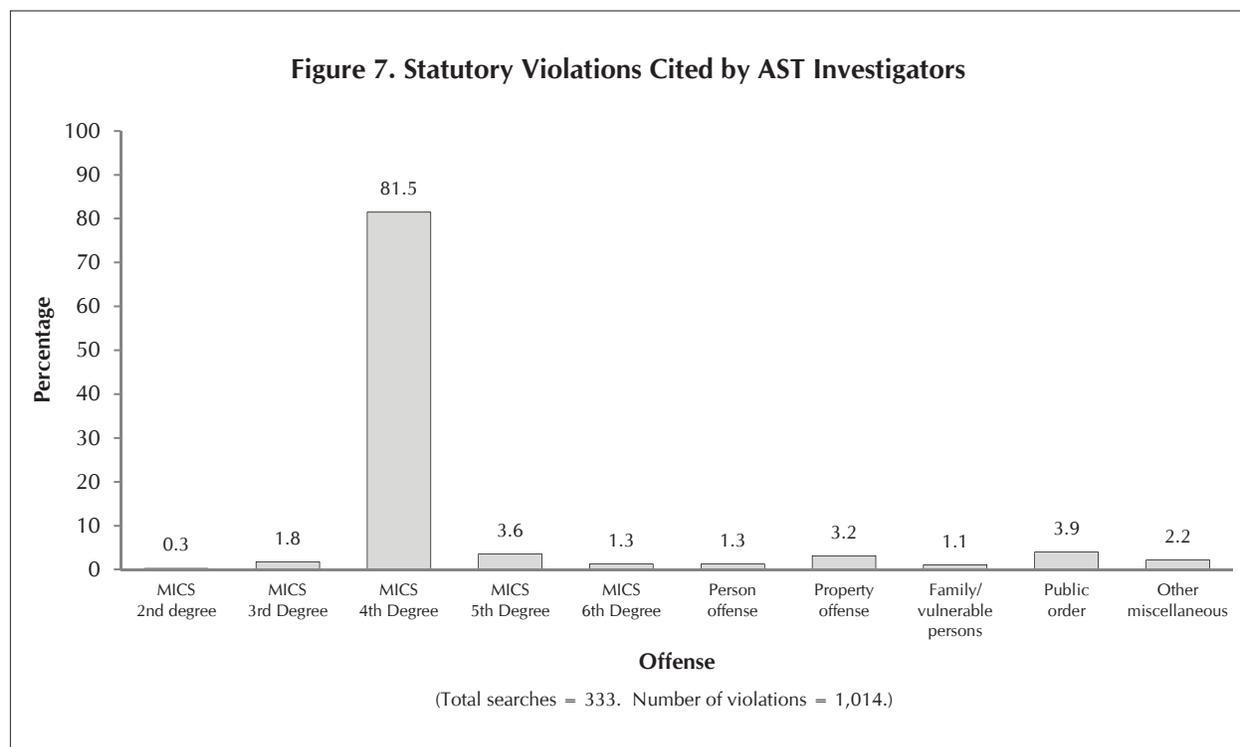


Marijuana Grow Searches: Offenses

A total of 1,014 *activities* were coded for the 333 case files reviewed. Every case file contained at least one activity; the maximum number of activities was 15. For each activity listed, troopers cited the specific Alaska statute for the offense committed, as well as noting a textual description of the offense. Results are depicted in Figure 7, below.

Nearly 90 percent of all violations recorded by AST investigators were classified as *Misconduct Involving Controlled Substances* (MICS) offenses. Approximately four percent of all criminal violations were classified as *Offenses Against Public Order*. Less than two percent of all criminal offenses were classified as *Offenses Against the Person* (1.3% of all cited violations) or *Offenses Against the Family and Vulnerable Persons* (1.1%). *Offenses Against Property* comprise just over three percent of all violations. An estimated two percent of all case files cited miscellaneous other statutory violations (only half of which were deemed criminal offenses).

Among the 896 MICS violations cited by AST investigators, more than 90 percent (n=826) were classified as *Misconduct Involving a Controlled Substance in the Fourth Degree* (MICS-4th Degree) (AS 11.71.040). This was followed, in descending order, by MICS-5th Degree (4% of all MICS violations), MICS-3rd Degree (2%), MICS-6th Degree (1.5%), and MICS-2nd Degree (0.3%). MICS-2nd Degree, MICS-3rd Degree, and MICS-4th Degree are felony offenses; MICS-5th Degree and MICS-6th Degree are misdemeanors.



Misconduct Involving a Controlled Substance in the Fourth Degree

The MICS-4th Degree statute governs, in some fashion, every category of controlled substances defined in Alaska law: Schedule IA, IIA, IIIA, IVA, VA, and VIA. A person commits the crime of MICS-4th Degree if the person:

- Possesses any amount of Schedule IA or IIA controlled substances;
- Possesses 25 or more tablets, or an aggregate weight of 3 grams or more, of Schedule IIIA or IVA controlled substances;
- Possesses 50 or more tablets, or an aggregate weight of 6 grams or more, of a Schedule VA substance;
- Possesses an aggregate weight of 4 ounces or more of a Schedule VIA controlled substance;
- Possesses 25 or more plants of the genus cannabis; or
- Possesses a Schedule IIIA, IVA, VA, or VIA controlled substance within 500 feet of a school or youth recreation center, or on a school bus.

In addition, a person commits the crime of MICS-4th Degree if the person:

- Manufactures, delivers, or possesses with the intent to manufacture or deliver any amount of a schedule IVA or VA controlled substance;
- Manufactures, delivers, or possesses with the intent to manufacture or deliver an aggregate weight of 1 ounce or more of a Schedule VIA controlled substance; or
- Knowingly maintains a structure or place for the purposes of storing or distributing controlled substances in violation of MICS-2nd Degree, MICS-3rd Degree, MICS-4th Degree, or AS 17.30.

Table 2 shows the frequency with which each of the various subsections of the MICS-4th Degree statute was cited by AST investigators. The offense cited most frequently was AS 11.71.040(a)(2), which pertains to the manufacture, delivery, or possession with the intent to manufacture or deliver one ounce or more of a Schedule VIA controlled substance. (The only substance identified by Alaska statute as a Schedule VIA controlled substance is marijuana.) This was followed by AS 11.71.040(a)(3)(F), which makes it illegal to possess an aggregate weight of 4 ounces or more of a Schedule VIA substance (marijuana), and AS 11.71.040(a)(5),

Table 2. Misconduct Involving a Controlled Substance in the Fourth Degree: Sections and Subsections Cited by AST Investigators

Alaska Statute	N	Percent
11.71.040*	47	5.7 %
11.71.040(a)*	5	0.6
11.71.040(a)(1)	16	1.9
11.71.040(a)(2)	199	24.1
11.71.040(a)(3)*	2	0.2
11.71.040(a)(3)(A)	37	4.5
11.71.040(a)(3)(C)	4	0.5
11.71.040(a)(3)(F)	185	22.4
11.71.040(a)(3)(G)	154	18.6
11.71.040(a)(5)	177	21.4
Total	826	

* "unspecified"

which prohibits maintaining a structure or place for the purposes of storing or distributing a controlled substance. The fourth most common offense was AS 11.71.040(a)(3)(G), which makes it a crime to possess 25 or more plants of the genus *cannabis* (marijuana plants). Taken together, these four statutes constituted more than 85 percent of the MICS-4th Degree offenses (and 70% of all violations) cited by AST investigators.

MICS offenses pertaining to drugs other than marijuana were also cited, albeit with much less frequency. The most common instance of a non-marijuana MICS-4th Degree charge was AS 11.71.040(a)(3)(A), which makes it illegal to possess any amount of a Schedule IA (e.g., opiates) or IIA controlled substance (e.g., cocaine, methamphetamine). In all, AST investigators recorded 37 violations of this statute (4.5% of all MICS-4th Degree offenses; 3.7% of all violations). An additional 16 violations of AS 11.71.040(a)(1), which prohibits the manufacture, delivery, or possession with the intent to manufacture or deliver any amount of a Schedule IVA or VA controlled substance, were also noted.

Misconduct Involving a Controlled Substance in the Second Degree

Only three violations were classified by AST investigators as MICS-2nd Degree offenses. Two of these offenses were violations of AS 11.71.020(a)(1), which makes it a crime to manufacture, deliver, or possess with the intent to manufacture or deliver any amount of a Schedule IA controlled substance. One violation resulted from the discovery of morphine tablets during the search of a private residence suspected of housing a marijuana grow operation; the other stemmed from a search warrant of a private residence that was executed as part of a drug interdiction task force investigation involving the delivery of parcels containing oxycontin. The unspecified MICS-2nd Degree violation involved the discovery of methamphetamine precursor chemicals in the garage of a residence that was searched for a marijuana grow.

Misconduct Involving a Controlled Substance in the Third Degree

A total of 18 violations were classified by AST investigators as MICS-3rd Degree offenses. A person commits the crime of MICS-3rd Degree if the person:

- Possesses any amount of a Schedule IA or IIA controlled substance within 500 feet of a school or youth recreation center;
- Manufactures, delivers, or possesses with the intent to manufacture or deliver any amount of a Schedule IIA or IIA controlled substance; or
- Delivers any amount of a schedule IVA, VA, or VIA controlled substance to a person under 19 years of age who is at least three years younger than the person delivering the substance.

Sixteen of the 18 violations were classified as violations of AS 11.71.030(a)(1), which prohibits the manufacture, delivery, or possession with the intent to manufacture or deliver any amount

of a Schedule IIA or IIIA controlled substance. The controlled substances discovered by AST investigators in these cases included psilocybin mushrooms, cocaine, and methamphetamine.

Misconduct Involving a Controlled Substance in the Fifth Degree

MICS-5th Degree offenses were cited a total of 36 times in the case records reviewed for this study. These 36 offenses represented 3.6 percent of all violations, and 4 percent of all MICS offenses. The MICS-5th Degree statute governs Schedule IIIA, IVA, VA, and VIA controlled substances. A person commits the crime of MICS-5th Degree if the person:

- Possesses less than 25 tablets, or an aggregate weight of less than 3 grams of Schedule IIIA or IVA controlled substances;
- Possesses less than 50 tablets, or an aggregate weight of less than 6 grams of a Schedule VA controlled substance;
- Possesses an aggregate weight of one ounce or more of a Schedule VIA controlled substance (marijuana); or
- Manufactures, delivers, or possesses with the intent to manufacture or deliver less than 1 ounce of a Schedule VIA controlled substance (marijuana).

The distribution of these offenses is presented in Table 3. Approximately 44 percent of all MICS-5th Degree offenses were deemed by AST investigators to be violations of AS 11.71.050(a)(1), which prohibits the manufacture, delivery, or possession with the intent to manufacture or deliver less than one ounce of marijuana. Six additional violations were cited for AS 11.71.050(a)(2)(A) and AS 11.71.050(a)(2)(B), which make it a crime to possess less than 25 tablets or an aggregate weight of less than 3 grams of a Schedule IIIA or IVA controlled substance. AST investigators noted four violations of AS 11.71.050(a)(2)(E), which prohibits the possession of an aggregate weight of one ounce or more of marijuana. Ten unspecified MICS-5th Degree violations were also recorded by AST investigators.

Misconduct Involving a Controlled Substance in the Sixth Degree

A person commits the crime of MICS-6th Degree if the person:

- Uses or displays any amount of a Schedule VIA controlled substance (marijuana); or
- Possesses an aggregate weight of less than one ounce of a Schedule VIA controlled substance (marijuana).

Table 3. Misconduct Involving a Controlled Substance in the Fifth Degree: Sections and Subsections Cited by AST Investigators

Alaska Statute	N	Percent
11.71.050*	10	27.8 %
11.71.050(a)(1)	16	44.4
11.71.050(a)(2)(A)	5	13.9
11.71.050(a)(2)(B)	1	2.8
11.71.050(a)(2)(E)	4	11.1
Total	36	

* "unspecified"

Out of the 1,014 violations cited in the case reports included in this study, only 13 were classified as MICS-6th Degree offenses. Eight of these violations were recorded by AST investigators as AS 11.71.060(a)(1) offenses, two were categorized as AS 11.71.060(a)(2) offenses, and three violations were classified as an unspecified AS 11.71.060 offense.

Other Criminal Offenses Associated with Marijuana Grow Searches/Investigations

AST investigators recorded a total of 104 criminal offenses in addition to the 896 MICS violations discussed above. Thirteen (12.6%) of these additional criminal offenses were classified as crimes against persons, one of which was murder in the first degree. The twelve remaining violations were classified as assaults (6 felonies, 6 misdemeanors).

Thirty-two (31.1%) of the additional 104 criminal offenses were classified as offenses against property. More than half of these violations (n=18) were categorized as theft. Additional charges included unlawful possession, burglary, and criminal mischief.

The largest portion of additional crimes recorded by AST investigators were offenses against public order (n=40, 38.8% of additional criminal offenses). All but four of these offenses were misconduct involving weapons violations; thirty of these offenses were felonies. The other public order offenses were disorderly conduct, harassment, and cruelty to animals.

AST investigators also recorded 11 offenses against family members and vulnerable adults (10.7% of additional criminal offenses). All but one of these offenses were classified as violations of AS 11.51.130(a)(2), contributing to the delinquency of a minor. The other offense was a violation of AS 11.51.100, endangering the welfare of a child.

A total of eight offenses against public administration were also recorded by AST investigators. Three of these were classified as tampering with physical evidence and two were classified as interfering with the reporting of a crime of domestic violence; the three remaining violations included escape, hindering prosecution, and false reporting.

Marijuana Grow Searches: Marijuana Seized

Detailed information pertaining to marijuana seizures was compiled for each of the 333 case records reviewed. Six variables were constructed indicating whether or not AST investigators: (1) seized ANY marijuana, (2) seized any marijuana PLANTS, (3) seized any CULTIVATED marijuana, (4) seized any PROCESSED marijuana, (5) seized any marijuana SHAKE, or (6) seized any marijuana SEEDS. An additional six variables were created to capture: (1) the number of marijuana plants seized, (2) the aggregate weight of marijuana plants seized, (3) the aggregate weight of cultivated marijuana seized, (4) the aggregate weight of processed marijuana seized, (5) the aggregate weight of marijuana shake seized, and (6) the total amount of marijuana seeds seized.

Marijuana, in some form, was seized by AST investigators in 326 of the 333 cases included in this study. In those cases where marijuana was not seized, AST investigators frequently discovered signs of past marijuana grow operations, but their searches failed to yield evidence of ongoing marijuana cultivation.

Nearly all marijuana seizures (n=314, 96.3%) included the seizure of marijuana plants. (See Table 4). However, less than a third of these seizures involved *only* marijuana plants; nearly 70 percent of all cases involving seizure of marijuana plants also included the seizure of marijuana in another form. In approximately two-thirds of marijuana plant seizures, AST investigators also seized processed marijuana (dried and packaged), and one-fifth of marijuana plant seizures included the seizure of cultivated (cut, but not dried or packaged) marijuana. Loose marijuana leaves and stems (“shake”) and marijuana seeds were also frequently seized along with marijuana plants. Figure 8 presents the various combinations of marijuana seized for all 326 cases.

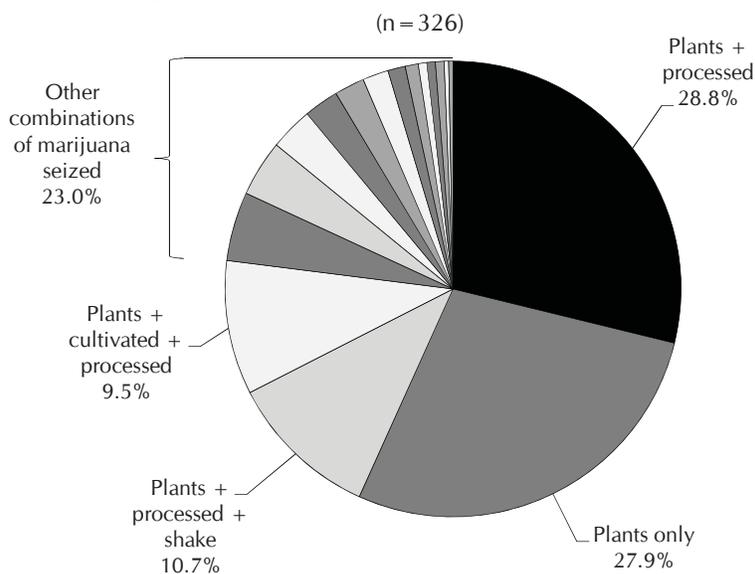
Overall, processed marijuana was placed into evidence by AST investigators in 62 percent of the reviewed cases, followed by marijuana shake (23%), cultivated marijuana (19.9%), and marijuana seeds (8.0%).

Table 4. Frequency of Marijuana Seized, by Form of Marijuana

Form of marijuana seized	Number of cases in which seized	Percent of cases
Marijuana plants	314	96.3 %
Processed marijuana	203	62.3
Cultivated marijuana	65	19.9
Marijuana shake	75	23.0
Marijuana seeds	26	8.0
Total cases	326	

Note: Detail adds to more than total because categories are not mutually exclusive.

Figure 8. Marijuana Seized, by Form of Marijuana



Seizure of Illegal Quantities of Marijuana

Alaska law specifies five quantitative thresholds with respect to marijuana possession. The first two thresholds are defined in AS 11.71.060(a)(1), which states that a person commits the crime of MICS-6th Degree if the person uses or displays any amount of a Schedule VIA controlled substance. AS 11.71.060(a)(2) states that a person commits the crime of MICS-6th Degree if the person possesses an aggregate weight of less than one ounce of a schedule VIA controlled substance. Violation of either of these statutes is a Class B misdemeanor. The third threshold is specified in AS 11.71.050, which states that a person commits the crime of MICS-5th Degree if the person possesses an aggregate weight of one ounce or more of a Schedule VIA controlled substance. Violation of this statute is a Class A misdemeanor. The last two thresholds are specified in separate subsections of AS 11.71.040.

According to AS 11.71.040(a)(3)(F), a person commits the crime of MICS-4th Degree if the person possesses an aggregate weight of four ounces or more of a Schedule VIA controlled substance, and AS 11.71.040(a)(3)(G) states that a person commits the crime of MICS-4th Degree if the person possesses 25 or more plants of the genus cannabis. Violation of either of these provisions is a Class C felony.

Four of these quantitative thresholds for marijuana possession were used to determine the frequency with which marijuana grow searches by AST investigators resulted in the seizure of illegal quantities of marijuana. A total of five variables were constructed to estimate the proportion of searches yielding illegal quantities of marijuana. First, a variable was created that combined all of the aggregate weights of marijuana seized (plants + cultivated + processed + shake + seeds) for each case record. This measure was then used to construct a separate binary variable for each of the three *weight* thresholds: less than one ounce of marijuana, one or more ounce of marijuana, and four ounces or more of marijuana. For each variable, cases that exceeded these thresholds were coded 1=*Yes*, otherwise 0=*No*. The final variable was defined using the threshold of 25 or more marijuana plants. Searches that resulted in the seizure of 25 or more marijuana plants were coded 1=*Yes*, otherwise 0=*No*.

Exact weight information was not recorded in 44 of the 326 cases in which marijuana was seized by AST investigators; therefore, the findings presented below are limited to the 282 case records for which one or more seized marijuana weights were provided.

Overall, the average aggregate weight of marijuana seized (in ounces) for the 282 case records for which investigators reported a weight was 58.4 oz. (s.d.=119.321). The minimum aggregate weight of marijuana seized was .002 oz; the maximum aggregate weight of marijuana seized was 1,544 oz (96.5 lbs.).

Table 5 presents the results for the four quantitative thresholds measured. An estimated five

**Table 5. Frequency of Marijuana Seized,
by Quantitative Thresholds**

Threshold	Number of cases	Percent of cases	Classification
By weight of marijuana seized¹			
Threshold 1: Less than one ounce	14	5.0 %	Misdemeanor
Threshold 2: One ounce or more	268	95.0	Misdemeanor
Threshold 3: Four ounces or more ²	248	87.9	Felony
By number of plants seized³			
Threshold 4: 25 or more plants	199	63.4 %	Felony

1. Includes only those cases in which investigators reported weight (N = 282). Detail adds to more than total.

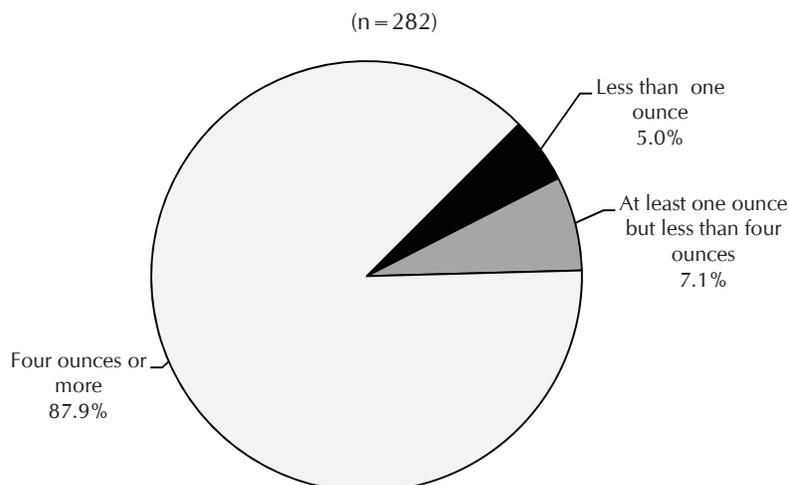
2. The 248 cases under Threshold 3 comprise a subset of the 268 cases under Threshold 2.

3. Includes only those cases in which investigators reported number of plants (N = 314).

percent of the case files examined reported aggregate weights of marijuana below the one-ounce threshold. Conversely, 95 percent of marijuana grow searches conducted by AST investigators produced aggregate weights of seized marijuana totaling one ounce or more; in excess of 92 percent of these cases (87.9% of all cases) yielded amounts of four ounces or more.

Figure 9 depicts the results for the first three quantitative thresholds in a slightly different manner. The smallest slice of the pie chart depicts the proportion of searches that resulted in the seizure of less than one ounce of marijuana (n=14, 5%). The second slice depicts the proportion of searches that yielded at least one ounce, but less than four ounces, of marijuana (n=20, 7.1%). The third, and largest, slice of the pie chart represents the proportion of searches that produced four ounces or more of marijuana (n=248, 87.9%).

Figure 9. Marijuana Seized by Quantitative Thresholds (by Weight)



Marijuana Grow Searches: Other Drugs, Cash, and Firearms Seized

In addition to the quantity of marijuana seized for each search, data was also collected pertaining to the seizure of other illicit drugs, drug paraphernalia, firearms, and cash discovered by AST investigators. Illicit drugs (other than marijuana) were seized and placed into evidence in approximately 15 percent (n=52) of the 333 case records reviewed. Most often, investigators seized prescription drugs suspected of being illegally used and/or obtained. Illegal “street” drugs were discovered infrequently. AST investigators recorded seizures of paraphernalia associated with the use and/or manufacture of illicit drugs (other than marijuana) on 31 occasions (9.3% of all case reports).

Roughly one out of every six case reports (n=52, 15.6%) documented the seizure of cash that was discovered by investigators. The amount of money seized varied widely, with a minimum of \$18 and a maximum of \$328,848 (s.d. = 58,286).

AST investigators reported seizing firearms in a quarter of searches (n=89).

Marijuana Grow Searches: Situational Conditions

In addition to information pertaining to the seizure of marijuana, detailed information related to the situational conditions that existed at the time of the search was also recorded for each case report. Of particular interest was whether or not AST investigators—particularly the lead investigator for each case—detected the odor of growing/green marijuana. A second odor detection variable was coded to capture instances when one or more assisting officers reported smelling growing/green marijuana. An additional variable was created to note when any AST officers (the lead investigator or any other officer assisting with the investigation) indicated smelling burning marijuana.

When AST investigators indicated that they smelled growing/green marijuana, additional variables were coded to capture information pertaining to the immediate circumstances that existed when the odor of marijuana was detected, including: wind conditions, exterior lighting, type of structure, excessive humidity (outdoors and indoors), officer location when odor was detected, the estimated distance from structure when odor was detected, and ambient temperature.

Detection of Marijuana Odor

Overall, AST investigators reported detecting the odor of growing/green marijuana in 55.6 percent (n=185) of the 333 case reports reviewed. Among those cases in which at least one investigating officer detected such an odor, more than half (51.4%) of the time both the primary investigator and at least one assisting officer noted smelling growing/green marijuana. Only the primary investigator reported smelling growing/green marijuana in more than a quarter of cases

(32.4%). One or more assisting officers, but not the primary investigator, detected the odor of growing/green marijuana in approximately one out of every six (16.2%) of case reports. (See Table 6). Officers noted smelling burning marijuana in only one case report.

Table 6. Investigator Detection of Odor: Growing/Green Marijuana

Any investigator detected odor	Number of cases	Percent of cases
Primary and assisting investigators detected odor of marijuana	95	51.4 %
Primary investigator smelled marijuana, but assisting officer(s) did not	60	32.4
Assisting officer(s) smelled marijuana, but primary investigator did not	30	16.2
Total	185	

Situational Conditions

Only limited information pertaining to the situational features of the searches conducted by AST investigators was provided in the case reports. As a result, the findings presented below describe the conditions present in only a relatively small portion of the marijuana grow searches that were conducted over the study period.

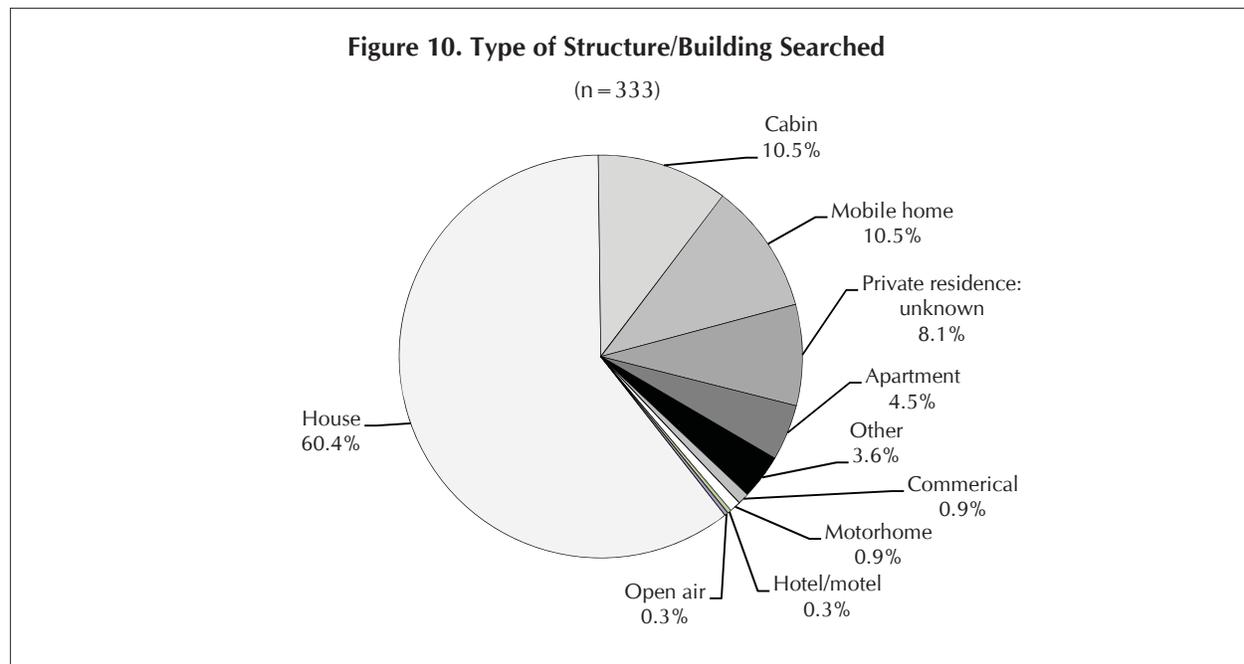
Investigators provided descriptions of the wind conditions present in 38 case reports (20.5%). Among these cases, investigators noted that they were positioned downwind of the structure suspected of housing the marijuana grow in 25 case reports (65.8%) and reported wind strength in 14 case reports (36.8%). “Light” winds were indicated in 13 of these 14 case reports.

Exterior lighting conditions were derived from the descriptions provided by investigators, not according to the time-of-day the search was reported to have occurred. This variable consisted of three broad categories: “daylight” (full light), “twilight” (dawn/dusk), and “nighttime” (darkness). A total of 134 (40.2%) case files contained adequate information to code this variable. In more than three quarters of these cases investigators indicated that the search was conducted during daylight hours and approximately one-fifth were conducted at night. One search was conducted during twilight.

The structures/buildings that were searched by AST investigators were almost exclusively private residences: houses, cabins, and mobile homes. (See Figure 10.) Single-family houses/cabins predominated (70.9%), followed by mobile homes (10.5%), apartments (4.5%) and motorhomes (0.9%). An additional 8 percent of structures were reported by investigators to be private residences, but insufficient information was provided to categorize them specifically. Only three searches of commercial buildings, and one search of a hotel/motel room, were conducted during the study period.

Search activities focused on unattached portions of buildings/structures (e.g., garages, greenhouses, sheds) were noted by investigators in 130 (39%) of case records.

Three variables were used to capture information on excessive humidity produced as a result of marijuana cultivation. The first variable was coded 1=Yes if AST investigators made mention of any



indications of excessive humidity visible from the exterior of the structure, otherwise this measure was coded 0=No. The second measure was coded 1=Yes if officers noticed unusual glaciation on the suspected structure's roof or windows. If there was no indication of glaciation, this variable was coded 0=No. The third measure of excessive humidity was coded 1=Yes if officers reported excessive humidity within the structure's interior. Case reports that did *not* mention indications of excessive interior humidity were coded 0=No. AST investigators reported signs of excessive exterior humidity in only 2.4 percent (n=8) of case reports; irregular glaciation on roofs and around windows was reported in 13 case reports (3.9%). Only one case report made mention of excessive interior humidity.

Three additional indicators were coded to capture information about possible mechanisms that could increase the likelihood that the odor of growing/green marijuana would be detected on the open air. Variables were coded to indicate if a window or door was open when officers arrived, whether or not officers discovered an exhaust/venting system designed to expel odors and/or humidity from the structure's interior, and if investigators observed or heard fans operating (0=No, 1=Yes for all measures). AST investigators reported that a door and/or window was open upon arrival in 18 case reports (9.7% of odor detection cases). Exhaust/venting systems were mentioned in 12 (6.4%) case reports; operating fans were described in 10 (5.4%) case reports.

Variables indicating where AST investigators were positioned when they detected the odor of growing/green marijuana were also coded. The following three measures were coded for each case report in which an investigator noted smelling growing/green marijuana: (1) Was the officer located inside or outside the structure when the odor was detected? (2) If the officer was positioned outside the structure, how far from the structure was the officer? (3) If the officer was positioned

outside the structure, was the officer positioned near a door when the odor was detected?

Primary investigators indicated their location inside or outside of the structure in 158 case records (85.4% of cases where odor detection was noted). (Investigator locations in the 27 remaining cases could not be determined.) Investigators were located outside the structure when they detected the odor of growing/green marijuana in 143 (90.5%) of these cases. They were positioned within close proximity to a door in 46 cases. “Close proximity” was operationalized as a range extending from the threshold of a door to an estimated distance of 10–15 feet. Primary investigators noted precise distances from the structure when the odor of growing/green marijuana was detected in only 15 case records. When noted, the average distance from the structure was 55.8 feet (s.d.=66.7 feet). Assisting officers were either noted as being present by the lead investigator or the assisting officer submitted a supplemental case report in 85.9 percent (n=286) of all searches. The location of assisting officers was provided in 123 case records (66.5% of all cases where odor detection was noted). Assisting officers were positioned near a door in 40 cases. Assisting officers noted their estimated distance from the structure in only 12 case records (mean = 43.8, s.d. = 63.0).

Ambient temperatures were not reported in any of the case reports reviewed.

The Association between Odor Detection and Illegal Possession of Marijuana

A central focus of this study is to assess the association between AST investigators’ detection of the odor of growing/green marijuana emanating from structures/buildings and the subsequent discovery of illegal quantities of marijuana by AST investigators in the course of searches of these structures/buildings. This section of the report explores the relationship.

AST investigators reported smelling the odor of growing/green marijuana in more than half (n=185, 55.6%) of the 333 case reports reviewed. The lead investigator reported detecting such an odor in 155 (83.8%) of these cases; at least one assisting officer reported smelling growing/green marijuana in 125 cases.

While Alaska statutes specify five quantitative thresholds for criminal offenses pertaining to the possession of marijuana, the analyses that follow focus only on the following four:

- **Threshold 1:** A person commits the crime of MICS-6th Degree if the person uses or displays any amount or possesses an aggregate weight of less than one ounce of a Schedule VIA controlled substance (AS 11.71.060(a)(1-2)). Violation of this statute is a Class B misdemeanor.
 - **Threshold 2:** A person commits the crime of MICS-5th Degree if the person possesses an aggregate weight of one ounce or more of a Schedule VIA controlled substance (AS 11.71.050(a)(2)(E)). Violation of this statute is a Class A misdemeanor.
 - **Threshold 3:** A person commits the crime of MICS-4th Degree if the person possesses
-

an aggregate weight of four ounces or more of a Schedule VIA controlled substance. (AS 11.71.040(a)(3)(F)). Violation of this statute is a Class C felony.

- **Threshold 4:** A person commits the crime of MICS-4th Degree if the person possesses 25 or more plants of the genus cannabis (AS 11.71.040(a)(3)(G)). Violation of this statute is a Class C felony.

Out of the 333 case reports reviewed, 282 noted the total aggregate weight of marijuana seized by AST investigators. Almost all of these searches (n=268, 95%) resulted in the discovery of one ounce or more of marijuana; nearly 90 percent (n=248) resulted in the discovery of four ounces or more of marijuana. AST investigators recorded the number of marijuana plants seized in 314 (94.3%) of the 333 case reports reviewed. Nearly two-thirds of these cases (63.4%) involved the seizure of 25 or more marijuana plants.

The relationship between *marijuana odor detection* and the discovery of *illegal quantities of marijuana* is presented in Tables 7–11. Table 7 presents the findings for Threshold 1 and Table 8 presents the findings for Threshold 2. Table 9 presents the findings for those cases when searches resulted in the seizure of more than one ounce, but less than four ounces, of marijuana. Table 10 presents the findings for Threshold 3, and Table 11 presents the findings for Threshold 4.

The results presented in Table 7 and Table 8 show that the odor of growing/green marijuana did not reliably predict whether or not a search would result in the discovery of less than one ounce of marijuana, or one ounce or more of marijuana. While an estimated 96.3 percent of searches in

Table 7. Association of Odor and Illegal Marijuana Possession: Threshold 1

Marijuana Threshold 1: Possessed less than one ounce	Did any investigating officers detect odor of marijuana?					
	No		Yes		Total	
	N	Percent	N	Percent	N	Percent
Did not possess less than one ounce	110	93.2 %	158	96.3 %	268	95.0 %
Did possess less than one ounce	8	6.8	6	3.7	14	5.0
Total	118		164		282	

Table 8. Association of Odor and Illegal Marijuana Possession: Threshold 2

Marijuana Threshold 2: Possessed one ounce or more	Did any investigating officers detect odor of marijuana?					
	No		Yes		Total	
	N	Percent	N	Percent	N	Percent
Did not possess at least one ounce	8	6.8 %	6	3.7 %	14	5.0 %
Did possess at least one ounce	110	93.2	158	96.3	268	95.0
Total	118		164		282	

Table 9. Association of Odor and Illegal Marijuana Possession: Between One and Four Ounces

Possession of more than one but less than four ounces	Did any investigating officers detect odor of marijuana?					
	No		Yes		Total	
	N	Percent	N	Percent	N	Percent
Possess less than one or more than four ounces	106	89.8 %	156	95.1 %	262	92.9 %
Possessed more than one ounce but less than four ounces	12	10.2	8	4.9	20	7.1
Total	118		164		282	

which investigators reported smelling growing/green marijuana resulted in the seizure of one or more ounces of marijuana, fully 93.2 percent of cases in which such an odor was not reported also yielded one ounce or more of marijuana. (The four percentage point difference was not statistically significant; Chi-square=1.417, $p=.234$).

Table 9 presents the results for possession of between one and four ounces of marijuana. As with seized weights of less than one ounce, there was not a significant association between the detection of green/growing marijuana odors and the discovery of between one and four ounces of marijuana (Chi-square=2.916, $p=.088$).

In contrast, the results presented in Table 10 show that the detection of growing/green marijuana odor was a significant predictor of whether or not a search resulted in the seizure of four or more ounces of marijuana. When one or more investigators reported smelling marijuana, four or more ounces of marijuana was discovered 91.5% of the time. In contrast, four or more ounces of marijuana was seized in 83.1% of the cases in which officers provided no indication of marijuana odor. (This difference of 8.4 percentage points was statistically significant; Chi-square=4.580, $p=.032$.)

The detection of growing/green marijuana odor by AST investigators was an even stronger predictor of the number of plants discovered during searches of structures/buildings. Nearly three-quarters of the cases in which officers reported smelling growing/green marijuana resulted in the discovery of 25 or more marijuana plants. This figure dropped to nearly 50 percent when

Table 10. Association of Odor and Illegal Marijuana Possession: Threshold 3

Marijuana Threshold 3: Possessed four ounces or more	Did any investigating officers detect odor of marijuana?					
	No		Yes		Total	
	N	Percent	N	Percent	N	Percent
Did not possess four ounces or more	20	16.9 %	14	8.5 %	34	12.1 %
Did possess at four ounces or more	98	83.1	150	91.5	248	87.9
Total	118		164		282	

Table 11. Association of Odor and Illegal Marijuana Possession: Threshold 4

Marijuana Threshold 4: Possessed 25 or more plants	Did any investigating officers detect odor of marijuana?					
	No		Yes		Total	
	N	Percent	N	Percent	N	Percent
Did not possess at least 25 plants	67	48.6 %	48	27.3 %	115	36.6 %
Did possess at least 25 plants	71	51.4	128	72.7	199	63.4
Total	138		176		314	

investigators made no mention of marijuana odor in their case reports. (This difference in excess of 21 percentage points was statistically significant; Chi-square=15.088, $p=.000$.)

Taken together, these findings suggest that while the detection of growing/green marijuana odor by investigators is not significantly associated with the discovery of “small” or “moderate” amounts of marijuana (aggregate weights of less than four ounces), it does appear to be significantly associated with the discovery of relatively “large” quantities—that is, four or more ounces and/or 25 more plants—of marijuana. Simply stated, when officers reported detecting the odor of growing/green marijuana, there was a *significantly increased probability* that substantial quantities of marijuana were discovered.

Odds Ratios

Another way to examine the extent to which detection of marijuana odor predicted the discovery of illegal quantities of marijuana is to compute *odds ratios*. An odds ratio is a statistic that allows for the comparison of the probability of an event for two groups. An odds ratio of “1” means that the *odds* of an event occurring is the same for both groups. When an odds ratio is greater than “1” it means that the odds of an event occurring is greater for the first group; an odds ratio of less than “1” means that the odds of an event occurring is greater for the second group.

In this study, the two groups are defined by whether or not an investigator detected the odor of growing/green marijuana on the open air: if an investigator did detect an odor of marijuana, the event was classified as belonging to one group; if an investigator did not detect an odor of marijuana, the event was classified as belonging to the other group.

The odds for the first group is determined by dividing a) the probability that an investigator who detected an odor of marijuana prior to conducting a search subsequently discovered an illegal quantity of marijuana by b) the probability that they did not discover an illegal quantity of marijuana. The odds for the second group is determined by dividing c) the probability that an investigator who did not detect an odor of marijuana prior to conducting a search subsequently discovered an illegal quantity of marijuana by d) the probability that they did not discover an

illegal quantity of marijuana. The odds ratio, then, is determined by dividing the odds for the first group by the odds for the second group.

Table 12 presents the odds for each group, for each of the legally defined quantitative thresholds for criminal offenses described in Table 7, Table 8, Table 10, and Table 11.

The odds ratios shown in Table 12 reinforce the findings reported in the previous section, namely that the detection of marijuana odor did *not* serve as a good predictor of the discovery of “small” quantities of marijuana (*p*-values greater than .05 indicate a lack of statistical significance). However, detecting the odor of marijuana was highly predictive of “large” quantities of marijuana—that is, four or more ounces or 25 or more plants.

These findings can be re-stated as follows:

For searches that were conducted following the detection of marijuana odor, the odds of discovering four ounces or more of marijuana were 2.2 times greater than the odds that a search that was *not* preceded by the detection of marijuana odor would result in the discovery of four ounces or more of marijuana.

For searches that were conducted following the detection of marijuana odor, the odds of discovering 25 or more marijuana plants were 2.5 times greater than the odds that a search that was *not* preceded by the detection of marijuana odor would result in the discovery of 25 or more marijuana plants.

Importantly, however, these results do not mean that odors detectable on the open air were a surefire predictor that illegal quantities of marijuana, whether small or large, would be found. *Smelling growing/green marijuana increased that probability, but it was not fully determinative.* The limitations of marijuana odor detection as a reliable predictor of illegal marijuana cultivation are discussed below.

	Odds	Odds ratio	z	p-value
Threshold 1				
Group 1	.038			
Group 2	.073	.522	-1.17	.241
Threshold 2				
Group 1	26.322			
Group 2	13.749	1.915	1.17	.241
Threshold 3				
Group 1	10.710			
Group 2	4.900	2.187	2.10	.035
Threshold 4				
Group 1	2.667			
Group 2	1.060	2.516	3.84	.000

Sensitivity and Specificity

The terms *sensitivity* and *specificity* have their foundations in medical research, where they are used to describe the extent to which medical tests accurately detect disease. Within the field of policing, sensitivity and specificity can be applied to other tests such as blood tests and breathalyzer tests, as well as the “test” that is the focus of this study – the detection of growing/green marijuana odors by investigators.

In the medical model, in order to determine a test’s sensitivity and specificity two pieces of information are necessary: (1) the proportion of patients who were administered the test, and (2) the proportion of patients who actually have the disease in question. If this model is adapted so that the “test” in question is the detection of growing/green marijuana odor, the two pieces of information required are: (1) the proportion of searches that were conducted following detection of marijuana odors, and (2) the proportion of searches that yielded illegal quantities of marijuana (see Table 13).

Table 13. Sensitivity and Specificity of the "Smell Test": Information Elements

Illegal quantity of marijuana seized	Detected odor of marijuana	
	Yes (+)	No (-)
Yes (+)	A	B
No (-)	C	D

Sensitivity refers to the proportion of searches that yielded illegal quantities of marijuana that were preceded by the detection of growing/green marijuana odors by AST investigators $\frac{(A)}{(A+B)}$; *specificity*, on the other hand, refers to the proportion of searches that did *not* yield illegal quantities of marijuana that were *not* preceded by the detection of growing/green marijuana odors by AST investigators $\frac{(D)}{(C+D)}$.⁷¹

A test that is perfectly accurate, at least in theory, will have a sensitivity of 1.0 (100%) and a specificity of 1.0 (100%). While there are no distinct cut-offs for determining “good” or “bad” sensitivity and specificity, scores near 1.0 (100%) are desired.

Table 14 presents the results for Marijuana Threshold 3 (possession of four ounces or more). The results presented below show that detection of growing/green marijuana odor had a sensitivity of .605 and a specificity of .588. This means that 60.5 percent of the searches that yielded four ounces or more of marijuana were preceded by the detection of an odor of growing/green marijuana.

71. It is important to note that sensitivity, which indicates the ability of the “smell test” to correctly identify those cases where an illegal quantity of marijuana was *not* present, might in this context suggest that because officers did *not* detect the odor of growing/green marijuana there would be no search of a property/structure. However, searches were conducted in all of the cases reported here.

Table 14. Sensitivity and Specificity of the "Smell Test": Threshold 3

Seized 4 ounces or more of marijuana	Detected odor of marijuana		
	Yes (+)	No (-)	Totals
Yes (+)	150	98	248
No (-)	14	20	34
Totals	164	118	282

Similarly, 58.8 percent of the searches that did *not* yield four ounces or more of marijuana were *not* preceded by the detection of marijuana odor. The overall *accuracy* of marijuana odor detection (the total number of correct assessments divided by the total number of assessments) was $\frac{(150+20)}{(150+20+98+14)} = .603$, or 60.3 percent.

Similar, though not identical, results were found for Marijuana Threshold 4 (possession of 25 or more marijuana plants). (See Table 15.) The detection of growing/green marijuana odor had a sensitivity of .643 and a specificity of .583. This means that 64.3 percent of the searches that yielded 25 or more marijuana plants were preceded by the detection of growing/green marijuana odors by AST investigators, and that 58.3 percent of the searches that did *not* result in the discovery of 25 or more marijuana plants were *not* preceded by the detection of marijuana odors. The overall accuracy of marijuana odor detection for Threshold 4 was .621.

Table 15. Sensitivity and Specificity of the "Smell Test": Threshold 4

Seized 25 or more marijuana plants	Detected odor of marijuana		
	Yes (+)	No (-)	Totals
Yes (+)	128	71	199
No (-)	48	67	115
Totals	176	138	314

These findings show that while the smell of growing/green marijuana was significantly associated with the discovery of relatively large quantities of marijuana by AST investigators, the smell of growing/green marijuana was a suboptimal (low sensitivity, low specificity, low accuracy) test for detecting relatively large quantities of marijuana (four ounces or more of marijuana, or 25 or more marijuana plants).

False Positives and False Negatives

Two related, but slightly different concerns, are the risk that a test will result in *false positives* or *false negatives*. Within the current context, a *false positive* represents those instances when an AST investigator detected the odor of growing/green marijuana, but an illegal quantity of marijuana

was *not* discovered, or $\frac{(C)}{(A+C)}$. Ideally, this proportion should be zero. In contrast, a *false negative* would occur when an officer did *not* detect an odor of growing/green marijuana when, in fact, an illegal quantity of marijuana was present, or $\frac{(B)}{(B+D)}$.

Each type of error presents its own consequences. If it were assumed that a search would be conducted in those instances when an investigator detected the odor of growing/green marijuana, a false positive would result in the search of an individual's property (most likely their home) even though a "large" quantity of marijuana was *not* present. From the perspective of civil liberties, such a situation would be problematic. On the other hand, if it were assumed that a search would *not* be conducted in those instances when an investigator did *not* detect the odor of growing/green marijuana, a false negative would mean that an opportunity to discover a "large" marijuana grow was missed. From a strict crime control perspective, this situation would be problematic.

Based on the case reports reviewed for this study, the *false positive* rate for searches that yielded four ounces or more of marijuana was .085. This means that in 8.5 percent of the cases in which officers reported smelling growing/green marijuana, less than four ounces of marijuana was subsequently discovered. Stated another way, when AST investigators detected the odor of growing/green marijuana, the probability of a search yielding four or more ounces of marijuana was 91.5 percent.

The *false negative* rate for searches that yielded four ounces or more of marijuana was .831. This means that in 83.1 percent of the cases in which officers did *not* report detecting the odor of growing/green marijuana, four ounces or more of marijuana was discovered.⁷²

The *false positive* rate for searches that yielded 25 or more marijuana plants was .273, or 27.3 percent; the *false negative* rate was .515, or 51.5 percent.

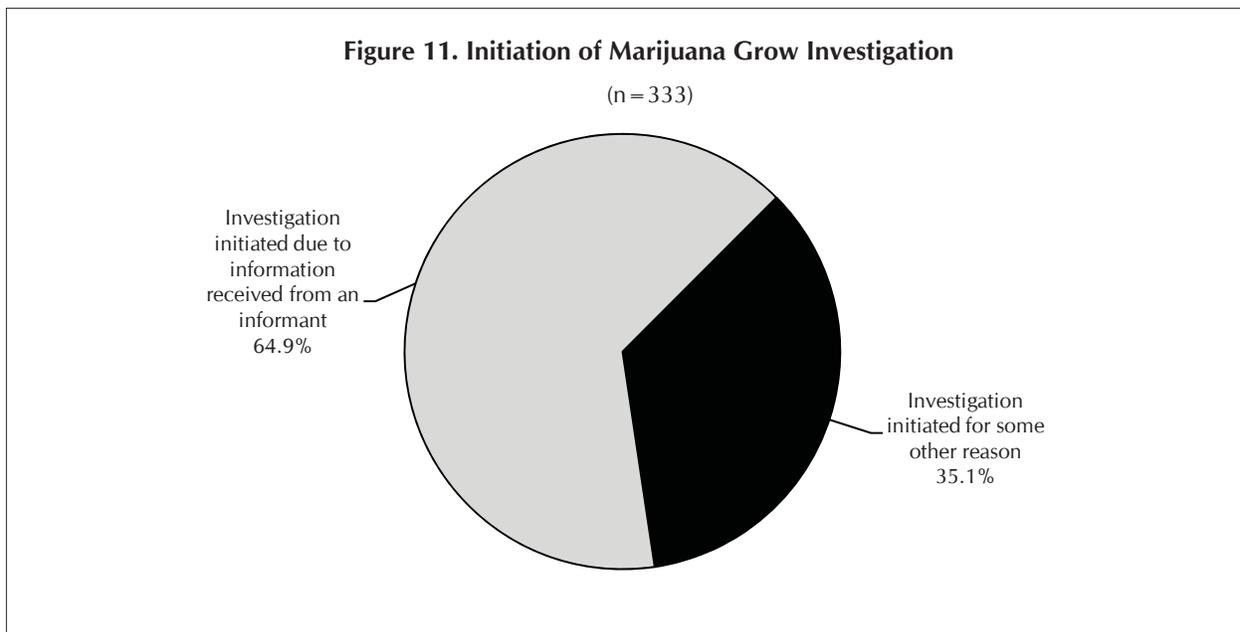
Investigation Information: Informant Activities and Information

This section of the report details the information obtained by AST investigators from informants, witnesses and other third parties, and suspects, as well as the investigative activities pursued by AST officers both prior to and during searches of structures/buildings.

Genesis of Investigation

Each case record was read in its entirety to determine if each investigation was the result of information received by AST investigators from informants, or whether the investigation was

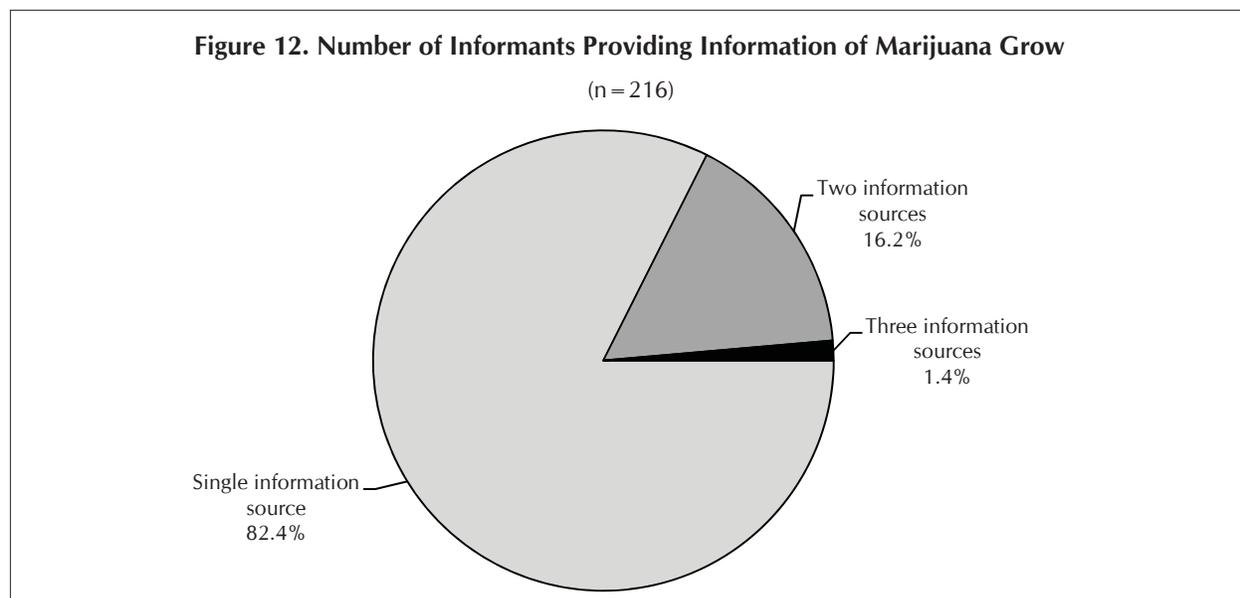
72. It is important to note that a false negative, which indicates how often marijuana was discovered when investigators did not detect marijuana odors, might in this context suggest that because investigators did not detect the odor of growing/green marijuana there would be no search of a property/structure. However, searches were conducted in all of the cases reported here.



the result of investigator initiative. Nearly two-thirds (n=216, 64.9%) of the 333 investigations reviewed were initiated once AST investigators received information from an informant. (See Figure 11.)

Case records indicating that the investigation was initiated due to information received from an informant were further examined to identify the type of informant who provided the information to AST investigators. Informants were categorized as *anonymous tip*, *confidential informant*, *individual citizen*, or *organization/agency*.

A total of 15 case records (6.9% of cases initiated by informant information) indicated that the investigation was initiated through information provided by a confidential informant. Anonymous informants provided AST investigators with information in 50 cases (23.2%). Sixty investigations were initiated by information from citizen reports where the identity of the informant was known. Finally, well over half of the marijuana grow investigations stemming from informant information (n=132, 61.1%) were initiated by information provided by organizations/agencies. In nearly all cases in which an organization/agency served as an informant, the organization that provided information was a police agency (n=122, 92.4%). Other organizations such as the Office of Children's Services and the Department of Corrections provided information about suspected marijuana grow operations in the remainder of cases. In most of the investigations that were initiated by informants (n=178, 82.4%), information was provided by a single source (see Figure 12).



Initial Contact with Resident/Owner

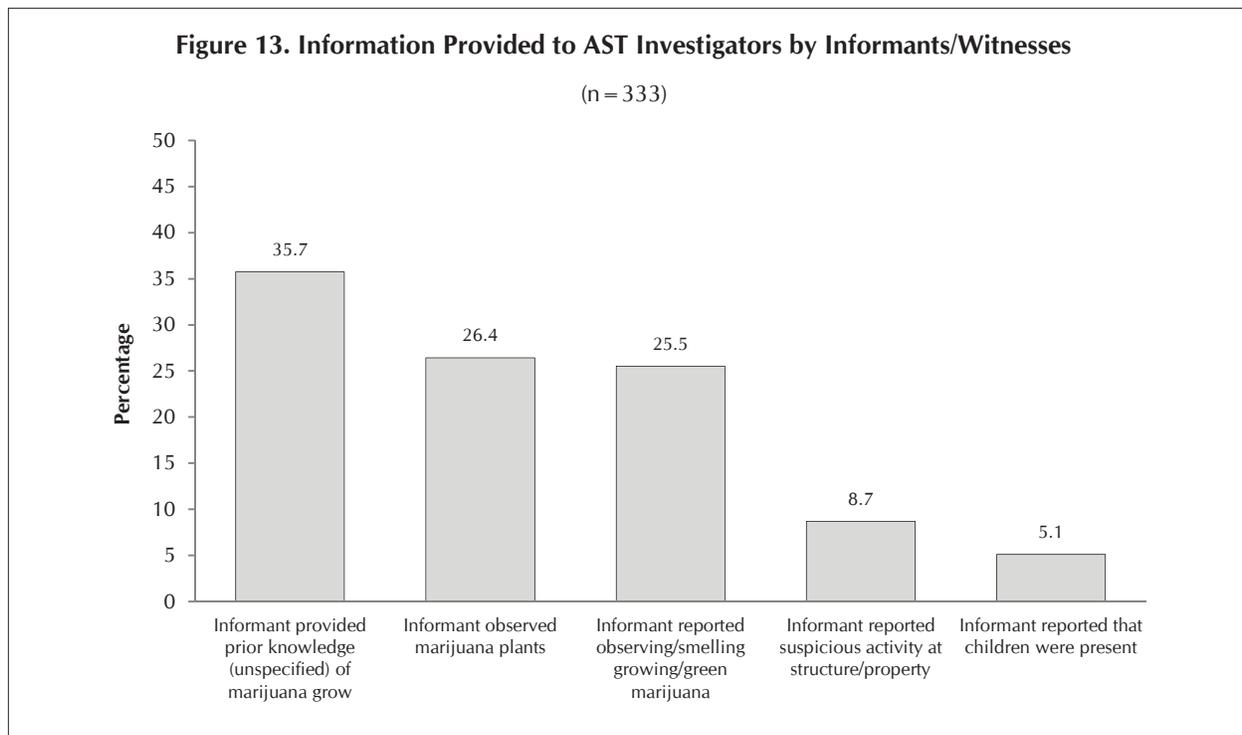
In approximately a third of all cases reviewed (n=99, 29.7%), investigators reported making initial contact with a resident through an investigative contact, commonly referred to as a “knock-and-talk.” In slightly more than half of the cases in which investigative contacts were made (n=55, 55.6%), investigators had received information about a possibly illegal marijuana grow from an informant.

Information Provided by Informants and Witnesses

In addition to the information they obtained from informants, AST investigators also interviewed witnesses (e.g., neighbors) either at the time of the search, or immediately following. (See Figure 13.) Informants and/or witnesses reported having knowledge of marijuana grow activity in the suspected structure/property in 35.7 percent (n=119) of the 333 case reports reviewed. These individuals told investigators that they personally observed growing marijuana plants in 88 (26.4%) of cases and they detected the odor of growing marijuana plants in 85 (25.5%) of cases. Investigators reported that informants/witnesses described suspicious activities (most commonly, strange comings and goings of people at the suspected property) in 29 (8.7%) case reports.

Informants provided suspect(s) names in 152 (45.7%) of all case records, and gave AST investigators specific location/address information for suspected marijuana grow operations in 214 (64.3%) cases.

Investigators reported that they were told by informants/witnesses that children lived at the suspected residence in 17 (5.1%) case reports. Investigators noted that children were present when they arrived at a suspected structure/residence in 50 (15.0%) case reports.



Other Investigative Activity Performed by Investigators

Surveillance of suspected structures/properties

Prior to conducting searches AST investigators undertook a variety of proactive measures in their investigations of suspected marijuana grow operations. The most common investigative action was the direct observation of properties, which was reported by officers in 40.2 percent (n=134) of the 333 case records reviewed. In 87 case reports (26.1%) investigators reported walking around the perimeter of properties thought to contain illegal marijuana grow operations. Officers observed structures/property from an automobile in 78 (23.4%) cases. In 40 (51.3%) of these cases investigators drove by the suspected property with vehicle windows open.

Investigators reported inspecting a structure's exterior electricity meter on 8 occasions. They obtained electricity usage records for suspected structures in 81 (24.3%) cases.

Background checks on suspects

In addition to conducting surveillance of suspected structures/properties, investigators also frequently performed background checks on the individuals identified as the owner/resident of suspected properties. Investigators reported conducting background checks in 101 (30.3%) of the 333 case records reviewed. These background checks consisted mostly of inquiries into suspects'

criminal histories (n=65, 64.4% of background investigations). In 41 (63.1%) of these criminal history checks, investigators examined suspects' prior drug-related offenses. Other forms of suspect background information sought by investigators included employment, contact with other criminal justice and social service agencies, and general information from friends and neighbors.

Plain view observations

Investigators reported personally observing marijuana plants growing in 50 case records (15.0% of all case records). Primary investigators noted observing marijuana plants in 43 instances; one or more assisting officers reported observing marijuana plants on 34 occasions; both primary and assisting officers observed marijuana plants in 27 cases.

Search and arrest warrants

Search warrant applications were reported by investigators in 203 cases (61%). Searches of structures/properties were conducted pursuant to a search warrant unrelated to the suspected marijuana grow operation in 23 (6.9%) of the cases reviewed. Investigators noted that suspects had an outstanding arrest warrant in 13 (3.9%) case reports.

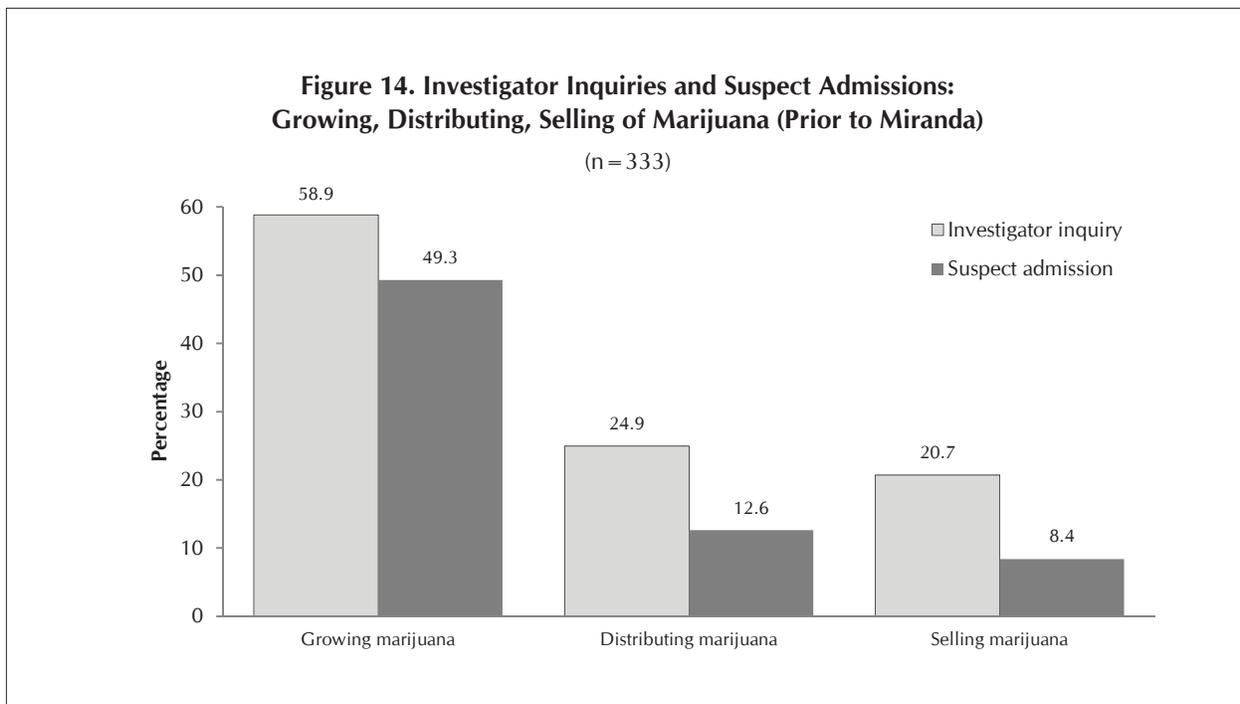
Information provided by suspect(s)

Whenever possible (that is, when investigator narratives contained the information), interviews with suspects were coded for the following:

- Did an investigator ask the suspect(s) if they grew marijuana?
- Did an investigator ask the suspect(s) if they distributed marijuana?
- Did an investigator ask the suspect(s) if they sold marijuana?
- Did suspect(s) admit to an investigator that they grew marijuana?
- Did suspect(s) admit to an investigator that they distributed marijuana?
- Did suspect(s) admit to an investigator that they sold marijuana?

Two versions of each of these measures were created to indicate if investigator inquiries and suspect(s) admissions were made prior to or following the issuance of a Miranda warning. If a case record narrative indicated that an investigator questioned a suspect, or that a suspect made an admission (or both), but there was no mention of a Miranda warning being given in the case record, it was assumed that no Miranda warning was issued.

Figure 14 presents the results for investigator inquiries and suspect(s) admissions prior to a Miranda warning being issued. Slightly more than half (n=196, 58.9%) of the 333 case records

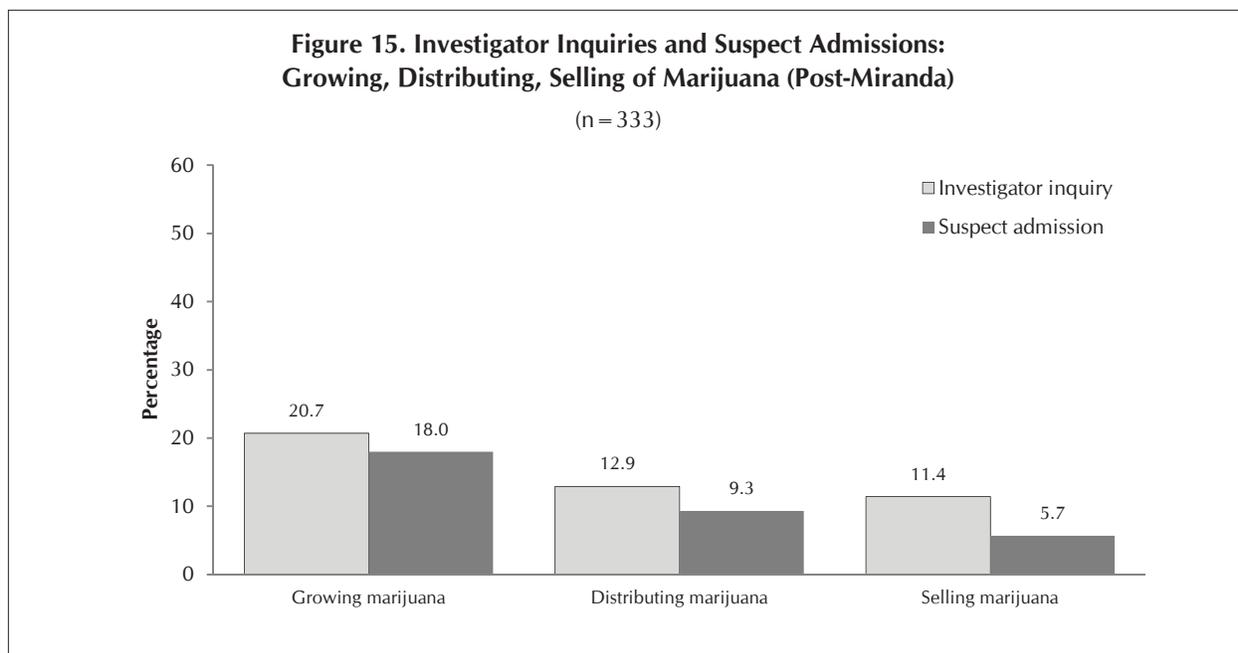


reviewed indicated that officers asked suspect(s) if they were growing marijuana prior to a Miranda warning being given. Investigators questioned suspect(s) about the distribution of marijuana in 83 (24.9%) case records. Suspects were asked about the sale of marijuana in 69 (20.7%) cases. Suspects admitted to growing marijuana prior to a Miranda warning in nearly half (n=164, 49.3%) of the case records reviewed. Admissions of distribution and sale of marijuana were much less common (12.6% and 8.4% of case records, respectively).⁷³

Based upon the information gleaned from case narratives, once a Miranda warning had been issued AST investigators were less likely to question suspect(s) about growing, distributing, and selling marijuana (see Figure 15). Post-Miranda questioning of suspect(s) about marijuana growing occurred in 20.7 percent (n=69) of the 333 case records reviewed. Investigators asked suspect(s) about the distribution and sale of marijuana in 12.9 percent (n=43) and 11.4 percent (n=38) of cases, respectively. Suspects were also less forthcoming once a Miranda warning was given, admitting to marijuana growing in 18 percent (n=60) case records, admitting to marijuana distribution in 9.3 percent (n=31) of case records, and admitting to the sale of marijuana in 5.7 percent (n=19) case records.

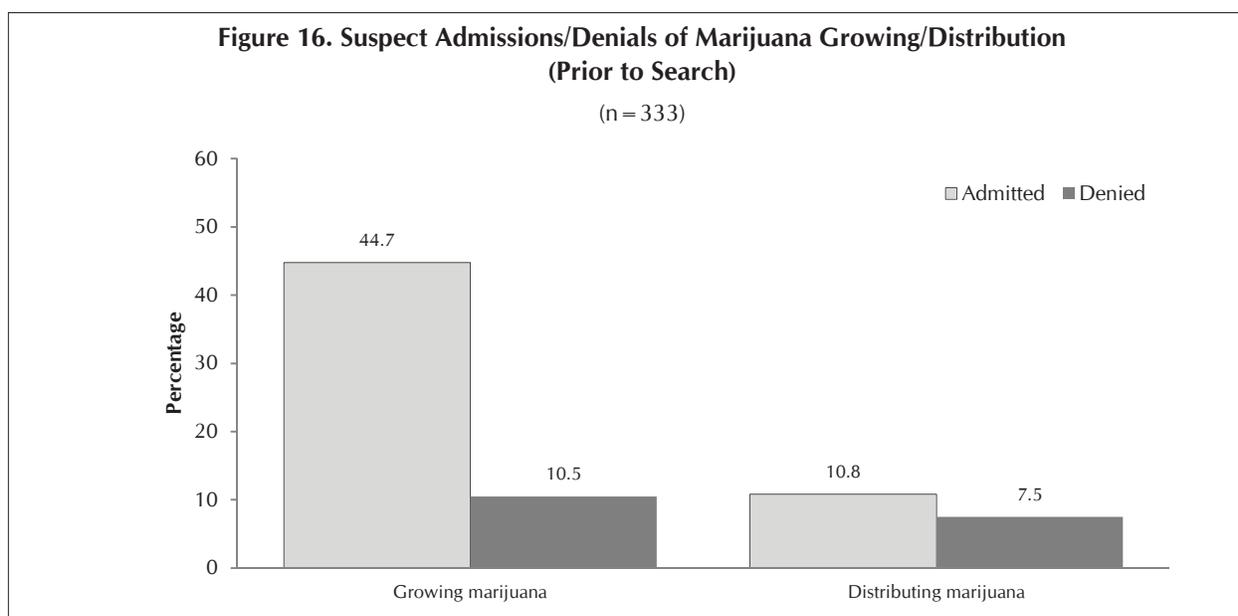
Four additional variables were coded to indicate if suspect(s) admitted or denied marijuana cultivation and distribution after AST investigators arrived, but before a search of the suspected

73. Suspect(s) admissions were not necessarily in response to a direct inquiry by an investigator. In a substantial proportion of cases, investigators' narratives indicated that suspects made admissions outside the context of formal interviews. In several instances, suspect admissions were "spontaneous" or "excited" utterances.



structure/property was conducted.⁷⁴ These results are presented in Figure 16.

During the period between the arrival of AST investigators and when a search was initiated,



74. As noted previously, suspect(s) admissions were not necessarily in response to a direct inquiry by an investigator. In a substantial proportion of cases, investigators' narratives indicated that suspects made admissions outside the context of formal interviews. In several instances, suspect admissions were "spontaneous" or "excited" utterances. In similar fashion, suspect(s) denials were also not necessarily in response to a direct question or accusation made by an investigator. It was not uncommon for suspects to deny growing and/or distributing marijuana absent a direct inquiry by an investigator.

suspect(s) were more likely to admit than deny growing marijuana. Whereas suspects admitted to growing marijuana in 149 (44.7%) of the case records reviewed, they denied doing so in only 35 (10.5%) cases. Similarly, suspect(s) were more likely to admit distributing marijuana (n=36, 10.8%) than deny distributing marijuana (n=25, 7.5%) in the moments before AST investigators began their search of the property.

Property and Evidence Seized

Nearly all case records (n=316, 94.9%) included evidence sheets describing items and quantities of property seized and placed into evidence. In all, AST investigators documented 2,931 pieces of evidence. The vast majority of articles seized and placed into evidence were either illicit drugs, equipment used in cultivation/distribution, or drug paraphernalia (see Table 16).

More than a quarter of all items (n=854, 29.1%) seized were described as some form of marijuana (i.e., growing plants, cultivated or processed marijuana, marijuana seeds, or hashish). AST investigators reported seizing 676 pieces of equipment used to grow marijuana, for example, lights, ballasts, and fans (23.1% of all seized items); 241 pieces of equipment used to process marijuana were also seized (8.2% of all seized items). Less than one percent of seizures (n=21) were of other illicit drugs, such as psilocybin mushrooms, cocaine, and methamphetamine. Seizures of medications (e.g., oxycodone) were seized with about the same frequency (n=27; 0.9% of all seized items). Investigators also seized alcoholic beverages 11 times. A total of 163 pieces of drug paraphernalia (e.g., pipes and syringes) were placed into evidence. One hundred seventy-six items identified as firearms/ammunition were also seized. Investigators seized cash on 61 occasions, but specified the exact amount in only 51 of these (totaling \$543,817). The smallest amount of money placed into evidence was \$0.82; the maximum placed into evidence was \$325,368. The median amount of cash seized by AST investigators was \$1,000.

Table 16. Evidence Seized

	N	Percent
Illicit drugs		
Marijuana	847	28.9 %
Pills/liquids	27	0.9
Alcohol	11	0.4
Mushrooms	8	0.3
Hashish	7	0.2
Methamphetamine	5	0.2
Cocaine	5	0.2
Acid	1	0.0
Other/multiple	2	0.1
Other evidence		
Marijuana grow equipment	676	23.1 %
Marijuana processing equipment	241	8.2
Drug paraphernalia	163	5.6
Evidence: photos/audio/video	271	9.2
Firearms/ammunition	176	6.0
Cash/currency	61	2.1
Miscellaneous other	409	14.0
Missing	21	0.7 %
Total	2,931	

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Summary

The findings presented in this report represent the first systematic empirical examination of marijuana grow searches in the state of Alaska. The detection of marijuana odors, the quantity of marijuana discovered by AST investigators, and the extent to which these two variables were associated with each other were the central focus of the study. An overview of the legal regulation of marijuana by the federal government and the state of Alaska was provided, as well as a description of additional aspects of marijuana searches, including (but not limited to):

- the temporal and geographic patterns of marijuana grow searches,
- the specific statutory violations committed by offenders,
- the situational conditions present when searches were conducted,
- the investigative activities undertaken by investigators, and
- the types of evidence seized as the result of marijuana grow searches.

Despite the overall breadth of the study, the central question guiding the analysis was more narrowly focused: *Did the detection of marijuana odors by AST investigators reliably predict the presence of legally prohibited quantities of marijuana?*

The answer to this question is both *yes* and *no*. The bivariate analyses that were conducted for this study show that the detection of marijuana odors on the open air by AST investigators was significantly associated with the subsequent discovery of “large” amounts of marijuana (e.g., four or more ounces, or 25 or more plants), but not “small” or “moderate” amounts of marijuana.

Investigators discovered four or more ounces of marijuana in 91.5 percent of searches that were preceded by one or more officers detecting marijuana odors. In contrast, investigators seized four or more ounces of marijuana in 83.1 percent of searches that were not preceded by the detection of marijuana odors. Similarly, investigators discovered 25 or more marijuana plants in 72.7 percent of searches that were preceded by the detection of marijuana odors. When investigators did not detect marijuana odors, only 51.4 percent of searches resulted in the seizure of 25 or more plants. Further analyses revealed that the odds that a search yielded four or more ounces of marijuana was 2.2 times more likely when it was preceded by the detection of marijuana odors than when it was not; the odds of a search resulting in the discovery of 25 or more marijuana plants was 2.5 times greater when preceded by the detection of marijuana odors.

Based on these findings, one could reasonably conclude that the detection of marijuana odors by AST investigators did serve as a reliable predictor of the presence of illegal quantities of marijuana in suspected structures/buildings. However, as we have noted, although the detection of marijuana odors by investigators was significantly associated with the discovery of relatively

“large” quantities of marijuana and can therefore be said to serve as a reliable indicator of such illegal quantities, it does not provide perfect prediction. In point of fact, the same data that revealed a significant correlation between marijuana odor detection and the subsequent discovery of “large” amounts of marijuana also show that the “smell test” performs only marginally as a screening tool. With respect to the four-ounce threshold, the sensitivity score for marijuana odor detection was only .605, and its specificity score was only .588. For the 25 or more plant threshold, these scores were .643 and .583, respectively. While precise cut-offs for determining “acceptable” sensitivity and specificity scores do not exist, scores close to 1.0 are desirable. (For purposes of comparison, medical diagnostic tests typically have sensitivity and specificity scores greater than .90.)

In addition to these limitations, the “smell test” also presents significant risks for false positives and false negatives. Based on the information provided by investigators in case reports, approximately nine percent of searches that were executed following the detection of marijuana odors were “false positives” in that they failed to yield four ounces or more of marijuana. (Importantly, this is not to say that marijuana was not discovered and seized, only that when marijuana was discovered it was in quantities less than four ounces). The false negative rate — that is, how often AST investigators did not report smelling marijuana, but discovered marijuana during a search — for these searches was 83 percent. When looking at searches yielding 25 or more plants, the false positive rate was notably higher — 27.3 percent — while the false negative rate was substantially lower — 51.5 percent.

In sum, this study finds that the detection of marijuana odors on the open air by AST investigators is significantly associated with the subsequent discovery of “large” amounts of marijuana (e.g., four or more ounces, or 25 or more plants). Thus, detection of marijuana odors by AST investigators significantly increased the probability that subsequent searches would yield “large” quantities of marijuana. But, despite its ability to increase the likelihood of discovering “large” quantities of marijuana, the ability of the “smell test” to accurately predict the outcome of a search (in terms of the quantity of marijuana that will be discovered) is limited.

Study Limitations

In addition to the limitations discussed above, which pertain specifically to the “smell test,” the limitations of the study, more generally, should also be noted. Perhaps the most important limitation of the study is its scope — that is, the population to which the findings can be generalized. The prevalence estimates identified in this study pertain only to the *marijuana grow searches conducted by AST investigators during the five-year period spanning 2006–2010*. Inferences to another sampling universe, other jurisdictions, or different time periods cannot be made from these data.

A second limitation of this study stems from the nature of the data sources used. The data

analyzed and presented here were *archival*; the sole source of data for this study was the case records written and submitted by AST investigators. Researchers did not directly observe the searches described, or any of the individuals who were present when they occurred. This feature of archival methodology is important to recognize because the accuracy of the analysis depends on the breadth and depth of information contained in archival documents and records. Any information that is not recorded in a document is automatically excluded from the data collection and analyses processes. Additionally, it is important to note that archival research is a historical data collection method – that is, it captures information about events that have already occurred. Recognition of this feature of archival research is important to consider because, since events have already occurred, it is rarely possible (or when possible, very difficult) to clarify factual ambiguities or address issues of missing data.

Finally, the analytic scope of this study is restricted to the presentation of univariate (single variable) and bivariate (two variable) statistics. While the descriptive results presented in this report provide important insights into the nature of marijuana grow searches conducted by AST investigators, their results, and the association between the detection of marijuana odors and the discovery of illegal quantities of marijuana, more work will need to be done to properly specify a multivariate model that can estimate the predictive power of the “smell test,” net of other factors.
