

## **Chapter 4: Estimate of Marijuana Availability in the United States**

The Marijuana Availability Working Group (MAWG) was tasked with developing a methodology for making a reliable estimate of the amount of marijuana available in the United States on an annual basis, and with deriving such an estimate for 2001. In pursuit of this objective, the group examined and evaluated all available national-level data sources for their reliability and utility and proposed a number of different estimation approaches based on the data. Having reviewed the quality and limits of the data available, the group decided to adopt a two-phase methodology to separately derive the quantities of foreign and domestically produced marijuana available. This approach was designated the Marijuana Availability Model.

The Marijuana Availability Model uses estimates of marijuana production in Mexico developed by the Crime and Narcotics Center (CNC) as well as seizure statistics, both foreign and domestic, to derive an estimate of the amount of foreign produced marijuana available. The model uses cannabis eradication statistics along with plant yield estimates to calculate the availability of domestically produced marijuana. The methodology, underlying assumptions, and the limitations of the model are addressed in this report.

Based on the Marijuana Availability Model, the quantity of foreign-produced marijuana available in the United States in 2001 was at least 4,581 metric tons. This figure results from applying the simplest set of assumptions to the calculations underlying the derivation of the foreign availability estimate. As a consequence, it represents a lower limit to the desired result. Applying additional reasonable assumptions to the model, and thereby introducing additional uncertainties, yields estimates for the availability of foreign-produced marijuana as high as 7,135 metric tons.

The quantity of domestically produced marijuana that was available in the United States in 2001 is unknown. While the group did develop a methodology for determining such availability in the future, the uncertainty in the required data, some of which do not currently exist, is magnified by the model, and prevents the derivation of a credible estimate at this time. However, by making reasonable assumptions regarding the number of cannabis plants eradicated and the amount of marijuana potentially produced per cannabis plant, and applying a set of hypothetical values for the cannabis eradication rate, the model yields an estimate for the availability of domestic marijuana ranging between 5,577 and 16,731 metric tons.

In the course of developing a methodology for estimating marijuana availability, the Marijuana Availability Working Group identified a number of data limitations and intelligence gaps that significantly impact the accuracy and reliability of the resultant estimates. This report makes nine specific recommendations as to how best to address these limitations. The recommendations are focused principally on improving and expanding cannabis crop estimates both domestically and overseas and on improved collection and consolidation of seizure data.

### **Overview**

Marijuana is the most available illicit drug throughout the United States. The demand for marijuana far exceeds that for any other illicit drug and the size of the American user population equates to steady profits for traffickers. Reporting from across the country identifies marijuana use among all age, ethnic, and economic groups. High levels of use are cited among youth in particular. The ready availability and popularity of the drug render it a significant threat to the health and safety of the nation.

Estimates of the number of marijuana users in the United States suggest that demand for marijuana far exceeds that of any other illicit drug. As of 2000, more than 76 million individuals aged 12

and older had tried marijuana in their lifetime, more than 18 million had used in the past year, and nearly 11 million in the past month, according to the National Household Survey on Drug Abuse (NHSDA). Furthermore, 2000 NHSDA data indicate that on an average day, 5,556 individuals try marijuana for the first time, of which 3,814 are aged 12 to 17.

The indoor and outdoor cultivation of cannabis in most regions of the country, as well as the presence of marijuana smuggled into the United States from foreign sources, contributes to the pervasiveness of the drug. Law enforcement reporting from every region identifies marijuana produced in the United States and Mexico as the most prevalent types available. Other marijuana types are available to varying degrees depending on the area of the country.

The MAWG was tasked with developing a methodology for making a reliable estimate of the amount of marijuana available in the United States. The group began by examining the Full Market Model approach developed by the Drug Enforcement Administration's Statistical Services Section. Upon examination of the model, the group decided that the complexity of the model, coupled with the uncertainty inherent in the multiple data sources involved, prevented its use in deriving a reliable estimate. In short, the accumulation of the uncertainties introduced at every step in the process would overwhelm all but the most general, order-of-magnitude final estimate. The group therefore decided that a preferable approach would be to develop a model that minimized the level of uncertainty by limiting the number of data sources used and the number of assumptions made.

With this in mind, the MAWG examined and evaluated all available national-level data sources for their reliability and utility and proposed a number of different estimative approaches based on the data. Having reviewed the quality and limits of the data available, the group decided to adopt a two-phase methodology to separately derive the quantities of foreign and domestically produced marijuana available. This approach was designated the Marijuana Availability Model.

## **Estimates**

The MAWG developed a two-phased methodology to estimate marijuana availability. This approach, designated the Marijuana Availability Model, was adopted after careful examination of all available estimative methodologies and relevant data sources. The model derives separate estimates of the amount of the available marijuana produced outside the country and domestically. The model is based on the recognition that there currently exists a very limited set of reliable data points on which to make calculations, as well as on a desire to minimize the number and impact of required assumptions.

### ***Foreign Produced Marijuana***

The Marijuana Availability Model relies on a two step approach to determine the amount of foreign-produced marijuana available in the United States. In the first step, the model makes a direct estimate of the availability of marijuana produced in Mexico. In the second step, the model derives an estimate of the availability of foreign produced marijuana from other source countries based on a calculation of the effectiveness of U.S. Customs Service (USCS) enforcement efforts against shipments of marijuana produced in Mexico.

The approach relies on the validity of three primary data sources:

- CNC estimates of potential marijuana production in Mexico
- USCS border seizure statistics
- EPIC arrival zone seizure statistics

The model also makes four primary assumptions:

- The CNC estimates of potential marijuana production in Mexico are valid.
- All of the marijuana seized by USCS at the Southwest Border, unless otherwise identified, was produced in Mexico.
- All of the marijuana seized by USCS at non-Southwest Border Ports of Entry (POEs), unless otherwise identified, was produced in countries other than Mexico.
- The USCS marijuana seizure rate at the Southwest Border is reflective of the seizure rate at other POEs.
- All of the marijuana seized in the Arrival Zone is of foreign origin.

The reliability and validity of the underlying assumptions and data sources used are addressed in Section 4-A and 4-B.

Based on the Marijuana Availability Model, the quantity of foreign-produced marijuana available in the United States in 2001 was at least 4,581 metric tons. This figure results from applying the simplest set of assumptions to the calculations underlying the derivation of the foreign availability estimate. As a consequence of the nature of the assumptions, it represents a lower limit to the desired result. Applying additional reasonable assumptions to the model, and thereby introducing additional uncertainties, yields estimates for the availability of foreign-produced marijuana as high as 7,135 metric tons. (See Tables 4-3 and 4-4 in Section 4-A)

### ***Domestically Produced Marijuana***

The Marijuana Availability Model relies on three factors to calculate the quantity of domestically produced marijuana available in the United States:

- Domestic cannabis eradication totals
- Cannabis plant marijuana yield estimates
- The cannabis eradication effectiveness rate

At present there is no single agreed upon value for either of the first two factors and there are insufficient data on which to base a credible estimate of the value of the third factor. Therefore, no credible estimate of the amount of domestically produced marijuana is possible at this time — the quantity of domestically produced marijuana that was available in the United States in 2001 is unknown.

Nevertheless, to illustrate the application of the model, a range of reasonable hypothetical values for the three factors were input. Based on reasonable assumptions regarding the number of cannabis plants eradicated and the amount of marijuana potentially produced per cannabis plant, and applying a set of hypothetical values for the cannabis eradication rate, the model yields an estimate of the amount of domestic marijuana available ranging between 5,577 and 16,731 metric tons.

**Table 4 - 1 Foreign Marijuana Available in the United States (1998-2001)**

Table 4-1 details the derivation of estimates for 1998 through 2001

<b>Calculations Based on Marijuana Availability Model</b>				
	<b>2001</b>	<b>2000</b>	<b>1999</b>	<b>1998</b>
Marijuana Produced in Mexico <sup>58</sup>	7400	7000	6700	8300
Seized in Mexico <sup>59</sup>	2007	1619	1459	1062
Consumed in Mexico <sup>60</sup>	168	168	168	168
Mexican MJ Available at U.S. Border <sup>61</sup>	5225	5213	5073	7070
Marijuana Seized Arriving fm Mexico <sup>62</sup>	643	562	474	402
Seizure Rate <sup>63</sup>	12.3%	10.8%	9.3%	5.7%
Multiplier <sup>64</sup>	7.13	8.26	9.75	16.54
Non-Mexican MJ Seized at Border <sup>65</sup>	61	57	56	43
Non-Mexican MJ Available in U.S. <sup>66</sup>	435	471	546	711
Non-Mexican MJ Available at Border <sup>67</sup>	496	528	602	754
Foreign Marijuana Available at Border <sup>68</sup>	5721	5741	5675	7824
Marijuana Seized in Arrival Zone <sup>69</sup>	1140	1175	1012	782
<b>Foreign Marijuana Available<sup>70</sup></b>	<b>4581</b>	<b>4566</b>	<b>4661</b>	<b>7042</b>

<sup>58</sup> CNC potential marijuana production estimates

<sup>59</sup> Host nation reporting of marijuana seizures in Mexico

<sup>60</sup> Consumption in Mexico based on estimated number of abusers reported in "*El Consumo de Drogas en Mexico: Diagnostico, Tendencias y Acciones.*" Only 1998 data available. See Appendix C for derivation.

<sup>61</sup> Equal to (Marijuana produced in Mexico) — (Seized in Mexico) — (Consumed in Mexico)

<sup>62</sup> Based on USCS seizure statistics - Includes all seizures of marijuana identified as having originated in Mexico and all seizures of marijuana of unidentified origin occurring at Southwest Border ports of entry. Assumes that all marijuana seized at the SWB not otherwise identified was produced in Mexico. USCS seizure statistics are used to determine seizure rates specifically at POEs. See Appendix D for details.

<sup>63</sup> Equal to (Marijuana seized arriving from Mexico) / (Mexican marijuana available at U.S. border)

<sup>64</sup> Equal to ( 1 — (Seizure Rate)) / (Seizure Rate)

<sup>65</sup> Based on USCS seizure statistics - Includes all seizures of marijuana identified as having originated in countries other than Mexico and all seizures of marijuana of unidentified origin occurring at non-Southwest Border ports of entry. Assumes that all marijuana seized at non-SWB POEs not otherwise identified was produced in countries other than Mexico. See Appendix D for details.

<sup>66</sup> Equal to (Non-Mexican Seized at Border) x (Multiplier)

<sup>67</sup> Equal to (Non-Mexican Seized at Border) + (Non-Mexican Available in U.S.)

<sup>68</sup> Equal to (Mexican Available at U.S. Border) + (Non-Mexican Available at Border)

<sup>69</sup> Based on EPIC seizure statistics. EPIC seizure data are assumed to be more comprehensive than USCS statistics, including all arrival zone seizures.

<sup>70</sup> Equal to (Foreign Marijuana Available at Border) — (Marijuana Seized in Arrival Zone)

Table 4-2 details the application of the domestic portion of the Marijuana Availability Model to the currently available estimates of cannabis eradication for 2001 and of plant yield, while using three hypothetical figures for the eradication rate.

**Table 4 - 2 Estimates of Domestic Marijuana Based on Cannabis Eradication**

Program	Cannabis Plants Eradicated <sup>71</sup>
DCE/SP <sup>72</sup>	3,304,760
USFS/DOI <sup>73</sup>	845,413
Total <sup>74</sup>	4,150,173

  

Plant Yield <sup>75</sup>	Potential Marijuana Eradicated (mt) <sup>76</sup>
200 Grams <sup>77</sup>	830
448 Grams (~1 Pound) <sup>78</sup>	1859
1 Kilogram <sup>79</sup>	4150

  

	Domestic Marijuana Potentially Available <sup>80</sup>			
Plant Yield	Eradication Rate <sup>81</sup> =>	10%	15%	25%
200 Grams		7,470	4,703	2,490
448 Grams (~1 Lb.)		16,731	10,534	5,577
1 Kilogram		37,350	23,516	12,450

<sup>71</sup> Total number of cultivated cannabis plants reported eradicated under programs sponsored by each reporting authority. Does not include figures for eradication of non-cultivated, i.e. "ditchweed" plants. Totals are not necessarily mutually exclusive.

<sup>72</sup> Cultivated cannabis plants reported eradicated under DEA's Domestic Cannabis Eradication/Suppression Program (DCE/SP).

<sup>73</sup> Cultivated cannabis plants eradicated on U.S. public lands as reported by the U.S. Forest Service and the Department of the Interior.

<sup>74</sup> The National Guard Bureau maintains statistics on plants eradicated during operations conducted with the assistance of National Guard assets. These operations eradicated 2,869,051 cannabis plants in 2001. However, the majority of these operations involved assistance to USFS/DOI or agencies reporting results to DCE/SP in which case the results are included in those agencies' statistics.

<sup>75</sup> Estimated quantity of marijuana produced from a single cannabis plant.

<sup>76</sup> Potential marijuana eradicated in metric tons based on four separate estimates of plant yield. Equal to (Number of Plants Eradicated) x (Plant Yield)

<sup>77</sup> Upper limit of yield estimates used by Royal Canadian Mounted Police to estimate marijuana production in Canada.

<sup>78</sup> Yield estimate used by DCE/SP based on University of Mississippi study published in June 1992

<sup>79</sup> Yield estimate used by USFS

<sup>80</sup> Potential domestic marijuana available in metric tons after eradication but before domestic seizures; based on plant yield estimates and hypothetical eradication effectiveness rates.

<sup>81</sup> Three hypothetical eradication rates used to illustrate impact of eradication estimates on domestic marijuana availability determined through the Marijuana Availability Model

## **Subsequent Decrease in Availability**

The availability of marijuana within the United States is further reduced by the impact of three factors:

- 1) **Domestic Law Enforcement Seizures:** There is no single source for determining the amount of marijuana seized by federal, state, and local authorities in the United States without federal involvement. Based on EPIC's EPIC Internal Database (EID), judged to be the most comprehensive reporting system available, some 282 metric tons of marijuana of indeterminate origin was seized within the United States, outside of the Arrival Zone, in 2001.
- 2) **Exports To Other Countries:** There is no way to estimate the amount of marijuana produced in the U.S. or imported into the U.S. from abroad that is subsequently exported to other countries. The figure is unknown.
- 3) **Loss:** There is no way to estimate the amount of marijuana lost through accident, fire, flood, etc. While it is not believed to be significant, the figure is unknown.

## **Recommendations**

The MAWG recommends the following actions to improve the accuracy of future marijuana availability estimates:

### ***Domestic Marijuana Availability***

- Improve U.S. Seizure Data

The MAWG recommends instituting a reliable single centralized database with mandatory reporting for recording marijuana seizures by federal, state, and local agencies.

- Develop Marijuana Signature Program

The MAWG recommends initiating a study to determine the feasibility of instituting a marijuana signature program to determine the source of seized marijuana.

- Centralize Eradication Reporting

The MAWG recommends instituting a single centralized database for reporting cannabis eradication with mandatory reporting by federal, and ideally, state and local agencies.

- Determine Plant Yield

The MAWG recommends initiating a study to determine the current average marijuana yield from a cannabis plant.

- Institute Statistical Grow Surveys

The MAWG recommends developing and supporting a program to derive statistically valid estimates of cannabis cultivation on U.S. public lands. The program would include efforts such as the National Guard Bureau's development of remote technical means of spotting high probability grow areas and predicting the level of cultivation. One such program is the National Guard Bureau's Mississippi Counter-Drug Enforcement Decision Support System (MCEDSS). [For more information contact the National Guard Bureau - CD Special Projects Division at (703) 607-5634.] The group also recommends revisiting legal restrictions against surveillance on private lands using new technologies for the purpose of statistical sampling.

### ***Foreign-Produced Marijuana Availability***

- Institute Foreign Cultivation Surveys

The MAWG recommends instituting foreign cultivation surveys in the three countries other than Mexico that constitute the primary source areas for foreign-produced marijuana in the United States – namely Canada, Colombia, and Jamaica. This would provide a mechanism for determining overall potential marijuana production impacting the United States and thereby provide a more direct estimate of foreign marijuana availability than currently possible with the Marijuana Availability Model.

- Determine Extent of Transshipment through Mexico

The MAWG recommends instituting a study of the extent of transshipment of marijuana from other source countries through Mexico, thereby providing a more accurate estimate of foreign marijuana availability using the Marijuana Availability Model.

- Develop Reliable Foreign Consumption Estimates

The MAWG recommends supporting international efforts, such as those being undertaken by the Organization of American States, to determine the level of marijuana consumption in source and transit countries.

- Develop Reliable Foreign Seizure Data

The MAWG recommends supporting foreign governments in source and transit countries in developing valid accounting systems for marijuana seizures.

## **Section 4-A: Assumptions**

### ***CNC production estimates for Mexico are valid.***

CNC marijuana production estimates are the only valid such estimates available. The estimates are based on a four phase approach that relies on high-quality imagery and a statistically valid random sample survey technique to determine the land area under cannabis cultivation. Cannabis cultivation estimates are subsequently converted to estimates of potential marijuana production. The approach results in estimates with an uncertainty of plus or minus five percent.

### ***All of the marijuana seized by USCS at the Southwest Border, unless otherwise identified, was produced in Mexico.***

It is highly unlikely that all of the marijuana seized by USCS at the Southwest Border is produced in Mexico. However, there is currently no way to estimate the quantity of marijuana produced in other countries, such as Colombia, that is transshipped through Mexico. No credible estimates of the amount of marijuana produced in Colombia have been made by the U.S. Government in over ten years. However, based on historical estimates of production in Colombia and the traditional impact of Colombian marijuana on the U.S. market, the fact that there have been only 10 significant seizures, totaling less than 16 metric tons, of marijuana identifiable in USCS seizure statistics as having likely originated in Colombia over the past six years indicates that significant quantities may be being smuggled to the United States via routes that disguise the shipments' origin. One such route could be transshipment through Mexico. A reduction in the ratio of marijuana of Mexican origin seized at the SWB would increase the estimate of foreign marijuana available.

Table 4-3 illustrates the impact on availability estimates that results from assuming that 10 percent and 20 percent of the marijuana seized at the Southwest Border is of non-Mexican origin. As is evident from the table, such assumptions increase the estimate for the amount of foreign marijuana available by 14 and 31 percent, respectively.

### ***Marijuana seized at non-Southwest Border Ports of Entry, unless otherwise identified, was produced in countries other than Mexico.***

It is not possible to gauge the validity of this assumption at this time. Greater confidence in the validity of the assumption would require a thorough review of all supporting data relevant to many of the close to 15,000 seizure incidents recorded by USCS in 2001. Even then the data available would detail, at best, movements of drug shipments and not the actual origins of the drugs themselves. It is often not possible to identify instances of transshipment of marijuana through third countries.

### ***The USCS marijuana seizure rate at the Southwest Border is reflective of the seizure rate at other Ports of Entry (POEs).***

It is very unlikely that the marijuana seizure rate recorded by USCS at other U.S. POEs mirrors that achieved at the Southwest Border. The obvious differences in smuggling methods encountered at the nation's airports, seaports and border crossings, as well as differences in staffing levels and enforcement techniques and priorities at other POEs, argue against the universality of a single seizure rate. In fact, it is reasonable to assume that, because of the nature of the smuggling methods used, the seizure rate at the other POEs is actually lower than that at the Southwest Border. If this is true, then the estimate of foreign marijuana availability would increase.



There is currently no way to estimate the effectiveness of enforcement efforts at POEs outside the Southwest Border area. Table 4-4 illustrates the effect on estimates of applying hypothetical seizure rates of 2, 5, and 10 percent to the availability model. As can be seen from the table, the three hypothetical rates increase the estimate of foreign marijuana availability by 56, 16, and 2 percent respectively.

***All of the marijuana seized in the Arrival Zone is of foreign origin.***

It is unlikely that all of the marijuana seized in the Arrival Zone - defined by EPIC as within 150 miles of the border for statistical purposes - is of foreign origin. Significant quantities of domestic marijuana are produced from cannabis grown on public lands within 150 miles of the Southwest Border. However, it is not possible to definitively determine the origin of all shipments of marijuana seized in the Arrival Zone based on the available data, nor is it possible at this time to make a reasonable assumption as to the ratio of foreign to domestic sourced marijuana seized.

**Table 4 - 3 Foreign Marijuana Available in the U.S. (1998-2001)**

<i>Effect of Varying Seizure Rate at Non-Southwest Border Ports of Entry</i>																
		<b>2001</b>				<b>2000</b>				<b>1999</b>				<b>1998</b>		
Marijuana Produced in Mexico	7400	7400	7400	7400	7000	7000	7000	7000	6700	6700	6700	6700	8300	8300	8300	
Seized in Mexico	2007	2007	2007	2007	1619	1619	1619	1619	1459	1459	1459	1459	1062	1062	1062	
Consumed in Mexico <sup>82</sup>	168	168	168	168	168	168	168	168	168	168	168	168	168	168	168	
Mexican MJ Available at U.S. Border	5225	5225	5225	5225	5213	5213	5213	5213	5073	5073	5073	5073	7070	7070	7070	
Seizure Rate at Non-SWB POEs <sup>83</sup>	<b>2%</b>	<b>5%</b>	<b>10%</b>		<b>2%</b>	<b>5%</b>	<b>10%</b>		<b>2%</b>	<b>5%</b>	<b>10%</b>		<b>2%</b>	<b>5%</b>	<b>10%</b>	
Multiplier	49	19	9		49	19	9		49	19	9		49	19	9	
Marijuana Seized at Non-SWB POEs	61	61	61	61	57	57	57	57	56	56	56	56	43	43	43	
Non-Mexican MJ Available in U.S.	2989	1159	549		2793	1083	513		2744	1064	504		2107	817	387	
Non-Mexican Available at U.S. Border	3050	1220	610		2850	1140	570		2800	1120	560		2150	860	430	
Foreign Marijuana Available at Border	8275	6445	5835		8063	6353	5783		7873	6193	5633		9220	7930	7500	
Seized in Arrival Zone	1140	1140	1140		1175	1175	1175		1012	1012	1012		782	782	782	
<b>Foreign Marijuana Available</b>	<b>7135</b>	<b>5305</b>	<b>4695</b>		<b>6888</b>	<b>5178</b>	<b>4608</b>		<b>6861</b>	<b>5181</b>	<b>4621</b>		<b>8438</b>	<b>7148</b>	<b>6718</b>	

<sup>82</sup> Estimate is based on 1998 data; data for other years are not available.

<sup>83</sup> Three reasonable hypothetical seizure rates selected to examine impact on availability estimates.

**Table 4 - 4 Foreign Marijuana Available in the U.S. (1998-2001)  
Effect of Varying Mexican Content of Marijuana Seized Arriving from Mexico**

	2001			2000			1999			1998		
Marijuana Produced in Mexico	7400	7400	7400	7000	7000	7000	6700	6700	6700	8300	8300	8300
Seized in Mexico	2007	2007	2007	1619	1619	1619	1459	1459	1459	1062	1062	1062
Consumed in Mexico	168	168	168	168	168	168	168	168	168	168	168	168
Mexican MJ Available at U.S. Border	5225	5225	5225	5213	5213	5213	5073	5073	5073	7070	7070	7070
Marijuana Seized Arriving from Mexico	643	643	643	562	562	562	474	474	474	402	402	402
Mexican Content of MJ Arriving fm MX <sup>84</sup>	100%	90%	80%	100%	90%	80%	100%	90%	80%	100%	90%	80%
Mexican Seized at U.S. Border	643	578.7	514.4	562	505.8	449.6	474	426.6	379.2	402	361.8	321.6
Seizure Rate	12.3%	11.1%	9.8%	10.8%	9.7%	8.6%	9.3%	8.4%	7.5%	5.7%	5.1%	4.5%
Multiplier	7.13	8.01	9.20	8.26	9.31	10.63	9.75	10.91	12.33	16.54	18.61	21.22
Non-Mexican MJ Seized at Border	61	125.3	189.6	57	113.2	169.4	56	103.4	150.8	43	83.2	123.4
Non-Mexican MJ Available in U.S.	435	1004	1745	471	1054	1800	546	1128	1860	711	1548	2619
Non-Mexican Available at U.S. Border	496	1129	1935	528	1167	1970	602	1231	2011	754	1631	2742
Foreign Marijuana Available at Border	5721	6354	7160	5741	6380	7183	5675	6304	7084	7824	8701	9812
Seized in Arrival Zone	1140	1140	1140	1175	1175	1175	1012	1012	1012	782	782	782
Foreign Marijuana Available	<b>4581</b>	<b>5214</b>	<b>6020</b>	<b>4566</b>	<b>5205</b>	<b>6008</b>	<b>4663</b>	<b>5292</b>	<b>6072</b>	<b>7042</b>	<b>7919</b>	<b>9030</b>

<sup>84</sup> Three hypothetical percentages selected to examine impact on availability estimates.



## **Appendix 4-B - Evaluation of Data Sources**

### ***Potential Marijuana Production in Mexico — CNC***

CNC marijuana production estimates are the only valid such estimates available. The estimates are based on a four phase approach that relies on high-quality imagery and a statistically-valid random sample survey technique to determine the land area under cannabis cultivation. Cannabis cultivation estimates are subsequently converted to estimates of potential marijuana production using a conversion rate of 1.8 metric tons of marijuana per hectare of cultivated cannabis. The approach results in estimates with an uncertainty of plus or minus five percent.

### ***Mexican Seizures — Host Nation***

Estimates of marijuana seizures in Mexico are based on host country reporting and are believed to be reasonably accurate.

### ***Consumption in Mexico — Host Nation***

The estimate of marijuana consumption in Mexico is based on the number of abusers in Mexico reported in *"El Consumo de Drogas en Mexico: Diagnostico, Tendencias y Acciones."* The relevant survey data are from 1998. The derivation of the estimate is described in Appendix C. The figure is a conservative estimate, with the actual number believed to be higher by an unknown amount. A higher consumption total would reduce the quantity of marijuana available at the U.S. border, increasing the resultant seizure rate and thereby decreasing the estimate of foreign marijuana available.

### ***Border Seizures — USCS***

USCS statistics on seizures of marijuana at POEs are accepted as accurate, except for occasional instances involving erroneous data entries. However, interpretation of the data for the purposes of the Marijuana Availability Model involves introducing a significant level of uncertainty as a result of the assumptions that must be made when information on the origins of marijuana shipments is not available. The primary assumptions made are that unless otherwise identified marijuana seized at the Southwest Border originated in Mexico and marijuana seized at other POEs originated elsewhere. The same logic was applied in instances where the country of origin was listed in the data as the United States.

### ***Arrival Zone / Domestic Seizures — EPIC***

Seizure amounts reported for Arrival Zone and Domestic Seizures were taken from the EID and are assumed to be reasonably accurate. The seizure amounts reported by EPIC are based on voluntary reporting to EPIC by federal state, and local law enforcement agencies. All seizure amounts are unofficial estimates and may vary from actual or official amounts. Due to the lack of any mandatory, comprehensive, nationwide drug seizure reporting system, the statistics do not necessarily provide an accurate overview of drug trafficking or seizure trends.

### ***Eradication Estimate — DCE/SP; NGB; USFS/DOI***

There is no single consolidated figure for the number of cannabis plants eradicated in the United States in any given year. There is not even a single figure for eradication efforts involving federal agencies, let alone state and local agencies. DEA's Domestic Cannabis Eradication/Suppression Program (DCE/SP) maintains statistics for all cannabis eradication efforts undertaken by federal, state, and local agencies under the aegis of DCE/SP. The National Guard Bureau maintains statistics for all cannabis

eradication efforts involving National Guard assets. There is considerable overlap in reporting by the two programs and no way to determine the extent of double counting without examining the level of involvement by the two in each eradication operation recorded. In addition, the U.S. Forest Service (USFS) and the Department of the Interior (DOI) maintain statistics on cannabis eradication efforts on federal lands, some of which involve one or both of the other two agencies. Finally, there is, of course, no single database recording cannabis eradication by state and local agencies without federal involvement.

***Cannabis Plant Yield - RCMP; USFS; DEA; U. Miss.***

There is no single agreed upon estimate for the average quantity of marijuana that can be produced from a single cannabis plant. The Royal Canadian Mounted Police uses an estimate of 170 to 200 grams per plant in estimating marijuana production in Canada. DEA uses an estimate of approximately 1 pound (448 grams) per plant based on a University of Mississippi study published in June 1992 and the USFS uses an estimate of 1 kilogram.

***Eradication Rate — Unknown***

There is currently no basis upon which to derive a credible estimate of the effectiveness of domestic cannabis eradication efforts. The figure is **unknown**.

***State / Local Seizures - Unknown***

There is no single source for determining the amount of marijuana seized by state and local authorities in the United States without federal involvement. The figure is **unknown**.

***Marijuana Exports — Unknown***

There is no way to estimate the amount of marijuana produced in the United States or imported into the country from abroad that is subsequently exported to other countries. The figure is **unknown**.

**Table 4 - 5 Estimated Marijuana Consumption in Mexico**

<i>Marijuana Consumption in Mexico</i>		
<b>Type of User</b>	<b>Number<sup>85</sup></b>	<b>MJ Consumed<sup>86</sup></b>
Hardcore	334,731	122 <sup>87</sup>
Occasional	438,298	46 <sup>88</sup>
<b>Total</b>		<b>168</b>

<sup>85</sup> As reported in *"El Consumo de Drogas en Mexico: Diagnostico, Tendencias y Acciones."*

<sup>86</sup> In metric tons

<sup>87</sup> Assuming each hardcore abuser consumes 1 cigarette containing 1 gram of marijuana per day — (Number of hardcore abusers) x (365 days per year) / (1,000,000 grams per metric ton)

<sup>88</sup> Assuming each occasional abuser consumes 2 cigarettes each containing 1 gram of marijuana per weekend — (Number of occasional abusers) x (52 weeks per year x 2) / (1,000,000 grams per metric ton)

## Appendix 4-C: Determination of Source of Foreign-Produced Marijuana from USCS Statistics

The following methodology was used to determine the source (Mexico vs. Other) of foreign-produced marijuana seized by U.S. Customs:

1. Generate report of USCS seizures in spreadsheet format for Calendar Year of interest for all seizure records in which the **Commodity Code** equals “MAR” (Marijuana). Include the following fields in the report: **Date, Quantity, Port of Entry, Conveyance, Origin, From, Via, Destination, and Incident Number.**
2. Sort on **From** field and calculate total **Quantity** for each country identified.
3. For records with a null **From** field, sort on **Origin, Via, and Destination** respectively to try to identify the country from which the marijuana was transported. Calculate total **Quantity** for each country identified.
4. For records with null entries in each of the fields listed above, sort on **Port of Entry** and calculate total **Quantity** for each POE identified. Assume that all seizures occurring at Southwest Border POEs were of marijuana produced in Mexico and that seizures occurring at other POEs were of marijuana produced in countries other than Mexico. For seizures occurring at POEs near but not on the Southwest Border, examine the **Conveyance** field and assume that shipments transported over land involved marijuana produced in Mexico and that shipments transported by other means involved marijuana produced in countries other than Mexico.
5. Total the Quantity of marijuana identified as having been produced in Mexico and the total identified as having been produced in countries other than Mexico.

Note: Identification of the origination of marijuana shipments seized by USCS would be made more accurate in the future by examining the details of the incident as reported in individual incident reports, identified using the Incident Number, for each seizure in which the origin of the shipment is in doubts.



**Figure 4-1 - Marijuana Available in the U.S. - 2001**

