



AREA OF FOREST OCCUPIED BY THE COLONIES OF MONARCH BUTTERFLIES IN MEXICO, DURING THE OVERWINTERING PERIOD 2024-2025.

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Executive Summary

During the overwintering season 2024-2025, eight colonies of monarch butterflies - three in Michoacán and five in the State of Mexico - were recorded occupying a total of 4.42 acres of forest (Fig. 1), this represents an increase of 99% in relation to the area recorded in the 2023-2024 winter (2.22 acres). Three colonies were located inside of the Monarch Butterfly Biosphere Reserve (MBBR) occupying 3.01 acres of forest, and five were located outside of the MBBR occupying 1.42 acres. The colony of Atlautla, outside of the Monarch Region, occupied 0.24 acres.

Introduction

The monarch butterflies (*Danaus Plexippus* L.) that overwinter in Mexico establish their colonies in the forests of Michoacán and the State of Mexico (Fig. 1). These butterflies from the eastern population of North America migrate at the end of the Summer from Canada and United States to Mexico escaping from the winter in their sites of origin. The threats to these monarchs are: i. decrease of milkweed plants in their breeding sites due to the use of herbicides and insecticides, ii. land use changes in North America, and iii. climate change in their breeding sites (Brower *et al.*, 2012; Pleasants & Oberhauser, 2012; Zylstra *et al.*, 2021).

The National Commission of Natural Protected Areas (CONANP) and World Wildlife Fund (WWF) have been monitoring the monarch overwintering sites since the 2004-2005 winter. This report shows data collected from the area occupied by colonies during the 2024-2025 winter. The second lowest area occupied by the monarch colonies in the last 30 years occurred in the 2023-2024 winter with 2.22 acres of forest; the lowest historical occupation occurred in the 2013-2014 winter with 1.65 acres, while the highest occupied recorded area was in the 1996-1997 winter, with 44.95 acres of forest (Rendón-Salinas *et al.*, 2022, 2023a & b, 2024).

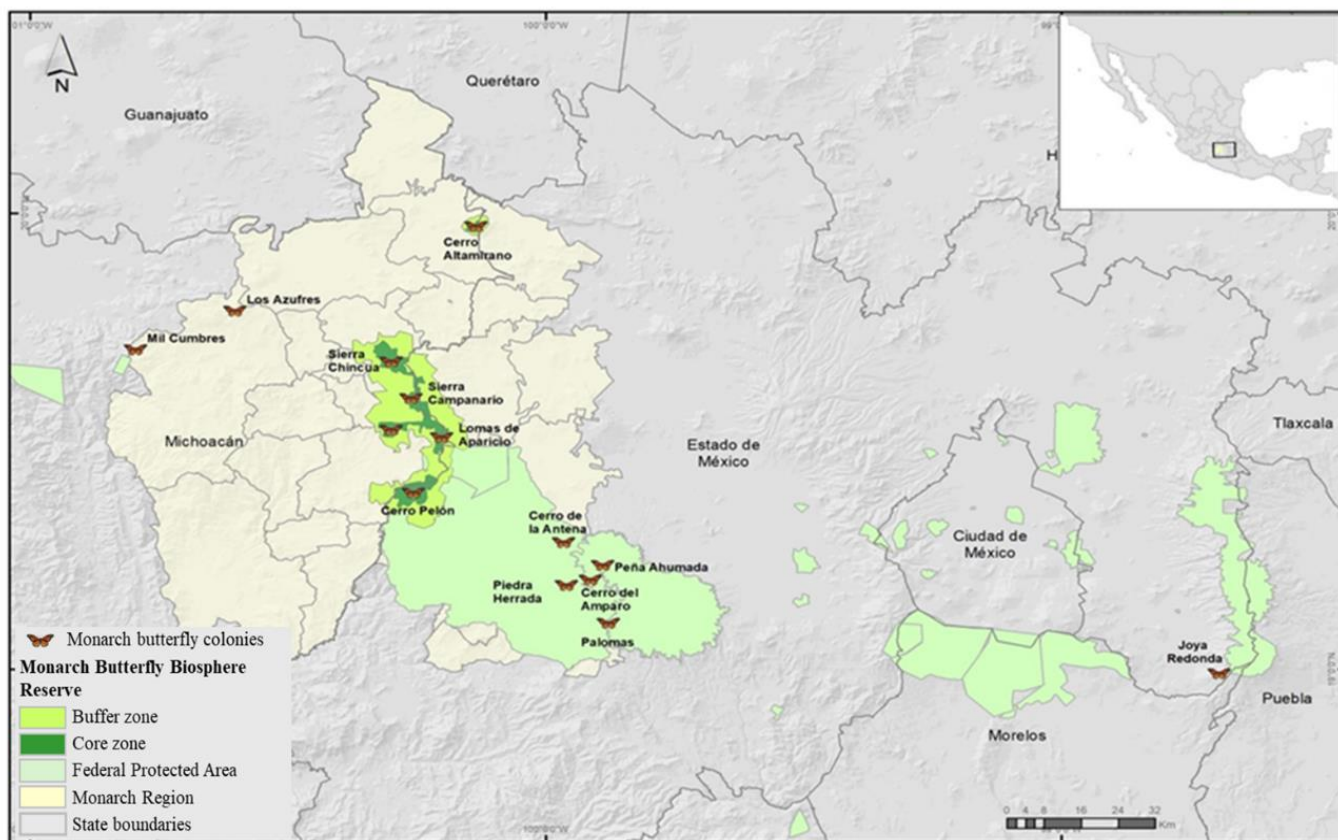


Figure 1. The Monarch Butterfly Biosphere Reserve (RBMM) located in the center of the Monarch Region between the limits of Michoacán and the State of Mexico., west Mexico City

Method

Starting in December 2024, each of the 13 overwintering sanctuaries in the “Monarch Region” were visited twice a month; when a colony was found its location was established with a GPS Garmin® Map 64 positioning device in UTM projection, with WGS 84 datum. The perimeter of the forest occupied by the butterflies was demarcated from the tree that was found on the highest point of the slope, then we recorded the direction and distance of the consecutive and peripheral tress of the colony (Calvert, 2004). The polygonal perimeter data was processed with the ArcGIS Pro geographic information system to establish the area occupied by the colonies (Vidal & Rendón-Salinas, 2014; Rendón-Salinas *et al.*, 2023, 2024). The Joya Redonda colony at Atlautla was also visited, whose area is not counted in the historical graph as it is located outside of the Monarch Region.

Results

In the second half of December 2024, seven colonies of the monarch butterflies were recorded - two in Michoacán and five in the State of Mexico -, additionally in January, the colony of San Andrés in Michoacán was measured up, and added to the total surface calculation. The eight colonies occupied an total area of 4.42 acres of forest and it was found that three colonies (3.01 acres) were located within the MBBR, while five colonies (1.42 acres) were located outside of it (Table 1). This surface

represents an increment of 99% compared to the occupied area in the 2023-2024 winter season, with a total of 2.22 acres of forest (Fig. 2). The largest colony (2.46 acres) was recorded in the ejido El Rosario, Michoacán, and the smallest colony (0.005 acres) was located in San Andrés, in the Los Azufres sanctuary. The Atlautla colony that is adjacent to the Iztaccíhuatl - Popocatepetl National Park and outside the Monarch Region occupied 0.24 acres.

Table 1. Forest area occupied by monarch butterfly g colonies in the 2024-2025 winter season.

Location	State	Sanctuary	Colony (Agrarian properties)	Area (acres)
Inside the Monarch Butterfly Biosphere Reserve (MBBR)	State of Mexico	Cerro Pelón	E. El Capulín	*
			E. Mesas Altas de Xoconusco	*
			I.C. San Juan Xoconusco	*
			I.C. San Pablo Malacatepec	0.44
		Sierra Campanario	E. San Joaquín Lamillas	*
			E. La Mesa	*
	Michoacán	Cerro Altamirano	E. Contepec	*
		Cerro Pelón	E. Nicolás Romero	*
		Chivatí-Huacal	I.C. Carpinteros	*
			I.C. Donaciano Ojeda	*
		Sierra Campanario	E. El Rosario	2.46
		Sierra Chincua	State Property	0.1
			Federal Property	*
			E. Cerro Prieto	*
E. El Calabozo Fracción 1	*			
Lomas de Aparicio	E. Crescencio Morales	*		
Area occupied inside the MBBR				3.01
Outside the MBBR	State of México	Cerro del Amparo	E. San Francisco Oxtotilpan	0.09
		Palomas	E. San Antonio Albarranes	0.97
		Piedra Herrada	E. San Mateo Almomoloa	0.34
		Peña Ahumada	E. Ojo de Agua	0.007
		Cerro de la Antena	E. El Potrero	*
	Michoacán	Los Azufres	S.P. San Andrés ^o	0.005
		Mil Cumbres	E. Río de Parras	*
Area occupied outside the MBBR				1.42
Total occupied area				4.42

E= Ejido, I.C.= Indigenous Community, S.P.= Small Property, * No colony present

Note: The colony of San Andrés in Los Azufres was measured in January^o

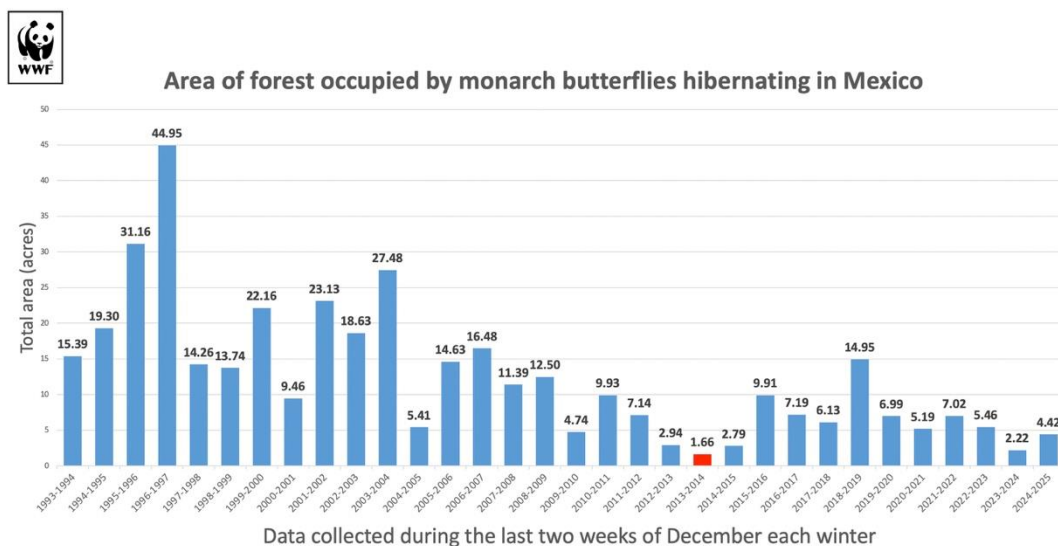


Figure 2. Forest area occupied by Monarch butterfly colonies in Mexico from 1993-1994 to 2024-2025.

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