

## Status of the Amazonian manatee (*Trichechus inunguis*) in the Cuyabeno Reserve, Ecuador

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Editado por/Edited by: C. Zambrano, Ph.D.

Recibido/Received: 05/14/2010. Aceptado/Accepted: 05/06/2010.

Publicado en línea/Published on Web: 05/25/2010. Impreso/Printed: 06/01/2010.

### Abstract

Amazonian manatees live in black water rivers and lakes in the Amazon basin. A study of Amazonian manatees in the Cuyabeno Reserve conducted by Timm et al. [1] in 1983 gave first information on distribution of manatees in the Cuyabeno Reserve and they suggested a possible extinction of the Amazonian Manatee in the following decade. Here I present results of observations, and interviews, realized 13 years after the first study as complementary observations during a research project on Amazon River dolphins (*Inia geoffrensis*) from 1996 to 1999. We surveyed during more than 127 days covering about 6.175km in manatee habitat with more than 456 hours continuously observing black water rivers and lagoons and we carried out manatee surveys paddling in the Lagunas Grandes de Cuyabeno. Interviews with tour guides, park rangers and native Indians give a complete sighting list for the presence of manatees and insight into the current situation in the Reserve. The relative abundance of manatees in the Cuyabeno River is 0.01 animals/h effort and even less in the Lagartococha River with 0.007 animals/h effort. Populations in the Lagartococha River seem to be severely reduced. Hunting in both rivers continued despite legal protection with 16 manatees killed from 1995 to 1998. Overall 40 to 49 animals were seen in the Cuyabeno Reserve from 1996 to 1998. Even though, predictions that manatees would be extinct by 1993 were not fulfilled, they are rare in the Reserve and living in a protected area does not necessarily safeguard this species.

**Keywords.** Amazonian manatee, *Trichechus inunguis*, status, Cuyabeno Reserve, Ecuador.

### Resumen

Los manatíes amazónicos viven en ríos de aguas negras y lagunas de la Cuenca Amazónica. La primera información sobre la distribución y el estado de conservación de manatíes en la Reserva Cuyabeno proviene de un estudio realizado en 1983 por Timm y otros [1]. Ellos concluyeron que el manatí se puede extinguir en la próxima década. En este artículo se presenta los resultados de observaciones y entrevistas realizados desde 1996 a 1999, trece años después. Durante 127 días de monitoreo del Delfín Amazónico (*Inia geoffrensis*) en el hábitat del manatí a lo largo de ríos y lagunas de agua negra, se observó durante 456 horas. Adicionalmente se realizaron monitoreos dirigidos a manatíes en las Lagunas Grandes de Cuyabeno. Entrevistas con guías de turismo, guardaparques e indígenas dan una lista completa de avistamientos de manatíes, su distribución y la situación de conservación. La abundancia relativa estimada en el Río Cuyabeno es de 0,01 animales/hora de esfuerzo y aún menor en el río Lagartococha con 0,007 animales/ hora de esfuerzo. Las poblaciones en el río Lagartococha parecen severamente reducidas. En ambos ríos la caza entre 1995 y 1998 continuó. A pesar de la protección legal se mataron al menos 16 animales dentro de la Reserva Cuyabeno, por ende el hecho de vivir en una área protegida no necesariamente significa la sobrevivencia de la especie.

**Palabras Clave.** Manatí amazónico, *Trichechus inunguis*, estado, Reserva Cuyabeno, Ecuador.

### Introduction

Amazonian Manatees (*Trichechus inunguis*), are the only fresh-water Sirenian endemic to the Amazon basin where they were once abundant [2]. The shy, secretive nature of the manatee makes it difficult to observe. It breaths

approximately once every 3 – 5 minutes but in moments of danger can remain submerged for up to 25 minutes [2]. Therefore population studies are rare and estimates are fairly inaccurate: [3] for example estimates the population of the Amaña lagoon to range from 500-

1000 animals. According to [4] the total population of manatees in Brasil is unknown. In the Pacaira – Samiria National Reserve in north eastern Peru, [5] state that there are only very few manatees left. As for Brasil and Peru, manatees seem to be very rare in most of their range [6]. In the Cuyabeno Reserve, according to native Indians, manatees used to be abundant in most of the lagoons and black water rivers. But the first manatee study in Ecuador by [1] during fall 1983 in the Cuyabeno Reserve in the Aguarico river system and the Napo river system, showed that manatees were abundant only in the Laguna Lagartococha close to the border with Peru, and apparently extinct in the Zancudococha lagoon.

As one of the largest mammals in the Amazon, manatees are one of the preferred items of prey for native Indians. Documentation of manatee hunting dates back to 1542 [7] and has been the main cause of severe population depletion [8] [9]. Manatees are hunted throughout the year [4] but they are more vulnerable during the dry season, when they concentrate in deeper lagoons and canals [10].

Since 1973 manatees are protected in most of the countries, as they were included in CITES Appendix I and countries like Peru, Ecuador and Brasil legally protect manatees, but in none of the countries is there any control or enforcement of the laws [4]. Hunting of the Amazonian manatee still continues in Brasil [4], Peru [5], and Ecuador [1]. Therefore in Ecuador, manatees are considered the most endangered mammal species of the country [11] and are listed as critically endangered [11]. Here, we show the current situation of the Amazonian Manatee in the Cuyabeno Reserve based on observations complementary to a 4 year research on Amazon River dolphins (*Inia geoffrensis*).

## Methodology

### Study area

The Cuyabeno River is a 150km black water river with the Lagunas Grandes de Cuyabeno, a system of 16 lagoons in the upper course and several oxbow lakes in its lower course. The Lagunas Grandes are connected by the Cuyabeno Chico, a small river which has its source in the west of the Cuyabeno Reserve and passes oil fields of *Petroecuador* outside the reserve. Flooded forests surround the lagoons with *Macaranga dendrolobium* as the dominant trees interspersed by floating meadows. The lagoons tend to dry out during the dry seasons from September to November and from December to March.

The Lagartococha river in the north of the Cuyabeno Reserve, borders with Peru. The upper parts of the Lagartococha River are situated near the confluence of the Guepi and the Pacuya Grande River from where it flows east into the Aguarico River, approximately 150km downstream from the source. On its course, it passes through

areas of flooded forest, wide extensions of floating meadows and numerous lagoons on both sides. Although some of the lagoons may dry completely during the dry season, the Lagartococha River always remains deep enough for river dolphins, manatees and boat traffic.

In the Reserve, there are 5 settlements of 4 different ethnic groups. The Secoya, Quichua and Cofan Indians live along the Aguarico River. The Sionas live on the Cuyabeno River, close to the Lagunas Grandes and there are 3 Military camps at the Aguarico river and one upstream on the Lagartococha River. The Ecuadorian army is based in the Reserve with 4 camps each hosting 10 to 20 soldiers; one camp is situated at the mouth of the Cuyabeno River, one in Zancudo, another camp at the mouth of the Lagartococha and the Aguarico river, with a Peruvian military camp just on the other side of the Aguarico River and upstream of the Lagartococh River (Map 1).

### Occasional sightings during Amazon river dolphin surveys

In the years 1996 to 1998 aquatic mammal surveys were carried out in the Cuyabeno and the Lagartococha Rivers of the Cuyabeno Reserve [12] (Map 1). During a total of 127 days with 146 transects, we covered a total distance of 6,175km in manatee habitat in a twelve-meter long dug out canoe powered with a Johnson 25 HP outboard motor and a speed of between 10 and 15 km/h. Two observers continuously watched the river one in front and one behind the canoe during a total of 456 hours.

### Dedicated manatee surveys in the Lagunas Grandes de Cuyabeno

We paddled a small dugout canoe in the Lagunas Grandes de Cuyabeno and adjacent streams. In May 1998 during mid water conditions, we carried out 3 manatee surveys for a total of 9.75 hours and another 7 surveys in June 1998 during high water conditions with 13 hours surveyed. Each survey lasted for a minimum of 2 hours and a maximum of 8:30 hours. Canoes were paddled slowly to avoid any disturbance due to noise and stopped for observation periods of 30 minutes to one hour to float nearby areas containing potential food resources (e.g. “floating meadows” (*Paspalo – Echinochloetum*) and water hyacinths (*Eichhornia* sp.).

### Incidental sightings and interviews

Tour guides, park rangers and native people living or working in the Cuyabeno Reserve were interviewed about Amazonian manatee presence and hunting trends. All manatees observation from 1996 to 1999 (personal and reported observations), were listed and plotted on a map.

## Results

### Relative abundance during river dolphin surveys

On all of the 146 river dolphin surveys, only 4 manatees were seen on 3 occasions. Two of these sightings were

	Distance surveyed (km)	# Transects	km Traveled	Hours suveyed	# Manatees sighted	Relative abundance (manatees/h)
Cuyabeno River	64.9	81	3426.3	311.95	3	0.010
Lagartococha River	136.1	65	2749.5	142.10	1	0.007

Table 1: Effort on surveys in manatee habitat and relative abundance of manatees in the Cuyabeno and Lagartococha river in the Cuyabeno Reserve.

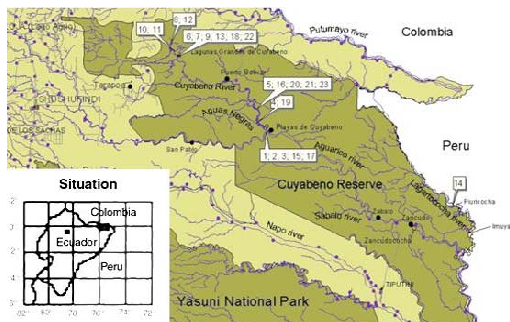


Figure 1: Manatee sightings in the Cuyabeno Reserve. Legend: Numbers are sighting numbers as listed in table 1; o = military camps, dots = settlements.

in the lower part of the Cuyabeno River and one in Piuricocha, in the middle course of the Lagartococha River. This gives a relative abundance of 0.01 manatees/h in the Cuyabeno River and 0.007manatees/h in the Lagartococha river (Table 2)

**Manatee surveys**

Eleven surveys by paddling, specifically dedicated to study manatees, were carried out in the Lagunas Grandes of Cuyabeno in April and June 1998 with a total of 31.45 hours surveyed. According to natives, manatees are frequently seen in these lagoons at this time of the year. On none of the eleven surveys were manatees seen.

**Sighting reports and interviews**

In the Cuyabeno Reserve 26 reports of incidental sightings with a total of 40 to 49 Manatees have been collected for the years 1996 – 1998. Most sightings were in the Cuyabeno River and in the Lagunas Grandes de Cuyabeno, only one sighting is from the Lagartococha river.

Most of the manatee sightings were in the Laguna Grande (6 sightings) and in the estuary from the Cuyabeno River (5 sightings). In the Cuyabeno River close to Puerto Bolívar, a community of native Sionas, there are 4 recorded manatee sightings. A maximum of 15 and minimum of 11 animals were estimated for these sightings. In most of the other sites, manatees were only seen once or twice (Cuyabeno Aguas Negras 2; Cuyabeno Posa de la Boa Grande 1, Mateococha 2; Patococha 2 and Piuricocha 1). Most sightings consisted of one or two animals. Groups with more than 2 animals were seen at Aguas Negras, Mateococha and Puerto Bolívar. (Table 1, Figure 1).

#	Date	Area	Manatees sighted		Behaviour	Cue	Observer
			min	max			
1	01/04/96	Cuyabeno Mouth	2	2	floating		Parkranger
2	06/07/96	Cuyabeno Mouth	1	1	floating	snout	Judith Denkinger
3	18/09/96	Cuyabeno Mouth	1	2	floating		Tour Guide
4	28/09/96	Cuyabeno	2	2			Quichua
5	06/10/96	Aguas Negras	2	2	feeding	snout	Judith Denkinger
6	27/12/96	Cuyabeno Posa de la Boa Grande	1	1		snout	Judith Denkinger
7	27/12/96	Laguna Grande	1	1		snout	Judith Denkinger
8	01/08/97	Cuyabeno	4	4			Siona
9	01/10/97	Mateococha	1	1			Tour Guide
10	15/10/97	Cuyabeno	1	1			Tour Guide
11	01/11/97	Patococha	1	1			Tour Guide
12	01/12/97	Cuyabeno	2	2			Siona
13	21/12/97	Mateococha	1	2			Tour Guide
14	29/12/97	Cuyabeno	1	2	floating	back	Judith Denkinger
15	03/01/98	Piuricocha	1	1	floating	back	Judith Denkinger
16	01/03/98	Cuyabeno Mouth	1	2	travelling	back	Native/Parkranger
17	20/03/98	Cuyabeno	1	1	floating	back	Native
18	28/03/98	Laguna Grande	2	3	feeding	back	Indio
19	30/03/98	Cuyabeno	4	5	travelling	back	Native
20	01/04/98	Aguas Negras	1	1			Native
21	02/04/98	Cuyabeno Posa de la Boa Grande	1	1			Native
22	03/04/98	Cuyabeno	1	1		snout	Tour Guide
23	01/05/98	Laguna Grande	4	6	travelling	back	Native

Table 2: Observations of Amazonian Manatees (*Trichechus inunguis*) in the Cuyabeno Reserve from 1996 to 1998.

**Interviews**

Twenty-one comments about Amazon manatees were collected in the Cuyabeno Reserve. All of the people interviewed know about manatees as opposed to Ashuar Indians in the Pastaza area in the southern Amazon of Ecuador, who had no knowledge of manatees. In the Cuyabeno Reserve, Sionas from Puerto Bolivar have seen manatees in the Lagunas Grandes and adjacent lagoons, especially in Mateococha, Caimancocha, Auca-cocha and Canangueno. In the upper course of the Cuyabeno River, manatees were seen during seasonal changes. Groups travelling upstream have been observed in May 1998 in the upper course of the Cuyabeno River. In the lower course of the Cuyabeno River, Quichuas from Playas de Cuyabeno saw manatees feeding on the vegetation in the confluence of the Balatayacu with the Cuyabeno River and in the Cuyabeno River close to Lino-cocha. Cofan Indians from Zábalo state that manatees

Year	#	Description	Area	Source
1995	1	One or more killed	Cuyabeno River	Park ranger
1995	1	Kept as a pet in a pool and starved	Cuyabeno River	Siona
1995	2	Hunted by Sionas	Cuyabeno River	Siona
1996	1	One or more killed	Cuyabeno River	Park ranger
1996	2	Hunted by Sionas	Cuyabeno River	Siona
1997	1	Cranium at Peruvian Military camp	Imuya, Lagartococha River	Personal observation
1997	5	Hunted by Sionas	Cuyabeno River	Siona
1997	1	Hunted by Quichuas	Lower Cuyabeno River	Quichua
1998	1	Hunted by Quichuas	Lower Cuyabeno River	Quichua
1998	1	Hunted by militaries	Lower Cuyabeno River	Quichua

**Table 3: Reports on manatees hunted from 1995 to 1998 in the Cuyabeno Reserve.**

live in the Sabalo River and lagoons.

Information about hunting is quite varied. The Director of the Cuyabeno Reserve, Luis Borbor, mentioned that manatees were hunted in the Lagartococha area, while Ecuadorian and Peruvian soldiers from camps in the Lagartococha river claim that they have not seen any manatees for 10 years. But in 1997 during our surveys in the Lagartococha River, a manatee cranium was observed at a hunting camp on the Peruvian side close to Imuya. Luis Borbor also mentioned that there was a self-imposed ban on manatee hunting by the Siona Indians, while Siona Indians claim that they killed at least 5 manatees in 1997. Some of the Park rangers know that manatees were hunted in 1995 and 1996. Another comment by a Siona Indian was that one of them has killed at least two manatees every year until 1996. In 1993 one manatee was caught and kept in a pool until Ecuadorian biology students released it. In 1995 another manatee was caught by a Siona and kept in a pool as a pet until it died from starvation. The Quichuas from Playas de Cuyabeno hunted one manatee in 1997 and one in 1998. Another manatee was killed in 1998 by soldiers in Linochocha in the same area.

According to these reports at least 16 manatees have been killed in the Cuyabeno Reserve in the three years from 1995 to 1998. (Table 2). Estimates provided by ten of the local people interviewed about the population size of Amazonian manatees in the Cuyabeno Reserve were widely disparate. Three of the natives interviewed and the director of the Cuyabeno Reserve suppose that about 50 manatees might live in the Cuyabeno River system. Two of these native Indians are manatee hunters. Overall there is a common sense in most native Indians and Park rangers, that there are fewer manatees than there used to be several years ago. Five statements about the population size were that there are hardly any manatees left. One tour guide has never seen a single manatee during the 10 years she has worked in the Reserve. Four of the Siona Indians questioned have not seen any manatees during the last 6 years. According to a Quichua from Zancudo, in the Iripari lagoon manatees disappeared in the early 90s (Tangoy, pers. com. 1997).

### Discussion

The survey effort of the Cuyabeno and Lagartococha River from 1996 to 1999 has been very high and the water

surface was constantly surveyed for many hours, concentrating on anything that moves and appears to be an aquatic mammal, but manatees were only seen on 4 occasions. Although the travelling speed of 10 to 15 km/h might have been too fast and manatees could be scared away by the noise of the motor, the high effort should still account for more animals if manatees were abundant in the area. Observations on the West Indian Manatee show that manatees become habituated to the sounds and do not avoid areas with heavy boat traffic [13]. However our sightings indicate that manatees still live in the Cuyabeno and Lagartococha Rivers, although there was only one manatee sighted every 100 hours in the Cuyabeno River or 7 manatees every 1000 hours of survey in the Lagartococha River. This indicates that since the surveys conducted by [1] in 1983, when manatees were only abundant in the Lagartococha lagoon, the situation has now completely changed. In our surveys, numbers in the Lagartococha River were considerably lower than in the Cuyabeno river which means that during the last decade the manatee population in the Lagartococha river seems to have severely declined. Even though most manatees were sighted in the Cuyabeno River system, where there is also most activity of possible observers, no animals were sighted on dedicated surveys in the Lagunas Grandes de Cuyabeno. Since in this area, most manatees were sighted during the last years, our surveys indicate that even in the Cuyabeno River system populations seem to be at very low levels.

However, compilation of occasional sightings of park rangers, natives, tour guides and own observations without dedicated surveys give an encouraging result of a total of 40 – 49 manatees seen in the Cuyabeno Reserve during 3 years. But for each year this only counts for 10 to 17 animals seen and only one sighting is from the Lagartococha river system. Even though there is far more activity of potential observers in the Cuyabeno river than in the more remote Lagartococha river, this still indicates that manatee numbers in the Lagartococha river seem to be critically low and Manatees are not as abundant as they used to be in the Cuyabeno river and the Lagunas Grandes de Cuyabeno. If we consider our information on manatees killed, 2 – 7 animals were killed each year since 1995. In 1997 the 7 manatees killed would be more than 60 % of all the animals seen, which is far from being sustainable.

Besides, on our surveys in the Lagartococha River we frequently met Peruvian hunters, who travelled all the way upstream the Lagartococha River to hunt black caimans and according to some conversations with them, they occasionally take manatees as well. But they say that they hardly find them any more.

As for observations by [4] in Brasil, in the Cuyabeno Reserve, there is no definite hunting season but manatees are killed whenever possible. According to [14] the Siona Indians practised a self-imposed ban on manatee hunting in 1984 because of low manatee populations. But in 1996 four manatees were reportedly killed by the

Siona Indians (Sionas pers. com), and in 1998 a total of eight manatees were killed, six by the Sionas and two by the Quichua Indians (Sionas and Quichuas pers. com.). Hence, hunting was carried on throughout the years and the hunting ban was never in force.

Considering that our hunting reports do not count for all manatees taken from the Cuyabeno reserve and numbers mentioned here are likely underestimates, [11] are probably wrong in assuming that the fact that most manatee habitat is within protected areas, gives some protection to manatees in Ecuador. If actual trends continue, manatees in the Lagartococha River will soon follow the situation of Zancudococha, where they were extirpated since the early 90s. For the entire Amazon basin, Grimwood in 1968 already mentions that the Amazonian Manatee is considered "nearer extinction than perhaps any other mammal of the Amazon region". Timm [14] estimated that if the current level of harvest goes on unabated, Amazonian manatees would be extinct in Ecuador within 10 – 15 years. However, our study carried out 16 years later, shows that few animals remain in the Cuyabeno River, numbers in the Lagartococha river seem to be critically low and manatees have disappeared from the Iripari Lagoon about five years before our survey started.

### Conclusions

To date, there is no improvement in control and enforcement of the laws in Ecuador, besides other threats such as habitat degradation, oil spills and contamination of rivers in even remote areas like the Cuyabeno and Lagartococha river (see [12]) are not considered here. And since 1999, no further studies on manatees have been carried out in the Cuyabeno Reserve or any other area of the Ecuadorian Amazon. However, Amazonian manatees have maintained a high genetic variability, which might indicate recovery of the population after severe hunting until 30 to 40 years ago [15]. More research on population size and conservation education programs are urgently needed and in order to avoid extinction of Amazonian Manatees, breeding programmes following the example of the INPA aquatic mammal centre in Manaus, should be implemented in other countries.

### Acknowledgements

During the four years project, Park rangers of the Cuyabeno Reserve helped in the field and with the logistics. I am especially grateful to Gonzalo Meza, Eugenio Ortiz, Daniel Payauaje, Luis Borbor and my field assistants Rafael Aguinda, Susanne Thaler, Becky Miller, Kumi Rattenbury, and many others. My thanks also go to the tour-guides, Sionas, Cofanes and Quichuas who provided information and to Luis Albuja and Kelly Swing, who gave important comments. This project was financed by Yaqu Pacha eV., Germany and with a grant of the German Academic Exchange Program (DAAD).

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