

Sharing Experiences in Conservation: Proceedings of the Rufford Small Grants Conference in Belize 13-15th November 2017

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December 2017



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Keywords: Rufford Small Grants Foundation, Belize, conference, sharing experiences

Front page: Clockwise from top left, attendees, facilitator and RSG Grants Director on first day; view to the south of Monkey Bay Wildlife Sanctuary; group session on day one; black howler monkey (*Alouatta pigra*) seen during outing to Community Baboon Sanctuary. All images © Louise Gardner.

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Figure i. Rufous-tailed hummingbird at Monkey Bay Wildlife Sanctuary.

1. Background

The Rufford Foundation has played a crucial role in the field of nature conservation in developing countries worldwide. Its small grants have offered immense opportunities to early career conservationists to explore and contribute to wildlife research and nature conservation. The Rufford Foundation has supported more than 4,200 research and conservation projects in 157 countries, including more than 1100 across Central and Latin America.

Since 2012, The Rufford Foundation has been holding conferences in collaboration with local organisations around the world with the aim of bringing their grant recipients together and providing a forum for them to discuss ideas, problems and issues, and create invaluable networking opportunities.

The first Rufford Small Grants (RSG) conference in Belize was held on 13-15th November 2017 at Monkey Bay Wildlife Sanctuary near Belmopan in the Belize District, and was organised by Blue Ventures on behalf of the Rufford Foundation. It was attended by Rufford grantees working across Belize and Mexico, who presented their work as oral presentations and engaged in group discussions and feedback sessions. The conference was enriched by an additional presentation from Reynold Cal from the Runaway Creek Nature Reserve in Belize about his work on the jaguar (*Panthera onca*) and Baird's tapir (*Tapirus bairdii*).



Figure 1. The participants, facilitator and Rufford Grants Director on the first morning.

2. Objectives

The field of conservation draws a great number of strong, passionate, and talented people, all willing to give what they can for their chosen cause. Many conservation researchers and practitioners work in difficult

conditions and under immense pressure, both from within and without, raising challenges and risks that people in other professions may find hard to comprehend. These same conservationists often work in isolation, distanced from those whose experiences could inform, uplift and help forge new ideas. The main objective of this conference, therefore, was to bring together Rufford grant recipients from across Belize and Mexico to discuss challenges, learn from experiences and celebrate successes in conservation.

3. Outcomes

Louise Gardner from Blue Ventures facilitated the conference, opening the first day with a short welcome and introductory talk, laying out the objectives and schedule of the two and a half day event

Presentations by grant recipients

There were presentations by grant recipients, which mainly summarised the results of their projects, highlighting the conservation impact of their work, the successes and challenges they experienced, and the role Rufford had played in supporting their research. The majority of talks were from early career conservationists who were completing or who had just finished their first Rufford-funded project, though there were four talks from established conservationists who had received their grant more than five years ago, two of which had obtained RSG booster grants. Two participants received news that they had been awarded their second RSG grant shortly before or after the conference.

The studies covered a wide range of subjects, from population and distribution status of key species, environmental impacts of human activities and behavioural and ecological studies, to capacity building, education and outreach programmes. See presentation abstracts in the appendices.



Figure 2. Maripaula Valdés-Bérrez answering questions following her talk on day one.

Group session I

The first group session took place on day one, following the first round of presentations. It focussed on the opportunities that grant recipients identified and acted upon as a result of their RSG grants, and the successes and challenges they encountered during their project. Grantees divided into four groups, loosely based on research area (bats, coral and marine, forests, community and capacity building) and spent an hour discussing the three topics before presenting the results to the group.

Opportunities

In several cases, the RSG **funded early career conservationists** to carry out independent projects that may never have otherwise happened, whether due to lack of a track record in their field, lack of funding to buy essential equipment or difficulty raising funds for research in certain fields. For many, their RSG grant was their first successful funding application, enabling them to gain credibility and valuable experience, making them more attractive to other funders, and helping to kick-start their careers in conservation.

RSG funds have also allowed **research freedom** for several recipients, enabling them to develop their own ideas and projects rather than being bound to the research priorities of governments or university supervisors. This included enabling research into basic science and non-charismatic animals (e.g. bats and dung beetles, which nonetheless have a disproportionate impact on their environment).

Rufford has also provided support for students and assistants of grant recipients to obtain their qualifications, degrees, or achieve vital field experience, helping to **train the next generation of conservationists**.

The fact that the RSG grant is paid direct to the grant recipient (rather than a university) was seen to **facilitate fieldwork and reduce bureaucracy**.

In addition, all participants valued the opportunity to meet other Rufford grantees at the conference who are working across a broad range of fields from the region, providing a wider range of perspectives, experiences and ideas, and allowing new collaborations to be made.



Figure 3. Rafael Reyna-Hurtado and Juana Garcia Flores present feedback during group session I.

Successes

During the completion of their project, the grant recipients displayed a wide variety of successes stemming from their RSG-funded work, demonstrating their drive, creativity and resourcefulness. Some of the highlights are summarised below.

Communities: Several grantees had provided training for local communities in plant- or wildlife-friendly practices. For example, Juana Garcia Flores has strengthened the capacity of a community group in ecological restoration techniques and native tree nursery management. Kristen Lear developed community engagement guidelines for implementing conservation measures for an endangered bat. She shared these recommendations with Bat Conservation International at their annual board meeting and they are interested in implementing community bat conservation programmes.

Antonio Ruiz-Sakamoto managed to change the way fishermen move around in their boats, so that they now always have someone checking the water to avoid collision with marine life. Minerva Uribe has trained staff on wind farms in Mexico to help reduce bat mortality due to collisions with wind turbines, and to monitor bat mortality. She has also involved the local authorities in mitigation measures. Alfonsina Arriaga-Jiminez

has worked closely with local communities to gain their trust in order to complete her studies on dung beetles in traditionally sensitive locales.

Identifying environmental threats: Cherie Chenot-Rose's work on American crocodiles identified high levels of heavy metal pollution in the island's waterways, a previously unknown and potentially severe risk to the health of this species on Ambergris Caye.

Networking and recognition: Several grantees had presented their research findings at various conferences, gaining opportunities to spread knowledge and make valuable contacts in their field. For example, Justin Baumann and Adam Suchley attended the International Congress for Conservation Biology in 2017, and Kristen Lear attended the North American Symposium on Bat Research in 2017.

Pioneering research: Abigail Martinez Serena has established the first study using acoustic monitoring with bats in Mexico. Maripaula Valdés-Bérrez has obtained the first data on the benefits of dispersal by tent-roosting bats (post-dispersal) in one of the few carried out under natural conditions. Stephanie Rousso has launched the Sea Turtle Spotter program and app to collect data from private boats sailing the waters of Pacific Mexico to help scientists better understand changes in populations, movements, foraging locations and habitat conditions.

Starting with his RSG funding, Rafael Reyna-Hurtado developed a long-term monitoring programme of wildlife associated with ponds, and which is still going eight years later. Antonio Ruiz-Sakamoto has succeeded in recording the first 48-hour track of a *Manta birostris*. Justin Baumann developed new science-based, data-driven and non-invasive approaches to habitat description which can be scaled up and used elsewhere.

Publications: Several participants had published their findings in peer-reviewed journals, and the majority had written popular media articles (both online and in print) raising awareness of the issues and their work. For some, their research is still on-going or has only recently been completed, so the publications are still in progress.

Training: Many grantees had engaged in training students or carrying out awareness raising activities amongst students. For example, Dánae Cabrera-Toledo trained a group of farmers in the propagation of endangered cycads; Rafael Reyna-Hurtado used his RSG funds to help his student achieve his masters degree and publish a paper; Stephanie Rousso created an NGO, through which she trained around 20 university students in Mexico, and provided basic training in citizen science data collection for over 100 people; and Abigail Martinez Serena has given talks to students about the issues threatening bats.

Challenges and recommendations

The participants had all experienced difficulties during the planning and execution of their project, and they shared thoughts on how they had dealt with these situations.

Communities: Challenges encountered when working with communities was a recurring theme throughout the session. Recommendations for how to improve the sustainability and success of an intervention when working with local communities are discussed in more detail in Group Session II.

Women researchers and 'outsiders': Take care when approaching communities for the first time. Take advice from colleagues or other researchers familiar with working with people in your target region, learn the local dialect if possible, and try to find an ally in the community who can help you to build further relationships.

Applications: Follow-up funding applications are often due when you are still analysing or writing up your first year of data. Be aware of these deadlines, and try to factor in time to your schedule to complete these in good time. Be clear with funders of the status of your current project.

Permissions: Before you embark on a project, ensure that you obtain official permits or local permission to work in your target area or with your target species to avoid embarrassing and expensive delays or conflicts.

Equipment: Underwater equipment is expensive and can be easily lost during storms or accidents. Gather information from experienced researchers in your field before investing in expensive equipment, and build in extra funding to your budget in case of unavoidable losses.

Flexibility: Try to build in flexibility and contingency plans into your methods so that you can adapt to unexpected situations in the field. Always have a plan B.

Security: If you are working in a region at risk from kidnapping or attack by bandits, ensure you have a contingency plan in case the worst happens.

Group Session II

Working with Communities

The following recommendations were given for working with local communities:

Approach

- Approach communities with respect. Ask community leaders for permission to work in their area. Consult them about their needs and concerns. Put down your notebook and really listen!
- Where possible, make alliances with local NGOs and community groups – they have experience of working in the area and can give you valuable advice on how to approach the community.
- Take time to understand the community structure to help you judge who should be approached and how best to do so.
- Make bonds and allies – Before you broach your research, talk about their families, bring offerings of fruit, vegetables and milk, (or other appropriate gifts), moan about the government etc.
- Value local ecological knowledge (LEK) - make it clear that their knowledge is valuable and useful, you are there to learn from them.
- Make them feel proud of their knowledge, their resources, and their community.
- Try to avoid direct questions and interviews about what really interests you, especially at first. Observe, share meals, go to events, talk to people naturally, you will get a truer picture.

Ownership

- Ensure that communities have ownership over a project right from the start.
- Ensure that your work is beneficial or useful for the local people – hire local people whenever possible, design your management activity in collaboration with the community to make sure it is relevant to them.
- Empower communities to replicate the monitoring/management/technique. Train people how to train other people.
- Give people opportunities to see, understand and interact with your research. For example, show videos or pictures of your work or species, invite people to witness what you are doing, show people

hard to see species (such as bats or crocodiles) whilst providing education to explain why you are handling them.

Maximising impact and managing expectations

- Consider developing incentives that can motivate people to change behaviours, and/or identify allies in the community who are naturally enthusiastic in the subject who can help motivate others.
- Don't rush: building trust and relationships with communities takes time.
- Manage expectations with the community: be very clear what you are aiming to achieve and in what time frame. Avoid making promises you may not be able to keep.
- Maintain a regular presence, and provide feedback about the results of your research, especially the findings that can benefit the community.
- Remain open to information from your local guides, you never know what you might learn.

Safety and social issues

- Women researchers should be aware of the social norms that may influence their ability to conduct their project safely and effectively. Make allies in the community who can introduce you and give your credibility and security.
- Eco-tourism, especially bringing people into close proximity with wild animals, can lead to exploitation of species (e.g. feeding monkeys, crocodiles for tourists). Make sure you educate wherever possible to prevent bad practices developing as a result of your activities.

4. Recommendations for Rufford

Maximise opportunities for information exchange

Participants took great advantage of every opportunity to ask questions and explore ideas with each other at the conference, hoping to enhance their own research and help others do the same. There was much enthusiasm for strengthening and expanding networks within the conservation community in Belize and Mexico and beyond, so that grantees who do not have the time or means to attend these conferences can also benefit. Three proposals were made:

Rufford forum (moderated by grantee volunteers):

- Non-member area – an open access forum for applicants wishing to consult existing grantees on technical questions of methodology or procedure. This would particularly help grassroots conservationists who may not have the academic background so useful in preparing applications.
- Existing grantees – a password-protected forum for existing grantees to discuss a range of matters including challenges and opportunities relating to their projects, and to exchange ideas and news that may be of interest to other researchers in their field.

Rufford social networks (moderated by grantee volunteers):

Participants expressed great interest in setting up Facebook groups of RSG grantees in order to share ideas and experiences, make new connections and collaborations with other conservationists, and have a space to potentially share resources and skills. These could be within country or region (e.g. Mexico or Central America), or by research area (e.g. climate research, forest ecology). Volunteer grantee administrators

would manage the groups, they would just need lists of grantee names for region or research area, and to discuss permission to use the Rufford logo.

It was also suggested that Rufford explicitly asks for personal email address as well as institutional email address, as the latter expires as soon as the grantee moves on and can make them hard to trace. Facebook names should also be gathered in addition to Twitter handles.

Mentorship programme:

This conference allowed a useful interchange of ideas and experience between grant recipients, especially from those who had been awarded booster grants to those on their first. All participants strongly supported the creation of a mentorship scheme that could be offered to new grantees working on their first project.

Rufford would hold a list of volunteer mentors who have achieved two or more RSG grants (or perhaps one RSG grant and several grants from other sources) and who would agree to guide one or more grantees through the challenges of their first project. Willingness to participate in the mentor scheme could be gathered during the application process for the booster grants. Services could include email discussions, video calls, critique of applications and sharing of successful proposals.

Grantee support and feedback

Extend applications for masters students:

Several grantees expressed interest in Rufford extending application deadlines for masters students, who are often still in the process of analysing and writing up results when the time to apply for a follow-up funding comes around.

Evaluation for post-project feedback:

Several grantees expressed interest in hearing feedback from Rufford upon completion of a project. This could include what Rufford particularly liked about their work, and what they could have done better.

Rufford could also give advice about how grantees could better represent the organisation on its behalf.

The conference achieved the overarching goal of enabling Rufford grantees from Belize and Mexico to exchange experiences and ideas, and to build new relationships which are likely to lead to future collaborations, as well as improving the sharing of information, ideas and resources in the region and beyond. Going forward, grantees are highly motivated to maintain the flow of ideas and information with a greater pool of Rufford grantees via a Rufford forum, social networks and a grantee mentoring programme.



Figure 4. The participants on an excursion to the Community Baboon Sanctuary in Belize.



Figure 5. Participants on a wildlife walk at the Tropical Education Centre with Monkey Bay guide Justin Wiltshire.

5. Appendices

6.1 List of attendees

Surname, First name	Organisation	Project title	Email
Arriaga-Jiménez, Alfonsina	INECOL, A.C.	Diversity of dung beetles in Oaxaca	ponchis.ariaga@gmail.com
Baumann, Justin H.	University of North Carolina	Impacts of climate change on near shore and marginal reef environments	baumannj@live.unc.edu j.baumann3@gmail.com
Cabrera-Toledo, Dánae	Universidad de Guadalajara	Population ecology for conservation of key species of the Tehuacán-Cuicatlán valley: Merging scientific knowledge with sustainable management options	danae@toledo@gmail.com
Garcia Flores, Juana	Universidad Nacional Autónoma de México	Mayan community knowledge for the conservation and restoration of forest systems in Tabasco, Mexico.	jugaf8@gmail.com
Lear, Kristen Marie	Integrative Conservation, University of Georgia	Building local capacity for conserving the endangered Mexican long-nosed bat and its habitat through community bat-friendly agave management in northeast Mexico	klear@uga.edu
Martinez Serena, Abigail	Universidad Nacional Autónoma de México	Assessment of aerial insectivorous bats in oil palm plantations (<i>Elaeis guineensis</i>) at the Selva Lacandona, Chiapas, Mexico	serena13@ciencias.unam.mx
Reyna-Hurtado, Rafael	El Colegio de la Frontera Sur ECOSUR	Endangered ungulates of the Maya Forest, ten years of research	rafaelcalakmul@gmail.com rreyna@ecosur.mx
Rose, Vincent	American Crocodile Education Sanctuary	American crocodile (<i>Crocodylus acutus</i>) population distribution and habitat viability assessments for crocodile conservation efforts in Ambergris Caye, Belize	vrcroc@comcast.net
Rousso, Stephanie	Alianza Keloni A.C	Building capacity for a community-based marine turtle conservation model	Stephanie@ProFaunaBaja.org
Suchley, Adam	Universidad Nacional Autónoma de México	Do marine protected areas benefit coral communities in the Mexican Caribbean?	adamsuchley@hotmail.com
Takahiro Ruiz Sakamoto, Antonio	Universidad Autónoma De Baja California Sur	Movements, residency and spatial utilization of the giant manta ray, (<i>Manta birostris</i>), in Bahía de	ruizsakamoto@gmail.com

		Banderas, Mexico.	
Uribe Rivera, Minerva	Universidad Autónoma de Baja California	Guidelines for the evaluation and impact mitigation of wind farms on bats at Mexico	minerva.uribe@uabc.edu.mx
Valdés-Bérriz, Maripaula	Universidad Nacional Autónoma de México	Effect of seed dispersal by small bats on germination and seedling survival of the Maya nut (<i>Brosimum alicastrum</i>)	maripaulavb@yahoo.com
Gardner, Louise	Blue Ventures	Facilitator	louise@blueventures.org , louisedjasper@gmail.com
Cole, Josh	Rufford Small Grants Foundation	Grants Director	josh@rufford.org

6.2 Conference schedule



Check in - Sunday 12 November

12:00 – 20:00	Arrival and check in at Monkey Bay Wildlife Sanctuary
18:00 – 19:00	Dinner (restaurant)

Day 1: Monday 13 November

08:00 – 08:45	Breakfast (restaurant)	
08:45 – 09:15	Registration	
09:15 – 10:00	Welcome and introductions	
10:00 – 10:30	Coffee break and conference photograph	
10:30 – 12:15	Grantee presentations	
	Baumann, Justin H.	Impact of climate change on coral reefs: Coral acclimation on the Belize Mesoamerican Barrier Reef System
	Bérriz, Maripaula	Effect of seed dispersal by small bats on germination and seedling survival of the Maya nut tree (<i>Brosimum alicastrum</i>)
	Suchley, Adam	American crocodile, <i>Crocodylus acutus</i> , population distribution and habitat viability assessments for crocodile conservation efforts in Ambergris Caye, Belize
	Flores, Juana G.	Mayan community knowledge for the conservation and restoration of forest systems in Tabasco, Mexico
12:15 – 13:45	Lunch and networking	
13:45 – 15:30	Grantee presentations	
	Jiménez, Alfonsina A.	Diversity of dung beetles in high mountains of Oaxaca
	Rose, Vincent	American crocodile, <i>Crocodylus acutus</i> , population distribution and habitat viability assessments for crocodile conservation efforts in Ambergris Caye, Belize
	Lear, Kristen M.	Building local capacity for conserving the endangered Mexican long-nosed bat and its habitat through community bat-friendly agave management in northeast Mexico
	Rivera, Minerva A. U.	Guidelines for the evaluation and impact mitigation of wind farms on bats in Mexico
15:30 – 16:00	Coffee break	
16:00 – 17:30	Group session: Sharing experiences in conservation	An opportunity to discuss the successes, opportunities and challenges faced whilst working on your RSG funded projects
18:00	Dinner	


Day 2:Tuesday 14 November

08:00	Breakfast	
09:00 – 09:15	Recap	
09:15 – 10:00	Grantee presentations	
	Reyna-Hurtado, Rafael	Endangered ungulates of the Maya Forest: Ten years of research
	Roussos, Stephanie	Building capacity for a community-based marine turtle conservation model
10:00 – 10:30	Coffee break	
10:30 – 12:00	Grantee presentations	
	Sakamoto, Antonio T. R.	Movements, residency and spatial utilization of the giant manta (<i>Manta birostris</i>) in Bahia de Banderas, Mexico.
	Serena, Abigail M.	Assessment of aerial insectivorous bats in oil palm plantations (<i>Elaeis guineensis</i>) at the Selva Lacandona, Chiapas, Mexico
	Cabrera-Toledo, Dánae	Population ecology for conservation of key species of the Tehuacán-Cuicatlán valley: Merging scientific knowledge with sustainable management options
12:00 – 13:00	Lunch	
13:00 – 17:30	Fieldtrip	Visit to Community Baboon Sanctuary
17:30	Personal time	
18:00	Dinner	

Day 3:Wednesday 15 November

06:30 – 08:30	Bird and wildlife walk (optional)	
08:00 – 09:00	Breakfast	
09:00 – 10:15	Group Session II	Discussion about challenges, and recommendations for Rufford.
10:15 – 10:30	Break	
10:30 – 12:00	Evaluation and closing address	
12:00	Lunch and departure	

6.3 Presentation abstracts

Diversity of dung beetles in Oaxaca

Alfonsina Arriaga-Jiménez

Two mountains in Oaxaca, Mexico were sampled in order to find dung beetles. One of them is considered a sacred mountain for the communities living around, while the other one lies near Oaxaca City and has an ecotourism project which has preserved the forest and the fauna impeccably. The Zempoaltépetl is a mountain where the Mixe people carry their offerings for Kondoy (the good god). During the field work, they found a great biodiversity of dung beetles on both mountains, and at least one new species for science was discovered. Alfonsina also joined in the customs of the Mixes (marriage, offerings and ceremonies) in order to be able to discover the biodiversity of their mountains. They also observed the impact of biodiversity loss upon their language, noting the loss of words for different native species.

Impact of climate change on coral reefs: coral acclimation on the Belize Mesoamerican Barrier Reef System

Justin H. Bauman

Justin studies the impacts of climate change on coral reefs in Belize, with a particular interest in understanding the physiological differences between near shore corals and corals on the main reef structure. Through surveys, molecular genetics, coral coring, and a tank experiment that is about to begin Justin and his colleagues have learned that near shore reefs harbour less diversity but that some coral species are able to survive in these warmer and more stressful environments. He is in the process of understanding how and why this is possible at the physiological level.

Population Ecology for conservation of key species of the Tehuacán-Cuicatlán valley: Merging scientific knowledge with sustainable management options.

Dánae Cabrera-Toledo

Dánae explained how the ecological data of endemic plants is useful as a management guide of natural resources in the region. She described the Tehuacán-Cuicatlán valley, then explained how she gathered the population ecological data, presented the most relevant results and the usefulness of this information in the design of in situ management strategies. Specifically, genetic diversity and population structure parameters will help to define management units by the identification of demographic trends of plant populations and by the recognition of populations with high genetic diversity as seed sources for reforestation plans. She explained how she will try to implement management strategies through a workshop as part of local community activities. Dánae concluded with some unforeseen difficulties that arose during the project and how these represent challenges for the future.

Mayan community knowledge for the conservation and restoration of forest systems in Tabasco, Mexico

Juana García Flores

Mexico has a rich ancestral tradition in the medicinal practices of its flora. This project concerns the conservation and restoration of forest systems with a focus on trees with important medicinal uses. The populations of several species of tree used by the Mayan communities of southeast Mexico have declined due to the overexploitation of this resource, which is also leading to the loss of traditional knowledge. The

transmission of community knowledge of medicinal trees will revalue the use of these resources, used by generations for the treatment of recurrent illnesses, as well as to identify species of social and ecological importance for reproduction and reintroduction in degraded areas. Additionally, it will encourage Mayan communities to continue restoration and conservation practices of the tropical forest.

Building local capacity for conserving the endangered Mexican long-nosed bat and its habitat through community bat-friendly agave management in northeast Mexico**Kristen M. Lear**

Kristen presented the key activities and results from her project on conserving the endangered Mexican long-nosed bat (*Leptonycteris nivalis*) in northeast Mexico. The main goal was to begin understanding where and how to implement 'bat-friendly' agave management programs. They used an integrative approach that combined natural and social sciences to identify which areas are most critical for the bats (through foraging studies and agave surveys) and to determine which communities are most open to adopting bat-friendly practices (through key informant interviews). Preliminary results from the ecological studies suggest that agaves should be planted in clusters in bat-friendly management programs. The results of the community studies show that each community has different social, political, and economic contexts, highlighting the need for locally-tailored approaches to promoting bat-friendly practices. Ultimately, these results will inform the development and implementation of bat-friendly agave management programs to help conserve the endangered Mexican long-nosed bat.

Endangered ungulates of the Maya Forest: Ten years of research**Rafael Reyna-Hurtado**

Rafael described the long-term study he is conducting on the relationship of wildlife with ephemeral water-ponds in the semi-dry forest of the Maya Forest in southern Mexico with the great support of Rufford Small Grant Program. He focussed on two endangered ungulate species, the white-lipped peccary and the Baird's tapir. These two species constrain their movements to the water ponds and their survival depends on water availability. He is investigating movements through the use of radio-telemetry and population dynamics with the use of camera traps in the water ponds. These species depend strongly on these water bodies and groups of white-lipped peccary have travelled 17 km to reach some of these. Tapir also have moved 10.5 km to reach some water bodies. The Maya Forest is the stronghold of these species' survival in Mexico and Central America. The water ponds in the Maya forest should be considered wildlife sanctuaries.

American crocodile (*Crocodylus acutus*) population distribution and habitat viability assessments for crocodile conservation efforts in Ambergris Caye, Belize**Vincent Rose**

Endangered in Belize and threatened throughout their entire range, American crocodiles (*Crocodylus acutus*) are considered to be in critical need of conservation. Ongoing population distribution surveys suggest there are fewer than one-thousand non-hatchling *C. acutus* in all of Belize. In conjunction with the observed declining number of sexually mature adults, water tests revealed dangerously high levels of *Coliform* bacteria and mercury. Additionally, crocodile scute samples tested for heavy metals exhibited exceptionally high levels of aluminum. These results are inferred to be contributing elements to observed signs of illness in

crocodiles in Ambergris Caye. Regardless of these underlying environmental factors, the fact is that random senseless killings; poaching; black-market pet trading; and tragically, the intentional torturing of American crocodiles in Belize is directly proportional to the absence of enforcement of Belize's wildlife protection laws and unfortunately, genuinely contributing to the decrease in the American crocodile population in Belize.

Building capacity for a community-based sea turtle conservation model

Stephanie Rousso

In Mexico, sea turtles are well protected on paper, however, implementation of conservation strategies by government agencies is lower priority than the lucrative tourism industry. Since 2012, RSG provided funding to help develop a community-based sea turtle conservation model. Stephanie successfully developed a wildlife tourism program with local biologists and students in a high-density nesting area. Then her team tried to fight the powerful ATV tourism companies who are illegally taking hundreds of tourists per day through fragile nesting habitat, however, failed to stop the activities. Along the way, they met some diehard volunteers and expanded our efforts to remote coastal communities in the southern Baja California peninsula. Thus, this past year, they successfully formed "Sea Turtle Spotter", a citizen science program engaging tourism, sailboats, and artisan fishermen to register sea turtles from the beach to the open ocean, allowing Stephanie and her team to align with international conservation strategies.

The effect of oil palm (*Elaeis guineensis*) plantations on aerial insectivorous bats' assemblage in the Greater Lacandona ecosystem, Chiapas, Mexico

Abigail Martinez Serena

Abigail studied the effect of the oil palm (*Elaeis guineensis*) plantations on aerial insectivorous bats because they can be good indicators of habitat disturbance. Using ultrasound detectors, she obtained results that show a modification of the aerial insectivorous bats assemblage in these plantations. She found changes in composition and activity levels of bats in oil palm plantations compared to pristine areas in the Selva Lacandona, Mexico. She explained that the expansion of this crop could contribute to the habitat reduction for species with dependence on forest areas. Moreover, oil palm plantations could be another threat to species listed under Mexican laws. Her presentation included a species list, acoustics analysis methodology, ecological analysis and statistics. She also shared the difficulties she experienced during fieldwork and acoustic identification, and described the conservation implications of her project.

Movements, residency and spatial utilization of the giant manta ray (*Manta birostris*) in Bahia de Banderas, Mexico

Antonio Ruiz-Sakamoto

Mantas are an example of charismatic megafauna, threatened by human activities. Mantas have been protected from fisheries in Mexico for over a decade, but populations show no signs of recovery. Bycatch remains a serious problem and mantas throughout Bahia de Banderas show numerous signs of harmful interactions with fisheries, including entanglement in nets or fishing gear, and boat strikes, which are often fatal. Antonio and his team are developing an ecological study to understand the population dynamics of the manta in Bahia de Banderas, allowing them gather information that can be used for its conservation, using

active ultrasonic tags to follow and describe the use of habitat of the mantas of Bahia de Banderas. As result, they have gathered more than 60 hours of tracking data and the first 48-hour track of *Manta birostris*.

Do Marine Protected Areas benefit coral communities in the Mexican Caribbean?

Adam Suchley

Coral reefs are tropical biodiversity hotspots that nourish, support and protect tropical coastal human populations worldwide. However, reef ecosystems are subject to multiple simultaneous stressors. Disease outbreaks, overfishing, destructive fishing practices, intensifying recreational use and widespread coastal development threaten ecosystem integrity. Consequently, coral reefs have experienced major declines in recent decades, particularly in the Caribbean. Implementation of Marine Protected Areas (MPAs) is a common management strategy employed to combat local stressors. MPAs seek to protect corals from direct physical damage and promote fish population recovery by regulating extractive practices. Furthermore, if MPAs include a terrestrial component then by controlling coastal development they may mediate run-off driven nutrient enrichment, a key factor contributing to reef degradation. However, MPA efficacy is highly heterogeneous due to MPA design, protection level and enforcement, in addition to spatial variability, trophic dynamics and external factors. Here, Adam and his team evaluated the effectiveness of MPAs and complete No Take Zones in protecting Mexican Caribbean coral communities. In 2016 they surveyed benthic and fish communities at 49 fore reef sites. They found that mean coral and macroalgal cover were not significantly affected by level of protection. However, coral cover was related to herbivorous fish biomass and fleshy macroalgal cover suggesting that effective fish protection can enhance herbivory, suppressing macroalgae and reducing benthic competition with corals. They also found that local anthropogenic threats suppressed coral cover, likely due to the lack of regulation of substantial coastal development. While MPA deficiencies in directly tackling the detrimental impacts of global climate change are well-documented, our results suggest that marine protection has a role to play in protecting coral reefs and maintaining ecosystem function under global change.

Guidelines for the evaluation and impact mitigation of wind farms on bats in Mexico

Minerva Uribe-Rivera

Wind energy projects in Mexico are legally regulated, however there are no specific guidelines for impact assessment on bats. Additionally, some areas like Baja California lack of information about composition and size of bat populations which is necessary to determine the real impact of wind projects on this mammals. A literature review of international guidelines for installation and operation of wind farms was made. Results were evaluated by experts in wind farms and bats of the United States Geological Survey and Bat Conservation International to adjust the recommendations for wind farms in Mexico. Additionally, we monitored bats at La Rumorosa wind farm during 2015 to 2016, to adapt the proposal to Baja California. The present work constitutes the first proposal for evaluating and mitigating the impact of wind farms on bats of Baja California, however it includes general guidelines that can be applied at national level in Mexico.

Effect of seed dispersal by small bats on germination and seedling survival of the Maya nut (*Brosimum alicastrum*)**Maripaula Valdes-Bérrez**

Although large seed dispersal is thought to be limited to larger animals, it is well documented that small bats disperse many large seeded species in tropical forests. Maripaula evaluated the effect of seed dispersal by bats to tents and other nocturnal feeding roosts on germination and seedling survival of *Brosimum alicastrum*. Dispersal to tents and feeding roosts increased germination, which was not significantly affected by seed density. On the other hand, initial seedling density was the most important factor affecting final seedling survival. Dispersal seemed to slow down the rate of seedling mortality over 10 months under nocturnal feeding roost, but not under tents. Finally, the effect of predation after 10 months enhanced evenness in the distribution of established seedlings over distance. These small and agile mammals are effective dispersers of large seeds as they increase germination and early seedling survival probabilities, even in aggregations under feeding roosts and tents.