

## The Rufford Small Grants Foundation

### Final Report

Congratulations on the completion of your project that was supported by The Rufford Small Grants Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to [jane@rufford.org](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

Grant Recipient Details	
<b>Your name</b>	Lenin Riquelme
<b>Project title</b>	Abundance, distribution and conservation of the Antillean manatee ( <i>Trichechus manatus manatus</i> ) in Panama's Caribbean coast (Phase II)
<b>RSG reference</b>	31.05.08
<b>Reporting period</b>	September 2008 – May 2010
<b>Amount of grant</b>	£5240
<b>Your email address</b>	<a href="mailto:fundacionconavi@yahoo.com">fundacionconavi@yahoo.com</a>
<b>Date of this report</b>	May 7 <sup>th</sup> , 2010

**1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.**

Objective	Partially achieved	Fully achieved	Comments
<p>1. To know the number, status, distribution and habitat use of Antillean manatees in unprotected areas and the Panama Canal to complement data collected in protected San San Pondsak and recently designated Escudo de Veraguas.</p>		X	<p>Activities included aerial survey overflights, interview surveys and on-site assessments. Research focused on three sectors:</p> <p><u>Chiriqui Grande Lagoon</u>: Rio Mananti river system yielded six manatee counts, all of which were adults. No sightings were made in Guariviara, neither at the marine habitat, seagrass-dominated Chiriqui Grande Lagoon despite greater clarity than the riverine systems.</p> <p><u>Ngobe Bugle Indigenous Territory</u>: the rio Cañas survey (including Jugli and Damani lagoons yielded a total of 13 counts, including five in Jugli and four in Damani.</p> <p><u>Panama Canal Watershed</u>: One manatee was seen feeding in western Gatun Lake near Gatun Lock. No other sightings were made. However, interviewees reported infrequent sightings in various parts of Gatun Lake, Rio Chagres and the Panama Canal route. No reports of manatees along the Pacific Coast were obtained<sup>1</sup>.</p> <p>East of the San San Pondsak area (which we surveyed during Phase I of this project), the research team found no traces of manatee presence in the Sixaola and Dayra rivers. The mouth of the Sixaola marks the southern tip of Gandoca-Manzanillo Wildlife Refuge that protects the lowlands of the southern Caribbean coastal region of Costa Rica. Manatee sightings in the area are scattered and include one in 1982 and three in 1990 at the coastal Gandoca Lagoon (Vasquez R. 1993 <i>in litt.</i>); an aerial survey in July 1991 yielded two sightings just north of the mouth of the Rio Sixaola (Reynolds <i>et al.</i>, 1995). It seems this manatee population living in Costa Rica's Gandoca Manzanillo area probably comprises a maximum of six and a minimum of three individuals</p>

<sup>1</sup> In 1964, a US Army veterinarian hatched a scheme to release manatees into Gatun Lake, part of the Panama Canal. *Hydrilla*, a rooted, shallow water plant from China, had completely blocked small boats from many of the lake's shallow bays popular with local sport fisherman who, ironically, fished for "rainbow bass" (*Cichla ocellaris*), another exotic introduction. The Panama Canal Company built pens near the mouth of the Chagres River, a major water source for Gatun Lake. Eventually, nine Antillean adult manatees were captured in Bocas del Toro in western Panama and the Air Force flew them to the canal. Along with one Amazonian manatee (*T. inunguis*) from Peru, they were relocated to the Lake Gatun in the Panama Canal Watershed by the former Panama Canal Commission. It turned out that the manatees were reluctant to eat *Hydrilla* because the stem has small calcareous spines. However, they ate all the other aquatic plants offered to them. A few escaped and eventually, when the promoters lost interest, all were released.

		<p>connected to manatee populations living in contiguous habitats in the San San Wildlife Sanctuary within Panama (Jimenez 1998; MINAE/PNUMA 2001).</p> <p>In unprotected areas of Bocas del Toro, interviewees reported infrequent sightings at the Sixaola, Vegay, Cricamola, Guariviara rivers and even less infrequent at Aguacate, Calovebora, Cahuita, Chiriqui, Chucara, Diablo, Palo Blanco, Pedregoso, San Pedro, Santa Catalina and Toncri rivers. Other than the Vegay, Toncri and Calobevora, these rivers share various combinations of being shallow, swift, rocky, poorly vegetated, or silted in at their mouths, failing to provide adequate manatee habitat.</p> <p>West of Bocas del Toro Province, no manatee was observed along the Caribbean Coast of Veraguas and Colon provinces and Kuna Yala indigenous territory; this included the Bejuco, Belen, Caimito, Candelaria, Carti, Chagres, Chiquero, Cocle del Norte, Concepción, Cuango, Culebra, Diego, Gobeá, Grande, Gua, Guazaro, Indio, Lagarto, Majagual, Medio, Miguel de la Borda, Palmilla, Petaquilla, Platanal, Portobelo, Rey, Sidra, Salud and Veraguas rivers. Most of these rivers are not suitable as manatee habitat. Rio Veraguas, along with the Caimito and Coclé del Norte, appeared more suitable for manatees; each opens to the sea, has slow water, and supports abundant vegetation.</p> <p>We conclude that Panama's resident manatee populations found in this project account for 20 individuals, these populations exist in Bocas del Toro province and Gatun Lake and associated waters. None were seen in aerial or field surveys elsewhere, but interviews suggest that sightings elsewhere represent wanderers or extremely small remnant groups. It is also worth to mention that Giselle Muschett conducted project "<i>The Manatees of the Panama Canal Watershed: A Study of Sentinel Species Abundance, Habitat Use and Genetics</i>", equally supported by Rufford Small Grants, at a relatively equal time period of our research. Her findings indicating 59 manatee sightings and the recording of 17 manatee deaths in the Panama Canal Watershed between 1995 – 2007 strongly indicates that its manatee population has significantly increased from an original pool of 10 introduced individuals in 1964.</p>
--	--	---

<p>2. To track individual manatees, recapture tagged individuals to conduct health assessments, collect genetic material and monitor reproductive condition and, at the same time, monitor environmental factors in their habitat.</p>	<p>X</p>		<p>We managed to send a team member to Belize to receive the necessary training from the Belizean Manatee Project, mainly including training from USA Fish and Wildlife Service-<i>Sirenia</i> Project on the capture, radio tagging of manatees and open water tag changes on wild manatees. We purchased all necessary equipment to conduct this task, including implant transmitters and their encasing, one scientific receiver and one three-element folding Yagi antenna. However, the National Environmental Authority (ANAM) and the National Authority on Water Resources (ARAP) indicated their reservation about authorising the capture and tagging of manatees. We expect to receive this authorisation once the authorities adopt internationally recognised animal handling protocols.</p>
<p>3. To determine the environmental factors that affect the health of individual manatees and how this impacts behaviour and reproduction and foster the long-term preservation of these factors. Ecological data are necessary for Panama's National Environmental Authority to know which regulations should be enforced in order to guarantee the conservation of manatee habitat, particularly the potential for designation new protected areas.</p>		<p>X</p>	<p>The main ecological factor affecting manatee populations in Panama is habitat availability and the environmental conditions found in those habitats. First, manatees in Panama appear to prefer fresh or estuarine waters over marine habitat. True grasses (<i>Poaceae</i>) growing along banks seem to be important dietary items. Observations of manatees feeding on bank grasses were reported by many interviewees. Some informants also reported manatees feeding on overhanging mangrove leaves and floating vegetation.</p> <p>Interviewees reported that occasionally manatees in Panama may be seen with barnacle growths, however, which indicates some individuals also spend considerable time away from fresh water. However, these individuals may face predation at sea; fishermen reported schools of sharks attacking manatees in marine areas but did not enter the rivers.</p> <p>Secondly, the systems where we observed manatees are black, tannin-stained and murky rivers and lakes where visibility was good because of lower turbidity. The lack of sightings in some of the other rivers probably owes to reduced visibility due to high turbidity rather than an absence of manatees.</p> <p>Illegal hunting hardly occurs in Panama; perhaps numbers killed illegally are probably much reduced in comparison with times prior to official protection and creation of protected areas and the enforcement of environmental regulations. We did not observe net fishing and there were no reports of incidental entrapment in gill nets. Determining</p>

		<p>mortality due to hunting is difficult to assess as suitable habitat outside protected areas remains remote and difficult to access.</p> <p>The main problem manatees face in Panama centres around habitat degradation. Large areas of banana plantations continue pumping drainage water containing agricultural chemical residues directly into the San San river; continued accumulation of contaminants could render the river unsuitable. More recently, a dam construction project currently taking place in the Changuinola-Teribe river system will produce major habitat changes in Bocas del Toro and a recently opened gold mine in Petaquilla (Colon) will likely impact river sources that empty into the Caribbean, including rivers where suitable manatee habitat exists. These two projects include road construction that will open relatively isolated areas to human settlement, affecting habitat quality and possibly increase poaching.</p> <p>Small populations of manatee and suitable habitat areas should be protected by designating reserve status to some of the unsettled rivers, particularly the lower Sixaola, Mananti and Cañas (including Jugli and Damani lagoons) in Bocas del Toro, as well as Rio Veraguas, Caimito and Coclé del Norte, in Veraguas and Colon provinces as they appeared more suitable for manatees and may be subject to further surveys or re-introduction of manatees.</p>
--	--	---

**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).**

Perhaps our main difficulty arose from not being able to secure a permit from ANAM and ARAP to capture and handle manatees to track and monitor them. However, it is expected that these institutions will be more open to considering our request as more information about manatees in Panama becomes available, internationally recognized animal handling protocols are adopted locally and local conservation initiatives bring in ANAM and ARAP personnel to conduct joint activities including animal tracking methodology.

**3. Briefly describe the three most important outcomes of your project.**

- a. Identification of small manatee populations in unprotected habitats, namely the Mananti and Cañas (including Jugli and Damani lagoons) rivers.
- b. Identification of potential small populations at Sixaola, Vegay, Cricamola, Guariviara rivers and potential habitat use at Aguacate, Calovebora, Cahuita, Chiriqui, Chucara, Diablo, Palo Blanco, Pedregoso, San Pedro, Santa Catalina and Toncri rivers.
- c. Identification of actual and potential habitat that should be granted protected status particularly the lower Sixaola, Mananti and Cañas (including Jugli and Damani lagoons) in

Bocas del Toro, as well as Rio Veraguas, Caimito and Coclé del Norte, in Veraguas and Colon provinces.

**4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).**

Much information as to where manatees could be found or have been sighted came from local dwellers, particularly those living on the edges of rivers and fishermen working on marine areas close to those rivers. The research team conducted environmental education town meetings in communities and hamlets and distributed a manatee conservation booklet for schoolchildren and posted posters in public places and offices in the manatee habitat areas. Future conservation activities will strongly require local participation in conservation efforts.

**5. Are there any plans to continue this work?**

We plan to continue our work on manatees as we have been doing research and environmental education activities since 2004. We will continue seeking permission to capture and place transmitters on manatees as means of determining the environmental factors that affect the health of individual manatees and how this impacts behaviour and reproduction. In addition, we feel that the results of this research as well as that of other Panamanian researchers have provided the basic information necessary to start an effective manatee management plan. To this end, we participated in the drafting of the Regional Plan for Manatee Conservation and Management in Central America and the Manatee Conservation Plan for San San Pondsak Wildlife Sanctuary.

**6. How do you plan to share the results of your work with others?**

All written and electronic materials will be sent to the Society for Marine Mammalogy and to the ANAM Library where they will be available to researchers, practitioners, NGOs, eco-tour operators and for general public use. In the project area, local organization AAMVECONA and other community-based organisations will be given copies of these materials as well. Electronic data will be entered into ANAM's national database known as National System of Environmental Information (SINIA) to make available to potentially interested public and private research and environmental policy institutions, both national and international. As it has been done before, the research team will continue making presentations on project results before relevant decision makers, research and conservationist institutions and organizations and the community at large; an upcoming presentation will take place at the XIV Congress of the Mesoamerican Society for Biology and Conservation.

**7. Timescale: Over what period was the RSG used? How does this compare to the anticipated or actual length of the project?**

The RSG Grant was used over a period of 16 months, from September 2008 – January 2010, instead of the 12 months originally projected. Two factors influenced a lengthier research period: a) overflights and deployment in the field were strongly hampered by heavier than normal rainfall in the Caribbean slope, making take off of airplanes rather dangerous while access to coastal and riverine areas became more difficult than usual to reach; b) We have not managed to obtain permission from ANAM to capture and place transmitters on manatees.

**8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.**

Exchange rate: 1 £ sterling= USD 1.48

Item	Budgeted Amount	Actual Amount	Difference	Comments
Local Guides	306	612	(+) 306	
Panama City – Changuinola roundtrip flight	130	260	(+) 130	
Field overflights	180	360	(+) 180	
Land-boat transportation (fuel)	698	1470	(+) 772	
Lodging in communities and hamlets	240	240	-	
Food for field trips	160	320	(+) 160	
Food for group meetings	150	300	(+) 150	
Tag transmitters	1800	4000	(+) 2200	
Garmin GPS unit	200	200	-	
Photocopies	26	26	-	
Rent of facilities	300	600	(+) 300	
Copies of EE booklets	500	1000	(+) 500	
Brochures/Posters on Manatee Conservation	250	750	(+) 500	
Medical Insurance for Research Staff	300	900	(+) 600	
<b>Total</b>	5240	11038	5798	A 2-year grant from Nagao Foundation for Nature Conservation (NEF) in the amount of £8,485 provided the necessary matching funds to completely cover these expenses.

*A 2-year grant of £8,485 was approved by Nagao Natural Environment Foundation (NEF), covering the following period: September 2007 – August 2008: £4,492 and September 2008 – August 2009: £3,993. In addition to expenses being covered with funds from both RSG and NEF, the NEF grant also funded additional expenses, such as hiring of one field assistant, lodging expenses in Changuinola City, purchase of maps, GIS Services, purchase of equipment (tag batteries, boots, machetes, raincoats, backpacks and field tents). To keep track of tagged manatees, we requested and obtained an in-kind donation of tracking equipment from Idea Wild Inc., worth £995: 1 Scientific Receiver R 410, 1 Three-element Folding Yagi Antena 162-166, 2 Implant Transmitters F 1860B, 2 Coaxial Cables RG58.*

**9. Looking ahead, what do you feel are the important next steps?**

We need to focus much of our efforts now in conservation by conducting a manatee conservation and management plan in Panama; a Regional Plan for Manatee Conservation and Management in Central America has been drafted as well as the Manatee Conservation Plan for San San Pondsak Wildlife Sanctuary - both require significant funding for their implementation.



**10. Did you use the RSGF logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?**

The RSG logo was used in every presentation of project results and has been printed in every information produced including articles and environmental education material.

**11. Any other comments?**

We thank The Rufford Small Grants Foundation for its generous and continued support on behalf of Panama's manatee population and habitats.