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### Final Project Evaluation Report

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We ask all grant recipients to complete a project evaluation that helps us to gauge the success of your project. This must be sent in **MS Word and not PDF 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 – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Complete the form in English and be as concise as you can. Note that the information may be edited before posting on our website.

Please email this report to [jane@rufford.org](mailto:jane@rufford.org).

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Your Details	
Full Name	Mario Espinoza
Project Title	Looking for lost fish: status of the largetooth sawfish (Pristis pristis) in Costa Rica and the Central American region
Application ID	22484-2
Grant Amount	£5000
Email Address	mario.espinoza_m@ucr.ac.cr
Date of this Report	13/05/18

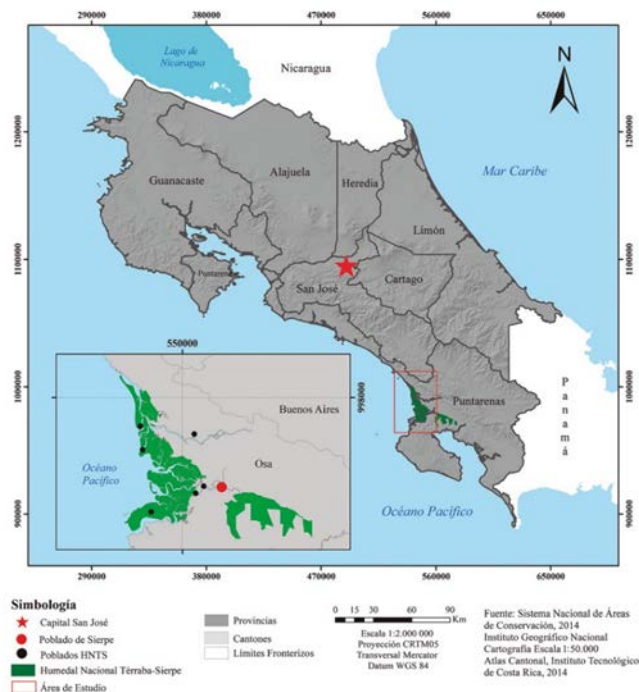
**1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.**

*Evaluate the status of Sawfish populations in Costa Rica*

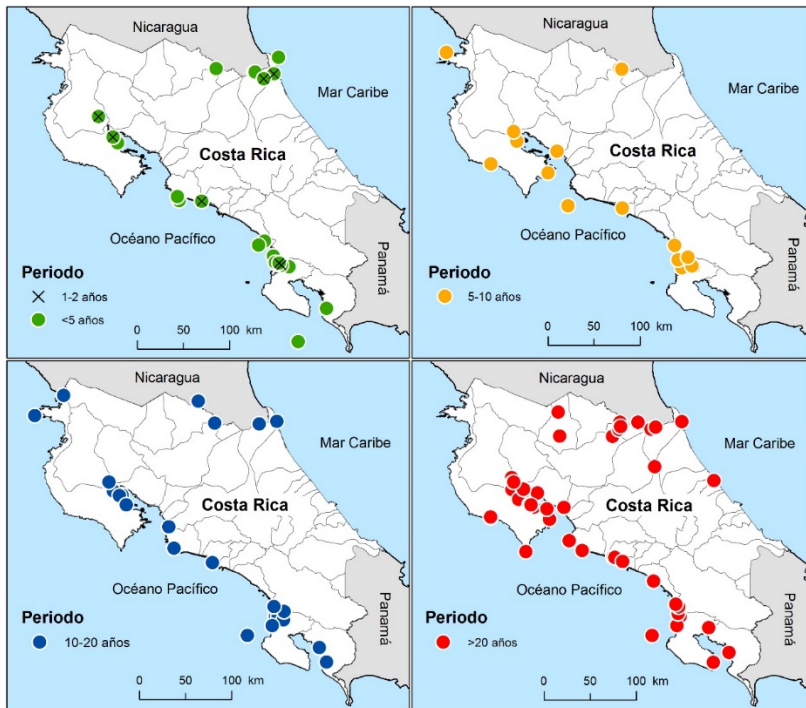
The project continues to generate the information necessary to evaluate the current conservation status of sawfish populations in Costa Rica. With over 280 interviews we have covered almost the entire country. Recently, we visited remote parts of the northern region, (along the border with Nicaragua), a historically important area due to the sawfish historical abundance; we also carried out interviews in the north Pacific, also a region with historical records. Recent interviews have served to update the historical and current distribution maps, refining the resolution of the distribution maps generated through our previous interviews. Still, there are a couple of sites in which we need to fill some gaps such as Barra del Colorado (north Caribbean) and Golfito (Golfo Dulce, south Pacific).

As phase I (interviews) is being completed, we started the phase II of the project (field sampling using several fishing methods) to survey one of the main "hotspots" for the species, the Térraba-Sierpe National Wetlands (TSNW) located in the south Pacific Region (Fig. 1). So far, we have conducted eight fishing expeditions mainly with the use of longlines and gillnets. By combining the data from interviews and field surveys, we will improve our knowledge about the status of sawfish in the entire country. However, our data do show a clear reduction in the distribution and number of sightings reported for the species. Most of the interviewers agreed that

sawfish were relatively common >20 years ago, but now their distribution is restricted to 3-4 main sites along the Pacific coast and northern region (Fig. 2).



**Figure 1.** Location of the Térraba-Sierpe National Wetlands



**Figure 2.** Map of the historical and recent distribution of sawfish in Costa Rica estimated from local interviews.

### *Identify potential threats affecting the survival and conservation of sawfish in Costa Rica*

Even though we have conducted new interviews in different regions in Costa Rica, sawfish main threats continue to be fishing, habitat destruction, and possibly climate change, which is already affecting river discharges and increasing water temperatures. Fishing nets such as gill and seines have affected sawfish populations mainly in coastal habitats, however, harpoon fishing is still occurring in the main rivers of the northern region and it poses a lethal threat to any sawfish present in the area, therefore it needs to be stopped.

### *Educate and raise awareness to Costa Ricans about the importance of protecting Sawfish, mainly through talks, workshops, and the use of social media*

Our project has raised awareness about the status of sawfish in Costa Rica through talks/seminars, workshops, news articles, TV and radio interviews, and social media. We have also participated in a number of outreach activities with kids and adults in San José and Puntarenas. Our aim with this awareness campaign was to educate the public about what sawfish are, why sawfish populations have declined and what the current threats affecting their survival are. However, educating and raising awareness is a non-stop process. Between 2017 and 2018, we prepared a series of workshops targeting young children (ages 8-12) in a school of Sierpe (south Pacific region), where sawfish sightings have been more common over the past few years.



These workshops were fundamental to launch an environmental sawfish educational programme that will be replicated on other areas of Costa Rica during 2018-2019. In these workshops we shared basic knowledge facts about sawfish biology and ecology, also the important role that local communities have to define the future of sawfish in Costa Rica. For example, at the end of the workshops these children received a certificate making them “Sawfish Guardians”, and are now instrumental in their protection and conservation (Fig. 3).



**Figure 3.** Some of the “Sawfish Guardians” graduated from our education program. Bottom left: Jorge Salmerón, one of our passionate sawfish educators.

In March 2018, we had a workshop with tourist guides and local fishers from Sierpe, in which we talked about the benefits of protecting sawfish species and the importance of collaboration between researchers and society, as they are always on the water and might have higher chances of having an encounter. We also discussed the steps to safely release a sawfish, and the importance of reporting any captures or sightings, as this will aid our understanding of sawfish population and current distribution.

*Promote a National Sawfish Conservation Strategy that could eventually expand to other countries in Central America*

With collaboration of a member of the Costa Rican Legislative Assembly, we presented our Phase 1 results to the government and we have achieved legal protection to sawfish species present in Costa Rican waters (Fig. 4). The publication of the decree was the result of a national strategy, in which we included several authorities, such as the Ministry of Environment (MINAE-SINAC), and the Costa Rican fisheries department (INCOPESCA); the worldwide sawfish conservation status as a critically endangered species and our results, urged them to take action. The official decree was published and made effect on September 2017.



**Figure 4.** Presentation of our results from Phase I in the Costa Rican Legislative Assembly, which was key for the decree on legal protection for sawfish species in our country. Mario Espinoza on the left.

Achieving legal protection in Costa Rican waters will aid in international negotiations with Nicaragua. It was claimed since the 1980s that inshore commercial netters from Barra del Colorado in Costa Rica were having an important effect on sawfish and bull shark that migrated to Lake Nicaragua and Nicaraguan authorities could not do anything about it without the support of Costa Rican government. Finally, with government support on this issue, a solution to the problem and international cooperation to save sawfish might be around the corner.



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

At the moment, we have not encountered any major issues affecting our work. With the funds from RF and some of the resources from the Centre of Marine Research at the University of Costa Rica (UCR) we have stretch a lot of the initial funds. We have even integrated masters and undergraduate students that are working non-stop in the project. Our main challenge now is to continue this important conservation effort in the near future (2-5 years), as well as in the long-term. Conservation campaigns to save a species and their critical habitats are always difficult in that they have to become viable over time. We have identified key people from Costa Rica (northern region and south Pacific) that could eventually lead our efforts at a local scale, promoting the protection of sawfish within their reach. We are slowly training these people so that they can feel part of the project, and hopefully, they could become leaders to others. With the support from UCR, we now have a lot of attention from the public and conservation groups in Costa Rica. For example, over the past year, UCR has giving us the opportunities to spread our work through different outlets (newspapers, TV and radio programmes, etc.). We even started working on a children's book named "Looking for sawfish in Costa Rica, a true story", that we hope will be published soon (Fig. 5). Funds from UCR have also cover some of the costs of organising talks and workshops to kids, fishers, coastal communities. However, getting funds to continue the educational programs, particularly in remote areas, is becoming difficult. In addition, increasing the frequency and spatial coverage of our field expeditions is critical to validate the results from our interviews (Fig. 6). Only then we could adequately define critical areas for sawfish conservation and estimate the true population size. Unfortunately, organizing these important field expeditions is also difficult and expensive, and require the support from the RFSG or other funding agencies.



**Figure 5.** Book chapter from the book "Looking for sawfish, a tale based on a real story"



**Figure 6.** Field expedition on Terraba-Sierpe National Wetlands. Esteban Jimenez (left) and Jorge Valerio (right) during fishing survey.

Since phase II of this project is a crucial one (using fishing independent surveys to assess the status and population size of sawfish in Costa Rica at sites previously identified as “hotspots” from local interviews), we are now trying to secure additional funds that could cover the cost of field expenses (fishing gear, boat rental, etc.) and more community-based outreach activities at remote locations, particularly those that require boat transportation fees.

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

(1) Distribution maps: With the support of RF we have conducted over 250 interviews to fishers and local coastal/riverine communities, which has resulted in a large dataset that includes historical and recent sawfish encounters throughout the country. Information from the data set was used to generate maps about the historical and current distribution of the species; this information has also served to make abundance estimates. The historical distribution of sawfish was much broader

than what we expected, being a very common species in many riverine and coastal ecosystems in both the Pacific and Caribbean coasts, as well as the northernmost rivers of the country (near the San Juan River). Its current distribution appears to be more restricted to only a few sites, and in considerably lower numbers (Fig. 1). However, more analyses are still required to estimate better population trends. Recent sightings (<2 years) were concentrated at two main sites: (i) the north of Costa Rica, near the Nicaraguan border; and (ii) the “Humedal Nacional Térraba-Sierpe”, one of the most important wetland of Central America, located in the south Pacific. Distribution maps serve to estimate the reduction of the species extent of occurrence in the country and prioritise conservation efforts in these areas, which include education, collaboration with society, and law enforcement. Information on the distribution of this species is necessary to continue with the phase II of the project that will focus on validating interview data with abundance estimates conducted during field expeditions. Interviews have also help evaluating people’s perception of this important species and identifying the main threats that affect the health of sawfish populations, which is crucial for designing more effective conservation approaches.

(2) Sawfish legal protection: Through the presentation of our phase I results in the Costa Rican Legislative Assembly, we draw attention to the species global decline and critically endangered status, and in particular its current situation in the country, where its abundance and distribution have reduced significantly in the entire territory. Our presentation and results were very effective and in a matter of 2 months, a legal protection decree was achieved, published and made to effect immediately. This decree protects sawfish species present in Costa Rican waters, as it establishes a permanent “no-take” status that prohibits the capture and killing of specimens, and any capture should be reported to the fisheries authorities; besides, it establishes sanctions to whom it breaches the regulations. The publication of the decree was the result of a national strategy, in which we included politicians of the Costa Rican Legislative Assembly engaged with conservation and various national authorities, such as the Ministry of Environment (MINAEC), National Conservation Areas System (SINAC), and the fisheries department (INCOPESCA).

With our achievement, Costa Rica has proudly become the 17<sup>th</sup> range state in which sawfishes have some level of legal protection. This achievement will aid in international negotiations with Nicaragua, since it was claimed that in the 1980s the inshore commercial netters from Barra del Colorado in Costa Rica were having an important effect on sawfish and bull shark that migrated to Lake Nicaragua and Nicaraguan authorities could not do anything about it without the support of Costa Rican government. Finally, with government support on this issue, a solution to the problem and international cooperation to save sawfish in the Central American region might be around the corner.



(3) Sawfish awareness: Our project has helped raise awareness about the status of sawfish in Costa Rica through talks, workshops, news articles, TV/ radio interviews, and social media. We wanted to educate the public about what sawfish were, why sawfish are an important species in marine/estuarine/riverine ecosystems, why sawfish populations are declining, and current threats affecting their survival. In this area, I can safely say that we have succeed. Consequently, this project has help promoting our National Sawfish Conservation Strategy, a key feature through which legal protection was accomplished.

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

One of the main goals of the project was to educate the public and raise awareness about the current status of sawfish in Costa Rica. For that, we have been conducting interviews to fishers and local communities throughout the country. Interviews have helped us assess people's perception of sawfish conservation and the threats that affect the health of their populations. In every interview, we spread the word of its conservation status and the importance to secure the future of its populations. We also started to conduct a series of talks and town meetings in coastal and riverine regions where sawfish have been recently sighted. During this year, we are planning more activities with schools (children ages 8-12) aiming to create more awareness around sawfish in young people.

During the project, we have identified key people to help us lead this important conservation effort at local scales. Esteban Jimenez is a fisher from the Humedal Nacional Terraba Sierpe that has become our captain in every fishing expedition in search for sawfish we have made so far; meanwhile Rubén González is a local tourist guide from the Northern region, he has become critical in our interview process in the area. Both of their knowledge has been extremely helpful to identify potential locations where sawfish may still hold viable populations, most importantly, they have shown impressive degree of commitment to our cause. Esteban is getting known as one of our crew members, which has attracted attention from local fishers who trust him and maintain close contact with him, thanks to this, we have gained access to some reports that otherwise would be impossible for us to discover, likewise Rubén has lead us to the locals that could give quality information on recent captures. Esteban has shown signs that he could take the lead on the Humedal Nacional Terraba-Sierpe, and possibly with some guidance and further help from others could also benefit from education and tourism-related activities promoting sawfish conservation.

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

Yes, our initiative has almost completed phase I, and while phase II is almost midway, phase III e-DNA (environmental DNA) surveys are on the planning stages. Even though the funding has been limited, we have achieved real progress in determining the sawfish conservation status in Costa Rica, but there is still so much more to do. The next phase of the project is the e-DNA surveys, a novel technique that can help verify the presence of sawfish species based on traces of DNA from water samples. Interviews and ecological sampling methods will be complemented with eDNA surveys. The use of eDNA has proven to be an effective method to survey invasive and threatened species that either occur in relatively low numbers or are difficult to detect. Water samples will be taken from sites previously identified as potential habitats for largetooth sawfish in Costa Rica.

Now that the foundations of this long-term conservation project have been built, we need to keep the push to achieve even greater things. Sawfish are now present of many Costa Ricans, even our national environmental agencies, which passed from not knowing about their existence to protecting it via legal decree. Now, we are putting more effort in the field expedition component as well as the educational and regional awareness phase, but also, we are keen to starting the e-DNA surveys. This means that our effort will not be restricted to Costa Rica, but also other countries like Nicaragua and Panama. The long-term viability of this project will depend on the support from organizations like Rufford Foundation, which was instrumental to us.

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

Our results will become available via several outlets:

- 1) Scientific publications (Endangered Species Journal).
- 2) Scientific and town-hall meetings.
- 3) Talks and seminars.
- 4) Meetings with the Costa Rican Natural Environmental Agency (MINAE-SINAC).
- 5) Meetings with the Costa Rican National Fishing Institute (INCOPESCA).
- 6) Meetings with local NGOs.
- 7) Radio and TV interviews.
- 8) Newspaper articles.
- 9) Social media (Facebook and Twitter).

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

The RSG was used over 1 year (a very productive and busy year), which was the actual length of the project.

**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.**

Item	Budgeted Amount	Actual Amount	Difference	Comments
Travel expenses to conduct local interviews and promote sawfish awareness	£5000	£5000	0	All of the funds from Rufford were used to conduct local interviews and promote sawfish awareness. Although most of the funds were used to cover travel expenses (meals and accommodations), we also use funds for printing material (stickers, posters, brochures, interview forms, information sheets, etc.).
<b>TOTAL</b>	£5000	£5000	0	

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

Our focus now is to continue with the field expeditions to some of the previously identified hotspots and start with eDNA, also to keep pushing the education programme phase, as education and awareness are key in conservation projects. Although we have already started some work in these two areas, we only had limited funds. As e-DNA is a very promising technique and has proven effective in determining the presence of sawfish species in tropical environments, we are aiming to expand our search to other previously identified hotspots besides the Terraba-Sierpe wetland. Very remote localities are promising to still hold largetooth sawfish, such as the Corcovado National Park, a protected area known for its abundant endangered fauna due to its high level of protection, however other remote areas like the Pejeverro coastal lagoons in the South Pacific and other coastal lagoons in the North Caribbean region are in our sight. The use of e-DNA will allow for a more complete evaluation on the current distribution of sawfish across the country.



The social media outreach has proven to be a valuable tool, but we also should invest resources to reach more remote and isolated communities.

**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?**

Yes, we used the RF logo in our interview forms, brochures, posters and PowerPoint presentations that we used at some meetings, and TV interviews (see materials produced by the project).



Brochure cover, bookmarker and poster of our project. These and other materials include the Rufford Foundation logo. Brochures are given in every event and are given to every interviewee; posters for project promotion are located in remote riverine and coastal communities.

**11. Any other comments?**

These are some of the main outcomes of the project:

**Interviews:** We have done over 250 interviews to fishers and local communities in coastal and riverine sites of Costa Rica (Table 1).

**Table 1.** Interviews by province and location.

Alajuela	Guanacaste	Heredia	Limón	Puntarenas
Boca San Carlos	Cuajiniquill	Puerto Viejo de Sarapiquí	Barra del Colorado	Ajuntaderas
Boca Tapada	Sámara		Laguna Madre de Dios	Boca Coronado
Caño Negro	San Pablo de Nandayure			Costa de Pájaros
Palenque Margarita				Isla Chira (Montero y Palito)
San Rafael de Guatuso				Ojochal
				Playa Palo Seco
				Puerto Cortés
				Puerto Jiménez
				Puerto Nispero
				Puerto Pochote
				Puntarenas Centro
				Sierpe
				Tárcoles

**Meetings:** We have done meetings at schools and high schools from local communities.

**Outreach material:** We have put together brochures, stickers, book page holders, posters, and other related outreach material for the project. The idea was to create awareness and educate the public about sawfish.

**Here are links to the project:**

**TV interviews:**

[https://www.youtube.com/watch?v=9Ut1pkmCLWA&feature=player\\_embedded](https://www.youtube.com/watch?v=9Ut1pkmCLWA&feature=player_embedded)

<https://vimeo.com/209496428>

**Radio interviews:**

[https://soundcloud.com/mario-espinoza-mendiola/entrevista-pezu-sierra-en-costa-rica?utm\\_source=soundcloud&utm\\_campaign=share&utm\\_medium=facebook](https://soundcloud.com/mario-espinoza-mendiola/entrevista-pezu-sierra-en-costa-rica?utm_source=soundcloud&utm_campaign=share&utm_medium=facebook)

**Project dedicated episode of an outdoors tv show**

<https://www.youtube.com/watch?v=H6hPhZy8KDI&feature=share>

**News and other links:**

<http://www.elpais.cr/2017/07/04/proyecto-de-ley-busca-prohibir-la-caza-del-raro-pezu-sierra-en-costa-rica/>

<http://www.ucr.ac.cr/noticias/2017/07/06/el-pezu-sierra-necesita-proteccion-legal.html>

<https://www.crhoy.com/nacionales/diputado-y-ucr-proponen-prohibir-caza-de-pezu-sierra>

<http://www.teletica.com/Noticias/150294-Cientificos-de-la-UCR-buscan-al-pezu-sierra-en-Costa-Rica.note.aspx>

<https://spark.adobe.com/page/lefEXjPSD6kha/>  
<http://sawfishconservationsociety.blogspot.ie/2017/01/looking-for-sawfish-in-costa-rica.html>

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