



# **ILLEGAL LOGGING AND ITS IMPACT IN THE MONARCH BUTTERFLY BIOSPHERE RESERVE**

**REPORT PREPARED BY THE WWF MEXICO PROGRAM<sup>1</sup>**

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<sup>1</sup> The information presented in this report was collected and analyzed by the WWF Mexico Program. The report represents the organization's point of view, and not necessarily that of its partners or organizations/foundations which support this report.

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## Executive Summary

1. Illegal logging is the main conservation problem in the Monarch Butterfly Biosphere Reserve. This report presents the direct and indirect evidence of illegal logging from 2001 to the beginning of 2004.

2. The report is based on the following evidence: (i) a change analysis of the forest cover in the central core zone (that has a total of 9,671 ha) of the Reserve through aerial photographs obtained in 2001 and 2003, (ii) field samplings of 12 properties in 2003, and (iii) the deforestation analysis in two areas of the buffer zone from 2001 to 2003. The report also discusses: sites where the impact of logging was especially evident in the buffer zone; data obtained during 21 aerial flights in 2003 and 2004; and 42 letters and complaints made primarily by the agrarian communities requesting support from the authorities to solve the issue of illegal logging. Additionally, reference is made to 23 inspections carried out by the Michoacan Delegation of the Federal Attorney General's Officer for Environment Protection (PROFEPA), between 2002 to 2004 in five properties; the construction of 43 trenches by the communities to stop illegal logging trucks; and of the location of 61 sawmills documented in the region.

3. The circumstances surrounding the illegal logging in five properties in the state of Michoacan are analyzed in detail: the ejido of Francisco Serrato, the Federal Property, and the indigenous communities of San Francisco Curungueo, Francisco Serrato and Crescencio Morales.

4. The available data on logging in the Monarch Butterfly Biosphere shows that between 2001 and 2003 at least 370 hectares have been deforested in the buffer zone (Francisco Serrato and Emiliano Zapata ejidos) and 140 hectares have suffered from serious forest degradation in the core zone. However the number of hectares logged does not reflect the seriousness of the problem. Considering the various types of evidences studied, a total of 28 communities have suffered from illegal logging during the last three years. Twenty three of these communities are located in the core zone (an area where logging is prohibited according to the 2000 Presidential Decree) and the remaining five communities are located on the buffer zone). On the other hand, it is not necessary to lose all the trees to affect the overwintering sites of the Monarch butterfly, since the removal of only a few trees may substantially alter the microclimatic conditions required for their survival.

5. The case studies presented here show local efforts to combat the illegal logging, including the letters of complaint sent to the authorities and obstructions created to stop the trucks of the illegal loggers. Communities have

repeatedly requested the permanent presence of the army to fight this problem which affects their forests.

6. Despite this, the response from the authorities has been sporadic and not of the necessary magnitude to stop this environmental crime. The law enforcement operations carried out by the authorities in April and May 2004 were important, however, these operations must be permanent in order to ensure the effective protection of the protected area.

7. Recommendations to stop the illegal logging include : (i) permanent presence of the army (as requested by the leaders of the agrarian communities), (ii) the obstruction of entrances to the core zone of the protected area to block the access of the illegal loggers, (iii) the periodical inspections of the Reserve and sawmills of the region, and (iv) the implementation of immediate communication mechanisms, so that the communities may inform the authorities of logging activities effectively .

## INTRODUCTION TO THE PROBLEM

### **Background**

Deforestation is the primary cause of forest deterioration the Monarch Butterfly Biosphere Reserve (Brower *et al.* 2002, Ramírez *et al.* 2003, Honey-Rosés *et al.* 2004).

Discovered by science in 1975, of the overwintering sites of the Monarch butterfly (*Danaus plexippus*) in the States of Mexico and Michoacan generated a huge interest to learn about the Monarchs and protect them (Urquhart 1976). The forest structure of this region provides the adequate microclimate that protects the butterfly colonies from dramatic changes in climate. The removal of trees alters the forest's capacity to protect the butterflies, which may result in high mortality when low temperatures and rain are combined. Therefore, it is of utmost importance to protect the overwintering habitat of the Monarch butterfly, since a well intact forest is critical for the survival of their migratory phenomenon, one that is considered endangered and unique in the world. (Urquhart & Urquhart 1977, Brower 1977, Wells 1983).

The first effort to protect these forests started with a Presidential Decree in 1980. This declaration protected all overwintering sites of the Monarch butterfly but without mention of any specific area (Diario Oficial de la Federación, 1980). The first territorial definition of the protected area came in 1986 and it included a surface area of 16,110 hectares ( Diario Oficial de la Federación 1986). Ten years later, the Mexican Government decided to amend the deficiencies in the design of this protected area (Hoth *et al.* 1999).

Two recent studies have documented the changes in forest cover of the Monarch butterfly region in the last 30 years. Brower *et al* (2002) analyzed the changes in the forest quality from 1971 to 1999 using aerial photographs (for the years 1971, 1984 and 1999) of an area of 42,020 hectares. During this period, the authors documented the degradation of 12,225 hectares (44%) of the conserved forest in 1971 (27,485 ha). Analyzing aerial photographs (for the years 1971 and 1994) and a Landsat satellite image (2000) of an area (45,439 hectares) very similar to that of Brower *et al* (2002) Ramírez *et al* (2003) concluded that from 1971 to 2000, 3,006 hectares have been degraded, consisting of 7% of the total area. Most forest degradation occurred in the indigenous community of San Cristobal which suffered from provoked forest fires in response to the first decree establishing a protected area in 1986. The different results of these two studies may be due to four factors: the scale of observation, the category definitions, the selected area of study, and the observation period (Ramírez, I. Pers. com.).

In November 2000, a decisive year for the protection of the Monarch butterfly's habitat in Mexico, the Monarch Butterfly Biosphere Reserve was enlarged to cover 56,259 hectares, of which 13,551 were protected in three core zones (Diario Oficial 2000) (Fig. 1).

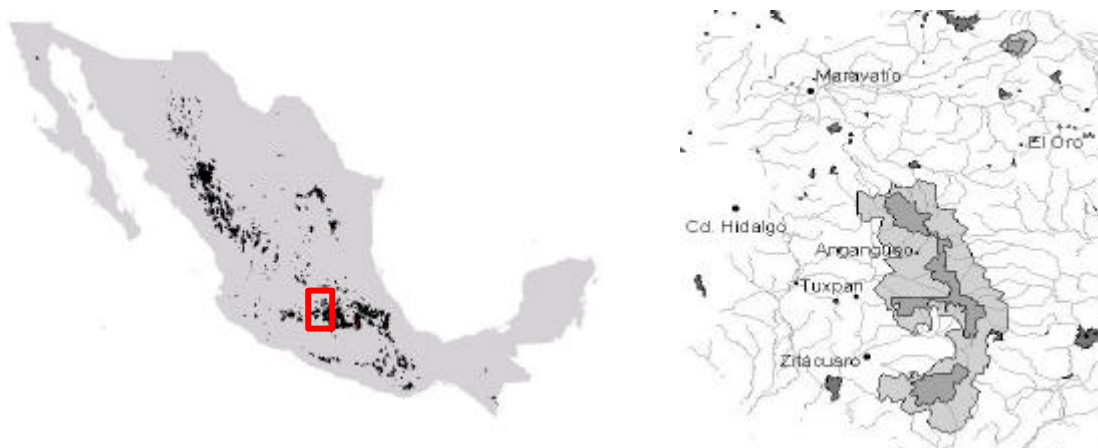


Figure 1. Location of the Monarch Butterfly Biosphere Reserve in the States of Mexico and Michoacan. The map of Mexico shows regions with mountains higher than 2500 meters.

The new protected area was accompanied by an economic incentive mechanism known as the Monarch Butterfly Conservation Fund (MBCF) that supported those agrarian communities affected by the establishment of the new core zones. The MBCF consists of a capital endowment donated by a private foundation in the United States with additional contributions from the Mexican Federal government, and the respective state governments of Mexico and Michoacan. This capital endowment produces interest which are distributed twice a year to the land owners of the protected area who have complied with the regulations to not deforest and who have participated in work in favor of conservation. This type of incentive is unique in Mexico. Every year, in the month of June, the corresponding payments are made to the owners who lost their logging permits in the core zones (WWF 2000). Furthermore, in December of every year, landowners with or without permit who have participated in conservation activities in the core zone may receive a payment per hectare of conserved forest (Honey- Rosés *et al.* 2004). World Wildlife Fund and the Mexican Fund for Nature Conservancy jointly administer the MBCF resources, in coordination with the Reserve. At present 31 of the 38 landowners of the core zone participate in this program.

In spite of the huge achievement that it was to enlargement the protected area to 56,259 hectares, the illegal logging persists in the MBBR.

**Present situation**

In March 2004, the first Monarch Butterfly Regional Forum was organized with the objective of increasing coordination among organizations working on forest conservation in this region. During the Forum, WWF presented preliminary results on the extent of the logging and its impact before several government authorities (Minister of the Environment and Natural Resources, Governors of the States of Mexico and Michoacan, Attorney General of PROFEPA and the President of the National Commission of Natural Protected Areas, among others), who recognized the importance of the problem, and expressed their will to coordinate actions to find solutions. Efforts to achieve sustainable development in this region will amount to little if in the future, the Monarch butterfly habitat in Mexico is lost, resulting in the loss of the overwintering phenomena.

To address the issue of illegal logging it is important to first understand its basic characteristics. Paradoxically, its illegal nature makes understanding and documenting illegal logging particularly difficult. Some of the illegal logging is sparsely distributed among small land owners who retrieve wood for simple construction or for use as an energy source. However it is the organized illegal logging which is much more serious and significant. The organized loggers transport huge volumes of timber in trucks to the sawmills in the surrounding region. This report focuses on the severity and impact of the organized illegal logging in the Monarch Butterfly Biosphere Reserve.

WWF has worked intermittently in Monarch butterfly conservation in Mexico for over 15 years. Since the enlargement of the protected area and the creation of the Monarch Butterfly Conservation Fund in the year 2000, WWF has engaged in the systematic monitoring of the forest condition in the core zone. The results of this monitoring is used to evaluate with agrarian community has fulfilled its commitment to protect their forest. This monitoring does not distinguish among possible illegal extraction of the community itself and logging carried out by third parties.

The objective of this report is to document the illegal logging and its impact in the Monarch Butterfly Biosphere Reserve (MBBR) with direct and indirect evidence between 2001 and 2004. This work may have inherent deficiencies given the difficulty in obtaining evidence, however WWF is confident that the report will help the government authorities and decision makers in their effort to protect the Monarch Butterfly Biosphere Reserve.

**AREA OF INTEREST**

The MBBR is located on the Transverse Neovolcanic System, between the limits of the State of Michoacan and the State of Mexico ( 19° 59' 42'' and 19° 18' 32'' north latitude and 100° 09' 54'' and 100° 06' 39'' west longitude) (Fig. 1). Its extension includes 56,259 hectares, of which 13,551 were decreed in three core zones. The northern core zone (588 ha) includes Cerro Altamirano (3,320 m altitude). The central core zone includes Sierra Chincua, Sierra del Campanario (3,640 m) and Sierra Chivati (3,180 m). The southern core zone (3,339 ha) includes Cerro Pelon (3,500 m).

These mountains are mainly covered by oak forests (*Quercus* spp.) up to 2,900 m; by pine-oak and pine forests (*Pinus* spp.) between 1,500 and 3,000 m, and by oyamel fir forests (*Abies religiosa*) between 2,400 and 3,600 m. Other associations with less representation are the cedar forest (*Cupressus lindleyi*) between 2,400 and 2,600 m (SEMARNAT 2001). In the area there are also juniper shrublands (*Juniperus* spp.) and large prairies (*Potentilla candicans*). The core zone also includes areas with crops and agricultural land.

The MBBR is considerably complex as demonstrated by the variety of land owners within this protected area: there are 59 ejidos, 13 indigenous communities and 21 private properties (SEMARNAT 2001).

This report summarizes various types of evidence with different spatial scales. The aerial photographs include only the central core zone (Honey-Rosés *et al.* 2004), while the location of the sawmills includes the buffer zone as well as bordering areas to the Reserve. This report concentrates on those communities that have shown evidence of illegal logging between 2001 to 2004.

## **METHODOLOGY**

### **A. DIRECT EVIDENCE**

#### **1. Photointerpretation of the core zone from 2001 to 2003**

On March 10, 2001 and February 22 and 23, 2003, 200 aerial digital photographs were obtained in the visible band of the central core zone (9,671 ha) of the MBBR. The printing scale of the pictures was 1:10,000.

The 2001 pictures were compared with those taken in 2003, using a mirror stereoscope. When changes were found with respect to the 2003 photographs, the 2003 were interpreted independently from the 2001 photographs. The same photointerpretation, restitution and digitalization methodology was used for the years 2001 and 2003. The digital processing was carried out based on the ILWIS Geographical Information System (*Integrated Land and Water Information System*), which permits exportation to different formats (this methodology is described in Honey-Rosés *et al.* 2004).



The forest cover was stratified into five categories of forest quality which are determined by the percentage of the surface area occupied by the forest canopy (Table 1). These classifications are compatible with previous analysis that compared 1971, 1984, and 1999 (Brower *et al.* 2002). In addition, eight more categories were used for non-forest ecosystems.

Table 1. Forest quality categories used to analyze the Monarch Butterfly Biosphere Reserve

Tree Cover (%)	Conservation category Brower <i>et al.</i> 2002	Conservation category 2003 (this report)
<b>Forest</b>		
80 - 100	Conserved	Closed
55 - 79	Semi-conserved	Semi-closed
35 - 54	Semi-altered	Semi-open
6 - 34	Altered	Open
0 - 5		Very open
	Altered	Open natural
<b>Non-Forest</b>		
		Shrubland
		Natural grassland
		Grassland
		Agricultural
		Regeneration
		Deforested
		Dry trees

Agricultural areas, grasslands and regeneration areas, were separated in areas with a cover from 0 to 5%. Natural grasslands were distinguished in a sixth category.

## 2. Field sampling in the core zone during 2003

The field samplings was conducted in 12 of the 17 properties with logging permits, in order to verify the photointerpretation analysis (Honey-Rosés *et al.* 2004). Four properties were not sampled since their cutting zone from 2002 to 2003 was not within the core zone. One property, the indigenous community of Francisco Serrato, was not sampled due to the social conflict in the community. Fifteen transects were established in each property and distributed at random. The number of transects was determined by the need to sample 2% of the surface area of each property. Transects were 20 meters wide and with a variable length between 76 and 480 meters depending on the size of each property. Each stump found in the transect was counted and measured for its diameter. Only the

stumps that appeared to have been cut during the last year were counted. A total number of 81.4 hectares were sampled.

Twenty four people participated in the field sampling. In order to standardize the methodology six coordinators were trained on March 14, 2003 at Llano de las Papas: 4 from WWF and 2 from the Reserve. Eighteen people from the communities were trained at the same place in a social participation workshop on March 31, 2003. Nine teams were formed with three people each, including participants from communities, WWF, the Reserve and the PROFEPA. The coordinator of each team was in charge of quality control when collecting the data. The field work was conducted during the last week of April and the first two weeks of May. The six coordinators were distributed to work with the nine teams.

### **3. Deforestation analysis in the buffer zone from 2001 to 2003**

The illegal deforestation in two communities in the buffer zone (Ejidos Francisco Serrato and Emiliano Zapata) were analyzed. This analysis used the aerial photograph mosaic of 2001 and the IKONOS 2003 satellite image.

## **B. OTHER EVIDENCE**

### **4. 2003 and 2004 Lighthawk flights**

During November 2003 and January 2004, WWF and the environmental organization of volunteer pilots, Lighthawk ([www.lighthawk.org](http://www.lighthawk.org)), organized aerial flights over the MBBR. Between November 27<sup>th</sup> and 30<sup>th</sup>, 33 passengers participated in a total of 13 flights. 20 local community members had the opportunity to see the MBBR from the air. Then again on January 21<sup>st</sup> and 22<sup>nd</sup> 2004, eight Lighthawk and WWF again organized to fly 28 passengers consisting mostly of scientific researchers and representatives from government agencies. Participants in these flights included authorities of the National Forestry Commission (CONAFOR), PROFEPA, the State of Michoacan Forestry Commission (COFOM) and Municipality Presidents of Angangueo, Ocampo and Senguio. Each flight traveled from Valle de Bravo to the core zone of the MBBR and lasted approximately one hour.

### **5. Community Letters, Complaints, and Requests for Help**

Agrarian communities in the MBBR have appealed to WWF seeking support to stop the illegal logging in their properties. Table 2. summarizes a database of letters, complaints and requests for help that have been sent to WWF and government authorities during 2002 and 2003, mostly written by the agrarian communities but also some from other groups or individuals. The case studies are founded in large part in the evidence these letters provide, in addition to first hand testimony from the members of these agrarian communities (see Results).

On February 13, 2004, WWF formally wrote to the government agencies who were recipients of these letters of complaints from the agrarian communities. WWF requested additional information surrounding these cases and the follow up work that resulted from these letters (Table 2). These government agencies included: the State of Michoacan Government, PROFEPA Delegations in the States of Mexico and Michoacan, Municipal Presidency of Zitacuaro, State Ministerial Police in Zitacuaro, and SEMARNAT in Zitacuaro. Only the PROFEPA Delegations in the States of Mexico and Michoacan responded.

### **6. The documentation of the trenches**

During the field visits with community leaders between March 2003 and April 2004, WWF documented the location and circumstances surrounding the construction of trenches built by the communities to block the entrance of illegal loggers.

### **7. Information about sawmills**

During the various visits to the region from 2002 to 2004, sawmills were registered in the buffer zone and in the surrounding areas.

## **RESULTS**

### **A. DIRECT EVIDENCE**

#### **1. Photointerpretation of the core zone from 2001 to 2003**

Comparison of aerial photographs from 2001 to 2003 indicate that 141 hectares of forest in the central core zone was degraded. This means that the illegal logging or removal of trees decreased the density of the forest canopy in 141 hectares. This result underestimates the real loss in forest cover in the core zone due to two reasons: First, photointerpretation method does not detect all the logging. The removal only a few trees may not be detected by the photointerpreter, as seen in the field sampling conducting in 2003 (Honey-Rosés *et al.* 2004). Second, forest degradation is only registered in an area where the changes in forest quality is dramatic enough to also change category (100–80; 80–60; 60–40; 40–20; 20–0). The tree losses within a category are not registered as forest degradation even though there is extraction.

Each forest quality category suffered from negative changes, but most of the changes were in the highest quality forest. The category “closed” (80–100% forest cover) decreased by 90 hectares. This change in forest quality was detected in the indigenous communities of Crescencio Morales (50 ha), Francisco Serrato (43 ha), Donaciano Ojeda (24 ha) and the Ejido El Rosario (2 ha) in the State of Michoacan, and the Ejido La Mesa (20 ha) and the private property Rancho Verde (2 ha) in the State of Mexico (Fig. 2, Honey-Rosés *et al.* 2004).

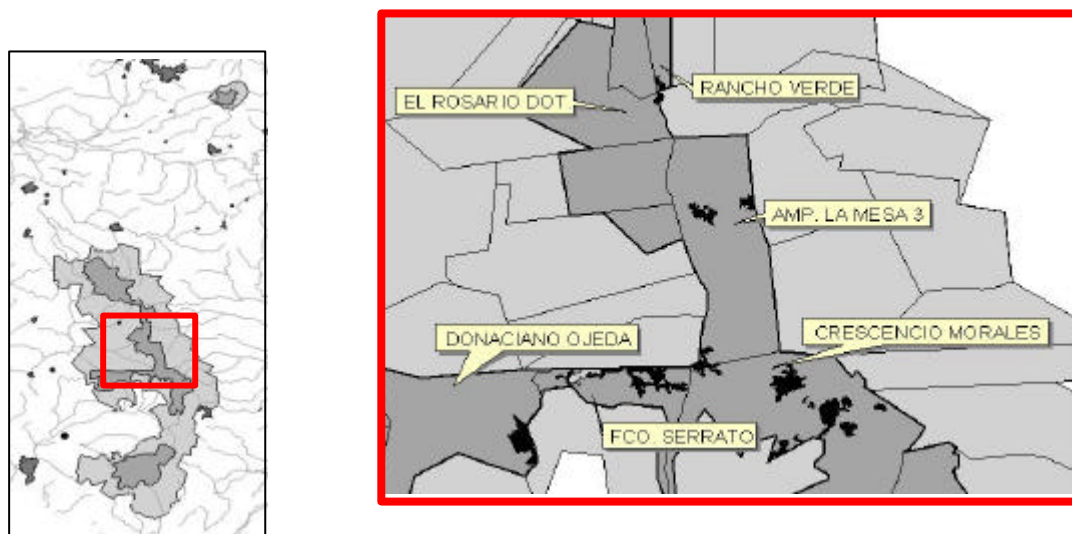


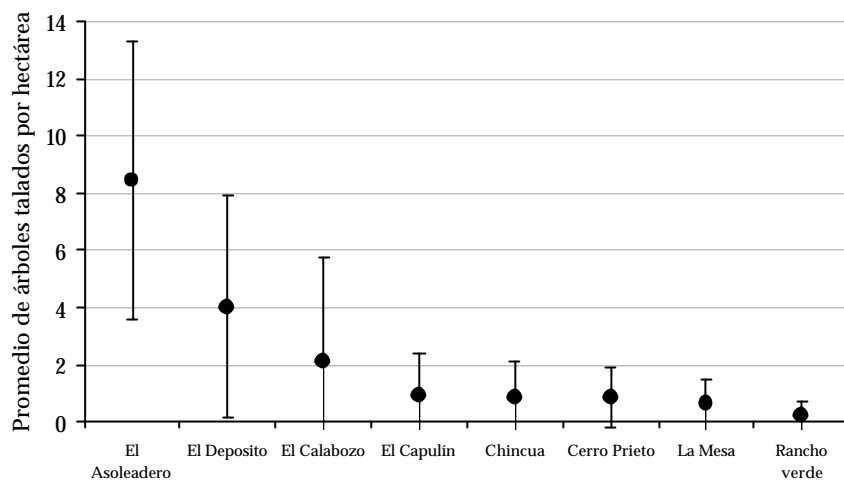
Figure 2. Areas in the central core zone with forest cover changes detected by the photointerpretation method in 2001- 2003

Currently, WWF is conducting another deforestation analysis in the MBBR using satellite images from the years 2003 and 2004. Local field reports and recent confiscation of thousands of cubic meters of illegally cut timber leads us to expect that these results will also show considerable changes in the year 2004.

## 2. Field sampling in the core zone during 2003

During the field verification, 119 recently cut stumps were counted within a range of 5 to 95 centimeters in diameter. The stumps were found in eight of the 12 sampled properties: the Ejidos El Asoleadero, El Calabozo, Cerro Prieto and Chincua, in the State of Michoacan, and the Ejidos El Capulín, La Mesa, El Depósito, and the private property of Rancho Verde, in the State of Mexico (Fig. 3, Honey-Rosés *et al.* 2004).

Figure 3. Average of logged trees in eight properties of the Reserve



### 3. Deforestation Analysis in the buffer zone from 2001 to 2003

Approximately 250 hectares were deforested in the Ejido Francisco Serrato (Table 11, see Case Study). In the eastern section of the Ejido Emiliano Zapata, at least 120 hectares were deforested (Tables 4 and 5). Thus in only these two ejidos, more than 370 hectares have been deforested from 2001 to 2003.

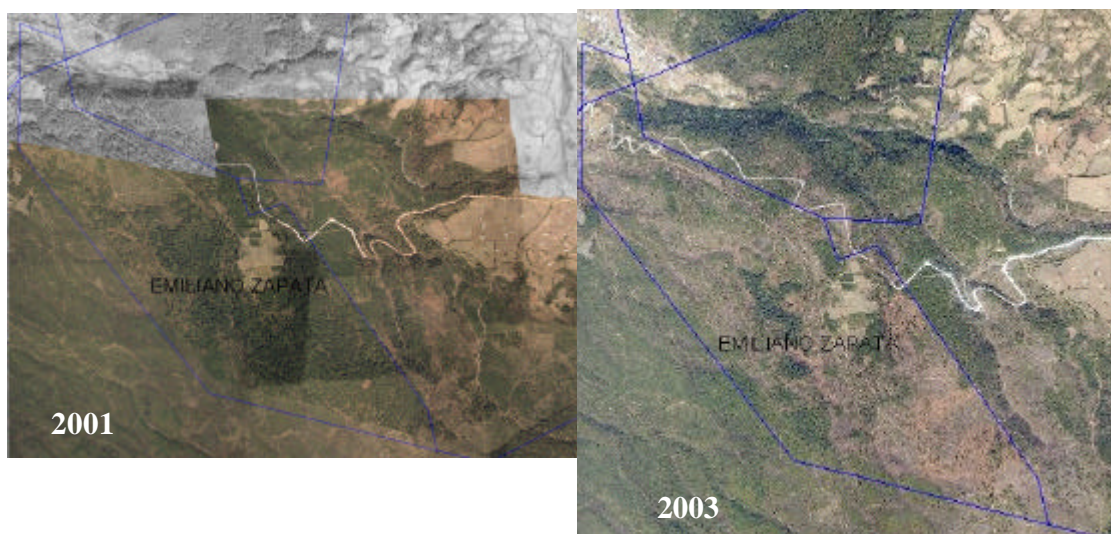


Figure 4. Evidence of forest loss in the Ejido Emiliano Zapata by comparing aerial photographs of March 10, 2001 and February 22-23, 2003 (WWF pictures)





Figure 5. Deforestation at the Emiliano Zapata and El Asoleadero Ejidos, on the road from Ocampo to El Rosario (WWF picture, January 2004).

## **B. OTHER EVIDENCE**

### **4 Lighthawk flights - 2003 and 2004**

During the flights participants could discern recently logged areas. These areas were photographed (Figure 6).



Figure 6. Deforestation of the Ejido Francisco Serrato , buffer zone of the Monarch Butterfly Biosphere Reserve, as viewed from the air (WWF photograph, November 27, 2003).

## 5. Community Letters, Complaints and Requests for Help

WWF has documented 48 letters from the communities addressed to various government agencies and other environmental groups, asking for help or demanding that the illegal logging in the MBBR be stopped (Table 2). Civil society and the media have repeatedly made reference to this illegal logging.

In all cases, the letters and complaints were delivered 5 to 30 days after the illegal activity was detected. Of the 42 letters from 11 communities, WWF only has record of five responses from the authorities. It is possible that some complaints were addressed and are not registered in this report. Additionally, only the PROFEPA in the State of Mexico and in the State of Michoacan responded to WWF's request for more information about the actions taken as a result of these letters. Their letters were dated on March 4<sup>th</sup> and 10<sup>th</sup>, 2004, respectively, although they arrived at the WWF offices on a later date.

Table 2. Summary of letters from the agrarian communities requesting support from the various agencies and institutions to address the issue of illegal logging.

Written by: Agrarian Community / Institution	Land Tenure / Agency	Addressed to:	Institution	Total
15 Ejidos and Communities	Indigenous Community and Ejidos	To whom it may concern	Michoacan Government	1
15 Ejidos and Communities	Indigenous Community and Ejidos	Juan Rafael Elvira Quezada	PROFEPA Michoacan	1
15 Ejidos and Communities	Indigenous Community and Ejidos	Lázaro Cárdenas Batel	Michoacan Government	1
15 Ejidos and Communities	Indigenous Community and Ejidos	Lázaro Cárdenas Batel	Michoacan Government	1
Cerro Prieto	Ejido	Juan Rafael Elvira Quezada	PROFEPA Michoacan	1
Cerro Prieto	Ejido	Marco Antonio Bernal Hernández	RBMM-CONANP	1
Mazahua-Otomí Coordination		Lázaro Cárdenas Batel	Michoacan Government	1
Crescencio Morales	Indigenous Community	Francisco Luna Contreras	PROFEPA Michoacan	1
Crescencio Morales	Indigenous Community	Juez de primera instancia	District Civil Judge	1
Crescencio Morales	Indigenous Community	Lázaro Cárdenas Batel	Michoacan Government	1
Crescencio Morales	Indigenous Community	Lourdes Jiménez Coronel	Zitacuaro Municipality	2
Crescencio Morales	Indigenous Community	Marco Antonio Bernal Hernández	RBMM-CONANP	1
Curungueo	Indigenous Community	Jordi Honey-Rosés	WWF	1

Curungueo	Indigenous Community	Manuel Jiménez González	Michoacan General Attorney	2
Curungueo	Indigenous Community	Marco Antonio Bernal Hernández	RBMM-CONANP	1
Curungueo	Indigenous Community	Omar Vidal	WWF	1
Donaciano Ojeda	Indigenous Community	Jordi Honey-Rosés	WWF	1
Donaciano Ojeda	Indigenous Community	Marco Antonio Bernal Hernández	RBMM-CONANP	1
Francisco Serrato	Indigenous Community	A quien corresponda	Zitacuaro Municipality	1
Francisco Serrato	Indigenous Community	Ambrocio Mayorga Zeron	PROFEPA Michoacan	1
Francisco Serrato	Indigenous Community	Carlos Galindo Leal	WWF	1
Francisco Serrato	Indigenous Community	Francisco Luna Contreras	PROFEPA Michoacan	1
Francisco Serrato	Indigenous Community	Jaime Díaz	Zitacuaro Municipality	1
Francisco Serrato	Indigenous Community	Jordi Honey-Rosés	WWF	1
Francisco Serrato	Indigenous Community	Juan Rafael Elvira Quezada	PROFEPA Michoacan	2
Francisco Serrato	Indigenous Community	Lázaro Cárdenas Batel	Michoacan Government	2
Francisco Serrato	Indigenous Community	Lourdes Jiménez Coronel	Zitacuaro Municipality	1
Francisco Serrato	Indigenous Community	Manuel Jiménez González	Procuraduría de Justicia Michoacan	1
Francisco Serrato	Indigenous Community	Marco Antonio Bernal Hernández	RBMM-CONANP	2
Francisco Serrato	Indigenous Community	Sin Nombre	PROFEPA Michoacan	1
Francisco Serrato	Indigenous Community		SEMARNAP	1
Francisco Serrato, Donaciano Ojeda and Carpinteros	Indigenous Communities	Lázaro Cárdenas Batel	Michoacan Government	1
Hotel "Rancho San Cayetano"	Private Individual	Genovevo Figueroa	SECTUR Michoacan	1
Government Agencies	Government Agencies	Juan Rafael Elvira Quezada	PROFEPA Michoacan	1
Jordi Honey-Rosés	Individual	No name	PROFEPA Federal	1



La Mesa	Ejido	Alejandro Soto Romero	PROFEPA Mexico	1
La Mesa	Ejido	Marco Antonio Bernal Hernández	RBMM- CONANP	1
Nicolás Romero	Indigenous Community	Juan Rafael Elvira Quezada	PROFEPA Michoacan	1
RBMM-CONANP	Federal Agency	Carmen Morales Reyes	PROFEPA Michoacan	1
San Pablo Malacatepec	Indigenous Community	Jordi Honey- Rosés	WWF	1
Senguio	Municipality	Vicente Fox Quesada	Republic Presidency	1
WWF	ONG	Marco Antonio Bernal Hernández	RBMM- CONANP	1
WWF	ONG	Juan Rafael Elvira Quezada	PROFEPA Michoacan	1
Total				48

In response to some of these letters, the Michoacan Delgation of PROFEPA conducted 23 forestry inspections between February 14<sup>th</sup> 2002 and February 24<sup>th</sup>, 2004, in five properties: Cerro Prieto, Crescencio Morales, Francisco Serrato, Nicolás Romero and the Federal Property, where the respective minutes and documentation was made certifying the forestry inspection.

## 6. Trenches

At the beginning of 2003, WWF received the first request from an agrarian community to build a trench as a preventive measure to stop the illegal loggers from accessing their properties. Throughout the year, these requests became more frequent and urgent. The first trenches were initially excavated with a picks and shovels but when these holes were easily covered it became necessary to use heavy machinery. These machines can make trenches 6-8 meters long by 2-3 meters wide and 2-2.5 meters deep in approximately eight hours.

This report can attest to the construction of forty-three trenches made with heavy machinery (Fig. 7). It is interesting to note that most of these trenches have been built in the state of Michoacan (Table 3). Twenty-one trenches have been built in the core zone, five in the buffer zone and one outside the Reserve.



Figure 7. Examples of trenches built in the region to stop the illegal loggers (WWF pictures).

Table 3. Location of 37 trenches built by the communities in the Monarch Butterfly Biosphere Reserve

RBMM Place	State	Municipality	Community	Total
Buffer Zone	Mich-Mex Limits	San José del Rincón	Rosa de Palo Amarillo	2
	Michoacan	Angangueo	Los Remedios	2
		Ocampo	El Paso	1
		Tlalpujahuá	El Rosario	1
			San José Corrales	4
Core Zone	Mich-Mex Limits	Angangueo	Los Remedios	1
	Michoacan	Angangueo	Cerro Prieto	1
			Los Remedios	2
			Federal Zone	3

		San José del Rincón		
		Zitacuaro	Crescencio Morales	7
			Curungueo	5
			Donaciano Ojeda	2
			Francisco Serrato	5
Outside the Reserve	Michoacan	Queréndaro	Parritas	1
General Total				37

Figure 8 presents the geographic location of where these trenches have been built in 2003 and 2004. They included the indigenous communities of Crescencio Morales, Curungueo, Francisco Serrato, and Donaciano Ojeda (Fig. 8a) and the Ejido's of San José Corrales, Rosa de Palo Amarillo, and Los Remedios ejidos as well as in the Federal Property (Fig. 8b). The case studies of Crescencio Morales, Curungueo, Francisco Serrato and the Federal Property offer a more detailed explanation about the efficiency of the trenches in each property.

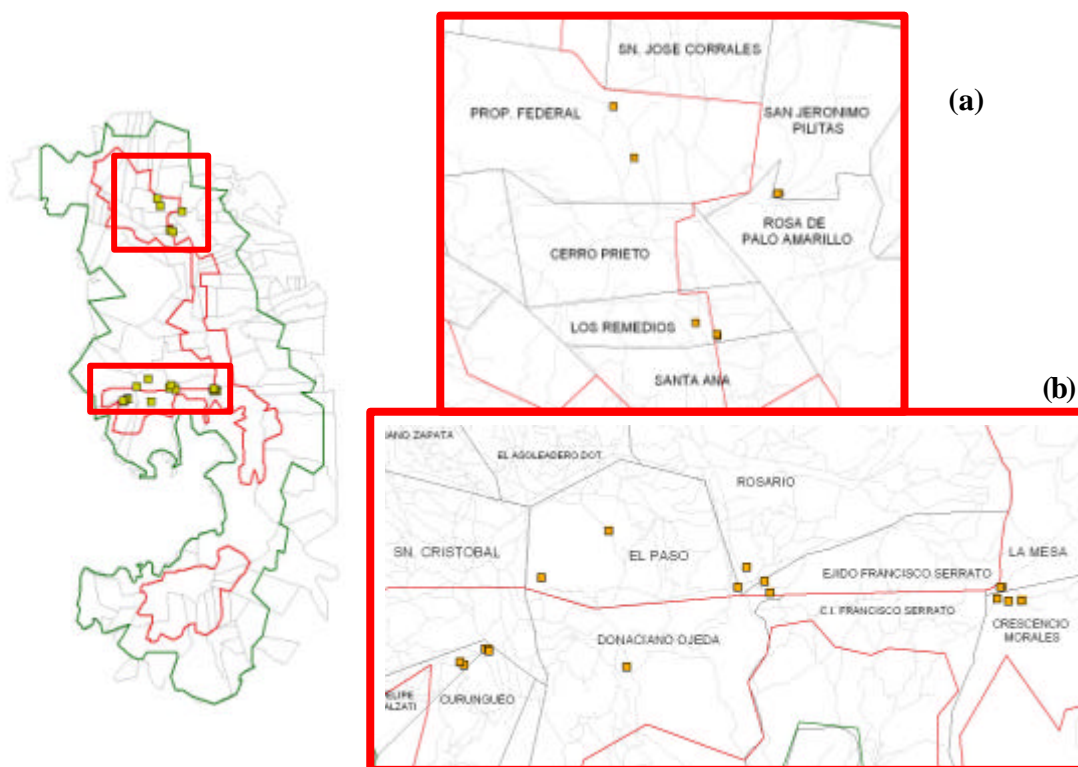


Figure 8. Location of trenches in the central core zone and adjoining areas

In some cases, the trenches have been effective, but there are also cases in which illegal loggers have refilled them or have simply created new entrances. Thus

trenches may be considered a short-term and preventative measure of last resort.

### 7. Sawmill documentation

During the field work 61 sawmills were documented in the Monarch Butterfly Region, 24 in the State of Mexico and 37 in the State of Michoacan (Table 4),. More than half of them are located in San José del Rincón, State of Mexico and in Zitacuaro and Ocampo, in the State of Michoacan. (Fig. 9).

Table 4. Sawmill distribution in the Monarch Biosphere Reserve Region

<b>RBMM</b>	<b>State</b>	<b>Municipality</b>	<b>Total</b>
Outside the Reserve	Mexico	San Felipe del Progreso	4
		San José del Rincón	16
		Villa de Allende	4
	Michoacan	Anganguero	5
		Aporo	5
		Irimbo	2
		Ocampo	9
		Senguio	1
		Zitacuaro	11
		Ocampo	4
Buffer Zone	Michoacan	Ocampo	4
<b>Total</b>			<b>61</b>

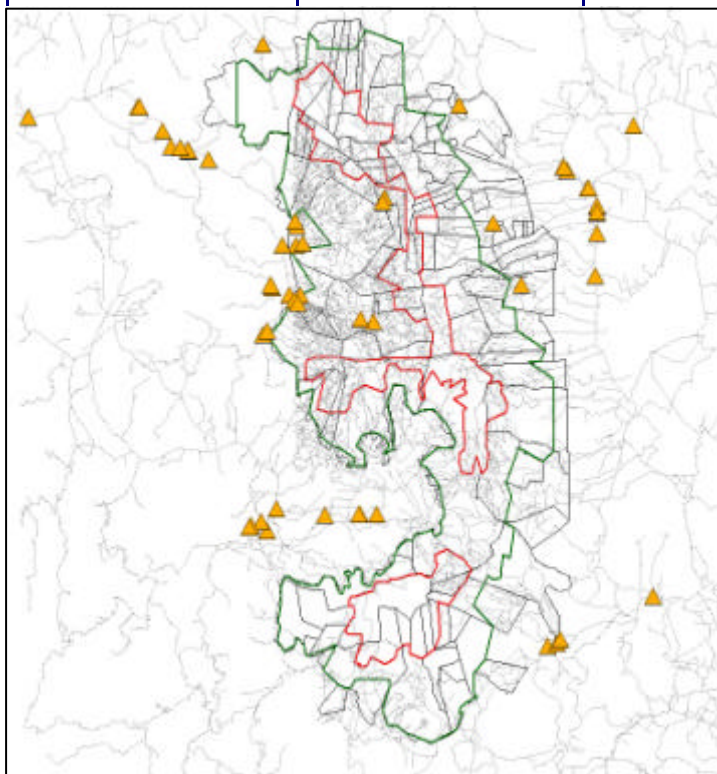




Figure 9. The triangles represent the location of sawmills in the Monarch Butterfly Biosphere Reserve region

### C. Case studies

The evidence suggests that illegal logging in the core zone and in the buffer zone of the MBBR is common, leaving few communities unharmed by some type of illegal timber extraction. In this section we document the illegal logging in five properties: the Ejido Francisco Serrato, the Federal Property and the indigenous communities of San Francisco Curungueo, Francisco Serrato and Crescencio Morales (Fig. 10). These case studies provide details on various aspects of illegal logging, and demonstrate that the communities have regularly informed the authorities asking for help to face this problem.

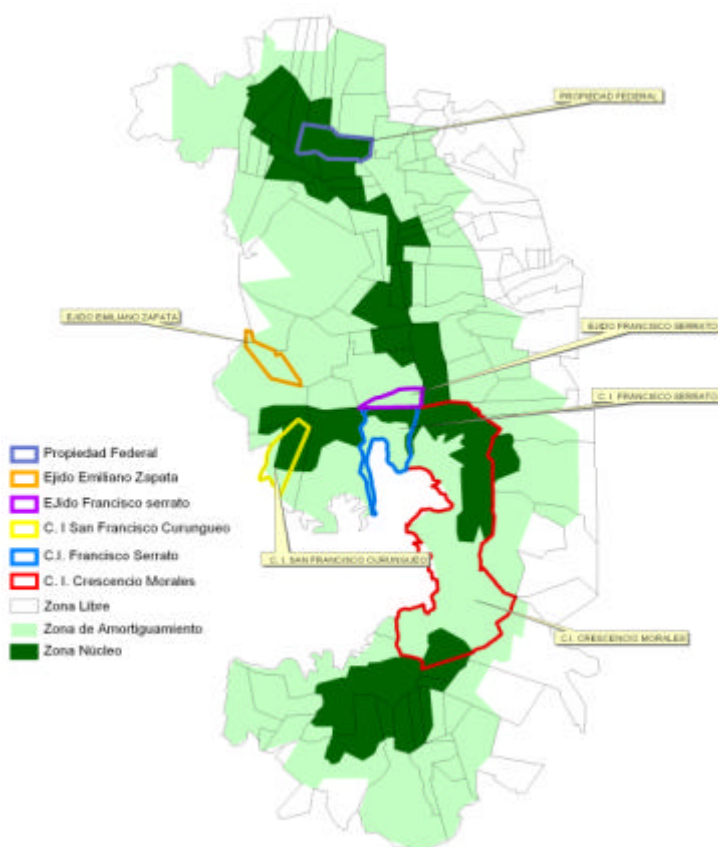


Figure 10. Properties analyzed in the case studies

#### 1. EJIDO FRANCISCO SERRATO

This case study shows that the agrarian authorities anticipated the threat of illegal loggers. The community made efforts to stop the logging but it was not

sufficient, and neither did they receive a favorable response from the authorities (Table 5).

The Ejido Francisco Serrato is located in the Municipality of Ocampo in eastern Michoacan. It covers an area of 250 hectares, all inside the buffer zone of the Reserve. In the original proposal to enlarge the protected area presented in the year 2000, conservationists proposed that the Ejido Francisco Serrato be included in the core zone. However after negotiations between the Ejido and Mexican environmental authorities (SEMARNAT-MBBR), the Ejido Francisco Serrato was had its forest reclassified from core zone to buffer zone. This explains why the core zone borders the property boundaries of the Ejido exactly to the east and south. (Fig. 10).

The analysis of aerial photographs and satellite images shows that the entire 250 hectares of forest in the ejido has been deforested since the RBBM enlargement in 2000 (Fig. 11).

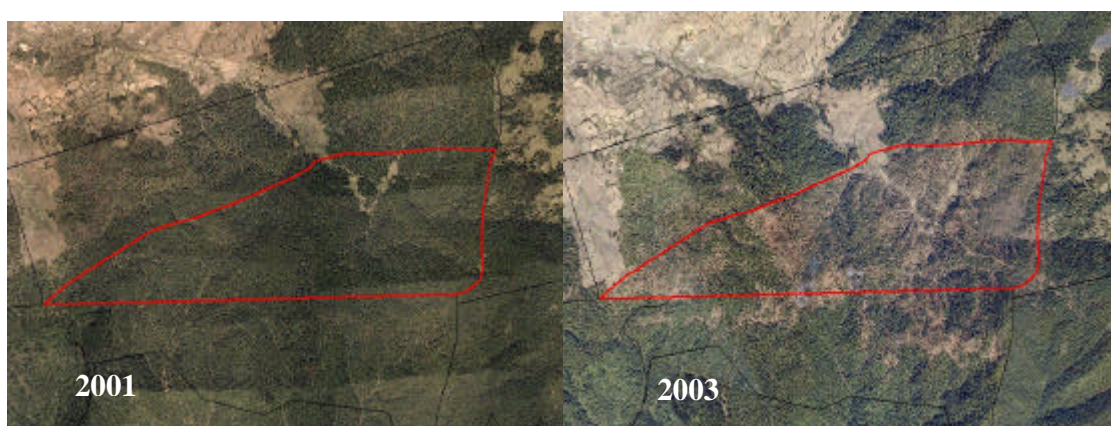


Figure 11. Aerial photographs of the Ejido Francisco Serrato taken on March 10<sup>th</sup>, 2001 and February 23<sup>rd</sup>, 2003. The Ejido boundaries are marked in red. The area of forest lost in two years is approximately 250 hectares (WWF pictures).

Table 5. Calendar of events related to illegal logging in the Ejido Francisco Serrato located in the buffer zone of the Monarch Butterfly Biosphere Reserve 2002–2003

<b>Year</b>	<b>Date</b>	<b>Event</b>
2002	September 3	The community writes about the illegal logging in their Ejido in a letter addressed to the Governor of Michoacan.
2002	September 27	The Ejido and indigenous community of Francisco Serrato and community jointly write a letter denouncing the illegal logging.
2002	November 30	WWF and RBBMM personnel observe the nocturnal transportation of more than 30 trucks loaded with timber in the Ejido El Rosario, going through San Luis, coming from the direction of Francisco Serrato arriving in Ocampo.

2003	March 14	Twenty members of the Follow-Up Commission of the Operative Program for Forest Fire Prevention and Fight send a letter on the logging in Francisco Serrato and ask for the intervention of the PROFEPA Delegate.
2003	July 29	The Francisco Serrato Commissioner denounces the logging once again in a letter sent to the Reserve Director.
2003	November 27	During the Lighthawk flights WWF documents the impact of the logging impact in the Francisco Serrado ejido and the surrounding area. (Fig. 12)
2004	March	In a comparison made on digital mosaics of 2001 and 2003, it is estimated that the Ejido Francisco Serrato lost 250 hectares of forest in this two year time period.



Figure 12. Result of the forest logging and burning in the Ejido Francisco Serrato (WWF pictures, November, 2003)

## 2. FEDERAL PROPERTY OF THE MONARCH BUTTERFLY BIOSPHERE RESERVE

Deforestation has been documented in the Federal Property, an area with some of the most well conserved forest in the region. Ever since the discovery of the overwintering sites in Mexico, the Monarch butterflies have used the Federal Property as their winter home. (Table 6).

The Federal Property includes 600 hectares of oyamel fir and pine forest located in the central part of Sierra Chincua, in the Municipality of Angangueo, in the State of Michoacan. Of its 600 hectares, 539 are in the core zone.

Table 6. Calendar of events related to illegal logging in the Federal Property of the Monarch Butterfly Biosphere Reserve – 2002-2003

Year	Date	Event
2002	May 13	Complaint from the Ejido Cerro Prieto to PROFEPA
2002	July 4	PROFEPA documents forest inspection in the Ejido Cerro Prieto (No. 254/2002/P)
2002	September 9 and 18	The MBBR documents logging in Sierra Chincua
2002	September 18	PROFEPA documents a forestry inspection in the Federal Property (No. 254/2002/P)
2003	January 31	First evidence of recent logging obtained by WWF in the Sierra Chincua Federal Property, documented with by the researcher Lincoln Brower and photographed by a Boston Globe reporter
2003	February 6	Meeting between Dr. Lincoln Brower, Dr. Ernesto Enkerlin (CONANP) and WWF, where the CONANP is informed about logging in the Federal Property
2003	February 18	PROFEPA documents a forestry inspection in the Ejido Cerro Prieto (No. 070/2003/P)
2003	May 30	PROFEPA mega-operation in Ocampo, Michoacan
2003	August 13	The Reserve informs PROFEPA of the cutting of 16 trees at the locality Encino Barrigón
2003	August 13	PROFEPA documents a forestry inspection in the Federal Property (No. 293/2003/P)
2003	September 5	First written complaint to the Reserve Administration by the Cerro Prieto Ejido commissioner, on logging activities
2003	September 5	The Reserve Director informs the PROFEPA Delegate of a about the complaint and request for intervention by the Ejido Cerro Prieto
2003	September 8	Follow up letter from the MBBR addressed to PROFEPA, confirming the logging at the Federal Property after a visit of the Reserve forest technician
2003	September 27	Another letter about the illegal logging from the MBBR addressed to PROFEPA Michoacan
2003	September 2	PROFEPA documents a forestry inspection in the Federal Property (No. 287/2003/P)
2003	November 3 to 7	PROFEPA closes off the MBBR with inspection points
2003	November 5	PROFEPA documents a forestry inspection in the Federal Property (No. 332/2003/P)



2003	November 26	PROFEPA documents a forestry inspection in the Federal Property (No. 344/2003/P)
2003	November 28-30	Lighthawk-WWF flights document with photographs the deforestation in the Federal Property

### 3. SAN FRANCISCO CURUNGUEO INDIGENOUS COMMUNITY

The case study of the San Francisco Curungueo indigenous community documents the exceptional efforts made by community representatives to stop the illegal logging in their forests. Without the support of government authorities, the community authorities organized vigilance brigades and built trenches. The community even asked for help at the very moment when the logging was occurring, and still did not receive a favorable response from the government officials. The case of Curungueo shows the limited capacity of the government authorities to respond to illegal logging. (Table 7).

This community is located on the Zitacuaro Municipality in Michoacan (19° 28' N, 100° 20' W, 1,930 m). Their property consists of 503 hectares, of which 299 are located on the south part of Cerro del Chivati, in the core zone of the Reserve (Figs. 13 y 14).

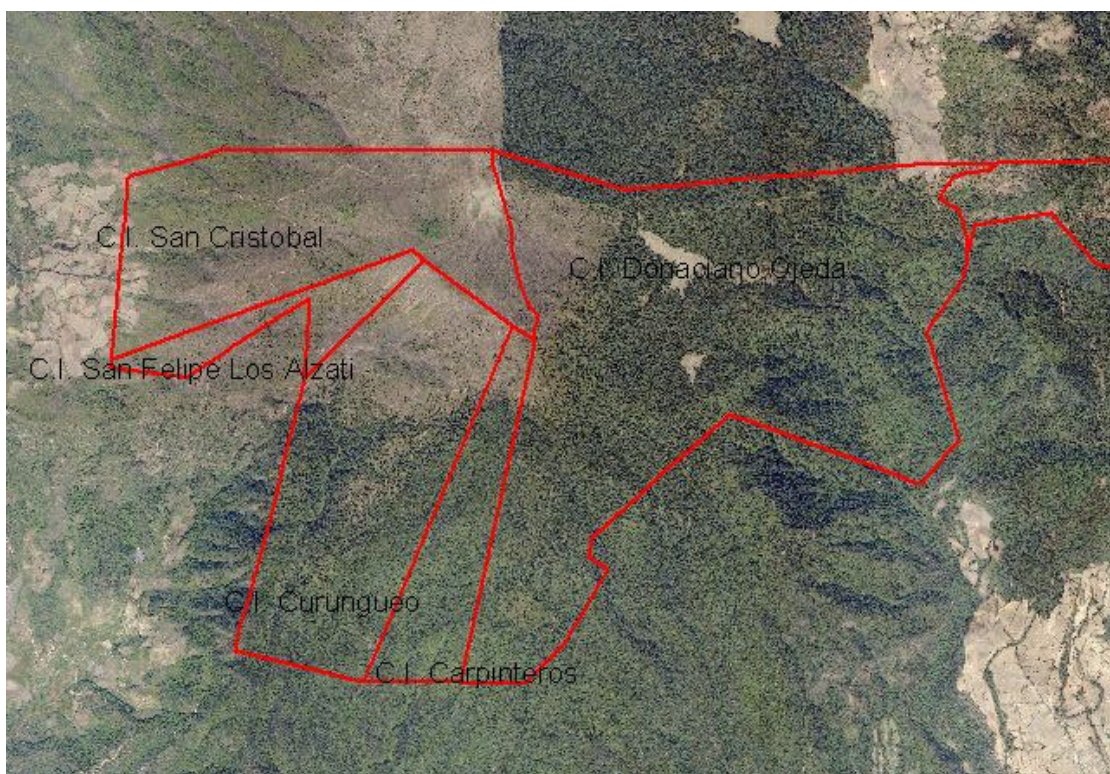


Figure 13. Aerial photos of Cerro del Chivatí Huacal in the core zone of the Monarch Butterfly Biosphere Reserve. The core zone and the tenure limits of the communities are

marked in red. The forest loss can be observed on the western side of Cerro del Chivatí Huacal in the San Cristóbal and San Felipe communities and in the highest part of Curungueo, which was affected by the forest fire of 1986 (WWF picture).



Figure 14. Cerro del Chivatí Huacal, Monarch Butterfly Biosphere Reserve (WWF picture, January 22<sup>nd</sup>, 2004)

Table 7. Calendar of events related to illegal logging in the Curungueo indigenous community, 2003

<b>Year</b>	<b>Date</b>	<b>Event</b>
2002	March	The community built 200 trenches with picks and shovels to block a first entrance.
2002	November	The community built 200 trenches with picks and shovels to block a second entrance.
2002	December	The community discovers that the illegal loggers have crossed the trench in the second entrance by using wooden planks as a bridge.
2002-03	December to February	Community brigades actively patrol the Curungueo forest, paid with funds obtained from the Monarch Butterfly Conservation Fund.
2003	February 25	The community asks WWF for radios to support the community brigades.
2003	March	The community again blocks the second entrance by enlarging the original trench with heavy machinery, and in the hope that they will be reimbursed by the Municipal government of Zitacuaro.
2003	March 31	First meeting between WWF and the agrarian authorities, where it is agreed to visit the Curungueo forest to see the trenches and learn about

		their conservation work.
2003	April 6	It is discovered that the 200 trenches which blocked the first entrance were covered. Evidence is found of illegal logging in the Curungueo forest.
2003	April 6	The community writes a letter to the authorities about this timber theft and the destruction of conservation work inside the Monarch Butterfly Biosphere Reserve. The community requests financial support to rent heavy machinery to cut off the roads that connect their forest with the town of Ocampo.
2003	April 7	The community asks WWF for support to block their roads and protect their forest.
2003	April 8	The community submits a complaint at the Justice Subattorney's Office of the State of Michoacan in Zitacuaro.
2003	April 9	The community rents the heavy machinery to cover the entrances again. On their way to their forest, they cross paths with illegal logging trucks loaded with illegally cut timber, supposedly from the Curungueo forest. The community immediately reports this theft to the Ministerial Police. The police commander tells them that he cannot stop a truck without evidence. Later their suspicion is confirmed and the illegally cut timber came from the Curungueo forest, and the loggers used the road the community closed off hours latter.
2003	April 10	The community writes an amendment to their original complaint to the Justice Subattorney's Office of the State of Michoacan in Zitacuaro, only after they are assisted by the Federal Congresswoman, María Cruz Martínez Colín.
2003	May 1	In an effort to get around the second entrance that had been blocked by the trench, the illegal loggers use a winch to pulley the trucks up a steep area where there was no road. Thus, once again the illegal loggers achieve entering through the second entrance.
2003	May 3	The community opens yet another trench to block the second access road. This trench now blocks the recently created access used by the loggers when they pulled the trucks up the steep hill. This time the trench is 20 meters long and 2 meters deep, the largest trench built in the MBBR to date.
2003	May 4	WWF visits Curungueo forest to see the trenches and the community's forest protection efforts.
2003	May 13	The Curungueo community denounces the clandestine logging to the Michoacan Governor, together with other six other agrarian communities from the Municipality of Zitacuaro.
2003	May 20	Another WWF visit to the forest of Curungueo.
2003	July 13	It is discovered that the original trench of the second access was opened by illegal loggers. Once more, cut trees are found in the Curungueo forest.

#### **4. FRANCISCO SERRATO INDIGENOUS COMMUNITY**

The case study of the indigenous community of Francisco Serrato documents how the agrarian authorities anticipated the entrance of loggers into their property. An effort was made to stop illegal logging, which only resulted in violence and social conflict within the community. This case is an example of the lack of capacity of the government authorities to respond and stop illegal logging (Table 8).



This indigenous community from the Mazahua ethnic group has a total of 835 hectares, of which 242 are located in the core zone and 593 in the buffer zone of the MBBR (Fig. 10).

Table 8. Calendar of events related to illegal logging at the Francisco Serrato community – 2002-2003

<b>Year</b>	<b>Date</b>	<b>Event</b>
2002	January 30	The Vigilance Committee asks for PROFEPA's intervention
2002	May 9	Confrontation between the community vigilance group and a group of seven persons stealing wood at El Puerto del Posito. One person is taken by the community and a vehicle is kept in the community as guaranty.
2002	May 15	More evidence of recent logging is found at El Puerto del Posito.
2002	May 20	The community denounces its findings from May 9th and 15th to the Michoacan Delegation of PROFEPA.
2002	July 24	The community asks for PROFEPA Michoacan's intervention once again.
2002	July 30	PROFEPA carries out a forest inspection on "Rosa Chica", "Rosa Grande", "Ciénega Larga", "Chiquero Viejo" and "Piedra Herrada", and the logging of 50 pine trees is registered consisting of an estimated 79,657 cubic meters of timber.
2002	August 16	PROFEPA informs the Francisco Serrato commissioner that an "Administrative Process" has been started against him due to the logging and events from May 9 <sup>th</sup> which included the stealing of a vehicle.
2002	September 3	The commissioner writes a letter explaining his communities circumstances to the Michoacan State Government and other authorities describing the continuous deforestation in the Francisco Serrato Ejido. The community leader asks for support from the Governor to stop the logging and bring in the army if necessary.
2002	September 27	The commissioner denounces illegal logging before the Subattorney's Office.
2002	November 7	The commissioner requests that PROFEPA concludes the administrative process against him, pointing out his letter dated September 3, 2002.
2003	February 23	WWF performs an aerial flight and obtains digital aerial photographs of the Reserve, including Francisco Serrato.
2003	March 14	The Follow Up Commission of the Operative Program for Fire Prevention and Fight reports forest fires in the community, as well as the presence of people involved in illegal logging.
2003	March 3	PROFEPA inspectors carry out a forest investigation in Francisco Serrato.
2003	April 21 – May 5	WWF decides not to conduct the field sampling of the Monarch Butterfly Conservation Fund in the Ejido Francisco Serrato due to the conflictive nature of the community at that time .
2003	June 9	The Monarch Trust Fund Technical Committee determines that the Francisco Serrato community will not receive financial support from the Monarch Fund due to the changes detected in their forest cover through the aerial p photographs.
2003	July 29	The commissioner of the indigenous community notifies the Reserve Director that most of the illegal logging occurs in the Ejido of Francisco Serrato, and writes that that such logging continues.
2003	December 12	The community denounces illegal logging and requests support from the PROFEPA Delegation of Michoacan.

### 5. CRESCENCIO MORALES INDIGENOUS COMMUNITY

Serious social conflict was also a characteristic associated with the illegal logging in the Crescencio Morales indigenous community. This community decided to take the law into their own hands and destroyed several trucks involved in illegal logging (Table 9).

This community is located in the municipality of Zitacuaro in eastern Michoacan, bordering with the State of Mexico. Crescencio Morales is the largest agrarian community in the MBBR, occupying an area of 5,989 hectares of which, 2,151 are located in the core zone. This represents 15.8% of the core zone and 10.6% of the entire protected area.

Table 9. Calendar of events related to illegal logging in the Crescencio Morales indigenous community, 2002-2004

<b>Year</b>	<b>Date</b>	<b>Event</b>
2002	July 18	PROFEPA carries out a forest inspection, drawing up certificate No. 200/2002/P.
2003	March	The community builds trenches between Llano de la Cumbre and Palo Herrado.
2003	March 8	The community holds three trucks loaded with wood in the forest of Crescencio Morales.
2003	March 31	Two community leaders of Crescencio Morales are arrested for holding the loggers' trucks .
2003	April 1st	Community leaders are released.
2003	April 6	Government authorities and NGO representatives visit the community.
2003	End of April	The community returns the three trucks to their owners.
2003	May 6	Community authorities declaration and complaint related to the events of March 8.
2003	May 22	PROFEPA carries out a forest inspection, drawing up certificate No. 151/2003/P.
2003	July 30	The neighbor agrarian community, San Pablo Malcatepec, denounces the illegal logging in their property, arguing that loggers enter through Crescencio Morales.
2003	October 21	Second holding of trucks loaded with illegal wood in the forest of Crescencio Morales in Palo Herrado.
2003	October 22	The community burn five trucks which were held due to illegal logging in their forest.
2003	October 24	The community requests for the intervention of the Municipal President of Zitacuaro
2003	October 28	The community requests for support from the Reserve Administration to demolish the sawmills.
2003	November 4	Confrontation between the community and people opening a new entrance in the forest.
2003	November 4	Complaint to the Michoacan Governor.
2003	November 4	Complaint to the Michoacan PROFEPA Delegation of the new roads that are being opened.

2003	December 4	PROFEPA carries out a forest inspection, drawing up certificate No. 274/2003/P.
2003	November 12	PROFEPA and the State Government start a blockade around the RBMM and macro illegal logging operation.
2003	November 27	The community opens again trenches which obstruct access from the north coming from Francisco Serrato and the Municipality of Ocampo
2004	February 4	Enlargement and re-digging of five trenches at Palo Herrado.
2004	February 23	The community informs PROFEPA that they opened a trench with the boundary with Francisco Serrato and request the use of confiscated wood, to cover expenses

### CONCLUSIONS

This report gathers many evidences of illegal logging in the Monarch Butterfly Biosphere Reserve from January 2001 to May 2004. Between 2001 and 2003 at least 370 hectares have been logged in the buffer zone (Francisco Serrato y Emiliano Zapata ejidos), and 140 hectares of forest has been degraded in the core zone. In the buffer zone, the legal logging should be selective and of low impact. No timber extraction should be found in the core zone according to the Presidential Decree of 2000.

Taking into account the different types of evidences presented in this report, it may be concluded that illegal logging has affected at least 28 communities of the Reserve during the last three years (Table 10, Fig. 15). Twenty three of these communities are located in the core zone and the remaining five in the buffer zone.

Figure 15. Synthesis of properties where there are evidences of illegal logging in the Monarch Butterfly Biosphere Reserve. A darker colors indicates more evidence of illegal logging is found in that community.

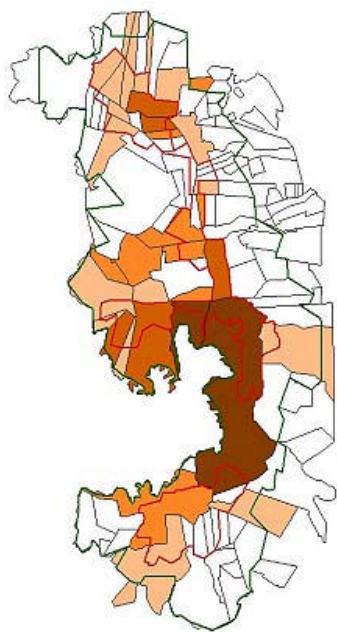


Table 10. Synthesis of communities with illegal logging evidences

Communities	Aerial pictures	Field sampling	Flights 2003	Flights 2004	Letters	PROFEPA Inspection	Case studies	Trenches	Total
Core Zone									
C.I. Francisco Serrato	1		1	1	1	1	1	1	7
Crescencio Morales	1		1		1	1	1	1	6
Cerro Prieto		1			1	1		1	4
Donaciano Ojeda	1				1			1	3
San Francisco Curungueo					1		1	1	3
Federal Property						1	1	1	3
La Mesa	1	1			1				3
Los Remedios					1			1	2
El Rosario	1							1	2
Rancho Verde	1	1							2
El Asoleadero		1			1				2
C.I. Nicolás Romero					1	1			2
Carpinteros					1				1
San Cristóbal (old logging)			1						1
Chincua		1							1
El Calabozo		1							1
El Capulín		1							1

El Depósito		1						1
Rosa de Palo Amarillo							1	1
San Pablo Malacatepec					1			1
Senguio					1			1
Hervidero y Plancha					1			1
Jesús de Nazareno					1			1
San Felipe Los Alzati					1			1
Buffer Zone								
Emiliano Zapata			1				1	2
E. Francisco Serrato				1			1	2
El Paso							1	1
San José Corrales							1	1
Outside the Reserve								
Zirahuato					1			1
Santiago Tuxpan					1			1
Parritas							1	1
Others								
Hotel Rancho San Cayetano					1			1
Mazahua-Otomí Coordination					1			1
<b>Total</b>	<b>6</b>	<b>8</b>	<b>4</b>	<b>2</b>	<b>19</b>	<b>5</b>	<b>6</b>	<b>12 33</b>

The Reserve is highly vulnerable since it contains a vast network of roads (Fig. 16). Most of logging is found within 50 meters of the roads and 30% of 56,259 hectares of the Reserve are located within these parameters meaning that the loggers have relatively access to a large part of the MBBR. Currently, the Geography Institute of the National Autonomous University of Mexico (UNAM) is analyzing the roads in the region, based on aerial photographs and Landsat satellite images of 2003, in order to identify strategic sites where timber inspection points should be established .



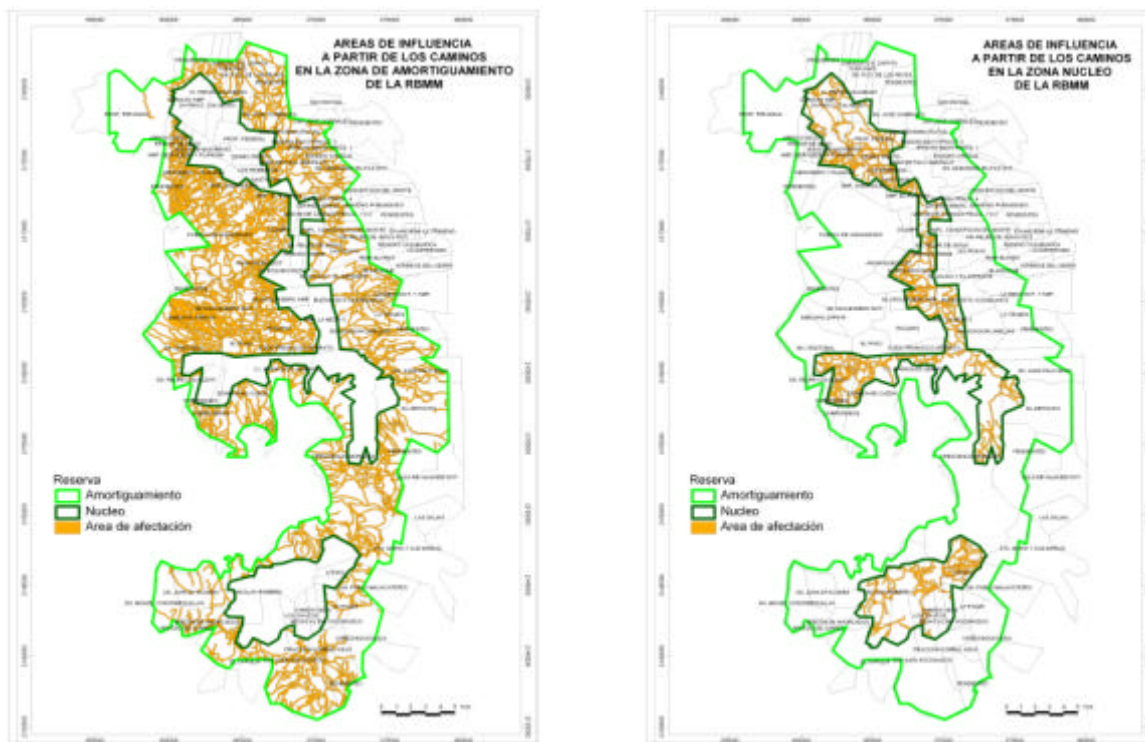


Figure 16. Road network in the Monarch Butterfly Biosphere Reserve

Deforestation has prevailed in the Monarch Butterfly Region in 2002 and 2003, even though federal, state and judicial authorities knew about this problem which affects the protected area. Letters of complaints and other documents from the agrarian communities inside the MBBR show their intentions and commitment to protect their forest. Communities which are fighting to protect their natural resources have received very little support on behalf of the authorities, and this is reflected in the fact that many of them do not trust official agencies any more, and they do not even want to continue to write letters documenting the deforestation they witness.

The lack of economic resources is no excuse for not being able to provide the basic protection for this protected area. The Monarch Butterfly Regional Forum (Valle de Bravo, March 2004) recently showed that many government agencies and organizations invest millions of pesos into the region each year. The forest conflict in the Monarch Butterfly Region has resulted in violence in the Crescencio Morales, Francisco Serrato and Sierra Chincua communities.

The agrarian communities inside the MBBR need urgent actions from the federal and state authorities to protect their forest. During the last few years, the seriousness of several illegal logging incidence has mobilized the agrarian communities to work against forest crime. These communities are and should

be the conservationists first ally for forest protection. In order to face this situation, it is also necessary to answer basic questions surrounding the social dynamic of illegal logging, and to understand the social aspects of the agrarian communities, of the logging groups, and the profile of those who participate in illegal logging, as well as those who protect their natural resources. Finally, while we are learning a little bit more about the characteristics of the deforestation seen in the MBBR, it is still necessary to deepen our understanding of the issue. If the causes of deforestation are ignored and the organizations and agencies involved are unable to modify their conservation strategy in accordance with the new diagnosis, the programs will be misdirected.

This report shows that the Monarch butterfly conservation panorama has changed in the last few years. As opposed to assumptions made a few years ago when it was believed that the agrarian communities logged their forest to survive, it has been shown in the case studies that members of the agrarian communities are organizing to protect their forest as their natural and socioeconomic heritage.

## **RECOMMENDATIONS**

This report documents the impact of illegal logging in the Reserve from 2001 to 2004 and the communities' efforts to stop it. Communities with properties in the Monarch Butterfly Biosphere Reserve believe that the government could control illegal logging, if there were political will at the highest levels. It is not economic resources which will stop illegal logging but rather it is commitment, political determination, and coordination. The creation of the protected area in 1986, its expansion in 2000, the implementation of the Monarch Butterfly Fund since 2001, and the organization of the Monarch Butterfly Regional Forum by state and federal authorities and the civil society in 2004, are all key actions. However, all those initiatives should ensure an efficient and permanent law enforcement in order to secure the conservation of the Monarch butterfly overwintering habitat in Mexico.

Based on the information presented in this report, the following recommendations are proposed:

### **1. Establish check points with the army presence in strategic spots**

The agrarian communities have requested the presence of the army to stop the illegal logging. This is also one of the recommendations of the First Monarch Butterfly Regional Forum. The Geography Institute of UNAM is finishing a report for WWF on potential sites of checking points location, based on the analysis of the road networks in the Reserve, which will be communicated to the federal and state authorities as soon as possible.

**2. Block access to the Protected Area**

The road network is vast and there are many access routes to the core and buffer zones. It is necessary to block most of these entrances through trenches or other means. Many communities have initiated this job during the last three years. It is essential to do this systematically, using the most recent information on the road network.

**3. To establish communication infrastructure and mechanisms**

Communication infrastructure should include radio transmission antennas, vigilance towers, and radios in strategic places. Currently, there is no way to inform the authorities expeditiously about illegal logging. At the same time, it is urgent to improve communication mechanisms between agrarian communities and the authorities, so that the information be delivered – and responded to – efficiently.

**4. Regular inspections of the Reserve and the sawmills**

A regular inspection program should be established to cover the entirety of the MBBR. Furthermore, it is necessary to make periodic inspections of the network of sawmills in order to verify their legal situation.

**5. Strengthen community vigilance committees**

Communities have lost confidence in government authorities. It is necessary to reestablish confidence and strengthen community vigilance committees. Committees should have direct and immediate communication with authorities.

**6. Signs on forbidden and permitted activities in the Reserve**

A network of signs should be located in the buffer and core zone and in the core zone, penalties for illegal logging should be included, as well as telephone numbers to denounce these activities.

**7. Environmental education campaign**

In spite of several efforts made on environmental education, this has not reached many groups which play an important role in the Monarch Butterfly Region. It is important to increase efforts on environmental education, concentrating on authorities, inhabitants, wood users, etc.

**8. Damage assessment and site restoration**

It is necessary to make an assessment of all the sites which have been logged, in order to identify in which sites restoration actions are required, prioritizing critical areas for the Monarch butterfly.

**9. Root cause analysis of the illegal logging**

It is essential to analyze the root causes of deforestation in the Monarch region. It is important to identify the socioeconomic profile of people participating in such activities, in order to promote long term and preventative actions targeted at this particular social group.

### **10. Recommendations of the First Monarch Butterfly Regional Forum**

During the Forum a series of thematic and geographic priorities were proposed. These priorities should be integrated into the inspection and vigilance actions. ([www.foromonarca.net](http://www.foromonarca.net))

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