

MARIJUANA NATIONAL FOREST:

Encroachment on California Public Lands for Cannabis Cultivation

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Marijuana cultivation on public lands has become an increasingly prominent issue affecting natural resources and public safety in California. Cultivators degrade natural reserves by altering land, diverting water, applying chemicals, and inhabiting sites for long periods of time. Clean up and remediation efforts are conducted to reduce the long-term impacts, but these efforts remain hindered by high costs, understaffing, and the remoteness of sites. The primary cultivators are Mexican Cartels that operate in California to exploit the fertile land and lucrative markets for marijuana. Environmental remediation depends on law enforcement agencies' ability to identify and seize sites. As the issue has become increasingly prevalent, law enforcement agencies have adapted their efforts, but have only had a limited effect. In order to prevent the problems created by remote marijuana production, cultivators must be prevented from utilizing public lands, or the incentive for doing so must be removed.

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INTRODUCTION

Cannabis is an adaptive and highly successful annual with the ability to grow in most climates across the globe. Cannabis belongs to the Cannabaceae family, "has a life cycle of only three to five months and germinates within six days."¹ Cannabis can occur in a wild, reproducing state throughout the California floristic provinces, and is cultivated even outside of areas where it may naturally reproduce.² Cannabis planting, growing, and harvesting seasons are similar throughout California and typically take place April through October. "Exposed river banks, meadows, and agricultural lands are ideal habitats for Cannabis" since these ecosystems provide "an open sunny environment, light well-drained composted soil,

¹ Booth, M. Cannabis: A History. Thomas Dunne Books. Picador, U.S.A. 368pps. 2004.

Childress, Michael T. A System Description of the Marijuana Trade. Santa Monica, CA : RAND, 1994.

² "UC/JEPS: Jepson Manual treatment for CANNABIS." University and Jepson Herbaria Portal to California Flora. 29 Mar. 2009 <http://ucjeps.berkeley.edu/cgi-bin/get_JM_treatment.pl?2847,2848>.

and ample irrigation.”³

The Cannabis plant has been utilized to produce a diverse set of products with various applications. Today, Cannabis is most commonly produced for its psychoactive properties, though historically it has been used for agricultural production, nutritional value, and industrial purposes. The two species of Cannabis cultivated for psychoactive and physiological effects are *Cannabis sativa* and *Cannabis indica*.⁴ Marijuana is the most common name referring to varieties of Cannabis produced for mind altering affects. Marijuana contains high levels of chemical cannabinoid compounds including delta-9 tetrahydrocannabinol, or THC, the primary psychoactive component of Cannabis.

Cannabis has a long history of use in the United States. During the 17th century, the government encouraged hemp production, a fibrous form of Cannabis, for use as rope, clothing, and sails. In the early 20th century after the Mexican Revolution, the recreational use of marijuana was introduced by Mexican immigrants. In 1937, the Marijuana Tax Act was enacted to effectively criminalize marijuana consumption as a result of an anti-marijuana propaganda campaign led by the commissioner of the Federal Bureau of Narcotics, Harry J. Anslinger. During World War II the U.S. Department of Agriculture provided incentives, including draft deferment, for farmers to grow hemp to meet wartime fiber needs. In the 1950s, a series of federal laws were enacted to create mandatory sentencing for people convicted of using drugs classified as illegal, including marijuana. Despite stricter regulation, marijuana was embraced by popular counter-culture movements in the 1960s.⁵

Shortly after taking office in 1969, President Nixon declared a national "war on drugs." As the first campaign of that war, Congress set out to enact legislation that would consolidate various drug laws on the books into a comprehensive statute, provide meaningful regulation over legitimate sources of drugs to prevent diversion into illegal channels, and strengthen law enforcement tools

³ Clarke, Robert C. "An Advanced Study: The Propagation and Breeding of Distinctive Cannabis." Marijuana Botany. 29 Mar. 2009 <<http://www.geocities.com/SunsetStrip/amphitheatre/5796/botany1.htm>>.

⁴ Small, E. and A. Cronquist. 1976. A Practical and Natural Taxonomy for Cannabis. *Taxon* 25(4): 405–435.

⁵ "Marijuana Timeline In The United States." Www.a1b2c3.com. PBS Online and WGBH/Frontline. 30 Mar. 2009 <<http://www.a1b2c3.com/drugs/mj005.htm>>.

against the traffic in illicit drugs. That effort culminated in the passage of the Comprehensive Drug Abuse Prevention and Control Act of 1970.⁶

This act classified marijuana as a Schedule I controlled substance, the most restrictive schedule of illegal drugs “found by the government to have a high abuse potential, a lack of accepted safety under medical supervision, and no currently accepted medical use.”⁷ In fact, the whole Cannabis plant was classified as Schedule I, which means that possession of any portion of the Cannabis plant became illegal under federal law. Petitions to reclassify Cannabis have been proposed since the 1970s based on an ever increasing literature of clinical studies and scientific research that disputes the vague classifications of “high abuse potential, a lack of accepted safety under medical supervision and no currently accepted medical use.”⁸ This article of the Comprehensive Drug Abuse Prevention and Control Act was brought to the forefront of legal and political debate in 1996 when the Compassionate Use Act, or Proposition 215, passed in California, followed by 13 other states, to legalize the medical use of marijuana.⁹ Criteria for the legal possession of medical marijuana vary from the state to county levels, but Cannabis possession and consumption remain illegal at the federal level. In the pivotal Supreme Court decision of *Gonzales v. Raich*, the court ruled that the federal ban on cannabis may be enforced at all levels of jurisdiction based on the Commerce Clause of the United States Constitution. Their basis was that “incidents of the traffic which are not an integral part of the interstate or foreign flow, such as manufacture, local distribution, and possession, nonetheless have a substantial and direct effect upon interstate commerce.”¹⁰ Despite the precedent set by this case, the development of legalized medical marijuana has led to significant changes in domestic Cannabis cultivation.

In California, marijuana is cultivated in various amounts ranging from a single plant

⁶ 545 U.S. 1 (2005) *GONZALES, ATTORNEY GENERAL, ET AL. v. RAICH ET AL.* No. 03-1454. Supreme Court of the United States. 6 June 2005. Print.

⁷ *United States. General Accounting Office. Marijuana: Early Experiences with Four States' Laws that Allow Use for Medical Purposes.* Washington, D.C. : U.S. General Accounting Office. 2002. <<http://purl.access.gpo.gov/GPO/LPS31227>>

⁸ U.S. *Gonzales v. Raich*

⁹ "14 Legal Medical Marijuana States: Laws, Fees, and Possession Limits." *ProCon.org*. 26 Jan. 2010. Web. 07 May 2010. <<http://medicalmarijuana.procon.org/view.resource.php?resourceID=000881>>.

¹⁰ U.S. *Gonzales v. Raich*

grown for personal consumption to thousands of plants per plot cultivated for commercial distribution. Law enforcement and US Forest Service reports indicate that Drug Trafficking Organizations (DTOs) control a significant portion of Cannabis cultivation in the United States and are establishing an increasing number of both indoor and outdoor growing sites. The primary DTOs operating in California are of Mexican origin and consist of the most powerful cartels in Mexico. The outdoor cultivation sites developed by DTOs are of special concern because they mainly occur on public lands. Remote areas used by cultivators include land holdings managed by the US Forest Service, the Bureau of Land Management, the National Park Service, the Fish and Wildlife Service, the Bureau of Indian Affairs, and the Bureau of Reclamation.¹¹ However, DTOs also cultivate marijuana plots on private lands including conservation reserves, game lands, and large private land holdings.

Marijuana cultivation on public lands is entrenched in California structurally, institutionally, economically, and culturally. The issues that surround marijuana cultivation and prevention efforts are both complex and large in scale. The systems and processes employed by both cultivators and law enforcement agencies are long established and the product of a dynamic progression. However, the scale of marijuana production and the adverse effects of cultivation have reached unprecedented proportions. Black market revenues have increased with the demand for marijuana, giving rise to criminal enterprises that go to any lengths necessary to maximize profits. The result is an oligopolistic market control, continued natural resource damage and sustained infringement on public safety.

MARIJUANA IN SOCIETY

Marijuana is California's largest cash crop, estimated to be worth between 10 and 14 billion dollars annually.¹² This immense profit incentive is the main cause for continual marijuana cultivation on public lands, and is based on high demand and inflated market prices. In the most highly concentrated cultivation counties in California, the

¹¹ National Drug Intelligence Center. 2007. Domestic Cannabis Cultivation Assessment 2007. National Drug Intelligence Center, Johnston, PA, 32pp.

¹² Ammiano, Tom. "Regulation would take it out of criminals' control." San Francisco Chronicle. 3 Mar. 2009.

economies of which are based on the marijuana industry, only a handful of cultivators are arrested each year.

Marijuana has a great cultural significance which is apparent in clothing, artwork, music, and many other forms. People of all ages and backgrounds consume marijuana for a variety of reasons. It is a constant and accessible commodity, even more so than alcohol to some, and has become deeply ingrained in California culture. Its accessibility makes it easy for people to use regularly and to create substance based relationships where marijuana becomes routine in certain activities or social situations. These habitual relationships are significant in social participation and the creation of psychological reliance.

Marijuana's unique psychoactive function distinguishes it from any other drug. Marijuana can alter one's perception in a way to provide relief from stress, or to simply to produce a pleasurable sensory perception. The most common mechanism of ingestion, inhalation, allows the psychoactive chemicals to take effect within thirty seconds.¹³ Marijuana is dose dependent so people can control the intensity of their high to some extent. It is a versatile natural medicine and provides viable relief from a myriad of symptoms and diseases. While individuals have their own motivation for smoking marijuana, the cannabis plant is a deeply rooted product in American culture.

DRUG TRAFFICKING ORGANIZATIONS IN CALIFORNIA

Marijuana cultivation by Drug Trafficking Organizations is a relatively recent development in California history. The foremost organizations that produce commercial marijuana plantations are of Mexican descent. Other major cultivators include outfits of Canadian and South American origin as well as comparably small scale independent growers. These groups began cultivating Cannabis on public lands in order to evade border security, capitalize on lucrative domestic markets, and take advantage of the optimal growing conditions provided by California lands. Remote Cannabis cultivation requires large scale

¹³ Presti, D. Professor, University of California, Berkeley. Molecular Cell Biology 62: Lecture 18, UC Berkeley. ASUC Lecture Notes Online. [Lecturenotes.berkeley.edu](http://lecturenotes.berkeley.edu). 10/25/07.

capital investments as well as a high degree of risk; however, DTOs have had a great measure of success.

TRADITIONAL TRAFFICKING

Traditionally, major organizations conducted drug traffic across international borders. Illegal substances were produced in foreign areas and transported across United States borders. Trafficking organizations utilized a variety of methods and a large quantity of smugglers to transport a steady flow of drugs beyond US border security with minimal losses to seizure.

Mexican cartels were notorious for supplying large amounts of low quality marijuana to the southern regions of the United States. This commercial grade marijuana was often referred to as 'Mexican Brick Weed'; a reference to the tightly condensed 'bricks' of dried marijuana buds packaged for international transfer. The process of drying and condensing buds distorted bud shape, reduced THC content, and decreased overall marketability, however, high volume smuggling created a surplus of marijuana that could be sold cheaply and in large quantities to compensate for the low quality of the substance. Mexican Brick Weed contained approximately 2-3 percent THC, whereas domestically produced strains of sinsemilla, marijuana without seeds, could reach levels upwards of 10 percent THC.¹⁴

In most areas of California, Mexican marijuana could not compete with domestically produced strains in terms of quality; only in competitive price. The risk involved with Cannabis cultivation enabled local growers and distributors to charge high prices, while the methods of pollination prevention, crossbreeding, and nutrient additives created highly psychoactive buds that maintained a widespread demand in California and across the nation.

Domestic marijuana cultivation traditionally occurred on a small scale by California residents. Small gardens were tended by a few people on private property, or a nearby location where plots of up to one hundred plants were grown.¹⁵ While marijuana cultivation

¹⁴ National Drug Intelligence Center. Domestic Cannabis Cultivation Assessment 2007.

¹⁵ Pugh, Ron. Special Agent in Charge, Pacific Southwest Region, United States Forest Service. Personal interview. 30 Oct. 2008.

remained illegal, this method provided a form of income and sustenance for people living in rural areas. Grow sites were generally outdoors near an accessible water source, and growers lived in local proximity to their sites. These small scale plantations were the primary producers of the marijuana sold in California up until early 1980s, when large scale organizations entered into marijuana production inside the US.

TRANSITION

A transition began during the mid-1980s as changing attitudes toward Mexican immigration lead to the Immigration Reform and Control Act of 1986.

“[This act] was passed in order to control and deter illegal immigration to the United States. Its major provisions stipulate legalization of undocumented aliens who had been continuously unlawfully present since 1982, legalization of certain agricultural workers, sanctions for employers who knowingly hire undocumented workers, and increased enforcement at U.S. borders.”¹⁶

These policies initiated a transition in immigration practices that allowed more Mexican laborers to legally enter the United States while deterring illegal methods of entry by tightening border security. The increased border security led to higher rates of drug seizure. These shifts in immigration were reinforced by the Immigration Act of 1990, which increased the limits on legal immigration, changed the status of aliens, and further increased border security by deploying a regular presence of National Guard troops to assist with Border Patrol.¹⁷ As the presence of law enforcement troops increased, the funding for extended patrols, searches and seizures increased as well. These measures threatened the flow of non-documented laborers and restricted the ability for Mexican organizations to regularly transport drugs across the border. As more traffickers were intercepted, DTOs responded by

¹⁶ "Immigration Reform and Control Act of 1986." *United States Citizen and Immigration Services*. Web. 10 Nov. 2009.

¹⁷ Pugh, Ron. Special Agent in Charge, Pacific Southwest Region, United States Forest Service. Personal interview. 30 Oct. 2008.

developing products within US borders.¹⁸

During the early 1990s the Mexican cartels began to participate in the trend that originated in California in the early 1980s. In response to increased marijuana related property seizures, California citizens began to grow marijuana on public lands because it made “ownership of marijuana... difficult to prove.”¹⁹ Growing Cannabis outside of personal property enabled local cultivators to limit investments on land and greatly reduced both the probability of getting caught and the liability of losing their property to the state. Commercial growers were able to diversify and decentralize their cultivation sites in order to make them less vulnerable. This cultivation model was ideal for cartels because they did not need to acquire land and could operate undetected by discreetly encroaching on remote landscapes.

Meanwhile, the dynamics of the marijuana market in California began to change as a result of state level policy changes. In 1996, the Compassionate Use Act, Proposition 215, passed 55.6 percent to 44.4 percent to allow medical marijuana to be legally grown and consumed in California, soon followed by thirteen other states.²⁰ Minimal regulation of doctor prescribed medical marijuana cards allowed cultivators to easily enter into the medical marijuana market. The new legal standing of marijuana decreased the consequences for cultivation on the whole, and often enabled traditional commercial cultivation to occur under the umbrella of the Compassionate Use Act. This proposition reduced the scale of some grow sites by setting limitations on legally cultivated amounts, but it also significantly increased the number of growers.

Proposition 215 created a political climate conducive to innovative cultivator practices. Access to important infrastructure and Cannabis enhancing inputs increased because cultivation efforts no longer needed to be kept completely secret. Commercial outlets and plant nurseries could supply high technology indoor and outdoor grow systems along with all of the associated inputs. As a result, more specialized systems were designed and sold commercially. As time passed, individuals increasingly experimented with techniques in

¹⁸ Ibid.

¹⁹ National Drug Intelligence Center. *Illegal and Unauthorized Activities on Public Lands*. 2005.

²⁰ “Proposition 215: Full Text of Proposed Law.” 1996 California General Election Server. 1996. California Secretary of State. 29 Sept. 2008 <<http://general96.ss.ca.gov/e/ballot/215txt.html>>.

crossbreeding, transgenesis, and high-tech indoor cultivation environments. Meticulous grower experimentation and utilization of extensive inputs increased the quality of high grade marijuana by increasing THC and Cannabinoid contents.²¹ Whereas the THC content of marijuana previously peaked around 12%, new strains could reach levels upward of 20%.²²

The change in California state marijuana policy decreased the demand for lower quality imported marijuana. California's Mediterranean climate, abundant water, and loamy organic soils provide ideal growing conditions. By increasing cultivation operations on US lands, DTOs were able to exploit the abundant resources, and domestic research and development necessary to produce high quality psychoactive Cannabis.

"Mexican DTOs that had previously produced marijuana with average THC (delta-9-tetrahydrocannabinol) levels of 2-3 percent from outdoor cultivated Cannabis began achieving 8-12 percent THC levels by applying growing methods typically used by indoor growers of high potency Cannabis. These DTOs typically use only select seeds from Mexico, prepare the seedlings in greenhouses, plant the seedlings outdoors before late April, separate male from female plants prior to pollination, and use high nitrogen fertilizer. Moreover, these DTOs are increasingly using cloned starter plants, irrigation systems composed of black polyethylene (also known as PVC) drip lines extending to each plant, and pesticides. The higher potency marijuana produced by outdoor plants... commands twice the price of commercial-grade Mexican marijuana."²³

As a result, DTO operations have "increasingly spread from remote forests to more public national parks" and other areas with closer proximity to a public presence.²⁴ This pattern of

²¹ According to the National Drug Intelligence Center's Marijuana and Methamphetamine Trafficking on Federal Lands Treat Assessment (2005), the highest ever recorded THC content in marijuana was 33.4% discovered in 2004 by a raid on an indoor cultivation operation

²² United States. General Accounting Office. Marijuana: Early Experiences with Four States' Laws that Allow Use for Medical Purposes. Washington, D.C. : U.S. General Accounting Office. 2002. <<http://purl.access.gpo.gov/GPO/LPS31227>>

²³ National Drug Intelligence Center. Illegal and Unauthorized Activities on Public Lands. 2005.

²⁴ Wood, Danial. "Wild West: Drug Cartels Thrive in US National Parks." The Christian Science Monitor. 10 June, 2003.

increasing DTO prevalence is expected to continue despite efforts to control the flow of immigrants, weapons, and money across the US-Mexico border. In 2005, the US House of Representatives enacted a policy to put up a barrier along the southern border of the United States, and since then, President Obama has vowed to increase border security by “doubling the number of border security task force teams and moving a significant number of other federal agents, equipment and resources to the border.”²⁵ These measures have continued the growth of the law enforcement industry, but have had little effect on drug markets.

AN INTERNATIONAL ORGANIZATION

The transition from traditional marijuana cultivation to DTO operated cultivation has transformed the scale, methods, economic scope, and environmental impact of marijuana growing. Land encroachment practices have likely increased cartel expenditures compared to traditional trafficking methods, but they have also increased market accessibility, demand and price. The marijuana market has become big business, and is estimated to be the most profitable industry in California.²⁶ However, the primary profiteers are safeguarded outside of the US.

Modern DTOs are international organizations governed by tight hierarchical structures, the upper ranks of which are controlled by familial ties.²⁷ The logistics of their operations are meticulously planned and highly organized. DTOs are sophisticated in their methods, technologically advanced in their systems, and resourceful in their practices. Cultivators select sites in rugged and remote wilderness locations that push the limits of human accessibility. They choose unusual locations to evade detection, even planting in sites not considered conducive for Cannabis cultivation. Grower methods for entering sites are both inventive and evasive. Suppliers drop off materials at inconspicuous locations during night hours in order to remain undetected. Laborers use irregular entry points and carry the

²⁵ CNN.com. 2008. “Illegal Marijuana Growing Pollutes U.S. National Parks.” The Associated Press. <http://edition.cnn.com/2008/WORLD/americas/10/12/eco.nationalparkpot.ap/index.html>

²⁶ Ammiano. “Regulation would take it out of criminals’ control.”

²⁷ Pugh, Ron. Special Agent in Charge, Pacific Southwest Region, United States Forest Service. Personal interview. 30 Oct. 2008.

supplies on their backs, hiking long distances off established paths through the darkness. These men sometimes carry more than their body weight in supplies over extremely rough terrain, and are careful to remove evidence of their presence. While some individuals use night vision goggles to navigate in the darkness, they still cross terrain that is dangerous in full daylight without added weight.

DTO-established sites are setup and operated by two to fifteen people, several of which live on location. A select number of workers with specialized technical expertise rotate between sites and aid in preparation according to their skill set (irrigation systems, communication systems, early detection systems, etc.).²⁸ The men who live on site throughout the season are usually Mexican nationals recruited out of economic desperation or to settle a debt to a Cartel. Their payment depends on the delivery of a complete harvest of marijuana buds without detection. Sometimes their lives and the lives of their families are used as collateral.

DTOs invest tens of thousands of dollars for each site, depending on the number of plants and necessary infrastructure. Expensive infrastructure components include weapons, drip irrigation, camp gear and mechanical equipment. Drip irrigation line can be left at the site over a period of years to save money and labor. Cultivators spray-paint subtle tree markings to identify campsites for re-utilization. Supplies that must be replenished annually include seed, or cloned starters, chemical inputs, food, ammunition and more. In addition, Cartels pay for travel and logistics, labor, and other variable costs. While these systems may seem both expensive and risky to establish, each harvest produces millions of dollars in profit.

The wholesale value of one pound of high quality marijuana buds ranges from \$1,800 to \$2,000, and the market value ranges from \$2,000 to \$6,000.²⁹ At these prices, marijuana is more valuable pound for pound than gold. The average number of plants for all discovered sites in 2006 was about 7,000, with each site producing between 7,000 -14,000 pounds of

²⁸ McCormick, Cheryl M. Director of the Conservation Science at the Santa Lucia. Personal interview. 11 Nov. 2008.

²⁹ *The Union: The Business Behind Getting High*. Prod. Adam Scorgie, Graeme Flanningan, and Stephen Green. Dir. Brett Harvey and Kieran Maguire. Perf. Adam Scorgie. [MoviesFoundOnline.com](http://www.moviesfoundonline.com/union_business_behind_getting_high.php). 15 Mar. 2009
<http://www.moviesfoundonline.com/union_business_behind_getting_high.php>.

buds.³⁰ This means that the average harvest is valued between \$12.6 million and \$28 million. Some outdoor plantations have contained upwards of 50,000 marijuana plants.³¹ In 2006, 346 sites were eradicated by the Forest Service in California estimated to represent only 30% to 40% of the marijuana produced within the state that year.³²

In an effort to capitalize on the immense returns, “cultivators [are] changing their cultivation process from a single planting to a two-crop planting with shortened growing cycles... this maximizes potential profits and reduces the risk of eradication.”³³ In order to do this, cultivators plant early in the spring, or plant specific strains of Cannabis that mature and produce buds faster. This means that the harvesting season may begin as early as March, and may not end until October.

Each DTO grow site supports between 5,000 and 50,000 plants and may contain advanced technological systems such as radios, alarms, scanners, night vision goggles, automated irrigation timers, chainsaws, camp equipment, and weapons. Armed guards are present at every site and carry weapons such as AR 15 assault rifles, AK-47 machine guns, hunting rifles, shotguns, and pistols. In order to provide a 24-hour watch, cultivators rotate their sleep patterns and setup early warning systems. Consequently, anybody in the near vicinity of a plantation is in extreme danger. In recent years cultivator aggression has increased, resulting in death threats, physical harassment, and gun violence. There are reports every year of vandalism to the homes of federal employees, guards firing at hunters, park visitors encountering armed Mexican nationals, law enforcement officers receiving death threats by mail and phone, and even cases of murder in remote areas.

LAW ENFORCEMENT EFFORTS

Domestic marijuana cultivation was traditionally a crime enforced by the Drug Enforcement Administration (DEA) and local law enforcement agencies. As marijuana

³⁰ National Drug Intelligence Center. Domestic Cannabis Cultivation Assessment 2007.

³¹ Ibid.

³² Ibid.

³³ Ibid.

production became an increasingly prominent and dynamic phenomenon during the mid-1980s, the governmental agencies responsible for enforcing the Controlled Substances Act of 1970 began to adapt to the changing trends. At this time, the DEA was primarily focused on addressing methamphetamine production across the United States.³⁴

Consequently, for the past several years most of the response to [marijuana cultivation] fell upon local law enforcement. Local sheriffs' offices stepped up and responded as best they could. However, most sheriffs do not have the resources to invest in the kind of long term investigations needed to have any long term affect on this issue. Some tend to focus primarily on eradication, with minimal effort to apprehend and prosecute those responsible. The arrests that have occurred have mostly been of those engaged directly in cultivation, with very limited success of apprehending those further up the criminal enterprise hierarchy.³⁵

Local police did not possess the resources or training to fully engage and repress remote cultivation efforts by international organizations. Marijuana production trends began to shift from people's personal property onto public lands around the early 1980s. At that time, California residents began to encroach on the National Parks and successfully grow and harvest marijuana crops.³⁶ The local Sheriffs could not deter this activity as it began because their time was limited by other casework, their funds were dedicated to addressing other criminal activity, their training and equipment was inadequate for remote operations, and their methods did not effectively identify, much less prevent the continuation of marijuana cultivation on private or public lands.

In March 1982, the House Committee on Interior and Insular Affairs and the Subcommittee on Public Lands and National Parks began to recognize the potential threat

³⁴ Pugh, Ron. Special Agent in Charge Pacific Southwest Region, United States Forest Service. Personal interview. 30 Oct. 2008.

³⁵ Ibid.

³⁶ General Accounting Office. Illegal and Unauthorized Activities on Public Lands.

posed by marijuana cultivation on federal land. The report Illegal and Unauthorized Activities on Public Lands – A Problem with Serious Implications evaluated how “crimes against persons and property, marijuana cultivation, timber thefts, and trespassing – were limiting the ability of the public to use and enjoy natural resources and recreational facilities on federal lands in California and Oregon... The Chairman was especially concerned about the danger marijuana growers posed to federal employees and land users.”³⁷

Governmental awareness of the issues facing public lands led to action that transformed the roles that various land management agencies would play in the future. In the 1983 report, Additional Actions Taken to Control Marijuana Cultivation and Other Crimes on Federal Lands, major governmental landholders were granted jurisdiction to regulate marijuana cultivation on public lands. The three principal federal land management agencies, the US Forest Service, the Bureau of Land Management, and the National Park Service were all cited along with the DEA as the primary agencies responsible for addressing threats to preserve the integrity of federal lands. This meant increased law enforcement responsibilities on the part of all three agencies. The National Park Service would utilize park police and park rangers while the US Forest Service and the Bureau of Land Management would employ special agents and enlist assistance from local and state law enforcement agencies. Cooperative efforts between the DEA, state and local law enforcement were often used to suppress domestic cultivation because they could “promote information sharing and contribute training, equipment, investigative and aircraft resources, and funding to support the efforts of state and local law enforcement agencies.”³⁸ One significant result of cooperation between federal, state, and local agencies was the development of the Campaign Against Marijuana Planting.

Created in 1983, the Campaign Against Marijuana Planting (CAMP) is a unique multi-agency law enforcement task force managed by the Bureau of Narcotic Enforcement and composed of local, state and federal agencies organized

³⁷ Ibid.

³⁸ General Accounting Office. Illegal and Unauthorized Activities on Public Lands. 2005.

expressly to eradicate illegal marijuana cultivation and trafficking in California. With more than 110 agencies having participated, CAMP is the largest law enforcement task force in the United States.³⁹

What these cooperative efforts show is that despite the increased responsibilities of federal land management agencies, outside sources were still relied upon for enforcement efforts. This is represented in Forest Service budgets that allocate a negligible amount of funds specifically for controlling marijuana cultivation. The funding allocated for marijuana control efforts by the USDA Forest Service in 1982 was \$206, only increased to \$1,072 in 1983.⁴⁰ During that same period of time, the "Forest Service reimbursed state and local law enforcement agencies \$5.3 million under cooperative law enforcement agreements."⁴¹ This shows that while land management agencies were responsible for the preservation and protection of land, they still relied mainly on state and local officers to conduct eradication operations. This may explain why in 1982, the US Forest Service's Pacific Southwest Region (California and Hawaii) located only 114,911 plants out of an estimated 387,000 plants, and only eradicated 55,561 of those located.

ERADICATION PARADIGM

Initial law enforcement efforts on public lands focused exclusively on locating and eradicating marijuana plots. To accomplish this goal, cooperative law enforcement agencies assigned agents to marijuana task forces during the late summer months because the harvest season was the only time of year that marijuana plantations reached adequate maturity to be visibly spotted by helicopter reconnaissance. Helicopter searches served as the primary means of locating plantations, so officers only conducted operations during times of the year when plantations were visible from an aerial perspective. Another reason that

³⁹ "Campaign Against Marijuana Planting - Bureau of Narcotic Enforcement - California Dept. of Justice - Office of the Attorney General." Office of the Attorney General - California Department of Justice. 10 Mar. 2009 <<http://ag.ca.gov/bne/camp.php>>.

⁴⁰ General Accounting Office. Illegal and Unauthorized Activities on Public Lands. 2005.

⁴¹ Ibid.

agencies only conducted periodic drug enforcement in remote areas was that traditionally, the success of enforcement operations was measured by the number of plants and sites eradicated, illustrated by the focus of law enforcement statistics on the plant eradication count. "Generally, this approach applies the rationale, 'the more plants eradicated, the greater the success.' However, a more holistic view recognizes that increased plant numbers may actually reflect a failed strategy."⁴² Short term annual operations maximized the plants eradicated for the resources dedicated, but did little to prevent the proliferation of marijuana cultivation on federal lands.

When Sheriffs raided sites for eradication, they apprehended individuals at the scene of the crime, but did not collect evidence, follow leads or conduct investigations. Eradication sometimes meant that plants were carried out in helicopter nets, but more often plants were slashed and burned or left to rot. However, officers did not enter every plantation that was visually identified due to limited budget allocation for remote operations. At the end of the eradication season, officers were transferred back to their regular assignments until eradication efforts began again in the following year.

As law enforcement agencies identified the increasing occurrence of cultivation on public lands, they also began to recognize the recurrence of grower operations in areas that had been eradicated in past years. It became evident that cultivators came back to sites year after year because the site infrastructure still remained. Eradicated sites could successfully produce marijuana harvests in years following a bust because federal agencies were so limited in time, staffing and resources that re-visitation of every previously eradicated site was impossible. The implication of grower recurrence on eradicated sites was that undiscovered sites were likely utilized on a yearly basis.

The establishment of DTO operations on California lands transformed the nature of law enforcement efforts to combat commercial marijuana production. While eradication efforts increased, "statistics show this approach has been less than effective. Most people that have been involved with this issue for any time agree that we cannot just eradicate our way to

⁴² Pugh, Ron. Special Agent in Charge Pacific Southwest Region. Strategic Plan: Impacts of Illegal Marijuana Cultivation on National Forests in California by Drug Trafficking Organizations. 2005.

success... Another common approach has been to use the number of arrests as a measure of success. Much like the plant count, using an increased number of arrests may also reflect a less than effective program.”⁴³ When small resident groups dominated marijuana cultivation in California, the eradication of a sole plantation had major economic implications for the individuals involved. Eradication statistics were directly correlated with the success of law enforcement, with some measure of legitimacy. When larger organizations entered into domestic production, they were able to compensate for losses by creating widespread and diversified operations. Eradicated sites only accounted for a small percentage of the organizations yearly production. In the 1970's, large eradications were responsible for cutting off the supply to an area for a period of time. Today, eradications serve to increase prices on remaining supplies.

A NEW APPROACH

While the law enforcement community understood that their longstanding methodology was ineffective at preventing remote cultivation, the organizational structures limited their ability to revolutionize their approach. Therefore, the National Marijuana Initiative (NMI) was established in 2001 by the Office of National Drug Control Policy to coordinate federal, state, and local agencies. Their goal was to reduce Cannabis cultivation in areas that produced the largest amounts of marijuana such as California.⁴⁴ Since its conception, the NMI has played a significant role in facilitating the spread of marijuana related information between law enforcement agencies and political entities. The NMI is responsible for developing the National Drug Intelligence Center's 2003 Marijuana Threat Assessment and the 2007 Domestic Cannabis Cultivation Assessment which compiled statistics from law enforcement agencies across the nation. Through coordination and cooperation with the widely dispersed agencies involved in marijuana control, the “NMI-funded investigations have identified drug trafficking organizations (DTOs) that operate

⁴³ Pugh. *Strategic Plan*.

⁴⁴ National Drug Intelligence Center. *Domestic Cannabis Cultivation Assessment*. 2007.

marijuana grows in several western states” and helped focus enforcement efforts toward key growing areas.⁴⁵

The NMI is a product of the long-term efforts of governmental agencies in conjunction with the short-term task forces of the 1980s. Interagency task forces such as CAMP have proven to be effective at mobilizing resources and conducting remote operations. Interagency cooperation has enabled task forces to pool funds, resources and agents to optimize strategic planning and meet government set objectives. Previously, law enforcement agencies were territorial when it came to marijuana raids because marijuana eradications increased funding and improved departmental image. Now, interagency connections and the personal relationships that result, encourage cooperative efforts instead of creating barriers to them.

The NMI played a crucial role in developing a political understanding of the transformation in marijuana production, cultivation by large criminal organizations, and in doing so shifted the primary focus away from eradication. In 2005, Senator Dianne Feinstein became aware of how DTO operations were adversely affecting federal lands through congressional hearings and media coverage on the issue.⁴⁶ In response, she held a meeting with the leaders of the DEA, US Forest Service, National Park Service, Bureau of Land Management, CAMP and other major law enforcement authorities in order to establish new objectives to increase the effectiveness of law enforcement. Through Feinstein's efforts and renewed support in Congress, state and individual organizations allocated more funding for a comprehensive approach to marijuana law enforcement. Marijuana cultivation on state and federal lands became a major law enforcement priority and the US Forest Service, National Guard, CAMP and other cooperative task forces have taken on primary roles in conducting counter-cultivation efforts.⁴⁷

⁴⁵ Steve, Frank. "NDIC Press Release." United States Department of Justice. 18 Jan. 2008. 17 Mar. 2009 <<http://www.usdoj.gov/ndic/prs/08ondcp/08ondcp.htm>>.

⁴⁶ Gaffrey. Statement on Drug Production on Public Lands.

⁴⁷ Pugh, Ron. Special Agent in Charge, Pacific Southwest Region, United States Forest Service. Personal interview. 30 Oct. 2008.

STRATEGIC PLAN

New law enforcement objectives were established in the “Strategic Plan” which identified short-term and long-term goals, as well as the methodology “to eliminate, disrupt and dismantle the leadership, command, control, and financial infrastructure of Drug Trafficking Organizations.”⁴⁸ The key developments within the agencies regulating marijuana cultivation were year round operations and investigations that targeted whole organizations. However, sustained operations required benchmarks for progress. Enforcement agencies would use short term results to measure progress on long term goals.

Our stated objective is to eliminate these crimes from national forest lands.

Hence, the only true measure of success will be to reduce, and idealistically to eliminate, the number of plants, sites and arrests. We do not expect these results to come quickly, or easy. This issue has been intensifying for several years. The risk to those profiting has been minimal. The incentives to continue have been enormous. To be effective, we must commit to a well-designed, long term collaborative strategy.⁴⁹

Previous measures of short-term success persisted, including site location, plant eradication and cultivator arrests. However, law enforcement agencies created divisions strictly dedicated to opposing DTOs by assigning patrol officers exclusively to the issue, reassigning alternative workloads, and removing extraneous administrative duties of those in charge in order to focus the necessary resources to impact DTOs. In addition, increased funding allowed agencies around the state to begin a training and recruitment process to significantly increase staffing. In the Pacific Southwest Region of the Forest Service, the additional staff would include 1 supervisory special agent, 3 patrol captains, 18 special agents, 50 law enforcement officers, and 6 administrative assistants, all of whom will be dedicated almost exclusively to

⁴⁸ Pugh. Strategic Plan.

⁴⁹ Ibid.

marijuana control.⁵⁰

This will allow for long-term engagement in year round counter-cultivation efforts that utilize preventative measures as an advantage. Instead of waiting for a site to be found in July or August, agents will be able to look for and follow up on leads throughout the year. Equally important, they can identify priority cases for full investigation so they may be completed to a “reasonable conclusion.”⁵¹

Investigations will be prioritized based on existing intelligence, site logistics, available resources, and special public interest. The process of site review involves a methodical documentation of evidence such as cell phone contacts and the origin of supplies, which is entered into records and scrutinized for pursuable leads. Previously, useful evidence would have remained untouched at the site, or on rare occasions, kept in police storage. The potentially useful information left at sites was lost to neglect. Now, a significant portion of the evidence left behind is subjected to intelligence analysis. Increased utilization of intelligence analysis centers has made this process much more efficient and effective, which enables preventative tactics and helps governmental agencies learn about and infiltrate tight drug trafficking institutions.

Governmental agencies have also changed investigation and detection strategies. While some authorities claim that there is nothing better than a helicopter and a well-trained eye, enforcement agencies are developing the use of more sophisticated techniques. These include, but are not limited to, ultraviolet, infrared, and electronic detection systems. Other techniques include night time patrols in high risk areas when cultivators may be less attentive, year-round patrols, and new detection methods such as monitoring for irrigation and cultivation supplies, comparing watershed precipitation with surveys of water flow quantities, and testing for chemical nutrient imbalances in bodies of water. The more time that is dedicated to research and detect sites early, the less time is required to raid and eradicate each site.

Raids are carefully planned efforts, designed to reach set goals while minimizing the

⁵⁰ Pugh. Strategic Plan.

⁵¹ Ibid.

risk to agents. First, team leaders develop a raid plan and develop logistics such as funding sources, equipment requirements and invasion methods. Agents in charge then gather a team that they brief, supply and prepare. New agents and officers are required to complete a thorough training program to learn remote raid techniques.

Teams sometimes hike into sites for covert operations, but more often, they rappel down from a helicopter into the nearby area. Officers face major disadvantages when raiding sites because cultivators have been living at the location for months. Covert operations involve the most risk because hiking conditions and landscape characteristics can subject officers to ambush and provide cultivators with vantage points for armed engagement. While no officers have been fatally wounded during remote operations, there have been various cases involving gunshot wounds. During helicopter raids, cultivators generally flee from the scene while law enforcement officers are lowered into the area.

While living on-site for months, cultivators develop elaborate escape routes and hiding spots. Hiding places can be as close as one hundred feet from a grow site, and are rarely found without K-9 assistance. The cultivators that are obtained are generally low-level employees with minimal knowledge about the larger organization that employs them.

To complement tactical operations, government agencies have developed another significant long-term goal to develop an understanding of commercial scale, remote marijuana cultivation, within the broader public. Regional leadership conducts public education programs by presenting PowerPoint demonstrations about DTOs at meetings, forums, and presentations for politicians, government employees, and the general public. Law enforcement organizations facilitate information sharing with the media and local contacts, and have developed “bi-lingual material to be distributed in high risk areas seeking information and offering rewards.”⁵² These programs aim to increase the awareness in an effort to increase reports of suspicious activities. When marijuana related activities are reported early, enforcement agencies gain a strategic advantage in combating individual sites. In addition, early detection allows more sites to be discovered and raided throughout the year because enforcement efforts are spread over a longer period of time. Public education

⁵² Pugh. Strategic Plan.

creates an understanding of the consequences of marijuana production on various scales. This can provide political support for the prevention of DTO related activities in California, as well as alter patterns of marijuana acquisition and consumption within the general public.

RESOURCE DAMAGE ON PUBLIC LANDS

The production of potent marijuana requires intensive resource inputs to achieve high yield. This means that carefully planned and executed cultivation systems are crucial to developing quality marijuana harvests, and that cultivators manipulate the environment to optimize conditions for Cannabis plants. The widespread influence of Mexican cartels on outdoor cultivation in California causes similar processes to be performed at separate sites dispersed across large geographic distances. DTO operated grow sites have developed systematic patterns of behavior that occur with regularity and make their efforts distinct. Cultivators inhabit remote sites over long periods of time to develop plantations, and create a multitude of adverse effects in the process.

LAND ALTERATION

Site selection is a crucial aspect of the cultivation process. DTOs often choose prospective locations long before they enter into a site. Some key elements that they look for on maps and aerial photographs are isolated water sources, slight canopy cover and adequate sunlight exposure.⁵³ Sites are created in areas such as logged landscapes, conservation reserves, remote areas of national parks, and other places with difficult access and visually indistinct features from a birds-eye view. These are often areas where people rarely go because entry is made difficult by physical barriers such as cliff faces, steep talus slopes, dense clusters of vegetation such as poison oak, and even man-made berms.

Due to the rugged and highly vegetated condition of most prospective sites, preparing land for marijuana planting is both labor intensive and time-consuming. Laborers

⁵³ Meyers, Kerry. San Bernadino National Forest Grove Assessments. Fall 2008 San Bernadino National Forest. 2008.

work long hours to provide Cannabis plants a monopolistic domination of the landscape. The dynamics of landscape alteration depend on site-specific characteristics, but many similar practices occur throughout DTO operations.

During the site supply process, cultivators cut or wear trails into the landscape that weave back and forth making site access for material transport easier. In order to avoid detection, laborers try to avoid leaving evidence of their presence up to a certain point, such as a major physical barrier, after which distinct paths are worn into the ground. The sheer weight of laborers' equipment loads combined with regular use of the trails is enough to trample and kill small vegetation. Dense stands of brush and trees are removed with saws and machetes. The paths connect site entry routes to the food preparation area, sleeping area, latrine, and various marijuana plantations. One site may contain 30,000 plants, but within that site the plants are often divided up between multiple smaller plots.

Laborers' movement along the paths is responsible for the introduction and distribution of non-native plant species to new areas. Laborers accumulate and transport seeds or spores on their bodies, clothing, shoes and equipment. In the California central coast region, cultivator movement along self-created paths is cited for the spread of Sudden Oak Death syndrome (SOD) in Tan Oak, Black Oak, and Coastal Live Oak trees.⁵⁴ Studies conducted by the Santa Lucia Conservancy show that the occurrence of SOD is facilitated by remote inhabitation through transmission of the plant pathogen responsible for SOD, *Phytophthora ramorum*. Marijuana cultivators contribute to the spread of *Phytophthora ramorum* to uninfected oak trees and exacerbate the effects of Sudden Oak Death syndrome by moving throughout affected landscapes that are part of their widespread system of sites. Movement by any person or animal can effectively transmit this pathogen to uninfected oak trees, but cultivators navigate through these areas more frequently than other people who may pass through. Their movements are also responsible for the spread of a variety of harmful invasive species including thistles, Vinca, Periwinkle, English Ivy, and others.⁵⁵ Invasive

⁵⁴ McCormick, Cheryl M. Director of the Conservation Science at the Santa Lucia Conservancy. Personal interview. 11 Nov. 2008.

⁵⁵ McCormick, Cheryl M. Director of the Conservation Science at the Santa Lucia Conservancy. Personal interview. 11 Nov. 2008.

organisms often out-compete native species because they possess adaptive characteristics and lack natural competitors when introduced in new areas, which results in widespread alterations to the food-web, nutrient cycling, fire regimes, and hydrology of otherwise well-preserved ecosystems.

Many attributes of remote ecosystems are not ideal for agriculture, so laborers invest much time and energy in altering land to make it suitable for Cannabis cultivation. Workers clear understory vegetation to eliminate potential competition and prepare the soil for Cannabis plantations. The cleared vegetation, referred to as “slash piles,” are discarded in stream beds, causing impediments to hydrologic flows, or used to create berms up to 8 feet tall in order to bar site access.⁵⁶

Throughout the growing season, cultivators use chemical techniques to maximize THC content and bud production. These intensive methods change soil dynamics, nutrient levels and chemical makeup, thus creating the opportunity for a new composition of vegetation to emerge. Landscape alteration may awaken seedbanks in the soil that have sat dormant for up to hundreds of years, alter the ability for some plants to re-grow because of changes in soil-chemistry, destroy habitat for a variety of organisms, and have many other adverse affects on otherwise preserved ecosystems. In short, remote Cannabis cultivation forever changes the ecosystems in which it takes place.

In highly mountainous areas, growers dig out terraces on hill slopes to create planting beds. In the process, soil is displaced leading to accelerated rates of hill-slope erosion. Some terrace beds are stabilized by falling trees, trimming them into logs, and inserting the logs into the terrace walls to hold the dirt in place. This is an important step to provide somewhat stable access to individual plants on steep slopes, and to prevent landslides that could destroy entire plantations. However, when these are removed, the stock of topsoil is greatly diminished. On slight grades or flat surfaces, cultivators mound soil around Cannabis stems to optimize nutrient uptake. For plantations with high percentages of gravel or sand, growers will bring in loamy soil to provide proper soil composition and nutrients.

The affects of these changes on the natural environment can vary. For instance, fallen

⁵⁶ Meyers. San Bernadino National Forest Grove Assessments.

trees naturally promote the growth of under story species; however, the cutting of trees can disturb soil and impact the ecosystem services that they once provided such as habitat, nutrient cycling and moisture retention. Many land alterations remove perennial root structures that stabilize sediment causing the hillsides to lose stability and become more susceptible to small landslides and sedimentation of water sources during precipitation. Sedimentation alters water flow, reduces the capacity of water stocks, degrades the habitats of various species, and makes waters turbid - reducing the capacity for organisms to photosynthesize. Further, chemical toxins and metals bind to clay particles in fluvial sediment, are consumed by bottom feeding organisms, and bioaccumulate in higher order predators throughout the food chain.

Cultivators approach land alterations with utter disregard; falling old growth trees, discarding of brush in stream beds, and littering the ground indiscriminately with waste. In sites intended for continued cultivation, laborers dig deep holes that are used to dispose of trash at the end of the harvest season in order to reduce the chances of detection between one season and the next. While their grow operations are usually restricted to between 5 and 10 acres, according to the National Park service, “for every acre of forest planted with marijuana, 10 acres are damaged.” In other words, the adverse effects of remote Cannabis cultivation reach far beyond the borders of the plots in which the plants are grown.

WATER DIVERSION

An isolated water source is essential for the success of the marijuana plant to produce market grade buds. Mendocino County Sheriff, Tom Allman, claims that “one marijuana plant requires approximately one gallon of water per large plant per day,” meaning that a typical remote grow site (about 7,000 plants) can consume approximately 7,000 gallons of water each day over a period of three to four months. This makes water diversion no simple task. Finding a reliable water source that is available year round is especially crucial because the growing season occurs during the summer months. Ideal water sources include springs, creeks, and small bodies of water that do not dry up even during the hot California

summers.

Cultivators enact a variety of methods to exploit water sources high in the watershed, some of which include makeshift dams, cisterns, storage tanks, on-site reservoirs, and gravity based PVC pipe flow systems. These systems are built to utilize gravity-based pressure to extract water from natural or man-made pools. The water is then transported through PVC pipes to cultivation sites. These water diversion systems connect water sources to marijuana plants up to four miles away. The resources that cultivators possess to build these extensive systems include shovels, pumps, sheets of plastic, tarps, string and large quantities of PVC piping. Other necessities are extracted from the nearby environment and include logs, rocks, clay, brush, and moss.

One site in Carmel contained a makeshift cistern that was dug out, lined with black plastic, and held in place with rocks. Water flowed from the cistern through the 1.5 miles of piping and dropped 700 feet in elevation en route to the site. Once water reached the grow site, the large PVC fed into progressively smaller tubing that connected drip irrigation lines to each plant. This system utilized control valves to prevent overwatering and to regulate watering schedules. In the case of small operations, the water is sometimes stored at the site in large plastic lined reservoirs or large storage tanks. The water is then pumped from the reservoir on regular schedules through drip irrigation lines in quantities that optimize growth.

Water diversion practices create adverse effects for humans and the environment alike. When the natural flow of water from springs or ephemeral creeks is modified, the pre-existing flora and fauna that rely on it are deprived. As surface level water disappears, riparian vegetation and animals have limited access to the water that they depend on. More seriously, keystone fish species (species with a major affect on many other organisms in an ecosystem) die from degradation and loss of habitat. The death or removal of keystone species from ecosystems creates a void that affects the entire food chain. As one species cannot sustain its diet, it dies off, leading to the death of other species that predate upon it.

Water diversion practices significantly impact human society as well. The state of California has abundant water resources that are necessary to sustain its vast population,

economy, and natural environments. Though the overall fresh water supply from precipitation is immense, the public demand for fresh water far exceeds the natural supply. The consequence is that California is effectively experiencing a water crisis resulting in agricultural drought, economic and natural devastation, and limiting water availability for California residents. Water diversion practices for marijuana cultivation serves only to further exacerbate the issue during the most critical drought months.

Water flow assessments estimate that an average of 650,000 gallons of water goes unaccounted for in California every day throughout the year.⁵⁷ Estimates of unaccounted water during the summer months can reach numbers as high as 3.6 million gallons per day.⁵⁸ This overconsumption depletes groundwater resources causing lowlands to subside below sea level, rivers to dry up, and salt water from the ocean to intrude and contaminate California's primary fresh water source the Sacramento San-Joaquin River Delta. Changes in water quantity cause the temperatures, pH, and salinity of lakes, rivers, and canals to increase. These decreases in water flow and reductions in water quality reduce the amount of viable breeding habitat for the sustenance and restoration of aquatic species.

The direct correlation between water consumption and marijuana bud production creates a large incentive for marijuana cultivators to heavily irrigate their crops. Remote cultivators extract water in mass quantities, blatantly "degrading the public water trust because they are divorced from the foundation of [American] laws."⁵⁹ Due to the illegal status of marijuana cultivation, growers experience limited liability for their diversion practices within the state of California, because they are outside of the realm of institutional oversight. Their access to water is difficult to obstruct because they extract water from the top of watersheds. Thus, they act in disregard for human communities, flora, and fauna that depend on reliable sources of fresh water. When Cannabis cultivators exploit over-extended water supplies, California is forced to extract increasing amounts of water from the Colorado River and other sources, for which the citizens of California and other areas foot the bill.

⁵⁷ Williams, Linda. "Island Mountain Arrests in Major Pot Grow." *The Willits News*. 18 July, 2008. 1+. (CHECK)

⁵⁸ Allman, Tom. Mendocino County Sheriff. Personal interview. 30 Oct. 2008.

⁵⁹ Higgins, Patrick. Stream ecologist, Independent Consultant. Personal interview. 30 Oct. 2008.

CHEMICAL APPLICATION

As in industrial agriculture, chemicals are applied in order to create plants that are fast growing, develop specific desired traits, and have an optimized yield. For the Cannabis plant, this means maximizing bud production, increasing THC levels and preventing any damages from deer, rodents, mites or mold. An average cultivation site of about 5 acres and 7,000 plants can contain 20 pounds of rat poison, 30 bags of fertilizer, plant growth hormones, insecticides, herbicides, fungicides, and a variety of other chemical inputs.⁶⁰

The key difference between industrial agriculture and marijuana cultivation is that Cannabis cultivators are not subject to government or industry regulations. DTO's import banned chemicals from Mexico which they apply in unrestricted amounts, causing extensive harm to the laborers and to the ecosystems exposed. It is estimated that 1.5 pounds of fertilizer is used for every 10 plants. Excess nutrients not taken up by plants are washed into lakes, rivers, streams and the ocean during periods of precipitation. These fertilizers cause nutrient imbalances with varying effects. Residual toxic compounds "enter and contaminate groundwater, pollute watersheds, kill fish and other wildlife, and eventually enter residential water supplies."⁶¹

The marijuana mono-cultures that Mexican DTOs create are especially susceptible to damage and infestation, causing cultivators to take preemptive measures to protect their plants. Four of the foremost threats to Cannabis plants are mold, mites, rats and Deer. Cultivators spray sulfur dioxide and pesticides directly onto Cannabis plants in order to combat mold and mite problems. Excess sulfur gas and sulfate particles diffuse into the atmosphere, high exposure to which can cause respiratory effects in humans and animals ranging from shortness of breath to respiratory diseases and premature death. In the environment, sulfur dioxide is the leading source of haze in national parks. More importantly, sulfur dioxide in the atmosphere leads to acid rain that "damages forests and crops, changes

⁶⁰ Heil, John. Director of Public Affairs, United States Department of Agriculture Forest Service. Personal interview. 20 Oct. 2008.

⁶¹ National Drug Intelligence Center. Domestic Cannabis Cultivation Assessment 2007.

the makeup of soil, and turns lakes and streams acidic which causes unsuitable" conditions for aquatic life.⁶² Acidic precipitation occurs in the form of rain, fog, snow, and particulates that can travel in winds for hundreds of miles, causing damage to plants, buildings, and monuments along the way.

One of the most notable chemicals that is used to combat mite infestations is Dichloro-Diphenyl-Trichloroethane (DDT). DDT was banned in the United States in 1973 after scientific research led to public outcry over its adverse effects on human health and the environment. DDT can persist in the environment for up to fifteen years because it binds to soil and bioaccumulates in plant materials and the fatty tissues of animals such as fish and birds.⁶³ DDT is a carcinogen that damages the nervous system (causing excitability, tremors and seizures), reduces reproductive success, and causes cancer to the liver. Despite the known health hazards posed by DDT, people throughout the world have been subjected to acute exposures through food consumption and inhalation. Another commonly used pesticide is Malathion, which is a synthesized organophosphate insecticide.⁶⁴ When Malathion enters the environment it has little harmful effects because it is broken down rapidly by bacteria in soil and water, and by UV radiation when it enters the atmosphere. However, direct "exposure to high amounts of Malathion can cause difficulty breathing, tightness in the chest, vomiting, cramps, diarrhea, blurred vision, sweating, headaches, dizziness, loss of consciousness, and possibly death," all symptoms which are most likely to be experienced by on-site laborers who do not wear proper respiratory protection.⁶⁵

The methods that cultivators use to apply chemicals are especially hazardous. At best, cultivators wear long sleeves, pants, and thin polypropylene masks as protection, all of which are inadequate for preventing significant exposure to chemical toxins. Laborers use hand held spray systems to administer chemicals in liquid or gaseous form. They are subjected to

⁶² "Chemtrade/Marsulex Clean Air Act Settlement | Civil Enforcement | Compliance and Enforcement | US EPA." *US Environmental Protection Agency*. Web. 0 Mar. 2009.

<<http://www.epa.gov/compliance/resources/cases/civil/caa/chemtrade-marsulex-infosht.html>>

⁶³ "Agency for Toxic Substances and Disease Registry - ToxFAQs™: DDT, DDE, and DDD." *ATSDR Home*. 11 Sept. 2007. 04 Mar. 2009 <<http://www.atsdr.cdc.gov/tfacts35.html>>.

⁶⁴ "Agency for Toxic Substances and Disease Registry - ToxFAQs™: Malathion." *ATSDR Home*. Sept. 2003. 04 Mar. 2009 <<http://www.atsdr.cdc.gov/tfacts154.html>>.

⁶⁵ *Ibid.*

concentrated chemicals for prolonged periods, causing high rates of exposure through inhalation and contact with clothing and exposed body parts. However, cultivators are not the only group risking exposure through direct contact. Chemical residues can persist on marijuana buds, resulting in exposure when buds are consumed.

Another threat to marijuana plantations is that “marijuana stalks are very appetizing to deer and rodents that chew the stalks of the plants.”⁶⁶ To combat this problem, growers use rat poison pellets to kill rodents, and rifles to kill large mammals. Chemical repellents and poisons are applied at or near the base of the Cannabis plants and around the perimeter of plantations to kill rats, deer, and other animals that could cause crop damage. “The poison kills the animals close by, and when the bodies decompose,” these poisons enter into the water table and contaminate soil and wildlife that come into contact with the polluted water.⁶⁷ Contaminants accumulate in small biotic creatures, which are then eaten by larger animals causing progressively concentrated levels of toxins within the tissue of large predators. Ultimately, this can lead to the death of large animals and the consumption of toxins by humans.

EFFECTS OF INHABITANCE

Sustained inhabitation at remote locations is one of the crucial distinctions between outdoor marijuana cultivation sites operated by Mexican DTOs and those operated by other groups. Mexican nationals inhabit sites over a period of three to five months in order to prepare the landscapes, maintain plants, and aggressively protect their plantations. On average, two to five people live on the site throughout the season while a total of ten to fifteen actively aid in supplying materials and preparing grow systems. These men ensure that the site is properly equipped, concealed by camouflage, and guarded against detection and seizure.

⁶⁶ McCormick, Cheryl M. Director of the Conservation Science at the Santa Lucia Conservancy. Personal interview. 11 Nov. 2008.

⁶⁷ Edmison, N. 2007. “Greening the Green: Marijuana is California’s Biggest Dollar Crop- and its Production is Stretching the North Coast’s Resources.” *Terrain Magazine*, Berkeley, CA, 9pp.

Cultivators rely on sufficient tree canopy as the primary camouflage for Cannabis plantations. They plant marijuana in areas where the sunlight reaches through the holes in the trees, but the tree cover is sufficient to obstruct the view of plants from an aerial perspective. Cultivators cut down trees strategically in order to let in more sunlight while maintaining obstruction to aerial detection. They then spray green spray paint and other colorings on stumps to mask the reflectivity of freshly cut wood. In more exposed areas, marijuana is sometimes interspersed with legitimate commercial agriculture to prevent visual detection. In addition, inhabitants paint camouflage patterns and netting to hide camp equipment and tents that do not blend in with the natural environment.

Cultivator concern for concealing their activity is limited to arboreal camouflage. Inhabitants contaminate sites by littering the ground with garbage including cook ware, stoves, empty propane tanks, extendable pruning saws, excess plastic irrigation hose, tarps, beer cans, plastic wrappers and many other forms of refuse. Dug out latrines contain months worth of excrement and excess chemicals. In Sequoia National Park in 2007, the California Army National Guard and the California Air National Guard cleaned up resident-camp infrastructure from 11 grow sites and 9 camps that were occupied by growers. In this effort they removed 5,600 pounds of garbage, including 75 propane canisters and 5.8 miles of irrigation hose.⁶⁸ In addition to leaving trash, some cultivators construct and leave fences around cultivation plots. They build deer fences that are 6-10 feet tall around planted areas with standard chicken wire, cattle fence, plastic netting, or livestock wire. These fences act as barriers to faunal migratory pathways and tangle animals in the netting or micro-filaments.

Wildlife is also impacted directly through cultivators' use of high powered weaponry. Many sites have scattered carcasses of deer and bears that were poached by laborers, who shoot almost anything that comes near their site. This aggressive behavior protects the plants and provides supplemental protein in the laborers diet. However, the vast majority of these carcasses are left to rot and to be eaten by vultures because growers cannot viably consume or preserve all of the meat from large mammals before it rots. The scavengers that successfully feed on carcasses have an increased risk of developing lead poisoning because they begin

⁶⁸ Markey, Sean. "Marijuana War Smolders on U.S. Public Lands." *National Geographic News*. 4 Nov. 2003.

eating at the point of bullet entry where inner flesh is the most exposed and easily accessible. By eating from a gunshot wound, scavengers consume bullets containing lead. Over time, lead can accumulate in their bodies and cause lead poisoning. Lead poisoning caused by hunting is cited as the number one killer of the California condor, an endangered species, and poses one of the most significant threats to wild scavengers in California.⁶⁹

Sustained inhabitation poses a significant hazard to fire prone areas throughout California. Cultivator activity can cause wildfires and the presence of a marijuana garden obstructs firefighting efforts due to safety issues. “On the Hume Lake Ranger District of the Sequoia National Forest, a wildfire in 1999 was started by a campfire in a marijuana garden. Firefighters found the garden and had to stop fire suppression activities in the area until law enforcement secured the area. This problem occurs several times every year.”⁷⁰ Cultivators use campfires and burn volatile gases for cooking during the dry season in areas vulnerable to fire. Under prime fire conditions, a stray spark, improperly connected tank, or overturned stove can initiate an out of control fire with drastic and widespread consequences.

A crucial function of sustained inhabitation is to perform counter-surveillance efforts. Cultivators are trained by cartel employees, often veterans of the Mexican army, and equipped with weapons ranging from shotguns to assault rifles. A station is setup at a vantage point above the grow site so a watchman can detect and alert his colleagues to approaching scouts or the presence of pedestrians. While entering sites, laborers sweep trails of any prints so they can patrol for signs of entry by others. One positive development is that the use of booby-traps has drastically declined. However, the protective behavior of inhabiting guards has become increasingly aggressive year to year as a result of escalating grower competition, law enforcement pressure, high crop value, and DTOs’ demand for harvest delivery.⁷¹ Men on patrol have been known to threaten anybody they encounter, and even harass law enforcement and forest service employees at their homes.⁷² Their engagement in armed standoffs with law enforcement scouts has increased in conjunction

⁶⁹ Stromberg, Mark, PhD. Wildlands Manager, Hastings Natural History Reserve. Personal Interview. 20 Sept. 2008.

⁷⁰ Gaffrey. Statement on Drug Production on Public Lands.

⁷¹ National Drug Intelligence Center. Domestic Cannabis Cultivation Assessment 2007.

⁷² National Drug Intelligence Center. 2005. Marijuana and Methamphetamine Trafficking on Federal Lands Threat Assessment. National Drug Intelligence Center, Johnston, PA, 22pp.

with the occurrence of gunfire. By shooting at site detection scouts, cultivators create a two to three day window during which they harvest all of the buds they can carry out, and flee the area before a larger task force can return. The rate of violence and harassment towards pedestrians has also increased. In June 2006, two individuals in a remote area north of Covelo, California, came near a marijuana plantation and were shot and killed."⁷³ Two months later, in October 2006, "a man hunting in a remote location within the Mendocino National Forest was fired upon by four individuals after he inadvertently approached the edge of a grow site."⁷⁴ Both instances lead to the discovery of the plantations that the gunmen were trying to protect.

ENVIRONMENTAL RECLAMATION

Due to the illegal status and consequently hazardous state of marijuana plantations, law enforcement agencies are the primary organizations responsible for site reclamation on public lands. "In the past, site reclamation has not been considered much, if any, by the law enforcement community."⁷⁵ Environmental cleanup and remediation are crucial to mitigating the effects of remote cultivation. Since the objectives of law enforcement agencies have changed, leaders have recognized the significance of clean up in counter-cultivation efforts, and have emphasized site reclamation in their large scale marijuana control plan. Even so, environmental cleanup and remediation remain the most neglected tasks associated with post-raid site processing. The main barriers to reclamation efforts are the high costs and intensive labor needs. Enforcement agencies, land managers and volunteer groups are increasing post-eradication cleanups, but reclamation efforts remain inadequate when compared to the damage that cultivators create.

CLEANUP STRATEGIES

⁷³ National Drug Intelligence Center. Domestic Cannabis Cultivation Assessment 2007.

⁷⁴ Ibid.

⁷⁵ Pugh. Strategic Plan.

The remoteness of Cannabis grow sites makes clean up both time consuming and arduous. Clean up crews remove marijuana plants, disassemble water diversion and drip irrigation systems, and clean up camp sites and surrounding areas. As forest technician Madison Thomson states, “[cultivators] pack everything in and nothing out. We [the conservation fund] don’t have enough money or enough manpower to go into these places and clean them up. It’s a big eye sore.” Depending on the number of people, available funding and equipment involved, the site cleanup process can take anywhere from a number of days to several months. More often than not, cleanup is not completed at all.

From the perspective of law enforcement agencies, it is crucial for grow sites to be cleaned up. Undoing the work cultivators put in and removing grow infrastructure minimizes the incentive for cultivators to come back. Otherwise, cultivators readily return to a location to save countless hours preparing the grow site. Equipment and trash that is dispersed across cultivated landscapes provides visual evidence of marijuana cultivation activities. Sites that are not cleaned up are indistinguishable from active cultivation plots, and provide evidence that may result in raids on unoccupied areas.

The most important piece of equipment used for optimizing the cleanup process is a helicopter. Helicopters enable cultivation equipment and trash to be removed quickly and in large quantities. Clean up crews fill up hauling nets with marijuana plants, irrigation tubing and trash bags. The nets are connected to an extended line and flown to a designated area for transport to a disposal location. A clear area is critical for helicopters to drop lines with nets into sites for equipment removal. Heavy tree canopy and forest fires hinder the use of helicopters, and greatly reduce the efficiency of cleanup efforts. What cannot be flown out due to inaccessible site conditions, limited time allocated for helicopter use, or limited funding to pay for helicopter costs, must be hiked out on peoples backs or left to rot.

Marijuana removal and destruction is a historical focus of law enforcement agencies that subsists today, despite the reality that plant removal after raids actually accomplishes little to remedy the environmental damages. Plant eradication provides a measure of operational success, prevents cultivators and civilians from attaining marijuana from already raided areas, and enables land alterations including terracing and mounds to be rectified.

However, the effort put into plant eradication is needless in sites that will not be cleaned up because abandoned sinsemilla Cannabis will rot and will not reproduce to grow in subsequent years.

During eradication, officers, land management employees and volunteer laborers use machetes and loppers to cut down Cannabis plants at the stems. On large plots, the work is both physically demanding and time consuming. Depending on the location of the site, different strategies are used to remove eradicated plants. Traditionally, a common method was to leave the cut plants on the ground to decompose. Today, this generally occurs only in the most remote locations to prevent plant acquisition by outside parties. Another historically prevalent practice was to burn the marijuana plants on-site. However, this process releases carbon into the atmosphere and poses a potential risk of fire spreading to surrounding vegetation. To prevent forest fires, this option requires constant monitoring and can only be done during certain times of the year. The final option is to airlift or hike plants out to a landfill or a location suitable for burning.

The most important structure to remove is the water diversion system. Removing miles of irrigation tubing is one of the most intensive aspects of cleanup in terms of time, effort, and money. It is the most important infrastructure to remove because DTOs invest large quantities of money and labor into its installation. When irrigation systems remain intact, DTOs retain a major incentive to return to eradicated sites in subsequent years, which perpetually prevents ecological recovery. Irrigation lines alone can fill multiple helicopter removal bundles, each weighing about five hundred pounds when full.⁷⁶ The most environmentally harmful element of irrigation systems is the dam or cistern that is used to create a catchment from which cultivators extract water. Removal of catchments requires great care to restore original flow patterns, while minimizing sedimentation and alterations to primary and ephemeral flows.

Additional clean up aims to remove equipment, supplies, piles of cleared vegetation and remains from human inhabitation: this includes bags of fertilizer, chemical containers, propane tanks, camp dwellings, food preparation areas, latrine sites, scattered trash and

⁷⁶ Johnson, Michael. Special Agent in charge of Campaign Against Marijuana Planting. Personal interview. 22 Oct. 2008.

more. The scattered trash includes composed of plastic wrapping, notebooks, clothing, tin cans, hiking packs, beer cans, pruning saws, rope, and more. It is important to gather and remove these scattered remains so that eradicated sites can be distinguished from active ones. The latrine, however, cannot be simply picked up and taken away. Cultivators generally dig at least one hole deep into the ground to be used throughout the duration of their stay. Nothing is currently done to remove the excrement aside from covering up the hole, marking the location, and allowing the contents to filter through the soil.

REMEDIATION PROCESSES

Holistic remediation efforts attempt to restore landscapes to pre-alteration conditions, which entails watershed maintenance, surface restoration, vegetation management, and wildlife promotion. While there are astounding regularities from one DTO site to another, remediation efforts still must be suited to specific landscapes and management goals because the individual problems of each site influence reclamation solutions.

Watershed maintenance centers on restoring water courses by removing cisterns and dams. Dams must be removed in a way that will not wash the dam components downstream. This requires careful consideration about how to release collected water in a controlled manner to its original path. However, the process of diversion may permanently alter the direction of ephemeral water flow and the way in which it accumulates in pools.

Equally important in preserving watershed function is preserving landscape drainage. Restoring the integrity of watershed drainage goes hand in hand with rectifying land alterations such as reservoirs, terracing and displaced vegetation that alters surface and sub-surface water flow. Remediation teams attempt to fill reservoirs, holes and sumps, re-contour slopes, and disperse vegetation.⁷⁷ It is important to fill any holes dug by cultivators because they can trap and kill small mammals.

Remediators use rakes and shovels to re-grade slopes and flatten mounds to smooth soil surfaces. While re-contouring can be significant, soil replacement is inevitably an

⁷⁷ Meyers. San Bernadino National Forest Grove Assessments.

imperfect process. The removal of logs providing terrace support can cause rapid erosion, which makes terrace remediation complicated and difficult. The original grade is never reproduced perfectly, but over time, the decomposition of organic matter and normal physical processes replace soil losses. In addition, crews perform restoration tasks such as “filling in planting holes and covering the hillsides with small branches and duff to help prevent [further] erosion.”⁷⁸ Clean up crews use the slash piles created by cultivators to control erosion in areas with bare soil. It is important to disperse cleared vegetation, to remove large berms that obstruct site accessibility, and to redistribute piles from streams and creeks.

Remote landscapes generally recover very well with time through “natural or unassisted regeneration.”⁷⁹ The dark and rich organic soils provide abundant nutrients to new sprouts, and the more inhospitable landscapes are well suited for native plants. For example, large trees that are topped off will take tens to hundreds of years to recover if at all; but successive plants will thrive in the newly sunlit areas. When remediators do restore vegetation, they spread seeds of native plant species or plant seedlings. This can provide habitat, prevent further establishment of invasive plants and mitigate erosion. Habitat maintenance and restoration is a major concern for cultivated areas containing threatened or endangered species. In certain cases, plant restoration requires regular monitoring to gauge effectiveness. The success of plant recovery depends on each site, but the most vital factors in site recovery are the prevention of cultivator return and the passing of time.

Little can be done to remove the presence of chemicals from the biomass. The high nitrogen and phosphorous fertilizers are both moveable and soluble, thus they are absorbed mostly in and around the site. Fungicides such as sulfur generally have a short half-life, so they remain in the area for only a short period of time before they decompose or dissolve into the atmosphere. Insecticides cannot be prevented from dissolving into the air and soil, or from accumulating in the food chain. However, a commonly used pesticide, Malathion, is rapidly broken down in soil and by sunlight and causes the most harm only through direct

⁷⁸ High Sierra Volunteer Trail Crew. “Environmental Restoration Program”. 5 Nov. 2008. 25 Nov. 2008.
<<http://www.trailcrew.org/>>

⁷⁹ Meyers. San Bernadino National Forest Grove Assessments.

exposure.⁸⁰ Rat poison pellets and similar rodenticides cause the most adverse and irreparable effects because they dissolve into soils and water tables and their direct consumption causes death in animals.

COSTS

According to Patrick Heil, the Director of Public Affairs for the US Forest Service, the average cost of cleanup per site is \$5,000. This is the real cost of cleanup on average for a ten acre site using helicopter assistance. When environmental remediation is included, the cost of site processing doubles, bringing the average to approximately \$10,000. These expenses include helicopter fees, fuel consumption, wages, food, gear (tents, hard hats, gloves, shovels, etc.), trash disposal fees, and other variable costs not including the cost of raids, eradication, or investigations.

Land management agencies have had to divert funding from other areas of operation to finance cleanup efforts due to the high costs. In 2007, the US Forest Service eradicated 346 sites, but allocated only \$300,000 to site cleanup and remediation.⁸¹ This means that the organization is over 3 million dollars short of what the cost would be to clean up and remediate every site eradicated, not including plantations on land managed by other agencies.

Land managers often create partnerships to allocate the resources necessary to clean up cultivated landscapes. One cooperative cleanup effort was conducted by land management groups in the Carmel Valley. In 2008, “The Herald” reported that one marijuana garden with about 6,500 plants and another garden with about 32,000 plants were destroyed by law enforcement officers.⁸² In order to clean up the campsites and infrastructure, The

⁸⁰ Agency for Toxic Substances and Disease Registry. Malathion.

⁸¹ Pugh, Ron. Special Agent in Charge, Pacific Southwest Region, United States Forest Service. Personal interview. 30 Oct. 2008.

⁸² Lopez, D. 2008. “Marijuana Farm Found in C.V. Hills.” *The Herald*. Monterey, CA.

Santa Lucia Conservancy partnered up with the National Guard, Big Sur Land Trust, the Department of Fish and Game, and the Monterey Peninsula Regional Park District to organize weekend clean up days and restore damaged landscapes. More common cooperative efforts are conducted between the California Conservation Corps, the High Sierra Trail Crew and major public land holders.

Non-profit organizations such as the High Sierra Trail Crew and other volunteer groups provide a portion of the man-power needed to clean up cultivated sites. These groups dedicate themselves almost exclusively to aiding in site cleanup and remediation. According to personal accounts, High Sierra volunteers dedicate their time because they feel a sense of land stewardship and an obligation to deter growers from returning to cultivated areas. Without the regular coordination of cleanup efforts by non-profit organizations such as the High Sierra Volunteer Trail Crew, site reclamation would be much less feasible. Volunteer groups rotate from site to site for efficient cleanup, but liability issues extend the time frame before they are allowed to enter any site, if they are allowed entry at all. Even though it has become common for volunteer groups to clean up cultivated landscapes, there remain major bureaucratic barriers that prevent the full utilization of volunteers. Even with sites secured by law enforcement officers, people face an array of hazards on the rugged hikes and potentially dangerous sites. Government agencies therefore require waivers of liability and extensive precautions against injury such as an armed security escort, proper clothing, hard hats, gloves, and use of established trails among other precautions.

CONCLUSION

The reality of remote DTO cultivation negates the romanticized visions of hippies, young experimenters, or mom and pop cultivators growing weed in their backyards. Almost 160,000 plants were eradicated from the national forests in 1983.⁸³ In 2006, after the firm establishment of DTOs in the US, 6,305,202 marijuana plants were eradicated from national forests throughout the United States, over half of which were in California. In the words of rap artist Immortal Technique, “this is big business, this is the American way.” The scale of marijuana production in the United States has boomed in the past thirty years, causing proportional changes in the scale of the market, environmental destruction, and safety hazards. The spread of information concerning the problems caused by industrial scale marijuana production has significantly increased, but much more must still be done.

The prevalence of cooperative counter-cultivation efforts shows that the response to DTO cultivation is no longer the burden of a handful of agencies, but of every institution and person with vested interests in public lands. By building working relationships, agencies and people can combine money, labor and strategic resources to make these cooperative efforts a more powerful force. However, until they incorporate holistic approaches for prevention, reclamation, and investigative follow through, their potential impact on remote Cannabis cultivation will never be realized.

It will require a combination of new law enforcement strategies, long term investment of the necessary resources, and drastic changes in public policy to change the current trends in marijuana production on public lands. “This issue has been intensifying for several years. The risk to those profiting has been minimal. The incentives to continue have been enormous. To be effective, we must commit to a well designed, long term collaborative strategy.”⁸⁴ The changes that must take place can only occur over time: investigations need to produce results; central agencies need to conduct regular assessments of their effectiveness and adapt their

⁸³ GAO/RECE- 85-18 1984. Illegal and Unauthorized Activities on Public Lands- A Problem with Serious Implications. (Mar. 10, 1982, CED 82-48).

⁸⁴ Pugh. Strategic Plan

methods; resources need to be allocated for site processing; citizens need to be educated about the issue; public officials need to reconsider current policies.

Preventative law enforcement efforts have proven more effective than previous methods, but commitment to them requires immense funding and strategic planning. They must occur on a daily basis over a widespread geographic area and are therefore difficult to implement comprehensively. Sustained cultivation prevention would require a significant increase of year round staffing within government organizations that are currently operating under budget cuts. If top officials choose to continue on the path laid out in the strategic plan, it is necessary to assign more staff so that marijuana specific employees can maintain manageable workloads, fully complete investigations, process and investigate sites, and continue preventative monitoring. However, continuing the trends of ever increasing demand for law enforcement, or more broadly, the growth of the law enforcement industry, may not be the solution.

If current marijuana control policies remain, increased reliance on tools such as remote sensing, Geographic Information Systems (GIS), and centralized information analysis centers can make site detection, information gathering, and remote operations more effective. “Cannabis interdiction operations have involved extensive use of aerial observation to locate actual cultivated plots or potential growth sites. This approach is both time-consuming and expensive, and is also frequently hampered by thick forest vegetation cover [and forest fires]. Therefore, a more efficient method for identifying potential target areas is required to facilitate the interdiction operations.”⁸⁵ The use of remote sensing can allow law enforcers to detect remote cultivator operations more efficiently using an array of technologies that create less strain on human resources. Specific applications include the use of electronic sensors placed at eradicated sites to detect cultivator return, infrared heat imaging to detect the presence of humans in remote areas, radio transmission interception to record DTO communications, and satellite imagery to detect campsites and tree canopy thinning without alerting cultivators to the presence of helicopters.

Land managers can integrate expert knowledge with GIS data input and analysis in

⁸⁵ Fung. “Modeling Cannabis Cultivation in North Georgia.”

order to map eradicated sites, compile statistics for official reports, and to facilitate preventative monitoring. These systems can be used to compile significant data from investigations in order to recognize trends, modify strategies and monitor remote areas in the future. Data compilation and spatial analysis can enable law enforcers to identify potential cultivation sites in an effort to prevent the creation of new ones. The use of these systems at centralized intelligence analysis centers would allow agents to instantly access significant information across agencies, and would foster the development of regular assessments that create awareness in government officials, land management personnel, law enforcement officers, and public citizens.

The information gathered at intelligence centers can support “prosecutor-led, intelligence-based task forces that bring together the Department of Justice, the Department of Homeland Security and other agencies to dismantle drug cartels through investigation, extradition and the seizure and forfeiture of assets.”⁸⁶ District attorneys rarely prosecute Mexican nationals for Cannabis related crimes on public lands. The reason for this is that unless they are repeat offenders, or provide crucial information that most cultivators don't have, the individuals are deported regardless of their crimes. The formation of specific task forces within agencies that possess jurisdiction for international operations, such as the DEA and the Department of Homeland Security, can create effective prosecution of cartel members, and impede DTO operation through international relations and governmental partnerships. Proper resource allocation as well as strategic networking is necessary to encourage cooperative efforts at an international level. With a developed understanding of the problems created by DTO marijuana cultivation, officials can collaborate and use more effective methods to oppose DTO operations. The marijuana control struggle no longer revolves around removing plants from the market, but centers on removing the powerful organizations that control the market. “As we've found with other large criminal groups, if you take their money and lock up their leaders, you can loosen their grip on the vast organizations that are used to carry out their criminal activities.”⁸⁷

⁸⁶ Markey. “Marijuana War Smolders On.”

⁸⁷ Gaffrey. Statement on Drug Production on Public Lands.

However, if DTOs are removed from the market the government's task will still not be completed. Land management agencies should conduct site reclamation at all damaged landscapes to ensure that all clean up and remediation needs are met. "The mission of the US Forest Service is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations," but through the evolution of law enforcement responsibilities within land management agencies, the essence of their missions have been lost.⁸⁸ Only a small portion of site reclamation needs are being met to the detriment of the health, diversity and productivity of the nation's public lands.

Environmental reclamation should be an inherent step included in post-eradication site processing. The California Conservation Corps has conducted the majority of cleanup efforts, but more is still to be done. Non-profit organizations and environmental groups desire to assist more in the reclamation of natural landscapes, and this process can provide a good medium for public education. Utilizing the help of volunteers lowers reclamation costs and informs people first-hand about the realities of remote cultivation. Due to liability issues, however, what is saved in money is sometimes lost in time and restrictions. Volunteers cannot viably clean up the majority of sites because of safety concerns and the sheer scale of labor that is necessary. The result is a widespread neglect of the very areas that land management institutions were created to protect.

Public education is a crucial element of preserving public lands. There is a major gap in knowledge between the public, politicians and people who deal with this issue on a day to day basis. The US Forest Service has 192 million visitors every year, most of whom are ignorant to the issues surrounding the valuable public lands that they are visiting.⁸⁹ An increased awareness of what is occurring, what the effects are, and what individuals can do to help would foster safe public practices as well as increase reports of suspicious activities. The Strategic Plan sites public education as a major contributor to the long term marijuana control strategy, but experts in the field are stretched too thin to conduct the public education campaign that is necessary to make a difference. Twenty to thirty percent of cultivation sites

⁸⁸ United States. The United States Department of Agriculture Forest Service. The U.S. Forest Service - An Overview. 15 Mar. 2009 <<http://www.fs.fed.us/>>.

⁸⁹ The U.S. Forest Service - An Overview

are discovered by members of the public who run into a cultivator or spot irrigation lines.⁹⁰ Given a widespread understanding of marijuana related activities on national forests, the number of sites safely reported by civilians could increase drastically. Many land management and law enforcement employees are unaware of DTO operations until they are forced to deal with cultivation sites first hand. Individuals such as forest service employees and highway patrolmen need to understand DTO operations because they have a high probability of encountering DTO related activity. A widespread, sustained program is the best way to transmit the breadth of fragmented information on this topic to the public using reliable sources. Such a project could provide land managers and law enforcement with the support they need to adequately monitor areas and respond accordingly. It could also encourage individuals to write to governmental officials and create pressure for policy makers to act.

Mexican DTOs are the foremost cultivator group and have the single largest impact on the marijuana industry. The same organizations responsible for the majority of marijuana production on California public lands are the heart of the bloody Mexican drug war. President Obama met with officials in Mexico City and augmented “ongoing US aid to Mexico under the Merida initiative: a three-year, \$1.4 billion package aimed at helping Mexico fight the drug cartels with law enforcement training, military equipment and improved intelligence cooperation.”⁹¹ However, this money is yet to incur any noticeable effect on drug cartels.⁹² In order to disrupt DTOs, the United States needs to halt the flow of money and weapons from the US to Mexico. By upholding current regulations, we empower cartels to continue their destructive, violent practices. Marijuana cultivation on public lands is a significant problem with viable solutions, but without essential changes in law enforcement strategies and nationwide public policy, it is a problem we can expect to continue, putting the future of our lands and our people at risk.

⁹⁰ Heil, John. Director of Public Affairs, United States Department of Agriculture Forest Service. Personal interview. 20 Oct. 2008.

⁹¹ Heil. Personal Interview.

⁹² Bowden, Charles. ““Murder City: Ciudad Juarez and the Global Economy's New Killing Fields”” *A Daily TV/radio News Program, Hosted by Amy Goodman and Juan Gonzalez*. 11 Aug. 2009. Web. 04 May 2010. <http://www.democracynow.org/2010/4/14/charles_bowden_murder_city_ciudad_juarez>.

The US war against marijuana has increasingly escalated since its conception because it is not a war that can be won. Drug production has become increasingly destructive and dangerous despite an estimated \$7.7 billion spent annually by the US Government to enforce marijuana laws.⁹³ Such regulation inflates the steady revenue flowing to criminal organizations that in turn generate widespread crime and violence. Regardless of the legal status of marijuana, as long as it remains in high demand there will be a market to supply it, regulated or unregulated. Government-imposed prohibition gives rise to black market systems that are dominated by major criminal organizations that control production and distribution. This system of perpetual crime and punishment is sustained at the cost of all parties involved, and requires a fundamental change in the system itself.

Public policy plays the most crucial role in dictating the status of marijuana markets and their effects on governance and fiscal resources. The most powerful mechanism for opposing cultivation trends is to change the role of marijuana in California and the United States through legalization. California legislator Tom Ammiano proposed the Marijuana Control, Regulation, and Education Act (A.B. 390) in 2009 in an effort to take marijuana cultivation out of cultivator control and put it to use for the government through tax revenues. It was estimated that marijuana taxes could generate over a billion dollars in tax revenues while saving the state of California hundreds of millions more in enforcement, legal, and incarceration costs. The Regulate, Control & Tax Cannabis Act, Proposition 19, was put on the California ballot in November, 2010, to legalize marijuana and control it like alcohol. Though Prop 19 failed by a narrow margin, widespread legalization could bring marijuana out of the black market and into the mainstream, enabling governmental controls that are impossible under the current system, such as barriers to marijuana access for youth. On a national scale, such a system would de-incentivize DTO operations by reducing their profit margins, and removing black market demand. Legalization would create a legitimate marijuana industry through which cultivators can be regulated, resulting in more efficient and less damaging practices. Consumers could then buy less harmfully produced marijuana because it would be available through established institutions. Finally, alternative uses of

⁹³ Ibid.

hemp including fibers, oil, and protein could be re-established within legitimate and competitive industries.

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